The Final Environmental Impact Statement (FEIS) For Training Range and Garrison Support Facilities Construction and Operation

Fort Stewart, Georgia

Volume I

FINAL ENVIRONMENTAL IMPACT STATEMENT

FOR TRAINING RANGE AND GARRISON SUPPORT FACILITIES

CONSTRUCTION AND OPERATION

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Acronyms and Abbreviations

10/25m FR	10-Meter/25-Meter Firing Range
ACHP	Advisory Council on Historic Preservation
ACM	Asbestos-Containing Materials
ACUB	Army Compatible Use Buffer
AEC	Army Environmental Command
AIA	Artillery Impact Area
AIRFA	American Indian Religious Freedom Act
APE	Area of Potential Effect
AR	Army Regulation
ARPA	Archaeological Resources Protection Act
ASL	Above Sea Level
AST	Aboveground Storage Tank
BA	Biological Assessment
BCT	Brigade Combat Team
BMP	Best Management Practices
BO	Biological Opinion
BCRC	Base Closure and Realignment Commission
CA	Cooperating Agency
CAA	Clean Air Act
CAB	Combat Aviation Brigade
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CLFR	Convoy Live Fire Range
CMETL	Core Mission Essential Task List
CPQC	Combat Pistol Qualification Course
CRM	Cultural Resources Management
CWA	Clean Water Act
DA	Department of the Army
DES	Directorate of Emergency Services
DMETL	Directed Mission Essential Task List
DMPTR	Digital Multipurpose Training Range
DMWR	Directorate of Morale, Welfare, and Recreation
DNL	Day-Night Sound Level
DNR	Department of Natural Resources
DOT	Department of Transportation (*State of Georgia)*
DPTMS	Directorate of Planning, Training, Mobilization, and Security
DPW	Directorate of Public Works
DRM	Directorate of Resource Management
EA	Environmental Assessment
EAAF	Evans Army Airfield
EIS	Environmental Impact Statement
EN BN	Engineer Battalion

EOD	Unexploded Ordnance Detachment
EPA	Environmental Protection Agency
EPD	Environmental Protection Division (*State of Georgia*)
ESA	Endangered Species Act
ESCA	Erosion and Sediment Control Act
ESPC Plan	Erosion, Sedimentation, and Pollution Control Plan
FFS	Frosted Flatwoods Salamander
FHA	Federal Highway Administration
FMR	Fire and Movement Range
FR	Federal Register
FS	Fort Stewart
FTA	Federal Transit Administration
FY	Fiscal Year
FYDP	Future Years Development Plan
GA	Georgia
GDPR	Global Defense Posture Realignment
GFC	Georgia Forestry Commission
GHG	Greenhouse Gas
GIS	Geographic Information System
GT	Gopher Tortoise
GTA	Grow the Army
HAAF	Hunter Army Airfield
HAMPO	Hinesville Area Metropolitan Planning Office
HAP	Hazardous Air Pollutants
HBCT	Heavy Brigade Combat Team
HMA	Hardwood Management Area
HQDA	Headquarters Department of the Army
HWMP	Hazardous Waste Management Plan
IBCT	Infantry Brigade Combat Team
ICRMP	Integrated Cultural Resources Management Plan
ICUZ	Installation Compatible Use Zone
IDG	Installation Design Guide
IED	Improvised Explosive Device
IENMP	Installation Environmental Noise Management Program
INRMP	Integrated Natural Resources Management Plan
IPBC	Infantry Platoon Battle Course
ISBC	Infantry Squad Battle Course
ITAM	Integrated Training Area Management
IWFMP	Integrated Wildland Fire Management Plan
JD	Jurisdictional Determination
JLUS	Joint Land Use Study
LAS	Land Application Site
LCBOE	Liberty County Board of Education
LEED	Leadership in Energy and Environmental Design
LID	Low Impact Development
LOS	Line of Sight

LRAM	Land Rehabilitation and Maintenance
LRTP	Long-Range Transportation Plan
LUPZ	Land Use Planning Zone
MAT	Moving Armor Target
METL	Mission Essential Task List
MIT	Moving Infantry Target
MMEP	Mitigation, Monitoring, and Enforcement Plan
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MOUT	Military Operations on Urbanized Terrain
MPO	Metropolitan Planning Organization
MS4	Municipal Separate Storm Sewer System
MSA	Metropolitan Statistical Area
MTBA	Migratory Bird Treaty Act
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOA	Notice of Availability
NOI	Notice of Intent
NOV	Notice of Violation
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NRMU	Natural Resources Management Unit
NSPS	New Source Performance Standards
NWI	National Wetlands Inventory
NWR	Notice of Weekly Receipts
OCGA	Official Code of Georgia
OSHA	Occupational Safety and Health Administration
P2	Pollution Prevention
PA	Programmatic Agreement
PCB	Polychlorinated Biphenyl
POL	Petroleum, Oil, and Lubricants
PPP	Public Participation Plan
PPRFFA	Past, Present, and Reasonably Foreseeable Future Actions
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RCW	Red-Cockaded Woodpecker
ROD	Record of Decision
ROI	Region of Influence
RTLA	Range and Training Lands Assessment
RTLP	Range and Training Land Program
SA	Small Arms
SAIA	Small Arms Impact Area
SAP	Satellite Accumulation Point

SAT	Stationary Armor Target
SB	Sustainment Brigade
SBV	Stream Buffer Variance
SDWA	Safe Drinking Water Act
SDZ	Surface Danger Zone
SHPO	State Historic Preservation Office
SIT	Stationary Infantry Target
SMS	Sustainability Management System
SOP	Standard Operating Procedure
SPCC	Spill Prevention Control and Countermeasure
SWCC	Soil and Water Conservation Commission
SWMU	Solid Waste Management Unit
SWP3	Stormwater Pollution Prevention Plan
TA	Training Area
TES	Threatened and/or Endandered Species
TIP	Transportation Improvement Program
TLS	Threshold Level of Significance
TMDL	Total Maximum Daily Load
UAVS	Unmanned Aerial Vehicle System
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
USGBC	U.S. Green Building Council
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
WAAF	Wright Army Airfield
WQA	Water Quality Act
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

ES 1. INSTALLATION SETTING AND MISSION

Fort Stewart, located in southeastern Georgia, is the largest Army Installation in area east of the Mississippi River. It encompasses nearly 280,000 acres of land located in parts of Liberty, Long, Bryan, Evans, and Tattnall counties. Fort Stewart plays a significant role in supporting the Army's mission and is an invaluable military readiness training platform. The Army's mission is to fight and win the nations wars, respond to national security threats, and promote peace. The Army does this by providing Troops trained, organized, and equipped to provide rapid and sustained military operations, from peacekeeping and security operations to high intensity military conflicts. To support the Army's mission, Fort Stewart must possess the infrastructure and facilities necessary to support the military training occurring there and support the quality of life of the Soldiers and their Families.

ES 2. PURPOSE AND NEED

The Army needs to build, update, and operate facilities and ranges on Fort Stewart to support its Soldiers and ensure they are proficiently trained across the full spectrum of military operations. All the projects analyzed in this document are common to both Alternatives B and C, and divided into two categories: training range construction and improvement projects and Garrison support projects.

Fort Stewart needs additional facilities to support an (as-yet undetermined) Engineer Battalion (EN BN) and the Sky Warrior Unit's Unmanned Aerial Vehicle System. The EN BN is a combat support unit that is capable of providing combat units of the 3rd Infantry Division with additional engineering and construction capabilities. The Sky Warrior Unit uses unmanned aerial systems to enhance reconnaissance and surveillance capabilities of combat units. Both of these units provide critical support functions to support the Army's Mission. These units will not have adequate facilities when they arrive.

Fort Stewart is also in need of new ranges to support Soldier training capacity and range modernization. Current ranges and training lands on Fort Stewart have reached or exceeded their capacity and accommodating training requirements of units on current ranges and training lands is challenging. The construction of the Multipurpose Machine Gun Range, Modified Record Fire Ranges (one in FY11 and one in FY13), Qualification Training Range, Combat Pistol Qualification Range, Fire and Movement Range, and 10/25 meter Zero Range will address the Army's shortfalls in capacity at Fort Stewart.

The Army has also identified new training range needs and requirements to better prepare its forces for upcoming training missions. Some modernization efforts include the ability to provide Soldiers with immediate critique of training activities following training events. The construction of the Infantry Platoon Battle Course, Infantry Squad Battle Course, Digital Multipurpose Training Range, Known Distance Range, and Convoy Live Fire Range will provide Fort Stewart with an upgraded ability to train its Soldiers.

This Final Environmental Impact Statement (Final EIS) evaluates the potential environmental and socioeconomic impacts on Fort Stewart and in the communities around Fort Stewart that are reasonably foreseeable should the Army construct all the projects associated with the Proposed Action. Specifically, this Final EIS looked at and analyzed:

- the past, current, and anticipated future military training conducted on Fort Stewart;
- the known range construction and Garrison support projects programmed by the Army to be built on Fort Stewart between 2011 and 2014;
- the direct and indirect environmental and socioeconomic impacts these projects may have on Fort Stewart and in surrounding communities;
- the cumulative environmental and socioeconomic impacts these projects may have on Fort Stewart and in surrounding communities when added to past projects and reasonably foreseeable future projects on Fort Stewart or in the local communities; and
- methods to avoid, minimize, and/or offset the direct, indirect, and cumulative impacts on environmental and socioeconomic resources caused during construction, by the use of new facilities, and the amount of military training conducted on Fort Stewart.

ES.3 DECISIONS TO BE MADE

This Final EIS describes the potential environmental and socioeconomic impacts of constructing and operating the ranges and other facilities of the Proposed Action, evaluates whether these impacts will be significant, and identifies mitigation measures, to help the Army make an informed decision. For each environmental resource analyzed in this Final EIS, a threshold level of significance and region of influence is defined. The use of the term "significant" (and derivations thereof) in this document is consistent with the definition and guidelines in the Council on Environmental Quality (CEQ) regulations (40 CFR 1508.27), which require consideration of both the context and intensity of impacts. In addition, this Final EIS identifies measures that will avoid, minimize, or compensate for adverse effects.

For the projects proposed, as may be applicable to the specific project, the Army has initiated consultation with the appropriate regulatory agencies such as the U.S. Fish and Wildlife Service, Georgia State Historic Preservation Office, U.S. Army Corps of Engineers-Regulatory Branch (Wetlands) and such consultations are proceeding in conjunction with this ongoing National Environmental Policy Act (NEPA) process.

ES.4 ALTERNATIVE A: NO ACTION

The No Action Alternative consists of continuing the current mission and support activities at Fort Stewart, using existing or previously programmed ranges and facilities. Inclusion of the No-Action Alternative is required by the Council on Environmental Quality (CEQ) regulations and is the benchmark against which the environmental impacts of the action alternatives are evaluated. Maintenance and repair of Fort Stewart's existing infrastructure would continue and Fort Stewart will continue to use its land and airspace training resources as it does currently. Construction proposed under the action alternatives (B and C) would not occur. The No-Action Alternative specifically consists of the following:

- Army Transformation, Army Modularity, Base Closure and Realignment Commission (BCRC), GDPR, and GTA actions are occurring, under which Fort Stewart is receiving relocated units;
- Training on existing ranges and established maneuver areas, plus construction and use of new ranges for which NEPA is complete;
- Garrison construction for which NEPA is complete;
- Minor Fort Stewart road improvements (intersection improvements, signal replacement, new signage, etc.) for which NEPA is complete or in process; and
- Continuing Fort Stewart's management plans (such as the Integrated Natural Resources Management Plan, etc.).

ES.5 ALTERNATIVE B: CONSTRUCT FACILITIES AT PREFERRED SITES

Under Alternative B, the Army would construct, operate, and maintain the projects as indicated on Figure ES-1 at the sites preferred by the Army for operational reasons, while avoiding and mitigating impacts to the environment.

ES.6 ALTERNATIVE C: CONSTRUCT FACILITIES AT ALTERNATE LOCATIONS

Alternative C differs from Alternative B only in the siting of the projects, as indicated on Figure ES-2. Alternative C is not preferred by the Army because it does not allow the Army to construct, operate, and maintain the ranges and Garrison support facilities at the sites currently preferred by the Army for operational and environmental reasons, but which are nonetheless feasible.

ES.6 STAKEHOLDER OUTREACH

Fort Stewart has a long-standing program of outreach to stakeholders with interest in or affected by the Installation's activities, as well as governmental agencies that have jurisdiction to issue approvals, authorizations, or permits for Installation projects. Stakeholder outreach was initiated

for this EIS in early 2009 via publication of its Notice of Intent in the Federal Register and local media sources.

ES.7 PUBLIC INVOLVEMENT

On April 3, 2009, the Department of the Army issued a Notice of Intent (NOI) to prepare an EIS at Fort Stewart, Georgia, in the Federal Register (FR) (74 FR 15257) and local newspapers (*Savannah Morning News*, *Coastal Courier*, and *The Frontline*). Fort Stewart also mailed copies of the NOI (including the notice of public scoping meetings) to local, county, state, Federal, and Tribal representatives, as well as other interested parties (such as local community organizations). The NOI indicated that the EIS would analyze the potential effects associated with range construction, Garrison expansion, the expansion of Georgia Highway 144 East, and the Georgia Highway 144 Bypass. The scope was later reduced to eliminate Garrison expansion and the Georgia Highway 144 projects due to a lack of sufficient project information, level of design, or funding certainty. Public scoping meetings were also held on April 13, 2009, at the Mighty Eighth Air Force Museum in Pooler, Georgia; April 14, 2009; at the Georgia National Guard Armory in Hinesville, Georgia; and on April 16, 2009, at the Wetlands Education Center in Richmond Hill, Georgia.

The 45-day public comment period for the Draft EIS began with publication of the Notice of Availability (NOA) in the Federal Register and local media sources on April 2, 2010. Federal, state, local, and Tribal representatives, as well as other stakeholders and members of the public expressing interest in the Draft EIS, were mailed a copy of the NOA of the Draft EIS, providing information on its availability, the request for its review and comment, and details regarding the scheduled public meetings. The Draft EIS was available to the public at the start of the public comment period via the EIS webpage (www.Fortstewart-mmp-eis.com) and local libraries. The Army held three public meetings to receive comment on this Draft EIS on April 26, 2010 at the Mighty Eighth Air Force Museum in Pooler, Georgia; April 27, 2010 at the Liberty County Recreation Area in Hinesville, Georgia; and April 29, 2010 at the Richmond Hill City Center, Richmond Hill, Georgia. All comments received were considered in the preparation of the Final EIS.

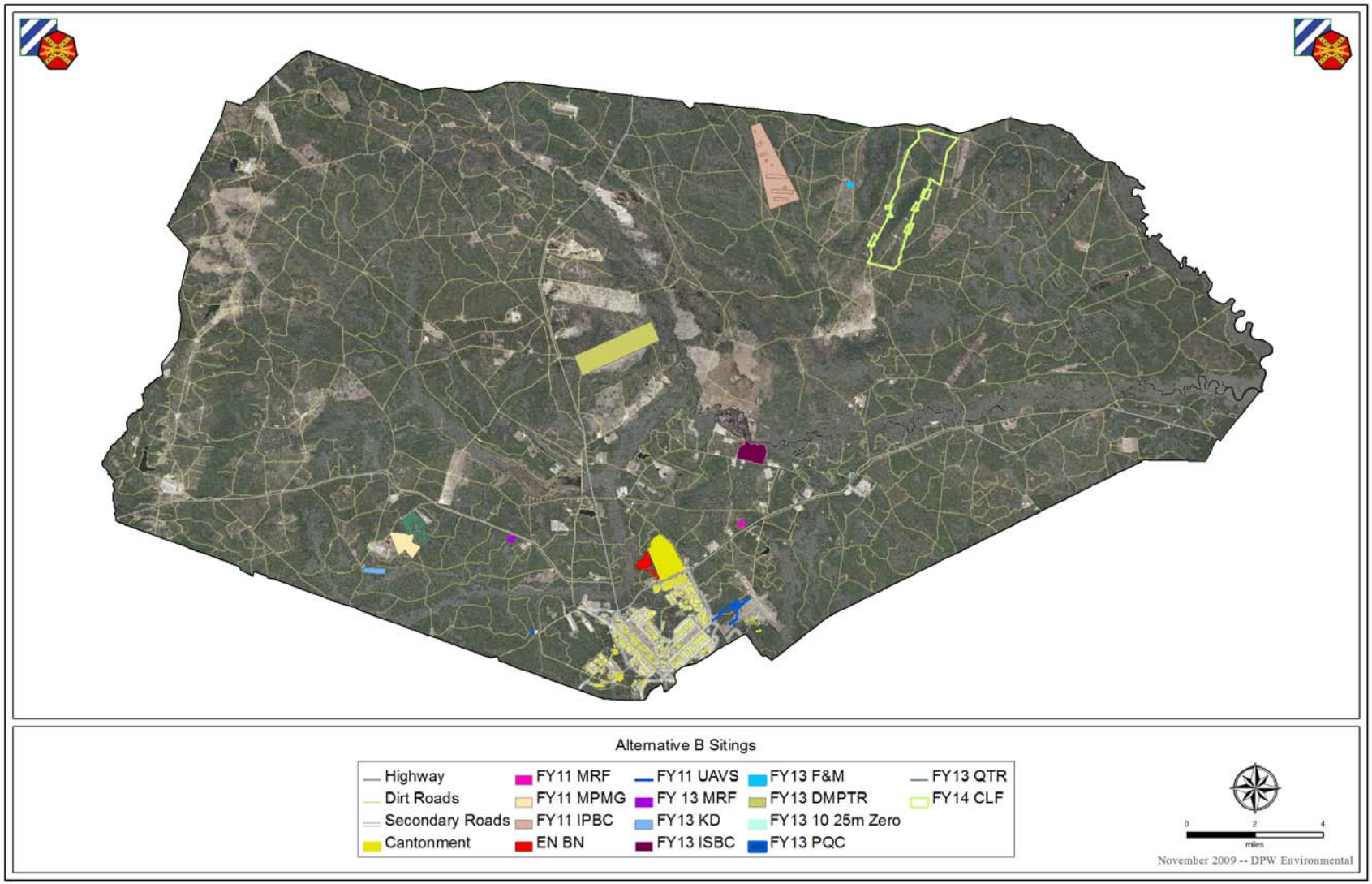


Figure ES-1: Construct and Operate at Alternative B Sitings.

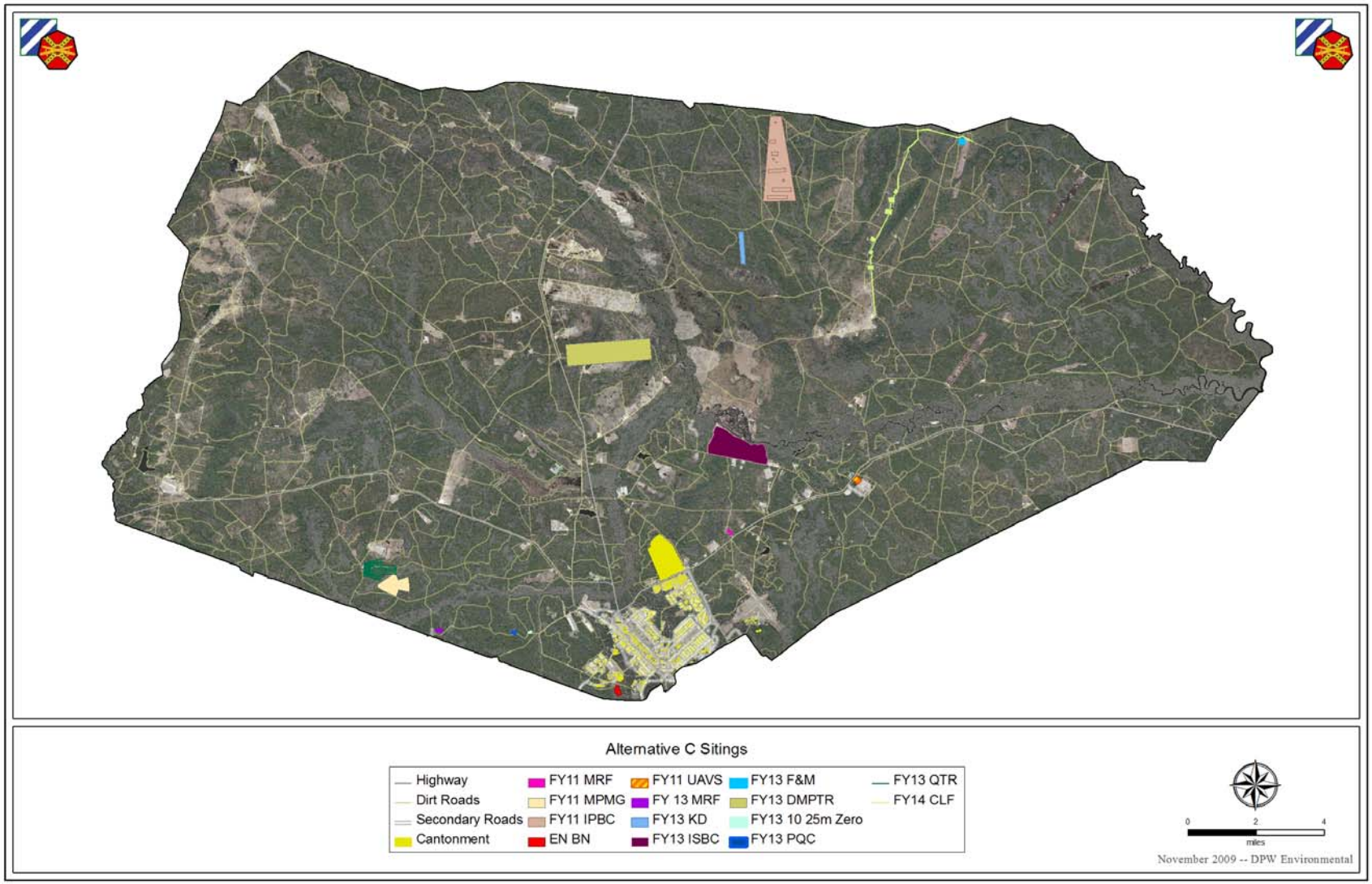


Figure ES-2: Construct and Operate Alternative C Sitings.

The NOA of the Final EIS will be published in the FR and local news media, announcing both its availability and where copies of the document may be obtained. Federal, state, local, and Tribal representatives, as well as other stakeholders and members of the public expressing interest in the Final EIS, will receive a mailed copy of the NOA. No public meetings are scheduled for this phase of the EIS process.

A final decision on the Proposed Action will be documented in a Record of Decision (ROD). The Army will issue the ROD after a 30-day waiting period following publication of the Final EIS. The NOA of the ROD will then be published in the *Federal Register* and local media. For questions regarding the Fort Stewart EIS please contact Charles Walden at (a) Directorate of Public Works Environmental Division, 1550 Frank Cochran Drive, Building 1137, Fort Stewart, Georgia 31314-4928, (b) Charles.Walden4@us.army.mil, or (c) 912-767-8642.

ES.8 ENVIRONMENTAL CONSEQUENCES

This Final EIS describes the potential environmental and socioeconomic impacts of building and utilizing training ranges and other facilities of the Proposed Action, evaluates whether these impacts will be significant, and identifies mitigation measures, to help the Army make an informed decision. For each environmental resource analyzed in this Final EIS, a threshold level of significance and region of influence will be defined. The use of the term "significant" (and derivations thereof) in this document is consistent with the definition and guidelines in the Council on Environmental Quality (CEQ) regulations (40 CFR 1508.27), which require consideration of both the context and intensity of impacts. In addition, this Final EIS identifies measures that will avoid, minimize, or compensate for adverse effects.

Implementation of either the "No Action" Alternative or the Proposed Action alternatives would result in some degree of adverse effect on most environmental resources. Table ES-1 presents a summary of the environmental and socioeconomic consequences of the alternatives analyzed in this EIS with consideration of land management and natural and cultural resource plans and programs mandated by the Army and committed to in previous NEPA documents. Mitigation measures have been proposed for those resource areas that would have the potential for

unavoidable adverse environmental impacts. Proposed mitigations can be found in Table 6-1 of the Final EIS.

Table ES-1: Summary of Environmental Effects.

Type and Intensity of Impact ○ = negligible ⊙= minor adverse ◎ = moderate adverse ● = significant adverse ✪ = beneficial			
Type of Effect	**Alternative A (No Action){xe "Alternative 1"}**	**Alternative B (Preferred){xe "Alternative 2"}**	**Alternative C {xe "Alternative 3"}{xe "No Action Alternative"}**
Soils & Geology{xe "Land Use"}			
Direct / Indirect	⊙	◎	◎
Cumulative	○ to ⊙	◎	◎
Air Quality{xe "Airspace"}			
Direct / Indirect	○	⊙	⊙
Cumulative	○ to ⊙	⊙	⊙
Water Quality & Resources (Streams, Stormwater, Floodplains)**{xe "Air Quality"}**			
Direct / Indirect	⊙	⊙	◎
Cumulative	⊙	◎	◎
Water Quality & Resources (Wetlands)**{xe "Noise"}**			
Direct / Indirect	○ to ⊙	⊙	◎
Cumulative	⊙	⊙ to ◎	◎
Biological Resources (Wildlife and Fisheries)			
Direct / Indirect	○	⊙	⊙
Cumulative	⊙	⊙	⊙
Biological Resources (Protected Species)			
Direct / Indirect	○	◎	◎
Cumulative	⊙	⊙	⊙
Biological Resources (Timber Resource Management)**{**xe "wetlands"**}**			
Direct / Indirect	○	⊙	⊙
Cumulative	⊙	◎	◎
Biological Resources (Wildland Fire Management)			
Direct / Indirect	○	⊙	⊙
Cumulative	⊙	◎	◎

Table ES-1: Summary of Environmental Effects, continued.

Type and Intensity of Impact ○ = negligible ⊙= minor adverse ◎ = moderate adverse ● = significant adverse ✪ = beneficial			
Type of Effect	**Alternative A (No Action){xe "Alternative 1"}**	**Alternative B (Preferred){xe "Alternative 2"}**	**Alternative C {xe "Alternative 3"}{xe "No Action Alternative"}**
Cultural Resources			
Direct / Indirect	○	⊙	⊙
Cumulative	○	○	○
Noise			
Direct / Indirect	○	◎	◎
Cumulative	⊙	◎	◎
Land Use{xe "Cultural Resources"}			
Direct / Indirect	○	⊙	⊙
Cumulative	○ to ⊙	⊙	⊙
Infrastructure (Utilities)**{**xe "Environmental Justice"**}**			
Direct / Indirect	○	⊙	⊙
Cumulative	○ to ⊙	○ to ⊙	○ to ⊙
Infrastructure (Transportation)			
Direct / Indirect	○	○	○
Cumulative	○ to ⊙	○ to ⊙	○ to ⊙
Safety			
Direct / Indirect	○	○	○
Cumulative	None	None	None
Hazardous & Toxic Materials and/or Wastes {xe "Hazardous and Toxic Substances"}			
Direct / Indirect	○	○	○
Cumulative	None	None	None
Socioeconomics			
Direct / Indirect	○	✪	✪
Cumulative	○	○	○

1. INTRODUCTION

This chapter will begin by providing a brief discussion of Fort Stewart's location and history, followed by a more detailed discussion of the purpose and need for the proposed action. This chapter then summarizes each of the decisions to be made by the Army, and outlines the Army's public outreach initiatives in the decision making process. The proposed action and its alternatives are discussed in Chapter 2 of this Final Environmental Impact Statement (EIS).

1.1 BACKGROUND INFORMATION ABOUT FORT STEWART

Fort Stewart, located in southeastern Georgia, is the largest Army Installation in area east of the Mississippi River. It encompasses nearly 280,000 acres of land located in parts of Liberty, Long, Bryan, Evans, and Tattnall counties (Figure 1-1). Hunter Army Airfield (HAAF) is a geographically separated component of Fort Stewart located approximately 40 miles to its east. HAAF encompasses an additional 5,400 acres of land in Chatham County, Georgia, and forms a common boundary with the City of Savannah along two sides.

Fort Stewart was established in 1940 to train Soldiers inducted into the General Infantry by Regular Army in anticipation of the United States entering World War II. The Army named the new Post Camp Stewart in honor of Daniel Stewart, a local Revolutionary War veteran and state political leader who rose to the rank of Brigadier General in the Georgia Militia. After World War II ended, the Army deactivated Camp Stewart, but reopened it four years later during the early stages of the Korean Conflict.

In 1953, the Army authorized construction of tank unit firing ranges and maneuver areas. The following year, the Post was renamed Camp Stewart Anti-Aircraft Artillery and Tank Training Center. The Army decided that Camp Stewart would play an integral role in training that force, and in 1956, the Post became a permanent Army Installation and was renamed Fort Stewart. With the activation of the 1st Brigade, 24th Infantry Division, the Post entered a new era. In June 1996, the 24th Infantry Division was reflagged the 3rd Infantry Division (Mechanized), also known as the Marne Division or "Rock of the Marne."

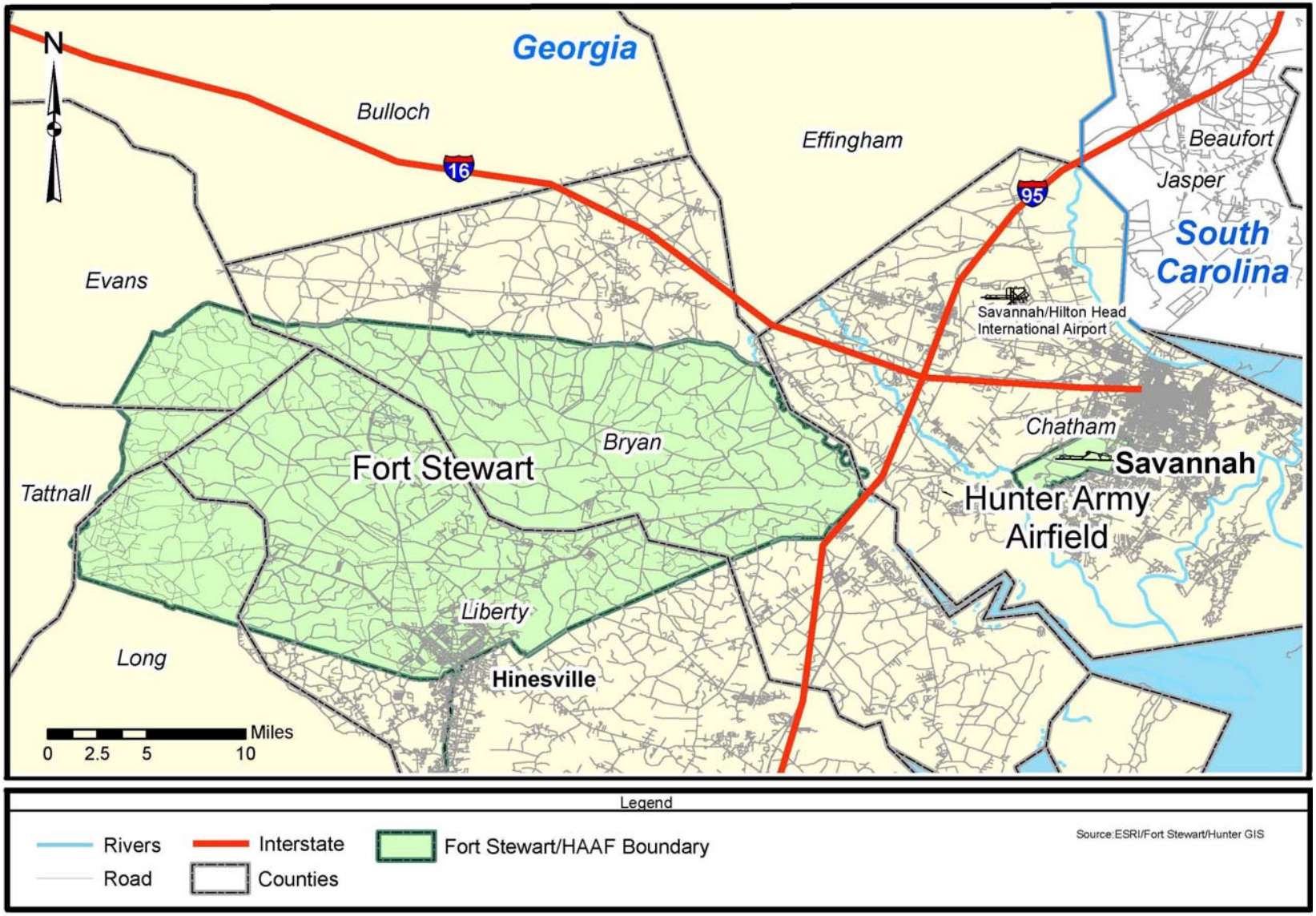


Figure 1-1: Fort Stewart and Hunter Army Airfield.

1.2 FORT STEWART'S ROLE IN THE ARMY MISSION

The Army's mission is to fight and win the nation's wars, respond to national security threats and promote peace. The Army does this by providing Troops trained, organized, and equipped to provide rapid and sustained military operations, from peacekeeping and security operations to high intensity military conflicts.

To support the Army's mission, Fort Stewart must possess the infrastructure and facilities necessary to support the military training occurring there and support the quality of life of the Soldiers and their Families. The Army projects approximately 25,000 Soldiers will be assigned to Fort Stewart once all the directives set out in the Army Transformation, Army Modularity, Global Defense Posture Realignment (GDPR), Base Closure and Realignment Commission (BCRC), and Grow the Army (GTA) initiatives involving Fort Stewart are implemented. More information regarding the current and future number of Soldiers, their Family Members, and civil service and contractor employees on Fort Stewart is in Section 3.12, Socioeconomics.

The Army units assigned to Fort Stewart routinely use its ranges and training lands to train Soldiers. The 3rd Infantry Division is by far the largest Army unit assigned to Fort Stewart, consisting of three Heavy Brigade Combat Teams (HBCTs), one Infantry Brigade Combat Team (IBCT), one Sustainment Brigade (SB), and one Combat Aviation Brigade (CAB). Although the CAB is stationed at HAAF, it is discussed in this Final EIS in relation to the impacts of the training of its resident Soldiers on Fort Stewart ranges and training lands. One HBCT of the 3rd Infantry Division is stationed at Fort Benning, Georgia, and trains there, rarely affecting Fort Stewart. The two remaining HBCTs and the IBCT stationed at Fort Stewart have different equipment, and training, maneuver, and support requirements, but each unit consists of two combined arms battalions, a reconnaissance squadron, an artillery battalion, and attached special troops and support battalions. There are several smaller units assigned to Fort Stewart that are not part of the 3rd Infantry Division, which will be discussed later in this document.

In addition to supporting the Army units assigned to Fort Stewart, two to three Army Reserve or Army National Guard units conduct their pre-deployment mobilizations on Fort Stewart each

year. A guard or reserve pre-deployment mobilization takes approximately 90 to 120 days. During each unit's pre-deployment, they use ranges and facilities on Fort Stewart as their training platform to equip their unit with the skill and competency to deploy overseas in a combat environment. Each pre-deployment mobilization involves an additional 1800 - 3000 Soldiers, depending on the unit.

1.3 PURPOSE AND NEED FOR THE PROPOSED ACTION

The Army needs to build, update, and operate military training ranges and other facilities on Fort Stewart to ensure its Soldiers are proficiently trained across the full spectrum of military operations. All the projects analyzed in this document are common to both Alternatives B and C, and divided into two categories: range construction and improvement projects and Garrison support projects. The Army incorporates sustainability principles into the planning, development, and upgrade of training ranges and maneuver areas. From the outset, site selection and range design follow sustainability principles, starting with design "charrettes" to ensure stakeholder collaboration toward optimal range design and encompassing training requirements, fiscal constraints, local characteristics and constraints, and environmental issues.

1.3.1 Purpose and Need for Garrison Support Projects

When an Army unit is not deployed (abroad), adequate Garrison facilities are required at their home station from which they can perform day-to-day administrative and command functions as well as their routine operational, training, and maintenance functions. A typical stationing action requires a Garrison to provide the new unit with a pre-determined amount office space, motorpool space, facilities for vehicle maintenance, armories for weapons, and other facilities dependent on the unit's size and mission. All such Garrison facilities currently existing on Fort Stewart or under construction are assigned to units and are being used at or above capacity.

Fort Stewart needs additional facilities to support the Sky Warrior Unit's Unmanned Aerial Vehicle System, scheduled to arrive at Fort Stewart in 2011. This unit will not have adequate facilities when it arrives. During preparation of this EIS, Fort Stewart was scheduled to receive

the 10th Engineer Battalion. As the Draft EIS neared completion, however, the move of the unit to Fort Stewart was cancelled. There is still a distinct possibility that either this unit or a similar-size unit will move to Fort Stewart in the near future; therefore, the facilities for an Engineer Battalion will continue to be analyzed in this Final EIS. For convenience, the unit receiving the facilities will simply be called the "Engineer Battalion," but it should be understood that this is being done to ensure that the Final EIS looks at the capacity of Fort Stewart to add another unit of similar size. This is necessary because of the ongoing transformation of the Army and the uncertainty of stationing decisions as the mission continues to evolve.

1.3.2 Purpose and Need for Range Construction and Improvement Projects

Of the 24,882 Soldiers who live and work on Fort Stewart, a majority belong to the 3rd Infantry Division. Other tenant units on Fort Stewart include the Non-Commissioned Officer's Academy; the 15th Air Support Operations Squadron (Air Force); the 188th Infantry Brigade; and the Test, Measurement, and Diagnostic Equipment Unit; as well as several other battalion, company, and detachment sized combat support units.

Current ranges and training lands on Fort Stewart have reached or exceeded their capacity (or throughput) and accommodating training requirements of units on current ranges and training lands is challenging. Fort Stewart is already overusing many of its ranges by exceeding standard Army planning use factors for ranges. To accommodate this shortfall, the Army conducts more training on weekends and holidays. In addition, the overuse of ranges leaves less time for the Army to access the ranges to conduct required or necessary range maintenance and environmental stewardship activities. The construction of the Multipurpose Machine Gun Range, Modified Record Fire Ranges (one in FY11 and one in FY13), Qualification Training Range, Combat Pistol Qualification Range, Fire and Movement Range, and 10/25 meter Zero Range will address the Army's shortfalls in capacity at Fort Stewart.

Over the past several years, the Army has identified new training range needs and requirements to better prepare its forces for upcoming training missions. Some modernization efforts include the ability to provide Soldiers with immediate critique of training activities following training events. The construction of the Infantry Platoon Battle Course, Infantry Squad Battle Course, Digital Multipurpose Training Range, Known Distance Range, and Convoy Live Fire Range will provide Fort Stewart with an upgraded ability to train its Soldiers.

While not able to train Soldiers to standards for full spectrum military operations, the Army has accommodated most of the deployment related training required by the 3rd Infantry Division's brigades and other tenant units station on Fort Stewart; however, this is only because the brigades have been training and deploying at different times. Should the pace of operational deployments overseas slow, severe limitations arise if the brigades are all at home station and attempting to train at the same time on current ranges and training lands.

In recent years, the Army's training program has evolved based on requirements determined from the wars in Iraq and Afghanistan. Normally, the Army trains according to standard doctrine without having a specific mission focus. These tasks are the Core Mission Essential Task List (CMETL) and comprise the recurring training requirements for each unit. When a unit is given a specific deployment mission, they receive additional, more focused training, designed to meet that specific objective; these tasks are the Directed Mission Essential Task List (DMETL). For assignments to Iraq or Afghanistan, the DMETL tasks relate to irregular warfare and stability operations.

When Soldiers on Fort Stewart return from a combat deployment, they are already designated for another combat deployment, approximately one year in the future. During this one-year period, the unit must conduct recovery operations, field new equipment, and integrate new Soldiers. This often leaves little, if any, time to train on CMETL tasks and instead results in a continued focus on DMETL tasks.

One of the more valuable and versatile CMETL tasks is the Combined Arms Live Fire Exercise (CALFEX). This trains Soldiers to respond to attacks, including how to react to improvised

explosive devices and how to respond with subsequent live fire. The CALFEX trains Soldiers for major combat operations against conventional opponents; however, this is not an operation currently occurring in Iraq or Afghanistan and, accordingly, is not a focus of training when Soldiers are at home station. Instead, the Army units focus on DMETL requirements (to be ready for deployment), delaying the CMETL requirements (such as the CALFEX). The Army will ultimately have to shift its emphasis back to training for both conventional warfare (CMETL) and major combat operations (DMETL) to ensure Soldiers are fully trained on both.

1.4 DECISIONS TO BE MADE

This Final EIS describes the potential environmental and socioeconomic impacts of constructing and operating the ranges and other facilities of the Proposed Action, evaluates whether these impacts will be significant, and identifies mitigation measures, to help the Army make an informed decision. For each environmental resource analyzed in this Final EIS, a threshold level of significance and region of influence will be defined. The use of the term "significant" (and derivations thereof) in this document is consistent with the definition and guidelines in the Council on Environmental Quality (CEQ) regulations (40 CFR 1508.27), which require consideration of both the context and intensity of impacts. In addition, this Final EIS identifies measures that will avoid, minimize, or compensate for adverse effects.

1.5 PUBLIC PARTICIPATION

The Army invites public participation in the NEPA process. Consideration of the views and information of all interested people promotes open communication and enables better decision making. All agencies, organizations, and members of the public having a potential interest in the proposed action – including minority, low-income, and/or disadvantaged groups – are urged to participate in the decision-making process. The term "public" is used to describe individuals who reside in communities near the project proposal area or who might be interested or affected by the proposed action. "Stakeholders" include Federally recognized American Indian Tribes associated with the Fort Stewart area; Federal, state, and local governmental agencies with regulatory authority over the Installation (e.g., the U.S. Fish and Wildlife Service and Georgia

Environmental Protection Division); special interest groups with a charter involving environmental or military matters; and any other person that may have a particular interest in the region.

Public participation opportunities with respect to the Draft and Final EIS and decision making on the proposed actions are guided by the Department of the Army (DA) NEPA regulation, which requires the preparation and implementation of public participation plans to guide the public and stakeholder involvement process throughout the EIS process. The Installation developed a public participation plan (PPP) for the entirety of the EIS process, the purpose of which is to conduct public communications and outreach properly and most effectively.

The PPP includes a discussion of environmental resource issues that are important during the EIS process, as well as a discussion of the outreach techniques to be employed throughout the life of the proposed action. These techniques include: identification of newspapers to be utilized for public notices or media releases; types and sizes of ads most effectively utilized in newspapers; the use of other public media, such as radio or television; the number of public meetings and best locations for scoping and public hearings; availability of the Draft and Final EIS for the public; and other pertinent issues, such as the requirement for multilingual information. The PPP includes the public and internal mailing lists for the project and notification lists, as well as a discussion on use and content of the project web site. The PPP is available for review at the EIS webpage (www.Fortstewart-mmp-eis.com) and in Appendix A of all drafts of the EIS.

1.6 NOTICE OF INTENT TO PREPARE AN EIS

On April 3, 2009, the DA issued a Notice of Intent (NOI) to prepare an EIS at Fort Stewart, Georgia, in the Federal Register (FR) (74 FR 15257) and local newspapers (*Savannah Morning News, Coastal Courier,* and *The Frontline*). Copies of the NOI's publication in these Federal and local media sources are in Appendix A. Fort Stewart also mailed copies of the NOI (including the notice of public scoping meetings) to local, county, state, Federal, and Tribal representatives, as well as other interested parties (such as local community organizations).

The NOI indicated that the Draft EIS would analyze the potential effects associated with range construction, Garrison area expansion, the expansion of Georgia Highway 144 East, and the Georgia Highway 144 Bypass. The scope of projects analyzed was later reduced to eliminate Garrison area expansion and the Georgia Highway 144 projects due to a lack of sufficient project information, level of design, or funding certainty. The Draft and Final EIS, therefore, focus on training range and Garrison support construction projects, discussed in greater detail in Chapter 2.

1.7 PUBLIC SCOPING MEETINGS

Scoping is an early and open process for (1) actively bringing the public into the decision-making process, (2) determining the scope of issues to be addressed, and (3) identifying the major issues related to a proposed action (40 CFR 1501.7). CEQ and DA NEPA regulations require a scoping process in the development of an EIS. The scoping period began on April 3, 2009, with the announcement of the NOI and Public Scoping Meetings.

The scoping meetings were held on April 13, 2009, at the Mighty Eighth Air Force Museum in Pooler, Georgia; April 14, 2009; at the Georgia National Guard Armory in Hinesville, Georgia; and on April 16, 2009, at the Wetlands Education Center in Richmond Hill, Georgia. The public was informed of these meetings via the printing of the NOI and informed that comments would be accepted. They were encouraged to submit scoping comments at the meeting itself, by mailing in the handout comment forms, or by visiting the EIS webpage. Sign-in sheets and comments (both written and transcribed by the court reporter) are included in Appendix A. Comments received after the meetings or submitted via the EIS website also are included in this appendix, as are articles from local, regional, or national newspapers, radio stations, and televised broadcasts, arranged in chronological order of publication.

1.8 DRAFT EIS

The 45-day public comment period for the Draft EIS began with publication of the Notice of Availability (NOA) in the Federal Register on April 2, 2010. The NOA was also published in

local media sources. Federal, state, local, and Tribal representatives, as well as other stakeholders and members of the public expressing interest in the Draft EIS, were mailed a copy of the NOA of the Draft EIS, providing information on its availability, the request for its review and comment, and details regarding the scheduled public meetings.

The Draft EIS was available to the public via the EIS webpage (www.Fortstewart-mmp-eis.com) and local libraries. The Army held three public meetings to receive comment on this Draft EIS on April 26, 2010 at the Mighty Eighth Air Force Museum in Pooler, Georgia; April 27, 2010 at the Liberty County Recreation Area in Hinesville, Georgia; and April 29, 2010 at the Richmond Hill City Center, Richmond Hill, Georgia. Attendees were encouraged to submit comments at the meeting itself, by mailing in comment forms, or by visiting the EIS webpage. Sign-in sheets and comments (written and transcribed) are in Appendix A, as well as articles from local, regional, or national newspapers, radio stations, and televised broadcasts, arranged in chronological order of publication.

1.9 FINAL EIS

Comments received on the Draft EIS were utilized to complete the Final EIS. The NOA of the Final EIS will be published in the FR and local news media announcing its availability and where copies of the document may be obtained. Federal, state, local, and Tribal representatives, as well as other stakeholders and members of the public expressing interest in the Final EIS, will receive a mailed copy of the NOA. No public meetings are scheduled for this phase of the EIS process.

1.10 RECORD OF DECISION (ROD)

The ROD will document the Army's decision for the projects analyzed in the Final EIS. The ROD will be distributed to agencies with authority or oversight over aspects of the proposal, cooperating agencies, appropriate congressional, state, and district offices, all parties that are directly affected, and others upon request. No decision will be made on a proposed action until

30 days after EPA has published the Notice of Weekly Receipts (NWR) of the Final EIS in the FR or 90 days after the NWR of the Draft EIS, whichever is later.

1.11 COOPERATING AGENCY COORDINATION

Members of the regulatory community and Tribes (with an ancestral affiliation with Fort Stewart) were invited to serve as Cooperating Agencies (CA) in this EIS process. Invitations were made via letter; copies of all such correspondence and replies are maintained in the Administrative Record for the EIS and in Appendix A of this document. Only the U.S. Army Corps of Engineers-Regulatory Branch (Wetlands) accepted the invitation to be a CA. They are providing valuable data for development of the determination of affect to water quality and resources, such as wetlands, in this Final EIS.

2. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This Final Environmental Impact Statement (EIS) examines the potential impacts of the Fort Stewart Fiscal Year (FY) 2011-14 range and Garrison construction projects on the environmental and socioeconomic resources present on Post, in addition to their potential impacts to surrounding lands and/or local communities. Current mission impacts are discussed primarily as part of the No Action Alternative, as Fort Stewart is an active military Installation and hosts various training activities, land rehabilitation efforts, and range repairs and maintenance on a daily basis. Fort Stewart's master planning process assisted in the siting of the range and Garrison projects needed to support and improve the Fort Stewart mission accomplishment.

All proposed training range and Garrison support facilities and their alternatives are discussed in Section 2.1. The projects considered in this Final EIS were identified from Fort Stewart's future years development plan (FYDP) and will occur in FYs 11-14. The Army's FY runs from October 1 to September 30. These projects have a preferred and alternate siting. Proposed projects on the FYDP with no proposed sitings were deemed insufficiently developed for analysis, but are discussed, if applicable, in Chapter 5, Cumulative Effects, as reasonably foreseeable future actions. It should be noted, however, that funding limitations may preclude the full execution of all projects in alternatives discussed in the EIS and eventually selected as part of the Record of Decision (ROD) for this EIS. The Army will work within its programmed budget to prioritize projects and allocate funding accordingly. A brief description of each alternative is presented below.

2.1 DESCRIPTION OF THE PROPOSED ACTION

The Army has a need to construct and modernize training ranges on Fort Stewart. This need falls into two general but somewhat overlapping categories: modernization and capacity. Several range projects proposed are needed to modernize ranges to create a more realistic training environment. The other range projects proposed will increase the capacity of available ranges required to serve the number of Soldiers and using Fort Stewart as a training platform. This Final EIS analyzes the following 12 ranges: Multipurpose Machine Gun Range, Modified

Record Fire Ranges (one in FY11 and one in FY13), Qualification Training Range, Combat Pistol Qualification Range, Fire and Movement Range, 10/25 meter Zero Range, Infantry Platoon Battle Course, Infantry Squad Battle Course, Digital Multipurpose Training Range, Known Distance Range, and Convoy Live Fire Range. A full description of these ranges is in Section 2.4. With the exception of the Digital Multipurpose Training Range, all of these ranges utilize small caliber weapons and associated ammunition (cartridges with a bullet diameter, or caliber, of up to 0.75 inch). Table 2-1 presents each training range and Garrison support construction project's approximate overall footprint; details concerning associated facilities located within these footprints are in Appendix H of this Final EIS.

Table 2-1: FY 11–14 Project List.

FY	Proposed Project	Alternative	Approximate Acreage
RANGE CONSTRUCTION & OPERATIONS			
2011	Multipurpose Machine Gun Range	B & C	250
2011	Infantry Platoon Battle Course	B & C	1005
2011	Modified Record Fire Range	B & C	30
2013	Infantry Squad Battle Course	B	275
		C	705
2013	Qualification Training Range	B & C	255
2013	Digital Multipurpose Training Range	B & C	1005
2013	10 Meter / 25 Meter Zero Range	B & C	5
2013	Combat Pistol Qualification Course	B & C	5
2013	Known Distance Range	B & C	85
2013	Fire and Movement Range	B & C	15
2013	Modified Record Fire Range	B & C	30
2014	Convoy Live Fire Range	B & C	65
GARRISON CONSTRUCTION & OPERATIONS			
2011	Engineer Battalion Facilities	B	55
		C	35
2011	Sky Warrior Unmanned Aerial Systems Facilities	B	35
		C	25

Two Garrison support projects are also analyzed in this Final EIS. One involves construction of facilities to support a stationing action involving an (as-yet undetermined) unit to operate the Unmanned Aerial Vehicle System (UAVS) associated with the Sky Warrior System, prior to its arrival in fiscal year 2011. The second involves construction of facilities to support the stationing action that involved the 10th Engineer Battalion (EN BN), and now could involve a similar-size unit (as discussed in Chapter 1), referred to in this EIS as the EN BN.

The facilities required for stationing the EN BN include company operation facilities with covered hardstand, battalion headquarters with classrooms, and organizational vehicle parking. The Sky Warrior UAVS system is a remotely controlled unmanned aerial vehicle that enables the Army to engage several different weapon systems in a coordinated attack against an enemy target with accuracy and precision without placing a large number of Soldiers in harm's way. It and its unit have very specific facility requirements, including having its hangar facilities next to an airfield.

Due to Army Transformation, Army Modularity, GDPR, BCRC, and GTA initiatives, the Army needs to construct additional Garrison support facilities on Fort Stewart to support the increased number of Soldiers and Civilian Employees working there. As stated above, there are no adequate facilities on Fort Stewart to support its mission.

2.2 ALTERNATIVES

2.2.1 Alternative A: No Action

The No Action Alternative consists of continuing the current mission and support activities at Fort Stewart, using existing or previously programmed ranges and facilities. Inclusion of the No-Action Alternative is required by the Council on Environmental Quality (CEQ) regulations and is the benchmark against which the environmental impacts of the action alternatives are evaluated. Maintenance and repair of Fort Stewart's existing infrastructure would continue and Fort Stewart will continue to use its land and airspace training resources as it does currently. Construction proposed under the action alternatives (B and C) would not occur. The No-Action Alternative specifically consists of the following:

- Army Transformation, Army Modularity, BCRC, GDPR, and GTA actions are occurring, under which Fort Stewart is receiving relocated units;
- Training on existing ranges and established maneuver areas, plus construction and use of new ranges for which NEPA is complete;
- Garrison construction for which NEPA is complete;
- Minor Fort Stewart road improvements (intersection improvements, signal replacement, new signage, etc.) for which NEPA is complete or in process; and
- Continuing Fort Stewart's management plans (such as the Integrated Natural Resources Management Plan, etc.).

2.2.2 Alternative B Siting (Preferred) (Figure 2-1)

Under Alternative B, the Army would construct, operate, and maintain the projects identified in Table 2-1 and indicated on Figure 2-1 at the sites preferred by the Army for operational reasons, while avoiding and mitigating impacts to the environment.

2.2.3 Alternative C Sitings (Figure 2-2)

Alternative C differs from Alternative B only in the siting of the projects, as indicated on Figure 2-2. Alternative C is not preferred by the Army because it does not allow the Army to construct, operate, and maintain the ranges and Garrison support facilities at the sites currently preferred by the Army for operational and environmental reasons, but which are nonetheless feasible.

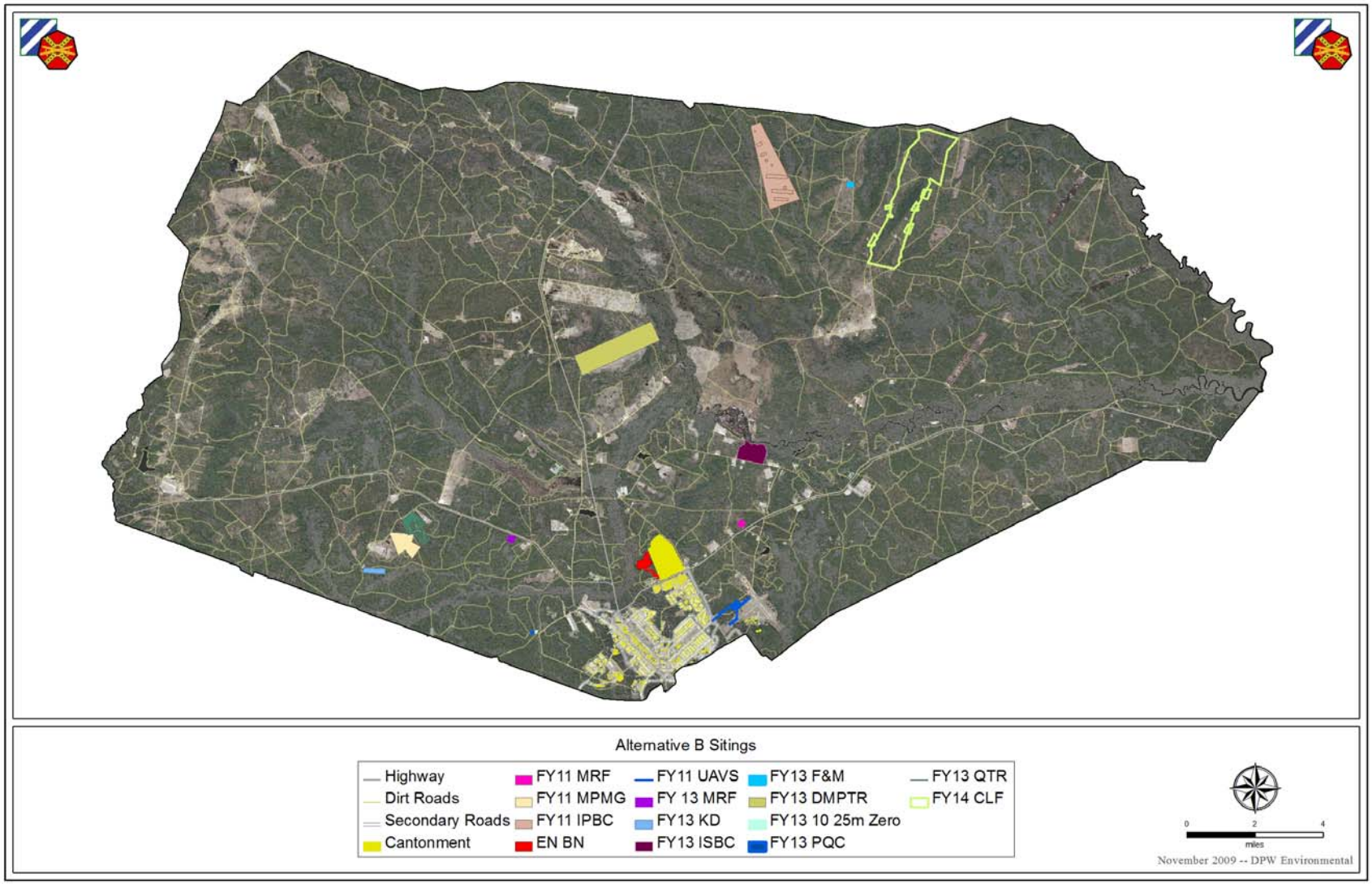


Figure 2-1: Construct and Operate at Alternatve B Sitings (Preferred).

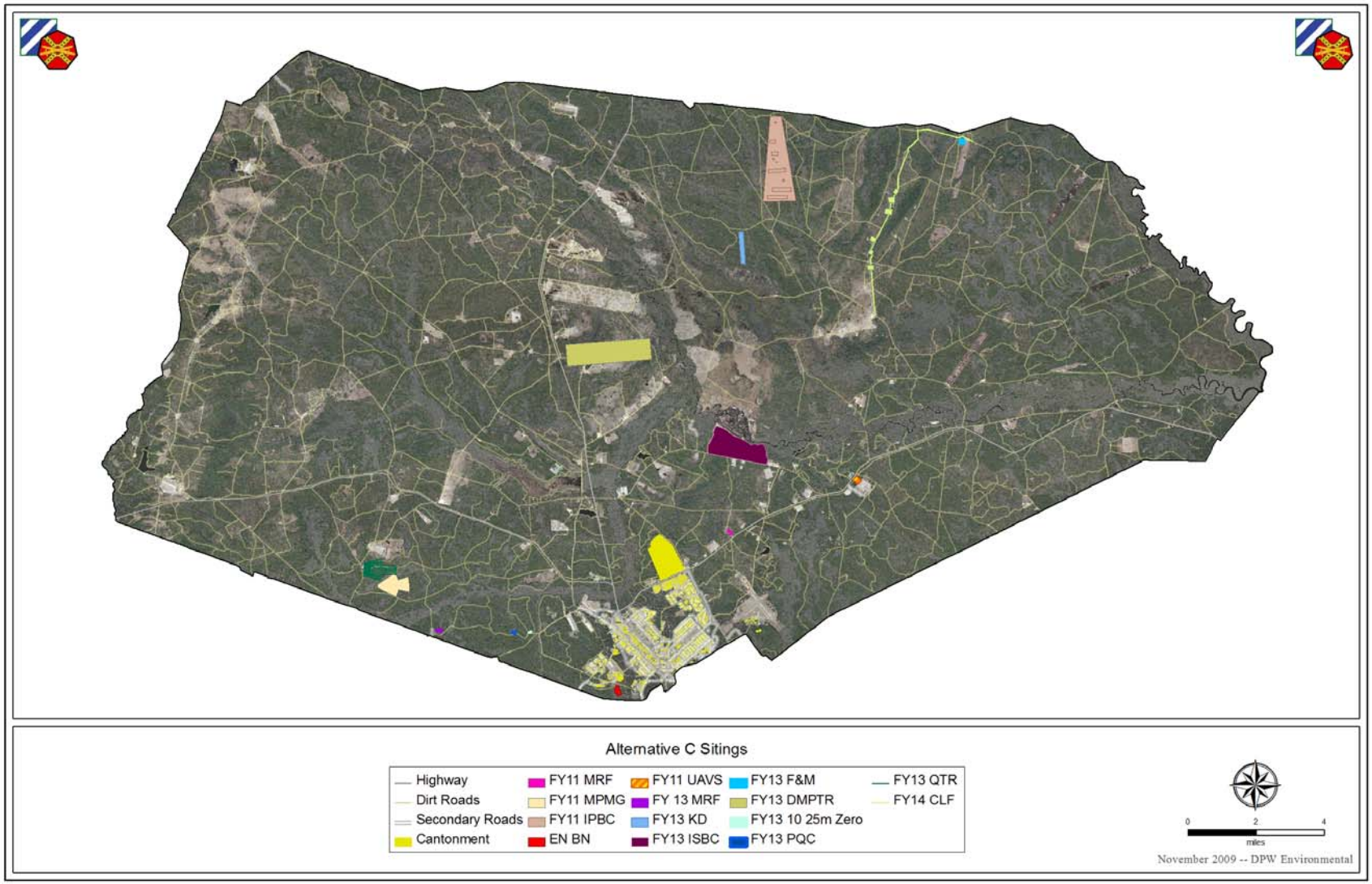


Figure 2-2: Construct and Operate at Alternative C Sitings.

2.3 SITE SCREENING CRITERIA ANALYSIS

The section explains the screening process utilized to site all required ranges and Garrison facilities. It discusses the preferred and viable alternate locations for each project, as well as other options later withdrawn from detailed consideration due to their non-viability as realistic options.

2.3.1 Screening Criteria Applicable to All Facilities

- **Allow Anti-Terrorism and Force Protection.** The facilities' design must be able to accommodate appropriate anti-terrorism measures and standoff distances.
- **Compatibility with Wildfire and Control (Prescribed) Burning Programs.** The risk of wildfires is taken into consideration when siting projects. Areas to be avoided are those that are infrequently burned, because of safety concerns and for adherence to protected species habitat management plans and include parcels near major highways (state and Interstate) and adjacent communities. Constructing facilities in locations that hinder Fort Stewart's prescribed burn program must be avoided.
- **Minimization of Environmental Impacts.** Consideration of environmental impacts when siting projects include the following: avoid or minimize impacts to cultural and natural resources (such as wetlands and protected species); avoid direct impacts to creeks and streams; limit expansion of noise zones into existing residential areas and off-Post communities; minimize adverse air quality impacts; and limit new metal contamination in standing timber (ranges).
- **Further Sustainability Goals.** The Army incorporates sustainability principals into the planning, development, and upgrade of its facilities. From the outset, site selection and design follow sustainability principals, starting with design "charrettes" to ensure stakeholder collaboration toward optimal design, fiscal constraints, local characteristics and constraints, environmental issues, and consideration of functional adjacencies/relationships and land use compatibility. Site selection is based on functional adjacencies/relationships and land use compatibility. Ensure development near Fort

Stewart's Garrison (living and working) areas flow well with existing infrastructure, protecting green fields and preserving habitat and natural resources. Minimize negative impacts on the site and on neighboring properties and structures; avoid or mitigate excessive noise, shading on green spaces, additional traffic, obscuring significant views, etc.

2.3.2 Range-Specific Screening Criteria

- **Ability to Meet Training Requirements.** Sufficient range capacity ensures that each unit meets requirements as set forth in Army regulation (AR) 350-1, *Army Training and Leader Development*; Training Circular (TC) 7-9, *Infantry Live-Fire Training*; Department of the Army (DA) Pamphlet (PAM) 350-38, *Standards in Weapons Training*; TC 25-8, *Training Ranges*; the 3rd Infantry Division's Live Fire Guidance; and the unit's related Mission Essential Task List.

  In particular, at the company level, each unit must be able to perform an annual combined arms live fire exercise that integrates the movement and live fire of infantry Soldiers with, at a minimum, aviation assets, artillery, mortar, and engineering activities (e.g., demolition). In addition, range facilities must be available to support air assault exercises, sniper training, demolition training, and convoy live-fire exercises and to act as a staging base for ground and air movement of Soldiers. Live-fire training must be conducted on ranges with surface danger zones (SDZs) that do not result in the closure of training areas needed for maneuver of units. A range must also be available when and where it would not interfere with the training requirements of other military units.
- **Range Design.** Based on each proposed range's training purpose, each range must be of sufficient acreage to accommodate the SDZs for use of the specified munitions, as required by DA PAM 385-64, *Ammunition and Explosive Safety Standards*. The SDZ is a temporary safety boundary that surrounds the firing range and associated impact area that provides a buffer to protect personnel from the non-dud producing rounds that may be ricocheted during operation of the range. It includes an ordnance dispersion area, ricochet area, and an added safety buffer zone. This area is closed to all unauthorized

personnel during each training exercise on the range. In addition, each range must have an existing impact area sufficient to support live-fire munitions used at Fort Stewart and be configured (e.g., course and targets) in a manner lending itself to achieving offensive and defensive objectives.

- **Proximity.** Range assets must be available for access by all Fort Stewart-stationed units to meet their annual training requirements and to achieve combat readiness status before they deploy. This means sufficient ranges must be available within a geographic distance that allows each unit to get equipment to and from range locations to complete essential tasks in a timely manner. The time and cost of transporting units to a training area must not interfere with the overall training levels for a unit. Each unit has a limited amount of time and cost resources to achieve training requirements. The time and cost of transport cannot be so excessive that it compromises the unit's ability to meet all mission essential tasks and readiness requirements. Quality of life may be affected if troops have to travel too far for training.

2.3.3 Garrison Support Facility-Specific Screening Criteria

- **Facility Design.** In addition to meeting sustainability and environmental principals, each non-range facility site must be of sufficient size to accommodate all supporting facilities, access roads, and parking areas.
- **Proximity.** Non-Range facilities must be available for access by personnel associated with the facilities. This means the facilities must be available within a geographic distance that allows personnel to easily access the facility in a reasonable amount of time. Therefore, proximity to existing paved roads and the Garrison area is necessary.

2.4 RANGE FACILITY DESCRIPTIONS AND ALTERNATIVES ANALYSIS

This section discusses each proposed range and Garrison facility construction project, along with its alternatives. The Council on Environmental Quality regulations [40 Code of Federal Regulations 1502.14(a)] require agencies to explore and objectively evaluate all reasonable alternatives and, for alternatives eliminated from detailed study, briefly explain the reasons for

elimination. In accordance with this requirement, alternatives developed during the master planning siting process, but ultimately eliminated from further review, are also discussed, along with the reasons for their dismissal.

2.4.1 FY11 Multipurpose Machine Gun (MPMG) Range

The MPMG is a small caliber range used to train tenant and reserve Soldiers in basic machine gun live-fire training tasks required to sustain combat proficiency; specifically, to identify and engage stationary infantry targets with a machine gun. Weapons used on this range include the M249 squad automatic weapon (SAW) (5.56mm), the M60 machine gun (7.62mm), the M240B machine gun, the MK19 automatic grenade launcher, the M42 sniper weapon, and the M2 machine gun (0.50 caliber).

Primary features of this range include 180 stationary infantry targets (SITs), 20 moving infantry targets (MITs), 20 stationary armor targets (SATs), 10 firing lanes, two 800-square-foot buildings, one ammunition breakdown building, one air-vault latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with an enclosure. The actual range will be 320 meters in width by 300 meters in depth and require approximately 250 acres of clear-cutting.

2.4.1.1 FY11 MPMG Range Alternative B Siting (Preferred)

Construction would occur in the Delta Training Area (TA) on top of an existing MPMG Range (Figure 2-3) and therefore require less timber removal (compared to Alternative C, which consists of undisturbed terrain). Complete leveling for contour consistency on the site may not be necessary, as well, because rolling terrain is a training benefit as long as the line of sight (LOS) (from shooter to target) is maintained. This will be beneficial to environmental resources in this area, including wetlands and protected species. Advantages of this site are that it does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult. It is located adjacent to an existing tank trail [Fort Stewart (FS) 36] and within 10,000 feet of existing power sources. During early siting efforts, targets were moved closer together to reduce the SDZ, which kept it within Fort Stewart's boundary and

avoided it crossing Georgia Highway 144 West. After publication of the Draft EIS, the footprint was reduced to 282 acres, as shown in Figure 2-3.

2.4.1.2 FY11 MPMG Range Alternative C Siting

Construction would also be within TA D-9 (Figure 2-4) and would have primarily the same operational benefits as Alternative B (not isolating useful maneuver terrain, not cutting off impact areas, etc.). Unlike Alternative B, however, the Alternative C site is not on top of an existing cleared area and would require approximately 250 acres of clear-cutting for LOS, as well as having more impacts to wetlands, protected species habitat, and adversely modify the noise contours in this area.

2.4.1.3 FY11 MPMG Range Alternatives Eliminated from Review

2.4.1.3.1 Course of Action (COA) 3

Construction at this alternative location would occur within the dismounted maneuver TA C-17, which would reduce available maneuver terrain. This alternative is farther from the Garrison area than the other alternatives, is not within 10,000 feet of existing power lines, and is adjacent to the City of Richmond Hill and Interstate 95 (I-95). The latter is problematic because vehicles traveling on I-95 and local roads are so numerous, with as many as 73,900 vehicles per day crossing near TA C-17. This training area is therefore rarely prescribed-burned by Fort Stewart because of safety risks (smoke and/or fire near the road) to these travelers on nearby roadways. In addition, live weapons firing within the proposed MPMG at this location and its SDZ may cause frequent brush and forest fires. Therefore, it was determined to be non-preferred due to operational constraints (see Appendix D, Case Document for MPMGR, for additional details).

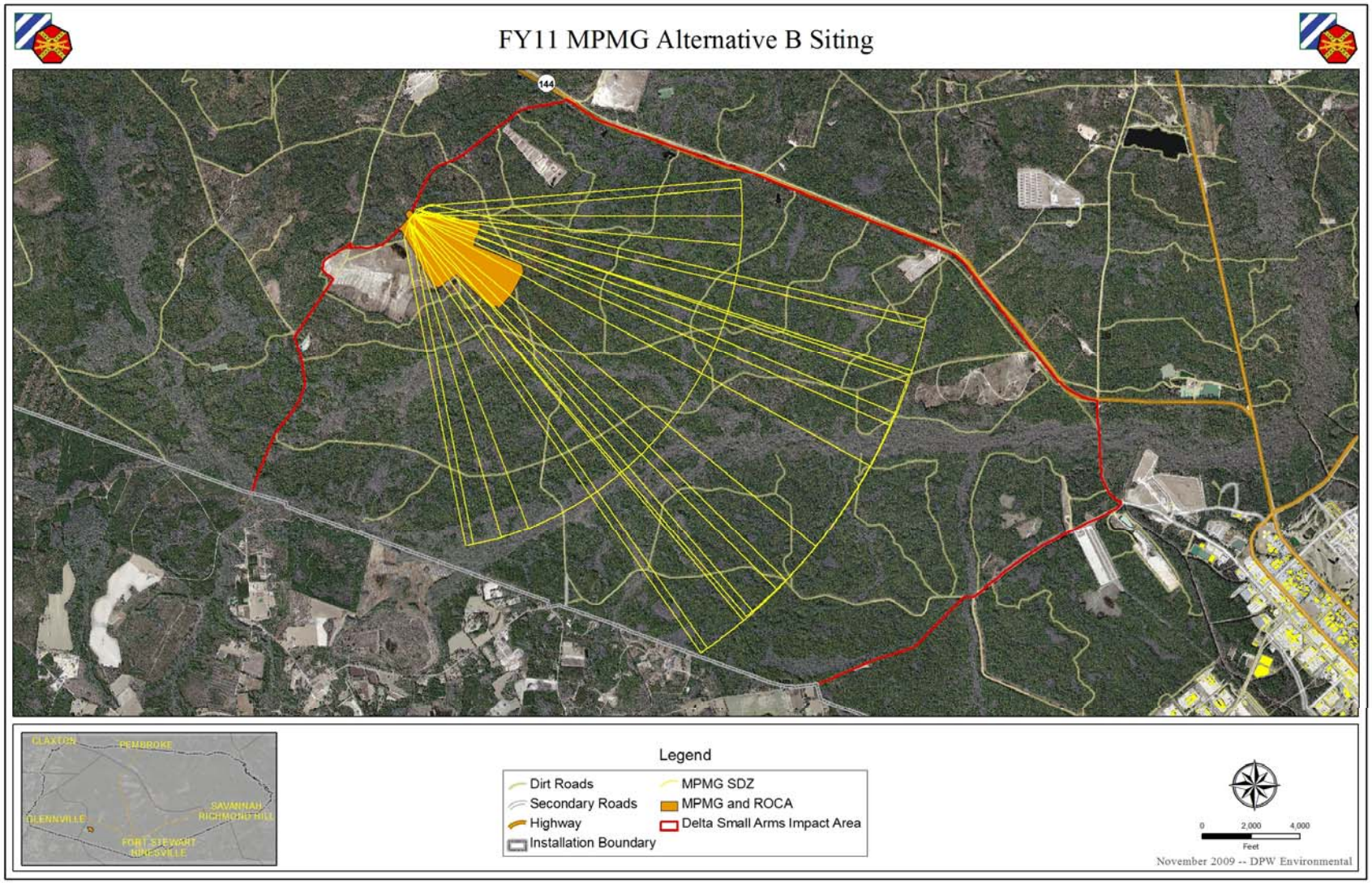


Figure 2-3: FY11 Revised MPMG Range Alternative B Siting (Preferred).

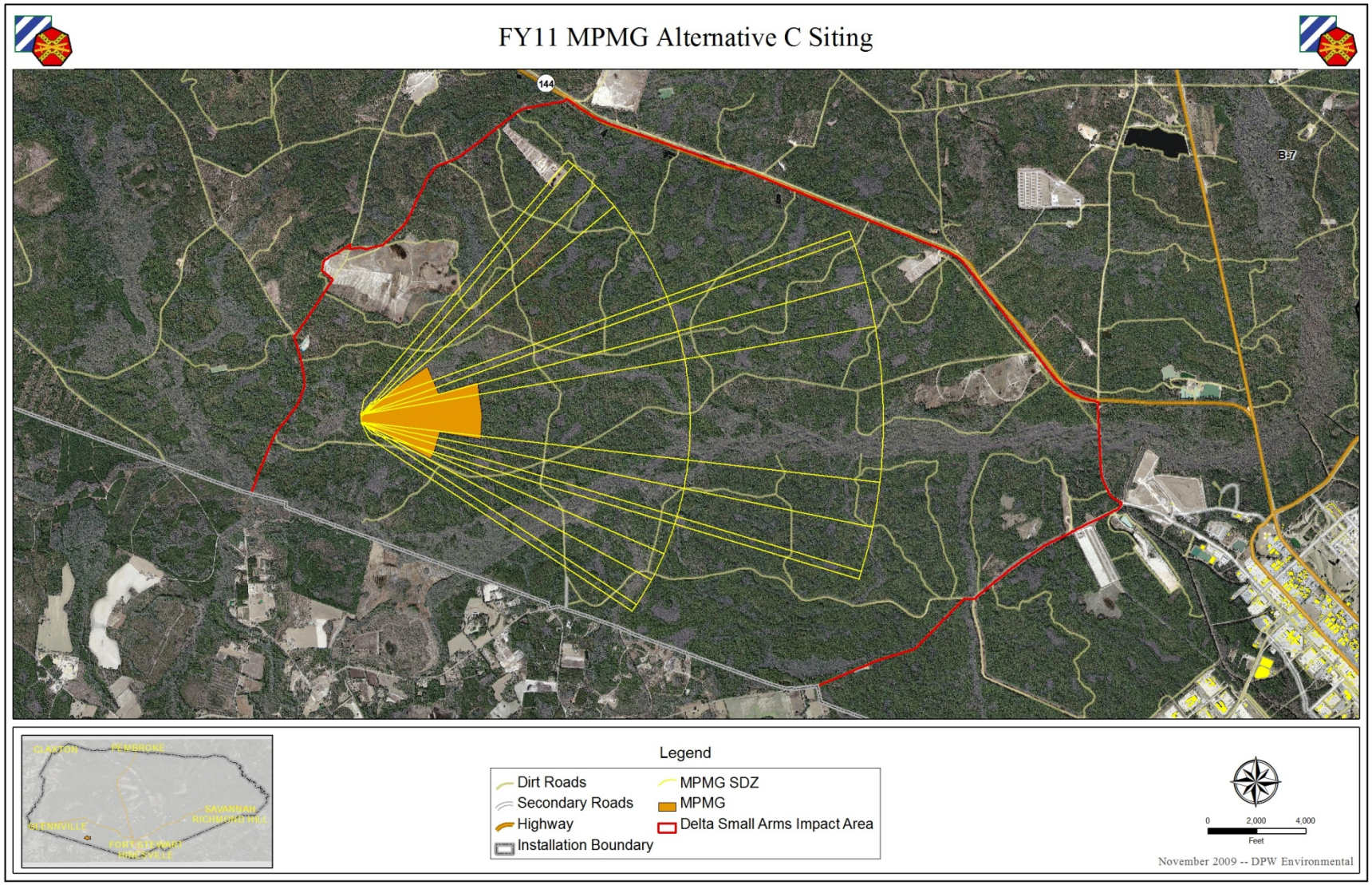


Figure 2-4: FY11 MPMG Range Alternative C Siting.

2.4.1.3.2 COA 4

Construction at this alternative location would occur within TA D-5 in the existing Delta Small Arms Range Area. This alternative would require up to 242 acres of land clearance, of which 106.8 is wetlands. This alternative would provide sufficient acreage to accommodate the range SDZ and can utilize an existing impact area from other ranges in the area; however, the site would constrain training within Fort Stewart because SDZ coordination by Range Control is required to ensure ranges in the Delta Training Area do not cross fire when in use. In addition, when the proposed range requires maintenance, the site would require construction of a new access road to connect to an existing tank trail in the area (FS 91 or FS 20). Therefore, it was determined to be non-preferred due to operational constraints (see Appendix D, Case Document for MPMGR, for additional details).

2.4.1.3.3 COA 5

Construction at this location would occur in TA B-4 over the existing Red Cloud-Foxtrot (RC-F) Range. This alternative would provide sufficient acreage to accommodate the range SDZ and can utilize an existing impact area from other ranges in the area. The RC-F Range is not currently utilized for armor and track vehicle training due to the fact that, once the adjacent Digital Multi Purpose Training Range (DMPTR) comes online (currently scheduled for construction in Fiscal Year 2013), both ranges' SDZs will cross and prevent their armor and track vehicles from maneuvering down the full length of the ranges' course roads. The RC-F Range is currently used for the qualification training of .50 cal machine gun. The machine gun qualification range does not require down range occupation of troops or vehicles and, therefore, it met the criteria for locating the new MPMGR.

Since that initial selection, however, the RC-F Range was proposed as the future site of the new FY13 DMPTR. It was considered a more appropriate size, more fully met the selection criteria, and has since been "officially" sited thru the Master Planning Office and signed off on by the Garrison Commander. Therefore, it was determined to be non-preferred due to operational constraints (see Appendix D, Case Document for MPMGR, for additional details).

2.4.2 FY11 Infantry Platoon Battle Course (IPBC)

The IPBC is a small caliber range used to support infantry platoon live-fire collective training to test infantry platoons (mounted or dismounted) on the skills necessary to conduct tactical movement techniques, and detect, identify, engage, and defeat stationary and moving infantry and armor targets in a tactical array. In addition to live fire, this range is used to train on sub-caliber and/or laser devices and can support the live-fire collective training needs of active and reserve component infantry platoons.

The IPBC includes eight mortar simulation device emplacements, six SATs, one moving armor target (MAT), 43 SITs, 14 MITs, one trench obstacle, nine machine-gun bunkers (with sound effects simulator), two landing zones, one assault/defend house, two 800-square-foot buildings, an air-vault latrine facility, ammo breakdown area, range tower, enclosed bleachers, and a covered mess facility. The IPBC footprint totals 1000 acres and would undergo selective tree removal (no clear-cut) to enhance training realism and for target placement. Landing and drop zone areas would be completely cleared. Subsequent to the publication of the Draft EIS, an electrical corridor, or right-of-way (ROW), was added to this project's overall footprint. The ROW will consist of 12.4 acres.

2.4.2.1 FY11 IPBC Alternative B Siting (Preferred)

Construction would occur in TA C-1, on top of an inactive aerial gunnery range, which is capable of accommodating the tactical array, electrical ROW, and large SDZ requirements of an IPBC (Figure 2-5). This would reduce the amount of tree removal needed, as it is a previously disturbed site and minimize potential environmental impacts. Advantages of this site are that it does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult. UXO presence is assumed (due to its historical use as a range) and will be characterized and removed prior to new range construction. Construction at this site would not result in live fire rounds crossing state highways or interstates, or the SDZ extending beyond Fort Stewart's boundary, and is within 10,000 feet of existing power lines.

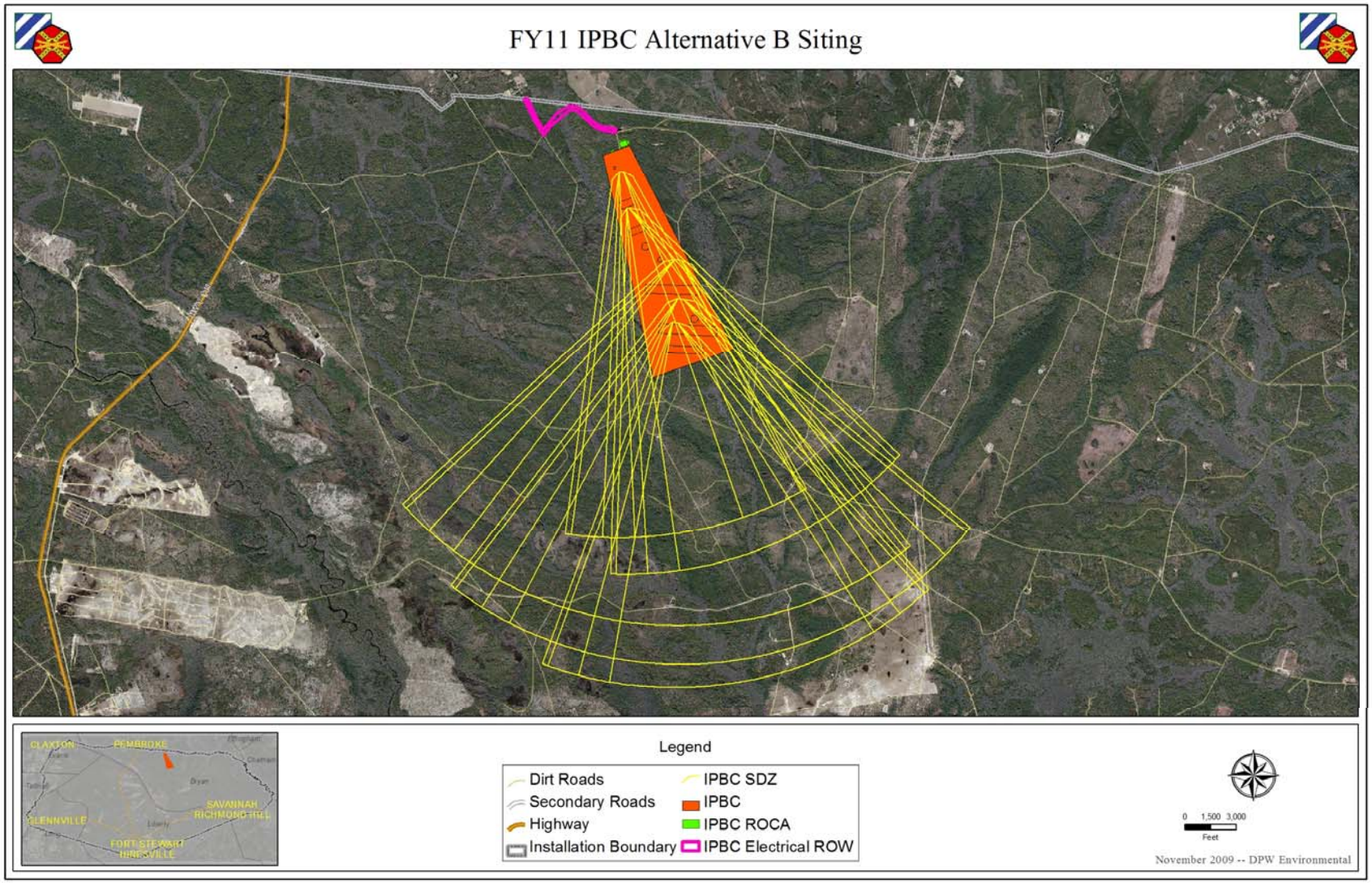


Figure 2-5: FY11 IPBC Revised Alternative B Siting (Preferred).

2.4.2.2 FY11 IPBC Alternative C Siting

Construction would also occur within TA C-1 under this alternative (Figure 2-6) and on previously disturbed terrain. The primary difference between it and Alternative B is the orientation of the IPBC footprint itself. This orientation would allow full utilization of the range; however, it would also result in the range's SDZ interfering with adjacent ranges and the extension of Noise Zone II contours off the Installation boundary. This orientation also results in construction on top of an existing duded impact area, requiring extensive UXO clearance and its associated costs. If this alternative is chosen, placement of its electrical ROW will be determined during its design phase.

2.4.2.3 FY11 IPBC Alternative Eliminated from Review

Construction in TAs B-14/15 would require the closure of a heavily utilized tank trail (FS 42). The SDZ of Red Cloud Hotel Range, when firing, would also interfere with and reduce the full use of the IPBC, which could remove or interfere with this range's use in the training rotation. This site is also not previously disturbed and results in substantially more tree removal than under Alternatives B or C, as well as having more impacts to wetlands and protected species habitat. When combined with these operational and environmental factors, this alternative was determined unfeasible.

2.4.3 FY11 Modified Record Fire Range (MRFR)

The MRFR is a small caliber range used to train individual Soldiers in the basic live-fire training tasks they require to sustain combat proficiency. Primary features of this range include 144 stationary infantry targets, 16 foxholes, two 800-square-foot buildings, one ammunition breakdown building, one air-vault latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with enclosure. The actual range will be 320 meters in width by 300 meters in depth and require 25 acres of site clearing.

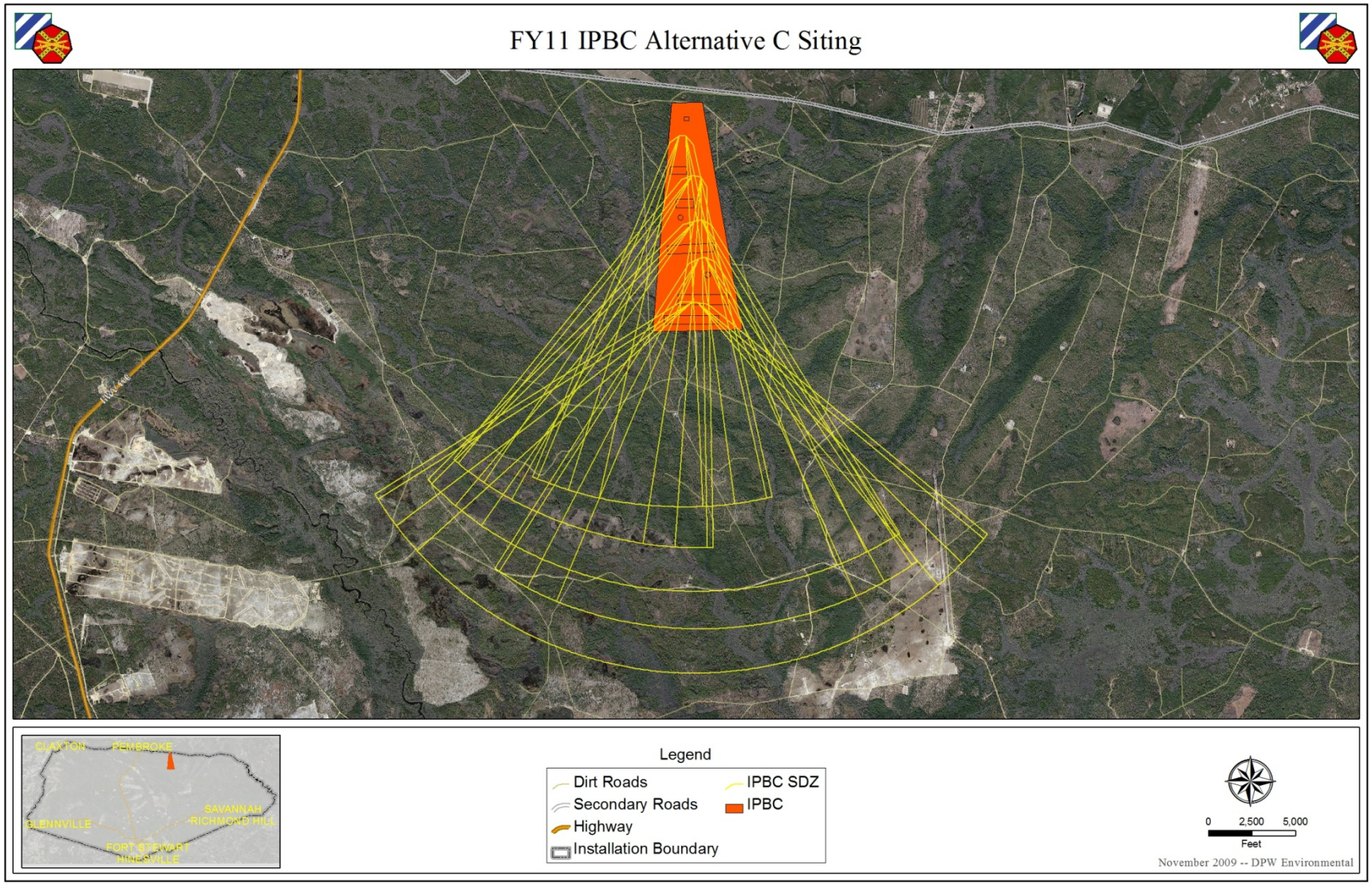


Figure 2-6: IPBC Alternative C Siting.

2.4.3.1 FY11 MRFR Alternative B Siting (Preferred)

Construction would occur on top of the existing SA Delta Range, located off Georgia Highway 144 in the Small Arms Impact Area (SAIA) (Figure 2-7). This would reduce the amount of tree removal needed, as it is a previously disturbed site and minimize potential environmental impacts. Other existing SA ranges were recently updated and remain viable training facilities; the SA Delta Range, however, has not been modernized, which makes it a logical site for the MRFR. Advantages of this site are that it is close to the Garrison area, and does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult.

2.4.3.2 FY11 MRFR Alternative C Siting

Construction would occur on top of the existing SA Charlie Range, located off Highway 144 in the SAIA (Figure 2-8), minimizing the amount of tree removal required, and its associated environmental impacts. The SA Charlie Range was recently upgraded to fully meet TC 25-8 standards and is a needed, functional, and heavily utilized operative training facility, thus it is not being selected as the preferred alternative. Taking it offline, then converting it to another function, would therefore be detrimental to the training mission on Post, as it removes SA Charlie from the training rotation.

2.4.3.3 FY11 MRFR Alternative Eliminated from Review

Construction would occur on top of existing SA Echo Range, located off Georgia Highway 144 in the SAIA. As with Alternative C, construction would occur in an existing cleared area. During the range siting process, however, Fort Stewart's Range Division decided to keep SA Echo as an active range and not utilize it as an alternative location for the new MRFR. This is because it would leave the Installation at a further deficit for small arms ranges.

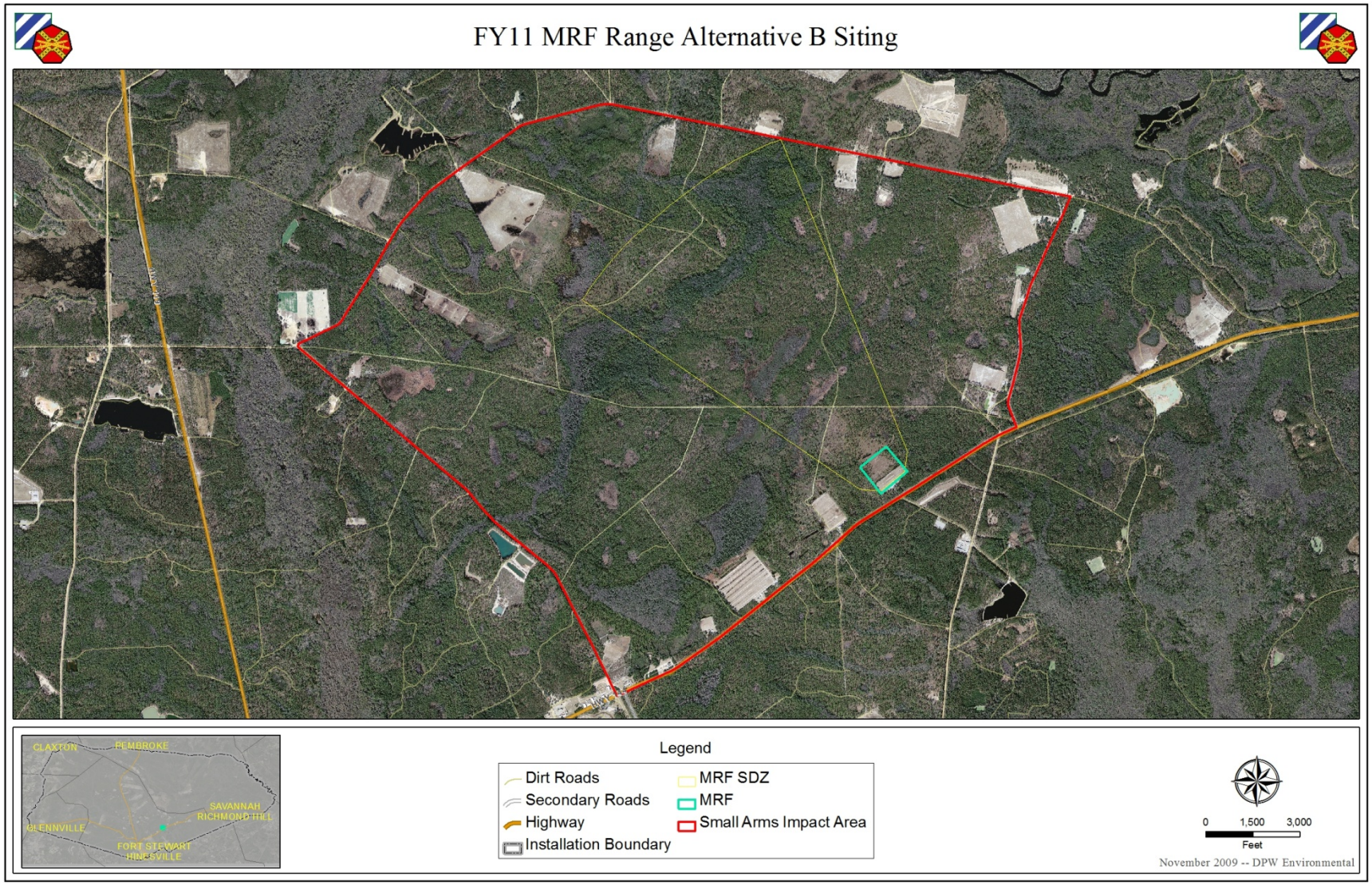


Figure 2-7: FY11 MRFR Alternative B Location.

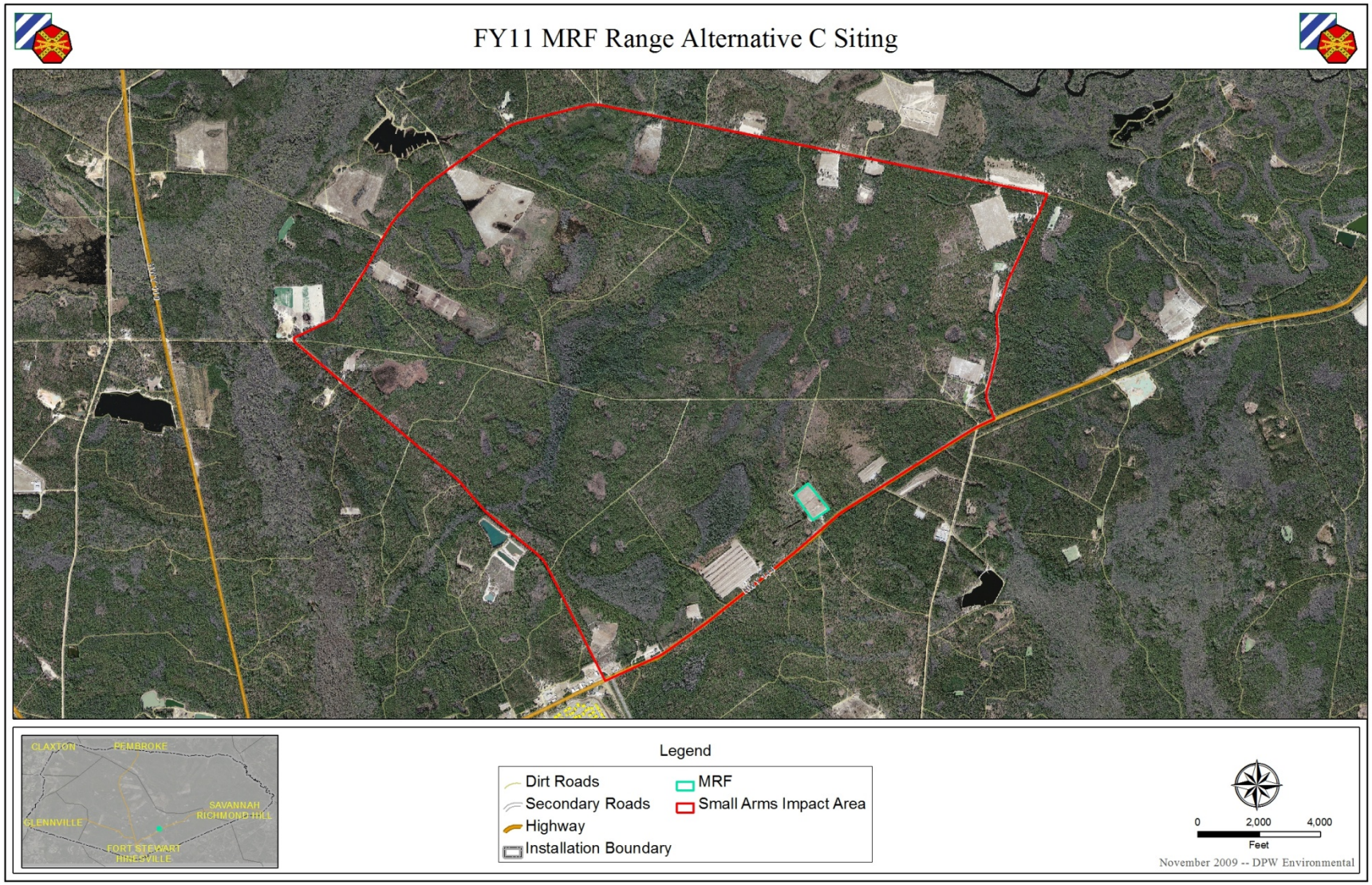


Figure 2-8: FY11 MRFR Alternative C Siting.

2.4.4 FY13 Digital Multipurpose Training Range (DMPTR)

The DMPTR is a large caliber range (utilizing ammunition cartridges with a bullet diameter, or caliber, of greater than 0.75 inches) and used to meet critical training needs for both active and reserve component units that train on Fort Stewart. The DMPTR is necessary to support the crew qualification tasks of M1A1 tank crews, M2 and M3 Bradley vehicle crews, and Stryker vehicle crews on the skills necessary to detect, identify, and engage an enemy doctrinal tactical array of stationary and moving infantry and armor targets.

In addition to live-fire, this range is used for training with sub-caliber and/or laser training devices. The range would consist of a standard one lane DMPTR with four roads with midpoint cross over capability and five battle positions per road. The DMPTR contains 105 SITs, 35 SATs, six MATs, six MITs, four urban target facades, five firing positions per road, one Range Operations Control Area facility, one AAR facility, an air-vault latrine facility, ammo breakdown area, ops storage building, instrumentation loading dock, general instruction building, and surfaced staging area.

2.4.4.1 FY13 DMPTR Alternative B Siting (Preferred)

Construction would occur on top of the existing Red Cloud Foxtrot Range within TAs B-9 and B-10, near Georgia Highway 119 (Figure 2-9). This would reduce the amount of tree removal needed, as it is a previously disturbed site and minimize potential environmental impacts. Advantages of this site are that it does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult. It is located adjacent to an existing tank trail (FS 36), close to the Garrison area, would not result in live fire rounds crossing state highways, not extend an SDZ beyond Fort Stewart's boundary, and is adjacent to power and fiber optics cable paralleling Georgia Highway 119.

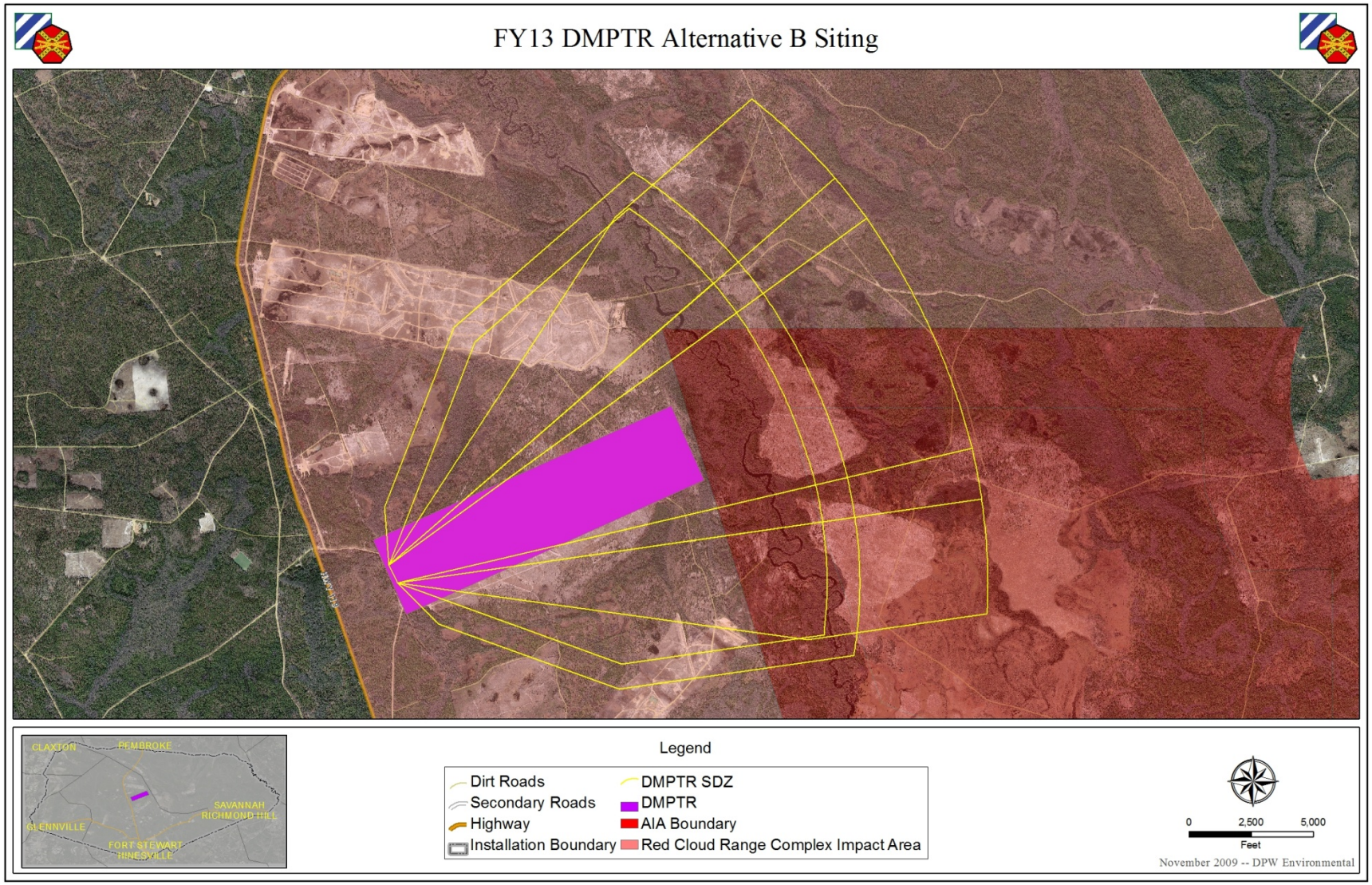


Figure 2-9: FY13 DMPTR Alternative B Siting (Preferred)

2.4.4.2 FY13 DMPTR Alternative C Siting

Construction would be in TAs B-9 and B-10 (Figure 2-10) and was initially preferred by the Fort Stewart DPTMS; however, construction would impact approximately 240 acres of wetlands, requiring extensive mitigation and permitting. Therefore, the DMPTR was shifted northwest to minimize adverse impacts. This shifted alignment became Alternative B, Fort Stewart's preferred site for the DMPTR.

2.4.4.3 FY13 DMPTR Alternative Eliminated from Review

Construct On Top of Existing Multipurpose Range Complex

The placement of the DMPTR on top of the currently heavily utilized Multipurpose Range Complex (MPRC) would result in minimal environmental issues. The MPRC is sufficient in width and length to place the entire DMPTR inside of the existing range without affecting previously undisturbed areas. Given the type of training which currently takes place at this facility there would be no new noise impacts or other new environmental constraints.

Given these considerations, the placement of the DMPTR within the existing MPRC footprint is an environmentally sound siting option; however, this siting would be a substantial detriment to Soldier training, as this facility is critical in meeting the Mission Essential Task List all Solders must obtain in order to be proficient in the weapons platform they must utilize in theatre. Therefore, construction on top of this existing range would remove it from the Installation's training cycle, where it is needed. Fort Stewart is currently constructing a Digital MPRC that will help alleviate throughput needs (discussed in more detail in Chapter 3). Therefore, it was determined to be non-preferred due to operational constraints (see Appendix D, Case Document for DMPTR, for additional details).

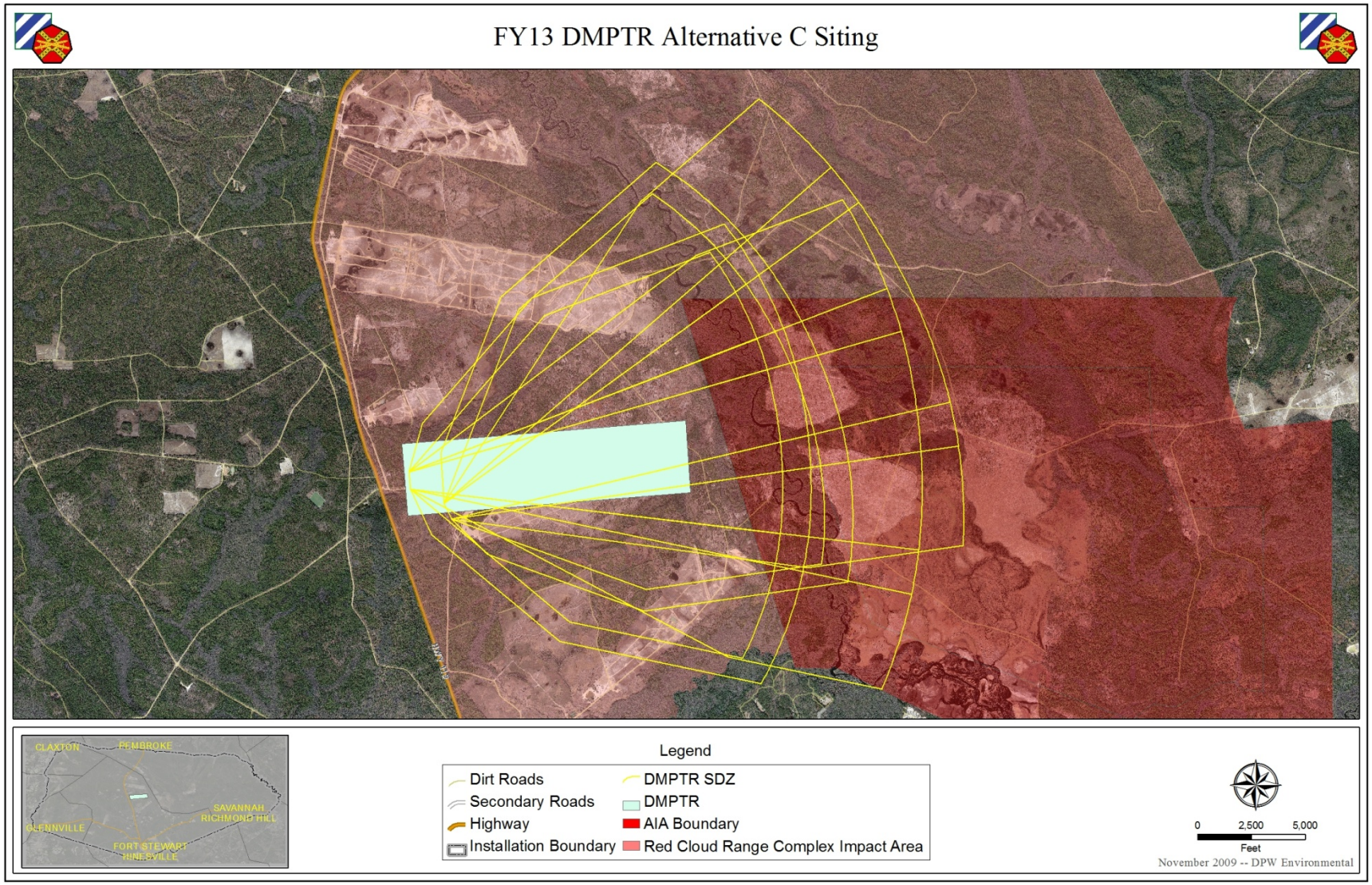


Figure 2-10: FY13 DMPTR Alternative C Siting.

2.4.5 FY13 Qualification Training Range (QTR)

The QTR is a small caliber range used to train individual Soldiers on the skills necessary to detect, identify, and engage stationary and moving infantry targets in a tactical array. This range enhances throughput capability for units by consolidating their efforts to operating one live-fire training facility. Primary features of this range include 429 SITs, 20 SATs, 20 moving MITs, 10 SIT emplacements with multiple targets, two 800-square-foot buildings, one ammunition breakdown building, one air-vault latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with enclosure.

2.4.5.1 FY13 QTR Alternative B Siting (Preferred)

Construction would occur within the SAIA in TA D-7 (Figure 2-11). Advantages of this site are that it does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult. It is also located adjacent to an existing tank trail (FS 36) and power sources, is proximate to the Garrison area, and minimizes operational constraints. The QTR at this site would not result in live fire rounds crossing state highways nor would it result in the SDZ extending beyond Fort Stewart's boundary. The SDZs of the existing Sniper Range and FY11 MPMG may interfere with the maintenance of the QTR beyond 1500 meters; however, this is not a substantial problem, as it would not remove the range from the training rotation. Use of this range, when constructed, would result in Noise Zone II contours extending off the Installation boundary; however, they already extend off the boundary in this portion of the SAIA.

2.4.5.2 FY13 QTR Alternative C Siting

Construction would occur within the SAIA in TA D-9, but would result in more environmentally adverse impacts than Alternative B (Figure 2-12), resulting in extensive mitigation costs and requirements. This would also result in the extension of the Noise Zone II contours further outside the Installation's boundaries than already occurring in the SAIA.

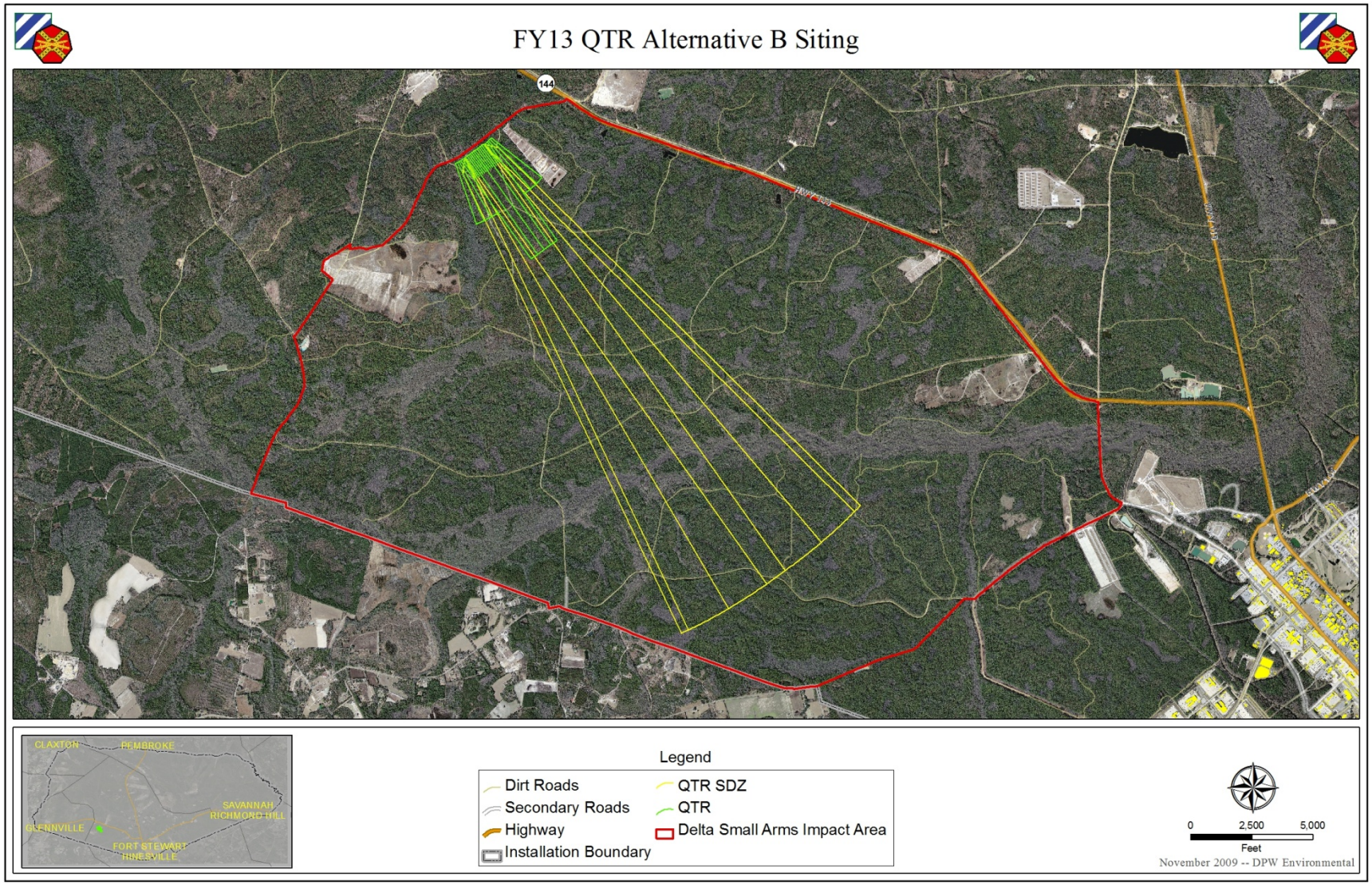


Figure 2-11: FY13 QTR Alternative B Siting (Preferred).

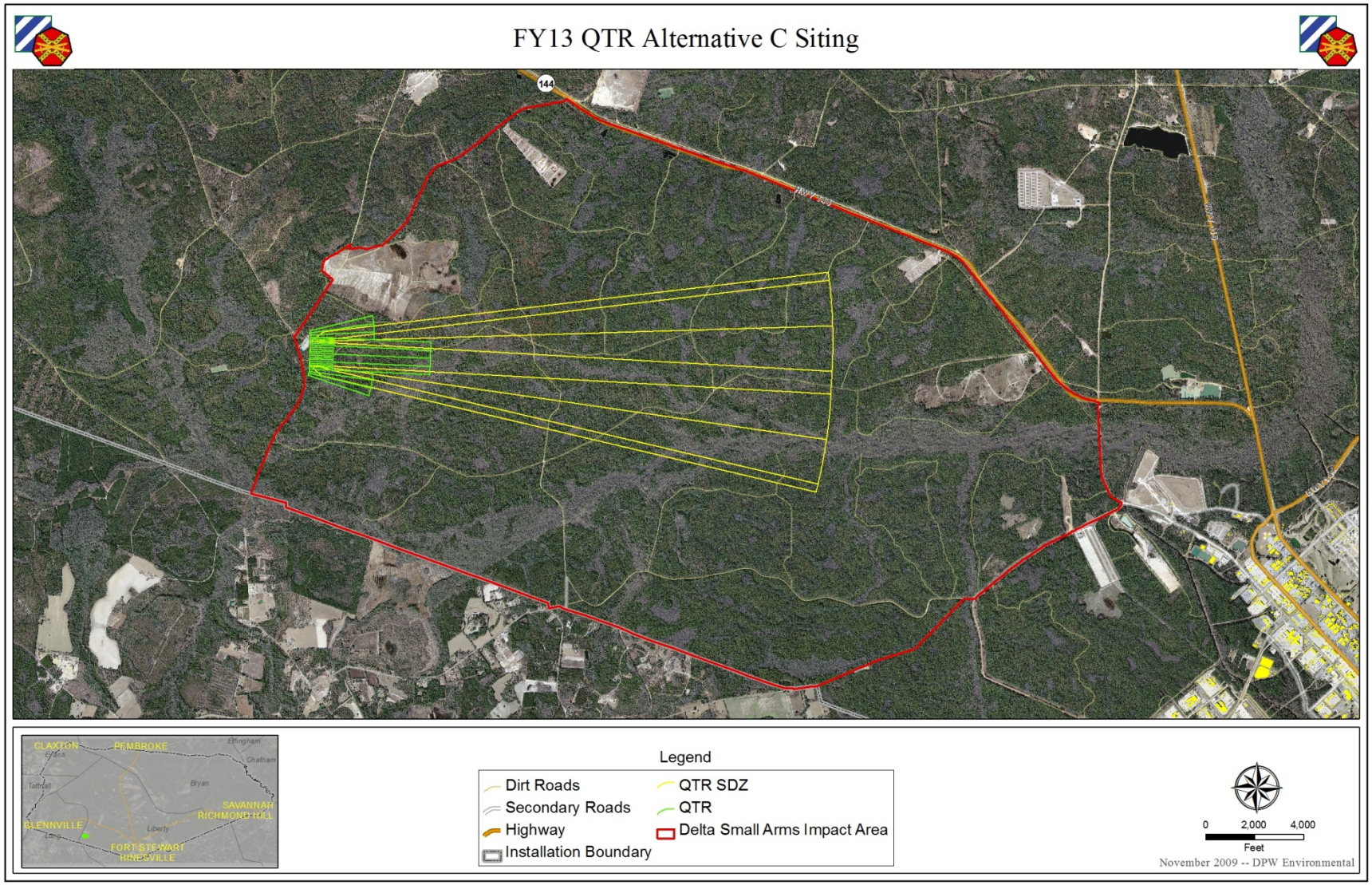


Figure 2-12: FY13 QTR Alternative C Siting.

2.4.5.3 FY13 QTR Alternative Eliminated from Review

This QTR siting option is similar to Alternative C site except that it is oriented northeast to prevent the associated SDZ from leaving Fort Stewart's boundary. Because of this, the QTR SDZ would affect the preferred alternative location for the FY13 MRF range. Essentially, if the QTR were sited here, the FY13 MRF range's preferred site would not be a viable option for Fort Stewart. Therefore, it was determined to be non-preferred due to operational constraints (see Appendix D, Case Document for QTR, for additional details).

2.4.6 FY13 Known Distance Range (KDR)

The KDR is a small caliber range used to train and familiarize Soldiers on the skills necessary to identify, calculate distance, engage, and hit targets in a static array with small arms weapons systems out to 1,000 meters. It is also used for Squad Designated Marksmanship training and certification, automatic rifle practice; basic and advance rifle marksmanship, designated marksman; and sniper training. The range firing points are graduated in 100-meter increments from 100 to 1,000 meters. Primary features of this range include 32 target-lifting devices, 32 firing lanes, two 800-square-foot buildings, one ammunition breakdown building, one air-vault latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with enclosure. The actual range is 1,000 meters in depth.

2.4.6.1 FY13 KDR Alternative B Siting (Preferred)

Construction would occur within the SAIA in TA D-6 (Figure 2-13). Advantages of this site are that it does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult. It is also located adjacent to an existing tank trail (FS 37) and power sources, would not result in live fire rounds crossing major roads, and not result in the SDZ extending beyond Fort Stewart's boundary. The adjacent proposed FY11 MPMG would interfere with the maintenance of the KDR beyond 1300 meters; however, this alternative would have an SDZ that overlaps 75-85 % of the SDZs associated with existing and proposed adjacent ranges, which reduces new adverse environmental impacts.

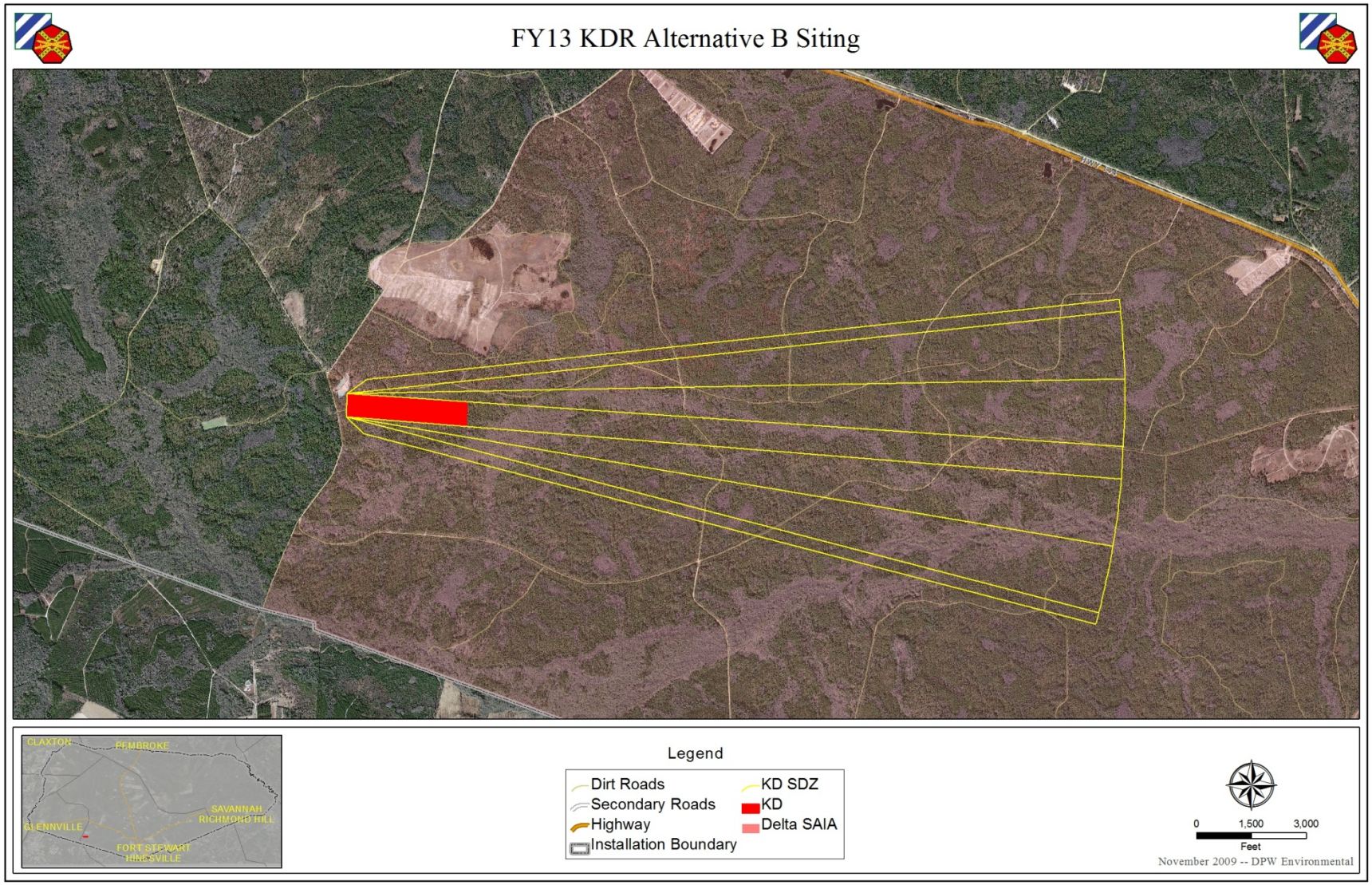


Figure 2-13: FY13 KDR Alternative B Siting (Preferred).

2.4.6.2 FY13 KDR Alternative C Siting

Construction would occur in the existing Red Cloud Impact Area in TA B-9 (Figure 2-14). Though viable, this would result in more environmental impacts, along with required mitigation and permitting. Construction at this site may also result in the range's SDZ interfering with the adjacent existing MPRC and its part in the training regime.

2.4.6.3 FY13 KDR Alternative Eliminated from Review

Construction would occur within the Red Cloud Range Complex. This site would affect substantially more wetlands compared to Alternative B and Alternative C, as well as result in an SDZ interfering with several adjacent ranges. This alternative was determined unfeasible.

2.4.7 FY13 Infantry Squad Battle Course (ISBC)

The ISBC is a small caliber range used to train and test infantry squads on the skills necessary to conduct tactical movement techniques, detect, identify, engage, and defeat an enemy doctrinal tactical array of stationary and moving infantry and armor targets. Infantry squads must train in a live-fire mode to accurately replicate those tasks they must perform in combat operations.

The ISBC includes six different objective areas and will contain a total of 20 SITs, six SATs, one MAT, six MITs, two trench obstacles, five machine gun/observation bunkers with sound effects simulators, two 800-square-foot buildings, one ammunition breakdown building, one air-vault latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with enclosure. To produce a realistic training environment, this range uses thermal targets, night illumination devices, and visual flash simulators.

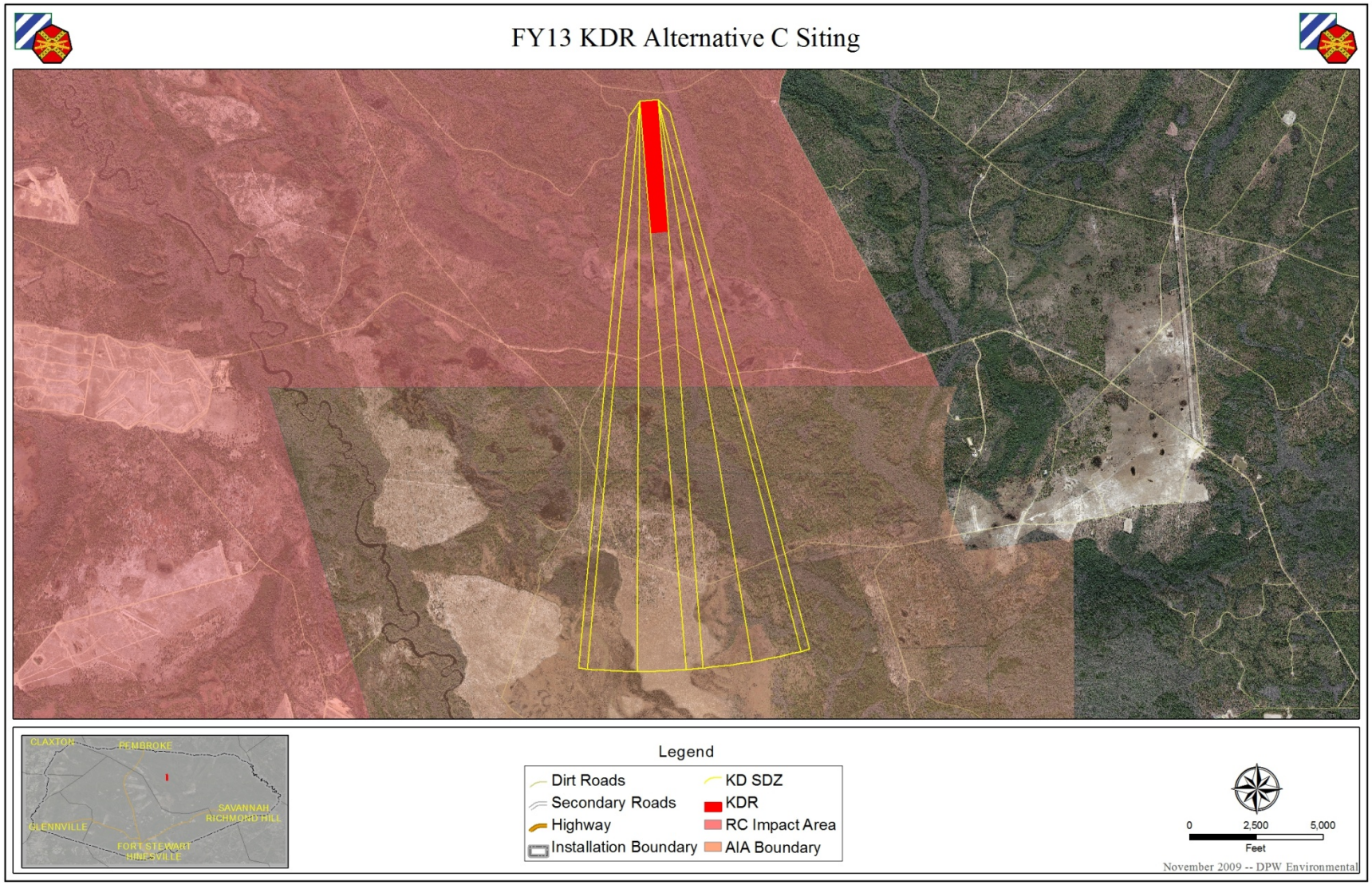


Figure 2-14: FY13 KDR Alternative C Siting.

2.4.7.1 FY13 ISBC Alternative B Siting (Preferred)

Construction would occur within TA B-3 (Figure 2-15). Advantages of this site are that it does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult. It is also located adjacent to an existing tank trail (FS 144) and power sources, would not result in live fire rounds crossing state highways, and would not result in the SDZ extending beyond Fort Stewart's boundary.

2.4.7.2 FY13 ISBC Alternative C Siting

Construction would occur in the B-3 TA (Figure 2-16). The footprint at this location is larger than under Alternative B and could affect a large wetland branch, if avoidance is not possible, requiring extensive mitigation and permitting. Construction at this location may also result in its SDZ interfering with the use of adjacent ranges.

2.4.7.3 FY13 ISBC Alternative Eliminated from Review

Construction would occur within TA B-13, near Tank Trail 75. The footprint would affect substantially more wetlands than the other alternatives, thus requiring substantially more mitigation and permitting costs and efforts. This alternative was determined unfeasible.

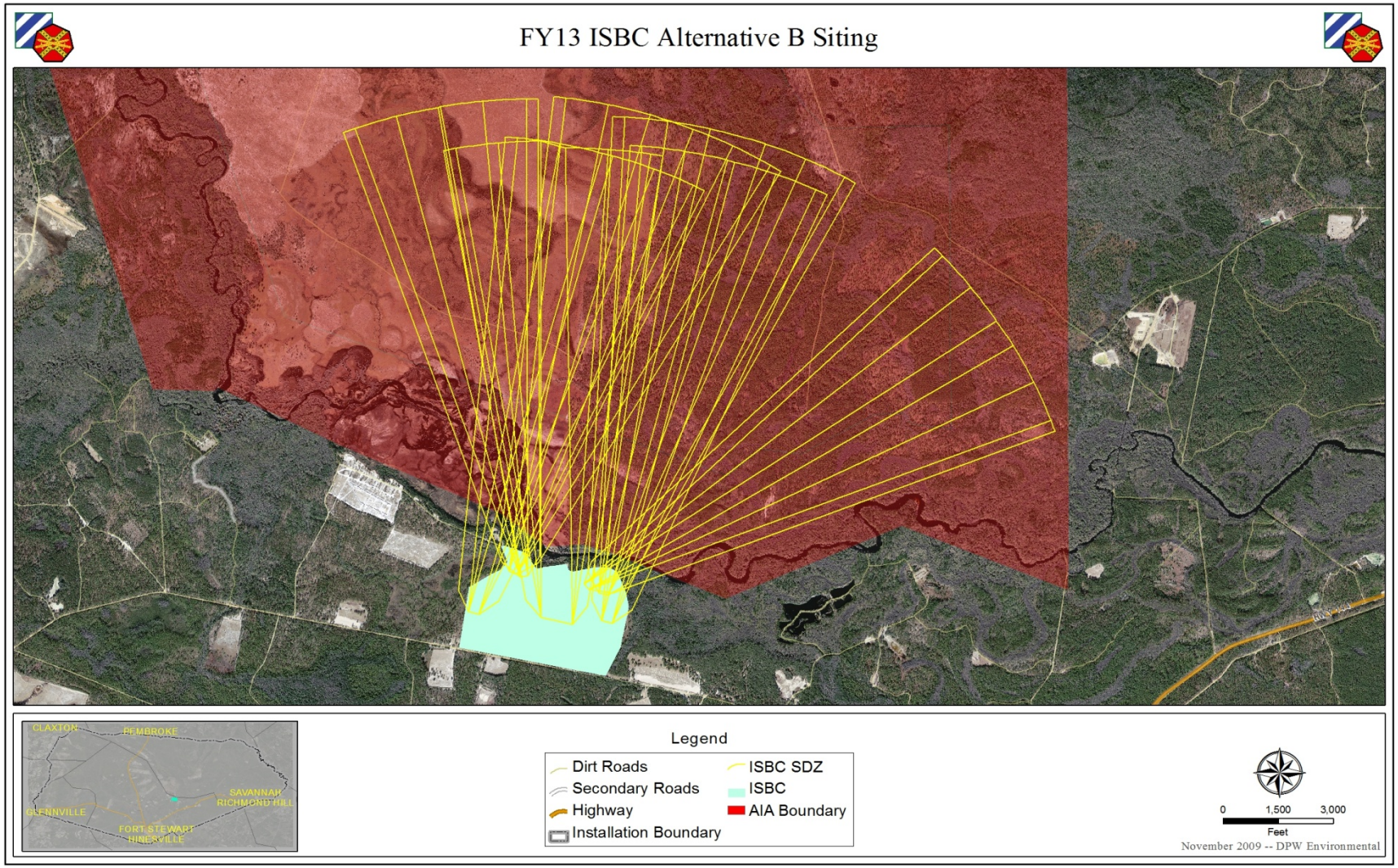


Figure 2-15: FY13 ISBC Alternative B Siting (Preferred).

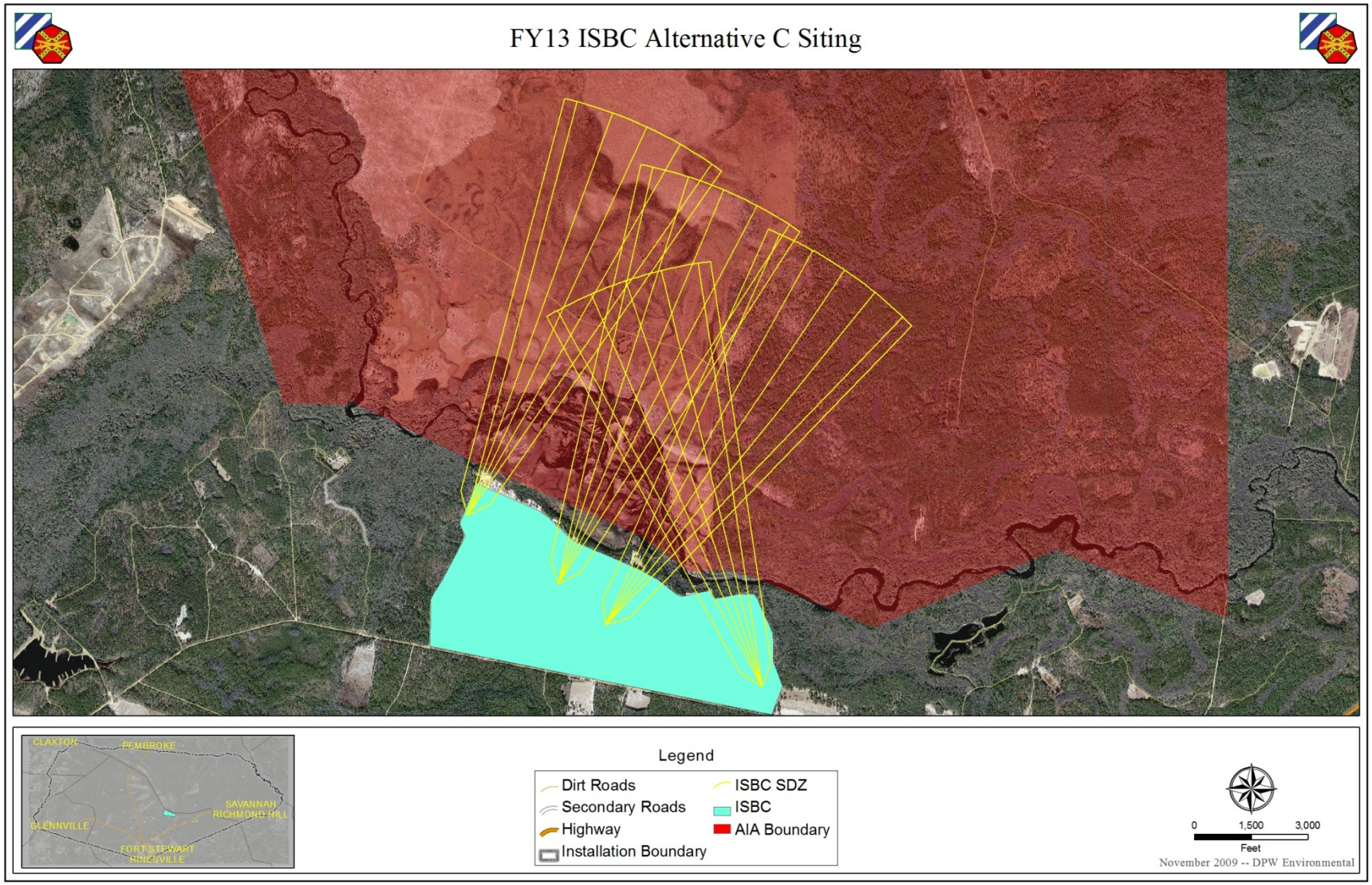


Figure 2-16: FY13 ISBC Alternative C Siting.

2.4.8 FY13 Fire and Movement Range (FMR)

The FMR is a small caliber range used to train individual Soldiers and buddy teams on basic fire and movement techniques against stationary infantry targets replicating enemy Soldiers on the battlefield. Soldiers learn to select covered and concealed positions, move while under fire, apply principles of teamwork, and use suppressive fire on enemy Soldier targets. All lanes would have natural vegetation and features that offer the Soldier covered or concealed positions from which he can select to move from one to the other while under enemy fire. Primary features of this range include four lanes, six SITs per lane, 3-meter-high berms along each side of each lane, two 800-square-foot buildings, one ammunition breakdown building, one air-vault latrine, one covered mess facility, one range operations tower, and covered bleachers with enclosure. Site disturbance would total 10 acres.

2.4.8.1 FY13 FMR Alternative B Siting (Preferred)

Construction would occur within TA C-3, which is previously disturbed and would not require tree-clearing operations in any undisturbed areas (Figure 2-17). The FMR SDZ would not affect the C-3 Shoothouse; therefore, both facilities could operate at the same time and it would not remove either facility from the training cycle. Advantages of this site are that it does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult. It is located adjacent to power sources, would not result in live fire rounds crossing major roads, and would not result in the SDZ extending beyond Fort Stewart's boundary.

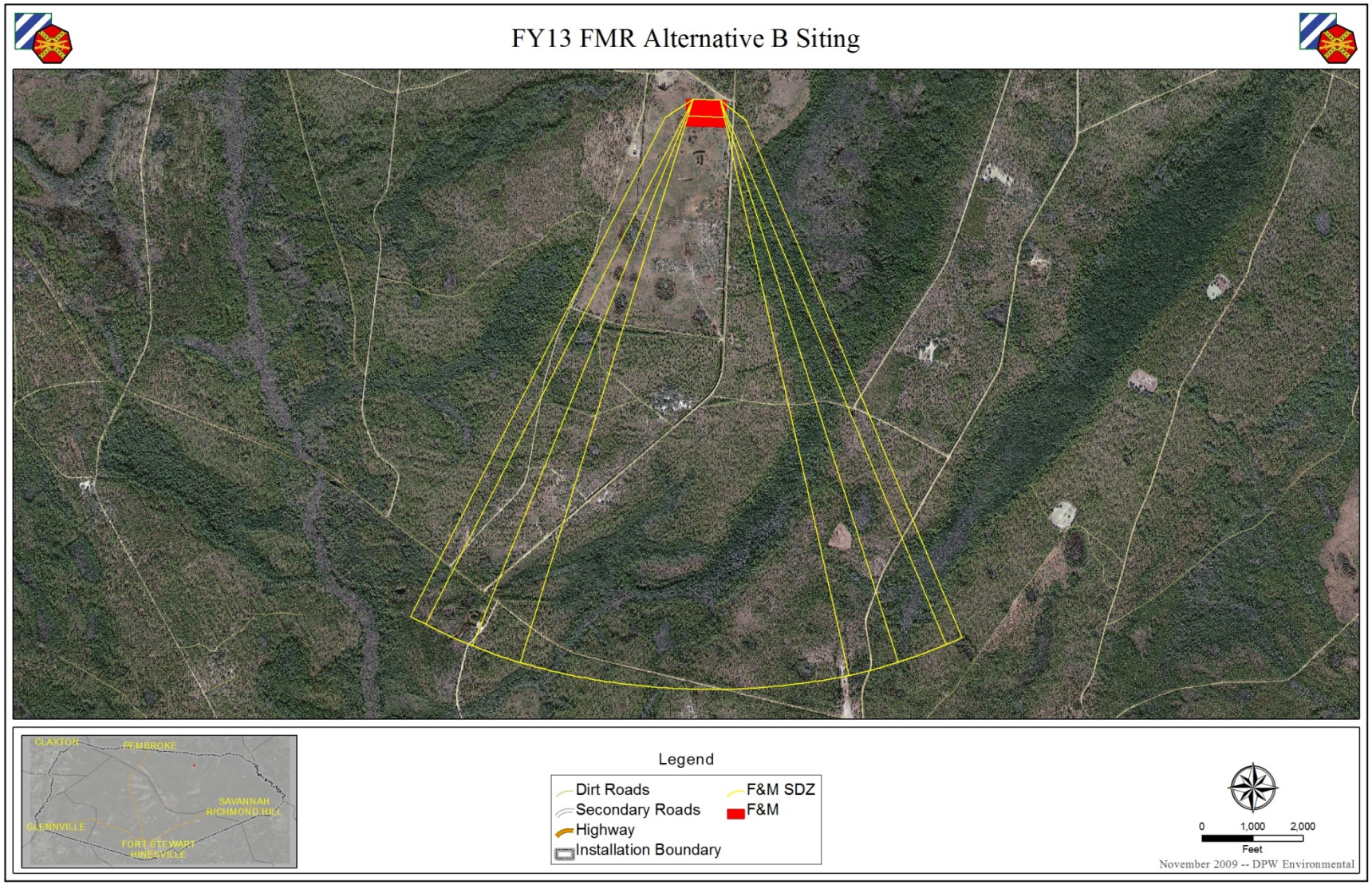


Figure 2-17: FY13 FMR Alternative B Siting (Preferred).

2.4.8.2 FY13 FMR Alternative C Siting

Construction would overlap the existing Aerial Gunnery Range (AGR) 1 (Figure 2-18). SDZs for ranges firing into the SAIA already overlap, and this would further reduce the total off-limits area during live-fire training activities. UXO avoidance and clearance activities would be required under this alternative, as it is an existing range; this could be problematic, as clearance would have to occur within the overlapping SDZs of active ranges.

2.4.8.3 FY13 FMR Alternative Eliminated from Review

Construction would occur within the SAIA on top of the existing SA Zulu Range. Even though environmental constraints are minimal within this footprint, SA Zulu is a heavily utilized range, and this alternative removes existing ranges from the training rotation. This alternative was determined unfeasible.

2.4.9 FY13 Modified Record Fire Range (MRFR)

The FY13 MRFR is a small caliber range used to meet the same requirements detailed in the FY11 MRF range description. Primary features would include the same target and supporting facility layout as with the proposed FY11 MRF range. Although Fort Stewart is already scheduled to receive a MRFR in FY11, the Army Range Requirements Model, which projects how many ranges by type are needed to meet the training requirements of the Soldiers assigned to or habitually training on Fort Stewart, shows that Fort Stewart requires an additional MRF in FY 2013 to fully meet its training requirements. The FY13 MRF range would total 320 meters in width by 300 meters in depth.

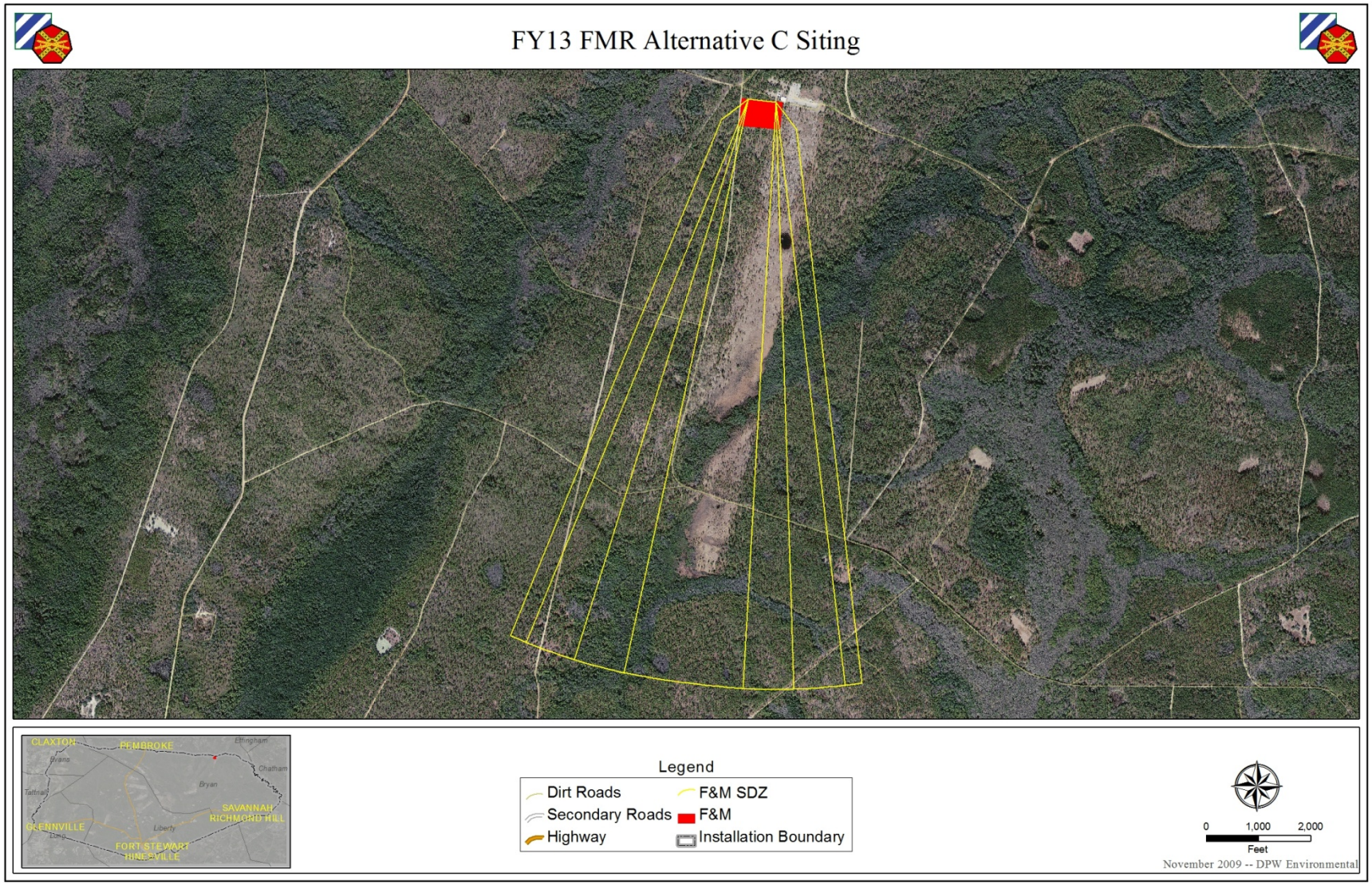


Figure 2-18: FY13 FMR Alternative C Siting.

2.4.9.1 FY13 MRFR Alternative B Siting (Preferred)

Construction would occur in the SAIA, within TA D-6 (Figure 2-19). Advantages of this site are that it does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult. It is located adjacent to power sources, would not result in live fire rounds crossing state roads, and would not result in the SDZ extending beyond Fort Stewart's boundary. When the proposed range requires maintenance, the site should provide easy access when adjacent ranges are active since it is sited off Georgia Highway 144 West.

2.4.9.2 FY13 MRFR Alternative C Siting

Operationally, construction of the range in TA D-5 (Figure 2-20) would meet safety and training requirements; however, environmental impacts would be slightly greater than at the Alternative B site. This would also result in the increase of the Noise Zone II contours in this area.

2.4.9.3 FY13 MRFR Alternative Eliminated from Review

The main reason this alternative, within the D-5 Training Area, is eliminated from further review is because the other alternatives would have substantially less adverse environmental impacts and, therefore, less cost and time associated with mitigation and permitting. This alternative was determined unfeasible.

2.4.10 FY13 Combat Pistol Qualification Course (CPQC)

The CPQC is a small caliber range used to train individual Soldiers and military police in the basic live-fire training tasks they require to sustain combat proficiency. Primary features of this range include 105 SITs, 15 firing lanes, 15 stationary silhouette targets, two 800-square-foot buildings, one ammunition breakdown building, one air-vault latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with enclosure. The actual range would be 120 meters in width by 31 meters in depth.

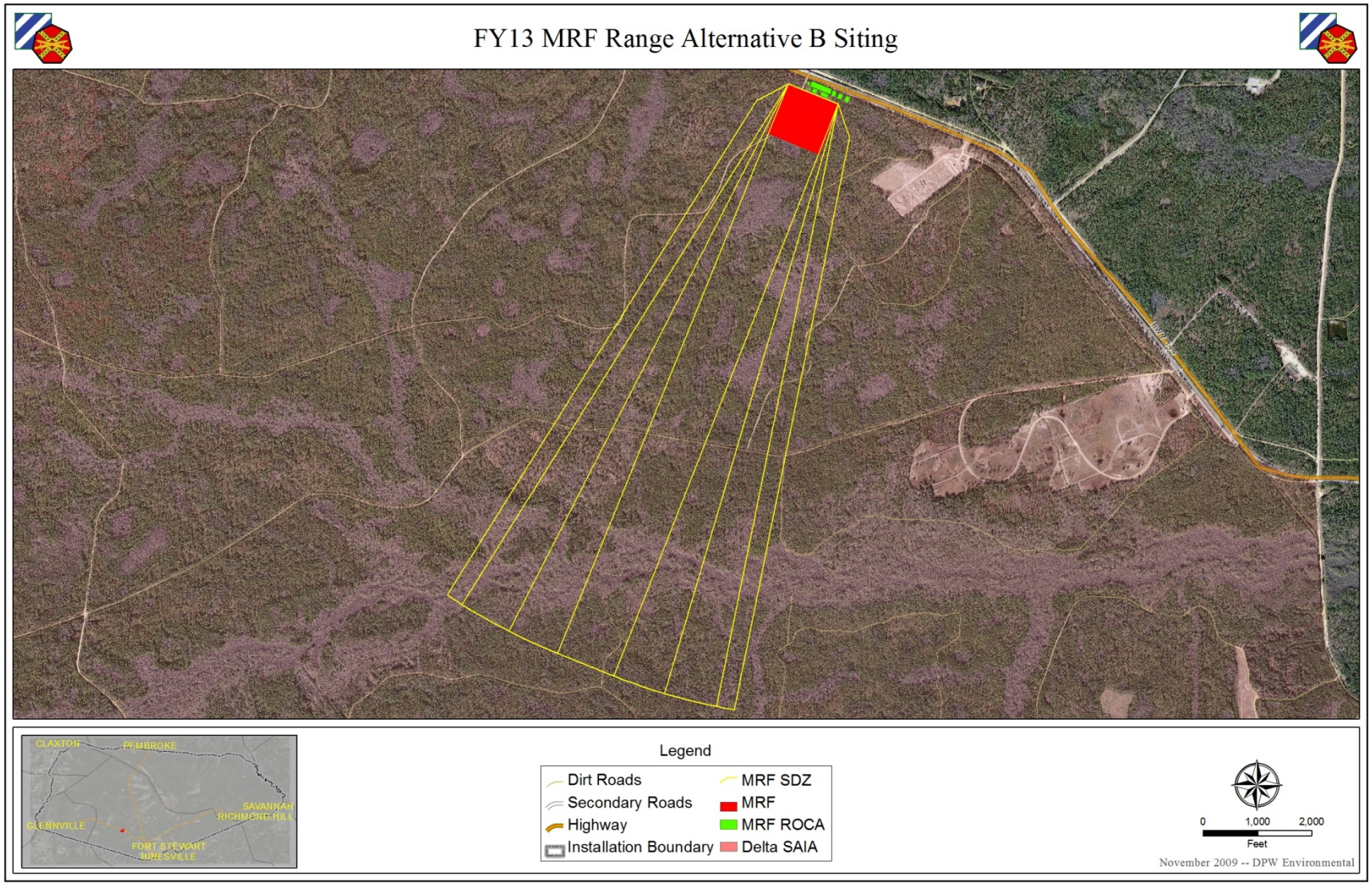


Figure 2-19: FY13 MRFR Alternative B Siting (Preferred).

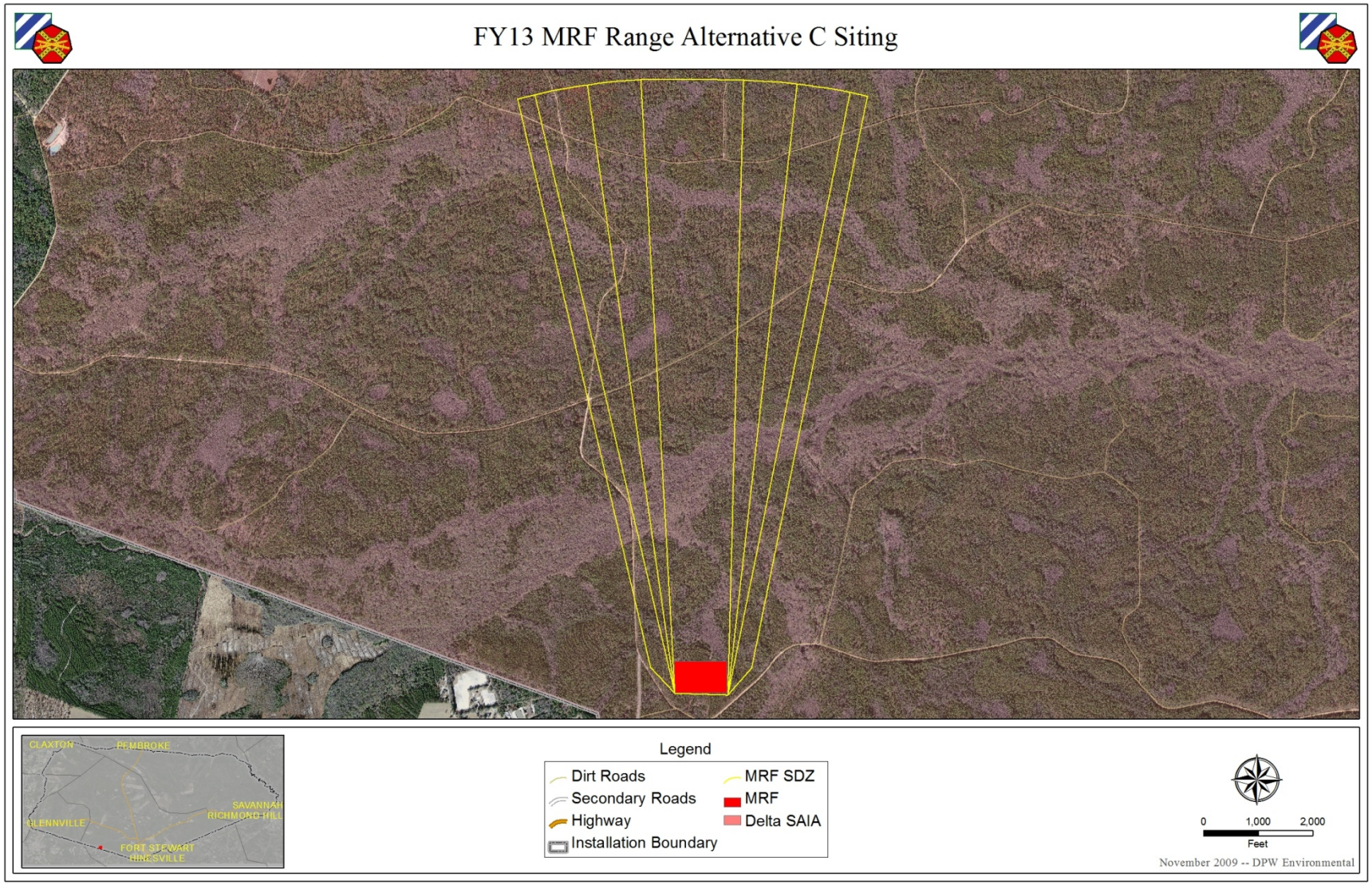


Figure 2-20: FY13 MRFR Alternative C Siting.

2.4.10.1 FY13 CPQC Alternative B Siting (Preferred)

Construction would occur in the SAIA within the D-6 TA (Figure 2-21). Advantages of this site are that it does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult. It is located adjacent to power sources, would not result in live fire rounds crossing state highways, and would not result in the SDZ extending beyond Fort Stewart's boundary. When the proposed range requires maintenance, the site should provide easy access when adjacent ranges are active since it is sited off an existing tank trail (FS 36), similar to existing and proposed ranges in the Delta SAIA.

2.4.10.2 FY13 CPQC Alternative C Siting

Construction would occur within the D-5 TA (Figure 2-22) and would not interfere with existing or proposed ranges' SDZs. The footprint may also be modified slightly to avoid wetlands impacts, although it will affect more protected species habitat and require additional cultural resource surveys.

2.4.11 FY13 Basic 10-Meter/25-Meter Firing Range (10/25 FR)

The 10/25 FR is a small caliber range used to train individual Soldiers and zero weapons in the basic M-16 and M-4 rifle live-fire training tasks and crew served machine guns they require to sustain combat proficiency. Primary features of this range include 32 frames at 25 meters, 16 target frames at 10 meters, and 32 foxholes. This range requires no automation. All targets are fixed at 25 meters from the firing line for M16/M4 and at 10 meters for machine gun. The range footprint is 25 meters in depth.

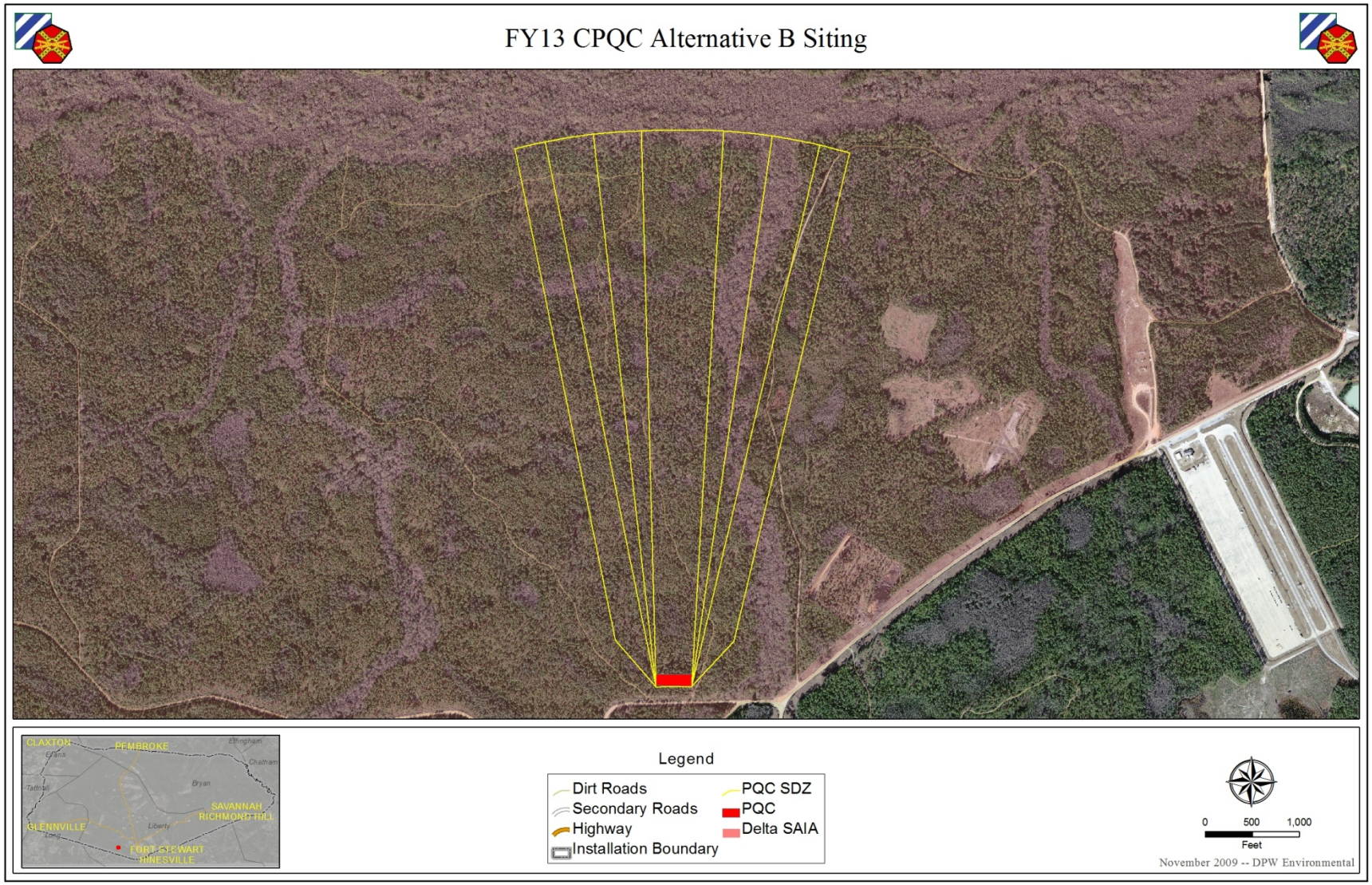


Figure 2-21: FY13 CPQC Alternative B Siting (Preferred).

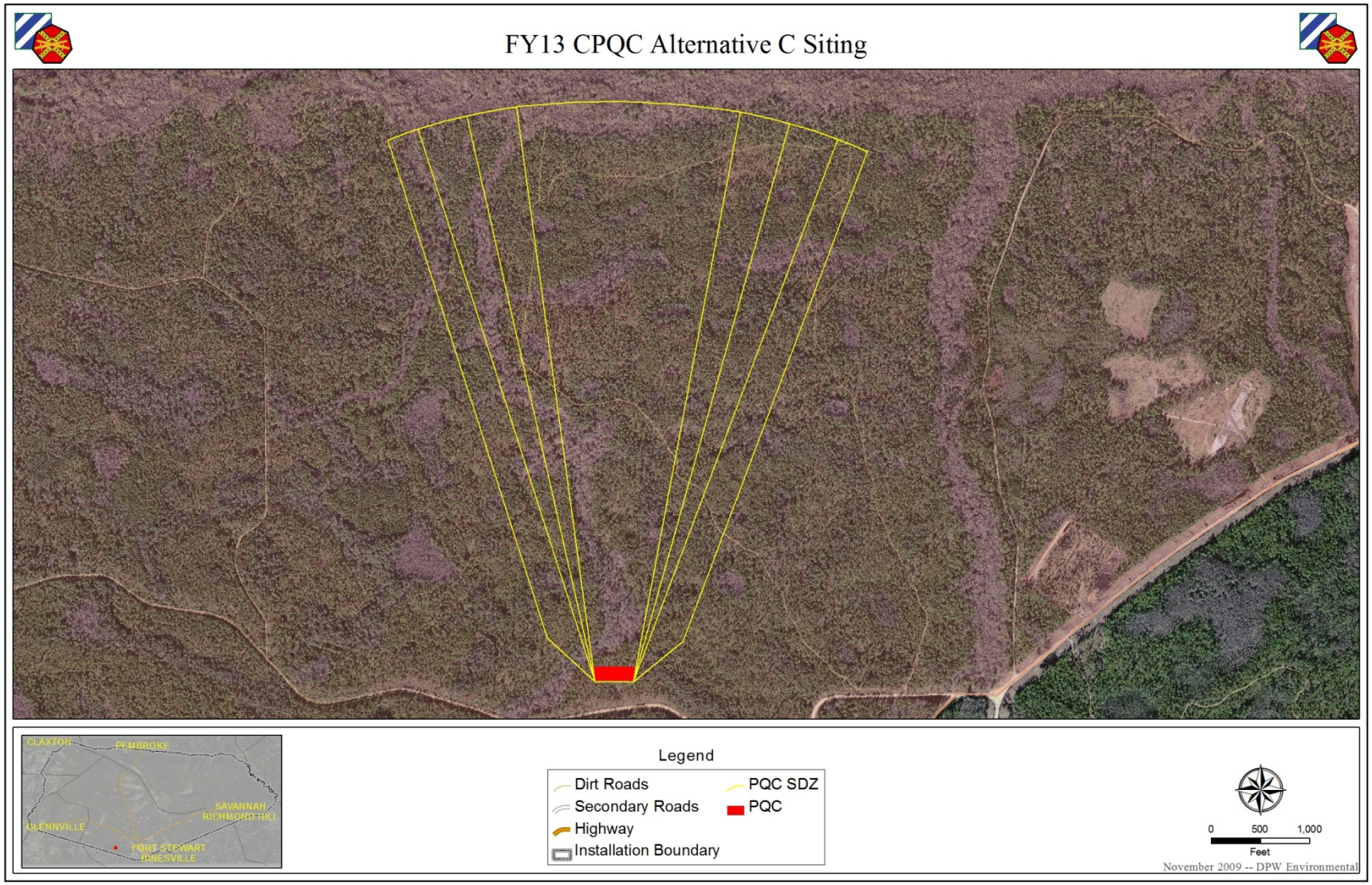


Figure 2-22: FY13 CPQC Alternative C Siting.

2.4.11.1 FY13 10/25 FR Alternative B Siting (Preferred)

Construction would occur in the SAIA, within the D-5 TA (Figure 2-23). Advantages of this site are that it does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult. It is located adjacent to power sources, would not result in live fire rounds crossing major roads, and would not result in the SDZ extending beyond Fort Stewart's boundary. When the proposed range requires maintenance, the site should provide easy access when adjacent ranges are active since it is sited off an existing tank trail (FS 38), similar to existing and proposed ranges in the area.

2.4.11.2 FY13 10/25 FR Alternative C Siting

Construction would occur within TA D-5 (Figure 2-24), but the SDZ associated with this site would affect downrange maintenance of the existing SA Zulu Range and potentially interfere with the Installation training regime.

2.4.11.3 FY13 10/25 FR Alternative Eliminated from Review

This alternative (also within the D-5 Training Area) for the zero range has comparable operational and environmental constraints as Alternative C. The reason this siting was eliminated from detailed analysis is because it would interfere with the operation of Fort Stewart's preferred CPQC site, potentially removing it or interfering with its inclusion in the training cycle. This alternative was determined unfeasible.

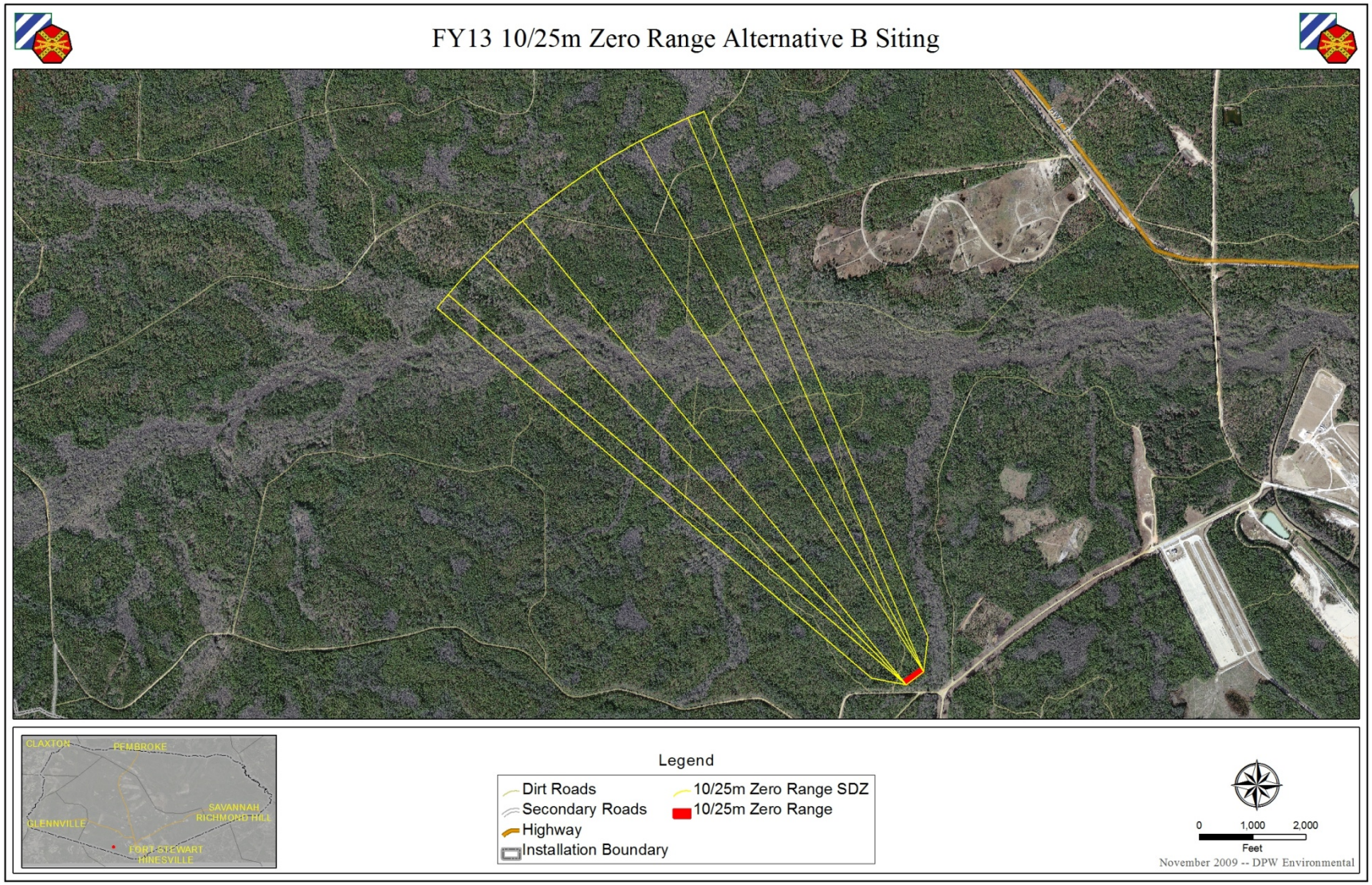


Figure 2-23: FY13 10/25 Meter Zero Range Alternative B Siting (Preferred).

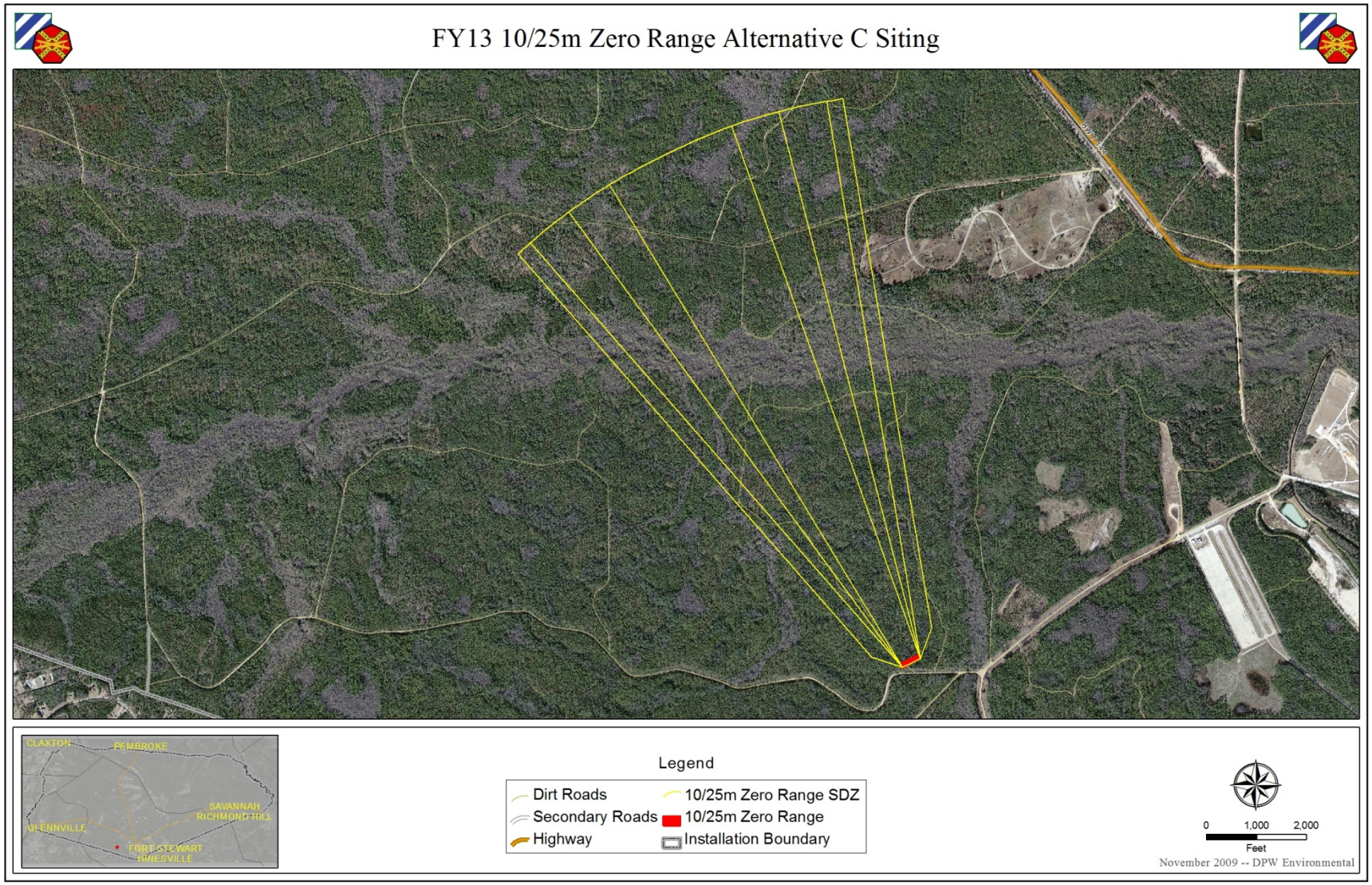


Figure 2-24: FY13 10/25 Meter Zero Range Alternative C Siting.

2.4.12 FY14 Convoy Live Fire Range (CLFR)

The CLFR is a small caliber range used to train individual Soldiers, crews, platoons, and companies in the basic live-fire training tasks they require to sustain combat proficiency during convoy operations. These include the skills necessary to detect, identify, engage, and defeat stationary and moving vehicle and infantry targets from a stationary or moving vehicle using all assigned weapons and weapons systems. The range also trains Soldiers and units to identify Improvised Explosive Devices (IEDs) and procedures for dealing with IEDs. This complex is also used to train and test Soldiers to engage and defeat vehicle and infantry targets from multiple firing points as part of an entry control point (ECP). Engagement boxes would be constructed along the CLF route for target placement. These entry points will not require complete site clearing.

Primary features of this range include five SATs, four MATs, 43 SITs, three MITs, six facades, one entry control point (ECP), one course road, one 800-square-foot building, an air-vault latrine facility, and ammo breakdown area. Gunnery tasks requiring the use of dud-producing ammunition cannot be fired on this range. If necessary, a UXO survey and clearance will be conducted prior to construction.

2.4.12.1 FY14 CLFR Alternative B Siting (Preferred)

Construction would occur within TAs C-5 and C-6 (Figure 2-25). The CLFR will be established on existing FS Tank Trails 68, 67, 72A, 43, and 4W; however, multiple training stations described as engagement boxes would be spread out along the route for convoys to fire upon targets. This site is also preferred because it allows Soldiers to fire from both sides of their convoy vehicles. The SDZs associated with the engagement boxes would not interfere with the nearby Shoothouse. This route also allows the engagement boxes to be spread out, which increases training realism.

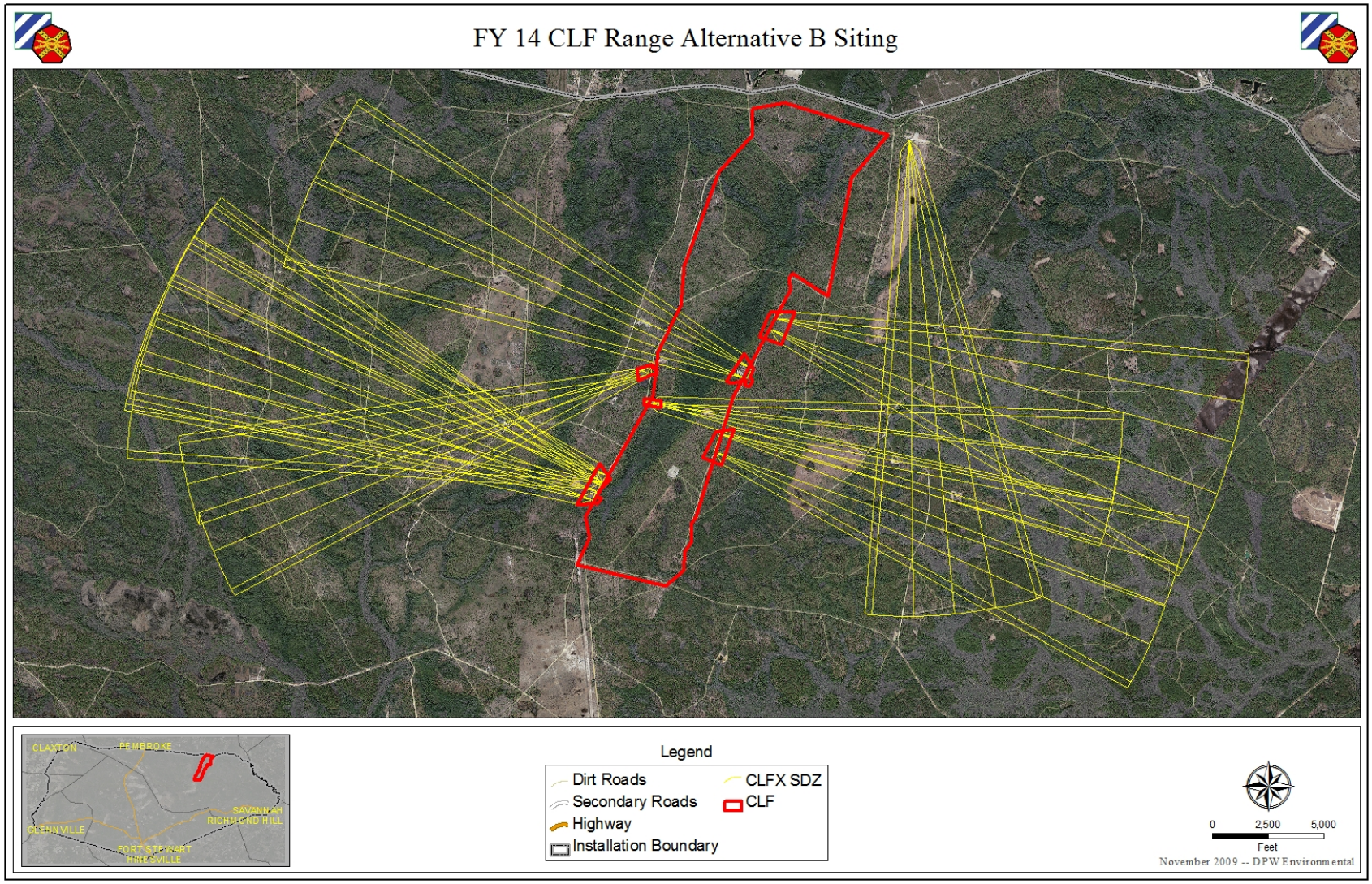


Figure 2-25: FY14 CLFR Alternative B Siting (Preferred).

2.4.12.2 FY14 CLFR Alternative C Siting

The difference between Alternative B and Alternative C for the CLFR is the route and placement of the engagement boxes. The route for Alternative C follows Tank Trail 43 from existing AGR 1 and south on Tank Trail 68, stopping at Tank Trail 79, near Galahad Drop Zone (Figure 2-26). From an operational standpoint, it is a shorter route than Alternative B and restricts movement to the C-3 Shoothouse area, which is not as effective for meeting the purpose of this training. The SDZ associated with the nearby Shoothouse would also limit use of the CLF range at this location, potentially removing it or interfering with its inclusion in the training cycle. As with Alternative B, site clearing, to include grubbing and grading, would not be required for each engagement box. To increase training realism, each engagement box would undergo selective tree thinning for target placement.

2.4.12.3 FY14 CLFR Alternative Eliminated from Review

As with Alternative C, the C-3 Shoothouse SDZ would adversely affect the operation of the CLFR, if sited in the B-17 TA, and remove existing ranges from the training rotation. Further operational constraints include Soldiers being restricted from firing along FS Road 68 and 79 due SDZs associated with the engagement boxes placed on FS Road 70 and 64. The route does not provide enough space to conduct realistic training while meeting SDZ requirements. This alternative was determined unfeasible.

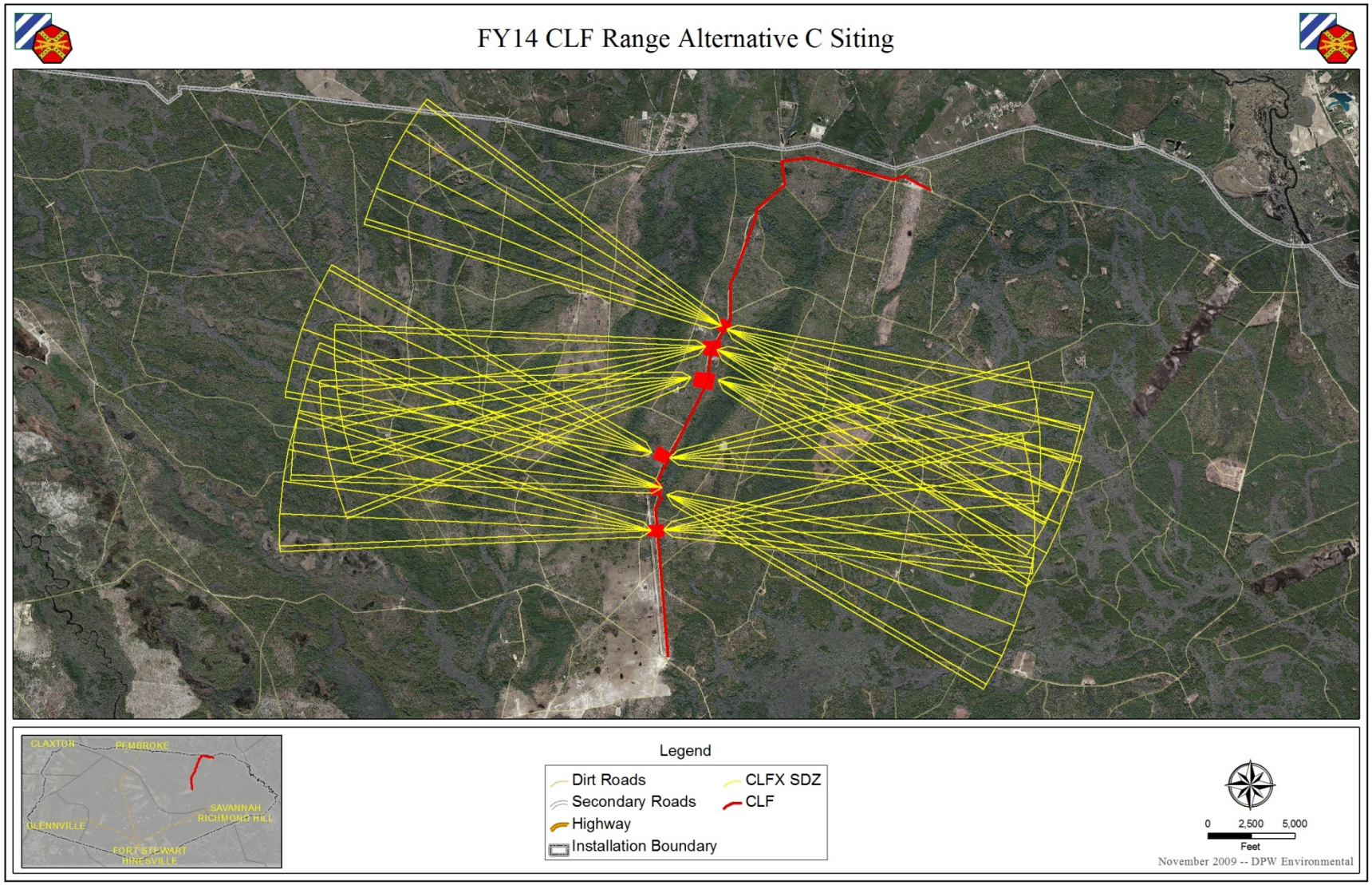


Figure 2-26: FY14 CLFR Alternative C Siting.

2.5 GARRISON FACILITY DESCRIPTIONS AND ALTERNATIVES ANALYSIS

2.5.1 FY11 Sky Warrior Unmanned Aerial Vehicle System (UAVS) Facilities

The Sky Warrior Company will activate at Fort Stewart in FY13. Its mission will be to provide dedicated UAVS support to the Combat Aviation Brigade (CAB). The activation would result in the stationing of an additional 17 Soldiers (one Officer, three Warrant Officers, and 13 Enlisted). Fort Stewart does not currently have the operational and support facilities required to receive the Sky Warrior unit, as all existing facilities suitable for use are fully utilized. These facilities are also necessary to support unit readiness and to house unit personnel. Construction would entail building Company Operations Facilities (COFs), a maintenance hangar, barracks (as none exist on any of the airfields proposed for this unit), and associated parking, as is an access control point, vehicle washrack, oil/water separator, and elevated water storage tank. Uninterrupted airspace allowing the Warrior unit to train with the vehicle is also required.

2.5.1.1 FY11 Sky Warrior UAVS Facilities Alternative B Siting (Preferred)

Activation of the Sky Warrior Unit and its UAVS includes requirements for standardized facilities. Operationally, there is a runway length requirement of at least 5000 feet in order for the Sky Warrior to take off and land, with a clear zone of 500 feet. The optimal site for the Sky Warrior and UAVS, therefore, is an airfield already possessing these capabilities, such as Wright Army Airfield (WAAF), shown in Figure 2-27. An access road from the proposed UAVS facilities is needed to connect to existing FS Road 47, in addition to a runway access route to the maintenance hangar, so the UAVS can be wheeled out to an existing airstrip.

WAAF is a joint use airfield, conducting both military and civilian (City of Hinesville) airfield operations; the UAVS facilities would be constructed on the military side of the airfield. Coordination with the local county and city has been initiated and there are no objections from their side. This site is also close to Fort Stewart's Garrison area and near major road networks, which allows easier travel for personnel.

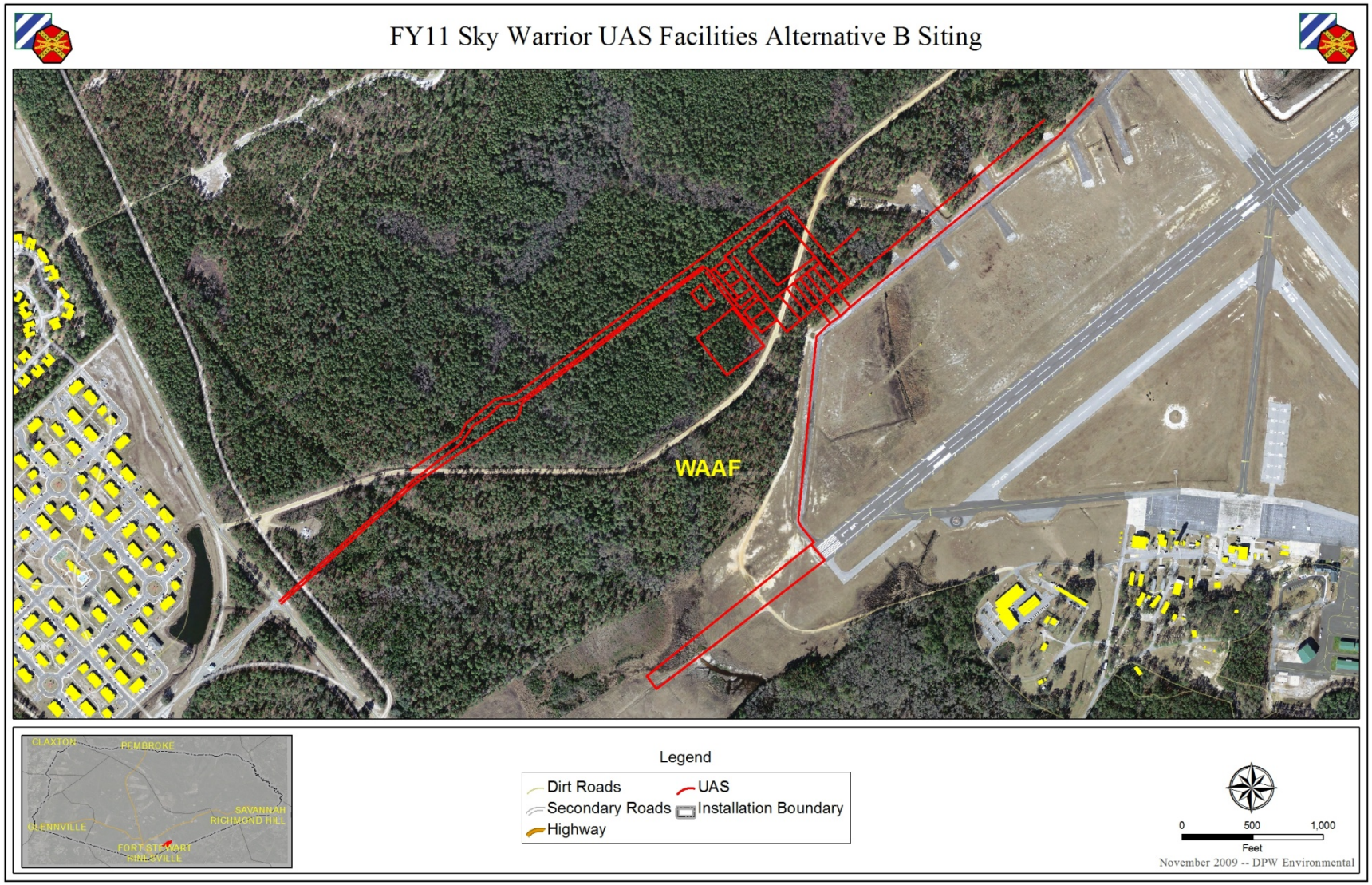


Figure 2-27: FY11 Sky Warrior UAVS Facilities Alternative B Siting (Preferred).

2.5.1.2 FY11 Sky Warrior UAVS Facilities Alternative C Siting

The Alternative C site is located at Evans Army Airfield (EAAF), shown in Figure 2-28. EAAF does not have the current runway capability needed to support the fielding of the UAVS and would require a 3500-foot runway extension, associated clear zones, and construction of support facilities. An adjacent low-level helicopter route borders EAAF, which is a restricted air use area. The Sky Warrior unit would have to adhere to this air use restriction. EAAF is near Fort Stewart's Garrison area and major highways, which provides convenient personnel travel. Siting of the Sky Warrior UAVS facilities and operations at EAAF, however, would mean its aerial vehicles would not have to compete with the civilian uses occurring at WAAF. There are also existing and newly constructed maintenance facilities that could be utilized to reduce the amount of construction needed to support the Sky Warrior unit and equipment.

2.5.1.3 FY11 Sky Warrior UAVS Facilities Alternative Eliminated from Review

Camp Oliver is located in the E-18 TA, approximately 30 miles from the Garrison area and is only accessible by Tank Trail. From an operational standpoint, the distance to and from Camp Oliver would be a burden to personnel traveling each day to train, work, and maintain the Sky Warrior UAVS facilities and equipment. The distance would also hinder timely emergency responses in the event of a crash, and road improvements would be required. Additional upgrades would have to include adding a communications capability and a control tower. The existing runway length is 4000 feet and 75 feet wide. Runway extension and expansion would be required to stand up the Sky Warrior UAVS at Camp Oliver. The operational constraints and limiting emergency response time factor make the Camp Oliver option unfeasible. Therefore, this alternative was eliminated.

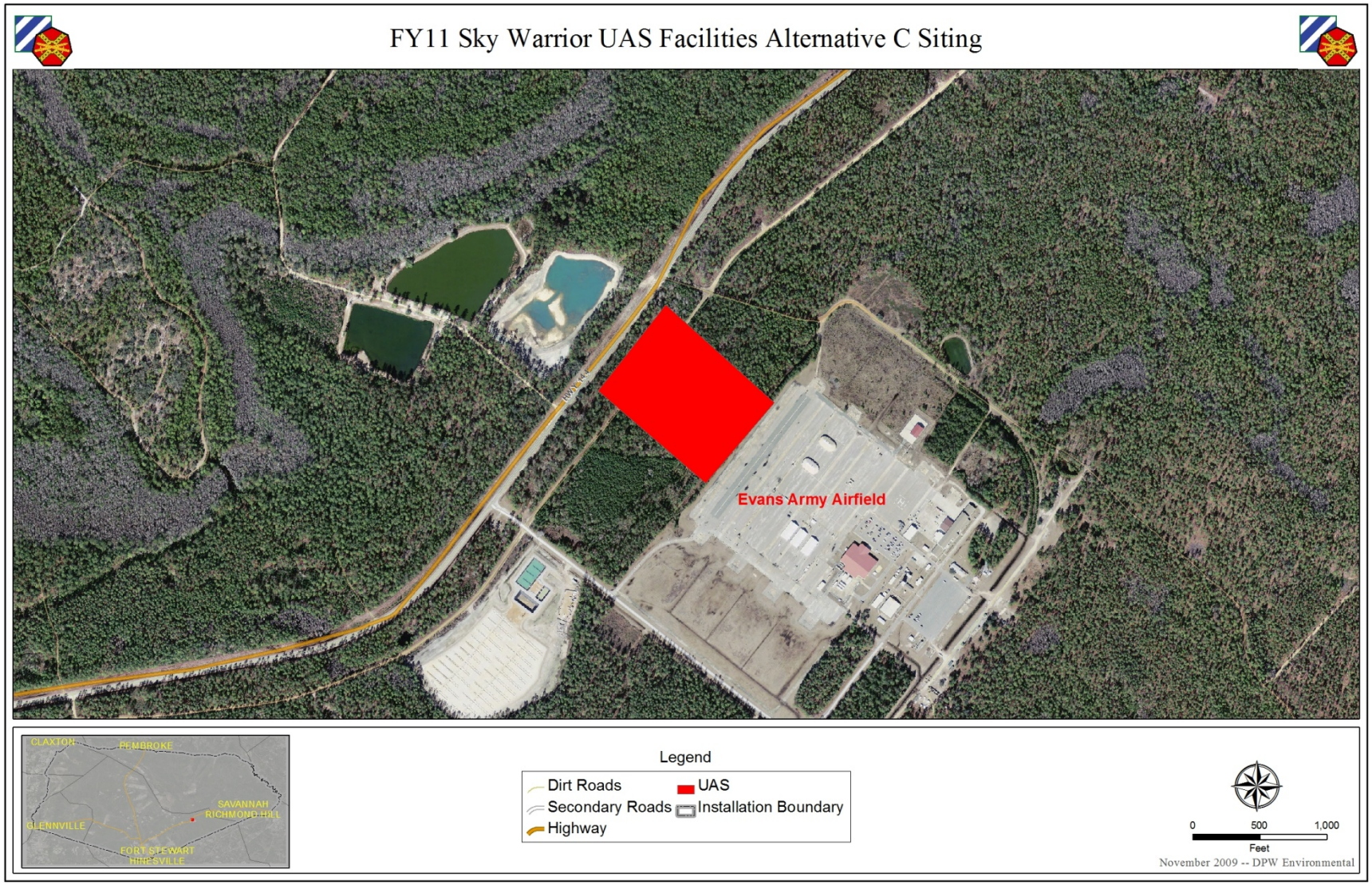


Figure 2-28: FY11 Sky Warrior UAVS Facilities Alternative C Siting.

2.5.2 Engineer Battalion (EN BN) Facilities

The 40th Engineer Battalion (EN BN) was scheduled to activate at Fort Stewart in FY11, then be redesignated the 10th EN BN. The 10th EN BN's mission was to increase the combat effectiveness of Fort Stewart's Heavy Brigade Combat Team by providing mobility and general engineering tasks. The 10th EN BN would have temporarily occupied existing company operations facilities until the proposed battalion complex was constructed. As discussed in Chapter 1, however, the 10th EN BN's relocation to Fort Stewart has been cancelled. This EIS, however, will continue to analyze the construction of required facilities for an EN BN in order to ensure that Fort Stewart will have the ability to absorb a similar-size unit in the near future.

The proposed complex would include one COF with covered hardstand, headquarters building with classrooms, and organizational vehicle and POV parking. Approximately 25 to 50 acres of disturbance would be necessary to construct the proposed complex. The proposed facilities are needed because all existing adequate facilities are being fully utilized to support current operations.

2.5.2.1 EN BN Alternative B Siting (Preferred)

Construction would occur in the B-5 TA, adjacent to the existing 4th Infantry Brigade Combat Team complex located off Georgia Highway 144 (Figure 2-29). The site is undeveloped and links to the existing 4IBCT infrastructure would need to be installed, although potable water and power are available along Highway 144. In terms of land use, there may be some incompatibility since this site's development would expand into areas historically used for dismounted training. A portion of this site also overlaps an inactive range; therefore, a UXO Avoidance Plan is required prior to construction. These operational impacts would not be a problem, as training lands are abundant throughout Fort Stewart. It would not affect the ability of Fort Stewart to attain its mission requirements.

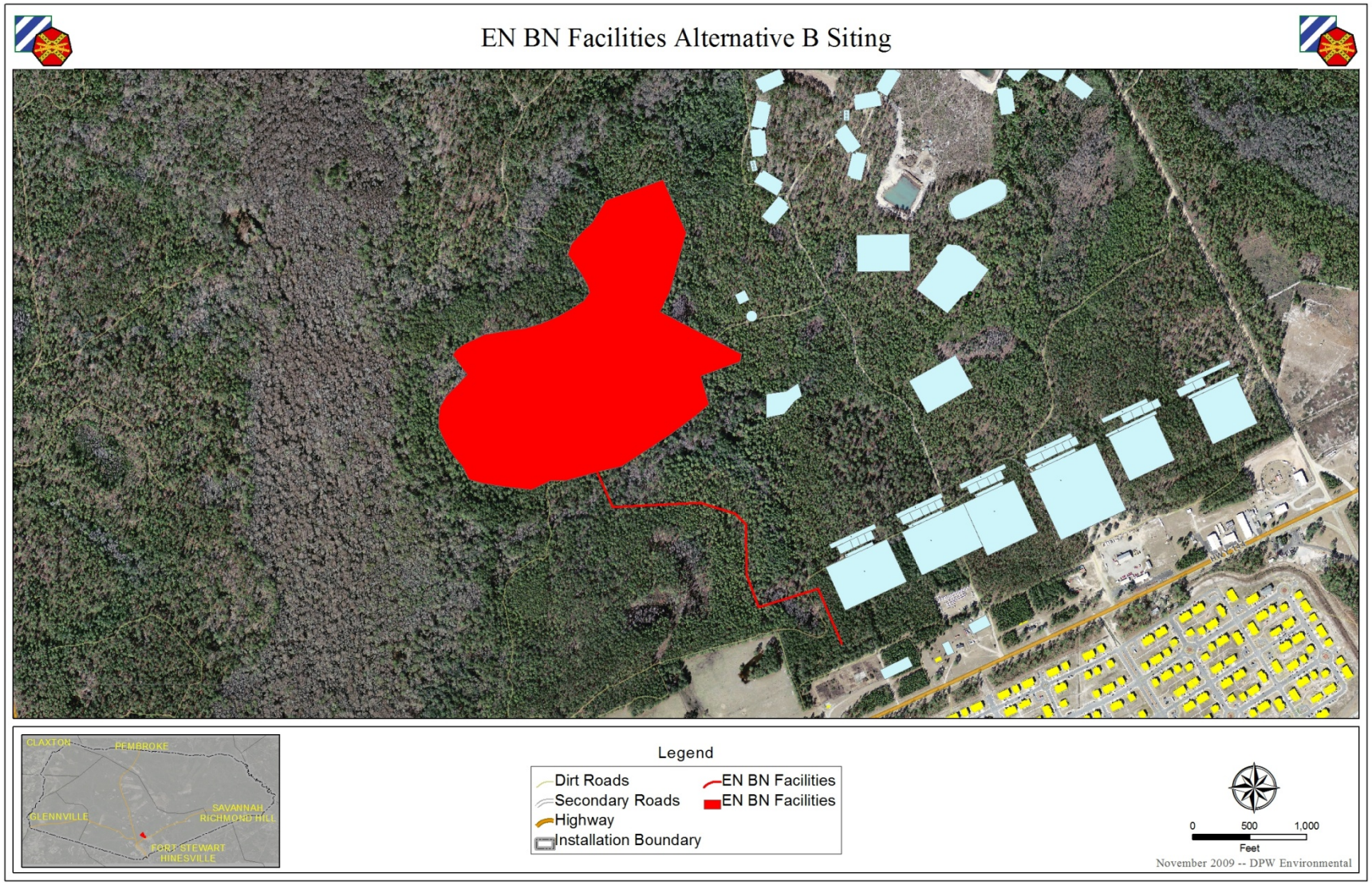


Figure 2-29: Engineer Battalion Facilities Alternative B Siting (Preferred).

2.5.2.2 EN BN Alternative C Siting

This alternative would establish the EN BN complex to the west of the Garrison area along the southern side of FS Road 90, within TA D-1 (Figure 2-30). As with Alternative B, there may be some incompatibility to land use since this site's development would expand into areas historically used for dismounted training. Similar to Alternative B, these operational impacts would not be a problem, as training lands are abundant throughout Fort Stewart and would not affect the ability of Fort Stewart to attain its mission requirements. Recently constructed facilities for the 2nd Brigade Combat Team (BCT) would allow access to nearby utility connections.

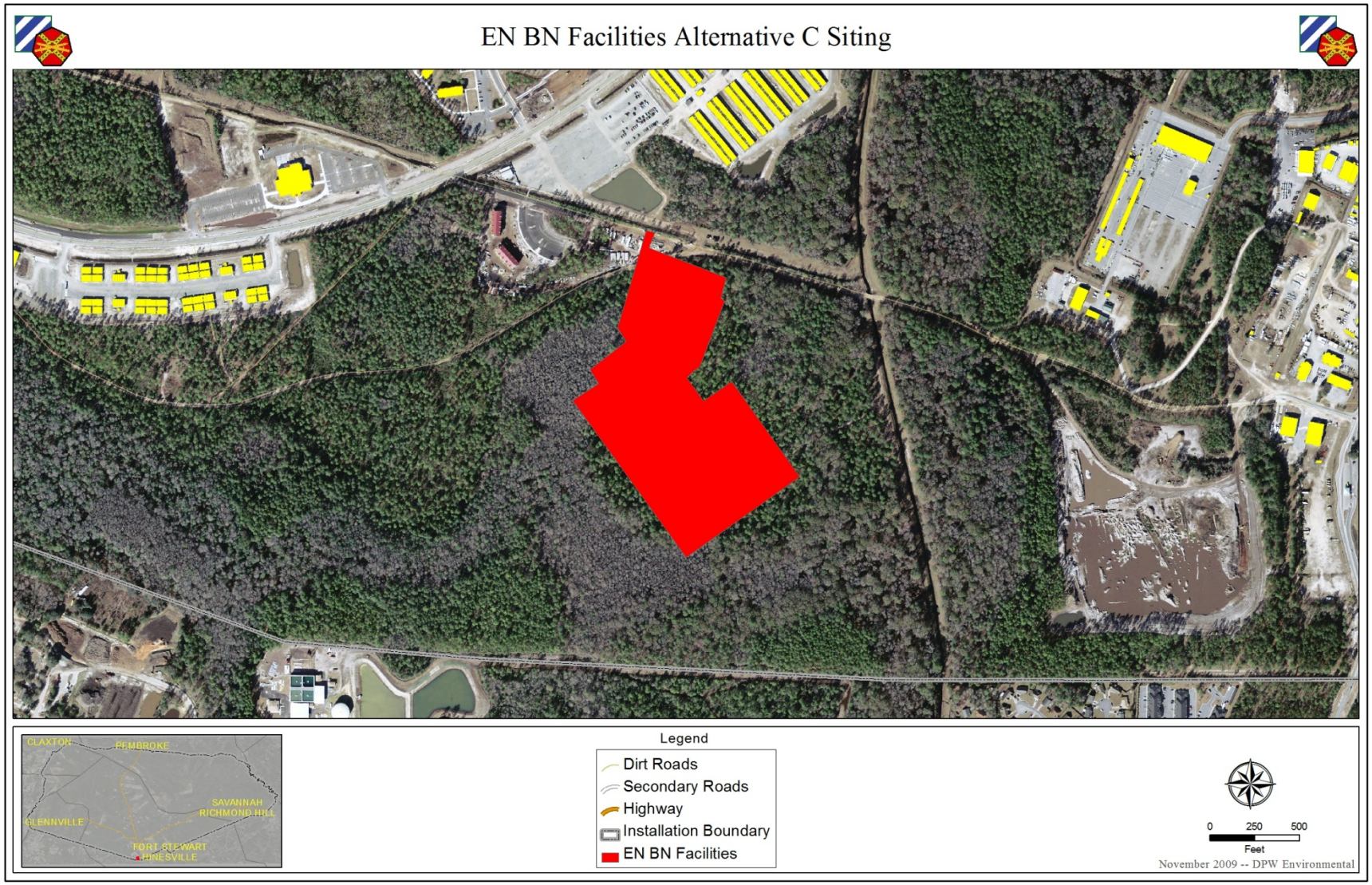


Figure 2-30: Engineer Battalion Facilities Alternative C Siting

3. AFFECTED ENVIRONMENT

This chapter describes the existing environmental and socioeconomic conditions on Fort Stewart, to include its Garrison area, ranges, and training lands. The most up-to-date and accurate information available was used to describe existing environment, facilities, activities, and projects in this Final EIS. The information serves as a baseline from which to identify and evaluate environmental changes resulting from the proposed action and alternatives. The environmental resources discussed in this chapter include geology and soils, air quality, water quality and resources, biological resources, cultural resources, noise, land use, infrastructure, safety, hazardous materials and wastes, and socioeconomics.

Fort Stewart has a number of ongoing environmental management programs and plans which it uses to address impacts to these resources. These include:

- The **Integrated Natural Resources Management Plan** (**INRMP)** defines how Fort Stewart complies with Federal and state laws governing forest ecosystems, wetlands, water quality, endangered species, and general wildlife management. This plan also helps ensure the conservation of natural resources and the maintenance of training lands.
- The **Integrated Cultural Resources Management Plan (ICRMP)** integrates Fort Stewart's cultural resources program with ongoing mission activities to identify potential conflicts and compliance actions necessary to preserve cultural resources while maintaining availability of mission-essential facilities and training lands. A Programmatic Agreement between Fort Stewart and the Georgia State Historic Preservation Office (SHPO) streamlines compliance with Section 106 of the National Historic Preservation Act (NHPA) and allows Fort Stewart to manage historic properties, reporting actions annually to the SHPO. Fort Stewart is required to consult with the SHPO and/or the Federal Advisory Council on Historic Preservation to resolve unavoidable adverse effects.
- In accordance with an Executive Order signed by the President, Fort Stewart emphasizes its commitment to fostering a Sustainable Installation and achieving a high level of environmental performance by implementing a **Sustainability Management System (SMS).** The objectives are to minimize negative environmental impacts, reduce

associated costs, and redirect those resource savings toward the Mission. Over the last few years, accomplishments have been made in the following areas: qualified recycling program implemented; solid waste diversion rate increased (40% reduction goal reached in 2009; striving to reach 50% by 2015); upgraded bio-treatment facility; improved monitoring of threatened and endangered species populations, including increase in number of red-cockaded woodpeckers potential breeding groups (*expect to reach recovery goal of 350 PBGs in 2013, which will reduce training restrictions on Post*); and partnered with city of Hinesville to utilize reuse water from their wastewater treatment plant for irrigation of Installation's golf course and system-cooling water at our central energy plant, thereby freeing up some of Fort Stewart's potable water resources.

- The **Army Compatible Use Buffer (ACUB)** program represents a powerful tool and unique opportunity to work in partnership with states, other governments, and environmental and conservation groups to achieve common goals of sustainability by establishing conservation buffer areas outside the Fort Stewart boundary. Urban development has increased rapidly in the southeast region and is recognized as the most critical factor contributing to the loss of habitat for endangered species. Encroachment from urban development surrounding military Installations can negatively affect the ability of the military to train realistically. The Fort Stewart ACUB program allows Fort Stewart to work with civilian partners to encumber land utilizing conservation easements as the preferred method to protect habitat and training without acquiring new land.
- The Department of Defense Office of Economic Adjustment administers its community planning assistance program through the **Joint Land Use Study (JLUS)** program. The purpose of the JLUS is to promote compatible civilian development patterns near military Installations by applying the local planning process to update local comprehensive plans and supporting land use regulations. The JLUS program relies on strong community planning and land use regulatory capabilities to implement the compatibility recommendations developed by the study through local communities' comprehensive planning programs and processes. The JLUS program is community controlled and community directed. A JLUS is a cooperative effort between the military and the local jurisdictions and is intended to benefit both.

- To identify noise-affected areas around Fort Stewart and to develop cooperative approaches for reducing adverse impacts of noise, the Army established the Fort Stewart **Installation Compatible Use Zone (ICUZ)** program and **Installation Environmental Noise Management Program (IENMP).** The problems of noise incompatibility are minimized by long-range land-use planning and noise abatement procedures. Fort Stewart's IENMP reduces the negative effects of noise through education (both military and civilian), complaint management, noise and vibration mitigation, noise abatement procedures, land use planning, and the "Fly Neighborly" program.
- **Range and Training Land Program (RTLP)** provides for the central management, programming, and policy for modernization of the Army's ranges and their day-to-day operations. The RTLP planning process integrates mission support, environmental stewardship, and economic feasibility and defines procedures for determining range projects and training land requirements to support live fire and maneuver training. The RTLP defines the quality assurance and inspection milestones for range development projects and the standard operating procedures (SOPs) to safely operate military training, recreational, or approved civilian ranges under Army control and support Commanders' METL and Army training strategies. RTLP also establishes the procedures and means by which the Army range infrastructure is managed and maintained on a daily basis, in support of the training mission.
- The **Integrated Training Area Management (ITAM)** program provides Army range officers with the capability to manage and maintain training lands by integrating mission requirements with environmental requirements and sound land management practices. ITAM relies on its four components and an integrated management from Headquarters-Department of the Army (HQDA), and Installations to accomplish its mission. The four components are Training Requirements Integration (TRI), Range and Training Land Assessment (RTLA), Land Rehabilitation and Maintenance (LRAM), and Sustainable Range Awareness (SRA). A Geographic Information System (GIS) is used as a foundational support element that provides geospatial information that assists land managers in decisions making. The ITAM program helps explain how the Army's training requirements affect land management practices, the effect of training on the

lands, how to mitigate and repair the effects, and how to communicate its goals to Soldiers and the public. The Army Sustainable Range Program governs the ITAM.

3.1 GEOGRAPHIC SETTING AND LOCATION

Fort Stewart, comprising about 280,000 acres, is bordered to the north and south by agriculture and wetlands, to the east by the Ogeechee River, and to the west by agricultural lands. The nearest cities are Hinesville, next to the southern boundary and Garrison area; Richmond Hill, one mile to the east of the eastern boundary; Pembroke, two miles to the north of the northern boundary; Glennville, on the western boundary; and Savannah, about 41 miles to the northeast. Fort Stewart is in the Coastal Marine Flatlands region of the Atlantic Coastal Plain physiographic province. The area is flat with an average slope of less than three percent. The land surface consists of rolling terraces gently rising east to west. These terraces are separated by broad, low-lying areas with poor drainage. Elevations average 33 feet above sea level (ASL) east of the Canoochee River with a peak elevation of 183 feet ASL near the western boundary.

Fort Stewart is a large, mostly undeveloped Installation with more than 87% (242,000 acres) composed of upland forest or forested wetlands and the remaining 13% (37,000 acres) composed of open areas, including the Garrison area, ranges, and impact areas. The Garrison area is the “living and working” portion of Fort Stewart, where the following functions co-exist: administrative, company operations, motorpool complexes, residential (bachelor and Family housing), and others. The Artillery Impact Area (AIA) is the primary and largest impact area on Fort Stewart and is in its geographic center.

3.1.1 Fort Stewart Ranges and Training Lands

When not deployed in combat, training is an Army unit's top priority. When at the home station, unit commanders emphasize the need for Soldiers to “train as they fight” and thus maintain combat readiness. "Battle Focus" is a concept used to define training requirements. Units train according to their Mission Essential Task List (METL), which prepares units for why they fight, how they fight, where they fight, and what they must do to win an engagement. The Army trains Soldiers first in individual skills, then on collective tasks (at the unit level), and finally on multi-

echelon training (several units fighting together). Normally, the Army trains according to a Core Mission Essential Task List (CMETL). When a unit is given a specific deployment mission, it trains accordingly to a Directed Mission Essential Task List (DMETL). Units must be trained to meet both standards.

Training ranges and lands are the Army's classroom. Commanders take every opportunity to move Soldiers out into the field, to fire weapons, maneuver as a combined arms team, and incorporate protective measures against enemy actions [Field Manual (FM) 7-1, "Battle Focused Training"]. The implementation of Transformation has required the Army to modernize its training ranges and associated infrastructure. Transformation is a generalized term for the integration of new concepts, organizations, and technology. Construction and modernization of range infrastructure is critical to the continued success of Fort Stewart in meeting its mission requirements and ensuring the training readiness of its Soldiers as well as continued implementation of Transformation.

To help ensure the Army has the lands and ranges it needs to meet future training requirements, the Army has implemented a "Sustainable Range Program." Army Training Circular (TC) 25-8, "Training Ranges," describes the standard designs and requirements of the Army's Sustainable Range Program for training Army units to doctrinal standards. To ensure Soldiers and units are trained to meet combat standards, a suite of live fire ranges and ancillary training areas are required. To ensure Soldiers are operationally deployed, at a minimum they must continually meet semi-annual weapons marksmanship proficiency requirements and conduct realistic maneuver rehearsals. Without adequate ranges and maneuver lands, Soldiers cannot meet these requirements. The Fort Stewart Range and Training Land Program (RTLP) categorizes training resources into seven basic categories, which account for and predict training facility usage at Fort Stewart, as discussed below and in Table 3-1.

Table 3-1: Fort Stewart Ranges.

Range Category	Description
Basic Weapons Marksmanship Ranges	Ranges used to qualify or train on rifles, pistols, sniper rifles, grenade launchers, sub-caliber light anti-armor weapons (LAWs), shotguns, machine guns (MGs), and grenade MGs.
Direct Fire Gunnery Ranges	Ranges used to qualify and train tank and Bradley crews. This category also includes ranges used to qualify anti-armor weapons systems using service ammunition.
Collective Live Fire Ranges	Ranges used for collective training events, such as infantry squad and platoon battle courses (ISBC, IPBC), multipurpose range complexes-heavy and -light (MPRC-H, -L), military operations on urbanized terrain (MOUT) assault courses, and aerial gunnery ranges.
Indirect Fire	Ranges or dedicated firing points used for the qualification and training of mortars, field artillery, or air defense artillery.
Special Live Fire Ranges	Ranges and training areas used for qualification and training of demolitions, live hand grenades, and claymores.
Maneuver Training Areas	Land used for the conduct of force-on-force maneuver training and situational training exercises (STXs). Areas are classified as light, or heavy depending on the type of training they can support. (Note: Lands classified as heavy maneuver areas can also be used to train light forces.)
Other, Non-live Fire Facilities	Assets that are used to train soldiers without the use of weapons, i.e., rappelling towers, drop zones, obstacle courses, gas chambers, and other facilities not covered in the previous categories.

3.1.1.1 Basic Weapons Marksmanship Ranges

There are 15 ranges on Fort Stewart in this category. Most of these ranges are in the Small Arms (SA) Complex and are as follows: SA Alpha, SA Charlie, Clifford Range, SA Delta, SA Echo, SA Foxtrot, SA Golf, SA India, SA Juliet, SA Kilo, SA Lima, SA Mike, Sniper Range, Red Cloud Bravo, and MK-19.

3.1.1.2 Direct Fire Gunnery Ranges

There are nine ranges on Fort Stewart in this category and are named as follows: Bradley Crew Proficiency Course / Tank Crew Proficiency Course, Luzon Range, Yankee, Zulu, Red Cloud Alpha, Red Cloud Foxtrot, Red Cloud Golf, Red Cloud Hotel, and Convoy Live Fire Range. There are four observation points located on the south side of the Artillery Impact Area that aid in direct and indirect fire training.

3.1.1.3 Collective Live Fire Ranges

There are 14 ranges on Fort Stewart in this category and are named as follows: Aerial Gunnery Ranges 1 – 3, Rifle Squad / Platoon Assault Course, Red Cloud Echo, B-18 Infantry Platoon Battle Course, B-22 Live Fire, Multipurpose Range Complex (MPRC), Firing Position 74 Mobile MOUT Village, Multipurpose Machine Gun Range, Shoot House, Tire House, Metz MOUT Village, and Close Quarter Battle Complex.

3.1.1.4 Indirect Firing Points

There are 84 Field Artillery Firing Points on Fort Stewart. Of these, 10 can support Multiple Launch Rocket Systems fire. There are also five mortar points that qualify as indirect firing points.

3.1.1.5 Special Live Fire Ranges

There are two special live fire ranges at Fort Stewart: the SA Hotel Range and Demolition Range/Engineer Qualification Course.

3.1.1.6 Maneuver Training Area

There are 118 maneuver training areas at Fort Stewart. Of these, 64 are categorized as light maneuver (wheeled and dismounted), and 54 as heavy maneuver (tracked and wheeled).

3.1.1.7 Other, Non-Live Fire Facilities

There are numerous other, non-live fire facilities at Fort Stewart, to include the tactical airstrips (rotary wing) at Camp Oliver, Fero, Bastogne, Taylor Creek, Burton, Taro, Remagen, Jaeck, Canoochee, and Cartwright.

Maneuver training builds on all of the individual skills that Soldiers possess and tests each echelon of a brigade's command. Maneuver training land requirements are defined in TC 25-1, "Training Land." Platoons, companies, and battalions within each brigade must engage in unit level training on live-fire ranges to ensure they are trained at a level to safely engage in wartime operations when deployed. Individual Soldier training occurs on small arms ranges. This type of individual training is necessary to hone marksmanship skills, such as zero, pistol, and rifle ranges.

At these live-fire ranges, various weapons systems use different types of munitions. Where possible, inert, more environmentally friendly training rounds are substituted for wartime rounds. All Soldiers must qualify with their individual weapon (rifle or pistol) at least twice annually; crew-served weapons (machine guns and other automatic weapons) qualification varies by type of unit. This training is usually accomplished at the company level on fixed ranges described in TC 25-8, "Training Ranges." Weapons system training (Abrams Tank, Bradley Fighting Vehicle, and Attack Helicopter) consists of a series of "tables" (or exercises) and occurs on large range complexes.

All ranges shut down for a Maintenance Day after 21 days of use. This applies to all ranges to ensure targets are functional and berms are not deteriorating or failing. Environmental Division utilizes these Maintenance Days for surveys and other needed access. A scheduling and de-conflicting meeting is held the last Tuesday of each month. The scheduling is done six months out and presents a good opportunity to see when available days are coming up in which to plan surveys (Griggs, personal communication, 2009).

The ITAM program is responsible for the maintenance and rehabilitation of training lands (non-ranges). They conduct these actions on an as-needed basis, determined by ITAM personnel's visual inspections of the areas (Brown, personal communication, 2009).

In addition to live fire training ranges, a certain amount of maneuver area is also required for combat readiness. Maneuver training provides units with the skills to synchronize execution of battle tasks and shoot, move, and communicate on the battlefield. On Fort Stewart, most maneuver training occurs on the western half of the Installation in an area called the Western Maneuver Area. Force-on-force battalion and brigade maneuver training events can be the capstone training exercises that test and certify whether a particular unit is qualified for operational deployments abroad.

3.1.2 Fort Stewart Training and Range Requirements

To ensure their operational capabilities, each platoon, company, battalion, and brigade must conduct a number of maneuver training events. Each platoon and company must train up to five weeks per year to meet maneuver training requirements. In addition, each battalion must conduct semiannual maneuvers lasting approximately three weeks, twice per year, to certify its subordinate platoons and companies. Each brigade must conduct maneuvers every 12-18 months in advance of operational deployments. Fort Stewart has a robust range and training land infrastructure that supports Abrams Tank, Bradley Fighting Vehicle, Aerial Gunnery, Artillery Live Fire Training, other assorted live fire training, maneuver training, and individual, team, and collective tasks.

Optimally, the 3D Infantry Division's two HBCTs, IBCT, SB, and CAB train on a green, amber, red training cycle when all Brigades are at home station (Fort Stewart and HAAF). The Green BCT is in the field training; the Amber BCT is preparing to go in the field (getting equipment ready, etc.); and the Red BCT is on leave, taking classroom training, etc. So, again, only one BCT is in the field at any one time. This does not change with the addition of

new ranges. All BCTs will still be in the Red-Amber-Green cycle and only one BCT at a time is in the field utilizing the ranges and training lands.

This training cycle helps to ensure no degradation to the training quality of the land. In other words, the training environment must be realistic and in good shape; this is not possible if appropriate resting and management practices are not in place. Currently, since many of its Brigades are deployed and not at home, Fort Stewart is operating on a deployment schedule, which means there is no problem accommodating all tenant and visiting Army National Guard units needing to use the ranges and training lands and the red-amber-green training cycle does not have to be in effect. Once all Brigades are home again, however, the red-amber-green training cycle will resume and ranges and training lands more rigidly scheduled. Therefore, the frequency of range and training lands use will be the same under the No Action and Action Alternatives (B or C) (Griggs, personal communication, 2009).

3.2 GEOLOGY AND SOILS

Earth resources include the geology and soils at Fort Stewart. No known petroleum or minerals of commercial value except sand, clay, and gravel occur on Fort Stewart. Bedrock and other parent materials are discussed in the Geology section. Soils, discussed later in this section, are the unconsolidated earthen materials overlying the bedrock.

3.2.1 Geology

The bedrock in the Fort Stewart area is composed primarily of rock formations ranging in age from the Precambrian (570 million years old) to Triassic (205 to 240 million years old) ages. This local bedrock is overlain with thick wedges of unconsolidated and partially consolidated sediments. A series of terraces, known as shore terraces, lie along the Coastal Plain. These sediments were greatly influenced by the rise and fall of sea levels during the Pleistocene Epoch (10,000 to 2 million years old) as glaciers repeatedly advanced and retreated.

While these great ice sheets did not reach Georgia, their influence can be seen in a series of terraces on the Coastal Plain. Each of these terraces occur at lower elevations seaward and were deposited as a result of changes in sea level in response to climatic change. These shore terraces were formed by wave action from the bluff at the shoreline to some distance offshore. Primarily four marine terraces occur on Fort Stewart: the Wicomico, Penholoway, Talbot, and Pamlico formations (Figure 3-1).

Except for the higher and more rolling western portion of Fort Stewart, the topography is generally flat. Slopes are less than 3% on most of Fort Stewart (The Nature Conservancy, 1995). A wedge of sediments dips thickens from a thin edge at the inland margin to great thicknesses along the Atlantic coast (near Savannah). The inland margin of the oldest formation, referred to as the Fall Line, occurs in a northeast-southwest direction on the surface and is about 115 miles northwest of Hinesville. The Miocene-aged units in this area (5 million to 24 million years old) represent three separate deposits related to cycles of sea level rise and fall. Each sequence consists of a basal limestone layer, a middle clay layer, and an upper sand layer. The Post-Miocene formations are largely undifferentiated, consisting of layers of sand, clay, and thin limestone beds (Fort Stewart, December 2007).

3.2.2 Soils

Most of the soil at Fort Stewart is classified as sandy and infertile. Soils in low-lying, poorly drained areas are high in organic matter and can remain saturated with water for eight months or more every year. Mechanized equipment and tanks cannot travel on these soils. The Installation has training area inspectors (from the Installation's Environmental Division, Integrated Training Area Management team, and Range Control Division) who routinely inspect tank trails, range access roads, range course roads, and dirt roads/trails to see if any damage is occurring (such as hardened tank trails or water crossings need repairs, to prevent sedimentation of adjacent streams). These inspectors report these issues and the Installation works to get them fixed before they become a detriment to the environment or Soldier training.

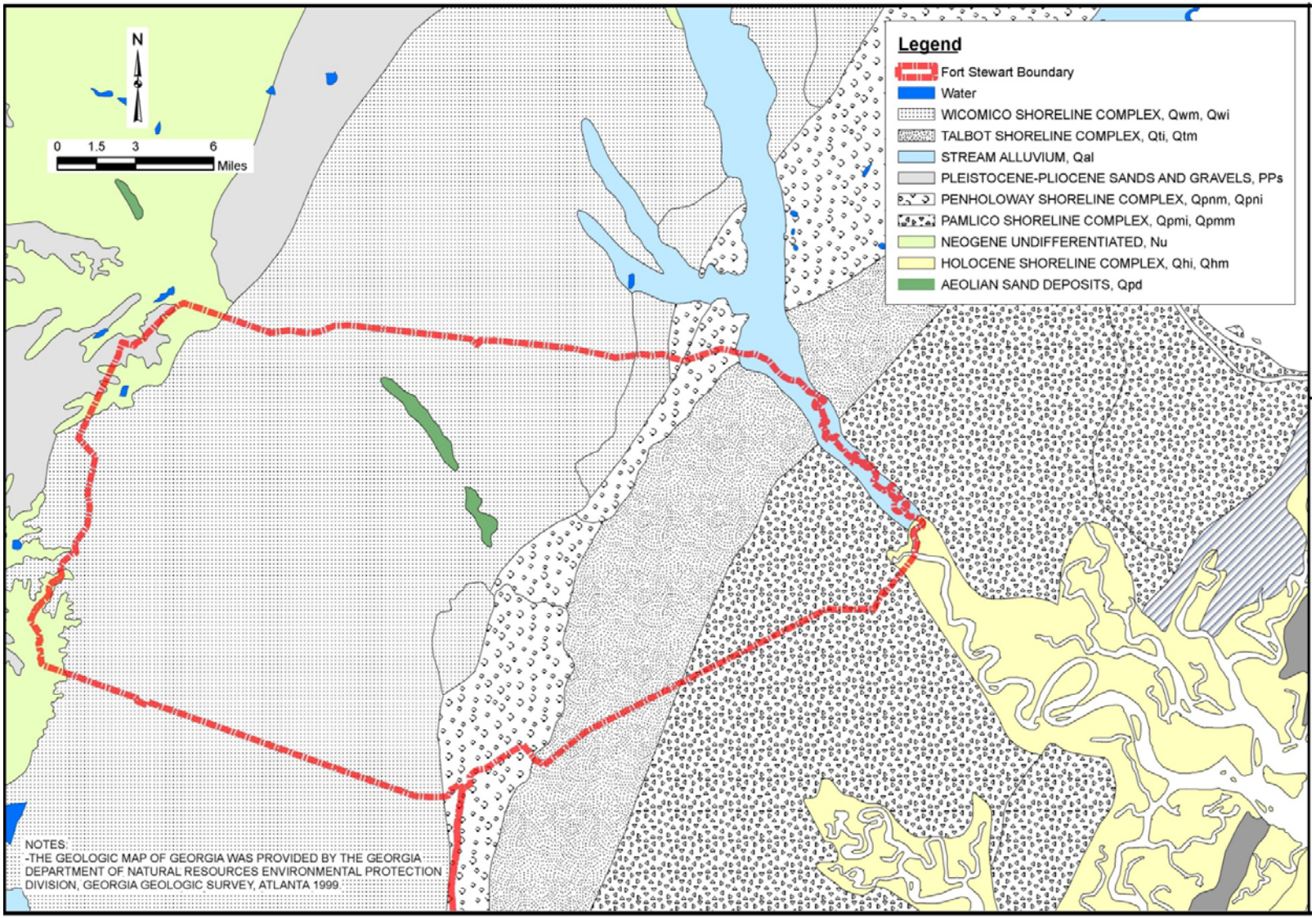


Figure 3-1: Regional Geology at Fort Stewart.

Some of the soil on Fort Stewart has been rated as fair to good sources of road fill, and borrow pits to support construction around the Garrison have been excavated from this soil (see Section 3.2.3, below, for further discussion). Additional details about the soil and its related acreage are available in the INRMP. The Georgia Erosion and Sediment Control Act (ESCA) of 1975 requires that land-disturbing activities in Georgia are protected from erosion and sedimentation caused by rainfall from a 25-year storm. A storm with rainfall intensity of approximately 8 inches per 24 hours and that occurs once in 25 years (or has a 4% probability of occurring in any one year) is a 25-year storm. Land-disturbing activities that affect wetlands or streams require a strict "no failures tolerated" implementation of erosion control measures to protect wetlands and streams from stormwater.

Construction projects with the potential to impact soils must adopt all erosion and sedimentation best management practices (BMPs). Erosion and sedimentation problems may occur when BMPs are not properly maintained or implemented. All erosion and sediment control measures must be designed and implemented in accordance with the *Georgia Manual for Erosion and Sediment Control*, published by the GA Soil and Water Conservation Commission, as of January 1 of the year the land disturbing activity is permitted, and the Official Code of Georgia 12-7-6. Since 2001, for example, the Installation has spent more than $15 million on erosion and sediment control projects for existing facilities, roads, tank trails, and other applicable structures in the cantonment area and range and training lands. Fort Stewart also hardened the tank trail crossing the Metz Training Area, eliminating an estimated 300 tons of silts and sediments previously transferring to waters of the state (Canoochee Creek) during rain events. Similar environmental results were achieved by hardening tank trail crossings at Bridges 11, 28, and 29, and at Fort Stewart Road 29 (East and West).

Additional guidance for identification and protection of streamside management zones or stream buffers is contained in *BMPs for Forestry* (Georgia Forestry Commission, May 2009) and *BMPs for Forested Wetlands* (Georgia Forestry Association Wetlands Committee, April 1993). Wetlands are discussed in further detail in Section 3.4.5 of this EIS. Additional erosion control measures are listed as integrated management practices in the low impact development, a new stormwater management strategy used in facility designs that incorporates many of the BMPs.

Although construction projects are monitored for adherence to permits and BMPs, site preparation does disturb soil and reduce vegetative cover. The area cleared may differ from project to project because in some cases more land may need clearing while in others some of the vegetation may remain and be topped to allow line of sight, minimizing the area susceptible to erosion.

3.2.3 Borrow Pits

There are currently 64 active borrow pits conveniently located throughout Fort Stewart. The purpose is to provide the Fort Stewart Directorate of Public Works (DPW) with an on-site source of suitable soils for use as fill material in forestry, construction, and maintenance of ranges and training lands. In addition, there are many future projects with an undetermined need for fill. To ensure Fort Stewart has adequate fill for its current and future projects, expansion of 60 of the 64 total existing borrow pits is permitted and expansion zones of approximately two acres per pit are already sited and mapped. The borrow pit expansions do not affect wetlands, threatened and endangered species, and/or historic properties. Existing borrow pits and expansion areas are included in the *Finding of No Significant Impact and Operation and Management of Borrow Pits Environmental Assessment* (July 2006). All borrow pit design and excavation actions support the objective of the borrow pit eventually becoming a recreational pond, if soil conditions, location, and groundwater resources favor such development.

Management of the open borrow pits is done in accordance with the procedures outlined in the *Fort Stewart Borrow Pit Excavation Management Plan*. The Environmental Division's Borrow Pit Manager is responsible for overseeing and permitting all borrow pit activities performed at Fort Stewart. The permit is project-specific and documents the specific planned excavation activities to ensure protection of adjacent resources from effects of erosion and sedimentation. Upon completion of the work, a borrow pit management representative inspects the completed work for compliance with the permit. In the event that a contractor has adversely deviated from the permit, corrective action is taken. The permit information, including comments and notes, is

maintained within the Borrow Pit database for future reference. A new application is required for any new work, even if by the same contractor.

3.3 AIR QUALITY

Air quality in a given location is described by the concentration of various pollutants in the atmosphere. This section of the EIS describes regulatory compliance as well as the current emissions and baseline greenhouse gas emissions at Fort Stewart.

3.3.1 Regulatory Compliance

The significance of the pollutant concentration is determined by comparing it to the Federal and state ambient air quality standards. The Clean Air Act (CAA) and its subsequent amendments established the National Ambient Air Quality Standards (NAAQS) for six "criteria" pollutants: ozone, carbon monoxide, nitrogen oxides, sulfur oxides, particulate matter less than 10 and 2.5 microns, and lead. These standards represent the maximum allowable atmospheric concentrations that may occur without endangering residents' health. These six "criteria" pollutants are all well below NAAQS limits at Fort Stewart.

The Prevention of Significant Deterioration (PSD) program, created by the CAA, established land classification schemes for those areas of the country (like Fort Stewart) with air quality better than the NAAQS. Class I allows very little deterioration of air quality; Class II allows moderate deterioration; and Class III allows more deterioration. However, in all cases, the pollution concentrations must not violate any of the NAAQS. Mandatory Class I areas include

- International parks,
- National wilderness areas and national memorial parks larger than 5,000 acres, and
- National parks larger than 6,000 acres existing as of August 7, 1977 (National Park Service, April 1981).

On November 30, 1979, the Federal Register announced that 48 mandatory Class I areas were designated for management by the National Park System and 21 mandatory Class I areas were

designated for management by U.S. Fish and Wildlife Service (USFWS). The nearest Class I areas to Fort Stewart are the Great Smoky Mountains National Park in Tennessee and North Carolina and Wolf Island National Wildlife Refuge and Okefenokee National Wildlife Refuge in Georgia.

Fort Stewart is considered a major source of air emissions and falls under Title V of the CAA because it has the potential to emit 100 tons per year (tpy) of any one criteria pollutant and 25 tpy of total combined hazardous air pollutants. The state of Georgia issued Fort Stewart a Title V Permit (Part 70 Operating Permit No. 9711-179-0018-V-02-0) on October 20, 2009. Federal New Source Performance Standards (NSPS), 40 CFR 60, Subpart A "General Provisions," and Subpart D "Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units" apply to boilers that have an input capacity from $10x10^6$ Btu/hr to $100x10^6$ Btu/hr built after June 1989. Three boilers (ID H009-H011) at Fort Stewart are subject to these requirements.

NSPS 40 CFR 60, Subpart A "General Provisions" and Subpart IIII "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines" apply to owners and operators of stationary CI ICE that commence construction of, modification of, or reconstruction of their stationary CI ICE after July 11, 2005. Several emergency generators (ID G-172 and G-176 through G-181, as well as new generators installed in CY2009) at Fort Stewart are subject to these requirements.

Both 40 CFR 63, Subpart A "General Provisions," and Subpart Z "National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines" apply to owners and operators of stationary RICE based on size, date of construction, and whether the source is located in a major or area source for hazardous air pollutants (HAP). The emergency generators at Fort Stewart that are subject to NSPS are also subject to the NESHAP. 40 CFR 63, Subpart G "National Emission Standards for Hazardous Air Pollutants: Site Remediation" applies to all remediation activity occurring at Fort Stewart. However, so long as total, facility-wide emissions of all HAP from all remediation activity remains less than 1 mega gram per year, Fort Stewart is only subject to record-keeping requirements.

3.3.2 Baseline Emissions

Fort Stewart is in the Savannah-Beaufort Interstate Air Quality Control Region, an area classified by EPA as attainment/unclassifiable for all NAAQS for all criteria pollutants (40 CFR 81.311). GEOMET Technologies conducted an air emission inventory reflecting calendar year 2007 operations at Fort Stewart. This inventory was used to support the calculation of the air emissions fees that Fort Stewart must submit annually to the Georgia EPD and is the most current data available. Title V requires states to develop and submit programs to the EPA for issuing operating permits for major stationary sources of air pollution; therefore, this inventory includes only stationary (including fugitive) sources. Mobile sources of air pollution (such as government-owned vehicles, private vehicles, aerospace ground equipment, field ground equipment, and aircraft) are not included in the inventory.

Emissions were reported for criteria pollutants, HAPs, and ozone-depleting substances. Criteria pollutants are those for which air quality "criteria" have been established under Section 108 of the CAA. Section 112 defines HAPs, and Title VI of the CAA defines ozone-depleting substances. Ozone is formed in the troposphere; therefore, volatile organic compound (VOC) emissions are reported as a surrogate for ozone. Particulate matter emissions are classified as total particulate matter, particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM-10), and particulate matter with an aerodynamic diameter less than or equal to 2.5 microns (PM-2.5). Results of the stationary source inventory show that actual criteria pollutant emissions during 2007 were, in order of descending emissions:

- Carbon monoxide – 9,240.5 tpy
- Particulate matter – 1,425.3 tpy
- PM-10/PM 2.5 – 1,033.5 tpy
- VOCs – 351.7 tpy
- Nitrogen oxides – 176.8 tpy
- Sulfur oxides – 2.1 tpy
- Lead – negligible.

The largest source of actual criteria pollutant emissions at Fort Stewart during 2007 was prescribed burning. Criteria emissions from this category far exceed all other emission. Note that this does not represent operations, as the wood-fired boiler was not operational during 2007. Although prescribed burning is a major contributor to criteria pollutants and hazardous air pollutants, the results from a catastrophic wildfire would be even more pronounced. Furthermore, the impacts to greenhouse gas emissions would also be greater from uncontrolled fires. The consensus is that prescribed fire increases carbon sequestration by (a) returning nutrients, which increase tree growth, to the soil and (b) reducing the risk of catastrophic fire, which would remove most of the cumulated biomass and increase greenhouse gas emissions (McNulty, personal communication, 2009). Therefore, the prescribed burn program at Fort Stewart is not an adverse event to this program area.

A total of 70 HAPs were identified as being emitted from Fort Stewart. Actual emissions estimates indicate that the most significant HAPs emitted (for example, actual emissions >1.0 tpy) are:

- Toluene – 4.81 tpy,
- Methyl isobutyl ketone – 2.31 tpy,
- Methyl tertiary-butyl ether – 1.94 tpy,
- Polycyclic organic matter – 1.8 tpy,
- Xylene – 1.54 tpy, and
- Methanol – 1.27 tpy,

The largest sources of HAP emissions at the Post are spray-painting operations, prescribed burning, miscellaneous product use, landfills, fueling operations, and heating units. In addition to criteria pollutants and hazardous air pollutants, seven ozone-depleting substances were identified at Fort Stewart, consisting of refrigerant leaks and landfills. The seven ozone-depleting substances were:

- 1,1,1-Trifluoroethane – 0.025 tpy
- Chlorodifluoromethane – 0.629 tpy
- Dichlorodifluoromethane – 0.243 tpy
- Dichlorofluoromethane – 0.035 tpy

- 1,1,1,2-Tetrafluoroethane – 0.032 tpy
- Pentafluoroethane – 0.021 tpy
- Trichloromonofluoromethane – 0.013 tpy

3.3.3 Baseline Greenhouse Gases

Fort Stewart has a temperate climate characterized by warm, humid summers and mild winters. Table 3-2 presents a monthly climate summary based on data from August 1, 1964, to December 31, 2008. Temperatures range from an average of 82.5 degrees Fahrenheit in July to 51.4 degrees Fahrenheit in January. The average annual precipitation is about 48 inches with about half of that falling during summer thunderstorms. The wettest month is August and driest is November. Snow is rare, and the frost-free season averages about 270 days. Tropical storms and hurricanes pose an occasional threat of high winds and heavy precipitation, especially August through October.

Table 3-2 Fort Stewart Monthly Climate Summary.

Month	Average Maximum Temperature (°F)	Average Minimum Temperature (°F)	Average Total Precipitation (in.)	Average Total Snowfall (in.)
January	62.7	40.1	3.88	0.0
February	66.0	42.2	3.24	0.0
March	73.3	48.1	3.92	0.0
April	80.0	54.4	2.60	0.0
May	86.1	62.0	3.75	0.0
June	90.3	68.8	5.41	0.0
July	93.1	71.9	6.12	0.0
August	91.3	71.6	6.35	0.0
September	87.3	67.8	4.37	0.0
October	79.5	57.7	3.22	0.0
November	72.0	48.6	2.47	0.0
December	65.0	42.3	3.02	0.1
Total Annual	78.9	56.3	48.35	0.1

Source: Southeast Regional Climate Center

Georgia does not have a program or policy requiring the reduction of greenhouse gases, but is following the activities associated with the development of a national policy. Congress directed the EPA to create a rule requiring mandatory reporting of greenhouse gas emissions under the Consolidated Appropriations Act of 2008 (H.R. 2764; Public Law 110–161). Congress also directed the EPA to create the reporting threshold and determine the reporting frequency for greenhouse gas emissions. On May 21, 2007, the state of Georgia became a member of The Climate Registry, a nonprofit organization formed by 39 states to develop a standardized methodology to report greenhouse gas emissions. More information on The Climate Registry is available at www.theclimateregistry.org.

GEOMET Technologies (September, 2008b) conducted a greenhouse gas emissions inventory for Fort Stewart, using the guidelines outlined in the *California Climate Action Registry General Reporting Protocol Version 2.2* (Protocol) to quantify the greenhouse gas emissions for several of its sources. The California Climate Action Registry is closely related to The Climate Registry, and the two entities worked together to finalize The Climate Registry's General Reporting Protocol Version 1.1. These guidelines are in line with the World Resources Institute's policies on greenhouse gas inventories and, therefore, are acceptable to EPA.

Greenhouse gas inventories, although not yet mandatory, are helpful because they provide a record of greenhouse gas emissions. As inventories are compiled in the years following the baseline inventory assessment, reductions in greenhouse gas emissions can be evaluated. Having a baseline inventory will also assist Fort Stewart when greenhouse gas reporting regulations are in place. Additionally, it can serve as further proof of Fort Stewart's environmental commitment. Greenhouse gas inventories assist in accounting for emissions during a certain time-period. The inventories typically account for six gases: carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, eight varieties of hydrofluorocarbons, and six varieties of perfluorocarbons (PFC). These gases both occur naturally and are human-induced. They are part of the Kyoto Protocol, an international agreement to reduce greenhouse gas emissions in the atmosphere.

Fort Stewart has multiple sources of greenhouse gas emissions. The carbon dioxide equivalent (CO_2e) emissions for 2006 from Fort Stewart were 497,715 metric tons. The emissions generated from the mobile combustion sector account for about 65 % of the total greenhouse gas inventory. The source with the second greatest emissions is electricity use. Greenhouse gas emissions generated from electricity use account for 29% of the carbon-dioxide-equivalent emissions at Fort Stewart. The smallest contributor to the greenhouse gas emissions generated at Fort Stewart is the stationary combustion source sector. This sector accounts for less than 6% of the greenhouse gas emissions. In the stationary source sector, wood combustion makes up the majority of the emissions, followed by natural gas combustion, with a small contribution from fuel oil and propane fuel combustion. Because there are so many variables, a 2009 figure has been difficult to calculate. The 2006 figures, however, provide an approximate baseline for discussion purposes in this EIS.

3.4 WATER QUALITY AND RESOURCES

The Clean Water Act (CWA) of 1972 protects the nation's waters, including lakes, rivers, aquifers, navigable waters (including intermittent streams), impoundments, tributary streams, and wetlands. The primary objective of the act is to restore and preserve the nation's waters. Jurisdictional "waters of the U.S." are regulated resources and are subject to Federal authority under Section 404 of the CWA. "Waters of the U.S." is broadly defined to include navigable waters (including intermittent streams), impoundments, tributary streams, and wetlands (Fort Stewart, 2008).

Aquatic resources at Fort Stewart include natural cypress bogs, evergreen bays, streams and rivers, and their associated bottomland hardwood swamps. Some manmade facilities were present before military occupation, including millponds and rice fields. Existing aquatic resources are discussed as surface water bodies, surface water quality, floodplains, and wetlands.

3.4.1 Surface Water

Four watersheds occur within Fort Stewart's boundaries: the Altamaha, Canoochee, Lower Ogeechee, and Ogeechee Coastal watersheds. Most of Fort Stewart is in the Canoochee River watershed, which is also the site of most of the proposed ranges and projects. The Canoochee River traverses from the northwest corner to the eastern side (Figure 3-2) with about 30 miles inside Fort Stewart. The Canoochee River originates in Emanuel County, Georgia, about 60 miles northwest of Fort Stewart (The Nature Conservancy, 1995).

The Canoochee watershed is further divided into sub-watersheds, which ultimately drain into the Ogeechee River watershed. Kirkland Creek, Taylors Creek, Gum Branch, Horse Creek, and Mill Creek drain into the western and southwestern portions; and Canoochee Creek, Otter Hope Branch, and Canoochee River drain into the northwestern portions. Boggy Pond, Cypress Bay, Cross Bay, Caney Bay, Malden Branch, and Savage Creek drain into the northern portions (with Little Creek and Black Creek draining some wetland areas north on Fort Stewart to the Ogeechee River); and Clyde Creek on the eastern portion, draining to the Canoochee River. Raccoon Branch and Mouat Hope Creek drain at the southeast boundary of Fort Stewart into Jerico Creek, which drains to the Jerico River; Melvin Swamp, Big Swamp, and Goshen Swamp at the southern portion of the Garrison area drain to Peacock Creek; ultimately, all drain into the Ogeechee River watershed (Moncrief, personal communication, 2009).

The Installation has about 265 miles of freshwater rivers and streams and an additional 12 miles of brackish water streams. The INRMP, which sets forth procedures for managing fish, vegetation, and wildlife, reports 1,454 acres of ponds, reservoirs, and borrow pits on Fort Stewart (Fort Stewart, December 2007). The following 22 water bodies either drain into or from Fort Stewart: Slades Branch, Beards Creek, Kirkland Creek, Taylors Creek, Gum Branch, Horse Creek, Mill Creek, Canoochee Creek, Otter Hope Branch, Canoochee River, Boggy Pond, Savage Creek, Cypress Bay, Cross Bay, Malden Branch, Little Creek, Black Creek, Raccoon Branch, Mouat Hope Creek, Melvin Swamp, Goshen Swamp, and Big Swamp (Moncrief, personal communication, 2009). Many of the streams draining the Garrison area are channelized and maintained by dredging (Cisar and Rohr, 2004).

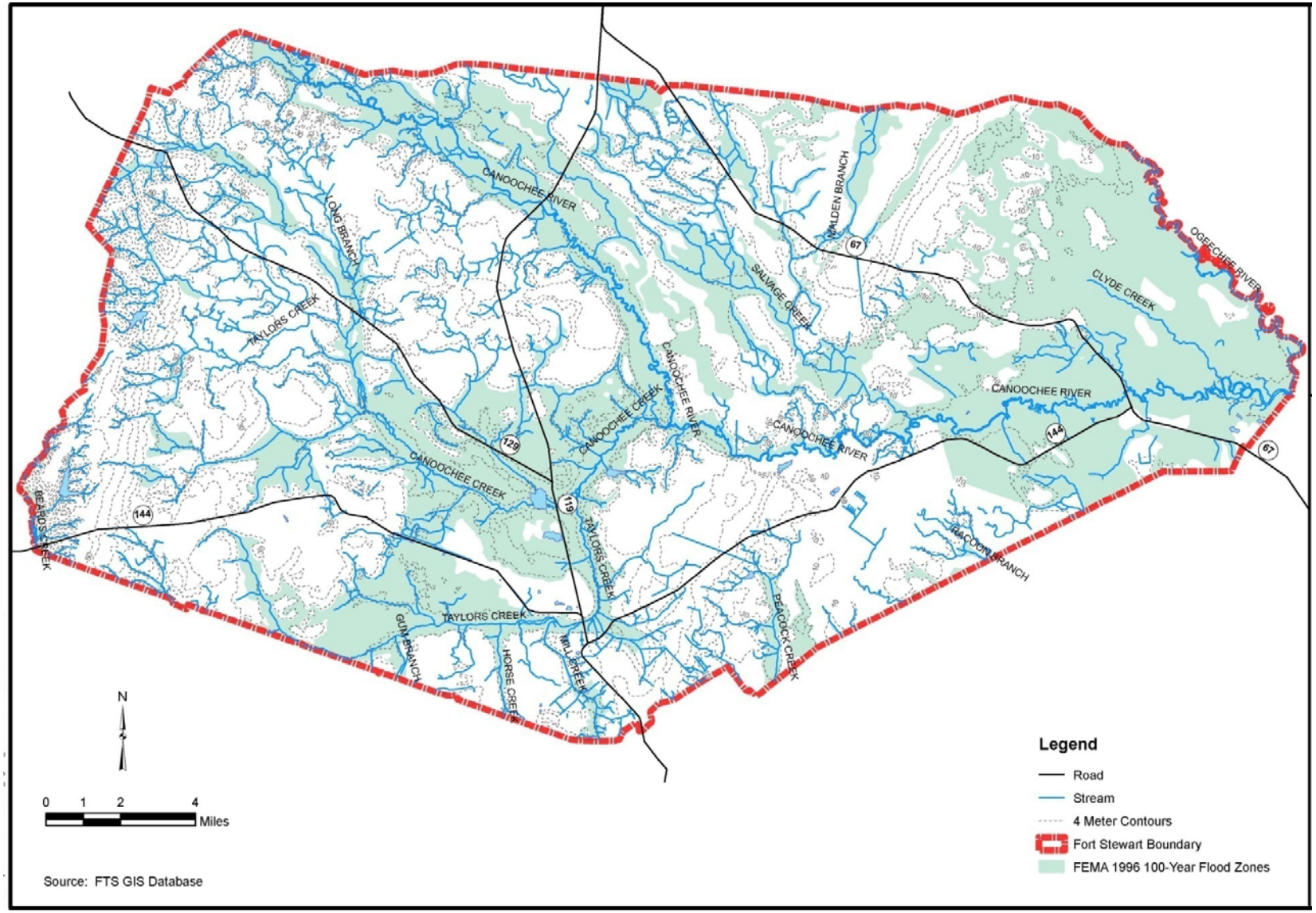


Figure 3-2: Surface Water Bodies on Fort Stewart.

The Ogeechee River also originates in the Coastal Plain, about 130 miles north-northwest of Fort Stewart in Hancock County, Georgia. The Ogeechee drains the extreme northeastern portion of Fort Stewart. The Ogeechee joins the Canoochee at the eastern boundary of Fort Stewart. From its confluence with the Canoochee, the Ogeechee flows into the Atlantic Ocean, about 30 river miles away. Two additional watersheds drain to the Ogeechee River: the Lower Ogeechee River and Coastal Ogeechee watersheds. The Coastal Ogeechee watershed has two sub-watersheds: the Midway River and North Newport River.

While the Ogeechee generally carries a high silt load, the Canoochee River does not carry a heavy silt load, and has not developed large natural levees. The floodplain is generally narrow with little migration of the stream channel. Organic matter content is generally high in the Canoochee River (Jones Technologies, 2001). Both the Ogeechee River and the Canoochee River are blackwater streams, which are acidic with low nutrient concentrations and low buffer capacity; the high quantity of dissolved organic carbon results in a dark color.

A small portion of Fort Stewart, along the extreme western boundary, is within the Altamaha River watershed. Beards Creek and Slades Branch are part of this drainage. A portion of the southeastern border of Fort Stewart drains southward to the Jerico River and the North Newport River. Streams in this drainage include Raccoon Branch, Mouat Hope Creek, and numerous unnamed tributaries (The Nature Conservancy, 1995). A small section of the Little Creek and Black Creek watershed occurs in the northeast section of Fort Stewart. Little Creek flows into Black Creek, which flows into the Ogeechee River north of Fort Stewart (Moncrief, personal communication, 2009). Mill Creek drains the western portion of the Garrison area, flowing toward Taylors Creek. Mill Creek originates in a blackwater swamp known as Terrils Mill pond and receives stormwater runoff from the city of Hinesville before flowing onto the western portion of the Garrison area. The eastern portion of the Garrison area, including Wright Army Airfield (WAAF), drains to Goshen Swamp, which drains to Peacock Creek. A small portion in the southeastern Garrison area, containing the Soldiers Residential Family Housing and Georgia National Guard Training Center, drains to Melvin Swamp, which joins Goshen Swamp to form Peacock Creek near the unincorporated town of McIntosh.

The central Garrison area and the Liberty Woods development (along the northeastern edge of the Garrison area) drain toward Taylors Creek. Taylors Creek flows to Canoochee Creek and then to Canoochee River, generally flowing in an easterly direction through the center of Fort Stewart. The Canoochee River joins the Ogeechee River at the city of Richmond Hill. The Ogeechee River flows southward and forms the eastern boundary of Fort Stewart.

3.4.1.1 Surface Water Quality

Existing impairments to surface water quality include both point sources and nonpoint sources. The most common point sources are municipal or industrial activities and wastewater treatment plants. The National Pollutant Discharge Elimination System (NPDES) permit, required under the Georgia WQA and GA ESCA, regulates the discharge of point source pollutants from industrial activities and construction projects within both the Garrison and training areas. Nonpoint sources in the region include stormwater runoff from urban areas, agricultural, construction, and range training activities, golf course irrigation, and forest timber harvesting. The Georgia NPDES Municipal Separate Storm Sewer Systems (MS4) Permit regulates the nonpoint source discharges.

Off-Post agricultural activity in the Ogeechee River watershed affects water quality by increasing the input of nutrients and pesticides, increasing soil erosion, and increasing channelization of off-Post tributaries to drain wetlands. The 2008 List of Impaired Water Bodies for Georgia includes the stream reaches listed in Table 3-3. These were assessed to identify whether the water quality will support the propagation of fish, shellfish, game, and other aquatic life.

Table 3-3: Impaired Water Bodies within Fort Stewart Watersheds.

Reach Name	Reach Location	Criteria Violated
Not Supporting		
Canoochee Creek	Taylors Creek to Canoochee Creek, Fort Stewart	DO
Canoochee Creek	Upstream of SR 119, Fort Stewart	DO
Canoochee River	Lotts Creek to Savage Creek	TWR
Canoochee River	Savage Creek to Ogeechee River	TWR, DO
Ogeechee River	Black Creek to Richmond Hill	TWR
Peacock Creek	Highway 144 to North Newport River near McIntosh	DO, FC
Taylors Creek	Downstream WPCP Discharge to Drainage Canal, Fort Stewart	DO
Assessment Pending		
Raccoon Creek	Headwaters to Mt. Hope Creek	-
Supporting		
Mill Creek	Upstream Taylors Creek, Fort Stewart	-
Taylors Creek	Upstream WPCP Drainage Canal, Fort Stewart	-
Tributary to Taylors Creek	Drainage Canal to Taylors Creek, Fort Stewart	TMDL completed for copper, lead, and mercury

DO – Dissolved Oxygen
TWR - Trophic-Weighted Residue Value of mercury in fish tissue exceeding human health standard of 0.3 mg/kg
FC – Fecal Coliform Bacteria
TMDL – Total Maximum Daily Load
WPCP – Water Pollution Control Plant

The Georgia Department of Natural Resources (DNR)-Environmental Protection Division (EPD) has listed oxygen depletion as a problem in water bodies of the Ogeechee River watershed. Historically, the largest threat to maintaining adequate oxygen levels to support aquatic life has come from the discharge of oxygen-demanding wastes from wastewater treatment plants. According to state standards, a stream is considered impaired when the dissolved oxygen level falls below 4 milligrams per liter (mg/L).

Water quality in the main stem of the Canoochee River is affected by urban runoff and nonpoint source pollution. A fish consumption advisory exists in the two segments of the Canoochee River and in the Ogeechee River, where mercury concentrations in the fish tissue exceed the public health standards of 0.3 mg/kg. The Georgia EPD lists a segment of Taylors Creek and Canoochee Creek as impaired for low dissolved oxygen, attributed to the discharge from the Hinesville/Fort Stewart WWTP, a municipal facility. Nonpoint sources of erosion and sediment from Fort Stewart activities in training areas, roadside ditches, construction activities, borrow pits, steam pit sump pumps, and nutrient loads from the golf course and residential landscapes are possible causes of the low dissolved oxygen impairment of Canoochee Creek and Canoochee River. Minimization measures for these potential effects include proper stream bank stabilization for prevention of erosion and/or scouring of banks, and implementation of appropriate LID BMPs in the United States Army Corp of Engineers Public Works Technical Bulletin (200-1-62 October 2008) "LID for Sustainable Installations: Stormwater Design Planning Guidance for Development within Army Training Areas," United Facilities Criteria (UFC 3-210-10 October 2004) "Design: Low Impact Development Manual," and several other laws, regulations, and executive orders.

Peacock Creek and its tributaries are identified as impaired because they exceed fecal coliform standards and have low dissolved oxygen concentrations. Off-site activities that could contribute to exceeding the limits include septic systems, sanitary sewer overflows, rural nonpoint sources, and animal wastes. Contributing on-site activities include urban nonpoint sources, such as construction, roadside ditches, nutrient loads from residential landscapes, WAAF WWTP land application system (LAS), Evans Army Airfield (EAAF) wastewater LAS, Georgia Army National Guard Training Center-Central Vehicle Wash Facility, and animal wastes.

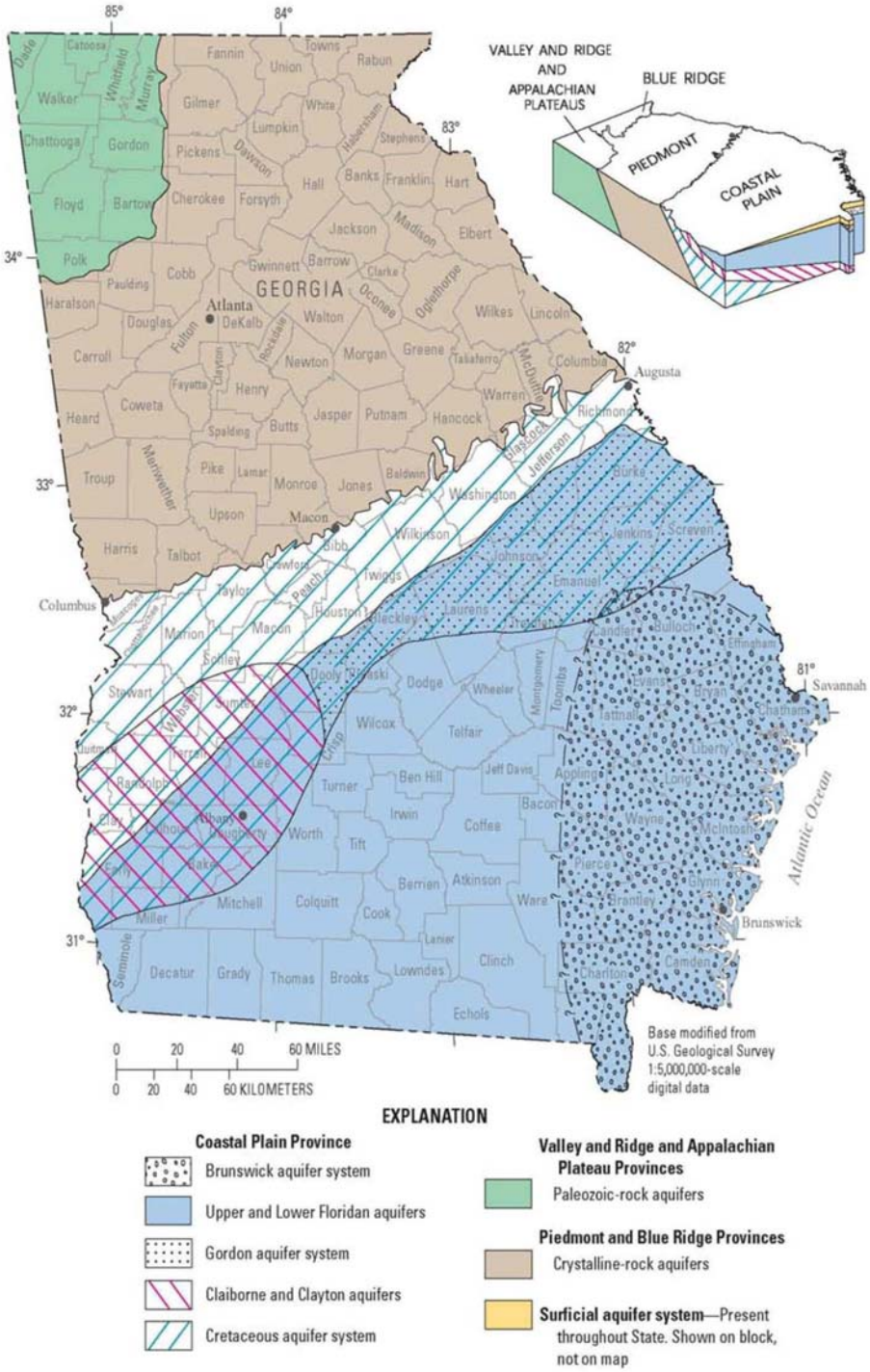
Three of the Ogeechee River's permitted discharges are on Fort Stewart. Within Fort Stewart boundaries, a municipal discharge plant on Taylors Creek (run by the city of Hinesville) serves both the city and Fort Stewart. Several off-site facilities, such as farming and commercial food stock industries, are upstream of Fort Stewart and may influence water quality at Fort Stewart. The low dissolved oxygen level of blackwater streams makes them particularly vulnerable to these discharges (UGA, 2001).

Most of the Garrison area on Fort Stewart – including administrative buildings, impervious parking lots, railroad, regulated industrial activities [such as washracks, central vehicle wash facility, motorpools, industrial wastewater treatment plant (WWTP), and the Central Energy Plant (CEP)] – drain to Mill Creek, which then drains to Taylors Creek, and ultimately discharges into a tributary of Canoochee Creek. The majority of runoff from the city of Hinesville enters Fort Stewart and drains to Mill Creek. An increase in sediment loads, higher stream velocities, overbank flooding, and turbidity occurs in Mill Creek, especially during heavy storm events. Fort Stewart also actively works to minimize impacts to impaired streams from the construction, operation, and maintenance of its ranges. For example, the Installation recently installed a rock check dam system for Tank Trail 144, upstream of Taylors Creek, one of our listed impaired streams. The Fort Stewart Stormwater Maintenance SOP of 2005 and the EPA's own "Guidelines for Dirt Road Installation and Turnouts" are also utilized in range areas, in addition to dirt roads and forestry trails.

The Hinesville/Fort Stewart WWTP, existing small arms ranges, borrow pits, training roads, industrial activities north of Georgia Highway 144 East, residential areas, Soldiers barracks, administrative buildings, parking lots, and the Taylors Creek Golf Course drain north to Taylors Creek, which then drains to a tributary of Canoochee Creek. The Georgia Army National Guard Training Center, EAAF, WWTP and LAS, and WAAF and LAS drain south to Goshen Swamp and Melvin Swamp, which drains to Peacock Creek in Liberty County, ultimately to the Ogeechee River (Moncrief, personal communication, 2009).

3.4.2 Groundwater and Hydrogeology

The Fort Stewart region has three distinct aquifer systems: the Floridan, Brunswick, and surficial (near surface) (Figure 3-3). The Floridan aquifer system is a deep sequence of limestone and is located 40 to 900 feet below the surface. It comprises two distinct layers: the Upper Floridan and the Lower Floridan (USGS, 2006 -2007).



Areas of use of major aquifers in Georgia (modified from Clarke and Pierce, 1985).

Figure 3-3: Fort Stewart Aquifer Systems.

The Upper Floridan is highly productive and crops out or is near the land surface at Macon, Georgia, becoming more deeply buried to the southeast. In southeast Georgia and northeast Florida, the Lower Floridan includes the Fernandina permeable zone, which is a salt water-bearing unit and potentially a source of saltwater contamination in the Upper and Lower Floridan. The Brunswick aquifer system is 85 to 390 feet thick and lies directly above the Upper Floridan aquifer (USGS, 2006 -2007). The Brunswick aquifer consists of two water-bearing zones: the upper Brunswick and lower Brunswick. It is recharged largely by percolation from the surficial (or near-surface) aquifer as well as some discharge from the Floridan aquifer.

The surficial aquifer extends from the soil surface to about 80 feet (deep near the coastal areas of Georgia. The surface aquifer is recharged directly from rainfall percolating directly through the soil. During dry months, the levels of streams and rivers of the coastal area are maintained by discharge from this surface aquifer. The groundwater table in the Fort Stewart Garrison area is generally eight-12 feet below ground surface with small seasonal variations (Weston, July 2007). Regional groundwater flow in the water-bearing units of the Coastal Plain is to the southeast; however, local variations in flow directions may result from the influence of groundwater pumping and surface water bodies.

Within the Upper Floridan aquifer, groundwater flow near Fort Stewart is easterly because of the effects of lowered groundwater levels to the northeast. This results from extensive use of the Upper Floridan aquifer in the areas of Hilton Head, South Carolina, and the coastal region of Brunswick, Georgia. The lowered groundwater level has caused saltwater to intrude into the Upper Floridan aquifer, increasing its salinity (Fort Stewart, December 2007). The Georgia Environmental Protection Division (EPD) has capped withdrawal from the Upper Floridan aquifer at 1997 rates in parts of the coastal area to limit further saltwater intrusion, prompting interest in developing alternative sources of drinking water, primarily from the shallower surficial and Brunswick aquifer systems (Payne et al, 2005). Fort Stewart withdraws its drinking water supplies from these groundwater sources, not surface water sources, and does not transfer water from one watershed into another.

The public water supply system in the region consists of 18 water wells. All of the Fort Stewart water supply wells draw groundwater from the Upper Floridan aquifer. The city of Hinesville operates four water supply wells drilled 700-800 feet deep with water intakes at depths of 132 to 168 feet. Most private wells in the area are 200 to 250 feet deep, indicating most of these wells produce water from the upper Brunswick aquifer, although some may be open in the shallower surficial aquifer. Water use estimates for pumping from the Upper Floridan aquifer near Fort Stewart were 700,000 gpd in Evans County, 700,000 gallons per day in Long County, 1.6 mgd in Bryan County, 15.7 mgd in Liberty County, and 68.2 mgd in Chatham County (USGS, 2006).

3.4.3 Floodplains

Executive Order 11988, *Floodplain Management*, requires Federal service agencies to avoid construction or management practices that will adversely affect floodplains unless (1) there is no practical alternative and/or (2) the proposed action is designed to minimize harm to or within the floodplain. The Federal Emergency Management Agency defines floodplains as areas subject to a 1% or greater chance of flooding in any given year. Floodplains, the low-lying lands subject to inundation from floodwaters, serve various functions, including water storage and conveyance, filtration of nutrients and other pollutants from runoff, erosion control, groundwater recharge, fish and wildlife habitat, and recreation.

In addition, the state requires additional BMPs for construction within a floodplain area, to include higher elevations for electrical pedestals/transformers (mechanical rooms, associated power generators, et al.), water hydrants, and sanitary lift stations, so they will not become inundated with floodwaters. Although not specifically a water resource, floodplains are linked to the adjacent streams and rivers. Floodplains adjacent to the Ogeechee River, Canoochee River, and the lower reaches of Canoochee Creek, Taylors Creek, and Savage Creek may be inundated for eight months or more annually. The U.S. Geological Surveys (USGS) mapped flood-prone areas and identified lands lying in the 100-year floodplains, indicating much of the eastern and southeastern portions of Fort Stewart inundated by floodwaters from the Ogeechee and Canoochee Rivers during a 100-year storm event (Figures 4-1 and 4-2 of Chapter 4). The Installation's design process therefore requires engineers to include stormwater flow calculations

demonstrating that runoff from rain events will not adversely impact (a) existing streams, (b) upstream systems, and (c) downstream systems of the proposed site. Elevating the project site also ensures the surface water elevations at the project site are the same as surface water elevations downstream of the project. This helps maintain stormwater flows at the same levels during pre-construction and post-construction periods of the project.

3.4.4 Stormwater

Stormwater runoff can be a major source of pollutants to receiving water bodies. The Canoochee or the Ogeechee River captures most surface water runoff at Fort Stewart; however, along the southeastern border of Fort Stewart, surface water runoff flows southward along a number of tributaries into the Jerico River and the North Newport River.

The amount of impervious surfaces in an area – such as rooftops, driveways, sidewalks, paved roads, and parking lots – impacts stormwater runoff because impervious surfaces collect pollutants that can rapidly wash into streams when it rains. The Installation's stormwater collection system is mainly open water ditches or channels. Developed portions of the Garrison area drain by engineered stormwater collection systems consisting of storm sewer pipes, catch basins and inlets, and concrete culverts that eventually discharge to maintained grass drainage ditches/swales and trapezoid-shaped drainage channels. These structural features are primarily found in areas with impervious surfaces and development. In the less-developed areas of Fort Stewart, stormwater drainage is primarily overland flow following the topography of the land (Versar, April 2003). The extensive stormwater drainage system at Fort Stewart allows for infiltration and some treatment in retention and/or detention basins to meet regulatory requirements for post-construction runoff.

Fort Stewart only utilizes sedimentation ponds and/or basins during the construction phase of a project. The existing retention ponds and detention basins on the Installation are post construction measures (structural BMPs), meant to ensure NPDES permitting for runoff reduction, water quality, and total suspended solids removal of 80% are being met, as required. In 2008, the Installation conducted stormwater modeling for the Mill Creek, Taylors Creek, and

Peacock Creek Basins, implementing recommendations for pipe size increases and required maintenance for existing pipes/culverts to allow and maintain proper flow. These recommendations were implemented by the Installation. Fort Stewart also adheres to the requirements of the Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) Permit requirements, the GA Stormwater Management Manual/Coastal Stormwater Supplement, the Energy Independence Security Act (EISA)-Section 438, and all applicable Executive Orders for all projects within the cantonment or range areas. In addition, Fort Stewart recommends the utilization of the United Facilities Criteria (UFC 3-210-10 October 2004) "*Design: Low Impact Development (LID) Manual*", and the United States Army Corp of Engineers (USACOE) Public Works Technical Bulletin (200-1-62 October 2008) "*LID for Sustainable Installations: Stormwater Design Planning Guidance for Development within Army Training Areas*."

Additionally, as required under the MS4 NPDES Permitting, a Stormwater Checklist with inspection and maintenance schedule is implemented for these structural BMPs to ensuring optimal operation, proper maintenance, and proper disposal of any hazardous materials if ever necessary. There are 22 engineered stormwater retention basins in the Garrison area:

- one on 15th Street near an elevated water tank;
- one on 6th Street and Essayons Drive at the General Issue Facility;
- five along West 6th Street collecting runoff from the 4IBCT Modular Housing, Temporary Barracks, and Battalion/Brigade Headquarters Facilities;
- five on West 6th Street at the Single Soldiers (North) Barracks, Bldgs. 3005, 3007, 3010 & 3011;
- one Sixth Street behind the Dining Facility (West), Building 3003;
- one at the 15th St. Company Operations Facility, Building 3014;
- one off West 6th Street and Tank Trail 90 at Taylors Creek Golf Course;
- one at the Single Soldiers South Barracks;
- one on 15th Street beside the Clam Shells;
- one on 18th Street, Building 814;

- two along Georgia Highway 144 East at Tank Trail 47, at the 4IBCT Barracks, Dining, Battalion/Brigade Headquarters, Physical Fitness Center, and Vehicle Maintenance Facilities;
- one at WAAF by the 15th ASOS; and
- one at the Southern Oaks residential community.

There are 20 engineered detention basins to assist with meeting regulatory requirements for post-construction runoff in the cantonment area. These include: the Unaccompanied Personnel Barracks, Fort Stewart Permanent Elementary School, Fort Stewart Child Development Center-Hase Road and Lindquist, Fort Stewart Chapel-Gulick Avenue, Vehicle Maintenance Facility-West 15th Street, Company Operations Facility-West 15th Street, Tactical Equipment Complex-West 15th Street, Dining Facility-West Sixth Street, EAB Barracks (48 Man Barracks)- Tank Trail 90 near South Barracks, Army Air Force Exchange Services-Sixth Street Mini-Mall and Harmon Gate Mini-Mall, several along Wilson Avenue, Education Center-Main Gate Entrance, Secure Command & Control Facility and LT Audie Murphy Building/Soldiers Services Center-East Baultman Avenue at Hase Road, RV Storage & Pet Boarding Facility-Holbrook Pond, Explosive Ordnance Disposal Complex-Georgia Highway 144 East, 4IBCT Company Operations Facilities-Georgia Highway 144 East at Tank Trail 47, WAAF-Midcoast Regional Airport-WAAF, and several at the residential communities areas of Liberty Woods, Coastal Ridge, New Marne, Southern Oaks, and the Unaccompanied Personnel Housing (Moncrief, personal communication, 2009).

Because Fort Stewart is flat and the surficial (near the surface) water table is high, some portions of the collection system have groundwater infiltration; in other areas, standing water collects in the ditches and the water temperature is very high on warm days. Because dissolved oxygen is low in waters with high temperature, much of the water that discharges from the slow-moving ditches to receiving water bodies is low in dissolved oxygen and may be a source of low dissolved oxygen for nearby water bodies such as Taylors and Canoochee Creeks (Cisar and Rohr, 2004).

Additionally, to address non-point source pollutants, Fort Stewart submitted the required Notice of Intent and Stormwater Management Plan for coverage under the Stormwater Phase II MS4 NPDES permitting requirements in July 2009 (Moncrief, personal communication, 2009). The MS4 Stormwater Management Plan addresses any potential pollutants, public education and outreach, public involvement, illicit discharge detection and elimination, construction sites, post-construction, and pollution prevention/good housekeeping for municipal operations that address the rooftops, roads, parking lots, housing, and municipal areas that are not covered under the industrial activities or construction permitting noted below.

Several Fort Stewart activities are subject to the requirements of the Environmental Protection Agency (EPA) and the Georgia Stormwater Regulations under the CWA. Potential sources of stormwater pollution have been identified, and stormwater discharges are regulated to protect water quality from industrial activities that have the greatest potential to contaminate runoff. These regulations affect transportation; roads; landfills; wastewater treatment facilities; and hazardous waste storage, treatment, or disposal activities. A Stormwater Pollution Prevention Plan (SWP3) was developed and implemented to outline BMPs to reduce the potential for these types of sources for stormwater pollution (updated in 2008). Incorporation of cost-effective solutions (pervious pavement, vegetated filters, and improved drainage) will improve compliance with the requirements of the SWP3 (Cisar and Rohr, 2004).

The CWA, Georgia WQA, Georgia ESCA, and Stormwater Phase II MS4 permitting require implementation of erosion and sediment controls during projects that disturb one or more acres of ground, although Fort Stewart uses a minimum of 0.75 acres. Some impacts of stormwater on surface water have been discussed earlier. Effective implementation of a site-specific or activity-specific Erosion, Sedimentation, and Pollution Control Plan (ESPC Plan), SWP3, and design requirements for post-construction will reduce potential impacts to and from stormwater.

3.4.4.1 Low Impact Development

Low impact development (LID) is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs

principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product. There are many practices used to adhere to these principles such as bioretention and infiltration basins, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. By implementing LID principles and practices, water is managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions. LID is characterized as a sustainable stormwater practice by the Water Environment Research Foundation and others (www.epa.gov/nps/lid, accessed 19 NOV 09).

Fort Stewart has installed numerous LID solutions to minimize impairment in receiving water bodies. Vegetating ditches with various native species shade and filter the water and enhance habitat. Installation of riprap and weirs increases dissolved oxygen and improves biological production. Standing water on impervious surfaces in parking lots and building entrances is diverted to the stormwater collection system by grading again to improve drainage. Bioretention areas (vegetated filters) will also improve the quality of stormwater and may be in swales, in landscaped parking islands, or in small ponds (Cisar and Rohr, 2004).

Several LID projects have been implemented since 2004, including the following:

- Single Soldiers Barracks Buildings 501-504 - three bioretention cells installed to remediate discharges of surfactants, disinfectants, detergents, and other chemicals from open atrium drains connected to the stormwater collection system.
- The Soldiers Services Center - drainage and detention basin improvements and the retrofit of two parking lots with interlocking concrete pavers, gravel pave, rain gardens, and rain barrels to improve infiltration, water, temperatures, and flows.
- Several conventional asphalt paved parking lots have been installed for additional parking areas; however, without curbing, gutters, and underground piping with pavements pitched to direct flows to infiltration vegetated swales and dry detention basins to demonstrate the benefits of LID for stormwater management.

- LID principles and techniques were implemented as a demonstration project by improving stormwater infiltration and water quality. Retrofitting an existing 34,000 square feet (sf) of asphalt pavement parking lot at building 1137 and an existing 8,000 sf conventional gravel parking lot at building 1145, with stormwater runoff into a zero-runoff permeable interlocking concrete pavement system, which included rain barrels and rain gardens for water conservation and irrigation (Moncrief, personal communication, 2009).

3.4.4.2 Low Water Crossings

Unpaved training roads and stream crossings are significant sources of fine sediment, excess nutrients, and nonpoint source pollution to Canoochee River. The roads must remain unpaved to meet mission requirements, and preventing erosion and stormwater runoff is difficult because of the sandy soils. These soils do not compact well, remold easily under pressure, and bear loads poorly, causing traffic problems. When wet, the soils become runny and lose bearing strength. Stream crossings are critical sites for erosion and sediment control. Stream crossings use bridges, culverts, or low water crossings to minimize impacts. Fort Stewart has developed a hardened low water crossing that uses a geo-grid foundation filled with washed aggregate. The geo-grid filled with aggregate forms a hardened surface path on the streambed where the training road crosses it. The top of the crossing is at the natural height of the stream bottom. The low water crossing functions well for both wheeled and tracked vehicles, is durable, requires little maintenance, and appears to have minimal impact on in-stream water quality (Cisar and Rohr, 2004).

Fort Stewart was issued a Regional Permit for construction of low water crossings (LWCs) by the USACE in 2001; the Permit was reissued in 2007. The Permit strictly defines the specifications and materials for constructing LWCs, to ensure that they incur minimal initial

impact to streams and wetlands, and allow unimpeded water flow after construction, maintaining the natural hydrology. The Permit further limits the Installation to a maximum of 15 acres of impact to wetlands and streams from low water crossings. At time of writing, only 5 acres had actually been so impacted. (This acreage is reflected in the totals given in Chapter 5, Cumulative Effects. The remaining 10 acres allowed under the Permit have not been included as there are no clear plans at this time to construct further low water crossings.)

Only the direct impact to the water body due to fill is taken into account in determining impacts, as the low water crossings by design avoid secondary water quality impacts. Impacts resulting from low water crossings are mitigated through debits from the Installation's Mitigation Bank. Given the flat topography, low elevation, and high water table of the area, Fort Stewart's LWCs have proven invaluable in promoting the balance between military training and sustainability.

3.4.5 Wetlands

Note: The U.S. Army Corps of Engineers (USACE)-Savannah District Regulatory Division is a Cooperating Agency (CA) in the Fort Stewart Range and Garrison Support Facilities Environmental Impact Statement. Information presented on wetlands in this, other chapters, and in Appendix D is a compilation of data, studies, and other information from both Fort Stewart archives and USACE sources.

Approximately one-third of Fort Stewart's 279,000 acres is wetlands of one type or another (Figure 3-4). This estimate is based on GIS analysis of the National Wetlands Inventory (NWI), a map-based planning tool first initiated by the U.S. Fish & Wildlife Service (USFWS) in 1974 and subject to a constant process of updating. Section 404 of the CWA defines wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

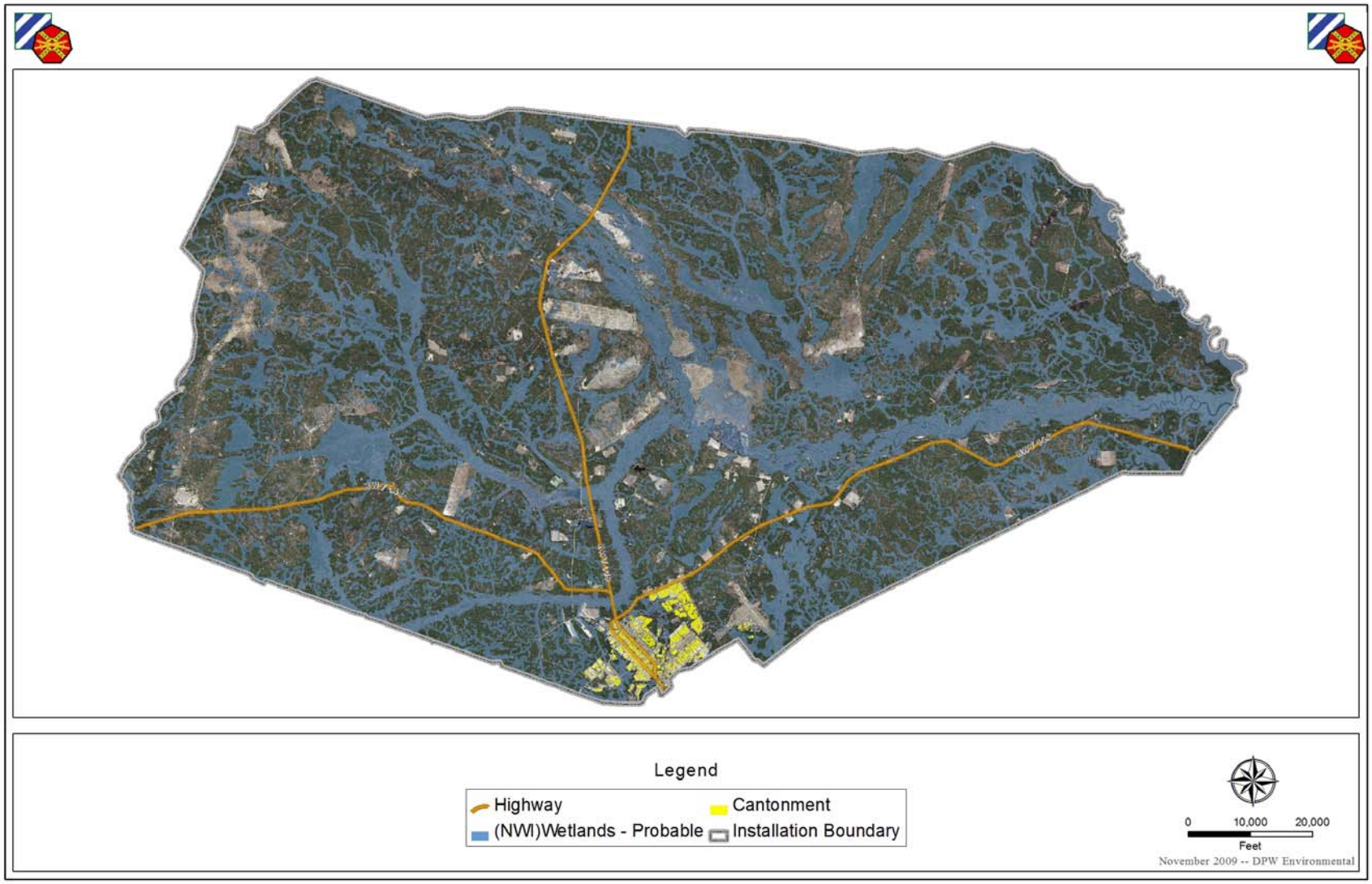


Figure 3-4: Fort Stewart Wetlands.

Wetlands serve as venues of water conveyance (feeding ponds, lakes, rivers, and coastal seas) and flood control, filter and purify water, reduce storm damage by absorbing the strength of violent weather events, and provide habitat, feeding, and breeding ground for a vast array of plant and animal life. Fort Stewart's position on the Atlantic Coastal Plain, with its low elevation, generally flat topography, and high water table, makes wetlands prominent and defining features on Fort Stewart.

The NWI data comes from a combination of surveys of topography, soil type, and vegetation type and is a largely reliable indicator of probable wetland areas for planning purposes. However, field surveys to delineate the boundaries of wetlands are the only way to definitively verify the existence and exact location of wetlands and are required when applying for a permit to affect wetlands. Because only a small portion (approximately 3%) of wetlands on Fort Stewart have been delineated, only the rough estimate of "one-third" of Fort Stewart's area can be reliably provided to describe the extent and quantity of its wetlands.

Fort Stewart wetlands are largely congruent with the lower elevations of the area's gently rolling natural landforms. These are typically of the type known as "bottomland hardwood," characterized by a mixed community of trees, shrubs, and herbaceous plants typical of hydrophytic (literally, "water-plant") vegetation in the southeastern United States, which are those plants preferring a wet environment. Fort Stewart wetlands are, for the most part, connected to each other and to natural bodies of open water simply by dint of the topography. Wetland branches on Fort Stewart may stretch for miles and cover hundreds of acres.

Wetlands also often border Fort Stewart's many ponds, streams, and creeks and the Canoochee and Ogeechee rivers, which run through Fort Stewart on their courses to the sea. Some wetlands are also connected by human-made water conveyances, most notably roadside drainage ditches. Fort Stewart also features a great many isolated wetlands, most of them relatively small (one-10 acres), that have no obvious connection to neighboring wetlands or bodies of water. In addition, disused and exhausted borrow pits may serve some wetland functions as they naturally fill with water though all may not meet the criteria to be formally considered wetlands. Wetlands tend to

be less prevalent at the northwest end of Fort Stewart, where the elevation rises and the topography becomes slightly more irregular.

Despite the Army's use of the land, wetlands on Fort Stewart are overall healthy. Robust communities of hydrophytic vegetation are found in wetlands throughout Fort Stewart. Typical species include pond cypress (*Taxodium ascendens*), bald cypress (*Taxodium distichum*), black tupelo (*Nyssa sylvatica*), swamp tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), pond pine (*Pinus serotina*), water oak (*Quercus nigra*), redbay (*Persea borbonia*), blueberry (*Vaccinium* spp.), fetterbush lyonia (*Lyonia lucida*), and cinnamon fern (*Osmunda cinnamomea*). Carnivorous plants often associated with wetlands include the roundleaf sundew (*Drosera rotundifolia*) and hooded pitcher plant (*Sarracenia minor*) (Fort Stewart, 2001). In areas with regular or permanent standing water, familiar aquatic species such as cattail (*Typha latifolia*), yellow waterlily (*Nymphaea mexicana*), and swamplily (*Crinum americanum*) are found. Animal populations also thrive within Fort Stewart's wetlands and are discussed in Sections 3.5.2 (Wildlife and Fisheries) and 3.5.3 (Protected Species).

Growing recognition of the importance of wetlands prompted their protection by the CWA. The USACE has responsibility for regulation of wetland impacts as an extension of its existing authority over navigable waterways and other waters important to U.S. productivity and commerce. Furthermore, Executive Order 11990 for protection of wetlands (1977), a Federal mandate from President George H.W. Bush for "no net loss" of wetlands (issued 1989 and strengthened by former President William J. Clinton in his Clean Water Action Plan of 1998), and general increasing interest in wetland conservation by conservation agencies have increased the power of the original legislation. Today, proposals to impact wetlands through filling require a determination of jurisdictional status by the USACE, possibly followed by an application for, and issuance of, a Section 404 Permit.

A Jurisdictional Determination (JD) follows submission to the USACE of a wetlands survey, data forms representing the vegetation and soil profiles of the areas of interest, and other supporting materials. The USACE verifies the existence and location of the wetland areas based on three criteria: presence of hydric soils (featuring traits consistent with long-term saturation by

water), presence of a vegetation community consisting primarily of hydrophytic (water-loving) plants, and hydrological factors allowing the formation of wetlands in the areas of interest. The USACE will determine jurisdictional status of the wetlands based on their connection or proximity to navigable waterways and other jurisdictional wetlands (Riley, Maj. Gen. Don T., *USACE.com*).

If an impact is proposed in wetlands, a permit is required. Two basic kinds of Section 404 permits are issued: general and individual. General permits – issued on nationwide, regional, and state bases – cover broad categories (various kinds of infrastructure projects) and generally small impacts. General permits carry a fixed set of conditions to which the permittee must adhere. For example, most nationwide permits state that impacts must be under a set number (generally 0.5 acres). Individual permits are typical for most special projects that would carry larger impacts and/or that would not fit the fixed conditions of a general permit. Fort Stewart also has a Regional Permit that was developed for low water crossings (discussed in 3.4.4.2) in 2001 and renewed in 2006 for another 5-year permit period. The Regional Permit allows for a maximum of 15 acres of cumulative wetland impacts from low water crossings. Approximately 5 acres of wetlands have been impacted using this permit.

Requirements for a permit application vary according to the level of permit which the requestor needs. For example, nationwide permits may require little more than notification of the intent to perform the work (for very small impacts on routine projects). Individual permits require the most material, including detailed project plans, drawings of the fill areas and estimates of the fill to be introduced, and in-depth analysis of alternatives considered and attempts to avoid and minimize wetlands impact. A public notice period is also required for individual permits (33 Part 323).

A stream buffer variance (SBV) may also be required, if construction, operation, and maintenance encroaches within 25 feet of a stream (its “buffer”). Potential water quality and/or aquatic resource impacts of SBV utilization (such as warming of streams due to tree canopy removal during construction or sedimentation from soil disturbance along the streamside) can be minimized via many measures. These include proper stream bank stabilization (for prevention of

erosion and scouring of stream banks) and implementation of appropriate LID BMPs. Often times, Fort Stewart prevents the need to apply for a variance by working with engineers to design the layout of a range to avoid stream impacts when possible and still meet the underlying training requirements.

If the permit is granted, the proponent must also mitigate the loss of wetlands through their actual or virtual replacement, as close as possible to the site of the lost wetlands. Wetland mitigation banks in the same watershed and with in-kind resources is the method of proposed mitigation preferred by the USACE; preservation of existing wetlands or creation of new wetland areas may also be considered. In response to the proposed mitigation requirement, many private landowners have created wetland mitigation banks on their properties. In such cases, restoration is performed and the subsequent preservation of the restored areas is legally ensured in perpetuity. Credits representing the restoration can be sold and bought as a commodity by developers and other project proponents, allowing the proponents to meet the proposed mitigation requirement and allowing the landowners to receive compensation for conservation.

Given the prevalence of wetlands at their Installation, Fort Stewart has made avoidance and minimization of wetland impact a top priority. Wetlands are one of the primary factors to be considered when siting a new project. Fort Stewart is located on a relatively flat coastal plain, however, and much of it is already committed to other training, recreational, and environmental activities. In addition, maneuver and dismounted training areas occupy large portions of the Installation, where the integration of large firing ranges is not suitable. The Army at Fort Stewart uses Geographical Information System (GIS) data to proactively analyze sites proposed for development to select optimal locations for a project, those capable of meeting the operational and training requirements of the range while minimizing environmental impacts.

In this manner, much of the avoidance and minimization of wetlands impacts takes place before actual site selection actually occurs. Training ranges have fairly specific requirements and site designers may be able to alter certain aspects of a proposed range in response to environmental concerns during various stages of the design process, such as the 10%, 35%, 60%, 90%, and 100% stages of completion.

On-site mitigation is performed at Fort Stewart when possible. For example, in 1995, 400 acres of wetland were enhanced in TA A-11 to mitigate for impacts from the construction of railroad "pass tracks." Fort Stewart has implemented an aggressive mitigation program in order to offset wetland impacts on Fort Stewart. These projects include wetland enhancement and wetland restoration projects on large-scale areas that provide higher quality mitigation than smaller patchwork single permit mitigation products. The following are current wetland mitigation projects located within the boundaries of Fort Stewart:

Pond 4 Mitigation Bank (USACE File Number 20007600). This single user bank was permitted for projects located within the boundaries of the Fort Stewart Installation. Approximately 1200 acres of wetlands were restored within the Canoochee Creek and Strum Bay wetland systems. This project is mostly comprised of deepwater and hardwood swamp habitat. Additional areas upstream of Pond 4 are currently being studied that would increase the total amount of wetland enhancement and restoration (see Strum Bay Mitigation Area below). Fort Stewart will debit from this bank to offset wetlands impacts from the two proposed Garrison support facility construction projects under Alternatives B and C of this EIS. (Wetlands impacts from the range constructions projects proposed under Alternatives B and C will be offset via purchase of credits from another, off-site bank, discussed later in this EIS.)

A-11 Mitigation Area (USACE File Number 940000880): This project specific mitigation area is comprised of approximately 1300 acres of wetland enhancement/restoration. Hydrologic enhancement/restoration was completed through the reintroduction of hydrology previously diverted around a project area. It is comprised mostly of pine/cypress flatwoods and hardwood drainages.

Strum Bay Mitigation Area (USACE File Number 200501852): This project specific mitigation was originally developed to mitigate impacts associated with the DMPRC. Subsequent studies realized a much larger restoration/enhancement was obtained by re-directing hydrology back into the Strum Bay wetland system. This project has now identified enhancement and restoration of wetland hydrology to approximately 730 acres. This portion of the Strum Bay wetland system is

located upstream from the Pond 4 Mitigation Bank, thus creating additional benefits to water quality and habitat to the entire Strum Bay wetland system and Pond 4 Mitigation Bank.

As stated earlier, the USACE is a CA in this EIS. It aims to ensure its own NEPA requirements are adequately and appropriately reflected in this document. This will ultimately streamline the permitting and public notice processes for these projects for both the USACE and Fort Stewart and allow the EIS to serve as a reference for future projects requiring Section 404 Permits not covered in the EIS. The USACE has worked closely with the Fort Stewart Environmental Division in advising on and reviewing the document. This participation has been an extension of the good working relationship maintained between the two groups for many years, allowing the most efficient management of Fort Stewart wetlands in support of both conservation and the Army mission.

3.5 BIOLOGICAL RESOURCES

Biological resources are the native and naturalized plants and animals found on Fort Stewart. Both game and non-game wildlife and fish along with their preferred habitat are discussed, as are neotropical migratory birds. Sensitive species are those plants and animals that are listed or proposed for listing as endangered, threatened, species of special concern, unusual, or rare. The Integrated Natural Resources Management Plan (INRMP) provides guidelines for managing the vegetation, wildlife, and fish. Several laws and regulations mandate the management and conservation of biological resources:

- The Sikes Act of 1960, *Conservation Programs on Military Installations* (16 USC 670 et seq.), requires Fort Stewart to prepare and implement an INRMP for conservation and rehabilitation programs and for fish- and wildlife-oriented recreation. The USFWS and appropriate Georgia agencies must agree on this plan, which must be reviewed at least every five years.
- The Army Forestry Program Authority (10 USC 2665 et seq.) allows the Army to sell any forest products produced on Fort Stewart.

- The Endangered Species Act of 1973 (16 USC 1531 et seq.) protects Federally listed species and requires all applicable Federal agencies to develop programs to conserve these species.
- The Magnuson-Stevens Act (16 USC 1801 et seq., 1976) governs the management and control of marine fish populations and regulates essential fish habitat in fishery management plans.
- The Federal Noxious Weed Act of 1974 (7 USC 2801-2814 et seq., as amended 1988 and 1994) provides for the control and management of non-indigenous weeds (Fort Stewart, July 2005).

3.5.1 Vegetation

Unless otherwise noted, information in this section is from the Fort Stewart INRMP, Fort Stewart Integrated Wildland Fire Management Plan (IWFMP), and Fort Stewart Forestry Branch Burn Prescription Handbook.

3.5.1.1 Physiography and Vegetation

Fort Stewart is located in the Atlantic Coastal Plain physiographic province of Georgia. The Atlantic Coastal Plain is characterized by flat to undulating topography, high water tables, and generally coarse sandy soils, except when broken by areas of extensive swamplands containing mostly organic soils. On a very broad scale, there are four types of ecosystems on Fort Stewart: sandhills, pine flatwoods, upland forests, and wetlands (Elfner, 1996). The Installation contains about 158,578 acres of upland forest, 82,148 acres of forested wetlands, and 38,253 acres of clearings.

The Nature Conservancy (1995) classified Fort Stewart land cover types by communities. Community classification was adapted from the Nature Conservancy's Community Characterization Abstracts, which were based on the North Carolina Natural Heritage Program, the Sandhills Field Office (at Fort Bragg, North Carolina), and the Florida Natural Areas Inventory. The following information briefly describes the communities on Fort Stewart.

- *Southern Mixed Hardwood Forest*. This community is characterized by a mostly closed canopy with straight trees, a well-developed sub-canopy, and a sparse to dense shrub and herb layer.
- *Upland Pine Forest*. This community is a rolling forest of widely spaced pines with few understory shrubs and a dense cover of grasses and herbs. Pristine areas are dominated by longleaf pine and wiregrass, while agriculturally disturbed areas are dominated by shortleaf pine, loblolly pines, and old-field grasses and herbs.
- *Southeastern Coastal Plain Xeric Sandhill*. This community contains longleaf pine with scattered turkey oak and small trees in the shrub layer, other low to tall-scattered shrubs, and a sparse to high cover of herbs, dominated by grasses.
- *Southeastern Coastal Plain Subxeric Pine-Scrub Sandhill*. This community is characterized by an open canopy of pines, low scrub oaks, and moderate cover in the herb layer.
- *Atlantic Coastal Plain Mesic Longleaf Pine Forest*. This community has an open-canopied forest over scattered shrubs, an abundant and grassy herb layer, and a species-rich herbaceous flora dominated by wiregrass and little bluestem.
- *Bay Forest*. This evergreen community is recognized by the presence of loblolly bay, swamp redbay, and sweet bay together in a peaty, acidic, wet area.
- *Non-Riverine Swamp Forest*. This community type does not occur in floodplains, which separates it from swamp forest and bottomland hardwood community types associated with rivers. The community vegetation is very diverse, affected by hydroperiod and disturbance.
- *Water Tupelo Swamp*. Found in the lowest, wettest portions of floodplains, this community type has a dense canopy dominated by bald cypress and water tupelo. Standing or flowing water is present for all or part of the year. Epiphytes, such as Spanish moss, are characteristic.
- *Coastal Plain Small Stream Swamp Forest*. This community type has a high species diversity in the canopy, with fine-scale microtopographic mosaics providing multiple habitats that support a variety of woody species. The shrub layer is often dense, and vines are abundant and diverse.
- *Pond Cypress Dome and Swamp Forest*. This community type characteristically has

pond cypress in a circular patch with a domed outline or a moderate to very dense canopy of pond cypress along a stream in organic soil. Larger trees are found in the interior with smaller ones to the outside, creating the "domed" appearance.

- *Pond Cypress Pond Forest*. This community has a fairly open tree canopy with little understory, occurring on mineral soils.
- *Swamp Tupelo Pond Forest*. This community has a canopy dominated by swamp tupelo, and it is found in a Carolina bay, sinkhole, or other Coastal Plain depressions, not in floodplains.
- *Slash Pine Flatwoods*. Slash Pine Flatwoods are similar to Wet Longleaf Pine Flatwoods, but slash pine is the canopy dominant.
- *Wet Longleaf Pine Flatwoods*. This community type has a moderately dense longleaf pine overstory over a dense to open shrub layer. The shrub layer density is directly related to the fire regime.
- *Pine Savanna*. Savanna communities are saturated or inundated during the rainy season and extremely dry during the dry season. Herb species dominate over woody species on regularly burned sites.
- *Pond Cypress Savanna*. This community type has an open canopy of pond cypress and a well-developed, species-rich, ground layer.
- *Streamhead Pocosin*. These communities occur at headwaters of streams and sometimes adjacent to them in floodplains. Pocosins are characterized by sparse to dense canopies of bay species and pines over very dense, almost impenetrable layers of evergreen shrubs and vines.
- *Sandhill Seep*. This community is characterized by wetland vegetation on seepage slopes. Sandhill seeps, if burned regularly, can have the highest species richness in temperate North America.

3.5.1.2 Forest/Timber Management and Resources

Fort Stewart supports one of the largest forest resources program in the Department of Defense. The primary purpose of the program, housed in DPW, Environmental Division, Forestry Branch, is to manage Fort Stewart's forested lands to support the Army training mission, to protect and

improve threatened and endangered species habitat, and to enhance ecosystem integrity through sound forest management practices. Additional objectives include the production of commercial forest products, enhancement of forested habitats to benefit wildlife, and protection of watersheds. Though the production of commercial forest products is no longer the primary objective of Fort Stewart's forest ecosystem management program, Fort Stewart will continue to produce quality forest products on a sustainable basis, as well as meet other obligations with regard to the forest.

Most timber harvesting currently consists of selective cutting (thinning), emphasizing retention of high quality pines at between 50 and 60 square feet of basal area per acre. Clear cutting is limited to clearing land for construction, wildland fire salvage operations, bark beetle salavage and suppression operations, or re-establishment of longleaf pine. Whether for military training actions, threatened and endangered species management, or silvicultural practices, the Forestry Branch harvests approximately 6,000 acres per year. The majority of timber harvested is pine, with hardwood making up only a small and low-value component of timber sales. Pine timber products produced include poles, saw timber, chip-n-saw, and pulpwood. The revenues generated by Fort Stewart and other Army Installations' timber sales provide funding for all Department of the Army forestry and natural resource management programs. A percentage of the annual proceeds may also be distributed to the surrounding counties that lie within the boundaries of Fort Stewart (Liberty, Bryan, Tattnall, Long, Evans, and Chatham). Timber harvested on Fort Stewart provides the forest products industry and people worldwide with useful forest products and supports local economies through timber related jobs.

Longleaf Pine/Wiregrass Management and Restoration. Dominating the southern landscape from Virginia to Florida and westward to Texas, longleaf pine forests once covered as much as 90 million acres. Today, less than 3 million acres remain. Fort Stewart contains Georgia's largest remaining forest of longleaf pine, which is essential habitat for the Federally endangered

red-cockaded woodpecker (www.nature.org). The longleaf pine/wiregrass ecosystem at Fort Stewart is also highly compatible with military training. This compatibility stems from the ecosystem's tolerance to such environmental factors as fire, mechanical damage, and disease, as well as its characteristic open, park-like stands which are essential for visibility during maneuver training. Fort Stewart Forestry Branch manages the preexisting stands of longleaf pine through prescribed burning and timber thinning. All thinning operations include the requirements to favor the retention of longleaf pine over other pine species, as well as provide natural longleaf regeneration areas adjacent to existing longleaf seed sources. Fort Stewart's Forestry Branch and Fish and Wildlife Branch (FWB) are also working cooperatively to re-establish longleaf pine/wiregrass to areas where it once was the dominant cover type. The goal is to re-establish longleaf pine and wiregrass on 200 acres of forestland per year. Each restoration site requires a three-year process to complete. The desired locations are clear-cut of merchantable timber, and the site is prepared during the first year. Wiregrass seed is then collected elsewhere on Fort Stewart and sown during the second year. Once the wiregrass is established, the site is prescribed burned, and longleaf seedlings are planted during the final year. Regular prescribed burning maintains the site as the seedlings grow, and it soon develops into a healthy longleaf/wiregrass stand.

Upland Hardwood Management Areas (HMAs). Hardwood mast is an important food source for white-tailed deer, wild turkeys, quail, squirrels, some ducks, and many non-game species. *Fort Stewart Integrated Natural Resources Management Plan* (INRMP) sets as a goal the protection of up to 10% of the forested upland acreage on Fort Stewart in quality, mast-producing hardwoods. Sites are identified and approved during the integrated management prescription (IMP) process and are managed by the Forestry Branch as hardwood management areas (HMAs). To protect and improve their mast-producing qualities, the Forestry Branch marks for removal all diseased or deformed trees and all non-mast producing hardwood species during timber thinning projects and protects HMAs from fire damage to the maximum extent practicable. Currently around 8% of the forested upland acreage is designated as HMAs.

Wildland Fire. Fire is a natural part of most Fort Stewart ecosystems, and most native species and habitats have adapted to fire. Fire can have beneficial impacts including maintaining and

improving Army training lands, enhancing wildlife habitat, and improving and maintaining ecosystem health and function. However, negative effects from wildland fire can also occur. Effects of fires on biological, physical, and human resources will depend on individual fire severity and extent. Primary effects on biological resources from fires may include loss of vegetative cover and resulting increase in erosion and soil stability (especially on the western side of Fort Stewart), mortality of vegetation, and temporary or permanent loss of wildlife habitat and forage habitats. Effects on humans may include loss of life and property, financial costs for suppression efforts, health and safety issues with regard to smoke, and temporary inconvenience to travel, daily activities, or interference with Army mission activities.

Fire History on Fort Stewart. Historically, fire has been a natural part of Fort Stewart ecosystems, but fire regimes were altered in past decades due to fire suppression and changes in land use. Throughout the 1940s and 1950s, wildfire detection and suppression were the most important fire management objectives. Human-caused wildfires were on the increase and always a concern because of military training activities. Fire suppression contributed to degradation of natural habitats. An increase in fuel loading in ecosystems such as longleaf pine/wiregrass woodlands also resulted from fire suppression. The Installation Wildland Fire Management Plan (IWFMP) and Forestry Branch's locally developed fuel load models outline in more detail the fuel characteristics and the wildland fire environment specific to Fort Stewart.

Wildland fire conditions are affected by many variables, including weather, fuel conditions, and military training. Historically, the majority of natural wildfires in southern Georgia occur from March to June due to increased lighting storms and dry, windy spring weather conditions. Prevailing winds throughout the year are generally from the south-southwest. Fuels are also diverse and range from continuous fine fuels to heavier herbaceous fuels in the wetter woodland areas.

The earliest records of prescribed burning on Fort Stewart date back to the 1950s. According to several old maps and current Forestry Branch employees who worked here in the 1960s and 1970s, very little prescribed burning occurred from the 1950s through the 1970s. All burning on Fort Stewart was done by hand crews when ground conditions were generally very wet. Fire behavior was subdued and little benefit resulted except for some limited fuel reduction. Aerial burning with a helicopter and private contractor began in 1984. More acres were burned with each successive year following the advent of aerial burning. With aerial burning, conditions are allowed to be somewhat drier, creating a more intense fuel-load reduction burn. Weather parameters can be more variable and areas burn out faster, resulting in better, faster smoke dispersion. Few data are available on wildland fires on Fort Stewart prior to 1940; however, post-1940 data indicate that the majority of wildland fires were caused by the military.

Fort Stewart initiated and implemented an aggressive prescribed burning program over the past 20 years for the purposes of decreasing wildland fire risk, improving Army training lands, improving ecosystem function, and improving wildlife habitat. As a result, fuel loads were reduced on a large scale, and wildfire numbers went from approximately 700 annually in the early 1980s to approximately 200 to 300 annually in the early 1990s. During the past 10 years (FY2000 to FY2009), Fort Stewart prescribed burned 1,097,977 acres. These burns were conducted during both the dormant season (15 November to 28 February) and growing season (1 March to 30 September). As a result, wildfires have been reduced to an average of 113 per year. Over the same 10-year period, burning was gradually being shifted from predominately dormant season burning to growing season burning. The objective of the Forestry Branch is to burn the non-range woodlands of Fort Stewart during the growing season to meet requirements for habitat management set by the USFWS and adopted by the Army as compatible with mission requirements. However, annual dormant season burning of most live-fire ranges is still required to limit and lessen intensities of wildfires caused by incendiary sources during Army training missions on Fort Stewart ranges.

Fire Management. Wildland fire management on Fort Stewart is the responsibility of the Environmental Division's Forestry Branch. The Forestry Branch Chief was designated by the Fort Stewart Garrison Commander as the Fort Stewart Wildland Fire Program Manager in FY02

and has control over all wildland fire activities, including prescribed burning, wildfire detection, wildfire suppression, and the deployment of equipment and resources to national disasters on and off Fort Stewart. In the event that fire suppression assistance is needed, the Forestry Chief can request assistance from the Fort Stewart Fire Department and/or other Army units trained in fire suppression. In addition, Fort Stewart has a formal Memorandum of Agreement (MOA) with the Georgia Forestry Commission (GFC) to provide fire suppression assistance when needed on Fort Stewart and, reciprocally, for Fort Stewart to provide assistance to GFC outside of the Fort Stewart boundary.

The IWFMP describes the objectives for the wildland fire program, presents background information on wildland fire specific to Fort Stewart and the region, and provides approaches for implementing these objectives. Primary goals for the wildland fire program at Fort Stewart include reducing the risk of catastrophic wildfires and providing for the safety of firefighters and the public, protecting the military mission from delay or loss of capacity, improving and maintaining ecosystem function, and improving wildlife habitat. Designation of Natural Resource Management Units (NRMUs) occurred, and are used a planning tool for suppression and prescribed burns by utilizing the Fort Stewart road network, streams and other natural barriers, and manmade firebreaks to define perimeter boundaries for both wildfire and prescribed fire. In the past, fire management strictly adhered to direct fire suppression tactics. Fort Stewart has now adopted a “let burn” policy in situations where fires pose no threat to public safety, property, the mission, or natural resources.

3.5.2 Wildlife and Fisheries

Note: Unless otherwise indicated, all information in this section is from the Fort Stewart INRMP.

Wildlife management activities on Fort Stewart identified 46 species of mammals, 57 species of reptiles, 241 species of birds, 38 species of amphibians, and 64 species of fish. Wildlife habitat is improved by several management activities. Wildlife clearings, firing points, landing zones, and other open areas are disked and seeded to encourage the growth of annual vegetation, such

as forbs, a preferred food source for bobwhite quail. Disking in December encourages germination of quail foods, such as partridge pea and croton while disking in April and May produces seeds, such as panic grass and beggar weed. Between 2001 and 2004, lime was applied to 212 acres of wildlife clearings to make the areas more fertile.

Supplemental food plantings are also extended into firing points. From 2001 to 2004, a total of 835 acres were planted in winter rye or a combination of rye, wheat, and oat; 215 acres were planted as dove fields; and 265 acres were planted in peas. These supplemental plantings are important for deer in the lower Coastal Plains, where the soil's fertility is low. These plantings also encourage proliferation of insect populations, which serve as important food sources for wild turkeys. Supplementing the browse (deer food) produced by prescribed fire, a browse management project was implemented as a wildlife management technique to set back forest succession and improve browse quality for wildlife.

3.5.2.1 Mammals

Mammals found on Fort Stewart include shrews, moles, bats, mice, rats, voles, white-tailed deer, feral hogs, gray squirrels, fox squirrels, eastern cottontails, red foxes, gray foxes, bobcats, raccoons, river otters, beavers, opossums, nine-banded armadillos, and mink. Population trends for white-tailed deer, feral hogs, and wild turkeys are gathered during hunting seasons. Deer hunting season is from early October to late December. Hunting season for hogs is year-round, except during wild turkey season. Check stations are operated on the weekends during the hunting season and are used to analyze deer herd health and regulate harvests. It is estimated that 40 to 50% of harvests are reported at check stations. The feral hog population has decreased significantly while the turkey population appears stable. During the 2001 and 2002 deer-hunting season, weights, antler measurements, and productivity were stable; however, a decline in all measurements for yearling bucks was observed in 2003. A Quality Deer Management Zone was established for the 2003-2004 hunting season in TAs E12, E13-E16, E20-E22, totaling 14,000 acres. The zone restricts harvest and contains supplemental plantings of high protein (alyce clover/iron-clay cowpeas) for late summer use during the antler growth period. In April 2004, 64 acres were planted in the management zone.

3.5.2.2 Reptiles and Amphibians

Reptiles on Fort Stewart include the American alligator, gopher tortoise, eastern diamondback rattlesnake, timber rattlesnake, eastern coral snake, eastern cottonmouth, copperhead, and eastern indigo snake. Pond-breeding amphibians inhabit isolated temporary freshwater wetlands in flatwoods on Fort Stewart. These ponds may be inhabited by the frosted flatwoods salamander, gopher frog, striped newt, tiger salamander, ornate chorus frog, and southern cricket frog. Reptile species also inhabit these ponds, including the eastern mud turtle, glossy crayfish snake, and cottonmouth. Burrowing crayfish are often abundant in these habitats; their tunnels are numerous, providing summer habitat for many of the amphibian species.

These naturally occurring flatwood ponds are associated with pond cypress or tupelo gum and are isolated from flowing streams. The ponds typically fill and dry with rainfall cycles. Most, if not all, of these ponds represent perched water tables, holding rainwater and runoff perched above the normal water table. The perching mechanism generally consists of an impermeable layer of clay underlying the pond basin. Typical breeding ponds fill during the late autumn and winter then dry during mid to late summer from evaporation. The isolation from flowing water and temporary presence of standing water typically results in the absence of predatory fish, which is essential to high-quality amphibian breeding ponds. However, small fish are commonly observed in the breeding-ponds, including the banded sunfish, pygmy sunfish, and mosquito fish.

Breeding ponds may be dominated by open shallow water, grass-sedge prairie (depression meadow), pond cypress savanna, and tupelo/gum pond (non-alluvial swamp forest). Amphibians tend to favor ponds with an open canopy and abundant grasses and sedges. Hydroperiod, defined as the duration and seasonality in which a pond holds water, ultimately determines the suitability of a pond for amphibian species. Breeding ponds are nested in the upland longleaf pine (in either flatwoods or sandhills) providing both terrestrial habitat and aquatic habitat necessary for amphibian life cycles.

3.5.2.3 Birds

Bird species identified in the inventory include raptors, waterfowl, wading birds, woodpeckers, upland game birds, and songbirds. The identified raptors are turkey vulture, black vulture, osprey, Mississippi kite, swallow-tailed kite, northern harrier, bald eagle, sharp-shinned hawk, Cooper's hawk, broad-winged hawk, red-shouldered hawk, red-tailed hawk, and American kestrel. Waterfowl and wading birds include the wood duck, great egret, and the Federally listed wood stork. Additional notable species include the Federally listed red-cockaded woodpecker, northern bobwhite, wild turkey, and several songbirds.

The INRMP established a 21,368-acre Upland Game Management Area for quail. Large expanses of the Western Maneuver Area were clear-cut to enhance training and the game management area. The INRMP 2004 Review proposed to further enhance this quail management area by strip disking 200 acres of the old-field habitat to maximize weed seed production and to plant 45 acres in bicolor lespedeza over 27 sites in the Upland Game Management Area.

Migratory Birds. Birds protected under the Migratory Bird Treaty Act include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows, and others, including their body parts (feathers, plumes, etc.), nests, and eggs. About 170 species of birds protected under the act could occur on Fort Stewart, either seasonally or year-round. Many of these species occur at least temporarily. The local USFWS must approve any Federal actions that would take the birds themselves, their nest, or eggs. However, a permit would not be needed if the birds' habitat is destroyed or altered. Fort Stewart complies with the Migratory Bird Treaty Act by implementing Army Policy Guidance of 17 August 2001 and Executive Order 13186 (Responsibilities of Federal Agencies to Migratory Bird Treaty Act, 11 January 2001). Fort Stewart manages and conserves migratory bird species through implementation of the INRMP and considers effects to migratory birds in any proposed action through the NEPA process.

Neotropical Migrant Species. Fort Stewart is collecting information to determine the status of neotropical migrant birds in surveys conducted every three years. The Breeding Bird Census and Winter Bird Population Study were conducted in 1996 and 1997 in Training Area E-17 to identify species in longleaf pine and wiregrass communities and describe their response to management. Monitoring of neotropical migrant bird nests at Fort Stewart was performed through the operation of a Monitoring Avian Production and Survivorship station. Surveys were conducted from 1998-2002 for 10 days each during the breeding season. In 1999, 107 individual birds were trapped and 27 species were identified as neotropical migrants. Recaptures and nesting locations were recorded.

Growing season prescribed burning has been found to negatively affect some habitats important to neotropical migrant species while others benefit from the growing season fire. Species that are negatively impacted are not particularly rare and are not likely to suffer globally because of habitat loss on Fort Stewart. Some rare neotropical migrants, such as the prairie warbler, as well as resident species, such as the Bachman's sparrow, American kestrel, and brown-headed nuthatch, benefit from growing season burning. The 1999-2002 Monitoring Avian Production and Survivorship surveys provided information that showed resident species like the Bachman's sparrow and long-distance migrants like the Arcadian flycatcher returning to the same nesting areas year after year.

3.5.2.4 Fish and Other Aquatic Species

A variety of fish occur at Fort Stewart in the ponds and slow-moving low-gradient streams and rivers. The kinds, size, and numbers of fish vary with the size of the stream or with the intensity of management in the manmade ponds. Fish species that inhabit waters of Fort Stewart include the Federally listed shortnose sturgeon, striped bass, and numerous species of sunfish, catfish, shiners, and darters. Large Coastal Plain streams support fish that eat other fish, such as the largemouth bass and chain pickerel, and fish that eat bottom-dwelling insects, such as the spotted sucker. Small Coastal Plain streams support insect-eating fish, such as most minnows, shiners, and small sunfish. Small, shallow headwater streams in the Coastal Plains support primarily minnows, bullheads, madtoms, sunfish, and darters. The most common species in Coastal Plains

headwater streams are yellowfin shiner, bluehead chub, and pirate perch. Other common species in Coastal Plains headwater streams include creek chub, dollar sunfish, spotted sunfish, redbreast sunfish, dusky shiner, tessellated darter, yellow bullhead, speckled madtom, margined madtom, creek chubsucker, and redfin pickerel. Larger Coastal Plain streams with greater depth and habitat support largemouth bass, spotted sucker, redbreast sunfish, chain pickerel, and American eel. Other common species in larger streams are pirate perch, spotted sunfish, blackbanded darter, flat bullhead, and various shiners, including the dusky shiner (Kilgo and Blake, 2005).

The Canoochee River is known as one of the best recreational fishing rivers in Georgia for the redbreast sunfish. Other panfish species present in the Ogeechee and Canoochee Rivers include bluegill, redear sunfish or shellcracker, black crappie, spotted sunfish or stump-knockers, and warmouth. Largemouth bass are not abundant on the Canoochee River and make up only 9 % of the sportfish population. White catfish are most abundant in the Canoochee with fewer numbers of channel catfish and bullhead. The Canoochee also has a healthy population of redfin and chain pickerel. Bowfin, Florida gar, and longnose gar are also common.

The Installation manages fisheries to support military readiness by enhancing residents' quality of life, to maintain the natural diversity, and to protect the surface water quality. Invasive and exotic fish species are controlled under a noxious fish project mostly on Installation ponds. Gizzard shad populations were controlled in Ponds 19, 20, and 35. Complete renovation was conducted in 2003 when golden shiners, bullhead catfish, and bluegill dominated Pond 10, which is managed for channel catfish to host a kid's day fishing event. The flathead catfish is an introduced noxious species that is actively removed when found; it is not known to occur in the Canoochee or Ogeechee rivers.

Ponds and lakes are stocked periodically with largemouth bass, bluegill, redear sunfish, channel catfish, hybrid striped bass, grass carp, threadfin shad, and black crappie. Since 1992, Installation ponds and lakes have produced 10 of the top 45 biggest largemouth bass officially recorded in Georgia (eight in the top 33), which indicates the success of the fisheries management program. All ponds are tested annually and limed and/or fertilized to help the fish population grow. Since 2000, Fort Stewart has converted two borrow pits to ponds and

increased the size of sport fishing ponds by nearly 60 acres. Four additional pits are planned for conversion to ponds.

A fish population study has been performed on the Canoochee River using a standardized electro-sampling for the Georgia Department of Natural Resource's "River Care" Assessment Program. The information from the study is used to track trends in fish population assemblages, determine fish population size structure, calculate fish condition indices, assess fish health, and develop a fishing forecast for anglers. Sport fish populations are monitored seasonally (three to six seasonal assessments per year) and annually (six 0.62-mile sections per year) on more than 100 miles of blackwater streams and rivers. Fish tissue is tested for mercury at three locations every two years, and fish consumption guidelines will be developed based on the results.

A freshwater mussel (an aquatic bivalve mollusks or clams) survey was expanded to additional sites on the Ogeechee River. Of the 15 freshwater mussels historically documented in the Ogeechee River Systems, the survey identified 11 of these species on Fort Stewart. Mussel species identified between 2001 and 2004 in the Ogeechee River Basin are the Carolina lance, eastern Elliptio complex, Carolina slabshell complex, variable spike complex, Florida pondhorn, barrel floater, eastern floater, paper pondshell, eastern creekshell, southern rainbow, and Savannah lilliput. Two mussels are designated as species of concern by the Georgia Natural Heritage Program. The Savannah lilliput was identified in Training Area C-16 along the Ogeechee River in Greens Creek. Two aquatic snails have been identified on Fort Stewart.

3.5.3 Protected Species

Protected species are defined as those listed by the USFWS as endangered or threatened under the Endangered Species Act (ESA); listed by Georgia's DNR as rare, unusual, endangered, or threatened; designated as a special species of concern by the Georgia Natural Heritage Program; or proposed for listing by the DNR or USFWS. The Installation has designated habitat management units to protect sensitive species as documented in the Fort Stewart Multi-Species Endangered Species Management Plan. Protected species known to occur on Fort Stewart are

listed in Table 3-4. The six Federal and one state of Georgia faunal species listed or proposed for listing by the Endangered Species Act are:

- Red-cockaded woodpecker,
- Eastern indigo snake,
- Frosted flatwoods salamander,
- Wood stork,
- Shortnose sturgeon, and
- Gopher tortoise (state listed).

The ESA sets up critical habitats, which are specific geographic areas essential to the conservation of a threatened or endangered species that may require special management considerations or protection. These habitats only apply to situations involving Federal funding or requiring a Federal permit. No critical habitat has been identified on Fort Stewart.

Table 3-4: Federal and State Special Status Species in Georgia.

Common Name	Federal Status	State Status	Natural Heritage Programs
Plants			
Purple Honeycomb Head	Species of Concern	Rare	• Imperiled globally because of rarity (6-20 occurrences) • Imperiled in state because of rarity (6-20 occurrences)
Georgia Plume	None	Threatened	• Imperiled globally because of rarity • Rare and local throughout range or in a special habitat or narrowly endemic (on the order of 21-100 occurrences) • Imperiled in state because of rarity • Rare or uncommon in state (on order of 21-100 occurrences)
Green-fly Orchid	None	Unusual	• Apparently secure globally (of no immediate conservation concern) • Rare or uncommon instate
Dwarf Witch-alder	None	Threatened	• Rare and local throughout range or in a special habitat or narrowly endemic • Apparently secure globally • Imperiled in state because of rarity
Pond Spice	None	Rare	• Rare and local throughout range or in a special habitat or narrowly endemic • Imperiled in state because of rarity
Crestless Plume Orchid	None	Threatened	• Imperiled globally because of rarity • Rare and local throughout range or in a special habitat or narrowly endemic • Critically imperiled in state because of extreme rarity (five or fewer occurrences)
Hooded Pitcher Plant	None	Unusual	• Apparently secure globally • Apparently secure in state
Swamp Buckthorn	None	Rare	• Imperiled globally because of rarity • Imperiled in state because of rarity
Silky Camellia	None	Rare	• Apparently secure globally • Imperiled in state because of rarity

Table 3-4: Federal and State Special Status Species in Georgia, continued.

Common Name	Federal Status	State Status	Natural Heritage Programs
Plants, continued			
Michaux's Orchid	None	Threatened	• Apparently secure globally • Demonstrably secure globally • Critically imperiled in state because of extreme rarity
Hairy Fever Tree		Potentially rare	NA
Needle Palm		Potentially rare	NA
Incised Groovebur	Species of Concern	None	• Rare and local throughout range or in a special habitat or narrowly endemic • Imperiled instate because of extreme rarity • Rare or uncommon in state
Narrowleaf Obedient Plant [a]	None	Threatened	• Apparently secure globally • Demonstrably secure globally • Of historical occurrence, perhaps not having been verified in the past 20 years and suspected to still be extant
Mammals			
Rafinesque's Big-eared Bat	None	Rare	• Rare and local throughout range or in a special habitat or narrowly endemic • Apparently secure globally • Rare or uncommon in state
West Indian Manatee	Endangered	Endangered	• Imperiled globally because of rarity • Critically imperiled in state because of extreme rarity • Imperiled in state because of rarity
Birds			
Bachman's Sparrow	Species of Concern	Rare	None
Swallow-tailed Kite	None	Rare	• Demonstrably secure globally • Imperiled in state because of rarity
Bald Eagle	*None	Threatened	• Demonstrably secure globally • Imperiled in state because of rarity

Table 3-4: Federal and State Special Status Species in Georgia, continued.

Common Name	Federal Status	State Status	Natural Heritage Programs
Birds, continued			
Wood Stork	Endangered	Endangered	• Apparently secure globally • Imperiled in state because of rarity
Red-cockaded Woodpecker	Endangered	Endangered	• Rare and local throughout the range or in a special habitat or narrowly endemic • Imperiled in state because of rarity
Least Tern	Endangered	Rare	• Apparently secure globally • Rare or uncommon in state
Peregrine Falcon	None	Rare	• Apparently secure globally • Critically imperiled in state because of extreme rarity
Southeastern Kestrel	Species of Concern	Rare	• Demonstrably secure globally • Imperiled in state because of rarity
Reptiles and Amphibians			
Spotted Turtle	None	Unusual	• Demonstrably secure globally • Rare or uncommon in state
Eastern Indigo Snake	Threatened	Threatened	• Rare and local throughout the range or in a special habitat or narrowly endemic • Rare or uncommon in state
Florida Pine Snake [a]	Species of Concern	None	• Demonstrably secure globally • Rare or uncommon in state
Gopher Tortoise	Species of Concern	Threatened	• Rare and local throughout range or in a special habitat or narrowly endemic • Imperiled in state because of rarity
Flatwoods Salamander	Threatened	Threatened	• Imperiled globally because of rarity • Rare and local throughout range or in a special habitat or narrowly endemic • Imperiled in state because of rarity
Striped Newt	Species of Concern	Threatened	• Imperiled globally because of rarity • Rare and local throughout range or in a special habitat or narrowly endemic • Imperiled in state because of rarity

Table 3-4: Federal and State Special Status Species in Georgia, continued.

Common Name	Federal Status	State Status	Natural Heritage Programs
Reptiles and Amphibians			
Southern Hognose Snake	Species of Concern	Threatened	• Imperiled globally because of rarity • Imperiled in state because of rarity
Diamondback Terrapin	None	Threatened	None
Mimic Glass Lizard	None	Rare	• Rare and local throughout range or in a special habitat or narrowly endemic • Imperiled in state because of rarity
Gopher Frog	None	Rare	• Rare and local throughout range or in a special habitat or narrowly endemic • Rare or uncommon in state
Invertebrates			
Savannah Lilliput (mollusk)	None	Threatened	• Critically imperiled globally because of extreme rarity • Imperiled globally because of rarity • Imperiled in state because of rarity
Carolina Slabshell (mollusk)	None	None	• Rare and local throughout range or in a special habitat or narrowly endemic • Rare or uncommon in state
Say's Spiketail (dragonfly)	Species of Concern	Threatened	• Imperiled globally because of rarity • Imperiled in state because of rarity
Fish			
Shortnose Sturgeon	Endangered	Endangered	• Rare and local throughout range or in a special habitat or narrowly endemic • Imperiled in state because of rarity

Sources: Georgia Department of Natural Resources, 2008
Fort Stewart, July 2005b
Fort Stewart DPW, December 2007

3.5.3.1 Red-Cockaded Woodpecker (RCW)

The RCW is listed by the USFWS and the state of Georgia as endangered. No critical habitat has been identified on Fort Stewart for this species. These woodpeckers are territorial, non-migratory, cooperative breeders that exclusively excavate their roost and nest cavities in living pines. A cooperative social structure, called a group, is formed with a breeding pair of RCWs, the current year's offspring, and helpers. Helpers are usually male offspring from previous breeding seasons that assist the breeding pair with cavity excavation and maintenance, egg incubation, feeding young, and defending a group's territory. The nesting season occurs from April to July. Some juvenile males disperse from their native territory to find vacant territories or to establish their own. Most juvenile females disperse after fledging. The average distance fledgling males and females disperse at Fort Stewart is 3.96 miles. Each group of RCWs occupies a discrete territory or area consisting of its cavity trees, called a cluster, and adjacent foraging habitat. The RCW cavity trees on Fort Stewart are shown in Figure 3-5.

The RCW excavates its nesting and roosting cavities in living, mature pine trees (usually greater than 60 years old). The male selects the most recently excavated cavity as the nest tree or selects cavity trees with high resin yields to protect nestlings from parasites and snakes. Nesting habitat for RCW cluster stands typically contain a less dense or open park-like stand of pine trees covering about 40 to 60 square feet of basal are per acre. An excessive midstory of pines or hardwoods is not good nesting habitat for RCWs. Prescribed burning of the midstory vegetation during the growing season improves nesting habitat and provides troops adequate room to maneuver.

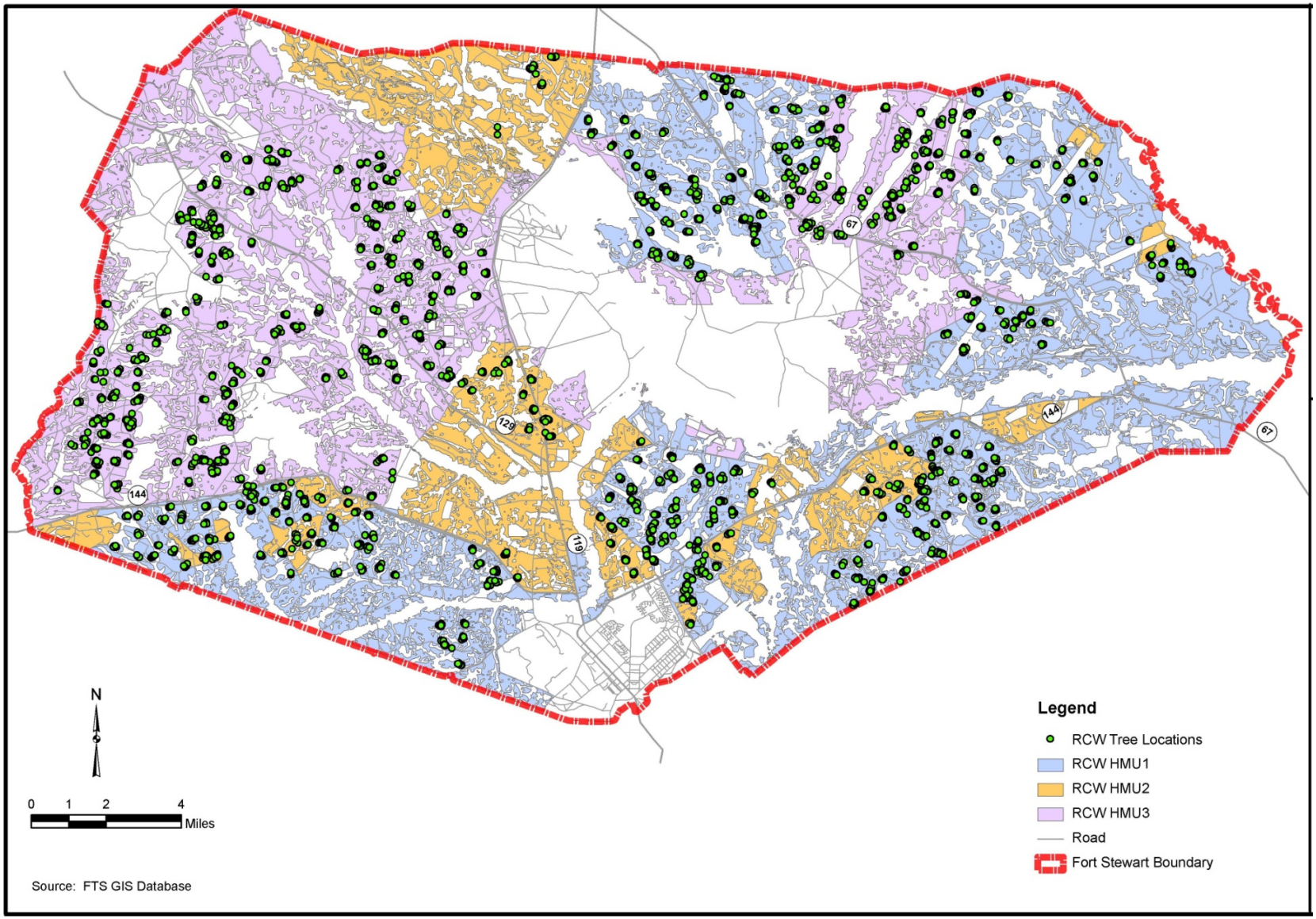


Figure 3-5: Red-Cockaded Woodpecker Habitat on Fort Stewart.

Midstory vegetation is also controlled by mechanical treatment on Fort Stewart. The INRMP reports that optimum RCW habitat is composed of open canopy pine stands with a basal area of hardwoods less than 10 square feet per acre. The RCWs forage or hunt for insect prey on the bark of living trees usually within one-half mile of the cluster. The quality of foraging habitat may vary depending upon vegetation in the understory, weather, soils, season, and fire frequency and intensity. An increased density of hardwood trees is presumed to lower the foraging habitat quality because the RCW territories are smaller in areas with few hardwoods, and the highest populations of RCWs occur on areas with active prescribed burning programs that control hardwoods.

The spatial distribution of RCW territories is important to long-term population stability. Populations with low-density groups may be impacted greater by habitat fragmentation than high-density groups. Populations with less than 2.5 active clusters within 1.25 miles on average had critically low densities that inhibited population expansion. Populations with greater than 4.7 active clusters within 1.25 miles had a high density and a higher probability of persistence. The number of active clusters within 1.25 miles of an affected cluster is evaluated to determine if the project will reduce group density, affecting the size and reproduction of the remaining groups (called a Group Level Analysis).

Natural population growth of RCWs without manmade cavities and habitat improvement is 1-2% per year. However, management of forest ecosystems and direct population techniques can improve forest habitat and increase the rate of RCW recruitment. Improvement of RCW habitat includes adding artificial cavities, controlling midstory vegetation, prescribed burning, thinning, and establishing longleaf pine. Direct population management includes augmenting single-bird groups by moving hatch year RCWs to them to create additional breeding pairs. Fort Stewart's RCW management program provides new recruitment sites or maintains existing unoccupied recruitment sites at a rate of 15% of active clusters every year.

There are 322 sites identified as future recruitment sites, and the decision on which to use depends upon the reproductive success of adjacent groups. The aggressive recruitment cluster program produces an unnaturally high percent of inactive clusters at Fort Stewart. The excess

recruitment clusters are believed to provide ample manmade cavities for dispersing RCWs and the low percent (1-2%) of solitary RCW groups is not believed to indicate a population in decline.

The amount and quality of RCW foraging and nesting habitat has declined as pine forests in the Southeastern U.S. have been cleared for agriculture, timber rotations have shortened, and fire has been suppressed. National forests, military Installations, and national wildlife refuges now contain most of the known populations and suitable habitat for RCWs. In Georgia, the largest and most stable populations are on Federal lands, including Fort Stewart, which provides habitat for 40% of the RCWs in Georgia and is one of the 13 Primary Core Recovery Populations identified in the USFWS RCW Recovery Plan. As a primary core population, Fort Stewart has a recovery objective of 500 active clusters. The range of 400 to 500 active clusters is believed to be the equivalent of 350 potential breeding groups. This goal is achievable because of the large amount of suitable RCW habitat on Fort Stewart (134,000 acres), which is capable of supporting greater than 670 groups. Carrying capacity of RCWs at Fort Stewart is estimated using one cluster for 200 acres of suitable habitat and 136,929 acres of suitable habitat. It has been shown that some of Fort Stewart wetlands are suitable foraging habitat for RCWs.

The RCW management program at Fort Stewart has undergone a series of changes based on USFWS and Army guidance. A 1996 U.S. Army Management Guidelines for the Red-Cockaded Woodpecker (RCW) on Army Installations (U.S. Army, 1996) proposed a secondary objective in compliance with the recovery plan. Because the IRRG of 500 active RCW clusters would impose training restrictions and would have unacceptable adverse impacts to Fort Stewart's training mission, an Installation Mission Compatible Goal of 411 active clusters was proposed. The difference (89 active clusters) is provided by creating Supplemental Recruitment Clusters using artificial cavities and habitat improvements. The Supplemental Recruitment Clusters would not be subject to training restrictions or be required to protect foraging habitat (USACE, October 2008).

A 2001 Biological Opinion (BO) for Implementation of the Fort Stewart INRMP (USFWS, July 2001) required Fort Stewart to divide the training areas into habitat management units (HMUs)

to integrate the protection of RCW habitat with Fort Stewart's training mission. The RCW HMU1 consists of 116, 814 acres and is an area where training restrictions are applied to protect RCW clusters (active and new recruitment clusters). These restrictions are proposed in training areas that will not have unacceptable impacts on training activities. The RCW HMU2 consists of 43,178 acres and is an area where imposition of training restrictions to protect new RCW clusters would have unacceptable impacts on Fort Stewart's training mission. The RCW HMU3 consists of 119,088 acres and is not subject to any training restrictions (USFWS, July 2001).

The 2001 BO requires clearing all midstory vegetation within 50 feet of cavity trees (USFWS, July 2001). Prescribed burning in the growing season every three years is the primary method of midstory control with mechanical methods (mowing, chainsaw, etc.) and/or herbicide injections of single stems used where fire is not possible or effective. The RCW cavity trees are protected during prescribed burns by pre-burning, raking, foaming, wetting, or by other means. Pine stands will maintain 50-80 square feet of basal area per acre to achieve sufficient habitat for RCWs; 10-20% of the slash or loblolly pine plantations are regenerated to longleaf pine. All cavity trees in RCW HMU1 are marked with white reflective bands and yellow warning signs are posted around a buffer zone. The 200-foot buffer zone around clusters has been reduced to 50 feet from cavity trees for through-cluster maneuver traffic (Fort Stewart Endangered Species Management Team, July 2001). Before any land-disturbing activity, the affected area is 100% surveyed for any RCW cavity trees and foraging areas. Each cluster and artificial recruitment cluster under management is inspected annually in March or April. All suitable RCW habitat is surveyed and mapped for new cavity trees every 10 years, with 10% of Fort Stewart surveyed annually (USFWS, July 2001).

During the nesting season, each active cluster is visited weekly to check for nesting activity. Monitoring ceases when a nest is confirmed, except for a random sample of 25% of the total number of clusters. These 25% are used to monitor nesting success. All adults and nestlings in this sample are banded. All recruitment clusters in artificial or new natural cavities that become active are monitored for number of fledglings produced for up to five years after activation. Active clusters that do not nest by the end of May are visited late in the nesting season to determine whether a potential breeding pair is present (USFWS, July 2001).

With the second revision of the RCW Recovery Plan in 2003, revised foraging guidelines were established that included a Recovery Standard and a Standard for Managed Stability. An RCW Foraging Matrix Application has been developed to standardize the evaluation of foraging habitat and allow the flexibility to adapt the application to different foraging types. The matrix is used by both the proponent of the proposed action (the Army) and by the USFWS, along with other tools and analyses, to evaluate the impacts of habitat-altering projects on RCW foraging habitat. The alteration of RCW foraging habitat includes the permanent loss of habitat from development and the temporary removal or modification of habitat from harvesting or thinning. The USFWS has encouraged the development of site-specific foraging matrices.

A 2007 revision to the Management Guidelines (U.S. Army, 2007) describes a population size of 350 potential breeding groups of RCW as highly robust or resistant to threats from random environmental or population events as wells as to inbreeding. Installations that have not yet achieved a population goal will implement actions to achieve a 5% annual increase in active clusters by providing a constant supply of unoccupied recruitment clusters equal to 10% of the current number of active clusters. In 2009, Fort Stewart supported a total of 330 active RCW clusters and projected a population growth of 5% per year, reaching its goal of 350 potential breeding groups by the year 2012 (U.S. Army, 2008b).

3.5.3.2 Eastern Indigo Snake

The eastern indigo snake is listed by USFWS and the state of Georgia as threatened (Figure 3-6). No critical habitat has been designated for this species.

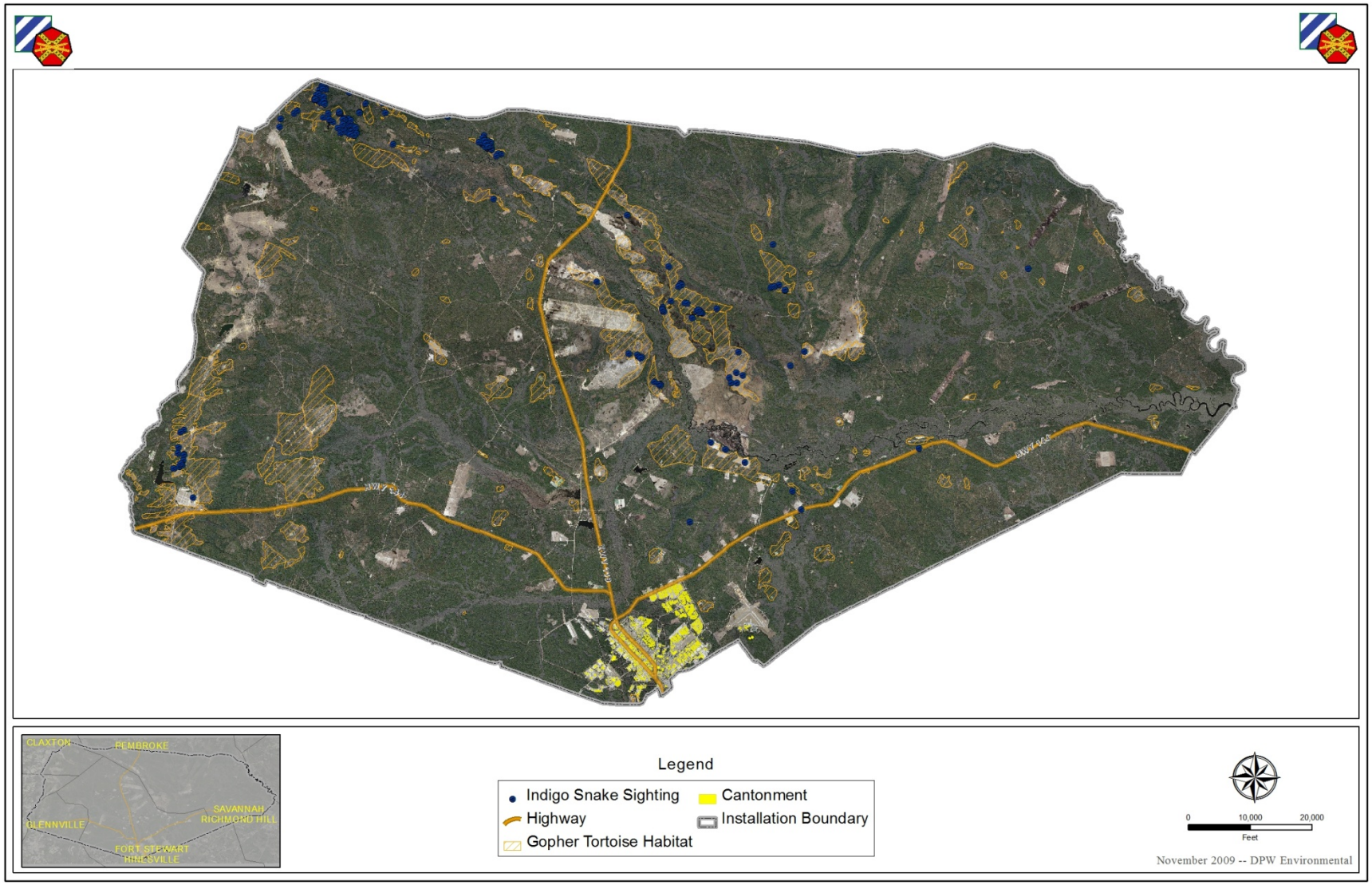


Figure 3-6: Eastern Indigo Snake and Gopher Tortoise Habitat on Fort Stewart.

This non-venomous snake now occurs in significant numbers only in Georgia and Florida. The indigo snake is believed to be declining throughout its range (USFWS, July 2001). The primary habitat of the eastern indigo snake is xeric (dry) upland communities (especially the longleaf pine-turkey oak-wiregrass association) interspersed with wetland habitats, such as drainage ways, river swamps, and cypress ponds. Research indicates that the majority of the winter dens used by the eastern indigo snakes are in gopher tortoise burrows.

Gopher tortoise habitat on Fort Stewart is also shown on Figure 3-6. The majority of the winter sightings of eastern indigo snakes occurred within or at the entrance of a tortoise burrow, and most of the locations of eastern indigo snakes from December through April were on ridges in the xeric upland (such as sandhill) habitats. Indigo snakes are quiescent during winter; therefore, the availability of deep dens that do not flood is essential for winter survival. Gopher tortoise burrows may be 30 or more feet long. Eastern indigo snakes show a tendency to make dens in gopher tortoise burrows near windrows of logging debris and will use more than one gopher tortoise burrow as dens during the winter (USFWS, July 2001).

From May through November, the eastern indigo snake moves out of winter habitat in the uplands to stream bottoms and agricultural fields. Seasonal range during the period from May through July is estimated at 106 acres and increases to 240 acres from August to November. Extensive movements in the late summer and fall probably are related to searches for winter dens or mates. The snakes' mating activity begins in November, peaks in December, and continues into March (USFWS, July 2001). Four eastern indigo snakes' nests were located in abandoned gopher tortoise burrows and one in a damp rotting pine stump covered with pine straw; clutch size in these five nests ranged from three to 10 eggs, and many were infertile (USFWS, July 2001).

Eastern indigo snakes forage in a variety of forest types, including wetlands and upland pine-hardwoods up to a mile from their winter dens. The snake feeds on other snakes, frogs, toads, small mammals, birds, turtles (including gopher tortoise hatchlings), fish, and other vertebrates

(USFWS, July 2001). Despite their formidable size, eastern indigo snakes are not constrictors (Fort Stewart Endangered Species Management Team, July 2001). Declines in eastern indigo snake populations are primarily from habitat loss. Xeric upland habitats within the range of the indigo snake have been severely impacted by silviculture, farming, and urbanization. A reduction in numbers and extent of wildfires and prescribed burns has resulted in adverse modification of upland pine habitats. Snake collections for the pet trade and deaths related to rattlesnake hunting also reduced numbers. Additional mortality may result from bioaccumulation of pesticides.

The status and future of survival of the eastern indigo snake is likely linked to the status of xeric upland habitats and other habitats that support healthy gopher tortoise populations. Density of gopher tortoise populations and, therefore, eastern indigo snake habitat is closely related to available biomass of herbaceous food plants; these in turn are dependent on a sparse tree canopy and relatively open (litter free) ground conditions (USFWS, July 2001). Frequent fires that remove some, but not all, scrub hardwoods and most brush are essential in maintaining habitat quality (USFWS, July 2001).

Four known populations have been identified on Fort Stewart associated with sandhills along the Canoochee River, the Ogeechee River, and Beards Creek (Figure 3-6). The snake is widely distributed on sandhills along the Canoochee River in the northwestern corner of Fort Stewart (TAs F11, F12, and F13). A large bay-blackwater creek swamp in F12 provides ideal foraging habitat for eastern indigo snakes. A smaller localized population occupies the north-south Pamlico Terrace east of Beard Creek in TAs E21, E22, and D16. Eastern indigo snakes have been reported in the Artillery Impact Area and Training Areas B3 and B4 in extensive sandhills (more than 1,500 acres) of the Artillery Impact Area, which may be among the best sites in the state. A poorly documented population has been identified in mesic flatwoods and creek swamps near a sand ridge area west of the Ogeechee River in TA C11 (Fort Stewart Endangered Species Management Team, July 2001).

As part of in-house monitoring, Fort Stewart FWB personnel have marked, weighed, measured, and sexed 110 eastern indigo snakes during the past seven years. Thirty eastern indigo snakes

have been radio-tracked on Fort Stewart and adjacent properties (Fort Stewart DPW, May 2008). Radio-tagged snakes exhibit site fidelity and have very large home ranges. Some large males on Fort Stewart are estimated to have home ranges of up to 1,214 hectares (3,000 acres) while females have smaller home ranges.

Annual population trend surveys are conducted on Fort Stewart by the FWB (Fort Stewart, July 2005). Because the indigo snake uses gopher tortoise burrows as winter refuges and as egg-laying sites, the population stability of the indigo snake is partially dependent upon the stability of the gopher tortoise. Gopher tortoises and their habitat have been extensively studied on Fort Stewart, and the population appears to be large and stable (Fort Stewart DPW, May 2008). Eastern indigo snakes naturally occur at low population densities, and their population on Fort Stewart appears to be large and stable from ongoing surveys and studies. Habitat management units (HMU) of the eastern indigo snake and locations where the snake has been sighted are shown in Figure 3-6. The primary risk to the eastern indigo snake from training activities on Fort Stewart is direct mortality from vehicle traffic or damage to gopher tortoise burrows or other retreats (Fort Stewart Endangered Species Management Team, July 2001).

The conservation goal for the eastern indigo snake is to maintain the four populations on Fort Stewart and to encourage expansion into suitable unoccupied habitat. The RCW habitat restoration of longleaf pine-wiregrass supports the indigo snake goal. Midstory vegetation control and growing-season prescribed burning also improve indigo snake habitat. To aid conservation of this species, prescribed burning will be avoided in the indigo snake HMUs during mid-July to September, when the snake is searching for dens, and timber harvesting in the HMU will be avoided during November through April, when the snake is primarily in its den. Gopher tortoise burrows are flagged and avoided when possible. Windrows and stumps are left in place when possible (USFWS, July 2001).

3.5.3.3 Frosted Flatwoods Salamander (FFS)

The USFWS and the state of Georgia have listed the FFS as threatened. No critical habitat for FFS has been designated on Fort

Stewart. Isolated populations of this salamander live in pine flatwoods in three states.

The decline of amphibians has been attributed to the use of herbicides/pesticides and to the loss or degradation of pine flatwoods and isolated temporarily or seasonally flooded ponds, including cypress ponds or grassy depressions. Disruption of natural fire cycles has also contributed to the decline of this species. Occurrences and potential breeding ponds of the frosted flatwoods salamander on Fort Stewart are shown in Figure 3-7. Adult FFS are autumn breeders, migrating at night to wetland breeding sites during wet weather from October to early December. Eggs are deposited in dry parts of the pond basin or wetland depression that eventually fills with water from rain in the late fall and early winter. The eggs hatch into aquatic larvae when flooded or inundated by rising pond levels. Larvae undergo metamorphosis and transform into terrestrial adults in late March or early April before the seasonal wetlands dry up.

Breeding population size has been reported from 60 adults to over 300 adults. Adult salamanders leave the pond basin during December-January and exhibit homing ability by leaving the pond near the point of their arrival (USFWS, July 2001). It is likely that salamanders return to the same breeding pond every year. Terrestrial adult FFS inhabit low areas in pine flatwoods, where they live in underground burrows that they excavate or in crayfish tunnels. Salamanders have been observed eating earthworms and probably also consume other small invertebrates.

The minimum viable population size needed to sustain a salamander population is unknown, but the presence of multiple high-quality breeding sites surrounded by an area of pine flatwoods/savanna is presumed to guard against extinction. Protected corridors between the sites will provide a route for movement between ponds and colonization of suitable habitat. The FFS have been found more than one mile from their breeding ponds; however, a protective buffer of 492 yards from the wetland edge has been recommended (USFWS, July 2001).

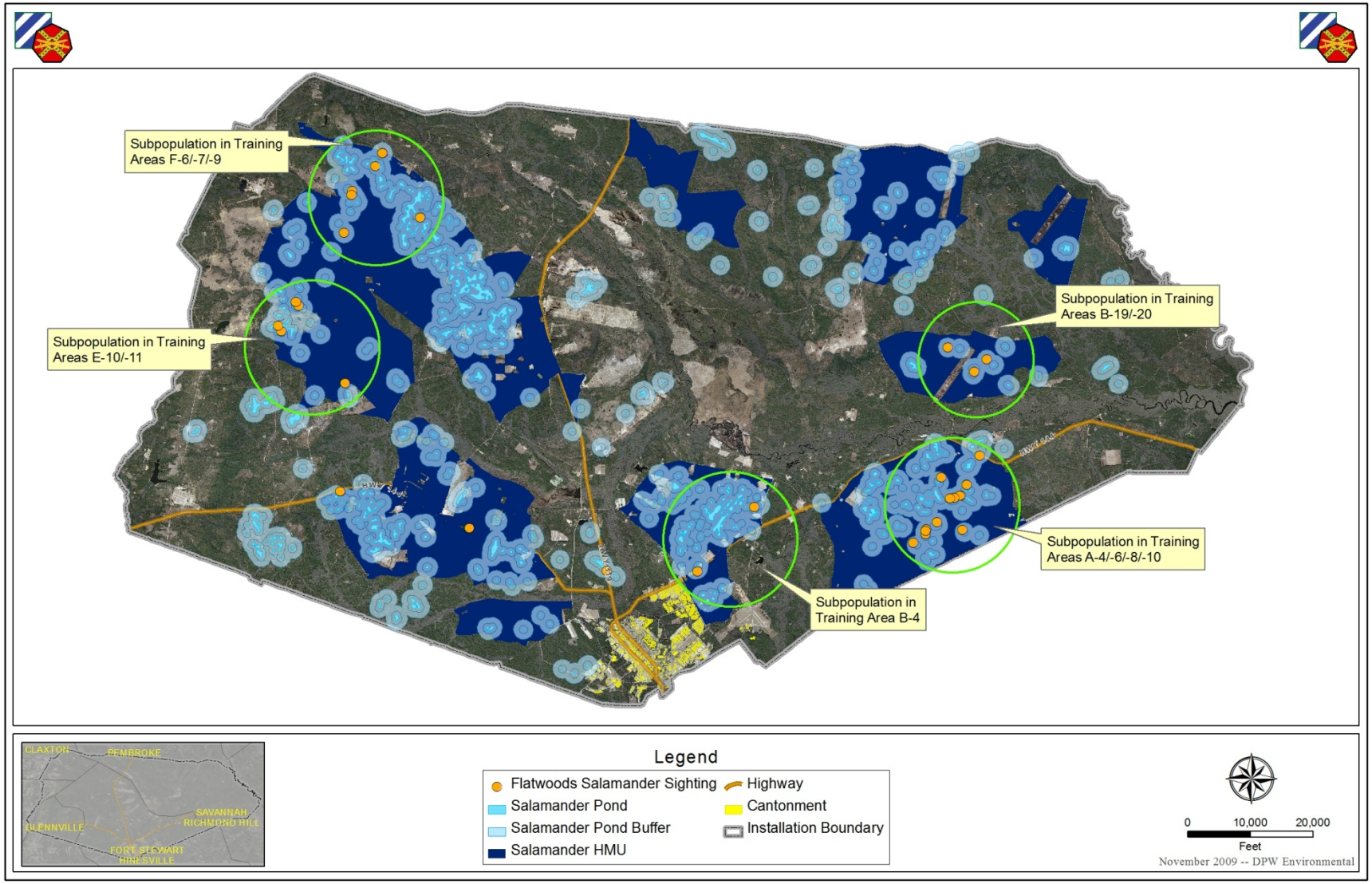


Figure 3-7: Frosted Flatwoods Salamander Habitat on Fort Stewart.

The FFS habitat is widespread on Fort Stewart and includes many areas not heavily used or impacted by mechanized training activities. A total of 10 HMUs that encompass 79,917 acres is designated for the FFS on Fort Stewart (Figure 3-7). Salamander breeding sites are small ponds, often less than one acre, which receive surface water runoff from adjacent pine habitat. Firebreaks, tire rutting, and ditching alter the hydrology and topography of small ponds, so these activities are avoided in or near seasonal ponds.

The conservation goal is to maintain the five existing populations of frosted flatwoods salamanders and 25 breeding sites currently known on Fort Stewart. The *Endangered Species Management Plan* reports annual monitoring of the flatwood salamander population at 10 known breeding sites and biennial monitoring at recently documented breeding sites or those with less certainty of occurrence. Monitoring protocols include dipnet or minnow trapping in February-March to survey for the aquatic larvae (USFWS, July 2001). Restoration of longleaf pine-wiregrass plant community for the RCW also benefits the salamander.

Prescribed growing-season burns to control midstory vegetation are used to restore and maintain the flatwood habitat. Mechanical control of midstory vegetation is avoided to prevent the creation of tire ruts in wetlands, and no herbicides are applied within wetlands and adjacent uplands in salamander habitat. No new firebreaks are plowed around the margins of or through cypress ponds in salamander habitat, except under rare circumstances when necessary to suppress wildfires. Except under certain conditions, logging is prevented within cypress pond/wetlands and in a 100-foot buffer of known or potential salamander breeding sites.

3.5.3.4 Wood Stork

The USFWS and the state of Georgia list the wood stork as endangered. No critical habitat has been designated for this species. Wood storks are large, long-legged wading birds about 50 inches tall with a wingspan of 60 to 65 inches. The plumage is white except for iridescent black wing edges and a short black tail. Wood storks nest in colonies, called rookeries (USFWS, July 2001). Typically, storks nest in medium to tall trees either in standing water or on islands

surrounded by relatively broad expanses of open water (Figure 3-8). Nests in Georgia often are constructed in cypress, blackgum, or southern willow. Storks tend to use the same rookeries over many years as long as the sites remain undisturbed and sufficient foraging habitat remains in surrounding wetlands.

Rookery sites must remain inundated during the nesting period to prevent predation and abandonment (USFWS, July 2001). Storks nest yearly and, in Georgia, lay two to five (generally three) eggs from March through late May. Nests are constructed of sticks, vines, leaves, and moss and lined with leaves or cypress foliage. Adults incubate the eggs in approximately 30 days, and the young fledge from July to August. Adults feed the young by regurgitating whole fish into the bottom of the nest three to 10 times per day. A study of wood storks in Georgia determined that over 85% of foraging sites were within 12 miles of the nesting colony, but foraging flights up to 60 miles from the colony occur (Fort Stewart Endangered Species Management Team, July 2001).

Wood storks feed in a variety of wetlands about six-10 inches deep, generally on small fish 1 to 10 inches long (USFWS, July 2001). They occasionally eat crustaceans, amphibians, reptiles, mammals, birds, and arthropods. To successfully feed themselves, wood storks need concentrated prey in relatively high densities. Storks forage in a variety of calm, shallow wetlands where the water column is uncluttered by dense patches of vegetation (Fort Stewart Endangered Species Management Team, July 2001). The wood stork is one of 20 stork species worldwide and is the only stork that occurs regularly in the United States. The breeding population in the United States dropped to 2,000; however, since being listed in 1984, it has ranged from 5,000 to 6,500 pairs. Historically, wood stork nesting colonies were primarily in southern Florida, but since the mid 1970s, have shifted to northern Florida, Georgia, and South Carolina (USFWS, July 2001).

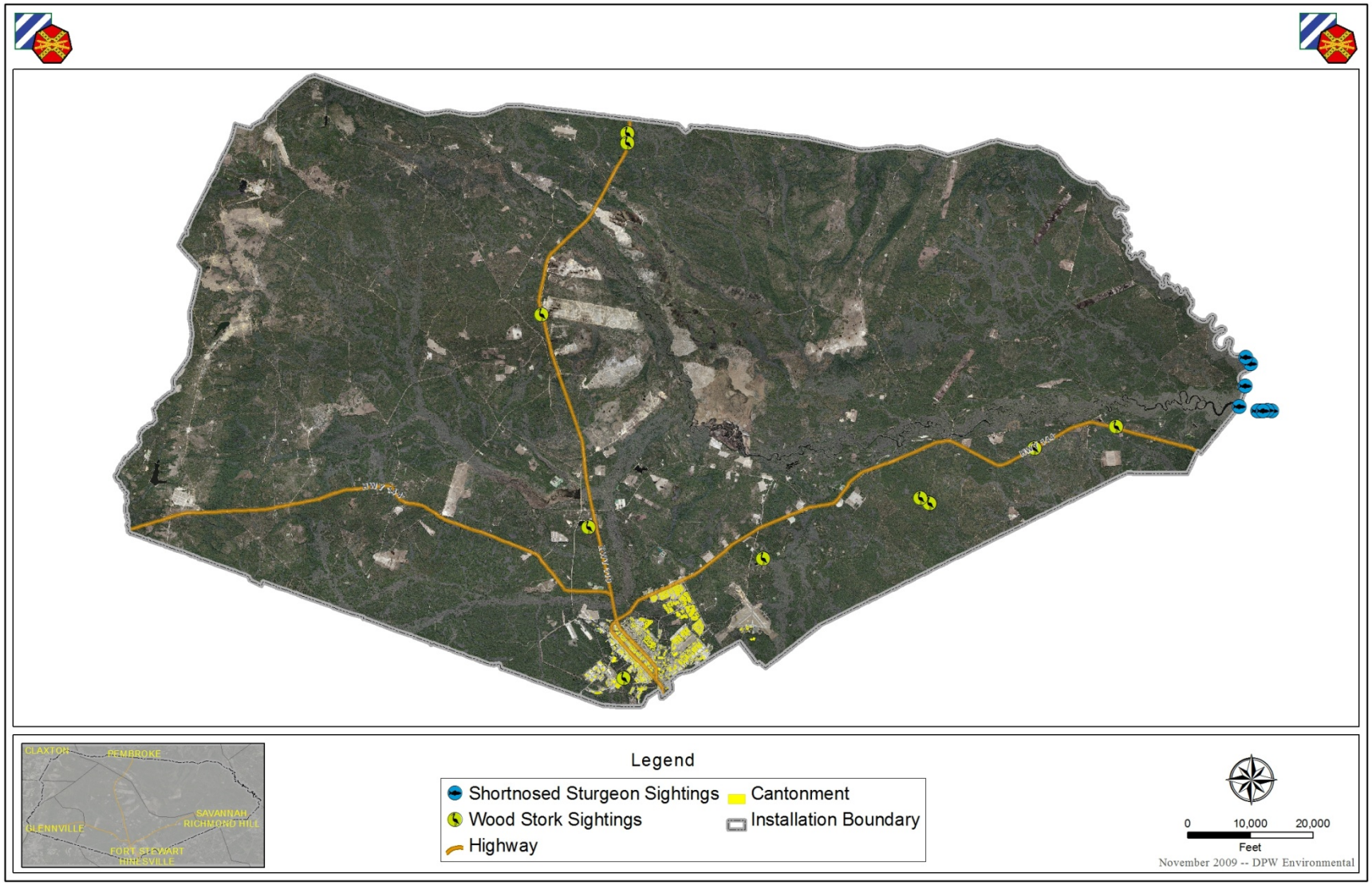
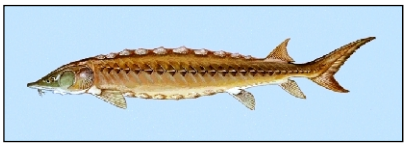


Figure 3-8: Wood Stork and Shortnose Sturgeon Sightings on Fort Stewart.

Fort Stewart conducted aerial and ground surveys, but no nesting wood storks were found on Fort Stewart. Several wood stork rookeries occur in McIntosh and Long counties within 30 miles of Fort Stewart, and wood storks may nest on Fort Stewart in the future (USFWS, July 2001). The establishment of a nesting colony of wood storks could conflict with the training mission because the birds present a hazard of striking low-altitude aircraft. Regionally, other opportunities exist for establishing wood stork nesting colonies (Fort Stewart Endangered Species Management Team, July 2001). Habitat management guidelines for the wood stork (and bald eagle) recommend prohibiting aircraft operation within 500 feet of a nesting colony (below 1,000 feet for eagle). Foraging wood storks are seen on Fort Stewart and HAAF regularly in streams, lakes, and borrow pits (USFWS, July 2001). BMPs for wetlands and forestry protect the wood stork's foraging habitat.

3.5.3.5 Shortnose Sturgeon



The shortnose sturgeon is listed as an endangered fish species by the USFWS, the National Marine Fisheries Service, and the state of Georgia (Figure 3-8). Shortnose sturgeons spawn in freshwater then remain in the river's estuary or in the river, and only periodically visit saltwater at the river's mouth. In the Ogeechee River, shortnose sturgeons range from the lower estuary to the upper river. They ascend the Canoochee River (a tributary to the Ogeechee River) only incidentally from a one-time observation and remain there for less than a 24-hour period. It is presumed that shortnose sturgeons probably do not go further than several kilometers into the Canoochee River during summer conditions because of the lack of adequate habitat during that season (UGA, 2001 ESMP for SNS).

Shortnose sturgeons are bottom (benthic) omnivorous feeders. The juveniles are believed to feed on sediment-dwelling insects and crustaceans. Adults consume mollusks and large crustaceans. During the summer in high-river flow, shortnose sturgeons move downriver toward estuaries. During the summer, in the Ogeechee and Altamaha rivers of Georgia, when water temperatures exceeded 81° F, shortnose sturgeons remained in deep freshwater spring-fed holes and migrated

further downriver in the fall, winter, and spring. Preferred spawning habitats are upriver channels with sand or gravel substrates and fast flowing currents.

Extensive sampling on the Ogeechee and Canoochee rivers in 1993-1995 revealed nearly 71% of the shortnose sturgeons collected were greater than 56 centimeters in length, suggesting an abundance of older juveniles and adults. This skewed distribution of size classes was interpreted to demonstrate a compromised nursery function, spawning success, or both. Historically, water quality in the Ogeechee River basin is degraded and vulnerable to impacts from additional anthropogenic sources (UGA, 2001 ESMP for SNS). A management goal of Fort Stewart is to protect and enhance the species and associated habitat to prevent, minimize, and eliminate training restrictions (Fort Stewart, July 2005).

3.5.3.6 Gopher Tortoise

The state of Georgia lists the gopher tortoise (GT) as threatened. The USFWS has listed only the GTs west of the Mobile and Tombigbee rivers in Alabama, Mississippi, and Louisiana as threatened; the eastern population in South Carolina, Georgia, and Florida is under review for listing. A dry land turtle, the GT has a high, domed shell with shell lengths of up to 15 inches. It has elephant-like hind feet and flattened shovel-like front feet for digging. The habitat of the GT is natural dry communities, mostly of the original longleaf pine-scrub oak type on well-drained sand ridges with an abundance of herbaceous ground cover and a generally open canopy with a sparse shrub midstory, which allows sunlight to reach the forest floor. The relative open canopy allowing the penetration of sunlight to the ground is important for egg incubation and for herbaceous food plants. The tortoise may also be found in disturbed habitats that are cleared and maintained as some mix of grasses and forbs. On military bases, they often place their burrows in areas maintained for training, such as firing points, ranges, and airstrips (Figure 3-6).

The GT digs a long sloping burrow up to 30 feet long and extending up to 9 feet below the surface. Small juveniles use similarly smaller burrows, often more than one. In active burrows, the single entrance contains a mound or apron of excavated sand near where the eggs are laid in May, June, and July. The GT is one of the important keystone vertebrates in longleaf pine savannas because its long-lasting burrows are used by numerous vertebrates and invertebrates (USFWS, 1990 GT Recovery Plan).

Feeding activity by gopher tortoises is very restricted in the winter months (late November through February). On unusually warm winter days when maximum temperatures exceeded 79° F, tortoises were occasionally observed at the burrow entrance (McRae et al, 1981 as cited in USFWS, 1990 GT Recovery Plan). During the spring (March and April), outside burrow activity was observed during the warmest part of the day (4:00 to 6:00 p.m.). During July and August, feeding forays outside the burrow were observed at mid-morning (10:00 a.m. to noon) and mid-afternoon (4:00 to 6:00 p.m.) with reduced activity during the hottest part of the day (higher than 90° F).

All feeding activity occurs within 33 yards of the GT burrow (McRae et al, 1981 as cited in USFWS, 1990 *GT Recovery Plan*). Foraging distances increased from the burrows with reduced ground cover. The mean area for home ranges of males was 0.47 hectares (1.16 acres) while females averaged 0.08 hectares (0.20 acres). The differences were attributed to breeding forays by males. Others reported the average colony typically used an area of less than 4 hectares (9.88 acres). Buffer zones for military training were reported at 25 feet from GT burrows (Guyer et al, 2006). The tortoises and their burrows are surveyed at least every five years; most sites are surveyed every three years or less to document numbers and distribution of active burrows and habitat quality for eastern indigo snakes, according to the methods described in "Management Guidelines for the Gopher Tortoise on Army Installations." The information is sent to the USFWS annually (Jones Technologies, 2001).

3.6 CULTURAL RESOURCES

This section summarizes the types and numbers of recorded archaeological, architectural, and Native American resources documented by the cultural resource management (CRM) program. The discussion incorporates the known archaeological resources along with the likelihood of encountering cultural resources in areas of Fort Stewart not formally surveyed. For additional information regarding Fort Stewart cultural resource management, refer to Appendix C.

3.6.1 Introduction

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources are divided into three major categories: archaeological resources (prehistoric and historic), architectural resources, and traditional cultural properties. Historic districts may fall within all three of these categories, depending upon what they contain. Objects are defined in 36 CFR 60.3(j) as a material thing of functional, aesthetic, cultural, historical, or scientific value that may be, by nature of design, movable yet related to a specific setting or environment.

Archaeological resources include any material remains of past human life or activities that can provide scientific or humanistic understandings of past human behavior and culture by applying scientific or scholarly techniques (16 U.S. Code 470bb). For example, archaeological resources consist of sites, arrowheads, stone flakes, or bottles. Architectural resources include standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance (National Park Service, 2002).

Traditional cultural properties can include archaeological resources, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, or traditional hunting and gathering areas that American Indians or others consider essential to continue traditional cultures (National Park Service 1998). Figures 3-9 and 3-10 show patterns of historic and prehistoric settlement patterns on Fort Stewart; these are the known resources managed on Fort Stewart.

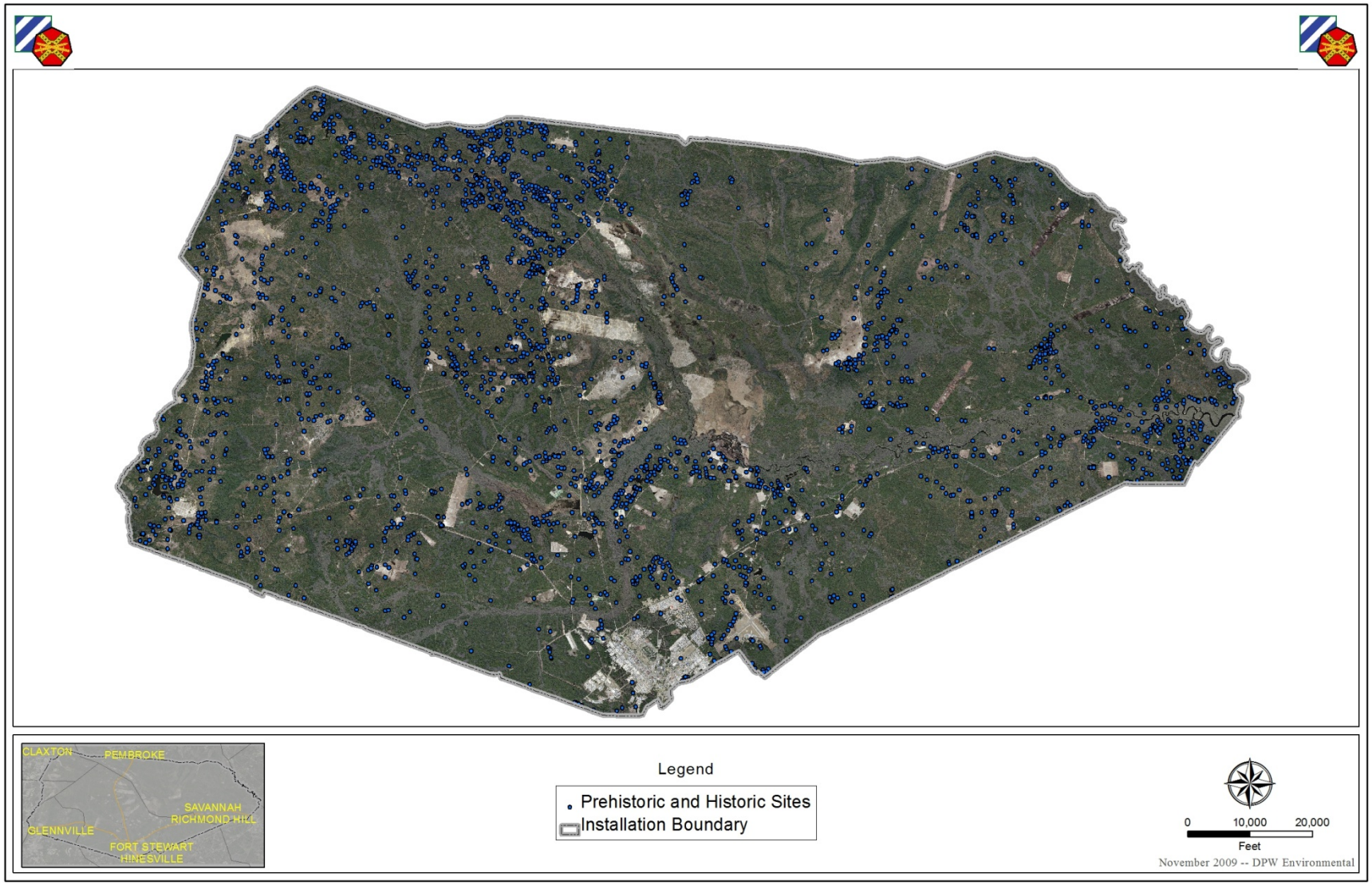


Figure 3-9: Prehistoric and Historic Period Cultural Resource Sites.

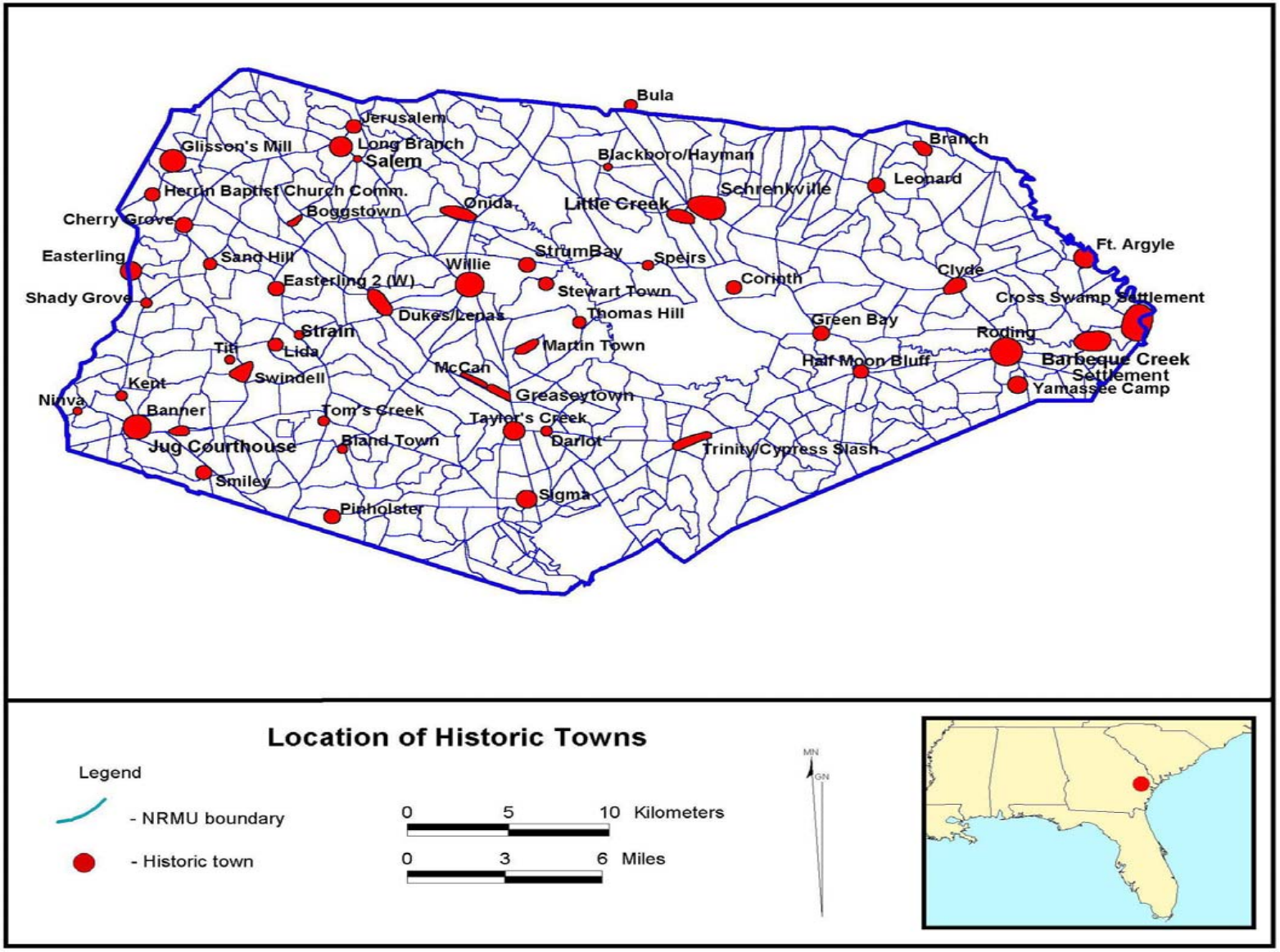


Figure 3-10: Settlement Patterns at Fort Stewart.

Under the National Historic Preservation Act (NHPA) as amended, only historic properties warrant consideration of impacts from a proposed action and any associated proposed mitigation. Historic properties are defined by the NHPA as any districts, sites, buildings, structures, or objects included on or eligible for inclusion on the NRHP. Historic properties include traditional cultural properties and, in general, must be more than 50 years old to be considered for protection under the NHPA. More recent structures, however, that are associated with important national events may warrant protection if they are "exceptionally significant." (Sherfy & Luce 1998).

To be considered significant, archaeological or architectural resources must meet one or more criteria as defined in 36 CFR 60.4 (Parks, Forests, and Public Property – National Register of Historic Places (NRHP) Criteria for Evaluation*)* for inclusion in the NRHP.

The criteria for eligibility to the NRHP are:

- Criterion A: Associated with events that have made significant contributions to the broad patterns of history;
- Criterion B: Associated with the lives of significant persons of the past;
- Criterion C: Embody distinctive characteristics of a type, period, or method of construction, or which represent the works of a master, or which possess high artistic values, or which represent a significant and distinguishable entity whose components may lack individual distinction; or
- Criterion D: Has yielded, or may be likely to yield, information important to history or prehistory. In order for a cultural resource to be determined eligible for the NRHP, the resource must meet at least one of the above criteria and must possess integrity. Integrity means the resource must retain sufficient elements of location, design, setting, materials, workmanship, feeling, and/or association. The Army complies with all Federal laws and regulations, including the cultural resource laws listed in Table 3-5.

Table 3-5: Prominent Federal Cultural Resource Laws.

ABANDONED SHIPWRECK ACT OF 1987 (43 USC 2101-2106)	Establishes ownership and preservation responsibilities for abandoned shipwrecks in United States waters.
AMERICAN INDIAN RELIGIOUS FREEDOM ACT (AIRFA) (42 USC 1996 and 1996a)	Establishes the policy of the United States to protect and preserve the inherent right of freedom for Native Americans to believe, express. and exercise the traditional religions of the Native American cultures. Rights guaranteed under this act include, but are not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites. Also included is the right of tribal leadership to be consulted by Federal agencies prior to disturbance of any kind to human burial sites that appear to relate to tribal ancestry.
ANTIQUITIES ACT OF 1906 (16 USC 431-322; 43 Stat. 225)	The Antiquities Act of 1906 was the first significant piece of Federal legislation concerned with nationwide archaeological resources. The act provides criminal sanctions for persons who "appropriate, excavate, injure, or destroy any historic or prehistoric ruin or monument, or any object of antiquity situated on lands owned or controlled by the Government of the United States." The act pertains only with Federally owned land, but it does afford a measure of protection to archaeological resources and other scientifically important resources such as paleontological remains. The act is composed of four basic sections. One sets sanctions for violators of the regulation. Another grants powers to the President to create national monuments, and to the Secretary of the Interior to accept, on behalf of the government, private lands that contained antiquities or objects of historic or scientific interest. The third designates the agencies that can grant permits for investigations on government land and states that objects would be preserved in public curatorial facilities. The fourth requires that the Secretaries of Interior, War, and Agriculture compile and publish the rules and regulations needed to implement the act. Many portions of this act are considered superseded by the Archaeological Resources Protection Act.
ARCHAEOLOGICAL AND HISTORIC DATA PRESERVATION ACT OF 1974 (AHPA) (16 USC 469-469c)	The AHPA ensures that any Federal construction project that encounters significant cultural data is required to notify the Secretary of the Interior of its discovery, whereupon the area to be impacted is to be investigated and the data recovered. The AHPA provides the mechanisms for the recovery of scientific, prehistoric, historical, and archaeological data if and when the planning processes provided for by NEPA, NHPA and related regulations have resulted in a conclusion that data recovery is the most economical and practical method of mitigating adverse effect.

Table 3-5: Prominent Federal Cultural Resource Laws (continued).

ARCHAEOLOGICAL RESOURCES PROTECTION ACT OF 1979 (ARPA) (16 USC 470aa-470ll)	ARPA is designed to accomplish two important goals. First, it protects archaeological resources on public lands and Native American reservations from unauthorized excavation, defacement, removal, damage, or alteration. Second, the spirit of the act is intended to enhance communication and exchange of information among government agencies, professional archaeologists and anthropologists, and private individuals possessing artifact collections and data acquired before enactment of the law. Archaeological dig permits on Federal lands are issued through ARPA regulations while punishments and penalties for ARPA violations are detailed in the law. For first offenses, these may include up to a year of incarceration or up to $100,000 in fines.
HISTORIC SITES ACT OF 1935 (16 USC 461-467)	The Historic Sites Act of 1935 established a National Register of historic sites and the National Historic Landmarks system. This law aims to denote historic and archaeological sites, buildings, and objects of national significance worthy of preservation. The act represents the first clear legal statement concerning the nation's interest in and responsibilities for the preservation of nationally significant sites and objects. Not only does the act begin the National Historic Landmarks program, which paved the way to the National Register of Historic Places (NRHP), it also established an Advisory Board on National Parks, Historic Sites, Buildings, and Monuments that was responsible for archaeological and architectural surveys, and it stated that private lands and buildings could be of national value as well. The act had many shortcomings such as no provisions for state, local, or group significance, and sanctions provided for by the act were weak, but it did establish the first national policy on historic preservation.
NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) (42 USC 4321-4370c)	NEPA, originally passed in 1969, requires Federal agencies to examine and describe the consequences of their actions that significantly affect the quality of the human environment. *NEPA requires integration of CRM concerns with other aspects of environmental management when documentation of a planned activity is required.* CRM has input into Environmental Assessments (EA) and Environmental Impact Statements (EIS) that may be required on Fort Stewart. NEPA is the beginning point for the environmental impact analysis process for any Federal tasks, and this process is the vehicle by which cultural resources are considered. Note, however, that compliance with NEPA does not automatically qualify as compliance with other CRM laws and regulations. The Section 106 implementing regulation, 36 CFR § 800, does make it possible to conduct simultaneous review and compliance for some projects and undertakings. See Volume III, SOP 7.

Table 3-5: Prominent Federal Cultural Resource Laws (continued).

THE NATIONAL HISTORIC PRESERVATION ACT (NHPA) (16 USC 470-470w)	Enacted in 1966, this law established the Advisory Council on Historic Preservation (ACHP), the NRHP, Federal preservation policy on Federal lands, and outlines the "Section 106 Process," which outlines the procedures for Federal agencies' responsibility to take into account their effects upon historic properties.
NATIVE AMERICAN GRAVES PROTECTION AND REPATRIATION ACT (NAGPRA) (25 USC 3001-3013)	NAGPRA addresses the rights of lineal descendants, Tribes, and the Native Hawaiian organizations to Native American human remains, funerary objects, sacred objects, or objects of cultural patrimony with which they are affiliated that have been removed from or discovered on Federal or tribal lands. It is also formulated to guarantee that human remains, artifacts from graves, and certain other artifacts held by Federal agencies and museums will be returned to the proper, Federally recognized Native American and Hawaiian groups. Fort Stewart is responsible for Native American remains from properties on Fort Stewart. This act also applies to Native American remains that are still in the ground at sites on base.

If an undertaking will potentially affect a historic property, then Federal agencies must engage in consultation with the ACHP and the SHPO. The Federal agency will either find alternatives to the undertaking or, failing this, mitigate the affected resource(s). This involves further consultation with the ACHP, the SHPO, the Tribes, and the public. The NHPA Section 106 regulation, 36 CFR § 800, encourages Federal agencies to adopt alternative methods of compliance (such as enacting a Programmatic Agreement). Section 106 as practiced on Fort Stewart is detailed in Standard Operating Procedure (SOP) 1 of the Integrated Cultural Resources Management Plan (ICRMP) (Appendix C).

3.6.1.1 Army Regulation 200-1 and the ICRMP

Army Regulation (AR) 200-1 is one of the key regulations implementing management of cultural resources on Army property. Implementation of AR 200-1 ensures Installations make informed decisions regarding the impacts to cultural resources in a manner consistent with legal compliance, in support of the military mission, and consistent with sound principles of cultural resource management. The ICRMP incorporates cultural resource laws and regulations into an internal document outlining how Fort Stewart manages its cultural resources. As part of the ICRMP, Fort Stewart also develops individual cultural resource action plans, used to manage its

resources within an integrated framework. These cultural resource action plans are incorporated into the INRMP and reviewed and updated on the same cycle as the INRMP. As such, Fort Stewart reviews approximately 25 cultural resource action plans per year to meet the five-year cycle. The ICRMP also has several SOPs that guide Installation personnel with regard to the execution of mission activities (see Appendix C).

3.6.1.2 Fort Stewart Programmatic Agreement (PA)

Fort Stewart and the Georgia SHPO developed a PA in September 2000, renewed it in September 2005, and will renew it again in 2010. It provides Fort Stewart with a flexible tool to manage its cultural resources, allowing Fort Stewart to meet the requirements of CRM review of undertakings with no effect or no adverse effect without waiting for the 30-day response from the SHPO. In short, the PA is the CRM program's regulatory backbone, guiding and streamlining the program's compliance with Federal laws and regulations while providing a timely, effective method of managing Fort Stewart's cultural resources.

3.6.1.3 DoD-wide PAs and Memoranda of Agreements applicable to Fort Stewart

One of the more prominent DoD PAs is the one between DoD, ACHP, and National Conference of SHPOs Regarding the Demolition of World War II Temporary Buildings, effective June 7, 1986. This PA allows DoD Installations to demolish World War II era temporary buildings without further Section 106 consultation. Other similar DoD-wide PAs have since been implemented that cover additional building types and include the following: Capehart and Wherry-era (1949-1962) Housing, Cold War Era (1946-1974) Unaccompanied Personnel Housing, World War II and Cold War era (1939-1974) Army Ammunition Production Facilities and Plants, and Army Airfields.

3.6.1.4 Archaeological Investigations and Analysis

Of the 279,270 acres on Fort Stewart, 257,961 acres are available for cultural resource surveys because of range impact zones, established special use facilities, developed areas of the Garrison,

and other areas categorically excluded from survey requirements. Of the remaining acres available, 174,832 acres have been inventoried (or excluded from survey requirements), which constitutes 62 % of Fort Stewart. Using the Johnstone Predictive Model, some high probability acres and low probability acres remain to be surveyed to fully inventory Fort Stewart's cultural resources. Figure 3-11 depicts the areas of Fort Stewart that have been previously surveyed (or categorically exempted from survey) for cultural resources as well as the remaining areas that are subject to future cultural resource inventories.

Because the primary driver for inventorying cultural resources is based upon Section 106 NHPA requirements, Fort Stewart inventories them based upon the following priorities: thinning training lands to accommodate military training requirements; thinning training lands and protected species habitat for sustainability of mission and environment; and thinning to support silvicultural health.

Cultural resource management personnel schedule 9,000 or more acres per year for survey. As a result of these surveys, Fort Stewart has identified 3,557 archaeological sites. Of the remaining 104,438 acres remaining to be surveyed, it is estimated that an additional 2,089 sites may be recorded, bringing the total of archaeological sites to as many as 5,645 (based on an historical average of encountering one site per 50 acres). Because the majority of the remaining acreage has been determined to be low probability for encountering resources, it is anticipated that the final site densities will be lower.

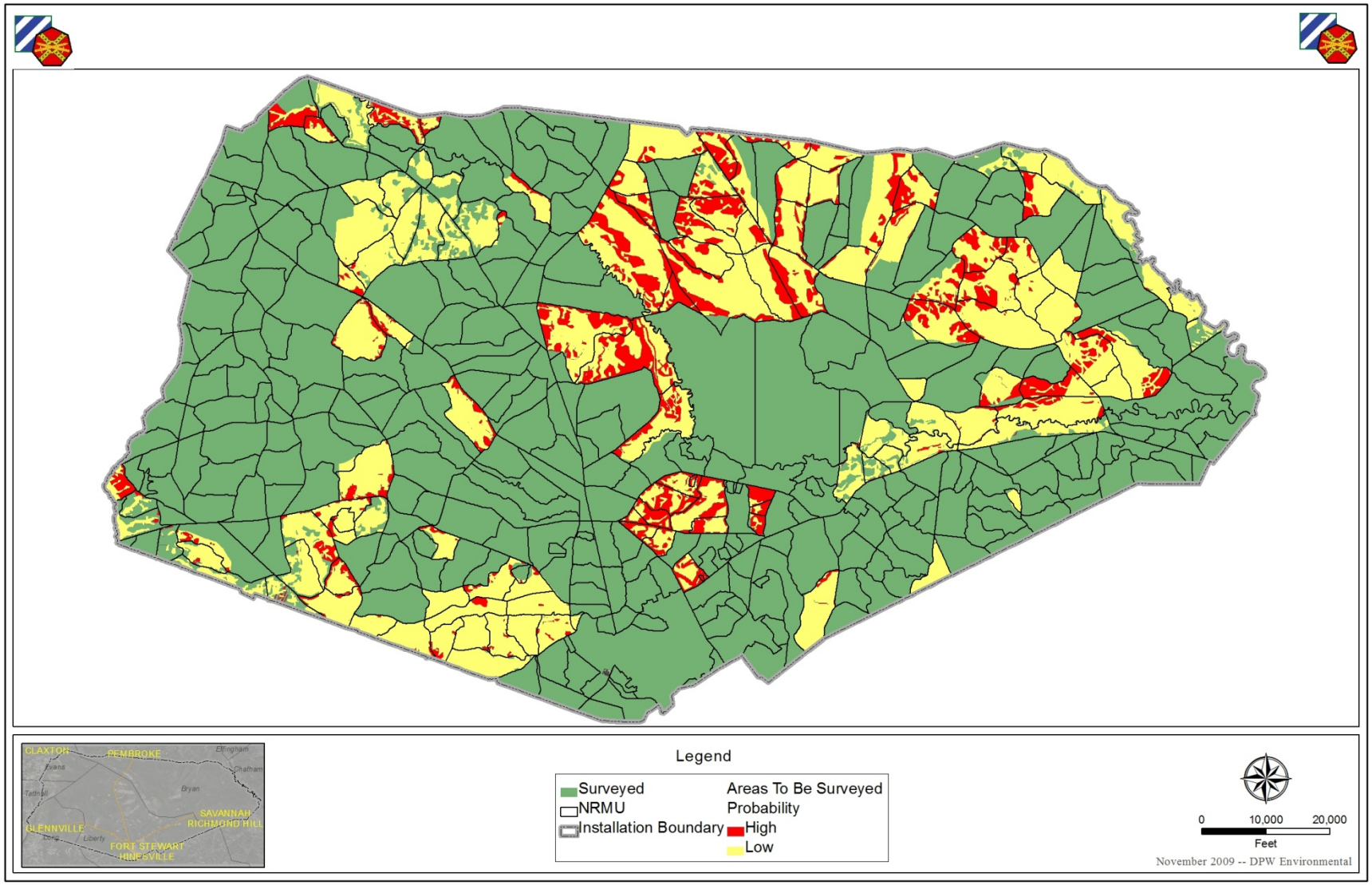


Figure 3-11: Areas Surveyed for Cultural Resources.

Archaeological resources identified on Fort Stewart are summarized in Table 3-6. To protect them, in accordance with NHPA and ARPA, the location of these archaeological resources are not graphically depicted within this public document, although general information regarding their location and eligibility to the NRHP is provided.

Table 3-6: Archaeological Resource Eligibility on Fort Stewart and HAAF.

Eligibility Status	Number of Sites
Listed on the NRHP	1
Eligible for NRHP inclusion	35
Potentially Eligible for NRHP inclusion	103
Indeterminate Eligibility for the NRHP inclusion (includes sites not fully delineated or pending final Phase I analysis)	222
Not Eligible for NHRP inclusion	3196

NRHP = National Register of Historic Places

The Installation maintains a GIS database of all recorded sites to manage and monitor potential impacts to these sites as a result of Federal undertakings. Sites listed, eligible, or potentially eligible for the NRHP are prohibited from unauthorized disturbance. After appropriate site-avoidance measures are emplaced, the boundaries are entered into the GIS system and shared only with authorized project planners. Not all sites receive physical boundary markers; they are considered on a case-by-case basis. Sites that are not in high-traffic areas and would benefit from less exposure are not marked. However, GIS boundary files are maintained for all eligible sites with known boundaries for planning purposes. As of 2009, protected sites accounting for approximately 800 acres of the 279,270 acres (i.e., less than 0.3%) of Fort Stewart have been identified as off-limits to land disturbing activities.

Although archaeological sites that are ineligible for the NRHP do not require protection from unauthorized excavation under the NHPA, *all* archaeological sites that are at least 100 years old and are of scientific value are prohibited from unauthorized disturbance under the Archaeological Resources Protection Act (ARPA). As such, Fort Stewart routinely monitors archaeological sites susceptible to vandalism and looting. Furthermore, Fort Stewart prohibits metal detection for the purposes of recovering artifacts without an ARPA permit.

3.6.1.5 Use of the Johnstone Site Prediction Model at Fort Stewart

Prior to conducting any archaeological surveys or issuing contracts for cultural resource surveys, the Johnstone Site Prediction Model is consulted to determine areas of high or low likelihood of encountering cultural resources (Figures 3-12 to 3-14). Areas of high probability are defined as: 1) having a high likelihood of encountering prehistoric *or* historic period sites within a given area or 2) areas that have medium probability for encountering cultural resources for *both* prehistoric and historic period resources. Areas determined to be high probability are surveyed at 30-meter intervals. Areas of low probability are defined as all other areas that do not meet the criteria for high probability. For both high and low probability areas, survey methodologies are in accordance with recommended guidelines of the state of Georgia for Phase I surveys. Analysis of the efficacy is still ongoing because data are constantly gathered for further analysis for this model. Based upon qualitative analysis, however, the site prediction model appears to be a significant improvement over previous site prediction models. As such, Fort Stewart continues to use the current model.

3.6.1.6 Architectural Resources

No impacts are anticipated to architectural resources eligible for the NRHP within the area of potential effect for the projects proposed as part of this EIS; therefore, this topic is not discussed further.

3.6.1.7 Traditional Cultural Properties (TCPs)

There are no TCPs potentially impacted in the area of potential effect for the projects proposed in this EIS; therefore, this topic is not discussed further.

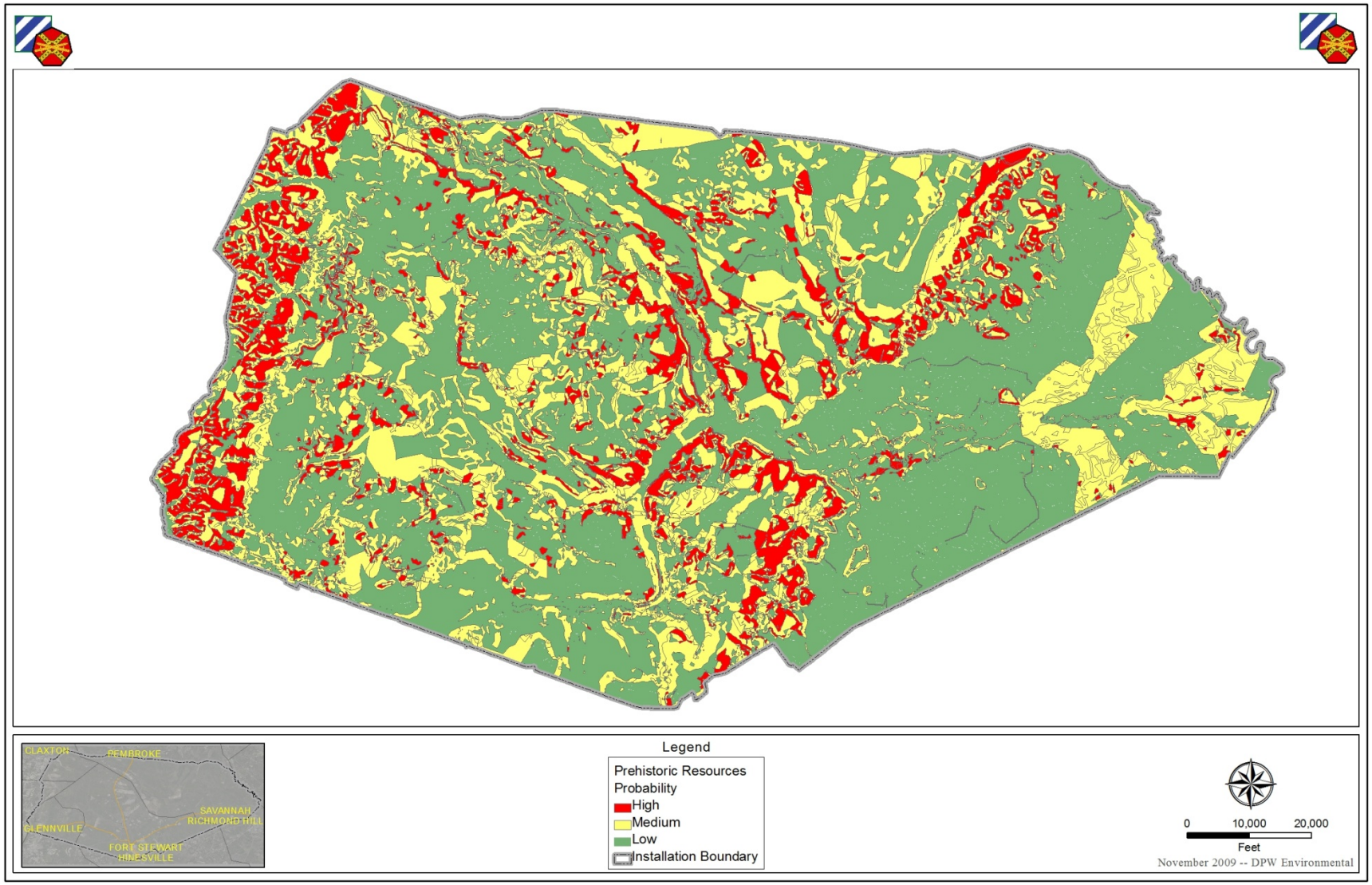


Figure 3-12: Johnstone Site Prediction Model Results - Prehistoric Resources on Fort Stewart.

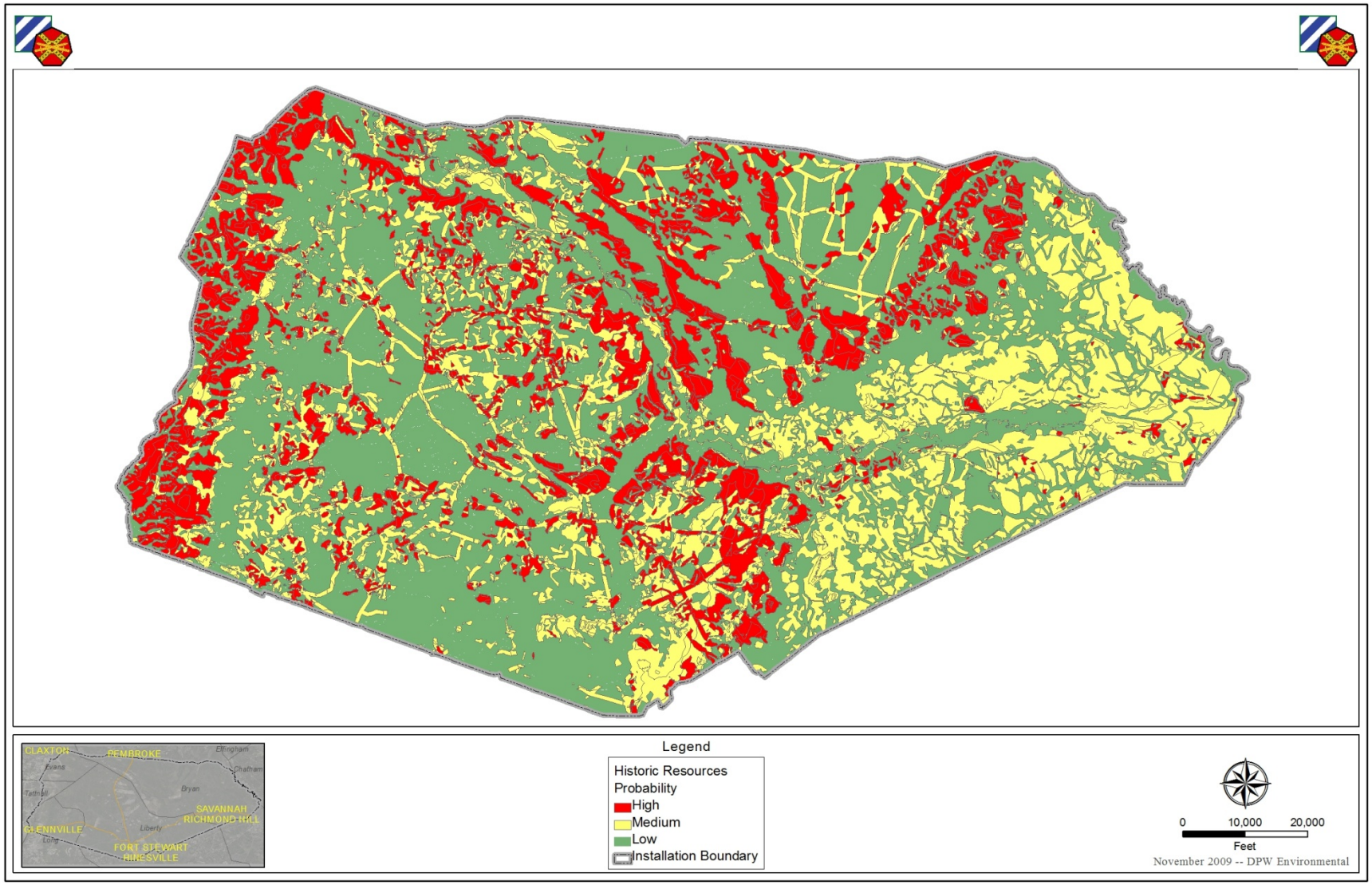


Figure 3-13: Johnstone Site Prediction Model Results - Historic Resources on Fort Stewart.

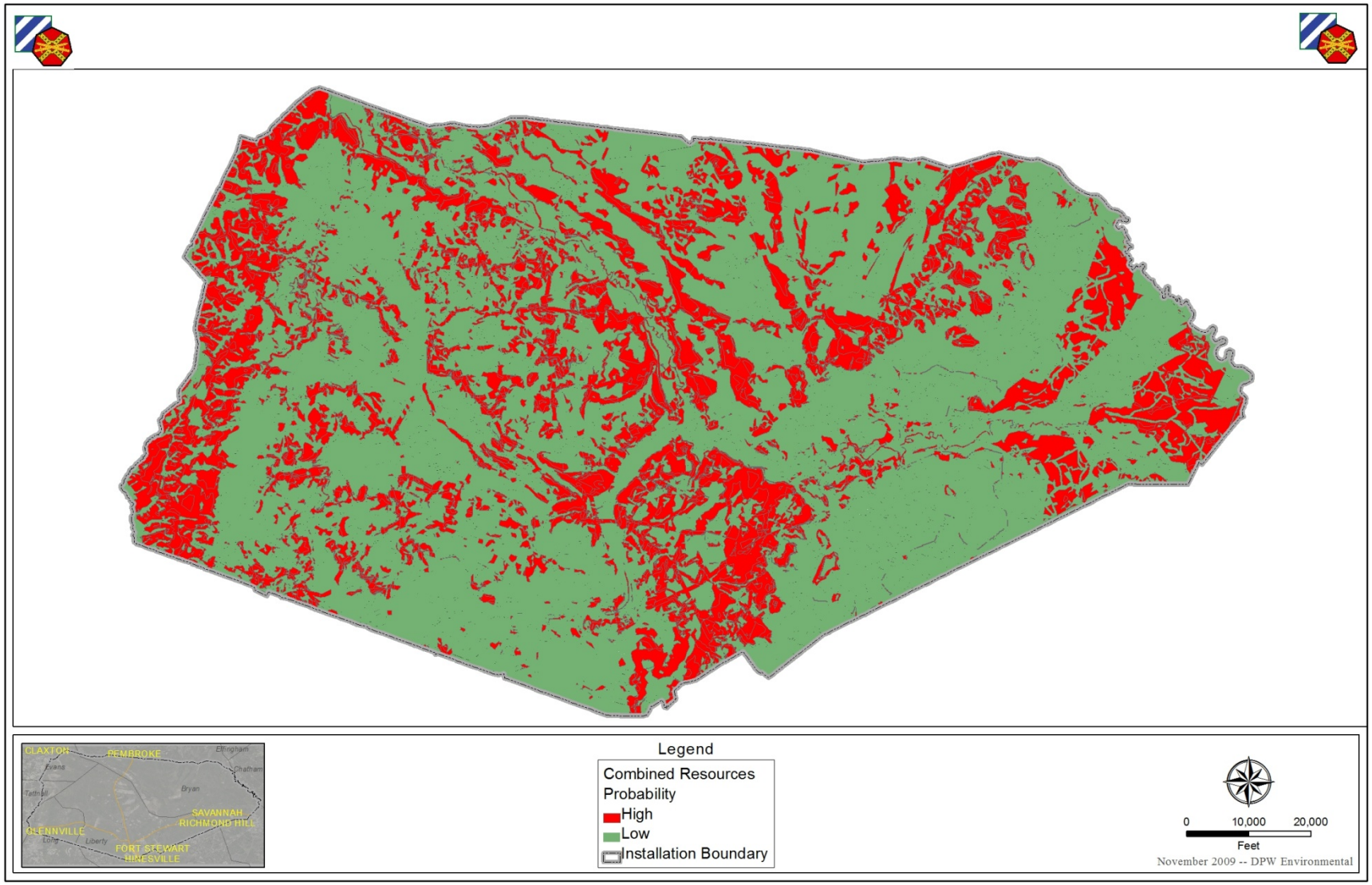


Figure 3-14: Johnstone Site Prediction Model Results – Prehistoric & Historic Resources on Fort Stewart.

3.6.1.8 Historic Cemeteries

This section discusses historic period cemeteries that were acquired by Fort Stewart during the acquisition of the land during 1940-41 and is excerpted from Fort Stewart's ICRMP (Maggioni et al. 2009). For a more detailed discussion of these cemeteries, refer to the ICRMP in Appendix C.

The Installation maintains an active cemetery monitoring program that incorporates cemeteries into its regime of overall site and project monitoring. Similar to protected archaeological sites, cemeteries are marked as off-limits to training where appropriate. Several cemeteries are located downrange of previously used ranges and active ranges and possess berms around appropriate sides to minimize or eliminate any inadvertent damage to the headstones from live fire. Potential impacts to cultural resources from wildfires are minimized through the establishment of firebreaks around sensitive cultural resources that may be impacted by either controlled or uncontrolled burns. Archaeological sites are typically not affected by routine burning. However, cemeteries with historic vegetation and/or wooden grave markers are potentially affected. Therefore, all cemeteries are routinely managed with firebreaks around their perimeter. Impacts to cultural resources through firebreak management activities are minimized by either plowing only existing firebreaks outside of sensitive cultural resource areas or coordinating the placement of new firebreaks to avoid impacting sensitive cultural resources.

3.6.1.9 Native American Resources

This section outlines the existing Native American resource concerns and the methods in which Fort Stewart complies with the various cultural resource laws and regulations associated with Federally Recognized Native American Tribes. The majority of this section is excerpted from appropriate sections of Fort Stewart's ICRMP (Maggioni et al. 2009).

Although Native American resources are limited on Fort Stewart (relative to the size of Fort Stewart) and appear to be associated with only one known site (the Lewis Mound), Fort Stewart consults with the Federally recognized Native American Tribes regarding effects to historic

properties and ensures Tribal concerns are taken into account in accordance with the appropriate cultural resource laws. Furthermore, Fort Stewart recognizes the importance of access to sacred sites and has established procedures that integrate not only the military mission, but also the safety and well-being of the requestor, and the rights and privacies of the requesting Tribes.

3.6.2 Paleontological Resources

This section summarizes the paleontological resources of Fort Stewart and is primarily excerpted from Fort Stewart's ICRMP (Maggioni, et al. 2009). Paleontological resources are defined as fossilized remains, specimens, deposits, and other scientific data associated with prehistoric *and* non-human origins. Under the AHPA of 1974, Federal agencies must provide for the survey and recovery of scientifically significant data that may be lost as a result of a Federal undertaking. As part of the cultural review process, impacts to known paleontological resources, which may impact or cause irreparable loss or destruction of resources, are addressed in NEPA documentation.

Per AR 200-1, paleontological resources are to be taken into account in accordance with the Antiquities Act of 1906 as "objects of antiquity" and the AHPA of 1974 as items of "scientific data." Paleontological resources on Fort Stewart are uncommon. In almost all cases, paleontological materials are encountered only through deep excavations, such as borrow pit excavations. To date, only one area of concern has been identified and is located at the active borrow pit used for Fort Stewart's landfill. As part of the rim-ditching activities associated along the southeastern edge of the borrow pit, a variety of vertebrate and invertebrate fossils have been recovered from spoil piles.

3.7 NOISE

3.7.1 Noise Introduction and Metrics

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, diminishes the quality of the environment, or is otherwise annoying. Human response to noise varies by the type and characteristics of the source of the

noise, distance from the source, individual sensitivity, and time of day. Noise can be intermittent or continuous, steady or impulsive, and it may be generated by stationary or mobile sources.

Sound levels are expressed in decibels (dB). Most commonly, A-weighting is applied or understood because the weighting scale is tied to the frequencies that humans hear best; however, for many military noise sources (such as large caliber weapons and small arms firing), the A-weighting ignores most of the low-frequency energy that is produced by these activities. Additionally, both small arms and large caliber weapons firing generate impulsive sounds, which are extremely short in duration (usually measured in milliseconds). The metrics, effects, and limits used for continuous sounds are not appropriate for assessing impacts of these impulsive noise sources. Therefore, the Army's standards for assessing noise impacts is to only use A-weighting for transportation noise sources, such as aircraft.

As defined in Army Regulation 200-1, for low-frequency sounds (large caliber weapons and demolitions) that can cause vibrations, the C-weighting metric is used. Many find that these lower frequency sounds, such as artillery and explosions, are more annoying than other noises, which is taken into account in this metric. To present average sounds on a 24-hour basis, the day-night sound level (DNL) metric is used. DN is used by most Federal agencies as a land-use planning tool for predicting areas of potential annoyance both inside and outside Fort Stewart. For the short impulsive sounds, such as small arms firing, the army uses unweighted decibel Peak (dBP) levels.

Though the use of DNL is the widely accepted means of evaluating land use compatibility, the Army has found that occasional loud events generated by large caliber weapons firing or demolition firing can generate complaints even in areas where the DNL levels are compatible with noise-sensitive land uses. For this reason, the Army will often describe dBP levels in additional to DNL.

The unweighted peak measurements (expressed in dBP), with no time averaging, are a good predictor of complaints (USACHPPM, 2006) for large caliber activity; however, they are not typically used in land-use planning nor do they indicate noise exposure over a given time. The

Army has identified four planning categories or zones associated with noise level contours: Zone I, Zone II, Zone III, and the Land Use Planning Zones. The paragraphs below and Table 3-7 presents these zones and the types of activities considered compatible within these zones (USACHPPM, 2006).

Table 3-7 Land Use Planning Guidelines.

Table 14–1
Noise Limits for Noise Zones

Noise zone	Noise limits (dB)	Noise limits (dB)	Noise limits (dB)
	Aviation ADNL	**Impulsive CDNL**	**Small arms — PK 15(met)**
LUPZ	60 - 65	57 - 62	N/A
I	< 65	< 62	<87
II	65 - 75	62 - 70	87 - 104
III	>75	>70	>104

Legend for Table 14-1:
dB=decibel
LUPZ–land use planning zone
ADNL–A-weighted day-night levels
CDNL=C-weighted day-night levels
PK 15(met)=Single event peak level exceeded by 15 percent of events
<=less than
>=greater than
N/A=Not Applicable

- **Zone I** includes all areas around a noise source in which DNL is less than 65 dBA or 62 dBC. This area is usually suitable for all types of land use activities (such as homes, schools, and hospitals).
- **Zone II** consists of areas where the DNL is between 65 and 75 dBA or 62 and 70 dBC. Exposure to noise in this area is normally not recommended with noise-sensitive land uses (such as homes, hospitals, churches, and educational facilities). Land in these zones should be used for industrial, manufacturing, transportation, and resource production (such as industrial parks, factories, and highways). In situations where noise-sensitive land uses occur within Zone II, noise level reduction features should be incorporated in design and construction.
- **Zone III** is an area around the source of noise in which the DNL is greater than 75 dBA, 70 dBC, or 104 dBP. The noise level within this zone is never recommended with noise-sensitive land uses, such as churches, schools, parks, playgrounds, homes, and hospitals.

- **Land Use Planning Zone (LUPZ)** is **t**he DNL noise contours, 62 CDNL and 65 ADNL, which represent an annual average that separates Noise Zone II from the Noise Zone I. There is no LUPZ associated with small arms noise. Taking all operations that occur at Fort Stewart over the year and dividing by the number of training days generates the contours. The noise environment at Fort Stewart varies daily and seasonally because operations are not consistent for all 365 days of the year. For residential land uses, depending on attitudes and other factors, an ADNL of 60 dB or a CDNL of 57 dB "may be considered by the public as an impact on the community environment" and up to 9% of the residents may be highly annoyed. In order to provide a planning tool that could be used to account for days of higher than average operations and possible annoyance, the Land Use Planning Zone (LUPZ) contour is included on Installation noise contour maps.

  Although the LUPZ is usually suitable for all types of land use activities, it can offer a better prediction of noise impacts when levels of operations are above average. For example, if operations are approximately three times more numerous than the normal daily firing, average noise levels increase approximately 5 dB. By setting the extent of the LUPZ contours at 57 CDNL and 60 ADNL, the variability in the Fort Stewart noise environment can be accounted for. The LUPZ can provide Fort Stewart with a buffer for land use planning and can reduce conflicts between Fort Stewart's noise-producing activities and the civilian community. It encompasses areas where, during periods of increased operations, community annoyance levels can increase. By using the LUPZ, 57 CDNL and 60 ADNL, Fort Stewart has a more comprehensive view of areas where complaints may occur and can meet the public demand for a better description of what will exist during a period of increased operations.
- **Zone of Influence** is another way to protect Fort Stewart training and readiness mission. This is an area within a 2-kilometer (1.24 mile) radius of Fort Stewart boundary that is not already contained within a Noise Zone. Local communities should disclose to existing and potential landowners within the ZOI and the LUPZ noise contour the existence of Fort Stewart and its activities (e.g. weapons firing, aircraft operations, etc.). This would provide the residents with an understanding of Fort Stewart mission/purpose. Informing the community of Fort Stewart's existence can reduce citizen

concerns/misunderstanding related to noise from unknown Installation activities.

3.7.2 Noise Management

In 1983, the Army established Fort Stewart Compatible Use Zone (ICUZ) program to identify noise-affected areas around Installations and to develop cooperative approaches for reducing adverse impacts. The ICUZ program has since become Fort Stewart's Environmental Noise Management Plan. In 2004, Fort Stewart / HAAF developed an Installation Environmental Noise Management Plan (IENMP) as a mechanism for identifying and addressing noise issues and concerns between Fort Stewart and surrounding communities.

To prevent the conflicts between military operations and civilian land use from reaching significant proportions, Fort Stewart/HAAF work with the local communities to prevent incompatible land use from occurring. The Installation also takes reasonable steps to protect the community from noise. Because the regulation of land use on adjoining land is the authority of local communities, Fort Stewart/HAAF cannot solve these problems unilaterally.

Fort Stewart/HAAF encourages cooperative land-use planning and zoning to minimize noise impacts outside Fort Stewart boundary. The Fort Stewart/HAAF JLUS is a cooperative land use planning initiative between Fort Stewart and surrounding cities and counties. Partners in the JLUS include Bryan, Effingham, Chatham, Liberty, Long, and Evans counties; the cities of Hinesville, Savannah, Pooler, Bloomingdale, Pembroke, Richmond Hill, Glennville, Gum Branch, Allenhurst, Flemington, and Walthourville; the Coastal Regional Commission; and the Heart of Georgia-Altamaha Regional Development Center.

As part of Fort Stewart's continuing efforts to increase communication between the military and local communities, a Memorandum of Understanding (MOU) has been or is in the process of being established between Fort Stewart and each local community. The purpose of the MOU is to maintain mutual interest in sustaining Fort Stewart/HAAF's ability to train Soldiers, project power, and modernize Installation ranges and other essential mission facilities as well as sustain the highest possible quality of life for area residents and provide for continued economic

prosperity within the region. Fort Stewart / HAAF maintain mutually beneficial local city and county partnerships by encouraging development proposals that are compatible with adjacent military training activities (e.g. agricultural, limited commercial, low density residential with sound attenuation for NLR of 25dB) within the Army Compatible Use Buffer (ACUB).

Fort Stewart /HAAF has adopted a Fly Neighborly program to reduce noise by training Army helicopter pilots on ways to reduce noise complaints when flying in developed areas. Fort Stewart/HAAF has also developed a system of corridors and visual flight rule routes to promote the safe and expeditious flow of air traffic. These corridors/routes have been situated to minimize the effect of the noise produced by the using aircraft. Control procedures designed to avoid or reduce noise include avoidance of residences, buildings, and farm-related facilities; avoidance of towns, cities, and communities; and use of designated traffic patterns and altitudes.

3.7.3 Existing Operating Environment

3.7.3.1 Hunter Army Airfield (HAAF)

HAAF is located in southeast Georgia within the western portion of the Savannah, Georgia, metropolitan area within Chatham County. There are no aircraft training ranges located within the HAAF boundary. Aerial gunnery practice is conducted at Fort Stewart. There is a small arms range located at HAAF. There is a shoothouse located at HAAF, which is used for training personnel in small arms close quarters combat.

Aircraft operations at HAAF occur 24 hours a day, year-round. These operations generate noise that may impact the citizens who live in the surrounding communities. HAAF is capable of handling the largest aircraft currently in the U.S. civilian and military fleets. With more than 350 acres of hardstand, 50 C-17 Globemaster aircraft can be on the ground simultaneously (USACHPPM, 2004). HAAF is also home to the U.S. Coast Guard Station, Savannah, and the largest helicopter unit in the Coast Guard. It provides Savannah and the southeast United States with 24-hour search and rescue coverage of its coastal area.

The HAAF aviation corridor system consists of five routes (Figure 3-15). The low-level transition routes are for rotary wing use during the day, Night Vision Devices, and special Visual Flight Rules. These routes are designed to provide safe transitions to and from Fort Stewart reservation boundaries using terrain flight altitudes. The five corridors or routes are:

- Little Neck. This is used one way (eastbound) from Tina's Landing to Reporting Point (RP) Chinook. Aircraft are required to maintain 500 feet Mean Sea Level (MSL) on this route.
- King's Ferry. This route is used one way (westbound) to identification point (IP) Cobra Bridge at Forest River, west along Little Ogeechee River, southeast to Hodges Airport to RP Church, and then west to Kings Ferry avoiding the housing areas at RP Church. Aircraft departing Runways 10/28 will be at 300 feet MSL to IP Cobra Bridge and then climb to 500 feet MSL to Kilo Point (KP) 5.
- Belfast. This is a one-way (eastbound) route from KP 6 to Belfast and Ogeechee River; at this IP fly an approximate heading of 100 degrees to Grove Point, turn to a heading of 020 degrees to Lotts Island for landing at HAAF. Aircraft will maintain 500 feet MSL while flying this route. NZ II is 175 feet wide along this route.
- External Load Operations (ELO) or Sling Load. Aircraft departing HAAF will proceed westbound from the airfield remaining clear of the Ammo Supply Point, then south passing between RP Cobra Bridge and Lotts Island. Aircraft arriving at HAAF will proceed from RP or KP 6 to Lotts Island to point of landing as directed. All ELO aircraft will maintain 700 feet MSL. Because of the low numbers of operations on this corridor, neither NZ III nor NZ II exists.
- Administrative Route. This route is used for off-reservation flights between HAAF and WAAF located at Fort Stewart. Fly to the right of the railroad tracks at the appropriate altitude for the direction of flight. Aircraft must maintain radio contact with Wright Tower or Marne Radio while on the Administrative Route. Westbound rotary wing aircraft will maintain 700 feet MSL and 1,000 feet MSL eastbound. Westbound fixed wing aircraft will maintain 2,000 feet and eastbound 1,500 feet MSL eastbound. NZ II is 190 feet wide along this route.

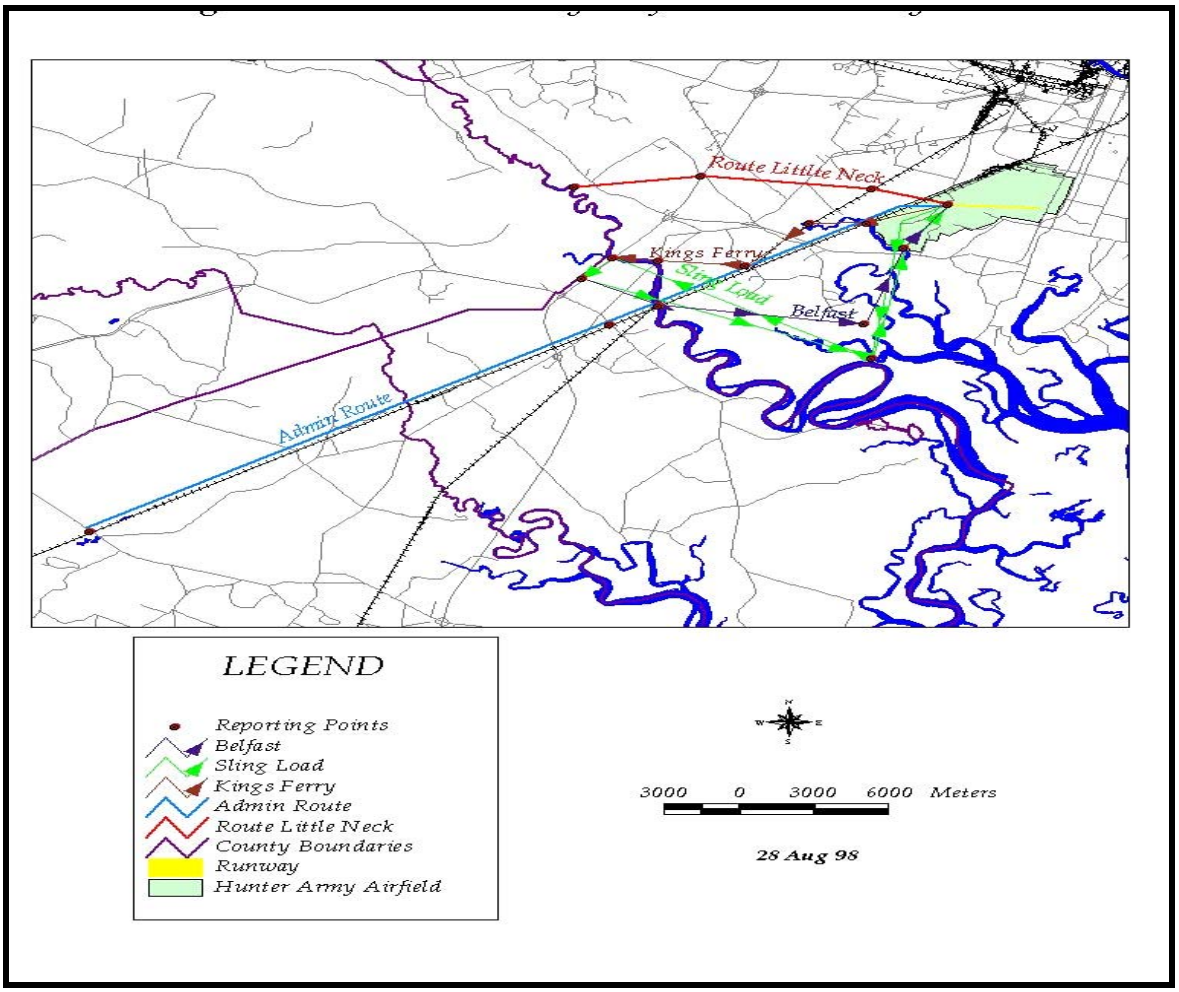


Figure 3-15: Hunter Army Airfield Corridors.

3.7.3.2 Wright Army Airfield (WAAF)

WAAF is located on Post just east of the Garrison area along the southern perimeter of Fort Stewart. Civilian aviation operations are being transferred from the Liberty County Airport to WAAF. Expansion of general aviation operations at the existing Liberty County Airport site is not possible because of a shortage of available land and encroachment by residential communities. The joint use of WAAF for military and civilian operations was initially proposed by the Liberty County Board of Commissioners in Hinesville, Georgia. The Board of Commissioners envisioned a mutually beneficial arrangement: Liberty County will be able to operate a local Level II general aviation facility, and the military will benefit from facility

upgrades resulting from civilian use of the airport as well as the possibility of civilian funding sources for airport improvements.

A Level II airport is defined as a business airport whose impact is local. A Level II aviation facility accommodates single and twin-engine aircraft for business and personal use. The airfield consists of four paved runways: 15R/33L, 6R/24L, 6L/24R, and 15L/33R. Runway 33R is the preferred runway for military operations and is used between 60% and 70% of the time for military aviation. Runway 24R is the preferred runway for civilian operations. Existing military aviation operations at WAAF are summarized in Table 3-8 and 3-9. WAAF air traffic control estimates that 60% of civilian aviation operations are single-engine planes; 35% of civilian operations are twin-engine planes; and the remaining 5% of civilian operations consist of helicopter and jet traffic. In addition, civilian air traffic is mostly concentrated on the weekend; most flights are closed-loop, and approximately 10% of civilian flights take place at night each week (USACHPPM, 2007).

Table 3-8: Current Military Aircraft Operations at Wright Army Airfield.

Military Operations Aircraft Type	Daily Operations	
	0700-2200	2200-0700
C-130	70	0
CH-47	20	4
AH-64	120	24
UH-60	30	5
C500 Citation	20	0
Super Air King (C-12)	20	0
OH-58	30	5

Table 3-9: Civilian Aircraft Operations at Wright Army Airfield, Based on Air Traffic Control Estimates.

Civilian Operations Aircraft Type	Daily Operations (Estimates by WAAF ATC)	
	0700-2200	2200-0700
Single Engine	29	3
Twin Engine	17	2
Helicopter	1	0
Small Jet	1	0

According to the data provided by WAAF Air Traffic Control, the joint-use LUPZ (60 ADNL) extends approximately ½ mile into the Hinesville and Flemington communities west of the Fort Stewart Garrison area (USACHPPM, 2007). The LUPZ also extends about 1/3 mile off Post into a rural area east of the Garrison area. The Noise Zone II (65 ADNL) contour extends less than 1,000 feet off Post into the same rural area. These results are displayed in Figure 3-16. The LUPZ encompasses two schools and a portion of a residential development. The schools are located in Hinesville and are listed as follows: the Snelson-Golden Middle School located at 465 Coates Road and the Joseph Martin Elementary School at 315 Coates Road.

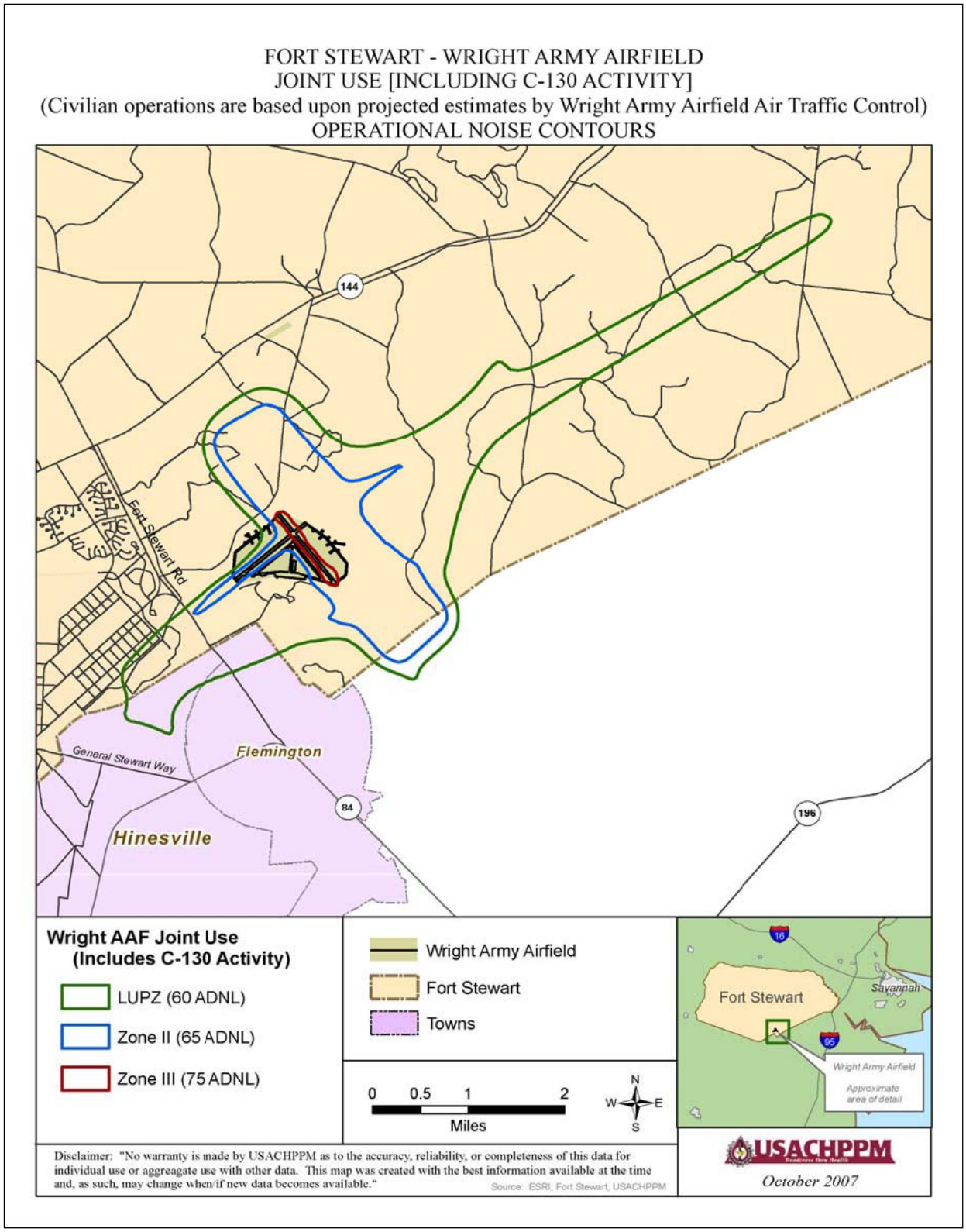


Figure 3-16: Wright Army Airfield Joint Use Contours.

3.7.3.3 Fort Stewart Helicopter Routes

Fort Stewart has five major low-level helicopter training routes: the White, Red, Blue, Purple, and Gold routes. These routes are primarily along Fort Stewart boundary, as shown in Figure 3-17. The helicopters using these routes are the OH-59, UH-60, AH-64, and CH-47 with four daytime flights and one nighttime flight for each route. Noise produced by these types of operations falls within Noise Zone II.

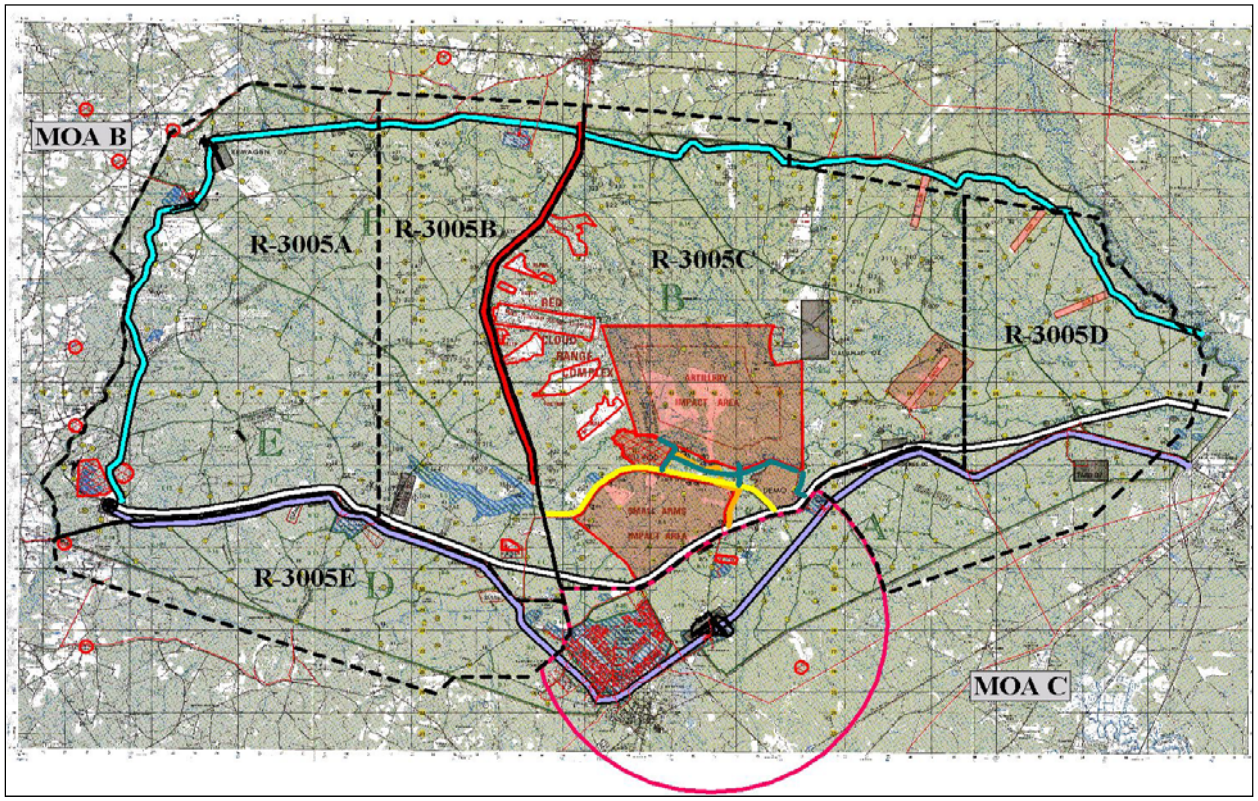


Figure 3-17: Existing Helicopter Training Routes.

3.7.3.4 Fort Stewart Training Area Airstrips, Landing and Drop Zones

Fort Stewart has seven drop zones, eight landing zones, and three airstrips (Figure 3-18). Both fixed-wing and rotary-wing aircraft are the sources of noise at these locations. The use at these drop zones varies from two to 72 days annually with 2 to 218 missions each year at 250 to 6,000 feet altitude above ground level. Because of the limited drop zone activity, no noise contour above 48 ADNL is generated. This ADNL was calculated with the noisiest aircraft, the C-141 cargo aircraft, using the drop zones (USACHPPM, 2004). The land use in and around the landing zones, airstrips, and drop zones is compatible.

3.7.3.5 Fort Stewart Small Arms Ranges

The small arms ranges are primarily located north and southwest of the Garrison area within Fort Stewart boundary. The noise from these small arms range activities of Fort Stewart is over shadowed by the large caliber noise activities. The land within NZs III and II is used for range and training operations. Land uses within the Noise Zones II and III meet the Federal guidelines.

3.7.3.6 Large Caliber Ranges

The Land Use Planning Zone (57-62 CDNL) and Noise Zone II (62-70 CDNL) from the firing of large caliber weapons (20mm and greater) extend beyond the northern and southern Installation boundaries into areas of Bryan and Liberty counties. The Noise Zone III does not extend beyond Fort Stewart boundary. The areas impacted by range activity noise are primarily agricultural/undeveloped with some areas of residential and commercial land uses. Most of the current land uses meet the Federal guidelines, except for the existing residential uses. Conflicts with development have been and continue to be reduced by disclosure or compatible development within these areas by limiting noise-sensitive land uses within the Land Use Planning Zone.

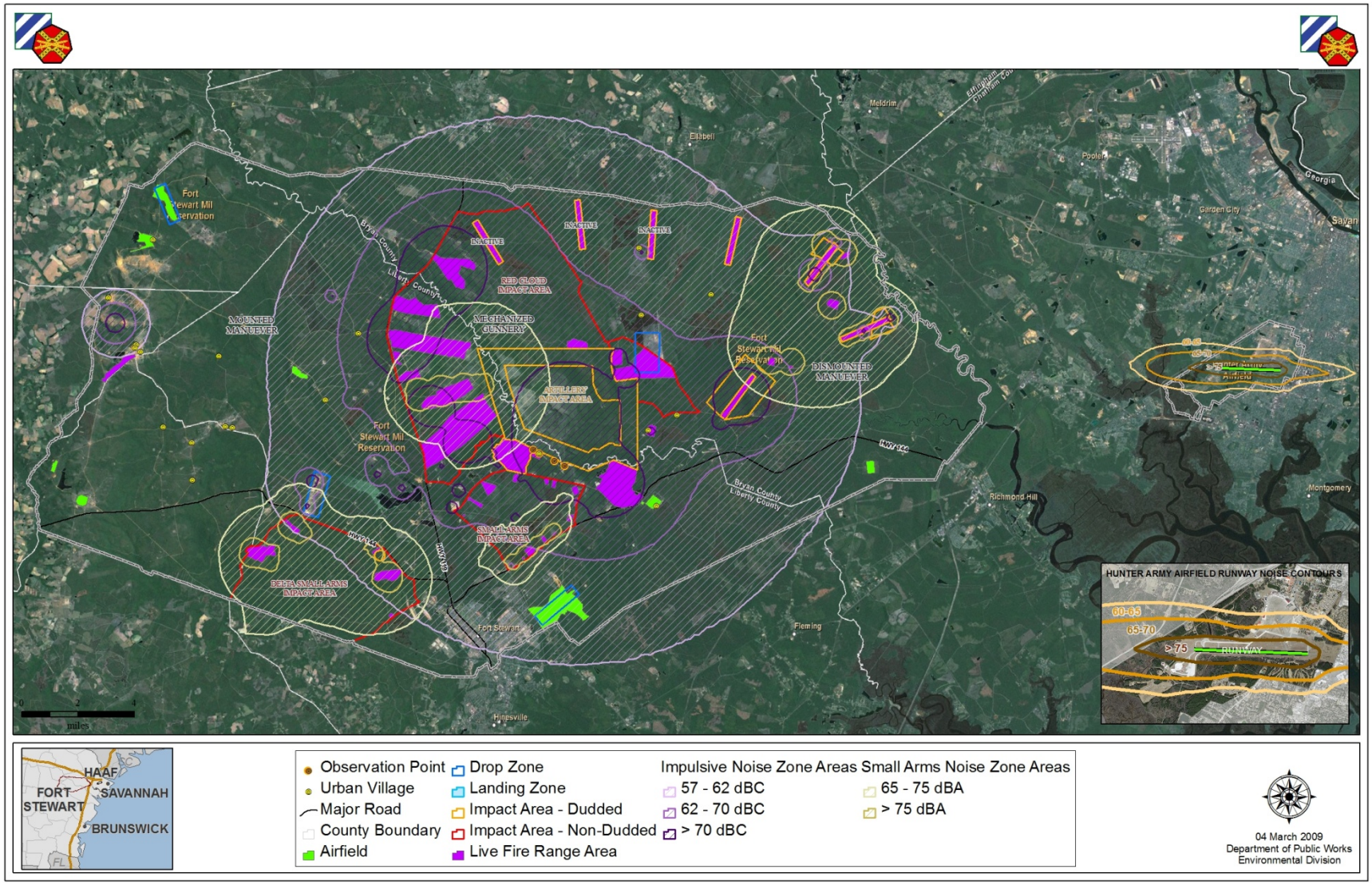


Figure 3-18: Fort Stewart/Hunter Army Airfield Noise Contours.

3.7.4 Effects of Current Operating Environment on Surrounding Communities

3.7.4.1 Liberty County

Much of Liberty County is agricultural, but there are scattered rural residential and communities, such as Hinesville, Flemington, and Gum Branch. The city of Hinesville has expanded along the southern boundary of Fort Stewart. As a result, noise-sensitive land uses are projected adjacent to Fort Stewart boundary. The current zoning is compatible with the Fort Stewart noise environment with a portion within the LUPZ and zone of influence (ZOI). The ZOI is an area within 2 kilometers of Fort Stewart boundary that is not already contained within a noise zone.

3.7.4.2 Bryan County

Bryan County land use is primarily agricultural, but there are scattered rural residential areas. The cities of Pembroke and Richmond Hill are 1.5 to 2.2 miles north of Fort Stewart. The city of Pembroke is near the northern boundary of Fort Stewart; recent construction of residences is close or just within Noise Zone II. Further expansion can result in additional land use incompatibilities. The city of Richmond Hill is located directly adjacent to the eastern Installation boundary. The western portions of Richmond Hill are in the ZOI. The city limits continue to move toward the eastern boundary of Fort Stewart. At this time, land uses are compatible with the current Fort Stewart activities.

3.7.4.3 Chatham County

Chatham County adjoins a small portion of the eastern boundary of Fort Stewart along the Ogeechee River. The land use is scattered rural residential and agricultural in the ZOI adjacent to Fort Stewart. With regards to HAAF, Fort Stewart has a definite impact upon Chatham County. Countywide, HAAF's presence has had an impact upon the overall population and employment levels, and the city of Savannah has an exceptionally close relationship with the Post. In view of the number of aircraft assigned and those that use HAAF at any given time and the low altitudes at which helicopters and aircraft are flown both day and night, makes noise the primary issue of concern. The environmental impacts of activities at HAAF extend beyond the

military reservation boundary. Therefore, officials at HAAF depend upon the goodwill and cooperation of the civilian sector to promote public support for and understanding of Fort Stewart's mission requirements. Although a number of positive steps, such as the Fly Neighborly program, have been taken by HAAF to minimize the unfavorable effects of noise and hazards to the public welfare and safety, these actions do not guarantee that the Post will be able to carry out its training mission on into the infinite future (USACHPPM, 2004).

3.7.4.4 Evans County

Evans County land use is primarily agricultural, but scattered rural residential and small communities are in the ZOI adjacent to Fort Stewart.

3.7.4.5 Long County

Long County land use is primarily agricultural, but there are scattered rural residential communities adjacent to Fort Stewart within the ZOI.

3.7.4.6 Tattnall County

Tattnall County land use is primarily agricultural, but there are scattered rural residential communities next to Fort Stewart that occurred in the past, now within the ZOI. These could be incompatible with the noise generated by Fort Stewart.

3.8 LAND USE

The following excerpted paragraph from the Final Programmatic Environmental Impact Statement on Army Transformation provides a useful background for understanding Installation land use planning (U.S. Army Corps of Engineers, 2002).

> "Land use refers to the planned development of property to achieve its highest and best use and to ensure compatibility among adjacent uses. In the civilian sector, land use plans guide the type and extent of allowable land use in an effort to control and limit

growth; maintain and improve social, cultural, and physical amenities; promote a stable economy; preserve agricultural lands; maintain scenic areas; supply adequate housing; ensure the availability of necessary public services and utilities; and protect specially designated or environmentally sensitive areas. These concepts apply, in part, to Army land use planning. Except for economic growth considerations, land use planning at Army Installations proceeds toward the same ends. In the Army, land use planning is the mapping and planned allocation of the use of all Installation lands based on established land use categories and criteria."

Army land use planning involves identification, evaluation, and implementation phases. In the identification phase, planners establish land use planning objectives and goals and develop a strategy for accomplishing the land use plan. The unique characteristics of each Installation require separate formulation of land use objectives and goals. In the evaluation phase, planners conduct a functional relationships analysis and actually prepare the land use plan. In the implementation phase, the land use plan is put to work to attain the identified planning objectives and goals.

It also refers to the use of land to preserve or protect natural resources, such as wildlife habitats, vegetation, or unique features. Unique natural features are often designated as national or state parks, forests, wilderness areas, or wildlife refuges. Land use at Fort Stewart is divided into the following categories: Garrison, training lands, recreation, aesthetics and visual resources, and buffer/ joint use areas.

3.8.1 Garrison

The Fort Stewart Garrison area is in the south-central portion of Fort Stewart next to the city of Hinesville and consists of the administrative, operational, and residential portions of Fort Stewart (Figure 3-19). The Garrison area encompasses about 3,600 acres and comprises the majority of development on Fort Stewart, including buildings, roads, parking, and adjacent open spaces for administrative functions, community activities, housing, barracks, and Installation support services (Fort Stewart, January 2009). The built environment at Fort Stewart is of similar architectural character and style, generally no more than three stories high, and suburban in setting. The Army's Installation Design Standards provide directives for the mandatory common facility and infrastructure standards for all Army Installations based on regional requirements. These standards facilitate the continuous improvement of the functional and visual aspects of Installations. They promote an integrated design process for all projects by addressing sustainable design and development, historic preservation, and architecture. The Installation Design Standards provide comprehensive Army standards for site planning, buildings, circulation, landscape design, site elements, and force protection.

The Installation Design Guide (IDG) for Fort Stewart was initially developed in 2001, updated in 2007, and is an important tool in getting construction and necessary details executed consistently. The goal of the Fort Stewart IDG is to provide guidance and to establish requirements for all Installation personnel involved in design, construction, maintenance, or renovation (Fort Stewart, 2009). The IDG also provides guidance on developing, implementing, and sustaining Fort Stewart infrastructure to meet current and future mission needs.

The IDG specifies and incorporated LEED Green Building criteria into all new construction at Fort Stewart. This will ensure that high performance sustainable design, construction, operation and management, maintenance, and deconstruction are implemented. LEED-certified buildings use resources more efficiently when compared to conventional buildings that are simply built to code. LEED-certified buildings strive to provide healthier work and living environments, which contributes to higher productivity and improved employee health and comfort (www.usgbc.org, accessed 24 OCT 09).

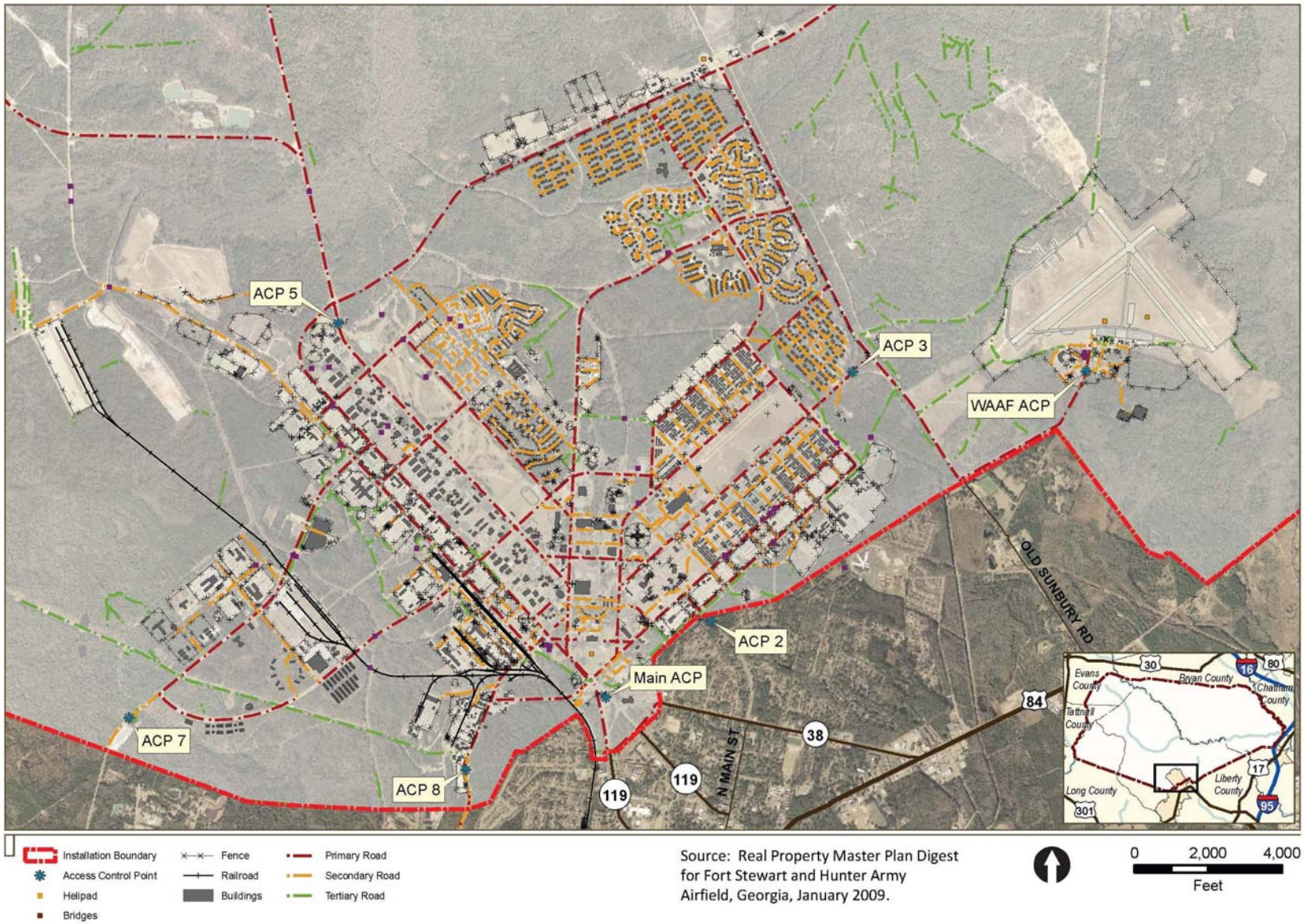


Figure 3-19: Fort Stewart Garrison Area.

Fort Stewart is currently implementing an architectural design theme called "Southern Living Station of Choice." The architectural characteristics of this theme are reminiscent of the Southern Colonial Revival style. It incorporates specific architectural features (such as porticos, verandas, columns, low-pitched hip or gable roofs, and regular patterns of fenestration) and building materials (such as brick, concrete masonry units, metal siding, and stucco). The colors are limited to white and earth tones. When properly combined, these elements create an architectural image that expresses continuity with the architectural traditions of Georgia (Fort Stewart, January 2009).

The Fort Stewart Garrison area was surveyed to identify visual themes and zones. Three visual themes were identified: Neighborhood, Central Campus, and Operations. Seven visual zones were defined based on visual features, architectural trends, and the functions of predominant facilities (Figure 3-20). Table 3-10 shows the correlation between the visual themes and visual zones (Fort Stewart, January 2009).

Table 3-10: Correlation between Visual Themes and Zones.

Neighborhood Theme	Central Campus Theme	Operations Theme
Family Housing Zone	Headquarters Zone	Installation Support Zone
Green Space Zone (part)	Town Center Zone	National Guard Zone
	Barracks and Operations Zone	
	Green Space Zone (part)	

3.8.2 Training Lands

Fort Stewart's range and training land infrastructure supports Abrams Tank, Bradley Fighting Vehicle, Aerial Gunnery, Artillery, and other live-fire training, maneuver training, and individual team and collective tasks (Figure 3-21). Range Support Operations estimates about 200,000 Soldiers annually use the range facilities at Fort Stewart for mounted and dismounted individual weapons and crew qualifications. This number includes Company/Team through Brigade Combat Team maneuver exercises.

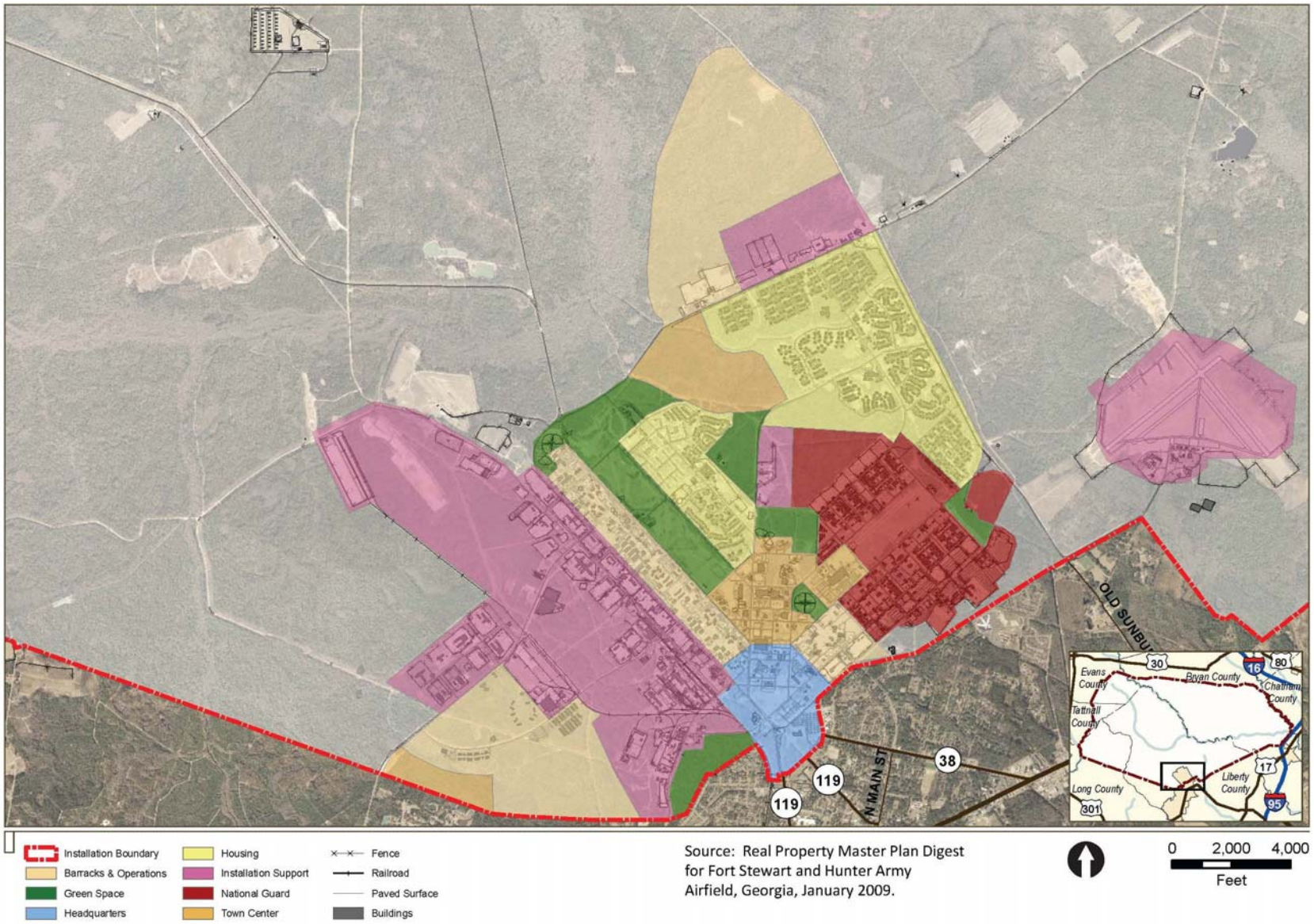


Figure 3-20: Visual Zones and Themes on Fort Stewart.

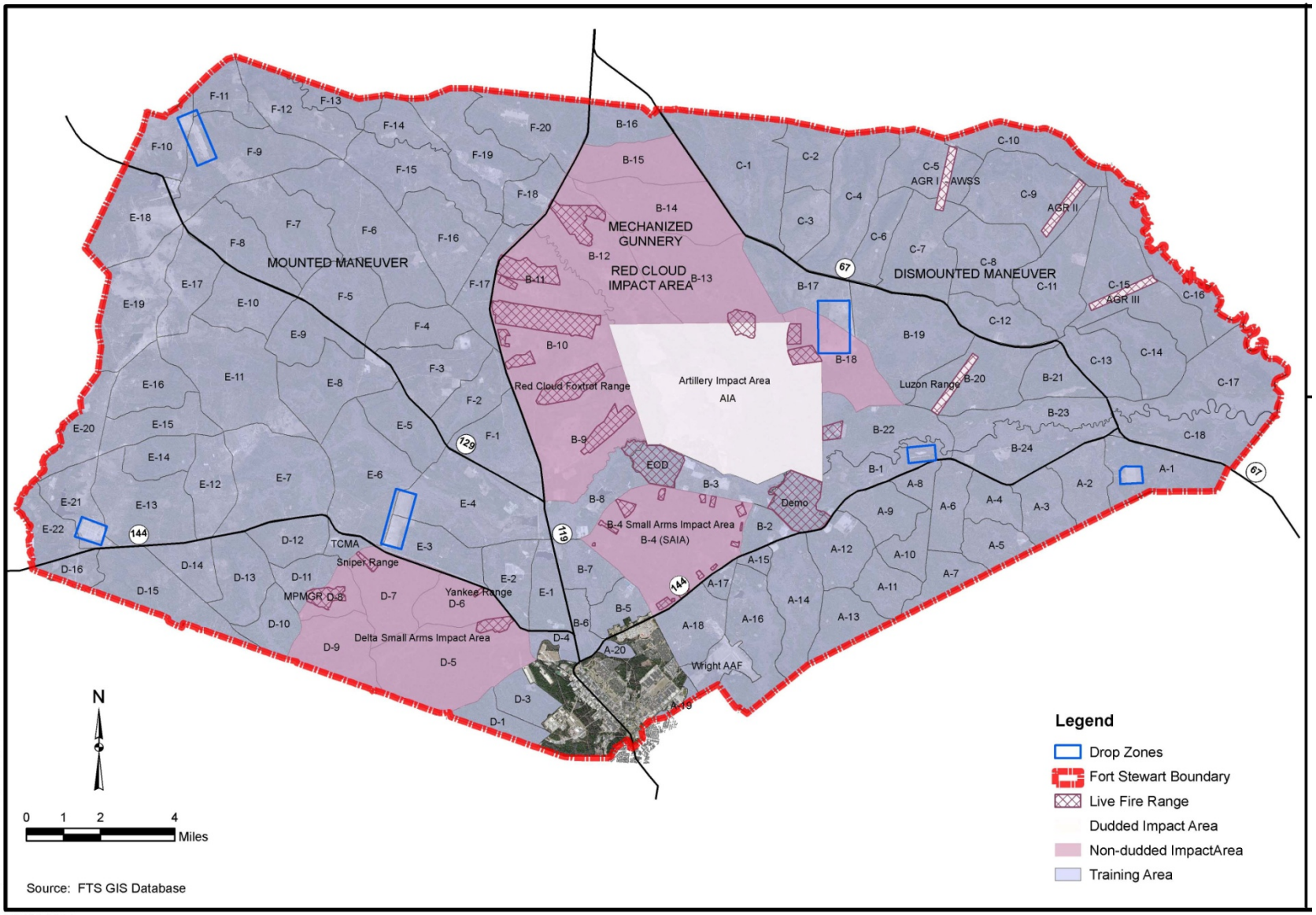


Figure 3-21: Range and Training Lands at Fort Stewart.

Heavy training activities occur in maneuver lands in the western portion of Fort Stewart, and light infantry training occurs in the eastern portion. The *heavy* designation refers to armor and mechanized infantry forces or to areas where maneuvers are unrestricted consisting of all types of vehicles and equipment, including *tracked* vehicles. *Light* refers to light infantry forces or to areas where maneuvers may be restricted to only small units or units having only *wheeled* vehicles.

Small arms ranges are concentrated in the southwestern Delta training area of Fort Stewart. Dismounted infantry training occurs south of Highway 144, primarily in the southeastern Alpha training areas. Training on established maneuver areas simulates battlefield conditions. Large-scale maneuver training events build on all the individual skills that Soldiers possess and test each rank of the Brigade Combat Team command. Both active duty and reserve Soldiers train at Fort Stewart. Currently, live-fire and maneuver training can occur simultaneously in separate areas of Fort Stewart. Existing Fort Stewart ranges, maneuver areas, and facilities will support mission-essential training requirements and not tax existing training resources. However, the frequency and type of training may need to be changed as the Army works to meet current and future national security needs. Although mission-essential training requirements are identified in Army doctrines, some training is based on a commander's intent, discretionary need, and the availability of training resources. Access to training range facilities is, therefore, a critical component of the need for the proposed action (refer to operational tempo, or OPTEMPO, discussion in Chapters 1 and 2 for additional discussion).

3.8.3 Recreation

Recreational resources include areas for swimming, boating, hiking, hunting, and fishing. Fort Stewart has allowed the public access to Installation lands for hunting and fishing since 1959. In general, any hunting or fishing area not closed for military use is open to the public with appropriate permits and restrictions. Access is denied to specific areas when safety or security concerns exist, prescribed burning is under way, or natural resources do not support such usage. About 1,500 to 2,000 people have permits to hunt at Fort Stewart, and they make 40,000 to 50,000 hunting trips annually. About 3,000 to 4,000 people hold a fishing permit, and they make

60,000 to 80,000 fishing trips annually. Existing fishing facilities include piers, docks, and boat ramps on Installation ponds and waterways. A limited number of landing sites provide access to the Canoochee and Ogeechee rivers.

White-tailed deer, feral hogs, and wild turkeys are prominent game species on Fort Stewart, and largemouth bass and redbreast sunfish are popular species for anglers. Additional outdoor recreation activities include wildlife observation, camping, shooting sports (including archery and skeet), volleyball, horseshoes, and playgrounds, which are in the Holbrook Pond Recreational Area.

The Directorate of Morale, Welfare, and Recreation (DMWR) funded the development of an *Outdoor Recreation Plan*, completed in June 2006. It provides a short-, mid-, and long-term perspective of the overall outdoor recreation program for Fort Stewart. Through this plan, the DMWR goals are to accomplish the following:

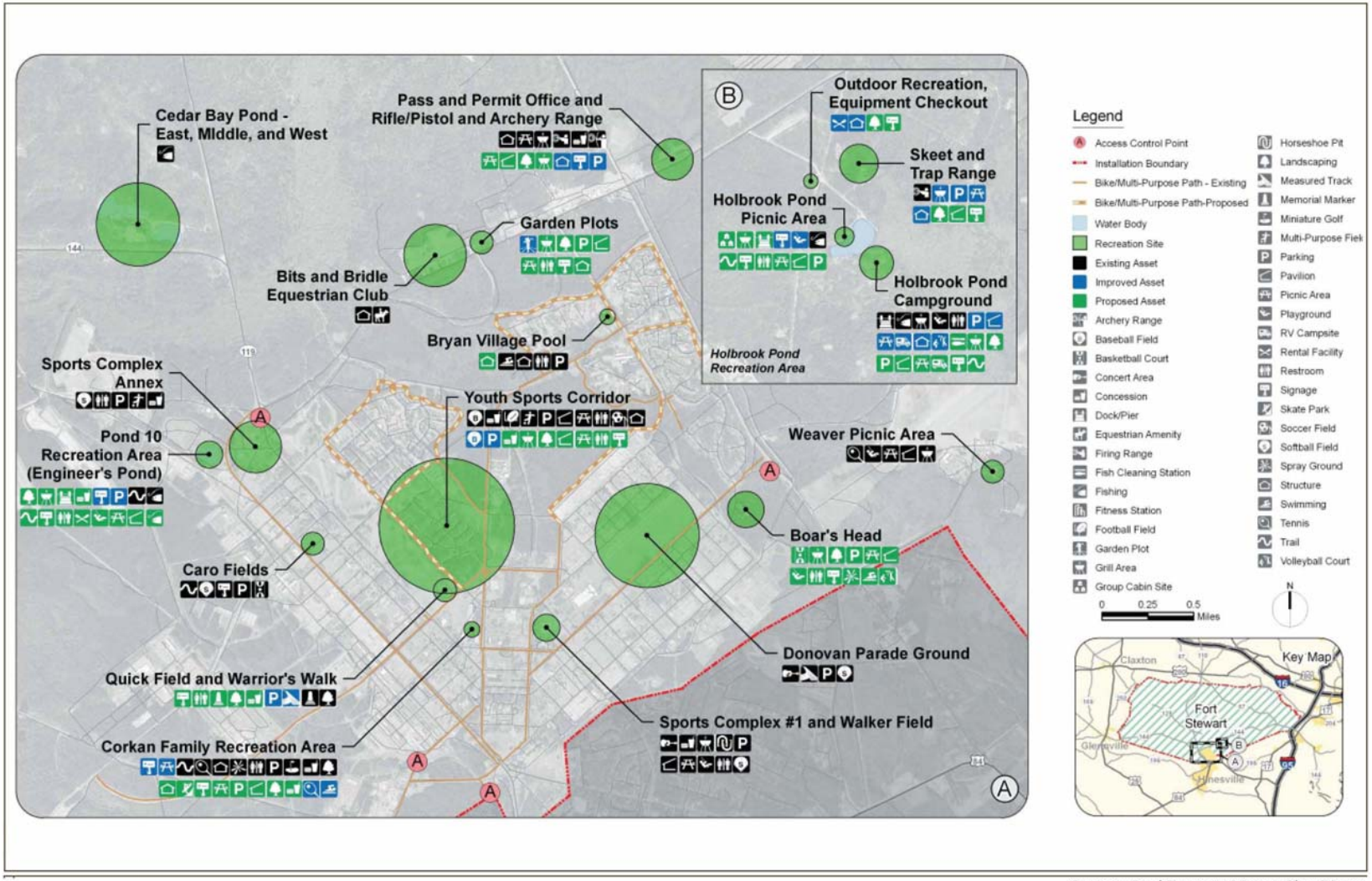
- Reinforce the military mission;
- Enhance job proficiency;
- Maintain esprit de corps;
- Contribute to military effectiveness;
- Serve as non-pay compensation;
- Promote physical, mental, and social well-being;
- Provide a sense of community and community support;
- Encourage constructive use of off-duty time;
- Provide community support programs and activities for Families; and
- Provide opportunities, recognition, and skill development for youths.

Other planned or programmed developments at Fort Stewart include a skate park, bike trail, child development center, and lazy river (Fort Stewart, January 2009). Figure 3-22 depicts the locations of the proposed improvements. With the Fort Stewart Outdoor Recreation Plans, the following recreational complex needs were identified:

- Holbrook Pond Campground,
- Holbrook Pond Picnic Area,
- Paintball Recreation Area,
- Corkan Family Recreation Area,
- Boar's Head,
- Youth Sports Corridor,
- Pond 10 Recreation Area (Engineer's Pond),
- Quick Field and Warrior's Walk, and
- Garden Plots.

3.8.4 Aesthetics and Visual Resources

Visual resources include the natural and manmade physical features that give a particular landscape its aesthetic character and value. Viewer perceptions are formed through the impression of scenic quality in elements such as landform, vegetation, water, color, adjacent scenery, and manmade (cultural) modifications. Visibility and visual sensitivity evaluations are based on public viewing opportunities and concern for the potential for changes to the landscape. Effects to these resources will include the following, among others (a) areas utilized for hiking and/or hunting, which will be converted to training ranges and (b) areas near or within the Garrison area, where views from family housing convert from forested to developed.



Source: Real Property Master Plan Digest for Fort Stewart and Hunter Army Airfield, Georgia, January 2009.

Figure 3-22: Locations of Proposed Recreation Improvements at Fort Stewart.

3.8.5 Buffer and Joint Use Areas

The Installation forms a core habitat area for many species of plants and animals. Fort Stewart currently has seven species that are Federally or state of Georgia (GA) listed as threatened or endangered: red-cockaded woodpecker, bald eagle (GA), wood stork, shortnose sturgeon, gopher tortoise (GA), frosted flatwoods salamander, and eastern indigo snake. Increasing development on surrounding civilian lands further fragments and reduces valuable wildlife habitat. Along with the protection of threatened or endangered species, the Army manages the longleaf pine ecosystem on the Post through periodic prescribed burns. The burns maintain the environmental health of the forest and protect visibility and maneuver room on range lands (CGRDC, September 2005).

Through the Army Compatible Use Buffer (ACUB) program, the Army and its partners seek to prevent incompatible development on about 120,000 acres around Fort Stewart. The program relies primarily on the acquisition or donation of conservation easements, which set aside certain development rights and/or encourage conservation use of the land (forestry, agriculture, etc.). All acquisitions are from willing sellers only. The ACUB program also provides important benefits to natural resource conservation efforts in the region. ACUB partners include the Georgia Land Trust, Fort Stewart's primary partner in the ACUB and with whom Fort Stewart has a cooperative agreement. As of 2008, the ACUB program protected about 1,600 acres, and actions are under way to protect at least 2,000 more acres by the end of 2009. Factors considered in prioritizing ACUB protection efforts include the potential for incompatible development to adversely impact Fort Stewart's mission, likelihood of such development, and conservation value (Fort Stewart, January 2009).

Fort Stewart's ACUB strategy also addresses a unique opportunity to link five river corridors (Savannah River, Ogeechee River, Canoochee River, Satlilla/Jerico River, Altamaha River) with Fort Stewart serving as the "hub" connecting up all five watersheds and providing the potential for migration of wildlife across the five watershed areas. This unique opportunity brings several diverse partners together to work collaboratively on projects such as the Lower Ogeechee River Corridor (LORCC) partnership project (Marshall, personal communication, 2009).

The Department of Defense Office of Economic Adjustment (OEA) administers its community planning assistance program through the Joint Land Use Study (JLUS) program. The purpose of the JLUS is to promote compatible civilian development patterns near military Installations by applying the local planning process to update local comprehensive plans and supporting land use regulations. The JLUS program relies on strong community planning and land use regulatory capabilities to implement the compatibility recommendations, developed by the study, through local communities' comprehensive planning programs and processes.

The JLUS program is community controlled and community directed. A JLUS is produced by and for the local jurisdictions and is intended to benefit both the local community and the military Installation. Some of the study recommendations will be controversial, particularly to groups or individuals having development interests in land affected by base operations. Local officials must face this reality before they agree to participate in the process and must be willing to consider the broader public health, safety, and welfare issues as they affect or are affected by the military presence (Marshall, personal communication, 2009, 2010).

As a result of the 2004 JLUS, many local governments took measures to limit the development of incompatible land uses on lands located in noise sensitive areas off Post. For example, both Liberty County and Bryan County Georgia have entered into separate Memoranda of Agreement with the Installation which provide for better coordination and communication of proposed changes in land uses and zoning in or near noise prone areas. In Liberty County, as well as Chatham County, these efforts have resulted in at least two petitions to re-zone land from agricultural use to residential use.

3.9 INFRASTRUCTURE

Infrastructure at Fort Stewart includes utilities (electrical power, natural gas, the potable water supply systems, and wastewater systems), solid waste collection and recycling, and transportation. The stormwater systems are discussed in Section 3.4, Water Resources. The Installation privatized its electrical, natural gas, and wastewater systems, but operates and

maintains its own potable (drinking) water, solid waste and recycling, and transportation systems. All (privatized or not) are capable of meeting the demands of existing and anticipated future populations.

3.9.1 Energy

Energy consumption is perhaps the major infrastructure and budgetary challenge to Army leadership, encompassing both domestic (stateside) challenges and both garrison and tactical challenges abroad. The generation, transmission, and use of power have significant economic, environmental, and mission implications (AEC, 2007) and have given rise to a myriad of energy consumption/use reduction programs across the Army. While the Army energy conservation program (army-energy.hqda.pentagon.mil, accessed 26 OCT 09) has been effective in reducing the energy demands on a "per capita" and a "per building" basis, the costs of future energy will become increasingly burdensome, and reduction of these costs (and the consumption that drives it) will become an Army management and leadership imperative (AEC, 2007). As Army energy conservation and sustainability initiatives are implemented, energy efficiencies will materialize, and magnitude of direct, indirect, and cumulative effects will decline.

The Army is increasingly including LEED considerations into building facilities, and almost all other Army activities now have a sustainability component, including range facilities (AEC, 2007). LEED is an internationally recognized green building certification system**,** providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO_2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts. Developed by the U.S. Green Building Council (USGBC), LEED provides building owners and operators a concise framework for identifying and implementing practical and measurable green building design, construction, operations, and maintenance solutions (www.usgbc.org, accessed 24 OCT 09).

Fort Stewart's energy consumption profile is diverse, consisting of six different sources of energy: electric power and natural gas (both delivered by commercial utilities), No. 2 fuel oil,

propane, waste wood, and waste oil. The abundance of energy sources and adequate supplies from each source provide Fort Stewart with ample excess energy capacity, allowing Fort Stewart to accommodate a variety of future mission expansion scenarios (USAEC, 2007)

Under the Defense Reform Initiative Directive 49 (which directed privatization of Army utility systems), ownership, operation, and maintenance responsibility for the government-owned portion of the electrical system was transferred to a private partner, the Canoochee Electric Membership Corporation (EMC), for a period of 50 years (through 2054) (USACE, October 2008). Canoochee EMC is a nonprofit cooperative that serves Fort Stewart and nine regional counties: Tattnall, Evans, Bryan, Chatham, Toombs, Liberty, Long, Emanuel, and Bulloch (Canoochee EMC, 2006). All Garrison areas use electricity as the main power generator with diesel-powered generators for emergencies.

3.9.2 Potable (Drinking) Water

The state of Georgia Department of Natural Resources-Environmental Protection Division (GA DNR-EPD) has identified Fort Stewart as one of the top 10 water users in the southeastern region of Georgia (USACE, October 2008) The Upper Floridan aquifer (a water-bearing rock formation) provides most of the fresh water for cities and communities throughout southeastern Georgia, including Fort Stewart. Water service to the main Garrison area is provided from five wells with a combined maximum rated capacity of 6.08 million gallons per day (mgd). (Information is based on all five wells pumping for a total of 16 hours continuously; capacity is more if pumped for a 24-hour period). Water service is provided to outlying areas (such as ranges) by an additional 13 wells (Thomas, 2009, personal communication). The Installation is in the process of drilling a new well into the Lower Floridan Aquifer in the 4th Infantry Brigade Combat Team area. This new well is expected to produce as much as 1,000,000 gallons per day of additional drinking water. Fort Stewart withdraws its drinking water supplies from groundwater sources, not surface water sources, and is not transferring water from one watershed into another.

Fort Stewart's permitted drinking water capacity is 4.5 mgd and its current use is 2.11 mgd (Thomas, 2009, personal communication). As a condition of the permit, Fort Stewart is required to sample for various contaminants in its drinking water and report those findings within a Consumer Confidence Report (CCR), compiled and provided to residents on an annual (calendar year) basis, no later than July 1 of each year. The Installation will begin preparing the 2009 CCR in January 2010 (after all data from January-December 2009 is received).

Fort Stewart is implementing water conservation measures to reduce water withdrawals; however, this is being done strictly as a conservation measure and not because of dwindling permitted withdrawal capacity. Additionally, Fort Stewart has partnered with the city of Hinesville to provide reuse water for irrigations of Fort Stewart golf course and cooling systems for the CEP. Reuse water is treated wastewater not released back into a surface water body but instead reutilized for beneficial purposes, such as agricultural and landscape irrigation, industrial processes, toilet flushing, and replenishing a ground water basin. In other words, it is water recycling. The golf course and CEP are currently consuming approximately 862,547 gpd of Fort Stewart's drinking water for irrigation and chiller purposes; therefore, access to use this reused water will be a great benefit to Fort Stewart's water conservation measures. This reuse of water tracks well with Fort Stewart's Sustainability Management System (SMS) goals for water conservation.

Fort Stewart currently has an adequate withdrawal capacity to support additional growth (USAEC, 2007), which does not include the expected additional water capacity from the LF, golf course, and CEP. With the referenced conservations and alternate water supplies in place, Fort Stewart's available permit capacity should increase by approximately 1.9 mgd. Water distribution systems outside the Garrison area are not linked or interconnected to the Garrison area systems; however, the groundwater permit capacity is inclusive of all wells, both in the Garrison and training lands. These isolated systems have various-sized storage tanks. With the exception of the elevated water tank at EAAF, all systems have hydro-pneumatic tanks. Because most of the Soldiers who train on these ranges live and/or work in the Garrison area, there is very little, if any, impact to the available water capacity.

Generally, accepted water storage design requirements specify maintaining two days' peak consumption volume (5,206,800 gallons per day) and 3,000 to 5,000 gallons per minute for three hours (540,000 – 900,000 gallons) of stored water for fire suppression (total maximum of 11,313,600 gallons). The total capacity of all water storage tanks is 1,300,000 gallons (Thomas, 2009, personal communication 2009), which meet current and future needs. The Garrison area has four elevated water storage tanks:

- Well #1 with a capacity of 300,000 gallons;
- Well #5 has two tanks each with a capacity of 250,000 gallons for a total of 500,000 gallons; and
- Diamond Elementary Tank has a capacity of 500,000 gallons.

3.9.3 Wastewater

Fort Stewart operates two sanitary and one industrial WWTP in accordance with the NPDES Permit Number GA0004309 (issued by Georgia DNR-EPD) and three LAS. NPDES permits are required for the sanitary and industrial WWTPs because they discharge effluent (treated wastewater) to the nation's waterways. Additionally, Fort Stewart's Garrison area is tied into and uses the Hinesville WWTP. By agreement, Fort Stewart can generate a maximum of 3.79 mgd of wastewater. Current use at the Post is 2.44 mgd (USACE, October 2008b).

3.9.3.1 Hinesville Wastewater Treatment Plant

Though Fort Stewart has its own sanitary WWTPs in the training areas as well as an industrial plant in the Garrison area, it discharges sanitary waste from its Garrison area to Hinesville's privately owned treatment plant. Though this facility is owned and operated by the city, Fort Stewart has an agreed-upon apportionment of 3,790,000 million gallons of wastewater per day (3.79 mgd) at the Plant. The plant is permitted to produce a total of 7,100,000 million gallons of wastewater per day. The Installation is currently only using about 2.44 mgd of its apportionment of 3.79 mgd. Additionally, the city has constructed another wastewater treatment plant on its north-western side, which can be used to divert some of their waste to create additional capacity for Fort Stewart if necessary.

3.9.3.2 Fort Stewart Land Application Site

Fort Stewart operates three LAS, located at WAAF, Camp Oliver, and EAAF. The LAS at WAAF is permitted for 10,000 gpd. The WAAF LAS is currently in compliance and has remained so for the last three years. The Camp Oliver LAS was recently upgraded. Camp Oliver, a remote training site approximately 15 miles from the main Garrison area has an efficient LAS that constantly maintains compliance. This system is permitted to treat up to 70,000 gpd of wastewater, which exceeds any requirements for training in that area. The EAAF LAS is new and permitted to treat 25, 000 gpd. Though this facility is permitted for 25,000 gpd, it is capable of treating much more, and Fort Stewart is in the process of requesting an additional 75,000 gpd of capacity at this facility.

3.9.3.3 NPDES WWTPs

Fort Stewart has two NPDES WWTPs, located at EAAF and the Non-Commissioned Officer Academy (NCOA). The EAAF WWTP is recent construction and is permitted to treat 35,000 gpd. Along with the LAS at EAAF, the total capacity is 60,000 gpd for that area. Due to lowering of the Total Maximum Daily Loads (TMDL) under Section 303(d) of the Clean Water Act, the NCOA WWTP will need to be updated to regain compliance. Funds have been awarded to construct a new LAS at that location to replace the current NPDES discharge, and work is expected to be completed by October 2010. Once completed, this facility will again be fully compliant.

3.9.3.4 Industrial WWTP

Fort Stewart operates an industrial WWTP, which treats all waste from industrial activities, such as motor pools and the CEP. This system physically separates the oil from the water with a sand filter system in the end for additional treatment. This is a very efficient system, which is currently compliant with all local, state, and Federal regulations. The Installation, along with the United States Army Center for Health Promotion and Preventive Medicine (USACHPPM),

recently completed an evaluation of the effluent (discharge) for this system and determined that the water quality was good enough to use as an alternate industrial water source without any additional treatment. This water can possibly be used as an alternative water source for the Bio Cell to remediate contaminated soil, Wash Racks to wash military vehicles, and CEP as cooling water for the chillers. Again, these measures track well with Fort Stewart's SMS program.

3.9.4 Solid Waste

It is the Army and Fort Stewart's policy to integrate solid waste management and pollution prevention programs in order to minimize solid waste generation and disposal. Army policy also mandates that recycling be maximized and that reuse through pollution prevention actions be integrated in the management of wastes, including all construction and demolition (C&D) activities. The environmental goals of the Army's solid waste management program are to protect public health and the environment by increasing solid waste diversion, minimizing the generation of solid wastes, and increasing the program's economic benefit by investing in pollution prevention initiatives and finding ways to better manage costs associated with disposal and diversion.

Figure 3-23 illustrates the success Fort Stewart and Hunter Army Airfield (HAAF) have achieved in reducing solid waste and diverting municipal solid waste (MSW) disposal through recycling. (*Note; even though HAAF is not discussed in detail in this document, the information presented in this section will reference both it and Fort Stewart because the data are calculated together and not separately.)*

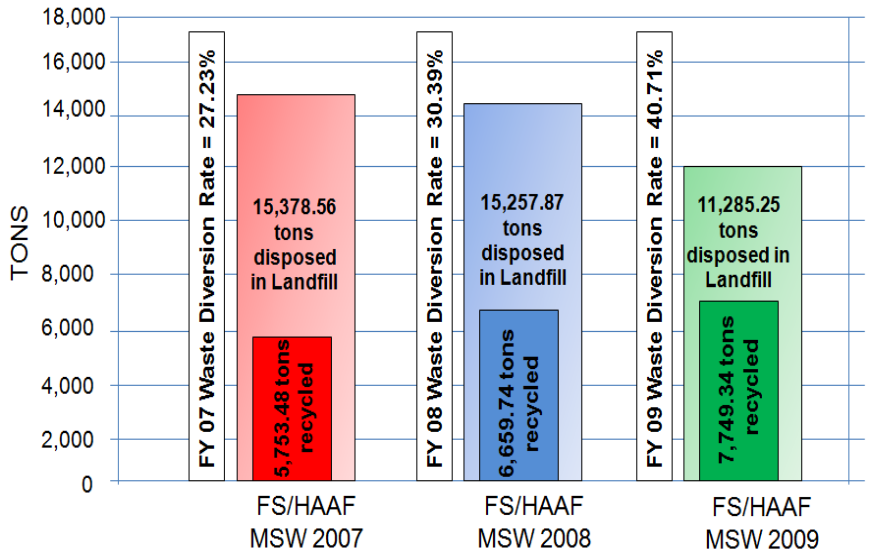


Figure 3-23: Fort Stewart/HAAF Solid Waste Reduction through Recycling.

In 2005 the Department of Defense established a Measure of Merit (MoM) goal to recycle 40% of the MSW it generated by the end of 2010. Fort Stewart exceeded that goal one year early and recycled 40.71% by the end of 2009. The MoM also required a 50% diversion, or recycling, of C&D waste by the end of 2010. All C&D projects must support this mandated 50% diversion rate. Figure 3-24 illustrates the success Fort Stewart/HAAF has achieved in reducing solid waste and diverting C&D waste disposal through recycling.

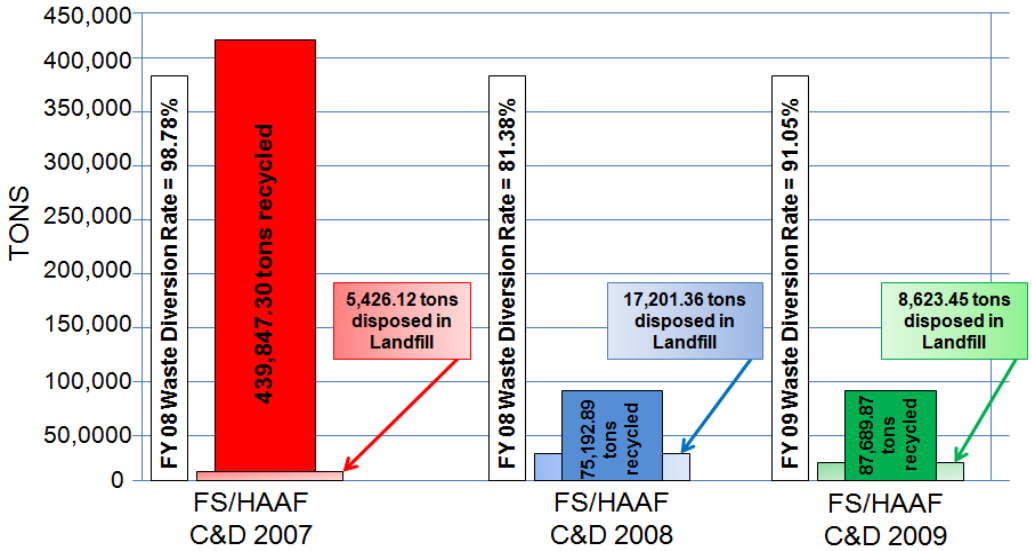


Figure 3-24: Fort Stewart/HAAF C&D Waste Reduction through Recycling.

Fort Stewart complies with Executive Order 13423 "Federal Leadership in Environmental, Energy and Economic Performance," which sets sustainability goals for Federal agencies and focuses on making improvements in environmental, energy, and economic performance. Projected benefits to the taxpayer include substantial energy savings and avoided costs from improved efficiency. This order requires agencies to meet a number of waste reduction targets, including a 50% recycling and waste diversion rates for MSW and C&D wastes by 2015. Implementation of that order will focus on integrating achievement of sustainability goals with mission and strategic planning to optimize performance and minimize implementation costs.

As noted in the Executive Order, management of solid waste and pollution prevention costs is a required component of waste minimization. Use of the on Post landfills is a crucial element of cost management. In 2001, an Army Audit Agency (AAA) study concluded that on Post disposal cost $17.69 per ton. It costs $71.00 per ton to transport and dispose of wastes to an off Post landfill. Cost avoidance savings through recycling and waste diversion are significant as shown in Figure 3-25.

2009 DISPOSED
Municipal Solid Waste (MSW) = 11,285.25 tons
Construction & Demolition (C&D) = +8,623.45 tons
19,908.7 tons

2009 RECYCLED @ landfill cost avoidance value equivalent $71/ton
MSW- 7,749.34 tons = $550,203.14
C&D- 128,648.87 tons = $9,684,300.91
134,839.00 tons = $10,234,504.05 cost avoidance savings

2009 Recycling Revenues = $223,640.13
2009 Brass sales + $645,134.56
total revenues 2009 = $868,774.69

Recycling Program Value = cost avoidance + revenues

2009 Value of Recycling Program $11,103,278.74

Figure 3-25: Cost Savings through Recycling.

Recycling reduces disposal costs, conserves natural resources, and minimizes environmental problems associated with land disposal. Fort Stewart personnel and contractors are required to actively participate in the recycling program. All of the proceeds from the program are retained by Fort Stewart. Recyclable materials that may be collected include paper, cardboard, metal cans, glass containers, scrap metal, and plastics. Figure 3-26 lists what is recycled.

Fort Stewart has one sanitary landfill (named the Post South Central Landfill), one non-putrescible (non-sanitary) landfill, and two inert landfills. The Post South Central Landfill is one of four landfills in the state of Georgia allowed to operate without the liner required for all new landfills (40 CFR 258.40). As a permitted facility, the Post South Central Landfill must meet closure and Post-closure requirements in accordance with the requirements of 40 CFR 258.60 and Chapter 391-34, Rules of the GA EPD.

The Post South Central Landfill has been used for solid waste disposal since the 1940s. The Post South Central Landfill is operated under Permit No. 089-010D (SL), issued by the state of Georgia in 1982. The current waste stream includes municipal solid waste generated from on Post activities and tenants. The remaining capacity report sent to GA EPD has concluded that the Post South Central Landfill will be able to receive wastes for 25.6 years or until 2034. The landfill received 23,868 tons in FY 01 and recycled 17%. In FY09, Fort Stewart disposed of 11,285.25 tons and recycled more than 40%, showing that Fort Stewart is generating less waste and recycling more. These landfills are discussed in more detail in Section 3.11, Hazardous and Toxic Materials and Wastes.

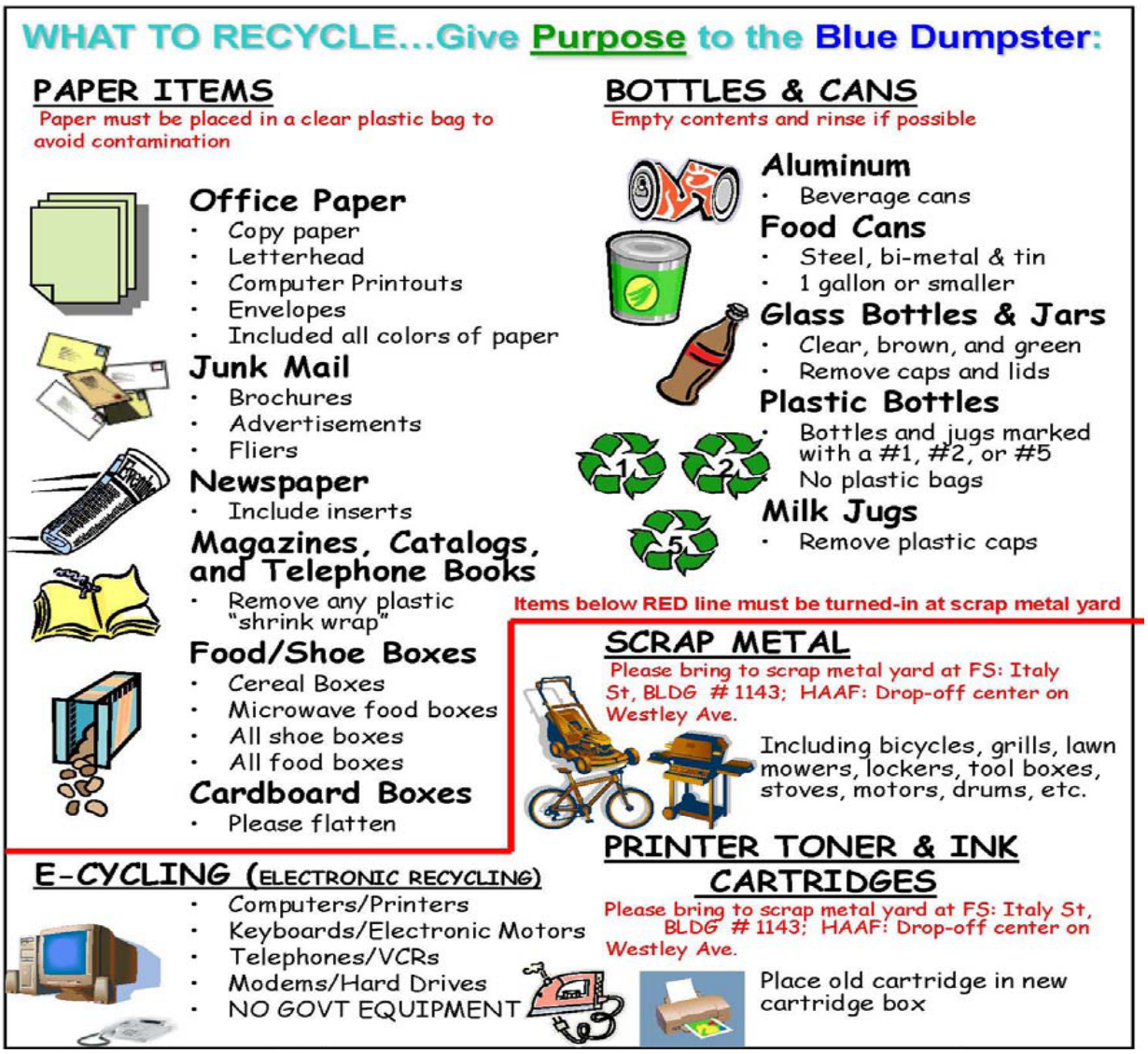


Figure 3-26: Installation Recyclables.

3.9.5 Transportation

Transportation resources refer to the infrastructure and equipment required to move people, manufactured goods, and raw materials in geographic space. For the purposes of this EIS, transportation resources surrounding and within Fort Stewart are the affected environment for analysis. Fort Stewart completed its Traffic Engineer Study in 2007; unless otherwise indicated, data in this section is from that study and one conducted in 2008 by the Hinesville Area Metropolitan Planning Office (HAMPO). The methodology used in conducting the study is

broken into three elements. The first element consists of an inventory of the existing transportation network and traffic conditions (discussed in this chapter). The second element examines future development plans, shifts in military and civilian personnel, and future transportation needs, and the third element includes the development of conceptual improvement projects and an implementation plan.

Regional access to Fort Stewart and Hinesville is from U.S. Interstates 95 and 16, U.S. Highway 84, and Georgia highways 119 and 144. (Figure 3-27) (USACE, October 2008). Georgia Highway 119, a north-south highway, bisects Fort Stewart and separates the primary heavy maneuver training areas from the collective firing ranges. Georgia Highway 144, an east-west highway, separates Training Areas A and D from Training Areas B, C, E, and F in the northern portion of Fort Stewart and is the primary ground route to HAAF, Savannah, and I-95. A network of improved roads serves the main Garrison area. About 400 miles of tank trails and unpaved roadways are outside the Garrison areas (USACE, October 2008).

The two main entrances to the Fort Stewart Garrison area are on General Screven Way (Gate #1) to the south and Highway 119 (Gate #5) to the north. Additionally, there are five secondary access points located at 4th Street (Gate #2), Harmon Avenue (Gate #3), Austin Road (Gate #4), 15th Street (Gate #7), and Frank Cochran Drive (Gate #8). Gate #4 is a temporary gate with limited hours of operation.

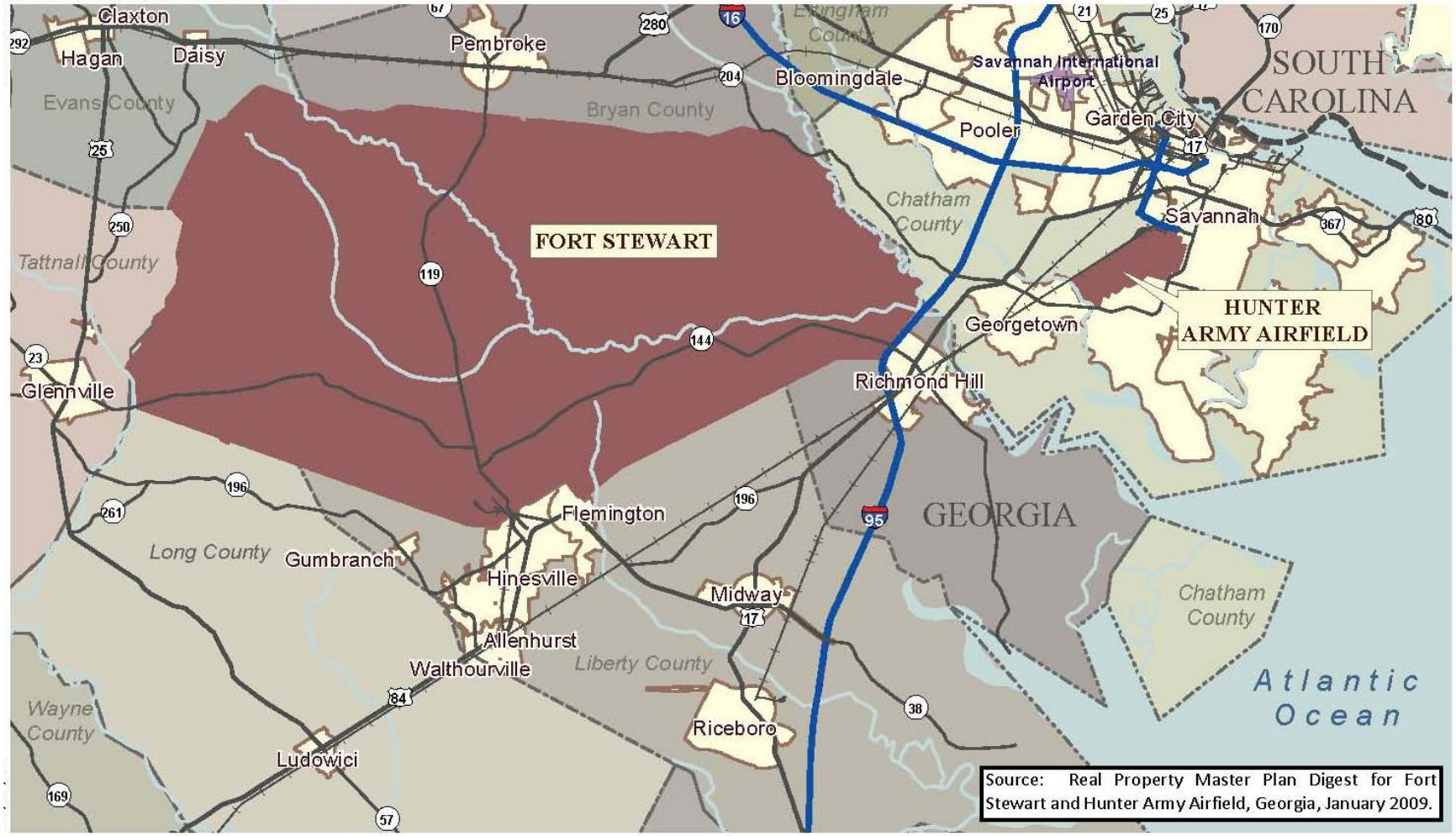


Figure 3-27: Major Highways Near Fort Stewart.

3.9.5.1 Daily Traffic Volumes

Twenty-four-hour traffic counts (or average daily traffic, ADT) were collected on December 5-6, 2006. The ADT counts identified the amount of traffic on each roadway on a typical day at peak traffic periods, well as the amount of traffic on each roadway for any particular hour of the day. Table 3-11 summarizes the results of the 24-hour traffic volumes entering and exiting Fort Stewart at each of the access points.

Table 3-11: Access Control Point 24-Hour Traffic Volumes.

Access Point	Inbound	Outbound	Total
Gate 1 (Main)	13,070	13,970	27,040
Gate 2 (Troupe Avenue)	2,420	2,360	4,780
Gate 3 (Harmon Avenue)	2,990	2,650	5,640
Gate 4 (Austin Road)	NA	NA	NA
Gate 5 (Gulick Avenue)	3,470	3,790	7,260
Gate 6 (Wilson Avenue) **Closed**	NA	NA	NA
Gate 7 (15th Street)	2,750	2,820	5,570
Gate 8 (Frank Cochran Drive)	5,650	5,510	11,160
Gate 9 (WAAF)	NA	NA	NA
Total Traffic	**30,350**	**31,100**	**61,450**

The access points feed the primary internal roadway network, which disperses traffic onto secondary roadways to reach different destinations on Post. Gulick Avenue carries 15,620 vehicles per day (vpd) with 7,930 traveling northbound and 7,690 southbound. Hero Road north of Gulick Avenue has 11,050 vpd with equal volumes in each direction. 6th Street carries 11,810 vpd with 5,480 vehicles eastbound and 6,330 vehicles westbound. Hase Road carries 5,250 vehicles northbound and 5,190 vehicles southbound per day. East Bultman Avenue has a total traffic volume of 11,120 vpd with 5,430 traveling eastbound and 5,690 westbound. Harmon Avenue has 5,330 vpd with eastbound and westbound evenly split. Austin Road, serving mainly residential land uses, carries 5,570 vpd with 2,750 eastbound and 2,820 westbound.

3.9.5.2 Peak Hour Traffic Volumes

Peak traffic flow is influenced by the standard operating characteristics of Fort Stewart. On a typical weekday, military personnel arrive at Fort Stewart between 5:30-6:30 AM for physical training (PT). After PT, military staff residing off Post leave to shower and dress before returning for duty. Between 7:00-8:00 AM, civilian employees arrive for work, while military personnel return for work between 8:00-9:00 AM. A large percentage of the military and civilian population leaves the Post for the lunch hour between 11:00 AM and 1:00 PM. In the afternoon, they leave between 4:00-6:00 PM. Inbound traffic at the gates peak at 6:00 AM, 9:00 AM, and 1:00 PM. The outbound traffic has a minor peak at 8:00 AM and then peaks again at noon and 5:00 PM. Peak hour turning movement counts were collected at the major intersections during the morning, noon, and afternoon peak periods.

3.9.5.3 Capacity Analysis

Intersections currently experiencing traffic congestion and poor operating conditions were analyzed to determine if improvements were warranted. Operational capacity analyses were performed during the morning, noon, and afternoon peak hours. The capacity analyses determined the operating level of service (LOS) at the studied intersections. LOS for an intersection is based on the vehicular delay at the intersection and is a typical measure of effectiveness. The Highway Capacity Manual provides ranges of delay for each LOS definition, spanning from very minimal (LOS A) to high (LOS F). LOS F is considered unacceptable for most drivers. The capacity analyses indicate the following intersections are operating at poor levels of service (LOS F) on the minor street approaches during at least one peak period of a typical weekday: Hero Road at Bundy Avenue, Hase Road at McNeely Avenue, Hero Road at Davis Drive, Frank Cochran Drive at McFarland Avenue, and McFarland Avenue at 15th Street.

3.9.5.4 Collision Summary

Collision data for 2005-2006 was obtained and summarized by location, date, and type of traffic violation. Similar data for 2007-2010 has not been compiled; therefore, this is the most recent data available and is utilized for this analysis. Based on the 2005 data, there were 412 accidents

recorded by military police; in 2006, there were 574 crashes. Table 3-12 indicates the type of violation responsible for these collisions. Exclusive of crashes along Highway 119 and Highway 144, the majority of the crashes occurred in parking lots. In 2005, the highest occurrence of parking lot collisions occurred at Winn Army Community Hospital (WACH) with 20 recorded crashes, which was reduced to four by 2006. The increase in available parking spaces at WACH likely reduced the number of vehicles parking on the streets or parking illegally, which reduces the number of accidents. The Main Gate at General Screven Way (ACP #1) is the only access point to experience a high volume of traffic violations resulting in accidents. The predominant traffic violation is following too closely with one of seven collisions in 2005 and six of ten collisions in 2006.

Table 3-12: Summary of Collision Data Traffic Violations.

Type of Violation	2005		2006	
	Frequency	Percentages	Frequency	Percentages
Animal Mishaps	19	4.61%	45	7.84%
Collision with Fixed Object	9	2.18%	8	1.39%
Damage to Government/Private Property	11	2.67%	17	2.96%
Duty Upon Striking Unattended Vehicle	46	11.17%	113	19.69%
Failure to Exercise Due Care	21	5.10%	15	2.61%
Failure to Maintain Lane	17	4.13%	36	6.27%
Failure to Obey Control Device	22	5.34%	11	1.92%
Failure to Yield Right of Way	25	6.07%	37	6.45%
Following Too Closely	24	5.83%	45	7.84%
Hit and Run	3	0.73%	0	0.00%
Improper Backing	88	21.36%	64	11.15%
Improper Lane Usage	3	0.73%	4	0.70%
Improper Left Turn	8	1.94%	23	4.01%
Improper Passing	3	0.73%	7	1.22%
Improper Right Turn	9	2.18%	18	3.14%
Improperly Starting a Parked Vehicle	0	0.00%	8	1.39%
Leaving Vehicle Unattended	4	0.97%	0	0.00%
Other	20	4.85%	26	4.53%
Unknown	80	19.42%	97	16.90%
Total Crashes:	**412**	**100.00%**	**574**	**100.00%**

3.9.5.5 Traffic Survey

A traffic survey of military, civilians, and visitors using Fort Stewart was also conducted. A questionnaire was distributed to all vehicles for a 24-hour period at each of the access points to Fort Stewart. Survey respondents were requested to drop off the completed surveys at the gate or fax them to the DPW. In addition to the questionnaires, some interview-style personal surveys were completed in front of the Post Exchange (shopping mall). The survey consisted of 12 questions pertaining to travel patterns, mode split, trip purpose, destinations, and several other travel characteristics including: military status (active military, retired, civilian, contractor, or visitor); frequently used gates; number of trips made to Fort Stewart; location of residence (on or off Post); destination on Post; and travel mode (car, bus, walk, bicycle).

A total of 1,528 responses were obtained and summarized, of which 1,193 responses (approximately 78 percent) were from military and civilian personnel currently assigned to Fort Stewart. Of the people surveyed, 41 percent were military personnel (including dependents), 34 percent were civilian employees, and 13 percent were contractors. The remaining 12 percent were composed of retired military, visitors, or others. Over 90 percent of survey respondents lived off Post and commuted to Fort Stewart, nearly half of which (48 percent) used the Main Gate to enter and exit Fort Stewart.

The average respondent made 2.5 trips off Post per day with a similar distribution between morning, midday, and evening trips. This supports the fact that many of the military personnel leave Fort Stewart after PT and return later for work. In addition, a high percentage leave Post during their lunch hour. Eight percent of respondents average zero trips off Post per day, 25 percent take one trip, 27 percent take two trips, 18 percent take three trips, and 10 percent take four or more trips. Approximately five percent of respondents waited more than 20 minutes at an access control point to enter Post.

Based on the results of the survey, a majority of responses (48 percent) indicated that traffic conditions were “fair,” while 36 percent indicated “good” traffic conditions. Only 14 percent of respondents designated either “poor” or “very poor.” Based on the responses received, the most

frequently cited concern, with over one-fourth of the comments, was a lack of parking around base. The next two most frequently cited comments were traffic near the Main Gate and Frank Cochran Gate and requests for signal improvements. Respondents indicated that a lack of personnel and lengthy security check process creates congestion at the gates. Additional deficiencies include pedestrian issues, such as a general lack of sidewalks throughout Fort Stewart, and speed limits too low or not observed by drivers.

3.9.5.6 Overall Assessment of Existing Traffic Deficiencies

Noted deficiencies are summarized in the following paragraphs.

- **Access Point Deficiencies.** During the AM peak period, Frank Cochran Gate and 15th Street Gate experience significant queuing. During the AM and noon peak periods, the Main Gate experiences moderate delay because of its proximity to the downtown Hinesville area.
- **Signalized Intersections Deficiencies.** There are eleven signalized intersections on Fort Stewart, several of which experience deficiencies. Inadequate signal design and phasing reduces the efficiency of signal and in some cases is a safety concern.
- **Parking Deficiencies.** Based on the parking inventory, some parking lots on William Wilson Avenue and McFarland Avenue are reaching their full capacity, are insufficient to meet the existing demand, and are not within close walking distance to the destinations. Personnel park their vehicles along the grass shoulders of William Wilson Avenue and McFarland Avenue within no parking zones. The lack of enforcement within the no parking zones encourages personnel to continue parking illegally along the roadside instead of parking in lots further away from their destination where space may be available. On-street parking reduces sight distance for vehicles as well as pedestrians. The parking lot on McFarland Avenue between Vanguard Street and 15th Street exceeds 95 percent capacity; however, two nearby lots exist but are underutilized. Enforcement of non-designated parking may encourage utilization of existing parking to allow clear zones on the sides of the roadways to be maintained. Removing vehicles from non-designated areas will better ensure safety for pedestrians and drivers.

- **Pedestrian Deficiencies.** There are limited pedestrian facilities on Fort Stewart. Sidewalks are present primarily around the Headquarters and along 6th Street. Crosswalks with advanced warning signs are provided in areas connecting the parking lots to the motor pool entrances; however, crosswalks do not connect to other pedestrian facilities.
- **Signing and Pavement Markings Deficiencies.** While the majority of the existing signing and pavement markings on Post are in good condition and follow the Manual on Uniform Traffic Control Devices standard guidelines, some deficiencies need to be addressed. Pedestrian warning signs located along William Wilson Avenue and McFarland Avenue are over-utilized and add to the signage clutter along this road. Another area with visual clutter is the area immediately prior to some of the access points. Warning and informational signs, including welcome, speed limit changes, no cell phones, seat belt, and curfew signs, etc., bombard drivers with information. Table 3-13 summarizes the location and types of deficiencies identified.

Table 3-13: Existing Transportation Deficiencies.

No.	Location	Type of Deficiency
1	Main Gate	Capacity and congestion
2	15th Street Gate	Capacity and congestion
3	Frank Cochran Gate	Capacity and congestion
4	Hero Road at Bundy Avenue	Capacity and congestion
5	McFarland Avenue at Frank Cochran Drive	Capacity and congestion
6	15th Street at McFarland Avenue	Capacity and congestion
7	Austin Road at Hero Road	Capacity and congestion
8	18th Street at McFarland Avenue	Capacity and congestion
9	Bundy Avenue at 6th Street	Capacity and congestion
10	Bultman Avenue at Hero Road	Timing, phasing, and signal head placement
11	Gulick Avenue at 6th Street	Timing, phasing, and signal head placement
12	Gulick Avenue at 18th Street	Timing, phasing, and signal head placement
13	Hero Road at Davis Drive	Traffic control
14	William Wilson Avenue	Parking and pedestrian
15	McFarland Avenue	Parking and pedestrian
16	Winn Army Community Hospital	Parking
17	Harmon Avenue	Signing and marking

3.10 SAFETY

The "Army Safety Program," AR 385-10, governs Army policies, responsibilities, and procedures to protect and preserve Army personnel and property against accidental loss. The regulation provides for operational safety, safe and healthy workplaces, and ensures compliance with applicable safety laws and regulations. Safety programs are required to include accident reporting, workplace safety, transportation safety, as well as family and off-the-job safety for all Installations and (where applicable) range safety, explosive safety, aviation safety, tactical safety, radiation safety, and system safety. "Accident Reporting and Records," AR 385-40, details the classes of accidents and the reporting requirements for each class. Meeting all OSHA requirements is also mandated. Ongoing activities are required to adhere to these requirements; therefore, only minimal adverse cumulative impacts to safety are possible. The objectives of the program include

- Preventing injury from Army operations;
- Detecting and eliminating causes of preventable, inadvertent damage to property both on and off the military reservation;
- Preventing accidents;
- Complying with Federal statutes dealing with the safety of people, property, or the environment;
- Safely conducting training and operating facilities;
- Safety of the airspace above the firing ranges; and
- Safety of training and operational activities by Army aircraft.

In keeping with its concern for the safety of Army training and allied activities, the Army has designated safety zones of fixed dimensions at its airfields and ranges. These safety zones help identify areas with the environs where an accident/injury/problem is likely to take place. In 1985, the DoD initiated the JLUS program to create a participatory, community-based framework for land use planning around military Installations. The objectives of the JLUS are two-fold:

- Encourage cooperative land use planning between military Installations and the surrounding community and

- Seek ways to reduce the operational impacts of military Installations on adjacent land.

The JLUS process encourages residents, local decision-makers, and Installation representatives to study issues of compatibility in an open forum, balancing both military and civilian interests (Coastal Georgia Regional Development Center, 2005).

3.10.1 Ground Safety

Surface danger zone is the area designated on the ground of a training complex (including associated safety areas) for the vertical and lateral containment of projectiles, fragments, debris, and components resulting from firing or detonating weapon systems. Each range must be of sufficient acreage to accommodate the SDZs for use of the specified munitions, as required by DA PAM 385-64, *Ammunition and Explosive Safety Standards*. The SDZ is a temporary safety boundary that surrounds the firing range and associated impact area that provides a buffer to protect personnel from the non-dud producing rounds that may be ricocheted during operation of the range. It includes an ordnance dispersion area, ricochet area, and an added safety buffer zone. This area is closed to all unauthorized personnel during each training exercise on the range. In addition, each range must have an existing impact area sufficient to support live-fire munitions used at Fort Stewart and be configured (e.g., course and targets) in a manner lending itself to achieving offensive and defensive objectives.

3.10.2 Flight Safety

The air safety component of the ICUZ identifies areas around the airfield where a mishap would be most likely to occur and assesses the likely impact of any single accident. The following ICUZ air safety zones exist around WAAF:

- **Clear Zone.** The Clear Zone is an area 1,000 feet wide by 3,000 feet long at the immediate ends of the runway. The accident potential in this area is sufficient to recommend prohibiting any structures in the Clear Zone.
- **Accident Potential Zone I.** Accident Potential Zone I is less critical than the Clear Zone but still possess significant potential for accidents. A variety of industrial,

manufacturing, transportation, open space, and agricultural uses can exist safely within this 1,000-foot-wide-by-2,500-foot-long area just beyond the Clear Zone. However, uses that concentrate people in small areas, such as higher density housing, pose a conflict with the safety risks of this zone.

- **Accident Potential Zone II.** Accident Potential Zone II is the least critical of the three air safety zones but still carries some risk of an accident. Accident Potential Zone II is 1,000 feet wide and extends 2,500 feet beyond Accident Potential Zone I. Compatible land uses include those of Accident Potential Zone I as well as low-density single family residential and lower intensity commercial activities. High-density functions such as multistory buildings and places of assembly (such as theaters, schools, churches, and restaurants), however, raise compatibility issues.

The accident potential zones from WAAF cross the Fort Stewart boundary to affect a portion of unincorporated Liberty County (Coastal Georgia Regional Development Center, 2005).

3.10.3 Explosive Safety

Fort Stewart complies with AR 385-64, "Update Issue 1, Ammunition and Explosives Safety Standards," sets the safety zone criteria for ASPs on Army Installations. The Installation's range safety program prohibits picking up, tampering with, or removing unexploded ordnance (UXO) by unauthorized personnel. Only explosive ordnance disposal (EOD) personnel qualified in UXO identification and removal procedures will be involved in clearance operations. The Installation's Range Control Division provides a training class twice a month to soldiers and civilians so that they may be familiar with UXO identification, safety protocols, and reporting requirements if UXO is encountered.

3.10.4 Construction Safety

Construction and demolition activities performed or contracted by the USACE must follow the USACE Safety and Health Manual 385-1-1 (USACE, September 2008). This manual outlines the requirements to comply with Occupational Safety and Health Act (OSHA) standards during the

construction and demolition process. Non-USACE contractors would not necessarily be required to follow the USACE manual but would be required to comply with all applicable OSHA standards and regulations.

3.10.5 Law Enforcement, Fire Protection, and Medical Facilities

On Post, the Directorate of Public Safety commands the Military Police Units, the Fort Stewart Fire Prevention and Protection Division, and the Post Safety Office. This directorate ensures unity of effort among Fort Stewart emergency services to provide a safe and secure environment within which to work, train, live, and play. Winn Army Community Hospital and Lloyd C. Hawks Troop Medical Clinic provide health services for active and retired military personnel and their families. Off Post, police and fire protection are provided by the city of Hinesville; Liberty Regional Medical Center in Hinesville provides the nearest health care facility (Fort Stewart, October 2008).

3.11 HAZARDOUS AND TOXIC MATERIALS AND WASTE

(Unless otherwise indicated, information in this section is from Fort Stewart's Pollution Prevention Plan [also known as the Waste Minimization Plan], Installation Solid Waste Management Plan, and Hazardous Waste Management Plan [HWMP]).

This section describes the affected environment and environmental consequences to hazardous and toxic substances, including uses of hazardous materials, storage, and handling areas, hazardous waste disposal, site contamination and cleanup, and special hazards within the Garrison area and the downrange area.

In accordance with the Resource Conservation Recovery Act (RCRA), Official Code of Georgia (OCGA) 12-8-60, 12-8-90, and 12-8-200, DA Regulations, and Resource Conservation and Recovery Act (RCRA) Part B Permit No. HW-045(S), Fort Stewart has a comprehensive program to address the management of hazardous waste, hazardous materials, and toxic substances. This includes the proper handling and disposal of hazardous waste and procurement,

use, storage, and abatement (if necessary) of toxic substances. Additionally, a systematic approach is employed to investigate and remediate known or suspected contaminated sites across Fort Stewart until closure or receipt of a No Further Action (NFA) is granted from the Georgia Department of Natural Resources.

Hazardous and toxic materials used at Fort Stewart include gasoline, batteries, paint, diesel fuel, oil and lubricants, explosives, JP-8 jet fuel, pyrotechnic devices used in military training operations, radiological materials at medical facilities, radioactive materials, pesticides, and toxic or hazardous chemicals used in industrial operations. Some of these materials end up as wastes either through a certain process or because of process changes, whereby the material no longer meets required specifications or becomes contaminated and unusable. The RCRA Part B Permit displays the estimated quantity of hazardous waste (in pounds per year) either currently or potentially generated annually at Fort Stewart.

To reduce the amount of hazardous waste generated on Fort Stewart, a program was established in an effort to centralize and control purchases of hazardous materials and employ affirmative procurement practices. The program includes a quarterly inspection regimen to ensure products are properly stored and a shelf life program is in place. To minimize hazardous waste disposal, Fort Stewart maximizes recovery of waste for reuse and recycles applicable materials according to the Pollution Prevention (P2) Plan (also known as the Waste Minimization Plan), the Installation Solid Waste Management Plan, and the Hazardous Waste Management Plan (HWMP). All support waste reduction efforts are currently being revised to incorporate additional sustainable principles.

3.11.1 Uses of Hazardous and Toxic Materials and Waste

3.11.1.1 Garrison Area

The principal industrial operations and activities involving the use of hazardous materials and petroleum-based products at Fort Stewart are painting, repair and maintenance of vehicles and aircraft at maintenance facilities, and activities at various motorpools throughout Fort Stewart. Additionally, Fort Stewart operates an industrial wastewater treatment plant and medical and

dental facilities and engages in solvent recycling. All of these activities represent the majority of the following hazardous waste generated at Fort Stewart: paint thinner, paint booth filters, paint-related rags and solvents, laboratory reagents, heptanes, kerosene, methanol, ethanol and solvent distillation sludges.

As required by DoD policies, Fort Stewart emphasizes integrated pest management using materials classified as hazardous materials in the process. Pesticides and herbicides are required for insect and rodent control in select structures and in the control of undesired vegetation, including noxious weeds. Building 3708 is used to store and mix pesticides; minor amounts of consumer pesticides are also stored and distributed at the commissary, Post Exchange, and veterinary clinic.

Asbestos-containing materials (ACM) were used prevalently in building construction prior to the 1970s. Although the use of asbestos has declined dramatically, asbestos is occasionally found in new building materials, such as floor tiles, pipe wrappings, ceilings, gypsum board, sheet rock mud, tank mud, and insulation. Fort Stewart continually updates asbestos surveys of buildings and facilities and reviews all Installation job orders for potential disturbance of ACM. Lead-based paint is no longer used but may be in older structures. Lead can potentially be found in chipped or cracking painted walls or in surrounding soils and, in liquid form, can contain hazardous lead concentrations.

Transformers manufactured prior to 1976 and light ballasts manufactured before 1979 are assumed to contain polychlorinated biphenyl (PCB) wastes. Fort Stewart privatized its electrical services and in the process removed all transformers containing PCBs. Ballast in light fixtures removed during renovations/demolitions are turned in to the Hazardous Waste Storage Facility (HWSF) for proper disposal.

3.11.1.2 Ranges and Training Lands

Fort Stewart maintains compliance with all applicable DoD Directives, Federal and state laws, and Army regulations and has an active, highly efficient Range Sustainability Program. Through

it, the Environmental Division works closely with the Directorate of Planning, Training, Mobilization, and Security (DPTMS) to ensure ranges maintain their operational efficiency, adhere to environmental requirements, and ensure optimal safety measures for Soldiers training on the ranges/training lands.

Petroleum-based products used in the repair of malfunctioning target systems and service vehicles are stored at established locations throughout the downrange area, including Buildings 8084, 8082, Training Ranges Alpha, Foxtrot, Golf, Hotel, and the Multipurpose Range Complex. Petroleum-based products used in the repair of malfunctioning military vehicles during maneuvers are stored at various locations throughout the downrange area. Each of these areas are inspected during the execution phase and cleared of materials and debris at the conclusion of each tactical exercise.

The Army Operational Range Assessment Program (ORAP) is currently assessing 378 facilities in the United States and territories with range complexes/ranges and will focus on off-range migration pathways and Munitions Constituents. The intent of the program is to keep ranges open and available for training and testing while protecting human health and the environment (www.ecos.org/files/1843_file_Army.PPT). The Military Munitions Rule states that used or fired munitions are considered a solid waste only when they are removed from their landing spot (www.epa.gov/epaoswer/hazwaste/military/index.htm). Therefore, since the proposed ranges will be constructed within existing impact areas and the munitions will be used for their intended purposes and will be left where they land, the munitions are not considered solid waste.

Lead is often found in soils and/or groundwater at gun and artillery practice ranges where lead munitions are used. Earthen berms are used on Fort Stewart to contain bullets for the protection of threatened and endangered species (TES). The 1992 Biological Opinion issued by the USFWS on effects of the military mission on TES required the construction of berms on all small arms ranges. The best practices to minimize the impact of lead on the environment are stormwater and erosion controls, vegetation management, soil amendments, bullet traps, and soil pH modifiers. The berms must be 12 feet high (Carlile 2009). To minimize soil erosion from the berms, sand/clay soil is the preferred construction material because it is more structurally stable.

This material can be placed at a 45 degree slope, which better controls richochet. The sand clay has a higher pH, which substantially reduces the incidence of lead leachate release. Also, lime application and fertilization during berm construction help establish good vegetative cover crops, which also greatly reduces erosion and leaching (Houston 2009). In addition, the berms are periodically maintained to keep their integrity. Therefore, the impact from lead at ranges on Fort Stewart are being minimized by all of the best management practices listed above.

The Army at Fort Stewart maintains compliance with all applicable DoD Directives, Federal and state laws, and Army regulations and has an active, highly efficient Range Sustainability Program. Through it, the Environmental Division works closely with the DPTMS to ensure ranges maintain their operational efficiency, adhere to environmental requirements, and ensure optimal safety measures for Soldiers training on the ranges/training lands. Ranges are inspected, controlled, and certified by the Fort Stewart Range Control Division. The officer in charge (OIC) for the range is responsible for the operation of the range. The Range Safety Officer works for the OIC and ensures all Soldiers adhere to safety aspects, Risk Management procedures, and regulations. Spent casings from all small arms ranges are collected by the Soldiers after each use at the training range, which is then taken to the Ammunition Supply Point for reuse or recycling.

UXO is found primarily in Fort Stewart's existing impact areas, where dud-producing ammunition is fired; however, as Fort Stewart has been an active military Installation for more than 60 years, it is possible for UXO to be found in non-impact areas, such as former closed range areas. UXO deemed unsafe to detonate in place are transported to the Unexploded Ordnance Detachment (EOD) for treatment via open detonation. A UXO avoidance plan is a requirement for construction in former range areas, as a safety precaution.

Recent research indicates there may be a potential increase in the mobility of lead when it is found in conjunction with tungsten fired as part of the Army's "Green Ammunition" program. For a few years in the last decade, Green Bullets, also known as tungsten nylon bullets, were part of the Army's small arms portion of this program, an effort to provide Soldiers with ammunition that would be more environmentally sustainable than traditional munitions with lead cores. In

this ammunition, tungsten metal and nylon were pressed together into the form of a bullet. Tungsten small arms ammunition is no longer used anywhere in the Army. Fort Stewart records indicate the use of green ammunition (tungsten) only on the site proposed for the FY11 Modified Record Fire Range. None of the other proposed sites for new range construction were exposed to this specific potential contaminant. There is no scientific information that would suggest that it is reasonably foreseeable that tungsten and lead combine in soils to cause significant adverse impacts. Nevertheless, the Army will continue to monitor the soil and ground water at this range. The Army has developed multiple types of lead-free ammunition to reduce dependence on lead-containing bullets in training, as well as bullet traps to contain bullets and prevent range contamination. As a last line of defense, the Army also constructs impact berms to stop bullets from leaving the firing range and aggressive cleanup goals for remediating existing contaminated sites.

The only other chemicals of concern on Army ranges are perchlorates, Cyclotrimethylenetrinitramine, and Dinitrotoluene. The Army has stopped production and use of perchlorates in its two most prevalent systems that used the contaminant (Artillery Simulators and Practice Hand Grenades) and replacements systems which do not utilize perchlorates have been created. By eliminating the use and production of these training aids the Army has reduced the potential release for perchlorate by 2/3. The Army monitors to ensure perchlorates do not leave Army ranges or represent a hazard to human health and is looking for ways to replace all of the systems in its inventories that may present a future perchlorate hazard.

RDX is a common high explosive used in large caliber munitions and residues may increase as a result of the training range project. The DoD/Army continues to investigate and respond to RDX releases at installations as part of DoD's overall environmental restoration program. Existing RDX toxicity and carcinogenicity data are 20 years old; Federal agencies are working together to generate new environmental health data. The EPA will use the new data in its IRIS process to refine the toxicity values for RDX used to protect human and environmental health.

The US Army Environmental Command has performed research on the connection between small arms training and dinitrotoluene contamination on ranges. The Army is also researching process changes and remediation technologies to meet regulatory requirements associated with

applicable drinking water standards. In the absence of a Federal drinking water standard, risk based guidelines have been developed by several USEPA regional offices and state regulatory agencies. These guidelines are used in site screening—to identify areas, contaminants and conditions that do not require further attention—and to establish initial and final cleanup goals. The USEPA made a pre-regulatory determination that a national primary drinking water regulation would not present a meaningful opportunity for health risk reduction.

3.11.2 Storage and Handling Areas (Garrison and Training Lands) for Hazardous and Toxic Materials and Waste

Hazardous materials are stored securely in maintenance areas, flammable storage lockers/areas, mobile transfer units, and aboveground storage tanks (ASTs). Petroleum products are stored in numerous ASTs within the Garrison area and include contractor-owned and contractor-operated bulk and retail fuel facilities that provide fuel to all military units on Fort Stewart. Currently, there are two commercial gas stations operated on Fort Stewart that have a combined total of seven underground storage tanks (USTs). Fort Stewart plans to open two more commercially operated gas stations during FY10. Each of these new facilities will have three USTs, increasing the total number of USTs to 13.

Lead-acid batteries are managed under Universal Waste Rule on Fort Stewart. Used batteries are collected at individual units and maintenance facilities and then taken to the HWSF, where the batteries are properly labeled, packaged, and prepared for shipment. A recycling vendor is contacted once the quantity of batteries in the storage facility is sufficient to justify a full load for the vendor.

3.11.3 Hazardous and Toxic Materials and Wastes Disposal

All hazardous waste generated at Fort Stewart (including the Garrison and downrange areas) is transported to the HWSF, Building 1157, for storage and eventual shipment off site for proper disposal. Currently, there are 54 satellite accumulation points (SAPs) on Fort Stewart for the collection and temporary controlled on-site storage of hazardous waste.

3.11.4 Landfills

Fort Stewart has one sanitary landfill (named the Post South Central Landfill), one non-putrescible (non-sanitary) landfill, and two inert materials landfills. The Post South Central Landfill is one of four landfills in the state of Georgia allowed to operate without the liner required for all new landfills (40 CFR 258.40). As a permitted facility, the Post South Central Landfill must meet closure and Post-closure requirements in accordance with the requirements of 40 CFR 258.60 and Chapter 391-34, Rules of the GA EPD. The Post South Central Landfill has been used for solid waste disposal since the 1940s. The Post South Central Landfill is operated under Permit No. 089-010D (SL), issued by the state of Georgia in 1982. The current waste stream includes municipal solid waste generated from on Post activities and tenants. The remaining capacity report sent to GA EPD has concluded that the Post South Central Landfill will be able to receive wastes for 25.6 years or until 2034. The landfill received 23,868 tons in FY01 and recycled 17%. In FY09, Fort Stewart disposed of 11,285.25 tons and recycled more than 40%, showing that Fort Stewart is generating less waste and recycling more.

The non-putrescible landfill (used for inert wastes and in the past C&D waste) is operated under Permit No. 089-020D (L), also issued by the state of Georgia in 1982. The remaining capacity report for the non-putrescible landfill estimated that this landfill had 40 years remaining and would be able to receive wastes until 2049. Although this landfill was used for the disposal of C&D wastes, today all C&D debris is taken to off Post landfills. Waste generated from construction, demolition, and renovation contracts are disposed of off Fort Stewart in a permitted disposal facility and in accordance with Federal, state, and local rules and regulations unless otherwise stated in the contract.

3.11.5 Corrective Action Sites

The RCRA Corrective Action Program covers cleanup of releases of hazardous waste and hazardous constituents from Solid Waste Management Units (SWMUs) or AOCs. AOC means any area having a known or suspected release of hazardous waste or hazardous constituents that

is not from a SWMU, and it is determined to pose a current or potential threat to human health or the environment. An AOC may include buildings, structures, and other locations at which releases of hazardous waste or constituents have not been remediated, including releases resulting from one-time and accidental events. Under this program, any facility applying for a RCRA Part B permit will be subject to a RCRA Facility Assessment. A RCRA Facility Assessment is used to identify SWMUs, collect existing contaminant release information, and identify known or suspected releases at SWMUs requiring further information. Thirty-nine SWMUs have been identified on Fort Stewart, and currently there are nine SWMUs and eight AOCs at Fort Stewart that have active corrective actions. Types of these units include former landfills, USTs, explosive ordnance disposal areas, unexploded ordnances, discarded munitions, oil/water separators, firefighting training areas, former training ranges, and petroleum releases.

3.11.6 Installation Restoration Program

The Installation Restoration Program is a DoD program designed to identify, characterize, and remediate the environmental contamination on military Installations. The program was implemented in response to CERCLA requirements to remediate sites posing a health threat. The Installation Restoration Program provides management for the identification, investigation, and cleanup of areas contaminated at Fort Stewart. A RCRA Facility Assessment of Fort Stewart conducted in 1997 identified 38 SWMUs (associated with 22 motor pool sites). Since then Fort Stewart has continued to investigate and cleanup sites warranting further action, including numerous voluntary cleanup actions and groundwater monitoring and soil borings to document the presence or absence of contaminants. Remedial work plans were developed outlining the best procedures for cleanup at sites, and Fort Stewart has received NFA rulings on sites at which cleanup actions were performed. Restoration activities occur according to a site's relative risk and restoration activities will either (a) clean the site up to a lower relative risk category or (b) have remedial systems in place for

- 50% of identified high relative risk sites by the end of FY02,
- 100% of identified high relative risk sites by the end of FY07,
- 100% of identified medium relative risk sites by the end of FY11, and
- 100% of identified low relative risk sites by the end of FY14.

3.12 SOCIOECONOMICS

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Economic activity typically encompasses employment, personal income, and industrial growth, but the socioeconomic analysis takes a broader look at how the potentially affected population lives, works, plays, relates to one another, organizes to meet its needs, and generally functions as a society. The affected environment for socioeconomics is the area in which the principal effects arising from implementation of the proposed action or alternatives are likely to occur. The affected environment for this analysis includes Fort Stewart, its surrounding communities (such as Hinesville), and Liberty County; impacts may be felt to a lesser extent in Tattnall, Bryan, Long, and Evans counties because of their distance from the main Garrison area and rural nature.

3.12.1 Population Demographics

A Command Data Summary (CDS) is periodically compiled by Fort Stewart's Directorate of Resource Management (DRM) for Fort Stewart. Unless otherwise stated, information and data in this section of the EIS is summarized from the September 2009 Fort Stewart CDS, the 2009 U.S. Census, or the Hinesville Area Metropolitan Planning Organization (HAMPO) *2030 Long Range Transportation Plan*. Note: because no significant impacts are predicted to HAAF as a result of the proposed action and its alternatives, it is not discussed in detail in this EIS. Information in this section is representative of Fort Stewart only.

Fort Stewart's population is an essential element of the demography and economy of the counties in which Fort Stewart is either physically located (in Liberty and Bryan Counties) or closely associated with (Evans, Long, and Tattnall Counties), hereafter referred to as the "study area" in the remainder of this section. Table 3-14 shows the population trends for these counties, in addition to 2015 population projections. Population numbers of Bryan, Evans, Long, and Tattnall counties are steadily increasing; the population of Liberty County is the only decrease in

population, but is minor at 5%. These trends are consistent with the state of Georgia population, also indicated below, which has grown at a steady rate of 18% between 200-2008.

Table 3-14: Population Trends 2000-2015.

County	2000	2008	Projected 2015	Percent Change 2000 - 2008
Bryan	23,417	31,173	38,746	33% increase
Evans	10,495	11,646	14,905	11% increase
Liberty	61,610	58,491	54,197	5 % decrease
Long	10,304	11,452	12,729	11% increase
Tattnall	22,305	23,469	23,549	5 % increase
Georgia	***8,186,453***	***9,685,744***	***10,813,573***	***18% increase***

Source: Fort Stewart, October 2008; US Census, 2009.
NA = Not available

According to the HAMPO, the study area has experienced predominantly growth, due to military growth associated with Fort Stewart (and retirees settling in the study area), suburbanization, and people moving here from other parts of the country. Both HAMPO and the Coastal Georgia Regional Development Center anticipate growth in Bryan, Evans, Long, and Tattnall counties by 2015. Conflicting data exists for Liberty County, however, which is expected to decrease according to Coastal Georgia Regional Development Center and increase according to HAMPO. No projections were available from the U.S. Census to clarify this discrepancy.

Census data on the 2008 racial and ethnic makeup of the study area and state of Georgia are summarized in Table 3-15. The white and black populations of Evans and Tattnall Counties are most proportionate to Georgia as a whole. Bryan County has the largest percentage white population and the smallest black population of the entire study area. The white and black populations of Liberty County are proportionate to one another. People of Hispanic origin are more numerous in Evans and Tattnall Counties. Other census data for persons indicating more than one race, Asian, American Indian or native Alaskan, and other ethnicities are not indicated on the chart, as they are less than 1% of the county's population.

Table 3-15: Race and Ethnicity 2008 (Percent).

County	White	Black	Hispanic or Latino
Bryan	78	15	3
Evans	58	32	11
Liberty	47	43	7
Long	64	25	9
Tattnall	59	28	12
Georgia	***58***	***30***	***8***

Source: US Census, 2009.

3.12.2 Economic Development

In 2009, Fort Stewart contributed approximately $1.4 billion to the local economy, of which $1,187,395,200 was for gross pay to its military employees, $197,155,100 to civilian employees, $146,200 to retirees, and $111,000 on contracts. In addition, Fort Stewart was responsible for $9,000 of school impact funds. Median household and family incomes for the study area and state of Georgia, as well as percentages of people living below the poverty level, as reported from the 2008 Census, are in Table 3-16. Median household and family incomes in Bryan and Liberty Counties were the highest in the study area, but only Bryan County household earnings were more than state levels in 2008; Evans and Tattnall counties had the lowest median household incomes. Tattnall County had the greatest percentage of individuals living below the poverty level.

Table 3-16: Income and Poverty.

County	2008			
	# of Household per County	Persons per Household	Median Family Income	Persons Below Poverty Level
Bryan	8,089	2.88	$60,879	10%
Evans	3,778	2.62	$34,526	23%
Liberty	19,383	2.93	$40,993	18%
Long	3,574	2.88	$37,334	21%
Tattnall	7,057	2.60	$33,003	26%
Georgia	***3,006,369***	***2.65***	***$49,080***	***14%***

Source: US Census, 2009.

No county-by-county unemployment data was available; however, per the Georgia Department of Labor, the following data applies to the Hinesville-Fort Stewart Metropolitan Statistical Area (MSA), as of November 2009. Of the civilian labor force of 32,117, there were 2,425 persons unemployed, for an unemployment rate of 7.6%. This represents an increase in the unemployment levels of the MSA, which had an unemployment rate of 6.3 in November 2008.

3.12.3 Housing

Per the 2009 CDS, the number of Soldiers who work and train on Fort Stewart lands has risen from approximately 13,000 Soldiers in 1980 to 18,000 in 2009. In addition, approximately 9,300 Army National Guard and Reserve Soldiers per year conduct mobilization training on Fort Stewart. The 2009 CDS indicates approximately 6,500 Soldiers' Family members live on Post and approximately 20,000 live off Post. In addition, an estimated 37,800 retired military personnel and their Family members live within a 50-mile radius of Fort Stewart. Residents who lived on Post included 4,174 military personnel in barracks. About 12,318 military personnel live off Post, the majority of whom live in Hinesville (52 %) followed by Richmond Hill (13%). According to the HAMPO, the increase in population and military growth has led to increased demand for housing. Household size decreased slightly in Liberty County (in which Hinesville and portions of Fort Stewart are located) from 3.84 people in 1980 to 2.93 people in 2008, but the number of households substantially increased from 3,969 in 1980 to 19,383 in 2008.

3.12.4 Education

On Post DA schools include Brittin Elementary and Diamond Elementary, both of which educate students in kindergarten through sixth grade who live on Post. Fort Stewart sends 300 seventh and eighth grade students off Post to Midway Middle School; in addition, 100 children from Liberty County in grades six through eight attend this school. Midway Middle School is about 10 miles away from Fort Stewart and Hinesville, creating a long commute for military students and parents. In response to these issues, the Liberty County Board of Education (LCBOE) will construct a new middle school on Post. This will accommodate approximately 750 seventh and eighth grade students within Fort Stewart and Liberty County, with the potential to expand to

1,000. It will be constructed on Fort Stewart, but funded, operated, and maintained by the LCBOE (Fort Stewart, October 2008). Fort Stewart is also construction one additional new elementary school, two child development centers (one for ages birth-five years; one for ages six to 10), and one youth activity center (for all ages' use). All high school-aged students attend schools off Post in the neighboring counties.

The U.S. Department of Education administers the Federal Impact Aid program, which was established in 1950 to assist local school districts that have lost property tax revenue from the presence of tax-exempt Federal property, such as Fort Stewart, or that have experienced increased expenditures from the enrollment of Federally connected children (including children living on Indian lands). The Impact Aid Law (now Title VIII of the Elementary and Secondary Education Act of 1996) provides assistance to local school districts with concentrations of children living on Indian lands, military bases, low-rent housing properties, or other Federal properties and, to a lesser extent, concentrations of children who have parents in the uniformed services or employed on eligible Federal properties who do not live on Federal property. The Impact Aid law refers to local school districts as local educational agencies.

To receive basic support payments, a school district must conduct a student survey each year to identify the number of Federal children it is enrolling. The school district then completes the impact aid application and submits it directly to the U.S. Department of Education. According to the 2009 CDS report, 688 students were educated on Post and 2,760 off Post in Liberty County, 630 in Long County, and 1,075 in Bryan County. No Fort Stewart children were educated off Post in Tattnall or Evans Counties. This resulted in Federal School Impact Aid funds totaling nearly $11.3 million for FY09 (Table 3-17) going into the area school systems.

Table 3-17: Student Population and Federal School Impact Aid Funds.

County	School Attended		Federal School Impact Aid Funds ($)
	On Post	Off Post	
Liberty	688	2,760	$10,811,270.75
Long	0	630	$74,002.13
Tattnall	0	0	0
Evans	0	0	0
Bryan	0	1,075	$392,366
Total	***948***	***5,102***	***$11,277,638.88***

Source: Fort Stewart, October 2008

3.12.5 Quality of Life

Quality of life pertains to both necessities and amenities a population may have at its disposal. Elements typically considered when evaluating the quality of life at military Installations include

- Availability of quality housing,
- Type of housing (homeowner or rental),
- Cost of housing,
- Number and types of schools,
- Available personnel services,
- Health care,
- Community services,
- Family support services,
- Quality manmade and natural environment,
- Recreational opportunities, and
- Availability and proximity to shopping centers.

These aspects of the quality of life at Fort Stewart are discussed in other sections of this EIS, and this topic was included here to collectively refer to discrete and overlapping elements that contribute to the well being of Soldiers and their Families.

3.12.6 Environmental Justice

Environmental justice analysis is prescribed by EO 12898, "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations," issued in 1994. This policy directive to Federal agencies outlines appropriate and necessary steps to identify and address disproportionately high and adverse effects of Federal projects on the health or environment of minority and low-income populations to the greatest extent possible. The existence of disproportionately high and adverse impacts depends on the nature and magnitude of the effects identified for each of the individual resources. Because the proposed action and alternatives are found within Post boundaries, and no disproportionately high low-income or minority populations are found adjacent to or near the proposed action alternatives, there are no environmental justice impacts. No construction projects, operations, or maintenance activities associated with the proposed action and alternatives would disproportionately impact low-income or minority populations. Therefore, environmental justice was not evaluated further in this EIS.

3.12.7 Protection of Children

EO 13045, "Protection of Children from Environmental Health Risks and Safety Risks," requires each Federal agency to identify and assess environmental health and safety risks that may disproportionately affect children and pose a disproportionate environmental health or safety risk to children. Environmental and safety risks are those that are attributable to products or substances a child is likely to come into contact with or ingest. None of the alternatives would affect children because construction activities would follow Federal and state safety and health regulations, and operations and maintenance activities would occur in areas zoned for such purposes (such as industrial and training areas). These areas are designed for such operations and would not pose environmental health or safety risks to children. Therefore, protection of children was not evaluated further in this EIS.

3.12.8 Provisions for the Handicapped

The Americans with Disabilities Act guarantees equal opportunity for individuals with disabilities in public accommodations, employment, transportation, state and local government services, and telecommunications. Construction, operation, or maintenance associated with the M&MP facilities would conform to and enforce this act and any other Federal and state disability regulations. Therefore, provisions for the handicapped were not evaluated further in this EIS.

4. ENVIRONMENTAL CONSEQUENCES

The Council on Environmental Quality (CEQ) and Army regulations (40 CFR §§ 1500-1508 and 32 CFR Part 651, respectively) for National Environmental Policy Act (NEPA) implementation require an Environmental Impact Statement (EIS) discuss impacts in proportion to their significance and in a manner that is clear, concise, and easily understood by both the public and regulatory agencies with whom Fort Stewart consults. Therefore, the main body of this EIS includes information and analysis sufficient to explain how and why a determination of effect was reached for all of Fort Stewart's environmental and socioeconomic resources, to include air quality, water quality, protected species, wetlands, and others. In many cases, these determinations are based on more detailed analyses, ones too large and/or technical to include in the main body of the EIS. These supporting documents are included as appendices to this EIS and referenced accordingly. If any reader requires a more detailed and technical discussion of any of these resources, they are encouraged to refer to those appendices. Studies, surveys, and other supporting information include the following:

- Transportation Surveys – Fort Stewart utilized information within its Traffic Engineer Study of 2007 and the Hinesville Area Planning Organization's (HAMPO) Transportation Improvement Program for 2010-2013 to determine potential projects of interest to the Fort Stewart infrastructure. The HAMPO operates under the leadership of a Policy Committee, comprised of elected officials and other decision makers from each participating jurisdiction, the Georgia Department of Transportation, and other state and Federal agencies, such as Fort Stewart. Participation in this process provides an early insight into what the neighboring community of Hinesville is planning, to include transportation improvements, development of biking and pedestrian corridors within existing and future road systems, and other similar projects. This information was used to develop the analysis presented in Section 4.8, Infrastructure, which discusses transportation. Both documents are available for review in Appendix F.
- Noise – Fort Stewart submitted its training data and other relevant information to U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) detailing current and future rounds fired on Fort Stewart; this information was used to generate noise contours which are presented in Section 4.6, Noise, as well as in Appendix I.

- Air Quality – Emissions generated from training, construction, operation, and maintenance, and ongoing day-to-day operations on Fort Stewart are routinely captured in databases managed by Fort Stewart's Air Quality program manager. Recent studies include an Air Emission Inventory, Greenhouse Gas Emission Inventory, and Prevention of Significant Deterioration Analysis. Results of these database compilations studies are summarized in Section 4.2, Air Quality. These studies are available for review in Appendix G.
- Wetlands Assessment –Wetlands delineations and the National Wetlands Inventory were used to determine potential impacts in this EIS. The U.S. Corps of Engineers Regulatory Branch-Savannah District (USACE) is a Cooperating Agency in this EIS and contributed to its development by providing watershed data and guidance in preparing the cumulative impact analysis for wetlands. The backup documentation for all projects at a sufficient level of design and with the potential to impact wetlands on Fort Stewart are available for review in Appendix D. Pertinent information is extracted and discussed in Section 4.3.2, Wetlands.
- Protected Species Surveys–surveys of Fort Stewart's population of Federally protected red-cockaded woodpecker, frosted flatwoods salamander, indigo snake, wood stork, and shortnose sturgeon, as well as for the state-protected gopher tortoise, are routinely conducted for a variety of reasons, to include compliance with the INRMP and in support of pending construction, operation, and maintenance projects. Results of these surveys are summarized in the Section 4.4.2, Protected Species. The Fort Stewart Fish and Wildlife Branch (FWB) prepared a Biological Assessment (BA), as well as two modifications to the BA, and submitted it to the U.S. Fish and Wildlife Service (USFWS), initiating formal consultation with them regarding the actions proposed in this EIS. The BA, its modifications, and the USFWS' Biological Opinion are available for review in Appendix B.
- Cultural Resource Management Surveys –surveys were previously conducted for most of the areas proposed for construction, operation, and maintenance. Results are presented in Section 4.5, Cultural Resources. Formal consultation with the Georgia State Historic Preservation Office (SHPO) and the Native American Tribes with whom Fort Stewart consults is complete and available for review in Appendix C. The attachments to the

consultation letters contain sensitive information on archaeological sites and are neither in this Final EIS nor distributed to the public in accordance with Section 9 of the Archaeological Resource Protection Act (ARPA) and Section 304 of the National Historic Preservation Act (NHPA).

Impact Methodology: The impact analysis process requires collecting scientifically valid and up-to-date information. Data collection involves reviewing previous studies (technical publications, agency databases, management plans, other NEPA documents), talking to agencies with information and/or jurisdiction on specific resources (USFWS, USACE, Georgia Department of Natural Resources, Georgia State Historic Preservation Office, American Indian Tribal representatives, community planners), and reviewing input received during the scoping process.

Existing management plans and procedures (as specified in each resource analysis), as well as local, state, and Federal requirements are not considered specific proposed mitigation measures because they are already included as part of the existing management regime, and will be undertaken regardless of the level of impacts. These ongoing management regimes are part of the proposed action and described under the affected environment and/or environmental consequences for the specific resources. Proposed mitigation for potential adverse impacts is also discussed, and per the Army NEPA Regulation and 40 CFR 1508.20, may include avoidance of effect; minimization of effect; repair, rehabilitation, or restoration of effect; reduction of effect; and/or compensation for effect.

Threshold Levels of Significance: To maintain consistent and defensible evaluation of impacts in the EIS, thresholds of concern were used for each resource. Fort Stewart resource specialists and NEPA staff developed these thresholds in coordination and consultation with stakeholder agencies. Although some thresholds have been so designated based on legal or regulatory limits or requirements, others reflect discretionary judgment and best management practices (BMPs) on the part of the Army in accomplishing their primary mission of military readiness, while also fulfilling their conservation stewardship responsibilities. Quantitative and qualitative analyses are used, if appropriate, in determining whether, and the extent to which, a threshold is exceeded.

Based in part on the results of this analysis, preparers of the EIS determined whether a particular impact would be negligible, minor, moderate, or significant. Thresholds levels of significance (TLS) and each environmental resource's region of influence (ROI) are presented in Table 4-1. The following terms are addressed throughout this EIS as a convention to indicate the relative degree of severity of predicted impacts:

- Negligible. The term used to indicate an environmental impact may occur, but would be less than minor and might not be perceptible.
- Minor. The term used to indicate an environmental impact that clearly would not be significant.
- Moderate. The term used to indicate an environmental impact that is not significant, but is readily apparent. Examples include cases as described in Table 4-1, where the predicted consequences of implementing an action suggest the need for additional care in following standard procedures, employing BMPs, or applying precautionary measures to minimize adverse impacts; or where there is some uncertainty inherent in whether the impacts forecasted by a predictive model would occur.
- Significant. A measure, in terms of the degree of severity of the environmental impact reflecting the context and intensity of the impact, as defined in CEQ Regulations (40 CFR§1508.27).

Somewhat different terms are used to describe the level of potential effects on threatened and endangered species in accordance with Section 7 of the Endangered Species Act (ESA). The determination of the level of effects of the proposed actions on threatened and endangered species reflect USFWS Guidance as follows:

- No Effect. The term used to indicate that no long- or short-term effects are expected.

Table 4-1: Regions of Influence and Threshold Levels of Significance.[1]

Areas of Concerns	ROI	TLS
Soils	Soils within and directly adjacent to Installation boundary	• Ground disturbance that violates applicable Federal, state, or local laws and regulations (such as the Georgia Erosion and Sedimentation Act) • Ground disturbance that results in Notices of Violation (NOVs), such as failure to obtain required permits
Air Quality	Airshed within Installation boundary and five counties in which it lies	• Violation of applicable Federal or state laws and regulations, such as the Clean Air Act • Potential for any new *stationary* source (i.e., a specific facility) to be considered a major source of emissions • Potential for an action to cause a violation of a National Ambient Air Quality Standard
Water Resources - streams, stormwater systems, floodplains	Water sources within the four Fort Stewart watersheds	• Actions causing long-term impacts (chemical, physical, or biological effects) that would alter the historical baseline or standard water quality conditions • Actions adversely impacting a water body currently considered impaired under the Clean Water Act (CWA)
Water Resources - Wetlands	Wetlands within the four Fort Stewart watersheds	• The TLS for wetlands occurs if the CWA is violated, such as failing to obtain a Section 404 Permit for fill of wetlands.
Biological Resources - Wildlife	Species habitat or migratory range within Fort Stewart's boundary	• Any action that violates applicable Federal laws, such as the Migratory Bird Treaty Act (MBTA) or Army regulations
Biological Resources – Protected Species	Habitat within Fort Stewart's boundary	• Any action that disrupts normal behavioral patterns or disturbs habitat at a level that substantially impedes Fort Stewart's ability to either avoid jeopardy or conserve and recover the species
Biological Resources – Forestry Management	Forest resources within Installation boundary	• Use of weapons with a potential for causing timber damage and metal contamination in previously uncontaminated areas • Substantial acreage removed from timber management for other uses • Proposed activities precluding or restricting access for management of timber resources

Table 4-1: Regions of Influence and Threshold Levels of Significance[1] (continued).

Areas of Concerns	ROI	TLS
Biological Resources – Wildland Fire Management	Forest resources within Installation boundary	• Use of weapons with a potential of causing wildfires • Occurrence of activities in areas with higher fuel loads • Occurrence of training during high fire danger days • Proximity of sites to smoke sensitive areas • Activities that preclude or restrict access for wildland fire management.
Cultural Resources	Cultural Resources within Fort Stewart's boundary	• Violation of applicable Federal laws and regulations, such as the National Historic Preservation Act and Archeological Resources Protection Act
Noise	Lands within and directly adjacent to Fort Stewart's boundary	• If noise (during construction, operation, and maintenance) would exceed the noise limit guidelines published in AR 200-1, Chapter 14 (2007) by having Zone III levels impacting noise-sensitive receptors.
Land Use	Lands within and directly adjacent to Fort Stewart's boundary	• Incompatibility with surrounding land uses • Changes land uses in such a way that mission-essential training is degraded • Inconsistency or conflict with the environmental goals, objectives, or guidelines of a community or county comprehensive plan for the affected area.
Infrastructure (utilities and transportation)	Infrastructure within Fort Stewart's boundary	Utilities • Potential for change in demand that would adversely affect the ability of a utility provider to service existing customers • Ability of utility provider to accommodate additional demand created by the proposed action. Transportation • Changes to traffic patterns that would cause a drop in level of service or that would cause an intersection to fail.
Safety	Lands within and directly adjacent to Fort Stewart's boundary	• Surface Danger Zone (SDZ) of a range extending off Fort Stewart • Violation of Occupational Safety and Health Administration Act (OSHA) standards • Unauthorized access to construction sites

Table 4-1: Regions of Influence and Threshold Levels of Significance[1] (continued).

Areas of Concerns	ROI	TLS
Hazardous and Toxic Materials and/or Wastes	Lands within Fort Stewart's boundary	• Cause a spill or release of a hazardous substance • Expose the environment or public to any hazardous or harmful substance through release or disposal • Increase the risk of accident or release from existing or proposed vehicles, equipment, procedures, or training practices • Impact the existing capacity of a landfill • Increase amounts of stored hazardous materials/wastes to the point of noncompliance with Federal, state, or local environmental regulations • Cause the amount of hazardous materials/waste to exceed the capacity of satellite accumulation points or other authorized repositories • Subject personnel or members of the public to unsafe levels of radiation • Result in noncompliance with established radiation exposure limits • Cause a release of pesticides or potentially expose military personnel or the public to pesticides • Expose military personnel or the public to PCBs • Cause a spill or release of petroleum-based products
Socioeconomics	The Installation and the five counties within which it lies	• Unusual population growth or reduction • Unusual decrease or increase in demands on housing and public services • Potential to increase/decrease employment opportunities substantially.

1. Although some thresholds have been so designated based on legal or regulatory limits or requirements, others reflect discretionary judgment and BMPs on the part of the Army accomplishing its primary mission of military readiness, while also fulfilling its conservation stewardship responsibilities. Quantitative/qualitative analyses may be used, if appropriate, in determining whether, and the extent to which, a threshold is exceeded.

- Discountable. The term used to indicate that effects would be extremely unlikely to occur, or would be insignificant (the size of the impact should never reach the scale where "take" occurs) or completely beneficial. "Take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct," and includes habitat modification and the impairment of essential behavioral patterns (e.g., breeding, feeding, sheltering). It should be noted that "discountable" as used herein is an aggregation of the three affect levels (discountable, insignificant, and

completely beneficial) defined by the USFWS upon which a conclusion of "is not likely to affect" is made.

- Not likely to adversely affect. Effects are beneficial, insignificant, or discountable.
- Adverse-individual. The term used to indicate that effects would be likely to affect individuals adversely, but not significantly affect populations.
- Adverse-population. The term used to indicate that effects would be likely to affect the population adversely.

Different terms are also used to describe potential impacts to cultural resources. The ROI for cultural resources is referred to as the "Area of Potential Effect" (APE), consistent with NHPA Section 106 review. During Section 106 review, the Army, in consultation with the SHPO, makes an assessment of adverse effects on the identified cultural resources based on criteria found in Advisory Council on Historic Preservation's regulations. The determination typically results in a "no adverse effect" or an "adverse effect."

Environmental Consequences. This EIS considers potential environmental effects on numerous resource areas and conditions within the ROI. Table 4-2 presents a summary of the environmental and socioeconomic consequences of the construction, operations, and maintenance associated with the alternatives analyzed in this EIS, as well impacts associated with the No Action/Status Quo alternative. Mitigation measures are proposed for those resource areas that would have the potential for unavoidable significant adverse environmental impacts. A brief summary of these impacts, by resource area of concern, follows.

Table 4-2: Summary of Environmental Effects.

Type and Intensity of Impact ○ = negligible ⊙= minor adverse ◎ = moderate adverse ● = significant adverse ✪ = beneficial			
Type of Effect	**Alternative A (No Action){xe "Alternative 1"}**	**Alternative B (Preferred){xe "Alternative 2"}**	**Alternative C {xe "Alternative 3"}{xe "No Action Alternative"}**
Soils & Geology{xe "Land Use"}			
Direct / Indirect	⊙	◎	◎
Cumulative	○ to ⊙	◎	◎
Air Quality{xe "Airspace"}			
Direct / Indirect	○	⊙	⊙
Cumulative	○ to ⊙	⊙	⊙
Water Quality & Resources (Streams, Stormwater, Floodplains)**{xe "Air Quality"}**			
Direct / Indirect	⊙	⊙	◎
Cumulative	⊙	◎	◎
Water Quality & Resources (Wetlands)**{xe "Noise"}**			
Direct / Indirect	○ to ⊙	⊙	◎
Cumulative	⊙	⊙ to ◎	◎
Biological Resources (Wildlife and Fisheries)			
Direct / Indirect	○	⊙	⊙
Cumulative	⊙	⊙	⊙
Biological Resources (Protected Species)			
Direct / Indirect	○	◎	◎
Cumulative	⊙	⊙	⊙
Biological Resources (Timber Resource Management)**{**xe "wetlands"**}**			
Direct / Indirect	○	⊙	⊙
Cumulative	⊙	◎	◎
Biological Resources (Wildland Fire Management)			
Direct / Indirect	○	⊙	⊙
Cumulative	⊙	◎	◎

Table 4-2: Summary of Environmental Effects (continued).

Type and Intensity of Impact ○ = negligible ⊙= minor adverse ◎ = moderate adverse ● = significant adverse ✪ = beneficial			
Cultural Resources			
Direct / Indirect	○	⊙	⊙
Cumulative	○	○	○
Noise			
Direct / Indirect	○	⊙	◎
Cumulative	⊙	◎	◎
Land Use{xe "Cultural Resources"}			
Direct / Indirect	○	⊙	⊙
Cumulative	○ to ⊙	⊙	⊙
Infrastructure (Utilities) **{**xe "Environmental Justice"**}**			
Direct / Indirect	○	⊙	⊙
Cumulative	○ to ⊙	○ to ⊙	○ to ⊙
Infrastructure (Transportation)			
Direct / Indirect	○	○	○
Cumulative	○ to ⊙	○ to ⊙	○ to ⊙
Safety			
Direct / Indirect	○	○	○
Cumulative	None	None	None
Hazardous & Toxic Materials and/or Wastes {xe "Hazardous and Toxic Substances"}			
Direct / Indirect	○	○	○
Cumulative	None	None	None
Socioeconomics			
Direct / Indirect	○	✪	✪
Cumulative	○	○	○

4.1 GEOLOGY AND SOILS

The TLS for geology and soil resources on Fort Stewart occurs if (a) ground disturbance violates applicable Federal, state, and/or local laws and regulations (such as the Georgia Erosion and Sedimentation Act) or (b) result in Notices of Violation (NOVs) (such as failure to receive

applicable permits). Preliminary analysis predicts impacts to soils, but no impacts to geologic or topographic conditions from any of the alternatives; therefore, geology and topography are not discussed further in this chapter. All personnel abide by Fort Stewart's Hazardous Materials Management Plan, Spill Response Plan, and others, as applicable, to prevent and/or minimize release from POLs or other hazardous materials into ground surfaces. In addition, training area inspectors (from the Installation's Environmental Division, Integrated Training Area Management team, and Range Control Division) routinely inspect the construction sites to ensure projects meet all erosion control measures. The Installation has a resident Natural Resource Conservation Service (NRCS) advisor who provides technical expertise during preparation of ESPCPs prior to the Installation approving the final design. During this process, the Installation's stormwater specialist and NRCS advisor review ESPCPs for compliance with the GA ESCA and the CWA. These technical experts continually inspect and monitor on-going construction projects to assure compliance and that BMP's are being maintained.

4.1.1 Alternative A: No Action

Overall, this alternative will have minor adverse effects to soils. The Installation will continue its infantry and mechanized training, to include impacts to soils from removal of or damage to vegetation, digging activities, ground disturbance from vehicles, and ammunition or explosives used in training events. Military training inherently causes reduced vegetative presence and cover, soil erosion, and sedimentation in the forest landscape downstream from the erosion site. They decrease the amount of available area usable for training and can thereby reducing training time, realism, maneuverability, and safety.

The Fort Stewart Integrated Training Area Management (ITAM) program continually monitors these training lands for disturbance and focuses most specifically on areas of high use such as drop zones, artillery firing positions, observation points, etc. Once the ITAM personnel identify damages, they plan and implement rehabilitation and erosion control measures on the training lands, to sustain the environment and mission use of these training lands (Brown, personal communication, 2009). This is true for routine maintenance of the lands, as well. The Directorate of Planning, Training, Mobilization, and Security (DPTMS) conducts monitoring, rehabilitation, and maintenance/repair of lands within range footprints. Standard policy is for

every 21 total days (consecutive or not) a range is in use, it is closed for one full day of maintenance. Maintenance consists of target replacement, targetry maintenance (batteries and/or electrical components), repairs to berms, erosion control measures, and others as needed (Griggs, personal communication, 2009).

Training vehicles may leak or spill petroleum-oil-lubricant-based (POLs) products on the soils during training events, resulting in potential soil contamination. These vehicles, however, are required to have drips pans underneath when parked to minimize the potential for contamination from POL spills. Military units are also required to utilize secondary containment for the storage of hazardous materials/wastes and during refueling operations and routine vehicle maintenance. A spill response protocol has been established Post-wide and personnel on the ranges and in the training areas have adequate spill response supplies on hand.

Prevention of erosion of soils resulting from currently authorized construction, operation, and maintenance projects is a major component of Fort Stewart's environmental programs, as discussed in Section 3.2.2, Soils. The Installation ensures compliance with the Georgia (GA) Water Quality Act (WQA) and GA Erosion Sedimentation Control Act (ESCA) on all projects, including minor maintenance and facility construction, operation, and maintenance for which NEPA is complete. This requires implementation of an Erosion and Sedimentation Pollution Control Plan (ESPC Plan), payment of associated fees per disturbed acre to the GA DNR, filing a Notice of Intent (NOI) package, and obtaining the National Pollutant Discharge Elimination System (NPDES) Permit. Installation personnel assist to ensure these plans and permits are technically sufficient and meet all Installation policies and protocols, as well as Federal and state of Georgia requirements. They also ensure all permit-required best management practices (BMPs) are followed throughout the entirety of the project. Short-term minor adverse effects to soils may occur as part of the ongoing road improvements, as discussed in Section 3.9.5, Transportation. These projects are small, often less than half an acre, and occur at previously disturbed locations (existing roads); therefore, no long-term effects are predicted.

Borrow pits are routinely utilized for the forestry, construction, operation, maintenance, and range projects in accordance with the Fort Stewart Borrow Pit Management Plan and all local,

state, and Federal rules, laws, and/or regulations. The borrow pit manager is also engaged in the observation and routine inspection of Fort Stewart's borrow pits to ensure these measures are followed, as discussed in Section 3.2.3, Borrow Pits.

4.1.2 Alternative B Siting (Preferred)

Overall, this alternative would result in moderate adverse effect to soils, with effects reduced by implementation of appropriate BMPs, erosion control measures, and adherence to all permits, plans, and applicable regulations and guidelines. These are summarized in the discussion below, per alternative.

4.1.2.1 Range Construction

These projects would result in moderate adverse effects to soils. Although a considerable amount of material will be removed from Installation borrow pits to accommodate these projects, impacts are not significant, due to the abundance of fill materials on Post. The implementation of NPDES and timber harvest BMPs will also help minimize impacts to soils during construction. Petroleum, oils, and lubricants (POLs) are used in the equipment for timber harvest, vegetative clearing, and construction, as well as during operations (training) and periodic maintenance activities at the ranges, once constructed.

Fort Stewart has more than 60 borrow pits distributed throughout Fort Stewart. Combined, these pits have an adequate amount of fill material to satisfy these projects' needs. Measured in cubic yards (CY), the volume of fill material needed for each of these projects differs, ranging from 50,000 CY (Multipurpose Machine Gun Range) to none (Combat Pistol Qualification Course) (see Table 4-3). Borrow materials will come from the nearest pits on Post, to reduce time and money spent hauling materials from the pit to the construction, operation, and maintenance site.

Table 4-3: Borrow Pit Requirement for Range Construction.

Purpose	FY	Fill Amount (CY)
Multipurpose Machine Gun Range (MPMGR)	11	50,100
Modified Record Fire Range (MRFR)	11	340
Infantry Platoon Battle Course (IPBC)	11	6,883
Digital Multipurpose Training Range (DMPTR)	13	17,600
Modified Record Fire Range (MRFR)	13	5,060
Combat Pistol Qualification Course (CPQC)	13	0
Qualification Training Range (QTR)	13	23,300
Known Distance Range (KDR)	13	3,840
Infantry Squad Battle Course (ISBC)	13	12,580
Fire and Movement Range (FMR)	13	40,890
Basic 10m/25m Zero Firing Range	13	10,715
Convoy Live Fire Range (CLFR)	14	6,910

Source: Coursey, 2009

4.1.2.2 Garrison Construction

Construction, operation, and maintenance of these two facilities will result in minor adverse effects to soils. Timber harvest and construction, operation, and maintenance will disturb soils at the Alternative B location for the Unmanned Aerial Vehicle System (UAVS) Facilities and Engineer Battalion (EN BN) Facilities. Timber harvest and construction would occur as discussed in Chapter 3. Borrow pit requirements for each project are listed in Table 4-4, below. These numbers are approximations based on standard designs and may be slightly adjusted during the subsequent design phases for each project. Borrow materials for these projects will also come from the nearest pits on Post.

Table 4-4: Borrow Pit Requirement for Garrison Construction.

Project	FY	Fill Material (CY)
UAVS Facilities	11	20,000
EN BN Facilities	11	0

Source: Coursey, 2009

4.1.3 Alternative C Siting

This alternative would result in moderate adverse effects to soils on the Installation, when combining the effects from range and Garrison construction, operation, and maintenance projects. They would be similar in magnitude and nature as those discussed under Alternative B, differing only in the physical location and, for some projects, possibly the amount of fill required per range. Exact fill amounts will not be available until each project is further along in the design process. Fill requirements in the tables for these projects is an estimate based on the real property master planning process. This process also utilizes information from Training Circular 25-8, which contains the standard information and requirements for each Army range, to estimate fill requirements. This difference in estimated versus real fill requirements would be related to the topography, amount of wetlands needing filling, and other site-specific, unique features for each alternate project location. For example, the soil elevation at one alternative location may require less fill to accomplish an even construction, operation, and maintenance site, etc.

4.2 AIR QUALITY

The TLS for air quality impacts is the violation of applicable Federal or state laws and regulations, such as the Clean Air Act (CAA), the potential for any new *stationary* source (i.e., a specific facility) to be considered a major source of emissions, and the potential for an action to cause a violation of National Ambient Air Quality Standards (NAAQS). The assessment of impacts to air quality are based on comparing existing use and conditions to proposed changes associated with the alternatives, as well as to Federal and state of Georgia standards. The analysis compares current air emissions with anticipated future emissions, including construction, operation, and maintenance to determine potential impacts.

4.2.1 Alternative A: No-Action

Overall, this alternative will have negligible adverse effects to air quality. Fort Stewart's emission rates for the six NAAQS criteria pollutants are all below established regulatory limits. Although there would continue to be minor short- and long-term fugitive dust impacts from

training, these impacts would not exceed threshold levels; therefore, a conformity determination is not required.

Fort Stewart's ongoing training, resource management, construction, operations, and maintenance activities would continue to generate emissions on a scale similar to that recorded in 2007 and existing air emission sources would be managed as they are now. Permit conditions would be monitored and met, but no changes to emission sources are anticipated, other than those mandated by maintenance, replacement, or elimination of sources as they age or are removed from service.

4.2.2 Alternative B Siting (Preferred)

Overall, this alternative will have minor adverse effects to air quality. Emissions from the construction, operation, and maintenance of the range and Garrison projects have the potential to produce localized, short-term elevated air pollutant concentrations; however, these are not anticipated to have a significant effect on Installation air quality.

The proposed action could result in an increase in greenhouse gases (GHG), both initially and on a long-term basis. Initially, the demolition and construction activity associated with land-clearing, paving, and building will require the use of fuel-burning equipment, which will emit GHG. In addition, traffic from privately-owned vehicles (POV), government-owned vehicles (GOV), and vendor-owned vehicles will contribute to GHG emissions. If the construction sites will have batch-concrete plants, even if they are only temporarily located on-site, there will be further increases in initial GHG emissions. Upon completion of construction work, there will be long-term GHG emissions, including from the following sources:

1. Training activities on the new ranges that involve the use of vehicles such as tanks and trucks.
2. Increased vehicular traffic to and from the new ranges.
3. Fuel-burning support activity (e.g., diesel power generators, auxiliary power units, etc.)
4. Electricity usage at the new ranges.

5. Electricity usage at new buildings, including for administrative use, barracks, and equipment storage.
6. Increased heating needs at administrative buildings, barracks, and other buildings involving human occupancy.
7. Increased vehicular traffic to and from the new buildings, including from POV, GOV, and vendors.

4.2.2.1 Range Construction

These projects will result in minor adverse effects to air quality. The volatile organic compound (VOC), carbon monoxide, NOx, and sulfur dioxide mobile source emissions are generated primarily by diesel-fueled, heavy construction and maintenance equipment, both on training lands and ranges. Fort Stewart's Title V permit explicitly includes Georgia Rules and Regulations [(Chapter 391-3-1.02(2)(n)] for fugitive dust, with a list of possible dust reduction actions to ensure local compliance. Particulate matter emissions (PM10 and PM2.5) arise from fugitive dust created by land disturbance activities, including timber harvest, land clearing, soil excavation, site filling, trenching, grading, construction, and maintenance. Additional sources include tailpipe emissions from personnel's privately owned vehicles (POVs) traveling to and from the range and training lands (such as DPTMS personnel who work on site and drive their POV to the range each day). The fugitive dust emission factor for PM10 (used as part of the PM2.5 calculation) is assumed to include the effects of typical control measures such as routine site watering for dust control. An ESPC Plan is required under the NPDES permit for construction activities, and this plan includes requirements for dust control in disturbed areas.

The Georgia Rules for Air Quality Control Chapter 391-3-1.02(5) do not generally condone open burning of timber and debris on construction sites; however, one exception to the rule allows open burning for the purpose of land clearing. An air curtain destructor (ACD) is a pollution control device that reduces the PM and smoke from burning wooden debris by stalling or slowing down the smoke particles on their way out, causing them to re-burn, further reducing their size to an acceptable limit. The result is a very clean burn with opacities well under 10 on the Ringelmann scale (as compared to open burning which can be 80 to 100 on the Ringelmann

scale). The Installation utilizes an ACD when burning within the Garrison area or adjacent to Fort Stewart's boundary, in order to reduce impacts to Soldiers, their Families, the surrounding communities, and the environment. The use of an air curtain destructor is not required outside of the Garrison area.

As operations and maintenance actions phase in for Alternative B ranges, possible air emissions include the operation and maintenance of additional boilers, the addition of commuter traffic, increased ordnance detonation in training, increased fuel storage and use, and an increase in the number of emergency generators on site. The Installation will evaluate new emission sources for construction, operation, and maintenance/operating permits and for possible inclusion in the Title V permit amendments or modifications.

Some individual heating systems would be required in the range support buildings, the vast majority of which would be small on-site electric or natural gas heating units capable of heating under the mild winter conditions at Fort Stewart. Other potential mobile sources would increase, such as military vehicles training on the ranges and personnel commuting to and from the ranges as their designated work site. Mobile source emissions from military tactical vehicles and equipment are exempt from Georgia vehicle emission regulations and Georgia fugitive dust regulations.

4.2.2.2 Garrison Construction

These projects will result in minor adverse effects to air quality. This construction, operation, and maintenance of the two Garrison facilities would result in less NAAQS, fugitive dust, and PSD as discussed in Section 4.2.2.1, Range Construction, but would be similar in nature (i.e., fugitive dust from land clearing; emissions from new boilers and generators; POL use during facility maintenance; etc.). Minimization and mitigation measures proposed for these impacts would also be as discussed above; however, burning of wooden debris from land clearing activities must utilize an ACD, as its use will be directly adjacent to the Garrison area.

As operations phase-in for Garrison area operations and maintenance, possible air emissions from new boilers, military vehicle use, commuter traffic, and other sources, as discussed under range construction, would also occur, as would potential Title V permit amendments or modifications.

4.2.3 Alternative C Sitings

The potential impacts to air quality under this alternative would not be substantially different from those described for Alternative B, differing only in the physical location. Overall, this alternative will have minor adverse effects to air quality. Emissions from the construction, operation, and maintenance of the range and Garrison projects have the potential to produce localized, short-term elevated air pollutant concentrations; however, these are not anticipated to have a significant effect on Installation air quality.

4.3 WATER QUALITY AND RESOURCES

4.3.1 Stormwater, Surface Water, and Floodplains

The TLS for stormwater, surface water, and floodplains is any long-term impacts (chemical, physical, or biological effects) that would alter the historical baseline or standard water quality conditions. Additionally, adversely impacting a water body currently considered impaired under Section 303(d) of the CWA is considered significant. Section 303(d) of the CWA requires a listing of all impaired surface water in the state for which pollutants limit the beneficial use of the water. Beneficial uses of surface water may include drinking, recreation, aquatic habitat, and industrial use. The CWA, the GA WQA, and GA ESCA each require that erosion and sediment controls be implemented on projects disturbing one or more acres, although Fort Stewart uses a minimum of 0.75 acres as a threshold. No new low water crossings (LWCs) are proposed, as discussed in Section 3.4.4.2, only routine maintenance and repair of existing ones in the range and training areas on Post, resulting in temporary, negligible impacts to water quality and resources. Should any new ones be deemed necessary, the appropriate level of NEPA will be conducted; therefore, LWCs are not discussed further in this section.

Effective implementation of the Timber Harvest BMPs, NPDES permit requirements, site-specific Erosion and Sedimentation Pollution Control (ESPC) Plan, and pre- and post-construction BMPs reduce the potential adverse impacts to water bodies. As mentioned in the Geology and Soils discussion, training area inspectors routinely inspect construction sites to ensure projects meet all E&S measures. The Installation has a resident Natural Resource Conservation Service (NRCS) advisor who provides technical expertise during preparation of ESPCPs prior to the Installation approving the final design. During this process, the Installation's stormwater specialist and NRCS advisor review ESPCPs for compliance with the GA ESCA and the CWA. These technical experts consistently inspect and monitor on-going construction projects to assure compliance and that BMP's are being maintained.

A stream buffer variance (SBV) may also be required, if construction, operation, and maintenance encroaches within 25 feet of a stream (its "buffer"). Potential water quality and/or aquatic resource impacts of SBV utilization (such as warming of streams due to tree canopy removal during construction or sedimentation from soil disturbance along the streamside) can be minimized via many measures. These include proper stream bank stabilization (for prevention of erosion and scouring of stream banks) and implementation of appropriate Low Impact Development (LID) BMPs noted in USACE PWTB 200-1-62 OCT 2008. Final designs must also ensure implementation of Low Impact Development (LID) techniques.

It should be noted that although the 7.5-minute USGS topographic quads indicate streams within the footprints of the MPMGR and IPBC (under both alternatives), a review of the project areas by both Fort Stewart and Georgia EPD personnel found no streams, only broad areas of wetlands with small reaches of braided conveyances (Anderson, personal communication, 2010). A site visit by GA EPD on January 20, 2010 further determined that within the MPMGR, the waterway was a state water without buffer requirements; the USACE-Savannah District also reviewed the site and did not take jurisdiction over any streams.

Much of the west-north-central, southeastern, and eastern portions of Fort Stewart would become inundated by floodwaters during a 100-year storm event. Therefore, this section will also discuss whether Fort Stewart can reach a finding of no practicable alternative, as discussed in Executive Order 11998. The Army complies with Section 438 of the Energy Independence and Security Act of 2007. This requires projects involving a Federal facility with footprints exceeding 5,000

square feet use site planning, design, construction, operation, and maintenance, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow. During the design stage for each action, more precise studies will be conducted to analyze the capacity of the existing stormwater conveyance systems and what additional measures should be implemented as a result of new construction.

Only a small amount of the proposed projects will include impermeable surfaces. For the proposed ranges, the only impermeable surfaces will consist of the range operations area and cover only 2% of each project footprint. The majority of the two garrison facilities will add impermeable surfaces; however, LID techniques help to reduce diverting all stormwater to surface water bodies. The Georgia Environmental Protection Division (EPD) also requires maintaining pre construction stormwater runoff rates.

4.3.1.1 Alternative A: No Action

Overall, this alternative will have minor adverse effects to stormwater, surface water, and floodplains. No change from existing conditions would occur and all construction, operation, and maintenance projects already under way (and for which NEPA is complete) have obtained the NPDES permit, SBV (if needed), and other applicable permits and are operating in adherence to their guidance. If constructing within a floodplain, those floodplain-specific restrictions were incorporated into the facility design. Impacts to impaired streams are minimized via CWA Section 303(d) specific BMPs. Training activities will continue, both on ranges and training lands, with adverse impacts mitigated via the DPTMS and ITAM land rehabilitation programs, respectively. Environmental Division personnel are also actively reviewing pending permit applications and conducting stormwater sampling to monitor the effectiveness of various projects across Fort Stewart.

4.3.1.2 Alternative B Siting (Preferred)

Overall, this alternative will have minor adverse effects to stormwater, surface water, and floodplains. Construction of new projects must comply with all Federal, state, or local laws and regulations to minimize impacts to these water resources. Due to the low elevations on most of Fort Stewart, there is a lack of non-floodplain locations available for construction. Therefore, there is no practicable alternative to locating these projects within floodplains and this alternative will affect a total of 484.32 acres of floodplains (Figure 4-1). Construction contractors working on these projects must utilize the state-specific additional BMPs for constructing within a floodplain, such as higher elevations for electrical pedestals/transformers (mechanical rooms, associated power generators, et al.), water hydrants, and sanitary lift stations, so these structures will not become inundated with floodwaters.

Range Construction. These projects will have minor adverse effects to stormwater, surface water, and floodplains. These projects require development and effective implementation of NPDES permit requirements and its associated BMPs to reduce the potential adverse impacts of stormwater, to include not only their construction, but their operation and maintenance, as well. Most of the proposed projects are located in the Canoochee River watershed, although two of the projects, the CLFR and FMR, lie mostly in the Black Creek watershed. The Installation must incorporate site-specific BMPs for these new activities. Portions of the 100-year floodplain will be impacted by the following projects: CLFR (4.42acres), IPBC (399.86 acres), DMPTR (64.13 acres), ISBC (0.01 acres) and the 10/25-meter Range (0.78 acres) (Figure 4-1). The other proposed range construction projects will not affect the 100-year floodplain.

Construction, operation, and maintenance activities near impaired streams are avoided, when possible, to prevent additional impacts to the stream, such as increasing an associated Total Maximum Daily Loads (TMDLs) for a pollutant causing the impairment. If the discharge or impact to the stream is not avoidable, specific additional measures, including Section 303(d)-required additional BMPs, are required, included in the design process for the range, and implemented to ensure the impact remains below a level of significance. Impaired streams in the vicinity of the range projects are indicated below.

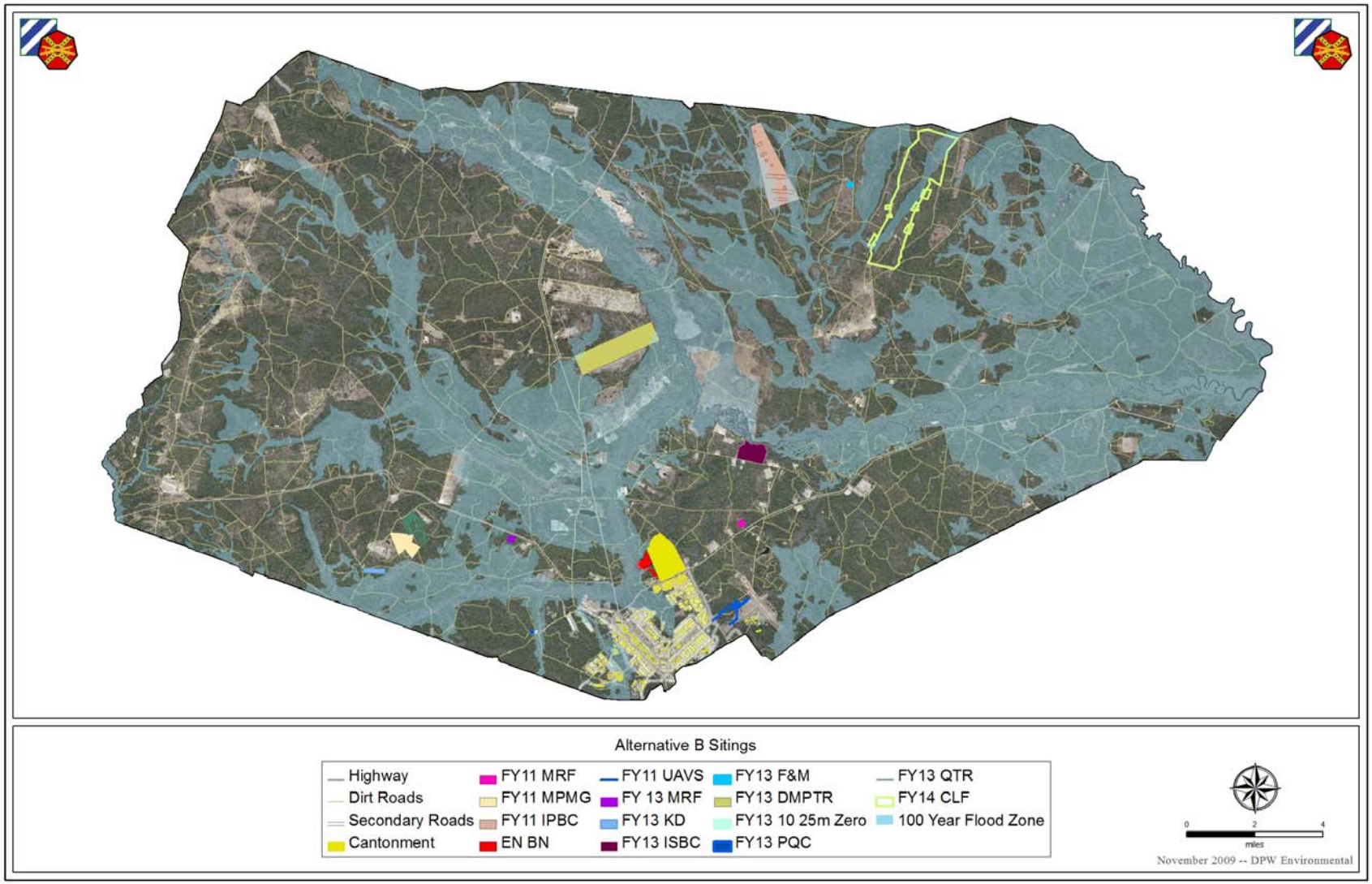


Figure 4-1: Alternative B Sitings and Floodplains Impacts.

- Canoochee Creek (upstream of GA Road 119) - QTR
- Canoochee River (Lotts Creek to Savage Creek) - DMPTR, ISBC, IPBC, FMR (Maulden Branch drains to Savage Creek, then to Canoochee River), CLFR (southern portion drains to wetlands, Savage Creek, then Canoochee River; northern portion drains to Black Creek, then Ogeechee River)
- Ogeechee River (Black Creek) - CLFR (southern portion drains to wetlands, Savage Creek, then Canoochee River; northern portion drains to Black Creek, then Ogeechee River)
- Peacock Creek - FY11 MRFR
- Taylors Creek
    - FY13 MRFR (Tributary to Taylors Creek)
    - MPMGR (Tributary to Taylors Creek)
    - KDR (Tributary to Taylors Creek)
    - CPQCR (Horse Creek to Taylors Creek)
    - 10/25-meter Zero Range (Horse Creek to Taylors Creek)

Garrison Construction. These projects will have minor adverse effects to stormwater, surface water, and floodplains. These two projects are considered Industrial Activities; therefore, development and effective implementation of a site- or activity-specific SWP3 is required to adhere to the NPDES permit requirements for industrial activities. Upon completion of construction, the SWP3 will reduce the potential adverse impacts of stormwater. The Installation must incorporate site-specific BMPs for the new activities, to include not only their construction, but their operation and maintenance, as well.

For the EN BN, the western portion of the footprint and northern portion of the access road are directly inside the 100-year floodplain; the northwestern and northern potions of the project footprint are at its edge, affecting 15.12 acres of floodplains (Figure 4-1). Additionally, the access road crosses a tributary stream to Taylors Creek in two locations, and the southern edge of the site has tributary traveling west to Taylors Creek. There will be minimal impacts under Alternative B because only portions of the project site (western and northern portions of the

access road) will be within the 100-year floodplain, minimizing impacts upstream or downstream, and at the completed project site during floods.

The footprint of the UAVS facilities at WAAF lies within the Peacock Creek-North Newport River watershed, but does not lie within the 100-year floodplain (Figure 4-1). The footprint has several tributaries associated with it that discharge to Goshen and Melvin swamps and ultimately to Peacock Creek (an impaired stream). One tributary is at the northeastern portion for an access road, one is through wetlands at the eastern portion of the center of site, and one is at the western portion for an access road connecting to Fort Stewart Road 47. Additionally, there are existing stormwater culverts and/or underground piping in portions of the aforementioned areas, considered as part of Fort Stewart's stormwater drainage systems. Impaired streams and the projects that would impact them include: Taylors Creek - EN BN Facilities (Tributaries to Taylors Creek); and Peacock Creek - UAVS Facilities at WAAF. As discussed under Range Construction, above, specific additional measures and BMPs must be designed and implemented to minimize additional impacts to impaired streams.

4.3.1.3 Alternative C Siting

Impacts to stormwater may be minimized via adherence to each construction site's NPDES permit and site-specific BMPs, as discussed under Alternative B. Alternative C will have a greater affect on floodplains compared to Alternative B, impacting a total of 969.45 acres of floodplains, compared to 484.32 acres of floodplains impacts under Alternative B. As with Alternative B, construction must comply with all Federal, state, or local laws and regulations to minimize impacts to these water resources. Also as with Alternative B, there is no practicable alternative to locating these projects within floodplains, within the meaning of Executive Order 11998. Overall, this alternative will have moderate adverse effects to streams, stormwater, and floodplains (Figure 4-2).

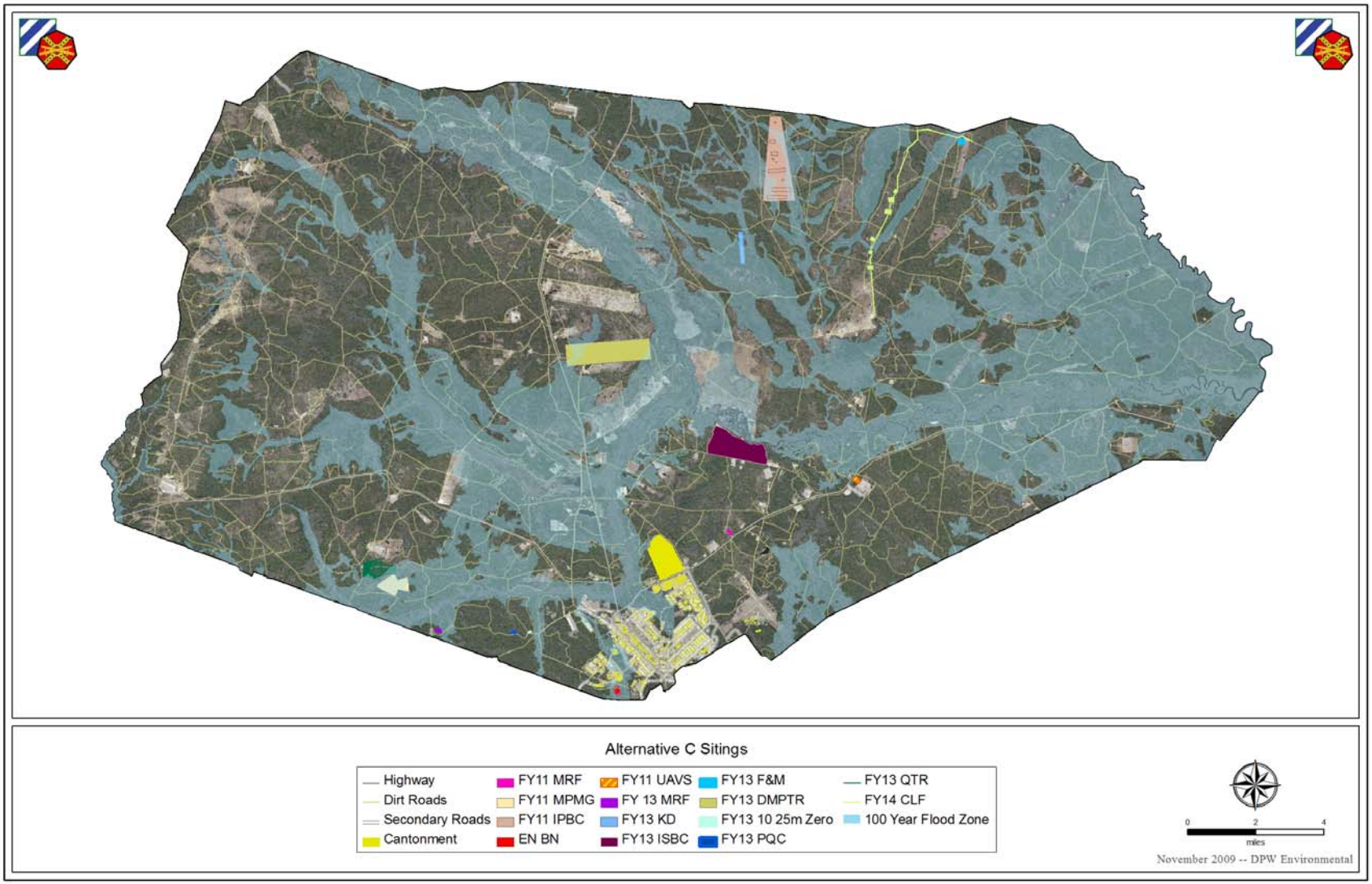


Figure 4-2: Alternative C Sitings and Floodplains Impacts.

Range Construction. Portions of the 100-year floodplain will be impacted by the following projects: CLFR (0.12 acres), IPBC (450.39 acres), DMPTR (176.32 acres),KDR (51.28 acres), MRFR (0.53 acres), FY11 MPMGR (228.77 acres), and QTR (47.18 acres) (Figure 4-2). The other proposed range construction projects will not affect the 100-year floodplain. Avoidance of impaired streams must be emphasized at these project locations; however, if the impaired streams are unavoidable, measures will be developed and additional, specific BMPs implemented as discussed under Alternative B. Streams designated as impaired under section 303(d) of the CWA and the range projects that would impact them include:

- Canoochee River (Lotts Creek to Savage Creek) – DMPTR, ISBC, IPBC, KDR, and CLFR (majority drains to wetlands, Savage Creek, then to the Canoochee River);
- Ogeechee River (Black Creek) – FMR (Little Creek into Black Creek to the Ogeechee River) and CLFR (southern portion drains to wetlands to Savage Creek to the Canoochee River and northern portion drains into Black Creek to Ogeechee River);
- Peacock Creek - FY11 MRFR; and
- Taylors Creek - FY13 MRFR (Gum Branch to Taylors Creek), QTR (Tributary to Taylors Creek), MPMGR (Tributary to Taylors Creek), CPQC (Tributary to Taylors Creek), and 10/25M Zero Ranges (Horse Creek to Taylors Creek)

Garrison Construction. These projects will have moderate adverse effects to stormwater, surface water, and floodplains. As discussed under Alternative B, these projects are industrial activities and must have a site- or activity-specific SWP3 to adhere to the NPDES permit requirements for industrial activities. For the EN BN Facilities, the majority of the proposed footprint (14.95 acres) is within the 100-year floodplain and its very center is in the 500-year floodplain area. The northern access point to the site (off Fort Stewart Road 90) crosses a tributary stream, and another tributary stream is at the southern portion of the site; each discharge into Mill Creek, which ultimately discharges into Taylors Creek.

Under this alternative, the UAVS Facilities would be constructed at Evans Army Airfield. This site has a ditch to the northeast of the existing facility to convey stormwater associated with the existing dirt tank trail and is out of the floodplain. The stormwater runoff from this site would

travel to surrounding areas in a southwesterly-to-southern direction, discharging into surrounding wetlands and then off-Post towards Jerico Creek and the Jerico River.

4.3.2 Wetlands

The TLS for wetlands occurs if the CWA is violated, such as failing to obtain a Section 404 Permit for fill of wetlands. Efforts are made to avoid and minimize impacts to wetland areas during the siting and design of the project. Wetland protection efforts also focus on erosion prevention and stormwater control, including the establishment of filter strips adjacent to bodies of water, terracing, seeding and mulching bare soil, planting cover vegetation, among others. Erosion and sedimentation impacts on wetlands during construction, operation, and maintenance are minimized through compliance with the requirements of NPDES permit, an activity-specific SWP3, and ESCP Plan.

Depending on the type(s) of impact, the USACE requires mitigation of wetland losses through actual or virtual replacement of the lost wetlands. As noted in Chapter 3, Fort Stewart is electing to mitigate loss of wetlands through two means: deductions from the on-Post Fort Stewart Wetland Mitigation Bank for Garrison support facilities construction projects and purchase of compensatory mitigation credits from a privately owned Wetland Mitigation Bank located within the same watershed for range construction projects.

The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR. Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Fort Stewart's mitigation plan went out for public notice and it explained how impacts associated with the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR are to be avoided, minimized, and compensated for. This explanation addressed proposed avoidance and minimization and the amount, type, and location of the proposed compensatory mitigation, including an intention to use an approved mitigation bank.

For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs). Similar to the process outlined in the Compensatory Mitigation Rule, the Installation's standard procurement processes conducts market research in accordance with the Federal Acquisition Regulation to evaluate current market and availability of primary and secondary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11. The FY13-FY14 projects would look first for mitigation opportunities in the same watershed. Full proposed mitigation efforts are discussed in Chapter 6, Mitigation and Monitoring.

For all projects for which wetlands impacts may occur, Fort Stewart has submitted a request for jurisdictional determination (JD). Fort Stewart has received JDs for the FY11 MPMGR, FY11 IPBC, and FY13 DMPTR. Section 404 permits are pending from the USACE for the FY11 MPMGR, FY11 IPBC, FY13 DMPTR, and FY13 QTR. The former identifies those wetlands that are under the jurisdiction of the USACE and that will, therefore, require a permit to impact; the latter describes the project, its impacts, and the proposed mitigation plan in detail. The USACE is a Cooperating Agency in this EIS and helped with the analysis in this chapter, as well as with the determination of cumulative effects to wetlands on both Fort Stewart and the watersheds in which it rests (discussed in Chapter 5). This section will also discuss whether we can reach a finding of no practicable alternative as discussed in Executive Order 11990.

4.3.2.1 Alternative A: No Action

Overall, this alternative will have a negligible-to-minor adverse effect to wetlands on Fort Stewart. Wetlands impacts from projects already under construction (or for which NEPA is complete and construction pending) have been assessed and, if required, appropriate mitigation and permitting have occurred. Additionally, training, personnel operations, and routine maintenance and monitoring activities on Fort Stewart would occur, resulting in minimal impacts to wetlands. These are minimized by BMPs and regular maintenance of roads, ranges, training lands, and developed areas, although traffic through wetlands is avoided and activities in wetland restoration areas monitored. Activities of the Forestry Branch, FWB, and grounds-keeping are also reviewed and tracked by the wetlands program manager.

4.3.2.2 Alternative B Siting (Preferred)

Overall, this alternative will have minor adverse effects to wetlands on Post, affecting a total of 181.59 acres of the Installation's approximate 91,000 acres of wetlands. The wetland impacts for these projects are based on delineations within the project footprint. Only those projects for which wetlands impacts are known or projected are discussed. Projects for which there are no potential wetlands impacts are omitted from this analysis. No wetlands impacts are predicted for the following projects: FY11 MRFR; ISBC; CPQC; KDR; and FMR.

Fort Stewart avoids and minimizes wetlands impacts when possible. While a scaling factor may be appropriate to use in many large scale projects where a great deal of fill is being introduced into the wetland system and where the projects require large amounts of impermeable surfaces, neither of these considerations constitute significant components of any of the projects under consideration in this EIS. Of this filled acreage only a small amount will include the introduction of impermeable surfaces (approximately 2% of each range footprint). The implementation of the actions proposed in the preferred alternative has the potential to negatively impact up to 0.2% of the Installation's nearly 91,000 acres of wetlands. More importantly, of the "up to 0.2% of the Installation's wetlands being impacted," most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement.

The Installation anticipates wetland impacts will be much less than projected through further avoidance and minimization incorporated during the design phases of each project after the site is selected. It is important to note, that despite the large amount of military training activity that occurs on Fort Stewart, because of the Installation's proactive efforts to avoid, enhance, and mitigate wetlands, its wetlands remain of a high quality, retaining and transmitting large amounts of fresh water and providing habitat for countless local species. Proactive environmental stewardship programs also help to keep our wetlands pristine. As discussed in opening paragraphs in Chapter 3, Fort Stewart's Integrated Training Area Management (ITAM) program

conducts land rehabilitation through the construction of low water crossings and Soldier training related to sustainability of Fort Stewart lands.

Range Construction. The construction, operations, and maintenance of these projects will have a minor adverse effect to 179.03 acres of wetlands on Fort Stewart. Complete wetlands avoidance is not possible for ranges because, among other things, each range must be of sufficient acreage to accommodate the SDZ for use of munitions specific to each range, as required by DA PAM 385-64 (*Ammunition and Explosive Safety Standards*), as previously discussed in Chapter 2 of this EIS, *Range-Specific Screening Criteria*. From the outset, site selection and design follow sustainability principals, starting with design "charrettes" to ensure stakeholder collaboration toward optimal design, fiscal constraints, local characteristics and constraints, environmental issues, and consideration of functional adjacencies/relationships and land use compatibility. Site selection is based on functional adjacencies/relationships and land use compatibility. The range design must be able to accommodate appropriate anti-terrorism measures and standoff distances, adherence to protected species habitat management plans, construct in locations and not hinder the Installation's prescribed burn program, and avoid or minimize impacts (to the best extent possible) impacts to to cultural and natural resources. These measures are utilized to site the ranges in the most environmentally and operationally sustainable sites possible.

Much of the avoidance and minimization takes place before actual site selection. Training ranges of this kind have fairly specific requirements and it is not always possible to build them without impacting every wetland in the footprint. Site designers may alter certain aspects of a proposed range in response to environmental concerns during various stages of the design process, typically reviewed at the 10%, 35%, 60%, 90%, and 100% stages of completion, if they can do so while still meeting the operational and training requirements of the range.

It is also important to note that not all of the 179.03 acres of wetlands will actually be cleared, grubbed, and/or filled. Rather, that is a maximum projected "up to" amount. The actual number of acres impacted will likely be reduced further at each design level for target placement, etc. Therefore, although the "permitted impacts" of this project may seem large in relation to other

recently permitted impacts in Georgia, they do not represent substantial impacts to Fort Stewart wetlands resources.

Expanded 404(b)(1) analyses, as required by the Clean Water Act, for the FY11 MPMGR, FY11 IPBC, FY13 QTR, and FY13 DMPTR are available for review in Appendix D. Expanded 404(b)(1) analyses have not been prepared for the FY13 MRFR, FY13 10/25 Meter Zero Range, and FY14 CLFR, as it is possible that wetland impacts could still be eliminated during the design process for these ranges. Ultimately, Section 404 permit applications and associated analyses will be implemented for all range construction that impacts wetlands. As discussed earlier, there is no practicable alternative to locating these projects within wetlands. The other range construction projects, not listed below, are projected to avoid wetland areas completely.

- FY11 MPMGR – Wetland impact projected is **103.3 acres** (Figure 4-3).
- FY11 IPBC – Wetlands impacts are limited to the "engagement boxes," in which various exercises are conducted, and a recently added electrical ROW. Total impact projected is **5.4 acres** for the engagement boxes and 0.4 acres for the electrical ROW (Figure 4-4). This work within the ROW, however, is covered under Nationwide Permit 12 for Utility Line Activities and will not factor into the Section 404 permit for this project,
- FY13 QTR – Wetland impact projected is **26.7 acres** (Figure 4-5).
- FY13 DMPTR – Wetland impact projected is **43.6 acres** (Figure 4-6).
- FY13 MRFR – Wetland impact projected is **0.9 acres** (Figure 4-7). Previous projection based on the National Wetlands Inventory (NWI) indicated no wetlands impact. Jurisdictional determination for this project is pending, but it is possible that a Section 404 permit will not be required.
- FY13 10/25 Meter Zero Range – Wetland impact projected is **0.65** acres (Figure 4-8).
- FY14 CLFR – Wetlands impacts are limited to the "engagement boxes" in which various exercises are conducted. Impact projected is **1.2 acres** (Figure 4-9).

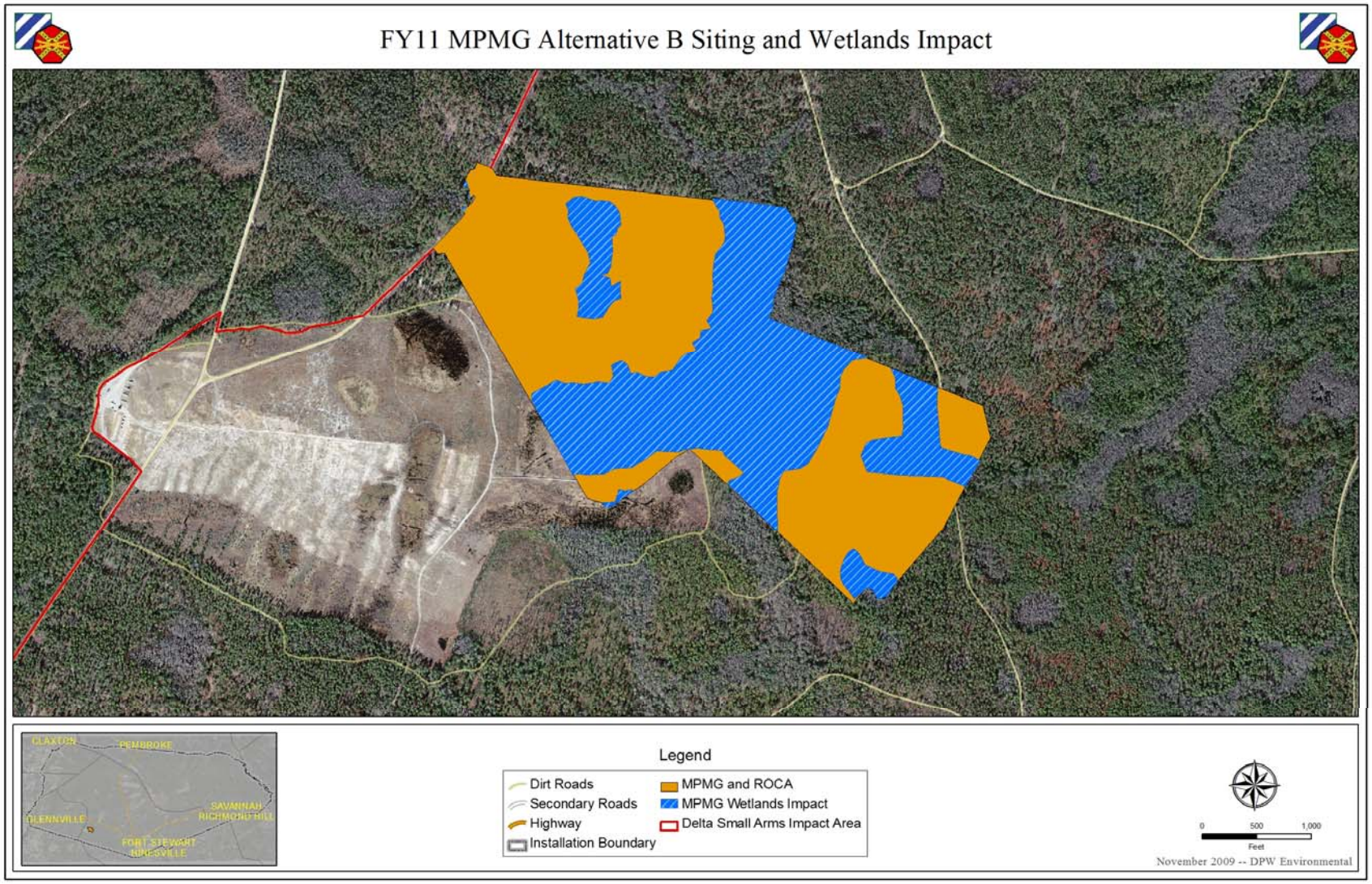


Figure 4-3: FY11 Revised MPMG Range Layout and Wetlands Impact.

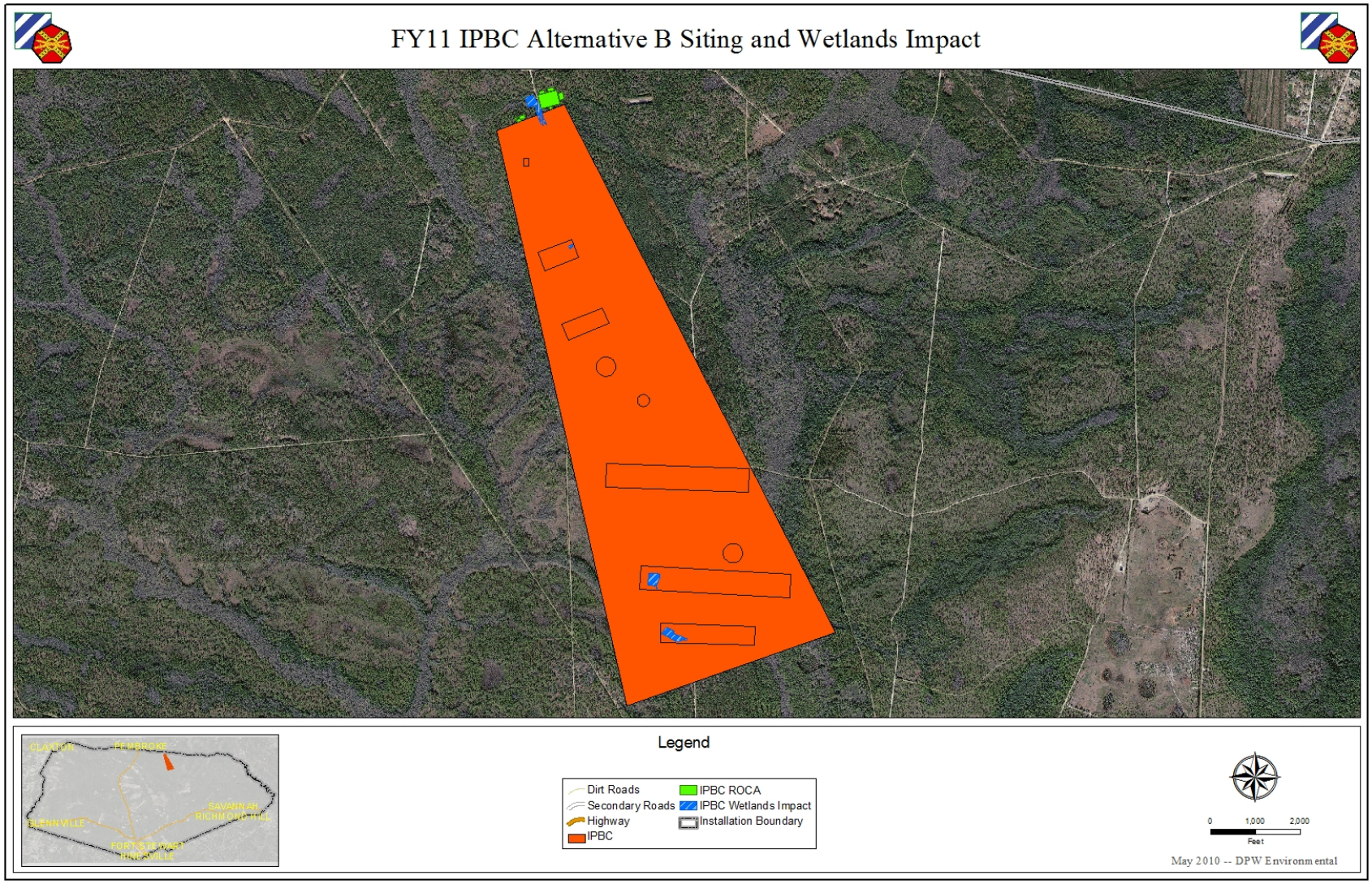


Figure 4-4: FY11 Revised IPBC Layout and Wetlands Impact.

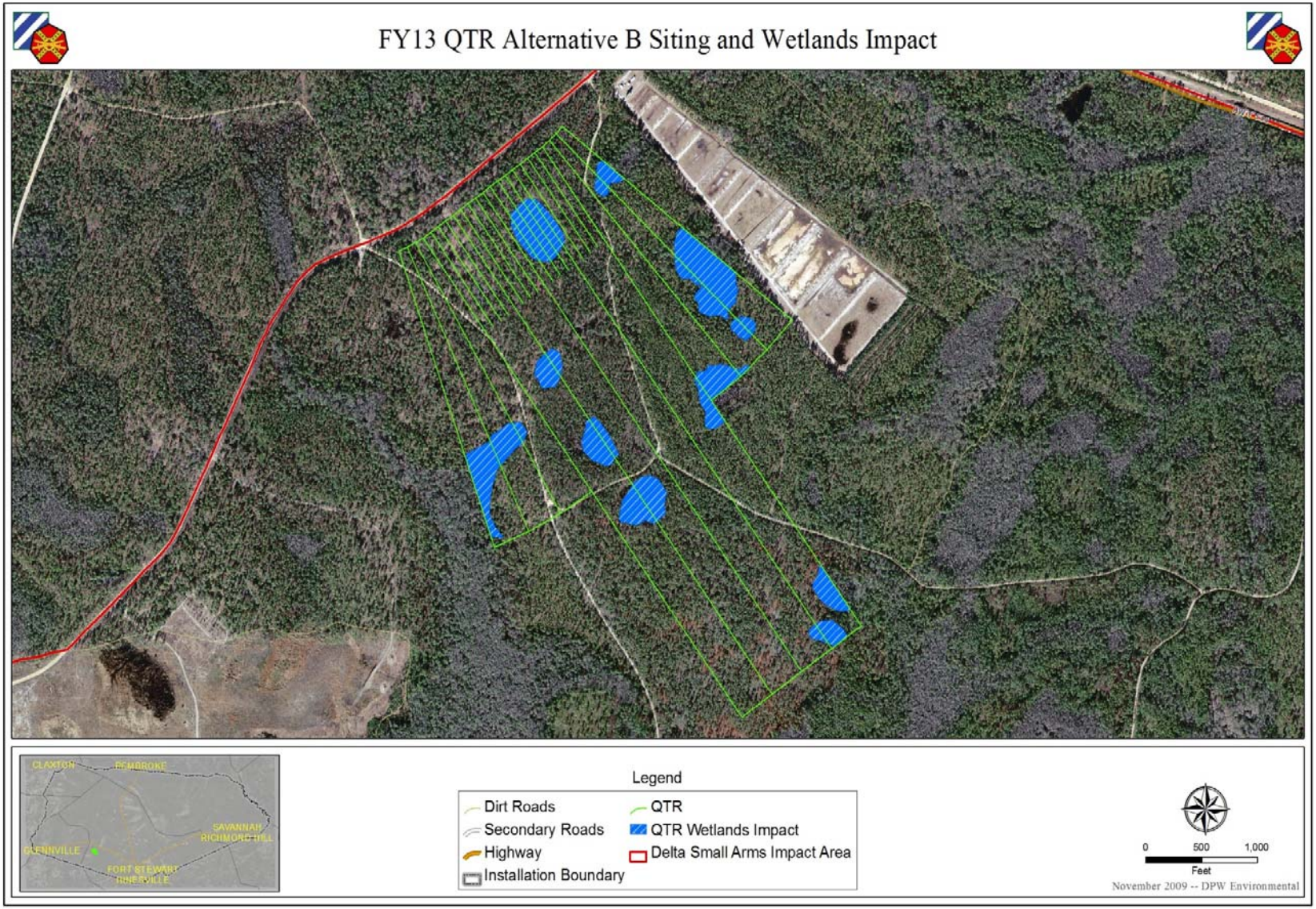


Figure 4-5: FY13 QTR and Wetlands Impact.

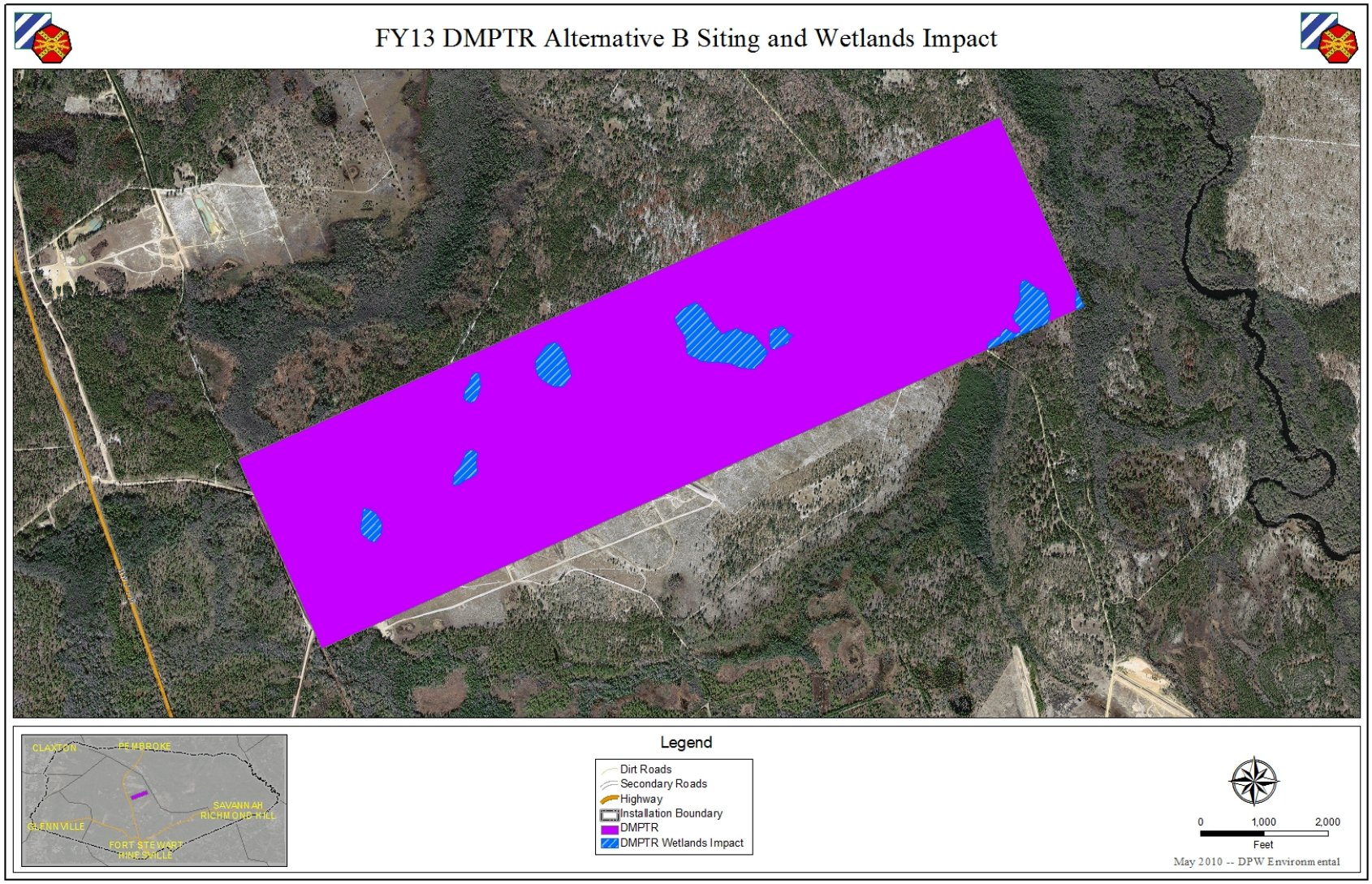


Figure 4-6: FY13 DMPTR and Wetlands Impact.

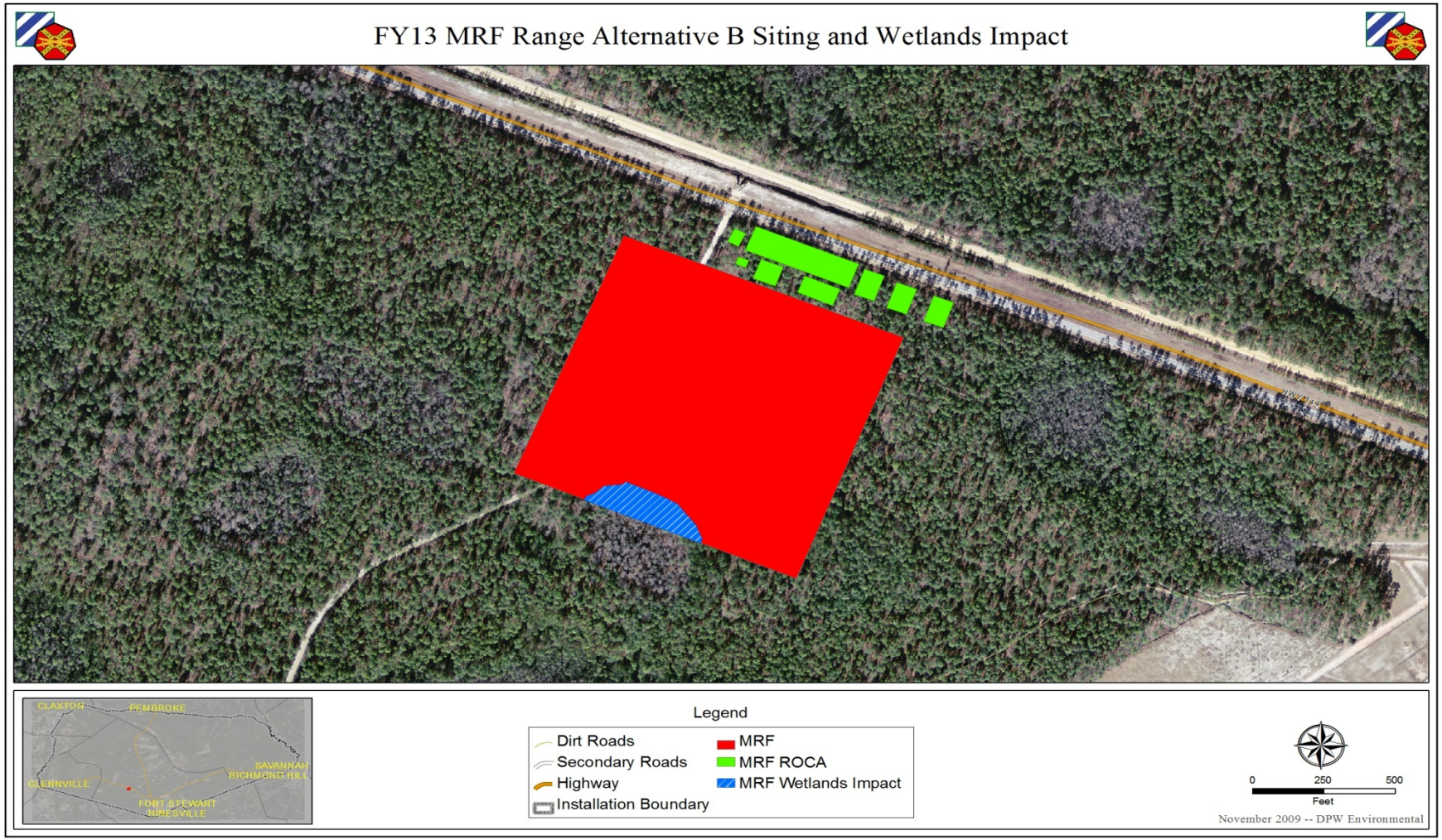


Figure 4-7: FY13 MRFR and Wetlands Impact.

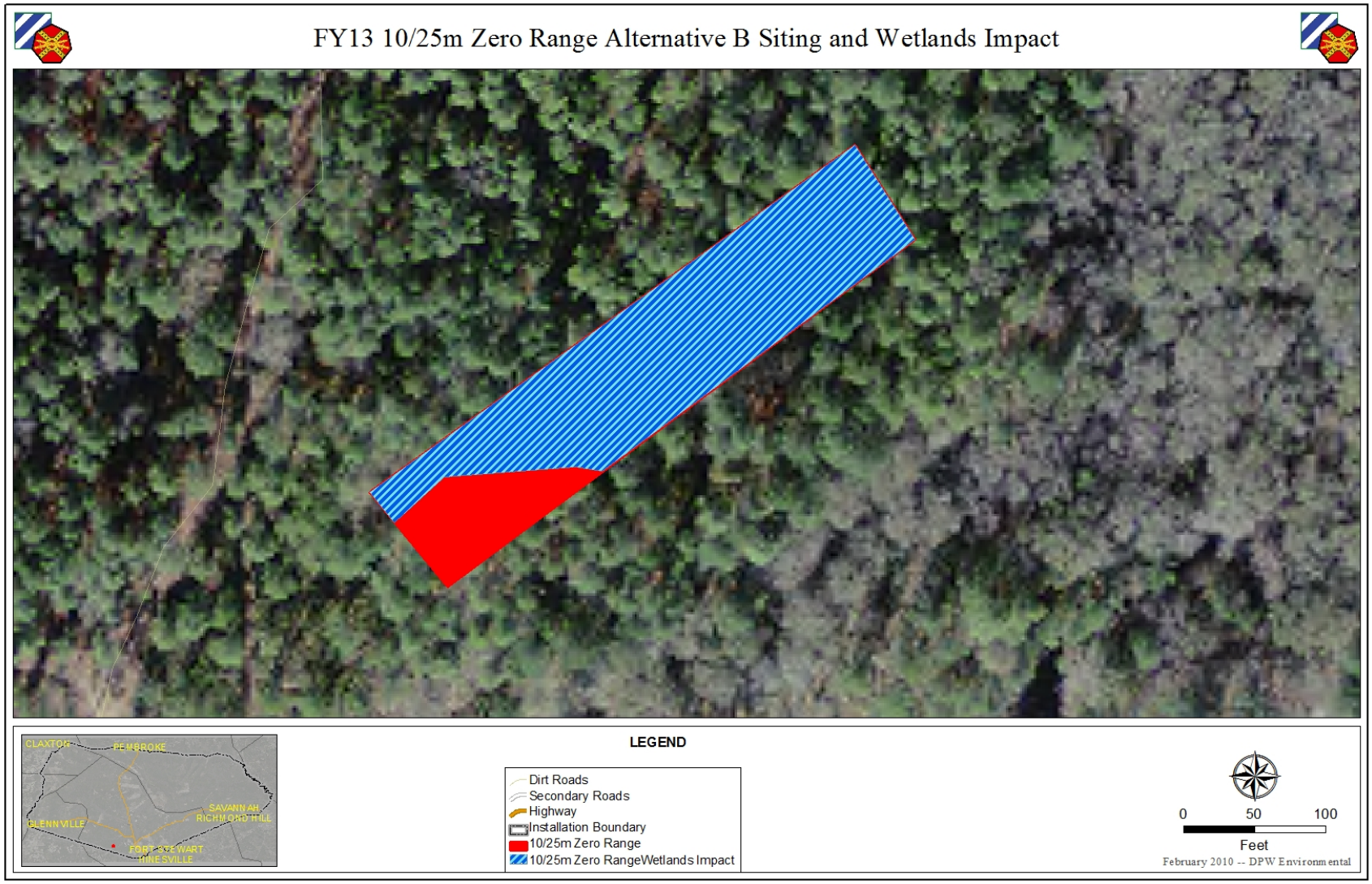


Figure 4-8: FY13 10/25 Meter Zero Range and Wetlands Impact.

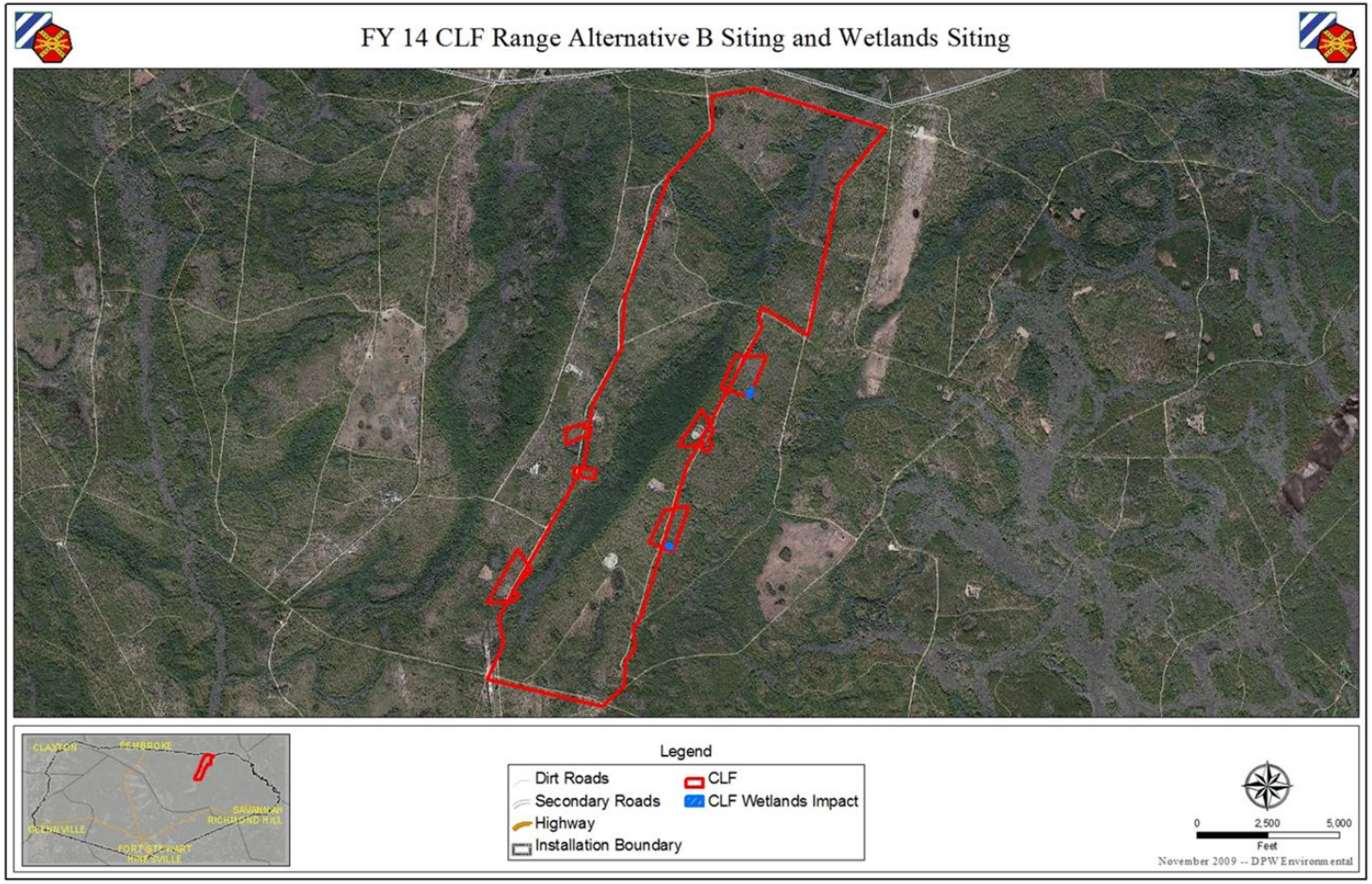


Figure 4-9: FY14 CLFR and Wetlands Impact.

Garrison Construction. The construction, operations, and maintenance of these projects will have a minor adverse effect to 2.56 acres of wetlands on Fort Stewart. Siting for these projects is limited by the need to keep them close to existing facilities and for them to tie into existing infrastructure (roads, utilities, etc.) There is also no practicable alternative to locating these projects outside wetlands, as discussed under ranges, above. Section 404 permit applications, following the 404(b)(1) guidelines, have been submitted for both projects; acreage impacted is noted below.

- EN BN Facilities – Wetland impact projected is **0.9 acres** (no figure).
- FY11 Sky Warrior UAVS Facilities– Wetland impact projected is **1.66 acres** (Figure 4-10).

4.3.2.3 Alternative C Siting

Overall, this alternative will have moderate adverse effects to wetlands on Post. The Alternative C locations for the ranges will affect 409.56 acres of wetlands, a substantially greater amount than under Alternative B (which has 184.31 acres affected). Garrison construction projects will also impact more wetlands, 9.41 acres, compared to the 2.56 acres affected under Alternative B. The analysis of these projects was conducted utilizing NWI data; if the Alternative C sites were chosen, delineations would occur and, once a definite acreage was determined, the JD and permitting process would begin.

As with Alternative B, there is no practicable alternative to locating these projects outside wetlands, within the meaning of Executive Order 11990. For these projects, the impacts were estimated based on analysis of the NWI, except in the case of the 10/25 Meter Zero Range, for which wetland delineation had been performed. Only those projects for which wetlands impacts are known or projected are discussed; projects for which there are no potential wetlands impacts identified are omitted from this analysis. No wetlands impacts are predicted for the following projects: FY11 MRFR; ISBC; CPQC; KDR; FMR.

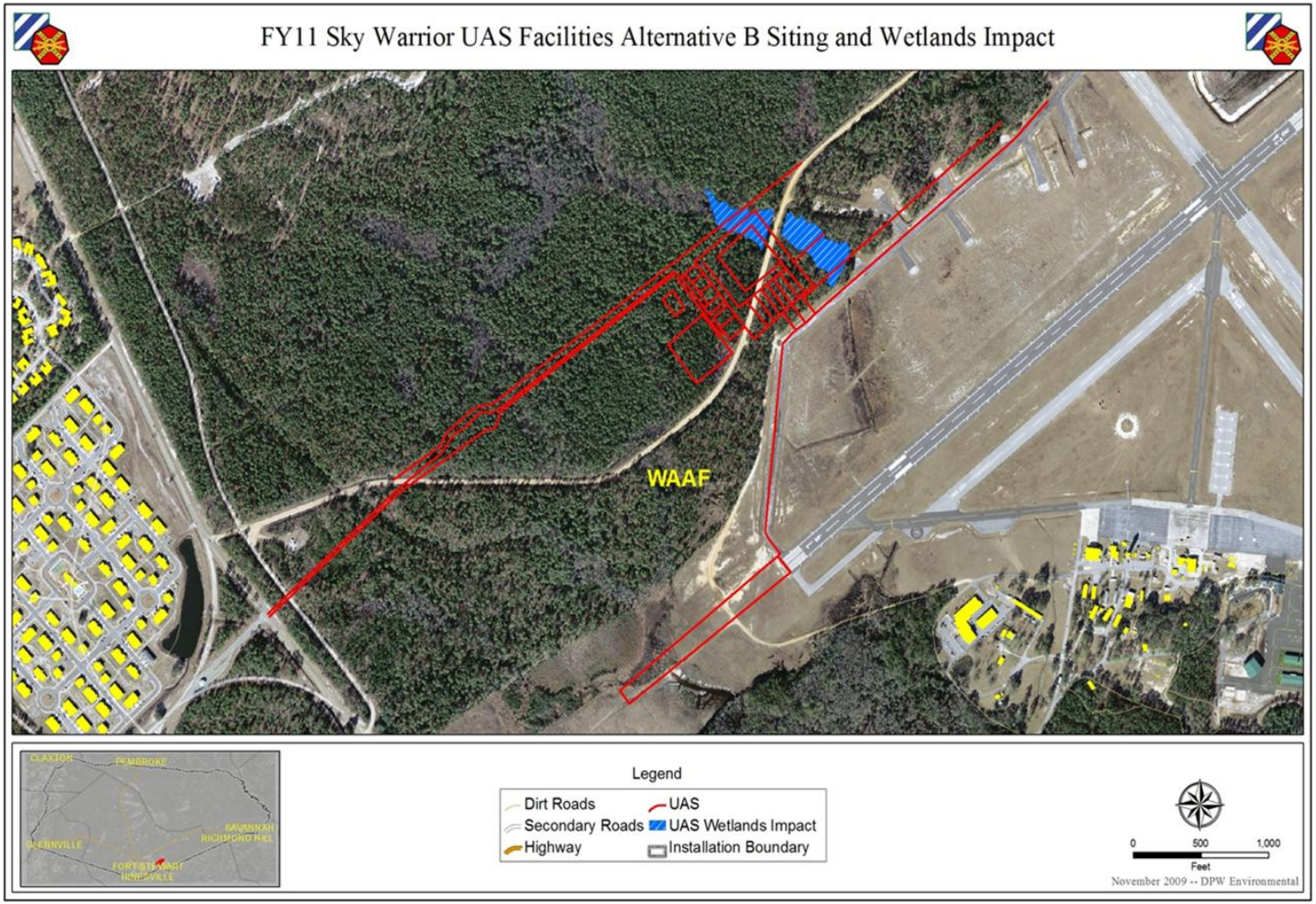


Figure 4-10: FY11 UAVS Facilities and Wetlands Impact.

Range Construction. The construction, operations, and maintenance of these projects will have a moderate adverse effect to wetlands on Fort Stewart. As discussed under Alternative B, complete wetlands avoidance is not possible for ranges because of their size, SDZ, UXO, and OPTEMPO requirements. Section 404 permit applications will be submitted for all of the ranges noted; for the other range projects, no wetlands impacts are predicted and no permitting required.

- FY11 MPMGR – Wetland impact projected is **106.8 acres** (Figure 4-11)**.**
- FY11 IPBC – Wetland impact projected is **31.5 acres** (Figure 4-12). The electrical ROW has not been included as part of the overall project footprint for this project; however, if this alternative were chosen, subsequent design efforts would include the electrical ROW and its potential wetlands impacts factored into permitting efforts for this project;
- FY13 QTR – Wetland impact projected is **24.7 acres** (Figure 4-13). This alternative was non-preferred because Alternative C has greater impacts to protected species than Alternative B and will alter the noise contour profile to an unacceptable degree. Therefore, even though implementation of Alternative B has more wetlands impacts, it is the most practical siting from an overall environmental and operational perspective.
- FY13 DMPTR – Wetland impact projected is **240 acres** (Figure 4-14).
- FY13 MRFR – Wetland impact projected is **0.5 acres** (Figure 4-15).
- FY13 10/25 Meter Zero Range – Wetland impact projected is **0.56 acres** (Figure 4-16). Although this figure is less than that calculated for the preferred alternative, this alternative was non-preferred for operational reasons (as discussed in Chapter 2).
- FY14 CLFR – Wetland impact projected is **5.8 acres** (Figure 4-17).

Garrison Construction. The construction, operations, and maintenance of these projects will have a minor adverse effect to wetlands on Fort Stewart. Specific impacts to wetlands are detailed below; Section 404 permit application, including an expanded 404(b)(1) analysis, will be submitted for all.

- EN BN Facilities – Wetland impact projected is **5.41 acres** (Figure 4-18)**.**
- FY11 Sky Warrior UAVS Facilities – Wetland impact projected is **4 acres** (Figure 4-19).

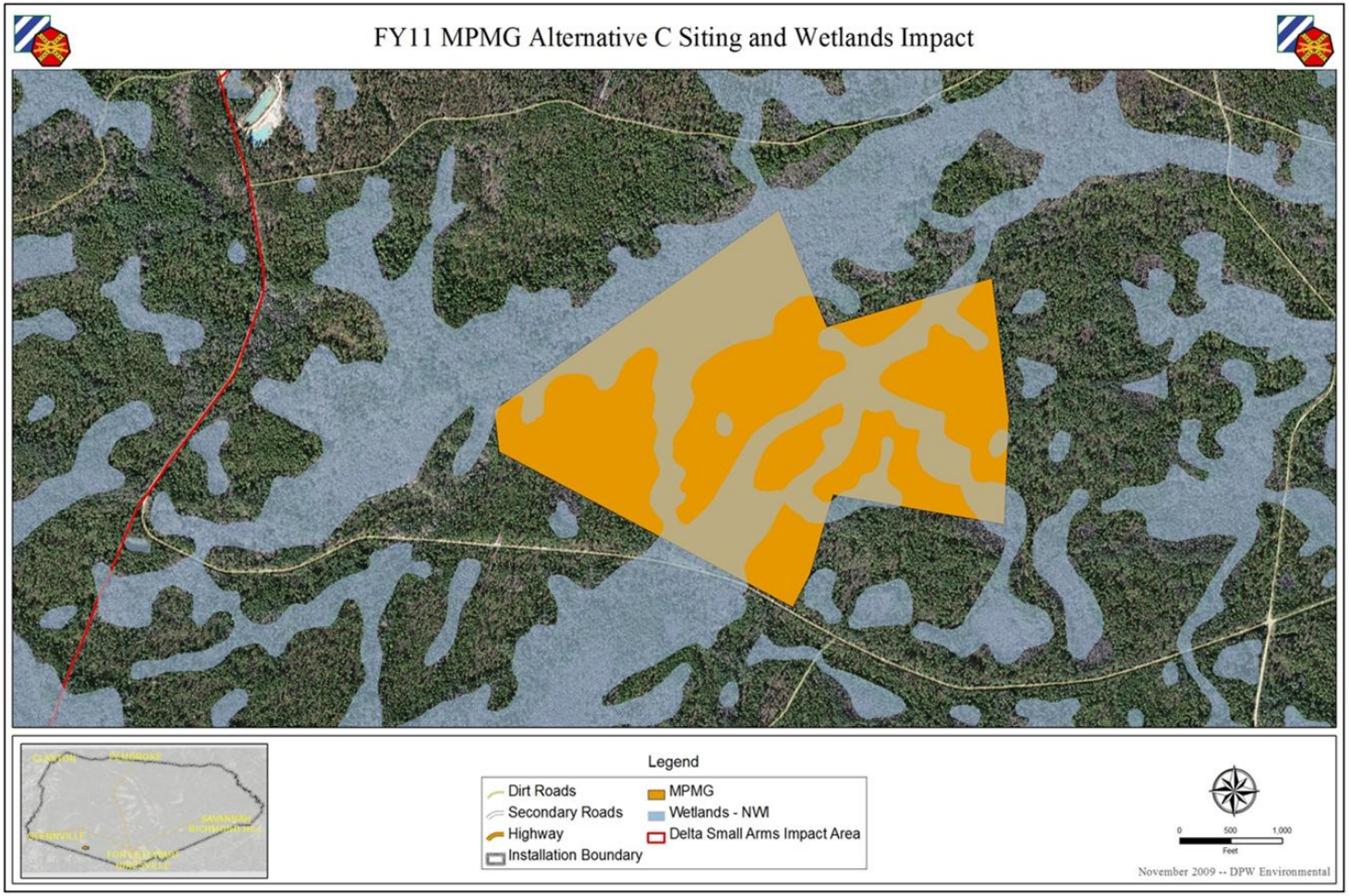


Figure 4-11: FY11 MPMGR and Wetlands Impact.

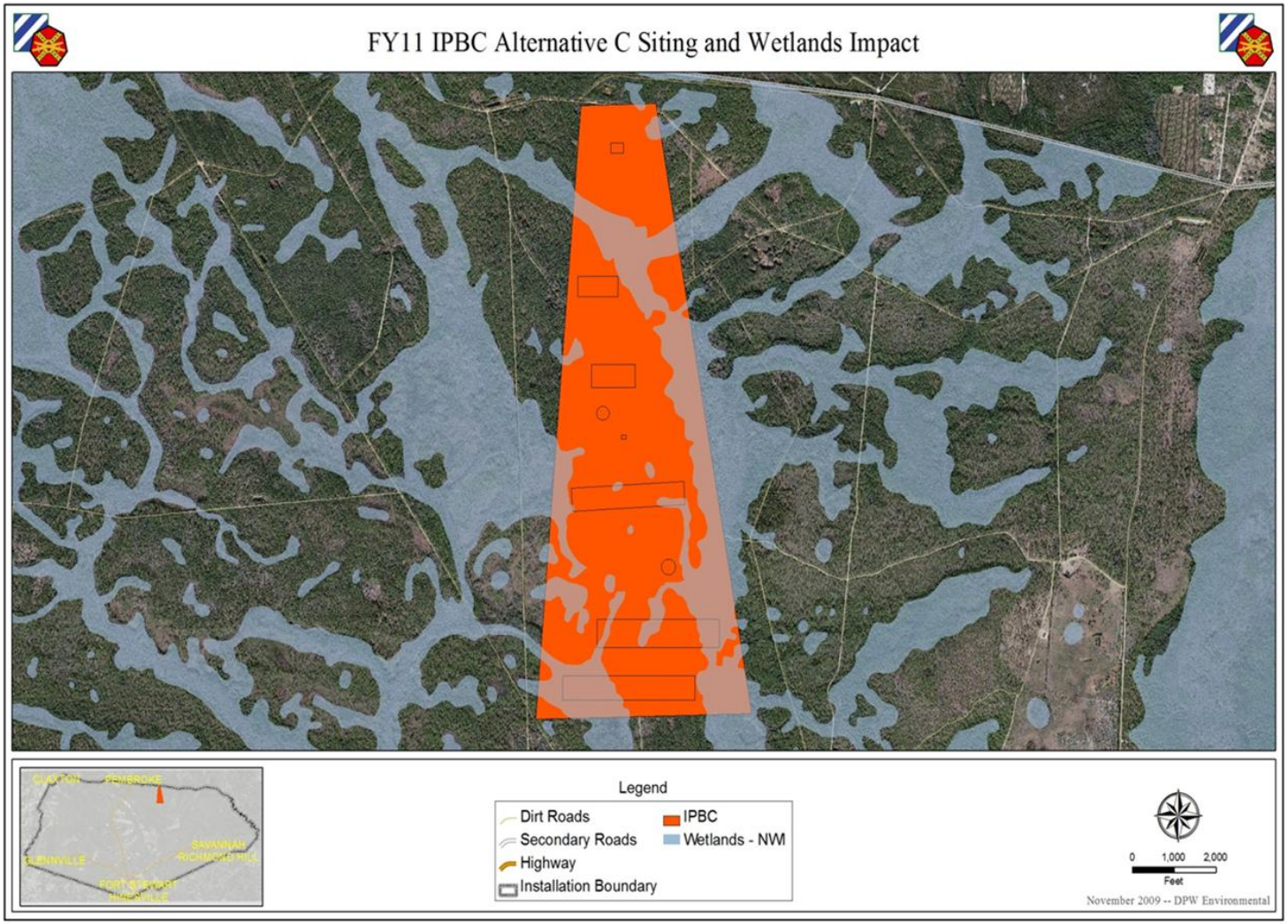


Figure 4-12: FY11 IPBC and Wetlands Impact.

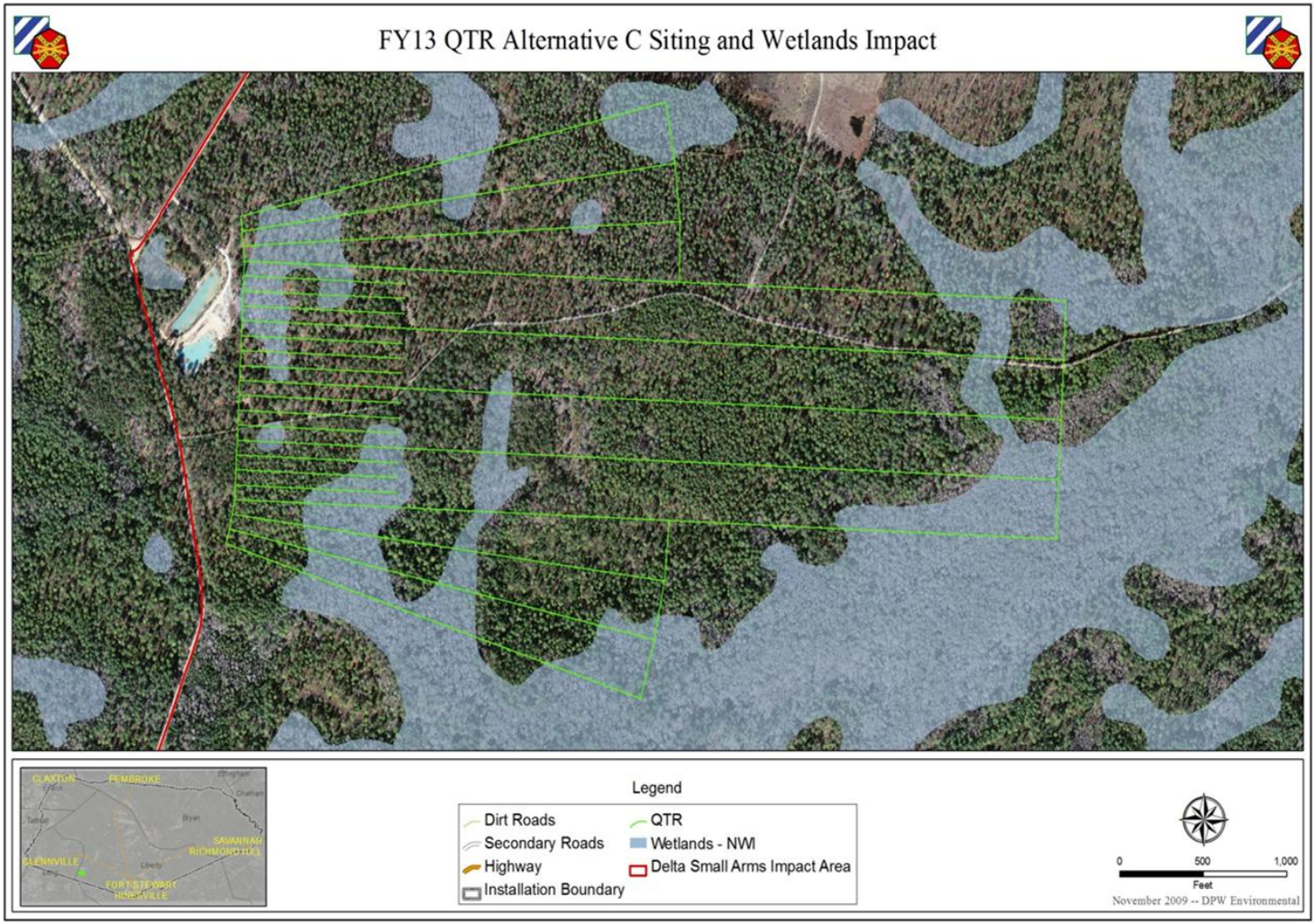


Figure 4-13: FY13 QTR and Wetlands Impact.

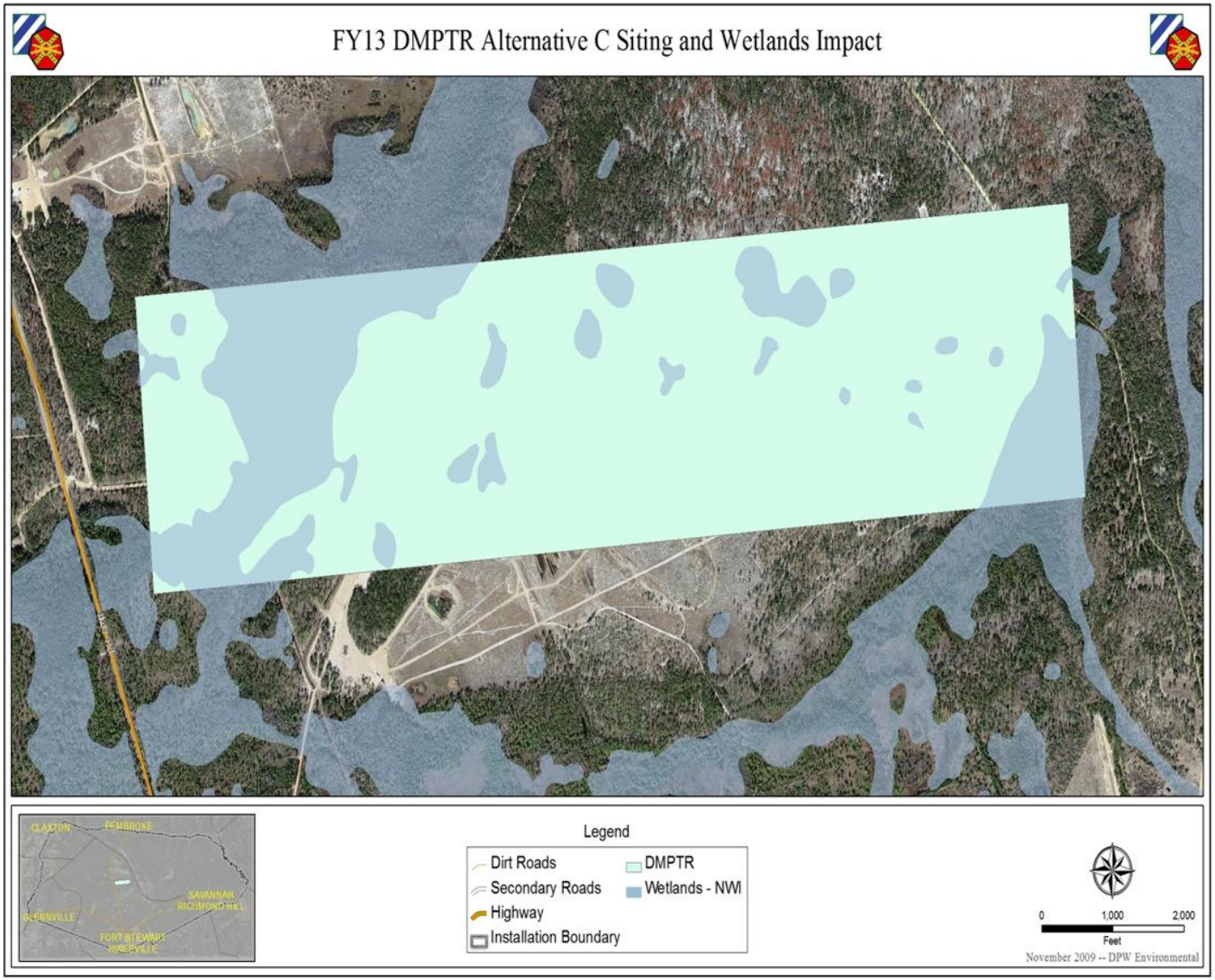


Figure 4-14: FY13 DMPTR and Wetlands Impact.

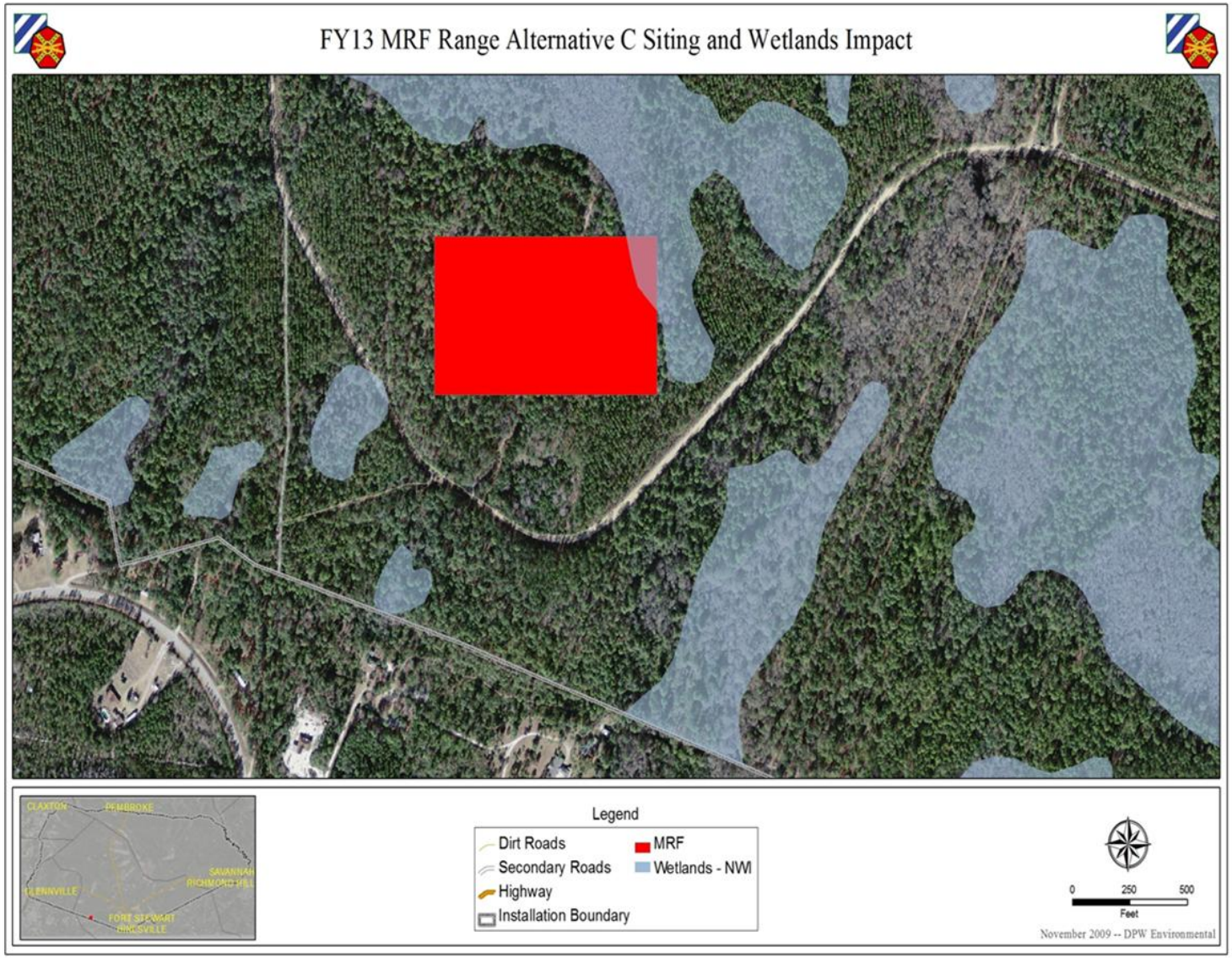


Figure 4-15: FY13 MRFR and Wetlands Impact.

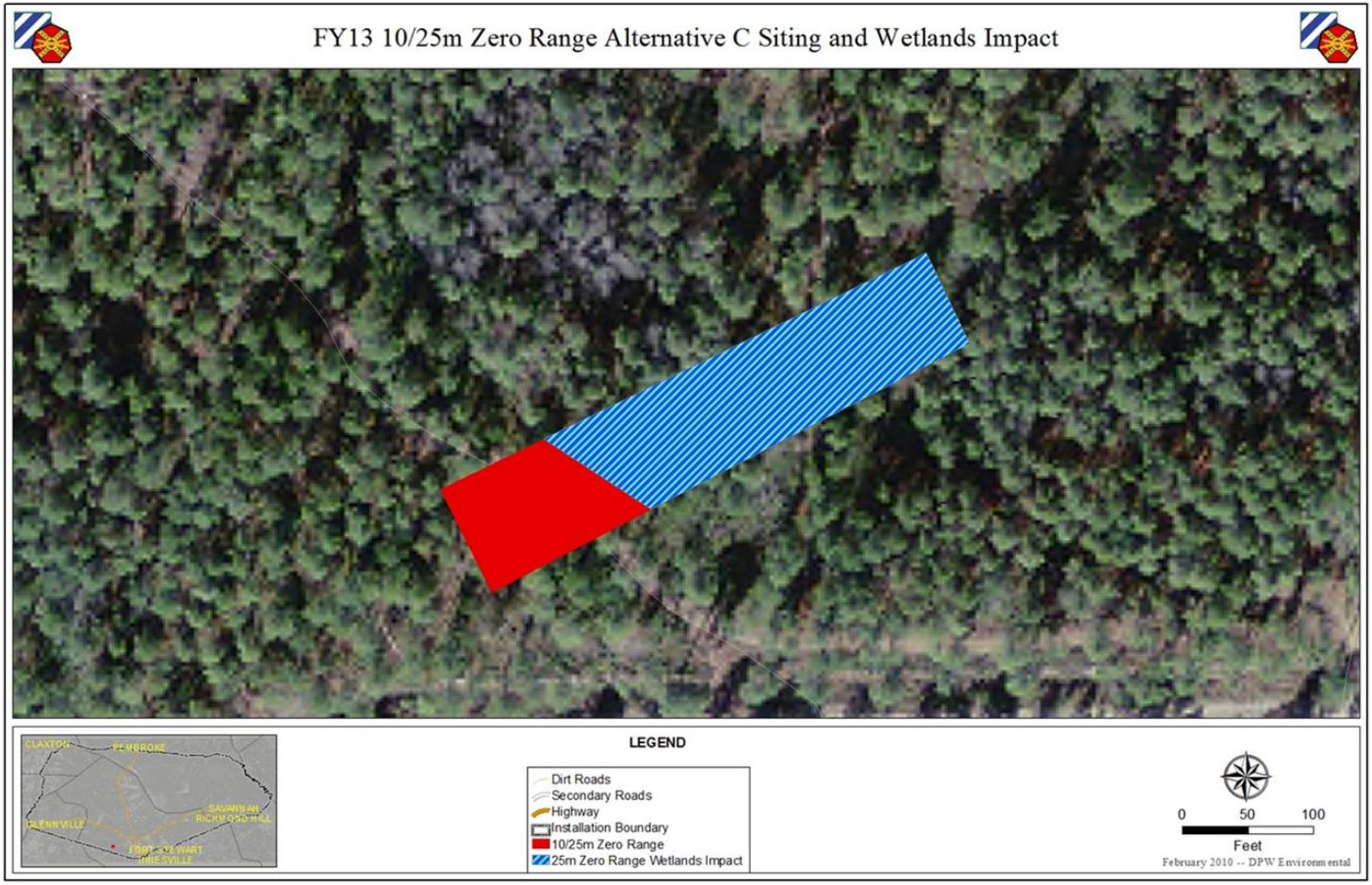


Figure 4-16: FY13 10/25 Zero Meter Range and Wetlands Impact.

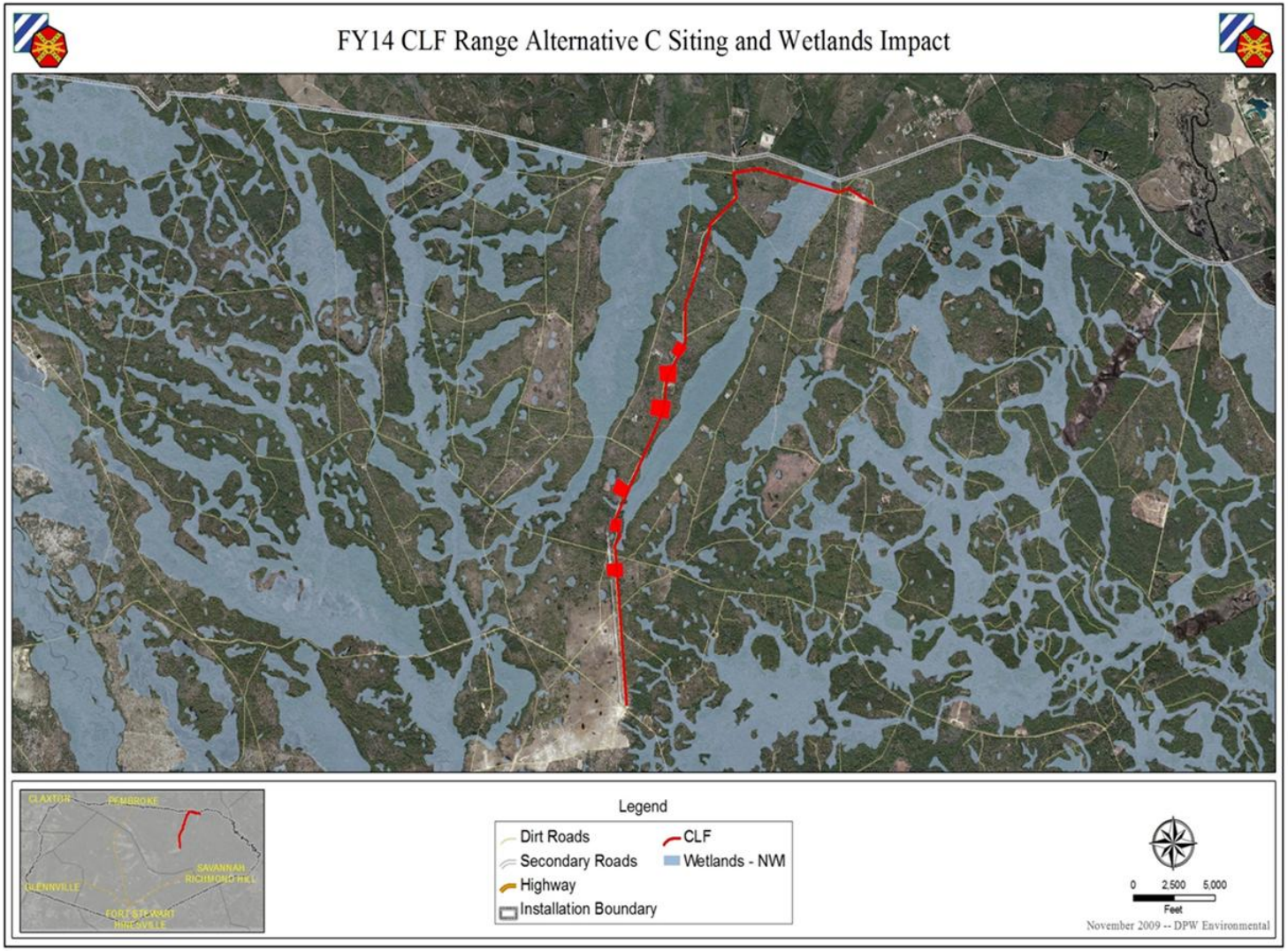


Figure 4-17: FY13 CLFR and Wetlands Impact.

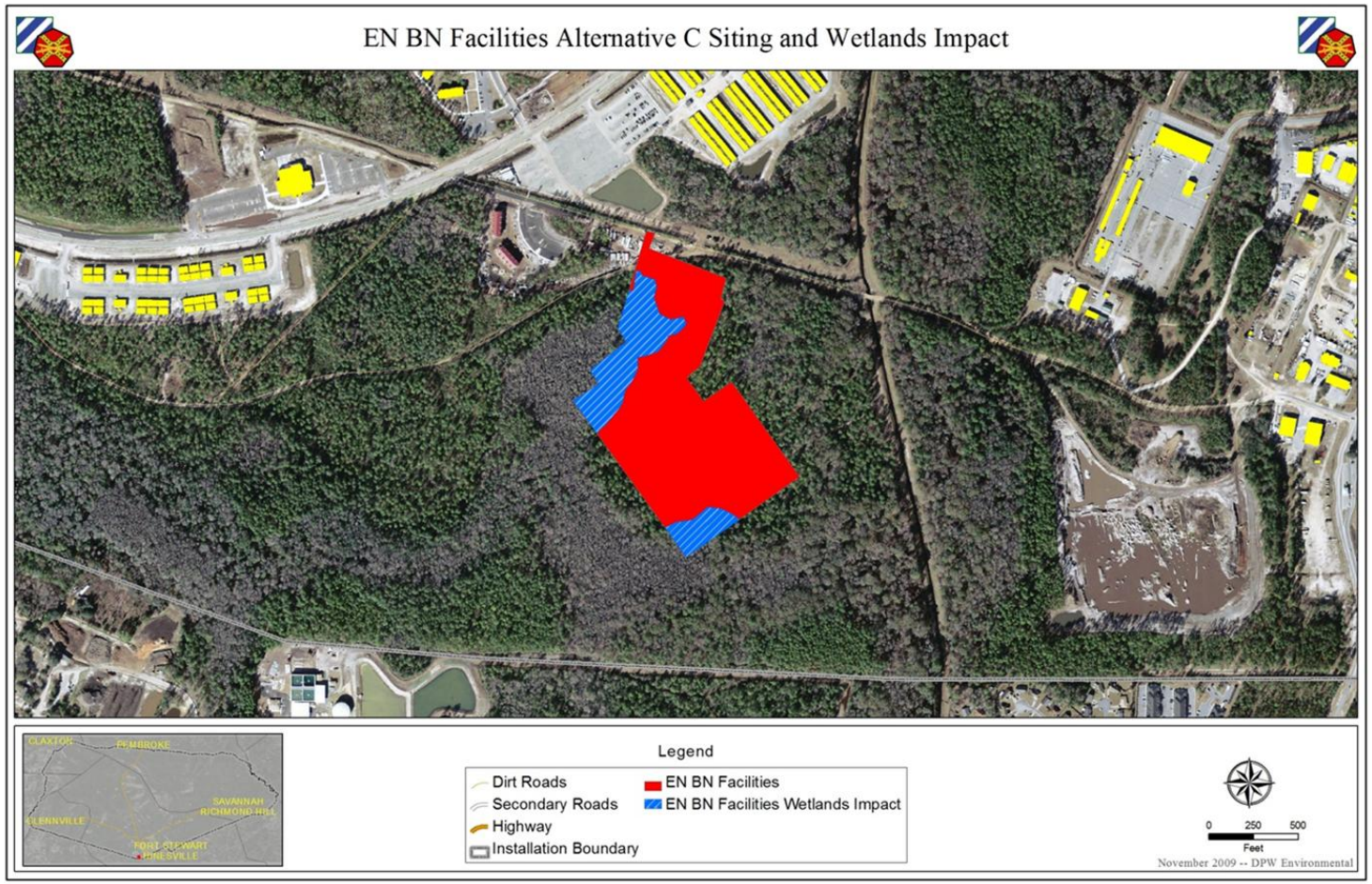


Figure 4-18: EN BN Facilities and Wetlands Impact.

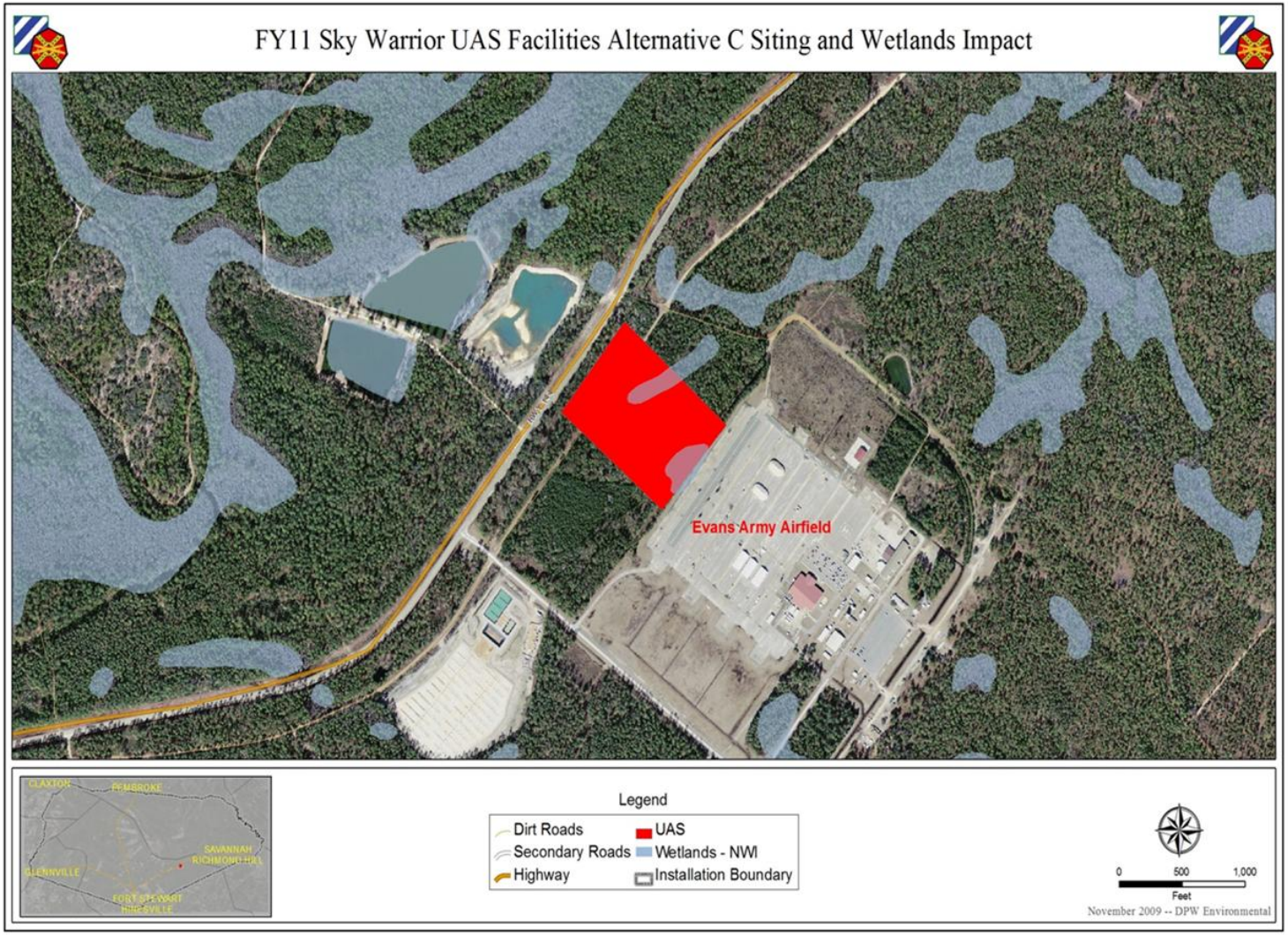


Figure 4-19: FY11 UAVS Facilities and Wetlands Impact.

4.4 BIOLOGICAL RESOURCES

4.4.1 Wildlife and Fisheries

The TLS for wildlife occurs if an action violates applicable Federal laws, such as the Migratory Bird Treaty Act (MBTA) or Army regulations. Management of wildlife and its habitat is conducted in accordance with the provisions of the Fort Stewart INRMP, which is incorporated herein by reference. Unless otherwise indicated, the information in this section is from that document. Wildlife management activities have been in progress on Fort Stewart since the early 1950s. There are 46 species of mammals, 57 species of reptiles, 241 species of birds, 38 species of amphibians, and 64 species of fish that have been reported on Fort Stewart.

Approximately 170 species of birds protected under the MBTA may occur on Fort Stewart seasonally, year round, or temporarily. Fort Stewart complies with the MBTA by implementing Army Policy Guidance of August 17, 2001, and Executive Order 13186 (*Responsibilities of Federal Agencies to Migratory Bird Treaty Act*, January 11, 2001). Fort Stewart manages and conserves migratory bird species through implementation of the INRMP and considers effects to migratory birds in any proposed action through the NEPA process.

4.4.1.1 Alternative A: No Action

Overall, this alternative will have a negligible adverse effect to wildlife. Current amounts and levels of training and construction (for which NEPA is complete) will continue, as will routine maintenance and repair of existing ranges, tank trails, roads, and residential and administrative facilities on Post. This often results in disturbances to wildlife (including protected species), which flush from the immediate area of disturbance, but then return once activities cease. Fort Stewart will continue to adhere to its existing resource management plans and to further minimize and monitor any potential effects.

4.4.1.2 Alternative B Siting (Preferred)

Overall, construction, operation, and maintenance of the ranges would have minor adverse effects to wildlife and the Garrison facilities would have minimal adverse effects to wildlife. Standard timber harvest and construction BMPs would minimize erosion and sedimentation, limiting the potential for off-site effects and degradation of surrounding habitat. Construction activities would temporarily displace some wildlife from suitable habitat in the immediate vicinity of the construction, operation, and maintenance footprints in the short term. Displacement would occur from soil disturbance, removal of vegetation, range impacts, and incidental human activity. Wildlife may also temporarily flush from the areas while in operation, especially in the vicinity of the new ranges, but would likely return to the area once operations cease. No disturbance to wildlife is predicted from routine maintenance activities.

Noise and activity during construction, operation, and maintenance would result in disturbance to wildlife primarily within the project footprints, but habitat fragmentation and edge effects would extend into adjacent habitat. With the increase in noise and activity, there would be a corresponding increase in potential disturbance to wildlife. As described in the Section 4.6, Noise, ambient and impulse noise levels would increase over large areas of Fort Stewart and in adjoining off-Post areas to the north and northeast. Increased activity within already disturbed areas (i.e. Garrison areas, ranges, training areas, and established roads) would not significantly affect wildlife given the ongoing activity to which they are already exposed.

4.4.1.3 Alternative C Siting

Potential effects to wildlife would be similar to those discussed under Alternative B, minor and temporary in nature. The alternatives differ primarily in physical location alone, as most of the wildlife potentially affected is distributed across the Post (refer to discussions in Chapter 3 for species and their locations on Post), as is the habitat in which they live. The two Garrison projects would have the most minimal disturbance to wildlife, consisting mostly of birds flushing from one portion of the Garrison area to another, returning once the disturbance ceases.

4.4.2 Protected Species

The TLS for Federally protected species occurs if an alternative disrupts normal behavioral patterns or disturbs habitat at a level that substantially impedes Fort Stewart's ability to either avoid jeopardy or conserve and recover the species. Where applicable, potential impacts to state of Georgia protected species are also discussed. This focuses primarily on the gopher tortoise, often found in the same habitat as the eastern indigo snake, a Federally protected species that often lives in the gopher tortoise burrows. No other state protected species are as closely aligned with Federally protected species. Preliminary determinations of effects are presented, in accordance with NEPA requirements, but are subject to change pending comment from the USFWS. Each project has a species-specific ESA determination (l*ikely to affect, but not to adversely effect,* etc.) and then a comprehensive species NEPA determination (*overall, this project will result in minor, moderate, or significant effects*, etc.).

4.4.2.1 Alternative A: No Action

Overall, this alternative will result in negligible adverse effects to protected species. Under this alternative, current training activities will continue across Fort Stewart. Units are briefed prior to each training event regarding sensitive areas on Post, such as protected species habitat, and what is and is not allowed within certain areas, such as within the protective buffer surrounding individual RCW cavity trees. Historical use of training areas and ranges indicate unit compliance with these restrictions and continued compliance is anticipated. Requirements for protected species protections were included in the NEPA documents for all construction currently under way on Post or in the range and training lands areas, with a finding of minor adverse effects (related to the period of construction) predicted under NEPA and a finding of not likely to adversely affect predicted under the ESA. Residential, administrative, and recreational actions, as well as routine operations and maintenance activities on training lands, ranges, airfields, and Garrison area will also continue and result in negligible affects, especially in the Garrison area, which is not managed for protected species per Fort Stewart's INRMP.

4.4.2.2 Alternative B Siting (Preferred)

Overall, this alternative will have moderate adverse effects to protected species. Alternative B sitings for ranges will impact 1,643.2 acres of RCW HMU, 41 RCW trees, 31 RCW partitions, 187.2 (primary) and 522.7 (secondary) acres of FFS pond buffers, 13.3 (potential) acres of FFS breeding ponds, 308.8 acres of gopher tortoise habitat, and 452.9 acres of eastern indigo snake HMU. Potential injury to wood storks resulting from the range and Garrison construction is unlikely to occur, virtually impossible to detect, and consequently the impacts of the projects on this species is discountable. The projects will not affect the shortnose sturgeon because habitats in the project areas are not suitable. Due to the large number of figures associated with this section, please refer to Appendix B for figures depicting the protected species known to occur at each proposed project location, as well as a more thorough discussion on potential effects.

Standard, routine, and required measures will be followed, to include adherence to guidance in required permits (such as NPDES permits, Section 404 permits, or SBVs for projects occurring within frosted flatwoods salamander habitat), best management practices (such as for timber harvest in areas within red-cockaded woodpecker habitat), and others, as applicable to each project. Minimization measures, as well as any reasonable and prudent measures required by the Biological Opinion rendered by the USFWS for the projects analyzed in this Final EIS, are discussed in Chapter 6.

Range Construction

FY11 Multipurpose Machine Gun Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs, but no effect to other protected species. No RCW cavity or start trees were detected within the project footprint; however, it is within the foraging area of five active RCW clusters. Initial information predicted an impact of 130.7 acres of RCW HMU; however, subsequent to the publication of the Draft EIS, the overall project footprint was reduced from 302 acres to 282 acres, representing a new potential impact to 115.6 acres of RCW HMU. Fort Stewart completed a modification to the BA for this project and submitted it to the USFWS for their review and comment (Appendix B). Although the project footprint is still within FFS habitat, the reduction in size means it will no longer impact any

highly likely or potential breeding sites. Potential impacts to their associated primary and secondary buffers will also be reduced. For these reasons, the project is not likely to adversely affect FFS.

The project area is not within eastern indigo snake habitat and none have been sighted. It is within gopher tortoise habitat, whose burrows the snakes often use as winter refuge, so eastern indigo snakes may be in the area. The project area does not lie within habitat for the shortnose sturgeon; therefore, the project is not likely to affect this species.

FY11 Infantry Platoon Battle Course. The construction, operation, and maintenance of this range will result in moderate adverse effects to RCWs, but no effect to other protected species. No new RCW cavity or start trees were detected within the project footprint; however, the project footprint will remove up to 900 acres within existing RCW habitat. Five active clusters will receive direct impacts from the IPBC that will result in incidental take. Although this is a greater environmental impact than under Alternative C (which will remove 766 acres of RCW habitat), it is still the preferred alternative for operational reasons, because it is closer to existing utility lines and mortar points than Alternative C. It will also affect the same RCW clusters and their habitat as under Alternative C, just to a slightly lesser extent. Subsequent to publication of the Draft EIS, an electrical ROW was added to this project's overall footprint. This will result in the removal of an additional 8.6 acres of RCW HMU, but not increase the potential effect to RCWs, which is still deemed moderate in nature. The ROW will also potentially impact one acre of primary and 4.3 acres of secondary pond buffers for one potential FFS breeding pond, but still not result in any adverse effect to this species. Fort Stewart submitted a modification to the BA for this project to the USFWS for their review and comment (Appendix B). The project footprint does not lie within eastern indigo snake, wood stork, or shortnose sturgeon habitat; therefore, the project is not likely to affect these species.

FY11 Modified Record Fire Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs, but no effect to other protected species. No RCW cavity or start trees were detected within the project footprint; however it is within the foraging area of one active RCW cluster. The project will impact 31.5 acres of that habitat. Although the

project footprint is within FFS habitat, none have been sighted. The FFS habitat consists of two potential breeding ponds with associated primary and secondary buffers. Project design, however, will incorporate erosion and sedimentation control measures to ensure impacts are minimized. For these reasons, the project is not likely to adversely affect FFS. The project area does not lie within habitat for the eastern indigo snake, gopher tortoise, wood stork, or shortnose sturgeon; therefore, the project is not likely to affect these species.

FY13 Infantry Squad Battle Course. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs and eastern indigo snakes, but no effect to other protected species. No RCW cavity or start trees were detected within the project footprint; however, it is within the foraging partition of two active clusters and will impact 153.8 acres of that habitat. The footprint does not lie within the FFS habitat, will not impact any FFS ponds or their associated buffers, and no FFS have been sighted. Therefore, the proposed action is not likely to adversely affect FFS.

The project footprint is within eastern indigo snake and gopher tortoise habitat and they have been detected within the area. Since this site contains approximately 275 acres of gopher tortoise habitat, this action will negatively impact gopher tortoises, though it is not likely to also affect the snake. Prior to construction, operation, and maintenance, gopher tortoises found in the project footprint will be captured and relocated to off-site suitable habitat. The project area does not lie within habitat for the wood storks or shortnose sturgeons; therefore, the project is not likely to affect these species.

FY13 Qualification Training Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs, but no effect to other protected species. No RCW cavity or start trees were detected within the project footprint; however, it is within the foraging area of five active clusters and will impact 157.6 acres of that habitat. Although the project footprint is within FFS habitat, none have been detected. The FFS habitat within the proposed project area contains two potential breeding ponds and the associated primary and secondary pond buffers. The project area does not lie within habitat for the eastern indigo snake, gopher

tortoise, wood stork, or shortnose sturgeon; therefore, the project is not likely to affect these species.

FY13 Digital Multipurpose Training Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs and eastern indigo snakes/gopher tortoises, but no effect to other protected species. No RCW cavity or start trees were detected within the project footprint; however, it will impact 22.4 acres of RCW-suitable habitat. A portion of the project footprint also lies within FFS habitat, but it will not adversely impact any known breeding ponds or their buffers and is not likely to adversely affect FFS

The project footprint is within eastern indigo snake habitat and a portion (267.8 acres) also lies within gopher tortoise habitat. The project may adversely affect these species. The project footprint does not lie within habitat for the wood storks or shortnose sturgeons; therefore, the proposed project is not expected to affect these species.

FY13 10 Meter / 25 Meter Zero Range. The construction, operation, and maintenance of this range will result in minor adverse effects to protected species. No RCW cavity or start trees were detected within the project footprint; however, it will impact 3.8 acres of existing RCW habitat. The project footprint lies within FFS habitat but will not impact any FFS ponds or their associated buffers. No FFS have been detected and it is not likely to adversely affect FFS. The project footprint does not lie within the eastern indigo snake habitat or near gopher tortoise burrows the snakes might use as winter refuge. Therefore, the proposed project is not likely to adversely affect this species. The project area does not lie within habitat for the wood storks or shortnose sturgeon; therefore, the proposed project is not expected to affect these species.

FY13 Pistol Range. The construction, operation, and maintenance of this range will result in no adverse effects to protected species. No RCW cavity or start trees were detected within the project footprint; however, it will impact 4.0 acres of existing RCW habitat. The project footprint lies within FFS habitat, but will not impact any FFS ponds or their associated buffers. No FFS detected; therefore, the proposed project is not likely to adversely affect FFS. The

project area does not lie within habitat for the eastern indigo snake, gopher tortoise, wood stork, or shortnose sturgeon; therefore, the proposed project is not expected to affect these species.

FY13 Known Distance Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs, but no effect to other protected species. No RCW cavity or start trees were detected within the project footprint; however, it will impact 39.7 acres of existing RCW habitat. A portion of the project footprint lies within FFS habitat, but it will not impact any likely breeding ponds or buffers and this species has never been detected here. Therefore, it is not likely to adversely affect FFS. The project area does not lie within habitat for the eastern indigo snake, gopher tortoise, wood stork, or shortnose sturgeon; therefore, the proposed project is not expected to affect these species.

FY13 Fire and Movement Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs, but no effect to other protected species. No RCW cavity or start trees were detected within the project footprint and no RCW habitat will be impacted. Most of this area was previously designated as non-forested habitat in Fort Stewart's INRMP and is therefore not managed for protected species. The entire proposed project footprint lies within FFS habitat, including a potential breeding pond with its associated primary and secondary buffer; however, there is no record of FFS occurring here. The proposed project will include erosion and sedimentation control measures and the proposed action is not likely to adversely affect FFS.

The project area does not lie within eastern indigo snake habitat and will not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refuge. The proposed project is not likely to adversely affect eastern indigo snakes or their habitat. The project area does not lie within habitat for the eastern indigo snake, gopher tortoise, wood stork, or shortnose sturgeon; therefore, the proposed project is not expected to affect these species.

FY13 Modified Record Fire Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs, but no effect to other protected species. The proposed project footprint lies within the foraging partition of one active RCW cluster and will

impact 22.2 acres of RCW habitat. The entire footprint also lies within FFS habitat that includes primary and secondary buffers of a potential breeding site, but no FFS sighting has occurred. The project area does not lie within habitat for the eastern indigo snake, gopher tortoise, wood stork, or shortnose sturgeon. Therefore, the proposed project is not expected to affect these species.

FY14 Convoy Live Fire Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs, but no effect to other protected species. No RCW cavity or start trees were detected within the project footprint; however, it will impact 150.4 acres of existing RCW habitat. The entry point of the Aerial Gunnery Range (AGR) lies within a secondary buffer of a potential FFS breeding site. Some of the engagement boxes lie within FFS habitat, but none have been identified in these areas. Because of the distance from the nearest FFS sighting, the proposed engagement and entry areas are not likely to adversely impact the FFS.

Some of the engagement boxes are within the eastern indigo snake habitat, but will not impact any gopher tortoise burrows the snakes might use as winter refuge. The proposed project is not likely to adversely affect either species. The project area does not lie within habitat for the wood storks or shortnose sturgeons. Therefore, the proposed project is not expected to affect these species.

Garrison Construction

Engineer Battalion Facilities. The construction, operation, and maintenance of this facility was previously assessed in the *Final Biological Assessment for the Implementation of the Army Campaign Plan at Fort Stewart, Georgia*, dated October 2008. Analysis by the FWB indicated a NEPA and ESA finding of no effect to protected species as a result of this project.

FY11 Sky Warrior UAVS Facilities. The construction, operation, and maintenance of this facility will result in minor adverse effects to RCWs, but no effect to other protected species. No RCW cavity or start trees were detected within the project footprint; however, it will impact 33.7 acres of RCW habitat. The project footprint lies within the FFS habitat, but not within potential

breeding ponds or their associated primary or secondary buffers. No FFS have been detected. Therefore, the project is not likely to adversely impact FFS. The project footprint does not lie within habitat for the eastern indigo snake, wood stork, or shortnose sturgeon. Therefore, the proposed project is not expected to affect these species.

4.4.2.3 Alternative C Siting

Overall, this alternative will have moderate adverse effects to protected species. Alternative C sightings for ranges will impact 1,648.2 acres of RCW HMU, 7 RCW trees, 18 RCW partitions, 98.6 (primary) and 328.2 (secondary) acres of FFS pond buffers, 12.6 acres of potential FFS breeding ponds, 665.1 acres of gopher tortoise habitat, and 844 acres of eastern indigo snake HMU. When compared to the effects predicted under Alternative B, implementation of Alternative C will result in the following (see range-by-range discussion for more details):

- virtually the same effect to RCW HMU, but slightly greater to RCW trees and partitions;
- slightly less effects to FFS pond buffers and ponds;
- more effects to eastern indigo snake habitat; and
- more effects to gopher tortoise habitat.

Potential injury to wood storks resulting from the Range and Infrastructure Construction is unlikely to occur, virtually impossible to detect, and consequently the impacts of the projects on this species is discountable. The projects will not affect the shortnose sturgeon because habitats in the project areas are not suitable.

Range Construction

FY11 Multipurpose Machine Gun Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs, but no effect to other protected species. The proposed project footprint does not lie within any active RCW foraging partitions, but will impact 134.2 acres of existing RCW habitat. A portion of the project footprint lies within two FFS potential breeding ponds, their associated primary and secondary buffers, and within the secondary buffer of a potential breeding site, though none have actually been detected. Therefore, the project is not likely to adversely affect FFS. The project area does not lie within

habitat for the eastern indigo snake, gopher tortoise, wood stork, or shortnose sturgeon. Therefore, the proposed project is not expected to affect these species. If this site were chosen, the footprint may or may not be reduced, as has happened with the Alternative B site. If so, the potential affects will be reassessed and a modification of the BA submitted to USFWS for their review and comment, as has occurred under Alternative B.

FY11 Infantry Platoon Battle Course. The construction, operation, and maintenance of this range will result in moderate adverse effects to RCWs and minor adverse effects to FFS, but no effect to other protected species. Construction at this location will remove all the trees within RCW cluster 105. The project footprint lies within seven active RCW foraging partitions and will remove 766.2 acres of existing RCW habitat (the same clusters and habitat as within the Alternative B siting). Although this is less RCW habitat removal than under Alternative B (which will remove 900 acres), it is still the non-preferred alternative due to its distance from existing infrastructure (utilities) and mortar firing points. If this alternative were chosen, subsequent designs would include the electrical ROW discussed under Alternative B and further consultation with the USFWS initiated.

A portion of the project footprint lies within two potential FFS breeding ponds, their associated primary and secondary buffers, and within the secondary buffer of a potential breeding site, though none have actually been detected. The project is not likely to adversely affect FFS. The project area does not lie within habitat for the eastern indigo snake, gopher tortoise, wood stork, or shortnose sturgeon. Therefore, the proposed project is not expected to affect these species.

FY11 Modified Record Fire Range. Overall, this project will result in no effect to protected species. The proposed project footprint does not lie within any active RCW foraging partitions, but will impact 17.4 acres of existing RCW habitat. The project footprint does not lie within habitat for the frosted flatwoods salamander, eastern indigo snake, gopher tortoise, wood stork, or shortnose sturgeon. Therefore, the proposed project is not expected to affect these species.

FY13 Infantry Squad Battle Course. The construction, operation, and maintenance of this range will result in moderate adverse effects to RCWs and minor adverse effects to eastern indigo

snakes, but no effect to other protected species. A portion of the proposed project footprint lies within two active RCW foraging partitions and will impact 356.4 acres of existing RCW habitat. The proposed action area does not lie within the FFS habitat, will not impact any FFS ponds or their associated buffers, and none have been detected in the area. The proposed project is therefore not likely to adversely affect this species. The entire proposed project area lies within the eastern indigo snake habitat and they have been detected within the project area. A portion of the project footprint also lies within gopher tortoise habitat, whose burrows the snakes often use as winter refuge. The proposed project is not likely to adversely affect either species. The project footprint does not lie within habitat for the wood storks or shortnose sturgeons. Therefore, the proposed project is not expected to affect these species.

FY13 Qualification Training Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs, but no effect to other protected species. No RCW cavity or start trees were detected within the project footprint; however, it will impact 124.6 acres of existing RCW habitat. A portion of the proposed project footprint lies within FFS habitat, but not within any FFS breeding ponds or their associated buffers, and none have been identified in the area. Therefore, the project is not likely to adversely affect FFS. The project footprint does not lie within habitat for the eastern indigo snake, wood stork, or shortnose sturgeon. Therefore, the proposed project is not expected to affect these species.

FY13 Digital Multipurpose Training Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs and eastern indigo snakes, but no effect to other protected species. No RCW cavity or start trees lie within the project footprint, but a portion falls within one active RCW foraging partition and result in an impact to 31.0 acres of RCW habitat. The entire project footprint lies within eastern indigo snake habitat and there have been five sightings of the species within it. A portion of this project footprint also lies within gopher tortoise habitat that the snakes may use for winter refuge. This action is not likely to adversely affect either species.

A portion of the project footprint lies within FFS habitat, but will not affect any known breeding ponds or their associated buffers and none have been sighted in the area. The proposed action is

not likely to adversely affect the FFS. The project footprint does not lie within habitat for wood storks or shortnose sturgeons. Therefore, the proposed project is not expected to affect these species.

FY13 10 Meter / 25 Meter Zero Range. The construction, operation, and maintenance of this range will result in no effect to protected species. There are no RCW cavity or start trees within the project footprint, but it is within an active RCW partition and will impact 2.9 acres of existing RCW habitat. The entire project footprint lies within FFS habitat but will not impact any FFS ponds or their associated buffers. No FFS have been detected and the project is not likely to adversely affect FFS. The project footprint does not lie within habitat for eastern indigo snakes, wood storks, or shortnose sturgeons. Therefore, the proposed project is not expected to affect these species.

FY13 Pistol Range. The construction, operation, and maintenance of this range will result in no effect to protected species. There are no RCW cavity or start trees within the project footprint but it will impact 4.8 acres of existing RCW habitat. The entire project footprint lies within the Fort Stewart FFS habitat but will not impact any FFS ponds or their associated buffers and none have been detected in the area. The project is not likely to adversely affect FFS. The project footprint does not lie within habitat for eastern indigo snakes, wood storks, or shortnose sturgeons. Therefore, the proposed project is not expected to affect these species.

FY13 Known Distance Range. The construction, operation, and maintenance of this range will result in moderate adverse effects to RCWs, but no effect to other protected species. A portion of RCW cluster 336 and its foraging partition lie within the project footprint. Specifically, trees 2761 and 4443 lie within the project footprint. Construction, operation, and maintenance will impact 70.0 acres of existing RCW habitat. The entire project footprint lies within eastern indigo snake habitat, but no eastern indigo snakes have been detected in the area. The project footprint does not lie within gopher tortoise habitat and will not impact any burrows that the snakes might use as a winter refuge. The proposed project is not likely to adversely affect either of these species. The project footprint does not lie within habitat for FFS, wood storks, or shortnose sturgeons. Therefore, the proposed project is not expected to affect these species.

FY13 Fire and Movement Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs, but no effect to other protected species. There are no RCW cavity or start trees within the project footprint, but it is within one active RCW foraging partition and will impact 11.4 acres of RCW habitat. The entire project area lies within the eastern indigo snake habitat, but none have been detected within the area. The project footprint does not lie within gopher tortoise habitat that the snakes may use as a winter refuge. The proposed project is not likely to adversely affect either of these species. The project footprint does not lie within habitat for FFS, wood storks, or shortnose sturgeons. Therefore, the proposed project is not expected to affect these species.

FY13 Modified Record Fire Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs, but no effect to other protected species. There are no RCW cavity or start trees within the project footprint, but it is within one active RCW foraging partition and will impact 2.1 acres of RCW habitat. The entire project footprint lies within FFS habitat, although there are no records of any FFS sightings. The project footprint does lie within a primary and secondary buffer of a potential breeding site, but is unlikely to adversely affect FFS. The project footprint does not lie within habitat for eastern indigo snakes, wood storks, or shortnose sturgeons. Therefore, the proposed project is not expected to affect these species.

FY14 Convoy Live Fire Range. The construction, operation, and maintenance of this range will result in minor adverse effects to RCWs, but no effect to other protected species. There are no RCW cavity or start trees within the project footprint, but a portion of it is within five active RCW foraging partitions. The project will impact 105.1 acres of existing RCW habitat. A portion of the project footprint lies within the eastern indigo snake habitat, but there are no records of sightings. Though the project footprint does not lie within gopher tortoise habitat, the nearest colony that eastern indigo snakes may use as refuge is just within a few feet east of the northernmost section of the range. The proposed action is still unlikely to adversely affect either species.

A portion of the project footprint lies within FFS habitat, but there are no records of any occurring within the project footprint. The project footprint lies within the primary and secondary buffers of four potential breeding sites. The proposed project is still unlikely to adversely affect FFS. The project footprint does not lie within habitat for wood storks or shortnose sturgeons. Therefore, the proposed project is not expected to affect these species.

Garrison Construction

Engineer Battalion Facilities. The construction, operation, and maintenance of this facility was previously assessed in the *Final Biological Assessment for the Implementation of the Army Campaign Plan at Fort Stewart, Georgia*, dated October 2008. Analysis by the FWB indicated a NEPA and ESA finding of no effect to protected species as a result of this project.

FY11 Sky Warrior UAVS Facilities. The construction, operation, and maintenance of this facility will result in minor adverse effects to RCWs, but no effect to other protected species. There are no RCW cavity or start trees within the project footprint, but it will impact 25.0 acres of RCW habitat. The entire project footprint lies within FFS habitat, but not within any FFS ponds or affect their associated buffers, and no FFS have been detected in the area. The proposed project is unlikely to adversely affect FFS. The project footprint does not lie within habitat for eastern indigo snake, wood stork, or shortnose sturgeon. Therefore, the proposed project is not expected to affect these species.

4.4.3 Forestry Management

This section evaluates the impacts to forestry resources, prescribed burns, and wildfire management. Impacts to timber resources were assessed by comparing Fort Stewart timber management methods and plans to the potential that activities associated with the alternatives would impact the timber management program. Data analyzed include existing timber management plans; timber management policies; operational guidelines and procedures; and GIS data, including proposed and existing range footprints, proposed and existing range SDZs, impact areas, and recent aerial photography. A review of the proposed changes in land use,

existing and proposed programs, and training requirements was conducted to determine activities with the potential to adversely affect forestry management.

4.4.3.1 Timber Resource Management

For this evaluation, there is no numeric TLS. Instead, the measure of significance is based on the extent or degree to which implementing each alternative would involve the following timber management issues:

- Use of weapons with a potential for causing timber damage and metal contamination in previously uncontaminated areas,
- Substantial acreage removed from timber management for other uses, and/or
- Proposed activities precluding or restricting access for management of timber resources

Activities were analyzed to determine if existing policies, plans, procedures, or restrictions are in place to protect human safety, infrastructure, cultural and biological resources, and mission activities. This analysis included determining what effect the proposed changes would potentially have on timber resources. Existing policies, plans, procedures, and restrictions at Fort Stewart relating to timber management that were evaluated include the INRMP, 2007 Management Guidelines for the Red-Cockaded Woodpecker on Army Installations, and AR200-1, "Environmental Protection and Enhancement." Unless otherwise indicated, the basis for the following analyses is within these documents.

Alternative A: No-Action. Overall, this alternative would result in negligible adverse effects impacts to timber resource management. Range capabilities and use timber management activities on Fort Stewart are ongoing and will continue under this alternative as planned in Fort Stewart's Timber Harvest Priority List (THPL). Most prescribed harvest activities are thinnings carried out to support troop training, endangered species management, and forest health. About 20 thinning harvests occur per year, each averaging 250 acres in size.

Timber harvests are already underway (and several pending) on the Garrison area and in the surrounding training lands for construction projects for which NEPA is complete. Most of these

harvests are small clear-cuts (less than 30 acres) to support construction, training land management (for training and environmental concerns, such as longleaf pine/wiregrass restoration), or tank trail and road maintenance. These actions occur on a frequency of about 15 to 20 per year, and average 2-3 acres each. Timber management activities on the Fort Stewart Garrison area are mostly related to mission-related construction and rarely are associated with operations or routine facility maintenance, unless for safety (such as a tree leaning and in danger of falling on personnel or facilities).

Alternative B Siting (Preferred). Overall, this alternative will have minor adverse effects to timber resource management as a result of construction activities and/or changes in land use designations (resulting from construction).

Range Construction: Range infrastructure: Any additional tank trails newly constructed or alongside existing roads could further reduce the timber base at Fort Stewart. Such actions may cause minor timber losses from timber harvest, but could also be beneficial if the new trails are positioned as firebreaks, preventing additional timber losses from wildfires. Coordination with the Forestry Branch regarding new tank trail construction associated with ranges would maximize this potential.

The change of land use classifications would have a direct impact on timber resources. The change of land uses from timbered lands to ranges would have the direct effect of permanently removing 997 acres of timber, including 41 acres designated as hardwood management areas (HMAs) within the proposed range footprints and/or engagement boxes. No direct impacts to future or existing longleaf/wiregrass restoration sites are expected.

Hazardous Operations*:* Potential metal contamination and tree mortality from hazardous operations (such as live fire weapons use) would increase under Alternative B, as it would result in the construction of new ranges and, accordingly, more live ammunition firing into Fort Stewart's forests. This creates a potential for mortality of standing timber and contamination of timber by the ammunition's metal shell anywhere within the SDZ of a particular range. The risk

increases the closer the trees are to the range footprint and in timber lying within overlapping SDZs, as occurs with most of the projects within Alternative B.

There are approximately 26,000 acres of timbered lands within the SDZs of the proposed projects that could be indirectly impacted by hazardous operations on the proposed ranges, of which 476 acres are designated as HMAs and 50 acres as potential longleaf/wiregrass restoration sites. Also, the IPBC and the ISBC are designed to have engagement boxes, some of which are embedded within standing timber left within the range footprints to add training realism. Timber mortality from live fire can be expected in areas adjacent to these engagement boxes, which may create a safety hazard to troops training on these ranges.

Additionally, the risk of wildfires and associated smoke hazards may increase because of the heavy fuel loads created by the dead timber (discussed in more detail in Section 4.4.4, Fire Management). In addition to the above impacts, live fire exercises make it difficult to schedule and accomplish silvicultural activities because of the length of time required to conduct timber cruising/ marking and harvesting operations.

Garrison Construction: The construction of these two projects would have a minor adverse effect to timber resource management. The change of land classifications from timbered lands to administrative/Garrison would have a direct impact on timber resources by permanently removing 124 acres of forest, including 11 acres designated as HMAs. Because these are not live fire ranges, no indirect impact of contaminated timber or off-site tree mortality is expected. No impacts to future or existing longleaf/wiregrass restoration sites are expected.

Alternative C Siting

Overall, this alternative will have minor adverse effects to timber resource management. Impacts would be similar in nature and acreage to those discussed under Alternative B; the differences between the two alternatives are presented below.

***Range Construction*:** The change of land use from timbered lands to ranges would have the direct effect of permanently removing 1,191 acres of timber, including 45 acres of HMAs, within

the proposed range footprints and/or engagement boxes. This is more acreage removal than proposed under Alternative B, which would remove 997 acres of timber and 41 acres of HMAs. No direct impacts to future or existing longleaf/wiregrass restoration sites are expected.

***Hazardous Operations*:** Potential metal contamination and tree mortality from hazardous operations (such as live fire weapons use) would increase under Alternative C. There are approximately 24,000 acres of timbered lands within the SDZs of the proposed projects indirectly impacted by hazardous operations on the proposed ranges, slightly less than the acreage proposed under Alternative B, which would result in 26,000 acres within new ranges' SDZs. This includes 430 acres designated as HMAs and 50 acres as potential longleaf/wiregrass restoration sites, compared to 476 acres of HMA and the same amount (50 acres) of restoration sites under Alternative B. Also, the IPBC and ISBC engagement boxes, some of which are embedded within standing timber will be left within the range footprints to add to training realism. Timber mortality and the risk of wildfires and associated smoke hazards may increase because of the heavy fuel loads created by the dead timber.

Garrison Construction: The construction of these two projects would have a negligible-to-minor adverse effect to timber resource management. The change of land classifications from timbered lands to administrative/Garrison would have a direct impact on timber resources by permanently removing 44 acres of forest, much less than under Alternative B. This would reduce the timber base upon which the Installation's forestry program depends for funding. Because these are not live fire ranges, no indirect impact of contaminated timber or off site tree mortality is expected. No impacts to future or existing longleaf/wiregrass restoration sites or HMAs are expected.

4.4.3.2 Wildland Fire Management

Wildland fires include both intentional (prescribed burn program) and non-intentional fires (wildfires). Impacts to wildland fire were assessed by comparing Fort Stewart fire management methods and plans to the potential of the alternatives to cause wildfires and impact the prescribed fire program. The TLS to the Fort Stewart wildland fire management program includes the degree to which implementing the alternative would involve the following issues:

- Use of weapons with a potential of causing wildfires,
- Occurrence of activities in areas with higher fuel loads,
- Occurrence of training during high fire danger days,
- Proximity of sites to smoke sensitive areas, and
- Activities that preclude or restrict access for wildland fire management.

Wildland fire management resources analyzed include existing fire management plans, fire management policies, operational guidelines and procedures, and the Fort Stewart wildland fire environment, including fuels, weather, and topography. A review of the proposed changes in land use was conducted to determine which changes have the potential either to directly or indirectly impact the wildland fire management program. This includes (a) an increase in the likelihood of wildland fire ignitions and (b) a modification of prescribed burning regimes for the areas.

Activities that have the potential to start wildland fires were analyzed to determine if existing policies, plans, procedures, or restrictions are in place to protect human safety, infrastructure, cultural and biological resources, and mission activities from potential impacts resulting from the proposed actions and alternatives. This analysis included determining what effect the proposed changes would potentially have on the prescribed fire program because safety considerations can require changes in both timing and rotational periods of prescribed fires in the vicinity of live fire ranges. Existing policies, plans, procedures, and restrictions at Fort Stewart relating to wildland fire management evaluated include those discussed under 4.4.3.1, Timber Resource Management, in addition to the 2010 Integrated Wildland Fire Management Plan (IWFMP) and the 1995 National Wildland Fire Policy.

Alternative A: No-Action. Overall, this alternative would result in negligible adverse effects to wildland fire management on Post. Current activities include suppression of wildfires occurring on ranges and training land, prescribed burning approximately 120,000 acres per year, maintenance of old firebreaks, and construction of new firebreaks. Lack of access to training areas may occur during mission-essential training, which restricts prescribed burning activities. Population densities and associated infrastructure on and around the boundary of Fort Stewart

also restrict when the branch may conduct prescribed burns, due to concerns with smoke management. Lack of access and smoke management delaying prescribed burning may lead to a buildup of fuel (timber debris, etc.) on the forested lands and training areas. This buildup and fuel loading then increases the potential for wildfires. These adverse effects to burning are minimized through close coordination with DPTMS Range Control Scheduling, so burns can occur when needed.

Activities on the Fort Stewart Garrison area do not currently affect or cause wildland fires or changes in prescribed burn regimes. The Forestry Branch (Fire Management) would continue to prescribe burn and respond to fire emergencies as needed. Adverse effects of wildfires on live fire ranges are reduced through the use of prescribed burns.

Alternative B Siting (Preferred). Overall, this alternative will have minor adverse effects to wildland fire management on Post. The following sections address potential impacts under Alternative B expected from range and Garrison activities and changes in levels of use.

Range Construction: The construction of new ranges and subsequent change of land use would have direct and indirect impacts on wildland fire management. The change and increase of range activities associated with the change in land uses would affect the potential for increased wildland fire, cause modification to the prescribed burn program, and create additional smoke concerns.

Modification to the prescribed burn program on Fort Stewart will result from construction of the proposed ranges under Alternative B. Fort Stewart's Forestry Branch will be required to burn the additional live-fire range footprints to help reduce occurrences of wildfires ignited in the range footprints during times of intense mission related training. This will increase the acres of range safety burning required during the dormant season to help reduce range wildfires. This addition will strain resources during times of range shutdowns, normally during a 3-4 week period over the Christmas/New Year's break, to accomplish the burning mission. This mission is subject to weather factors and the addition of more range acres may further limit burning. Also, because of the conversion of the training lands from multi-use training activities to live-fire range use only,

loss of available days for burning in any season, either growing season or dormant season, will be likely.

Training associated with the ranges constructed under Alternative B could potentially cause wildfires within range boundaries or nearby woodlands. This, in turn, raises the likelihood of smoke impacting surrounding areas. With the potential limitation of prescribed burns on these areas, as described in the paragraph above, woodland fuels may increase and smoke can be generated by wildfires under any conditions. Smoke generated by wildfires is more likely to affect surrounding communities due to the inability of managers to use weather resources available, as is the case with prescribed burns, under more predictable conditions.

Potential wildfires from hazardous operations (such as live fire weapons use) could increase under Alternative B. Risks would be greater in areas with increased woodland fuels buildup, particularly during times of drought or high winds. Additionally, the risk of wildfires and associated smoke hazards may increase because of the heavy fuel loads created by the dead timber. Any additional tank trails alongside roads, or separately constructed independent of roads, could have a beneficial impact on wildland fire management by acting as potential firebreaks. No impacts are expected due to routine maintenance activities on the new ranges.

Garrison Construction: The change of land use from timbered lands to administrative/Garrison due to these two facilities' construction would have minor adverse impacts on wildland fire management. The change and increase of training activities associated with the change in land uses, particularly in the B-5 training area, would increase the potential for wildfires and limit the use of prescribed burning because of the difficulties associated with smoke management and reduced access because of training. This would affect the reduction of woodland fuels and increase the incidence of wildfires and the associated smoke management concerns.

Alternative C Siting. Overall, this alternative will have minor adverse effects to wildland fire management, similar to those discussed under Alternative B.

Range Construction: The change and increase of range activities associated with the change in land uses would affect the potential for increased wildland fire, cause modification to the prescribed burn program (as discussed under Alternative B), and create additional smoke concerns. Potential unplanned fire ignitions from hazardous operations (such as live fire weapons use) could increase under Alternative C and are similar to those expected under Alternative B. Risks would be greater in areas with increased woodland fuels buildup, particularly during times of drought or high winds. Additionally, the risk of wildfires and associated smoke hazards may increase because of the heavy fuel loads created by the dead timber.

Any additional tank trails alongside roads, or separately constructed independent of roads, could have a beneficial impact on wildland fire management by acting as potential firebreaks. However, new range infrastructure construction, operation, and maintenance would potentially be negatively impacted by wildland fire if not carefully planned and sited to minimize effects of unwanted wildland fire.

Garrison Construction: The change of land use from timbered lands to administrative/Garrison due to these two facilities' construction would have minor adverse impacts on wildland fire management, affecting the reduction of woodland fuels and increasing the incidence of wildfires and smoke management concerns. This is especially true in the D-1 training area because of its proximity to the Garrison. A slight increase in air operations, including UAVS facilities, under Alternative C in the A-12 training area could cause a fire under restricted airspace. The increased risk would be minor and mostly minimized through ongoing wildland fire management practices.

4.5 CULTURAL RESOURCES

The TLS for cultural resources is the violation of applicable Federal laws and regulations, such as the National Historic Preservation Act, the Archeological Resources Protection Act, and others. Direct and indirect impacts were assessed within the context of applicable laws and regulations. For this EIS, impact analyses for historic properties follow guidelines set forth in

Section 106 of the NHPA implementing regulations (36 CFR 800), Fort Stewart's Programmatic Agreement (PA) with the Georgia SHPO, and applicable SOPs of the ICRMP.

Per the Department of the Army's Pamphlet 200-4, in most cases the types of activities that are considered significant impacts to cultural resources include 1) demolition of a national historic landmark, or any part thereof, without mitigative measures; or 2) other unmitigated cultural resource-disturbing activity of severe adverse magnitude (1998:7). For each proposed project discussed in this section, the potential for prehistoric historic, and Native American resources is assessed. No systematic inventory of paleontological remains has been conducted for the areas of these projects and no known paleontological resources identified; therefore, this resource is not discussed in this EIS.

4.5.1 Alternative A: No-Action

Overall, this alternative has the potential for negligible adverse effects to cultural resources. Construction for which NEPA (and cultural resource review) is complete will occur, as will operations and training on existing ranges and training areas. Activities associated with operations and maintenance of training areas with the potential to affect cultural resources include vehicle maneuvers, individual fighting position entrenchment, live fire training, prescribed burning and wildland fire management practices, and recreational use of training areas. Impacts are monitored and regulated when anticipated through a variety of preventative and minimization measures.

Examples include: clearly marking sensitive cultural resources as off-limits to training and/or ground disturbance; education of military and civilian work force on cultural resources responsibilities; and careful monitoring of cultural resources to ensure intentional and inadvertent damage is documented and measures to prevent future disturbance are in place. Indirect impacts may occur to nearby historic properties, if they exist, as a result of continued traffic, bivouac activities, and/or generalized training within adjacent training lands. Impacts to cultural resources can be avoided, minimized, or mitigated in accordance with applicable cultural resource laws.

4.5.2 Alternative B Siting (Preferred)

Overall, this alternative may result in minor adverse effects to eligible historic properties. All proposed project sitings have been inventoried for cultural resources and impact assessments conducted. There is a low potential for impact to four cemeteries from live fire, once the ranges are operational. Additional details on these resources are available in the project-by-project discussions in this section. The record of Fort Stewart's consultation with the GA SHPO and the Native American Tribes with whom it consults regarding the projects in this EIS is complete and available for review in Appendix C of this Final EIS. Per ARPA and NHPA, the attachments to this consultation (which may include information idenfying the location of these sensitive resources) are not presented in this appendix.

4.5.2.1 Range Facility Construction

Multipurpose Machine Gun Range. Alternative B will affect portions of TAs D7, D8, and D11, which have been surveyed for cultural resources (Trinkley and Hacker 2000; Trinkley et al, 1998). Four archaeological sites (9LI485, 9LI490, 9LI491, and 9LI494) were encountered within the project footprint and determined ineligible for the NRHP. Therefore, no direct or indirect impacts to historic properties will occur as a result of construction at this alternative location for this range.

Infantry Platoon Battle Course. Alternative B will affect portions of TA C1. It has been surveyed for cultural resources (Cain et al. 2009; Kennedy et al. 2004; Greer et al. 2010), with the exception of portions not suitable for survey due to the elevated risk of unexploded ordnance (UXO) associated with the former Aerial Gunnery Range impact area. One archaeological site (9BN1136) was identified within the project footprint and determined ineligible for the NRHP. Therefore, no direct impacts will occur as a result of Alternative B. The recent addition of a 12.4 acre electrical ROW to the IPBC's overall footprint (as discussed under Wetlands and Protected Species) would not result in additional impacts to Cultural Resources.

Minor indirect impacts to cultural resources may result from the utilization of the small arms range. Three cemeteries (Little Creek, Shuman, and Bonnet Bay) are located within the SDZs associated with the IPBC. During the detailed design phase of the proposed range, if an impact to the cemeteries from live fire seems likely, protective berms or redesigns to the IPBC will be considered. As with all cemeteries within active SDZs, the Installation routinely monitors the cemeteries for any damage.

FY11 Modified Record Fire Range. Alternative B will affect TA B4 on the Small Arms Delta Range, previously surveyed for cultural resources (Ross 2004b). No cultural resources were identified within or in proximity to the project footprint. Therefore, no direct or indirect impacts to historic properties will occur as a result of construction at this alternative location for this range.

Digital Multipurpose Training Range. Alternative B will affect portions of TAs B9 and B10, previously surveyed for cultural resources (Ross 2004a; Cain et al. 2005, 2009 Morehead et al. 2008b). The existing range floor was excluded from cultural resource survey in accordance with the categorical exclusion of survey requirements for previously disturbed special use facilities (such as range floors) in accordance with the Installation's PA with the Georgia SHPO. Twelve archaeological sites were identified within the proposed footprint (see Appendix C for sites affected) which have all been determined ineligible for the NRHP, as have all buildings within the viewshed of the proposed range (Fortune and Maggioni 2002). Although areas in proximity to the proposed footprint have not been fully evaluated for archaeological resources, adjacent training lands have a predominantly low potential for cultural resources. Once detailed range designs are developed and impacts to cultural resources are indicated, additional cultural resource surveys may be required in accordance with the NHPA and other applicable laws. Therefore, as currently proposed, no adverse impacts to historic properties will occur.

Qualification Training Range. Alternative B will affect portions of TA D7. The proposed project footprint was surveyed for cultural resources and none were identified (Trinkley and Hacker 2000). Also, an examination of adjacent areas to Alternative B's location did not

indicate any historic properties in proximity. Therefore, no impacts to cultural resources will occur from Alternative B.

Known Distance Range. Alternative B will affect portions of TAs D8 and D9; both areas were surveyed for cultural resources (Trinkley et al. 1998). One site (9LI486) has been identified within the project footprint and has been determined ineligible for the NRHP. Examination of adjacent training lands to the proposed KDR did not indicate any historic properties nearby. Although not eligible for the NRHP, one historic period cemetery (Golden Family) is located within the SDZ of the proposed range. Golden Family Cemetery is located in TA D5 and is 4.9km away from the proposed range. During the design phase of the proposed range, if an impact to the cemetery from live fire seems likely, protective berms or redesigns to the KDR will be considered. The Installation routinely monitors its cemeteries within SDZs for any damage. In summary, there is a low potential for indirect impacts to nearby cultural resources that can be avoided or minimized for Alternative B.

Fire and Movement Range. Alternative B will affect portions of TA C3. Affected portions of this TA are off-limits to cultural resource survey due to elevated risk of UXO associated with former Aerial Gunnery Range IV. No cultural resources were identified within the project footprint and no direct impacts are expected. No historic properties were found during an examination of adjacent areas to the Alternative B location.

FY13 Modified Record Fire Range. Alternative B will affect portions of TA D6 and has been surveyed for cultural resources (Kennedy et al. 2004; Cain et al. 2009). No cultural resources were identified within the project footprint and no historic properties in proximity to the Alternative B location were found. Although areas in proximity to the proposed footprint have not been fully evaluated for archaeological resources, adjacent training lands have a predominantly low potential for cultural resources. Once detailed range designs are developed and impacts to cultural resources are indicated, additional cultural resource surveys may be required in accordance with the NHPA and other applicable laws. If historic properties are encountered, efforts to avoid the resource or minimization and proposed mitigation efforts will

be conducted in accordance with the NHPA. This will avoid and/or minimize adverse impacts to historic properties.

Combat Pistol Qualification Course. Alternative B will affect portions of TA D5, which has been surveyed for cultural resources (Greer et al. 2010). No cultural resources were found and, therefore, no direct impacts to historic properties will occur under Alternative B. Although areas in proximity to the proposed footprint have not been fully evaluated for archaeological resources, adjacent training lands have a predominantly low potential for cultural resources. Once detailed range designs are developed and impacts to cultural resources are indicated, additional cultural resource surveys may be required in accordance with the NHPA and other applicable laws. Therefore, as currently proposed, no adverse impacts to historic properties will occur.

10m/25m Zero Range. Alternative B for the 10M/25M Zero Range will affect portions of TA D5, which has been previously surveyed for cultural resources (Cain et al. 2009). No cultural resources were found and, therefore, no direct impacts to historic properties will occur under Alternative B. Although areas in proximity to the proposed footprint have not been fully evaluated for archaeological resources, adjacent training lands have a predominantly low potential for cultural resources. Once detailed range designs are developed and impacts to cultural resources are indicated, additional cultural resource surveys may be required in accordance with the NHPA and other applicable laws. Therefore, as currently proposed, no adverse impacts to historic properties will occur.

Convoy Live Fire Range. Alternative B will affect portions of TAs C4, C5, C6, and C7. The proposed engagement box footprints and area of potential effect have been surveyed for cultural resources (Maggioni et al. 2009a; Ross 2004; Morehead et al. 2008a; Mallory et al. 2006; Ambrosino et al. 2001; Greer et al. 2010). As a result of these surveys, 19 archaeological sites have been identified within the proposed footprint (see Appendix C, SHPO Consultation Letters). Only one site potentially eligible for the NRHP (9BN628) has been identified in proximity to the proposed range. Site 9BN628 has recently undergone further evaluation and is pending a final determination of eligibility. However, it has been determined through consultation with the GA SHPO that the proposed project will not adversely affect 9BN628,

since there will be no expansion of the associated tank trails or construction of engagement boxes in proximity to the archaeological site.

Impacts associated with the range utilization of the CLF may have the potential to adversely affect cemeteries located within the SDZ. Little Creek and Liberty Chapel cemeteries are located within the proposed engagement boxes' SDZs. During the design phase of the proposed range, if an impact to the cemetery from live fire seems likely, protective berms or redesigns to the KDR will be considered. The Installation routinely monitors its cemeteries within SDZs for any damage.

In summary, there is a low potential for indirect impacts to nearby cultural resources that can be avoided or minimized for Alternative B and an overall low to moderately-low potential for impacts to cultural resources. Recent additional cultural resource surveys in proximity to the area of potential effect were conducted in March and April 2010 and are pending final analysis. These areas are predominantly within areas of low potential for historic properties. After the surveys are completed and if historic properties are identified, the Installation will seek means to avoid or minimize the impacts through project design modifications, should it indicate that areas beyond the identified area of potential effect occur. If avoidance or minimization measures cannot be feasibly employed, proposed mitigation of adverse effects to historic properties will be conducted in accordance with the NHPA and other applicable cultural resource laws. Cemeteries that may be adversely affected by live-fire will also be taken into account during the design phase of the proposed range construction. If necessary, protective berms will be placed to prevent damage to the cemeteries.

Infantry Squad Battle Course. Alternative B will affect portions of TA B3 and the Artillery Impact Area. Training Area B3 was surveyed for cultural resources (Regnier and Ambrosino 2003). The Artillery Impact Area is off limits to cultural resource surveys due to the elevated risk of unexploded ordnance. Eleven sites were identified within the project footprint of the ISPBC and have been determined ineligible for the NRHP (see Appendix C, SHPO Consultation). Examination of adjacent training lands did not indicate any known historic

properties in proximity to the proposed footprint. Buildings within the viewshed of the proposed footprint are less than 50 years old and have been determined ineligible for the NRHP.

4.5.2.2 Garrison Construction

Unmanned Aerial Vehicle System (UAVS) Facilities. Alternative B for the UAVS Facilities will affect portions of TA A18 and Wright Army Airfield (WAAF). TA A18 and the survey-able portions of WAAF were surveyed for cultural resources (Morehead et al. 2008). Seven archaeological sites have been identified within the proposed footprint and have been determined ineligible for the NRHP (See Appendix C, SHPO Consultation). Construction of the UAVS facilities will affect the viewsheds of thirteen buildings southeast of the project footprint: 7703, 7704, 7706, 7707, 7727, 7728, 7730, 77732, 7733, 7734, 7754, 7778, and 7781. All of the buildings were assessed as ineligible by the 2002 architectural survey or subsequent survey codicils (Fortune and Maggioni 2003; Maggioni 2007:4; Cain et al. 2008; Cain et al. 2009; Maggioni 2010).

Engineer Battalion Facilities (EN BN). Alternative B for the EN BN will affect portions of TA B5 which has been previously surveyed for cultural resources (Morehead et al. 2008). Seven archaeological sites were identified within the project footprint and have been determined ineligible for the NRHP (See Appendix C, SHPO Consultation). Therefore, no direct impacts to cultural resources are anticipated from the construction of the EN BN.

4.5.3 Alternative C Siting

Overall, Alternative C will result in minor adverse effects to cultural resources. Approximately 287 acres of survey are pending under Alternative C. One site deemed eligible for the NRHP will be affected (compared to none in Alternative B, although final determination on those potentially eligible sites is still pending further surveys) and six buildings require further NRHP evaluations (compared to two under Alternative B). There is a low potential for impact to four cemeteries from live fire, once the ranges are operational. Additional details on these resources are available in the project-by-project discussions in this section.

4.5.3.1 Range Facility Construction

Multipurpose Machine Gun Range. Alternative C will affect portions of TA D9 which has been previously surveyed for cultural resources (Trinkley et al. 1998). Although considered to have a higher potential for cultural resources, no cultural resources were identified within the proposed APE. Therefore no direct impacts to historic properties will occur under Alternative C.

Examination of areas adjacent to Alternative C identified an historic property immediately south of the project footprint. Site 9LG363, an historic early 20th century railroad tramline, was identified as the present location of Fort Stewart Road 91. Elements of 9LG363 were recommended eligible for the NRHP by the GA SHPO(Greer et al. 2005). Maintaining the resource's linear feature and as a transportation route is not likely to result in an adverse effect and therefore has a low potential for being affected by Alternative C. Operation, maintenance, and use of this portion of FSR 91 that results in an adverse effect to the historic property would require consultation in accordance with 36 CFR 800.

Other than the historic tramline, indirect impacts to cultural resources are not fully known. Areas in proximity to the proposed footprint have not been fully evaluated for archaeological resources; however, these areas have a predominantly low potential for cultural resources. Once detailed range designs are developed and impacts to cultural resources are indicated, additional cultural resource surveys may be required in accordance with the NHPA and other applicable laws. Therefore, as currently proposed, no adverse impacts to historic properties are anticipated.

Infantry Platoon Battle Course. Alternative C will affect portions of TA C1. All areas available for cultural resource survey of the proposed IPBC were surveyed (Cain et al. 2009). Portions of the proposed footprint cannot be surveyed due to the elevated risk of UXO associated with the former AGR impact area. One archaeological site recommended ineligible for the NRHP was encountered within the project footprint. Therefore, no direct impacts will occur as a result of Alternative C. The recent addition of a 12.4 acre electrical ROW to the IPBC's overall footprint (as discussed under Wetlands and Protected Species) would not result in impacts to Cultural Resources.

Indirect impacts to cultural resources may result from the utilization of the small arms range. Three cemeteries (Little Creek, Shuman, and Bonnet Bay) are located within the SDZs associated with the IPBC. During the detailed design phase of the proposed range, if an impact to the cemeteries from live fire seems likely, protective berms or redesigns to the IPBC will be considered. As with all cemeteries within active SDZs, the Installation routinely monitors the cemeteries for any damage. In summary, there is a low potential for indirect impacts to nearby cultural resources, which can be avoided or minimized.

FY11 Modified Record Fire Range. Alternative C will affect portions of TA B4 on the Small Arms Delta Range, which has been previously surveyed for cultural resources (Ross 2004b). No cultural resources were identified within or in proximity to the project footprint. Therefore, no direct impacts to historic properties will occur under Alternative C.

Although areas in proximity to the proposed footprint have not been fully evaluated for archaeological resources, adjacent training lands have a predominantly low potential for cultural resources. Once detailed range designs are developed and impacts to cultural resources are indicated, additional cultural resource surveys may be required in accordance with the NHPA and other applicable laws. Therefore, as currently proposed, no adverse impacts to historic properties will occur.

Digital Multipurpose Training Range. Alternative C will affect portions of TAs B9 and B10. The majority of the project footprint has been previously surveyed for cultural resources (Cain et al 2005, 2009; Ross 2004a; Morehead et al. 2008b; Cain et al. 2009). Approximately 50 acres remain to be surveyed and is dominated by low probability for cultural resources (approximately 90%). Additional cultural resource surveys are planned in FY10 to completely inventory the potential effects to cultural resources prior to any construction should this alternative be determined the preferred course of action. The existing range floor was excluded from cultural resource survey in accordance with the categorical exclusion of survey requirements for previously disturbed special use facilities in accordance with Fort Stewart's Programmatic Agreement with the Georgia SHPO. Eight cultural resources were identified within the project

footprint (9BN145, 9LI1592, 9LI1610, 9LI1611, 9LI1612, 9LI1622, 9LI1657, and 9LI1653), which have all been determined ineligible for the NRHP. Therefore, no direct impacts to historic properties will occur under Alternative C.

Although areas in proximity to the proposed footprint have not been fully evaluated for archaeological resources, adjacent training lands have a predominantly low potential for cultural resources. No known historic properties have been identified in proximity to the Alternative C location. Once detailed range designs are developed and impacts to cultural resources are indicated, additional cultural resource surveys may be required in accordance with the NHPA and other applicable laws. Therefore, as currently proposed, no adverse impacts to historic properties are anticipated from Alternative C.

Qualification Training Range. Alternative C will affect TAs D8 and D9, which have been surveyed for cultural resources (Trinkley et al. 1998). One cultural resource (9LI486) was identified within the project footprint and was determined ineligible for the NRHP; therefore, no direct impacts to historic properties will occur under Alternative C.

Although areas in proximity to the proposed footprint have not been fully evaluated for archaeological resources, adjacent training lands have a predominantly low potential for cultural resources. No known historic properties have been identified in proximity to the Alternative C location. Once detailed range designs are developed and impacts to cultural resources are indicated, additional cultural resource surveys may be required in accordance with the NHPA and other applicable laws. Therefore, as currently proposed, no adverse impacts to historic properties are anticipated from Alternative C.

Known Distance Range. Alternative C will affect portions of TA B13. Portions of Training Area B13 are unavailable to be surveyed due to elevated risk of unexploded ordnance associated with the Artillery Impact Area (AIA). Portions of available areas of B13 were surveyed for cultural resources (Maggioni et al. 2009a, 2009b). Approximately 54 acres remain to be surveyed to fully inventory the potential impacts to cultural resources; however, this acreage has

a high potential for unexploded ordnance and a low potential for encountering archaeological sites. Survey of this area is scheduled for FY10.

To date, no cultural resources have been identified from previous surveys; however, it is suspected that remnants of an historic railbed (a small portion of the Savannah Division of the Savannah & Southern Railroad) may exist within the AIA (Greer et al. 2005). Due to the inability to confirm its presence and the extreme danger from the elevated risk of UXO to conduct surveys within the impact area, it is considered exempt from consideration and determined an ineligible portion of the overall resource. Based upon the existing surveys and the likelihood of encountering historic properties within the remaining areas to be surveyed, there is a low to very low potential for direct impacts to historic properties to occur under Alternative C.

Although areas in proximity to the proposed footprint have not been fully evaluated for archaeological resources, adjacent training lands have a predominantly low potential for cultural resources. No known historic properties have been identified in proximity to the Alternative C location. Once detailed range designs are developed and impacts to cultural resources are indicated, additional cultural resource surveys may be required in accordance with the NHPA and other applicable laws. Therefore, as currently proposed, no adverse impacts to historic properties are anticipated from Alternative C.

Fire and Movement Range. Alternative C will affect portions of TA C5, which is off-limits to cultural resources survey due to elevated risk of unexploded ordnance associated with Aerial Gunnery Range I. No previously identified cultural resources were documented within the project footprint. Therefore, no direct impacts to historic properties will occur under Alternative C.

No historic properties in proximity to the Alternative C location were found. Large portions of adjoining training lands were surveyed or are off-limits due to unexploded ordnance. Recent archaeological surveys in nearby NRMU C10.1 are still pending analysis (Morehead et al. 2009) and NRMU C5.3 has not been completely inventoried. A watchtower and unknown structure of unknown data is within the viewshed of the proposed action. It is likely this structure is

associated with the existing range facility. Therefore, there is a low potential anticipated for indirect impacts to adjacent training lands and the structure for Alternative C.

FY13 Modified Record Fire Range. Alternative C will affect TA D5, which has not been surveyed for cultural resources. Areas not surveyed inside and outside the project footprint predominantly have a low potential for cultural resources. If Alternative C for the MRFR is chosen, appropriate cultural resource surveys will be conducted and efforts made to avoid, minimize, or mitigate adverse effects to any historic properties in accordance with 36 CFR 800.

Although areas in proximity to the proposed footprint have not been fully evaluated for archaeological resources, adjacent training lands have a predominantly low potential for cultural resources. No known historic properties have been identified in proximity to the Alternative C location. Once detailed range designs are developed and impacts to cultural resources are indicated, additional cultural resource surveys may be required in accordance with the NHPA and other applicable laws. Therefore, as currently proposed, no adverse impacts to historic properties are anticipated from Alternative C.

Combat Pistol Qualification Course. Alternative C will affect portions of TA D5, which has not been surveyed for cultural resources. Areas not surveyed inside and outside the project footprint predominantly have a low potential for cultural resources. No historic properties in proximity to the Alternative C location were found. If the project is altered to impact the areas not surveyed for cultural resources, additional cultural resource surveys would be conducted and impacts to historic properties would be assessed in accordance with the NHPA and other applicable laws. Therefore, little or no indirect impacts are anticipated from Alternative C.

10m/25m Zero Range. Alternative C will affect portions of TA D5 not previously surveyed for cultural resources. A total of 1 acre is needed to survey for the project footprint. Survey will be completed during FY10. Areas not surveyed inside the project footprint predominantly have a low potential for cultural resources. If the project is altered to impact the areas not surveyed for cultural resources, additional cultural resource surveys would be conducted and impacts to historic properties would be assessed in accordance with the NHPA and other applicable laws.

Although areas in proximity to the proposed footprint have not been fully evaluated for archaeological resources, adjacent training lands have a predominantly low potential for cultural resources. No known historic properties have been identified in proximity to the Alternative C location. Once detailed range designs are developed and impacts to cultural resources are indicated, additional cultural resource surveys may be required in accordance with the NHPA and other applicable laws. Therefore, as currently proposed, no adverse impacts to historic properties are anticipated from Alternative C.

Convoy Live Fire Range. Alternative C will affect portions of TAs B17, B19, C4, and C6. A portion of the proposed engagement boxes have been previously surveyed (Ross 2004b; Mallory et al. 2006; Maggioni et al. 2009a) or are considered off limits for survey due to elevated risk of unexploded ordnance. The remaining engagement boxes require cultural resource surveys. Approximately 5 acres of high probability and 70 acres of low probability for cultural resources remain to be surveyed and are scheduled to begin in February 2010. Currently there are no known direct impacts to historic properties from the engagement boxes. As a result of the previous surveys and the relatively low potential for encountering historic properties within the remaining areas to be surveyed, there is a low potential to directly impact historic properties under the proposed Alternative C.

Impacts associated with the range utilization of the CLF may have the potential to adversely affect cemeteries located within the SDZ. Little Creek cemetery is located within the proposed SDZ. During the design phase of the proposed range, if an impact to the cemetery from live fire seems likely, protective berms or redesigns to the CLF will be considered. The Installation routinely monitors its cemeteries within SDZs for any damage. In summary, there is a low potential for indirect impacts to nearby cultural resources and can be avoided or minimized for Alternative B.

Infantry Squad Battle Course. Alternative C will affect TA B3 and the Artillery Impact Area (AIA). Training Area B3 has been previously surveyed for cultural resources (Little et al. 2000). The AIA is off-limits to cultural resource surveys due to the elevated risk of unexploded

ordnance. As a result of these surveys, 34 sites were identified within the project footprint (9LI680 - 9LI685, 9LI687, 9LI689 - 9LI699, 9LI701 - 9LI704, 9LI706, 9LI707, 9LI710, 9LI715 - 9LI720, 9LI722, and 9LI897. All 33 sites were determined ineligible for the NRHP; therefore, no direct impacts to historic properties will occur under Alternative C.

Examination of adjacent areas to the proposed location of Alternative C did not indicate any historic properties in proximity with the exception of 9LI1302, which is 200 meters from the project area. 9LI1302 was recommended potentially eligible for the NRHP and is a Middle/Late Woodland prehistoric site. Phase II NRHP eligibility testing is scheduled for this site in FY10. Large portions of the adjacent training areas were surveyed for cultural resources. Architectural evaluations of buildings associated with these ranges may be required (likely general support structures dating from the 1970s and are currently awaiting assessment and are scheduled for FY10). Building 8556, a range building built in 1975, is adjacent to and within the viewshed of the Alternative C footprint. Bleachers and an ammunition point associated with building 8556 are also within the viewshed of the Alternative C footprint. Building 8556 is less than fifty years old and has not been surveyed. Due to the distance of 9LI1302 and because areas outside of the proposed range are not expected to be impacted, a low to moderately low potential for indirect adverse impacts to historic properties under Alternative C is anticipated.

4.5.3.2 Garrison Construction

UAVS Facilities. Alternative C for the UAVS facilities will affect portions of TA A12 which has been surveyed for cultural resources (Trinkley and Hacker 2000:97). No cultural resources were identified within the project footprint. No direct impacts to archaeological historic properties will occur under Alternative C.

Construction of the UAVS facilities will affect the viewsheds of 23 buildings: 19EVN, 20EVN, 21EVN, 22EVN, 25EVN, 26EVN, 30EVN, 19101, 19103, and 19109 – 19115, and five un-numbered temporary buildings. Most of the buildings are of recent construction (Post-1990) or were determined ineligible for the NRHP by the 2002 Building Survey (Fortune and Maggioni 2003); however, five facilities (Buildings 19101, 19102, 19013, 19104, and 19108) will require

reassessment for eligibility once they reach 45 years of age in 2013. These buildings were originally surveyed by the 2002 historic building survey, but because the buildings were less than fifty years old at the time, they could only be assessed for exceptional historic significance.

Buildings 19101, 19102, 19013, 19104, and 19108 are now nearly fifty years old and in accordance with Department of the Interior standards must be reassessed again for NRHP-eligibility. The buildings will require reassessment once they reach 45 years of age in 2013, so there is a possibility of indirect impacts from Alternative C, dependent on the NRHP reassessment of Buildings 19101, 19102, 19103, 19104, and 19108. In summation, there will be no direct impacts to cultural resources as a result of Alternative C, but there is a possibility of indirect impacts, dependent upon historic building reassessment of five structures.

EN BN Facility. Alternative C for the EN BN will affect TA D1, which has been surveyed for cultural resources (Kennedy et al. 2004). One cultural resource was identified within the project footprint (9LI256) which is a remnant of an historic tramline that crosses the southeastern portion of the project footprint. This tramline is one of the better preserved portions of the complex of railbeds and tramline beds found on the Installation. The portions within the wetland were identified as a potential candidate for preservation as part of a larger proposed mitigation project for all of the rail/tramlines on Fort Stewart (Greer et al. 2005). A direct impact will occur to this historic property under Alternative C.

No historic properties in proximity to the Alternative C location were found. The existing Fort Stewart Road 90 directly to the north of the proposed project is the former railbed of the Dunlevie tramline. Although no longer an intact railbed, the resource still retains its linear characteristic and use as a transportation route. This resource was determined eligible for the NRHP, but has recently been mitigated for all Section 106 concerns by a 2008 MOA. Therefore, although there is a moderate potential for indirect impacts anticipated from Alternative C, these impacts have already been mitigated. Alternative C will have no effect on historic buildings. No extant buildings are within the footprint.

4.6 NOISE

The TLS under noise is the determination if noise (during construction, operation, and maintenance) would exceed the noise limit guidelines published in AR 200-1, Chapter 14 (2007) by having Zone III levels impacting noise-sensitive receptors (i.e., schools, hospitals, churches, daycares, etc.). USACHPPM evaluated potential noise impacts associated with the proposed action and alternatives at Fort Stewart in July 2009. The evaluation compared Fort Stewart's 2004 noise study against potential future actions and resulted in no substantial change. The following discussions describe elements of the proposed action and the alternatives, including the environmental analyses performed, that are common to all the scenarios.

4.6.1 Alternative A: No-Action

Overall, negligible adverse effects are predicted as a result of this alternative, which consists of a continuation of activities currently supported by Fort Stewart, as well as projected future activities that have been previously assessed. These are not expected to create new noise impacts. The acoustic environment of Fort Stewart would continue to be dominated by small- and large-caliber weaponry and aircraft overflight (as shown in Figure 3-18, Chapter 3). Other activities, such as ground maneuver training and exercises resulting in noise created by personnel and vehicles, would continue to contribute noise on Fort Stewart, to the same levels and intensity as historically experienced. The existing operating environment has a moderate risk of generating noise complaints near Old River Road and Highway 204 (Fort Argyle Road). The moderate risk of noise complaints also extends into the Fort Stewart housing area.

4.6.2 Alternative B Siting (Preferred)

Overall, this alternative will have moderate adverse effects to the noise environment on Post. Construction, operations, and maintenance of new projects must comply with all Federal, state, or local laws and regulations. Impacts and conclusions in this section are based on historical and current noise surveys, contours, and similar data, including a recent study by USACHPPM completed in July and August 2009 for the proposed FY11 – FY14 range projects.

Potential noise effects on listed species caused by expansion, construction, operation, and maintenance in the Alternative B action areas are not likely to adversely affect listed species' populations based on the existence of stable or increasing populations on similar landscapes where listed species have existed for many years. Scientific studies on the effects of noise (Delaney et al. 2002) on RCW fecundity demonstrate that reproductive parameters of RCWs in or near noise areas are not statistically different from the reproductive parameters of RCWs in more protected habitats. A study on the effects of military maneuvers on the Fort Stewart RCW population (Hayden et al. 2002) detected a difference in the mean number of fledglings produced per successful nest between RCW clusters that experienced "high activity" and those that experienced "low-activity," but the sample size of the "high activity" treatment was low (n=3) when compared to the "low activity" sample size (n=19), and these observed differences were considered inconclusive. Fort Stewart expects the RCW population to persist near the ranges and infrastructure as they have historically persisted adjacent to existing developed areas.

4.6.2.1 Range Construction

With the exception of the DMPTR, all proposed ranges in this EIS are small-caliber. The operation of the proposed small arms ranges will result in moderate adverse effects. The existing impact areas are located in the center and in the southwest of Fort Stewart. To the extent practicable, range footprints were modified to reduce noise impacts, as well as other sensitive resource impacts. For example, the proposed Convoy Live Fire Alternative B engagement boxes were originally sited in close proximity to the northeast boundary, which showed a Noise Zone III contour extending outside the boundary. The engagement boxes were moved south to prevent Zone III contours from extending beyond the Installation boundary. The proposed CLR range also creates a Zone III noise contour that extends approximately 50 meters beyond the northern boundary; however, there are no noise sensitive land uses within this contour. The Alternative B projected small-arms operating environment creates a Zone II noise contour that extends less than 1,000 meters beyond the northeastern boundary toward Fort Argyle and Old River roads. In the southern boundary, the Zone II noise contour would extend approximately 1,300 meters toward state Georgia Highway 196. Within Fort Stewart, the Zone II noise contour would extend approximately 700 meters into the Bryan Village North and Liberty Woods housing

areas. The operation of the DMPTR will result in moderate adverse impacts. The Zone II noise contour would extend beyond the northern boundary approximately 1,200 meters and the Zone III noise contour does not extend beyond the boundary. Figure 4-20 shows Fort Stewart's anticipated operating environment as a result of Alternative B.

4.6.2.2 Garrison Construction

Construction and operation of these two facilities will result in moderate adverse effects. Noise from construction, operation, and maintenance activities of the Sky Warrior UAVS facilities and EN BN facilities would not extend beyond the boundaries of Fort Stewart. During operation, heavy equipment and other construction, operation, and maintenance noise generate noise levels ranging typically from 70 to 90 dBA at a distance of 50 feet. Commonly, use of heavy equipment occurs sporadically throughout the daytime hours.

Under either action alternative, the greatest noise levels would be generated during the earth moving/site clearing phase and could reach a maximum of more than 70 dBA at 50 feet from any of the proposed courses of action. Therefore, noise impacts from construction, operation, and maintenance activities would be minimal to negligible for the following reasons:

- Heavy equipment that would generate the highest noise levels would not be used consistently enough to exceed the hourly equivalent noise level of 75 dBA for more than one hour and be at the boundaries of Fort Stewart.
- Construction activities would be expected to occur between 7:30 a.m. and 4:30 p.m. and pose little impact to any neighboring communities.

In general, construction, operation, and maintenance noise would be intermittent and short term in duration, and no long-term (recurring) adverse noise impacts would result from implementation of any of the action alternatives.

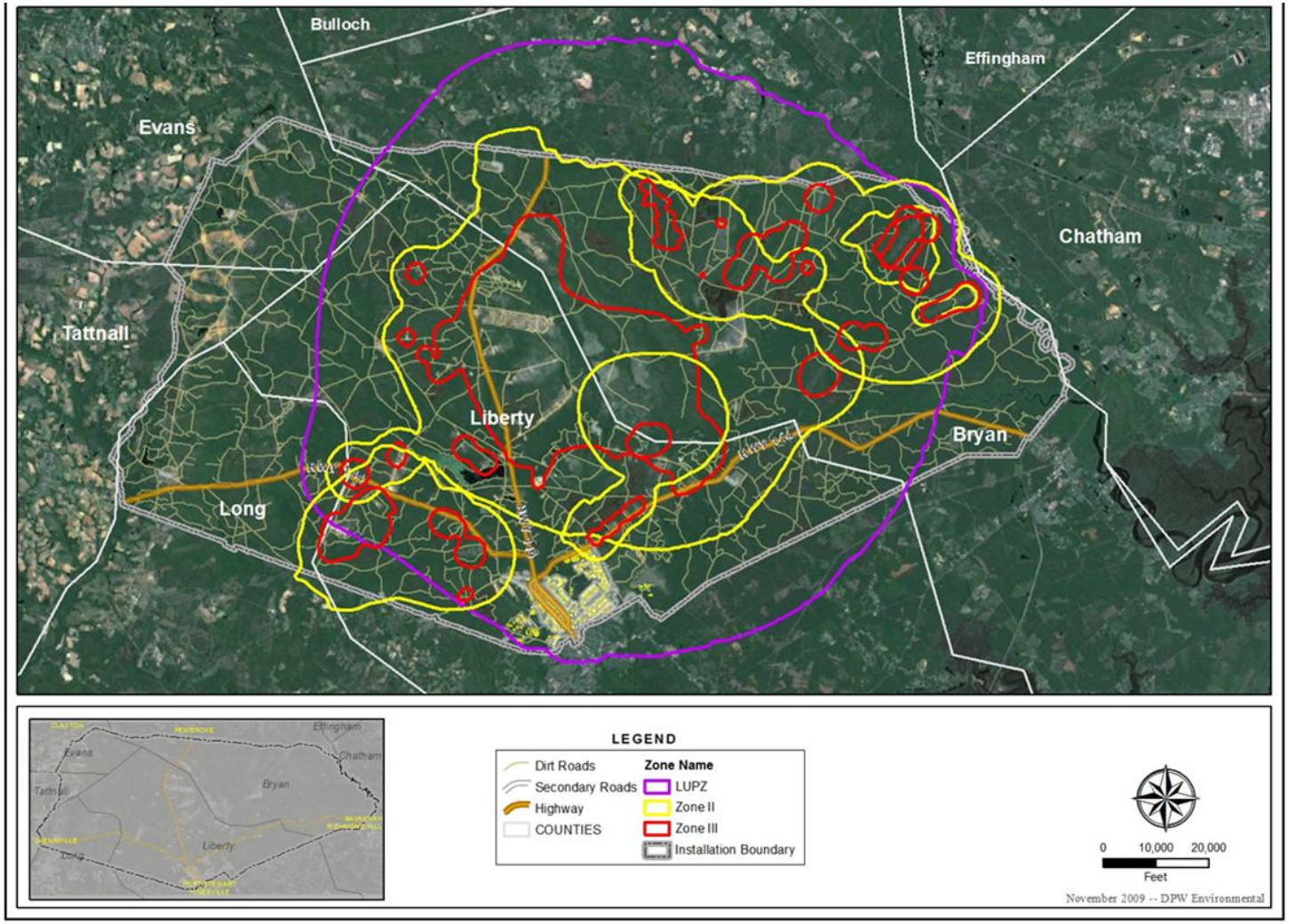


Figure 4-20: Anticipated Noise Contours from Alternative B.

Air operations proposed under Alternative B would be in the form of flights associated with the Sky Warrior UAVS test and training events. These small aircraft would not be expected to result in an increase in A-weighted time-averaged noise levels. The exact extent of the increase would be determined by the specific aircraft and flight profiles used.

4.6.3 Alternative C Siting

Overall, this alternative will have moderate adverse effects to the noise-affected environment on- and off-Post. Construction, operations, and maintenance of new projects must comply with all Federal, state, or local laws and regulations. Impacts and conclusions in this section are based on historical and current noise surveys, contours, and similar data, including a recent study by USACHPPM completed in July and August 2009 for the proposed FY11 – FY14 range projects. Potential noise effects on listed species caused by expansion, construction, operation, and maintenance in the Alternative C action areas are not likely to adversely affect listed species' populations based on the existence of stable or increasing populations on similar landscapes where listed species have existed for many years. Impacts to the RCW would be similar to the impacts of Alternative B.

4.6.3.1 Range Construction

Operation of these ranges would result in moderate adverse effects from noise. Figure 4-21 contains the small and large caliber weapons contours for the Alternative C projected operating environment. The Alternative C projected small-arms operating environment creates a Zone II noise contour that would extend less than 1,000 meters beyond the northern boundary and less than 1,000 meters beyond the northeastern boundary towards Fort Argyle and Old River roads. The Alternative C range locations create a Zone III noise contour that extends approximately 50 meters beyond the northern boundary; however, there are no noise sensitive land uses in this area. Beyond the southern boundary, the Zone II noise contour would extend approximately 2,300 meters toward state Georgia Highway 196. Within Fort Stewart, the Zone II noise contour extends approximately 700 meters into the Fort Stewart Bryan Village North and Liberty Woods housing areas.

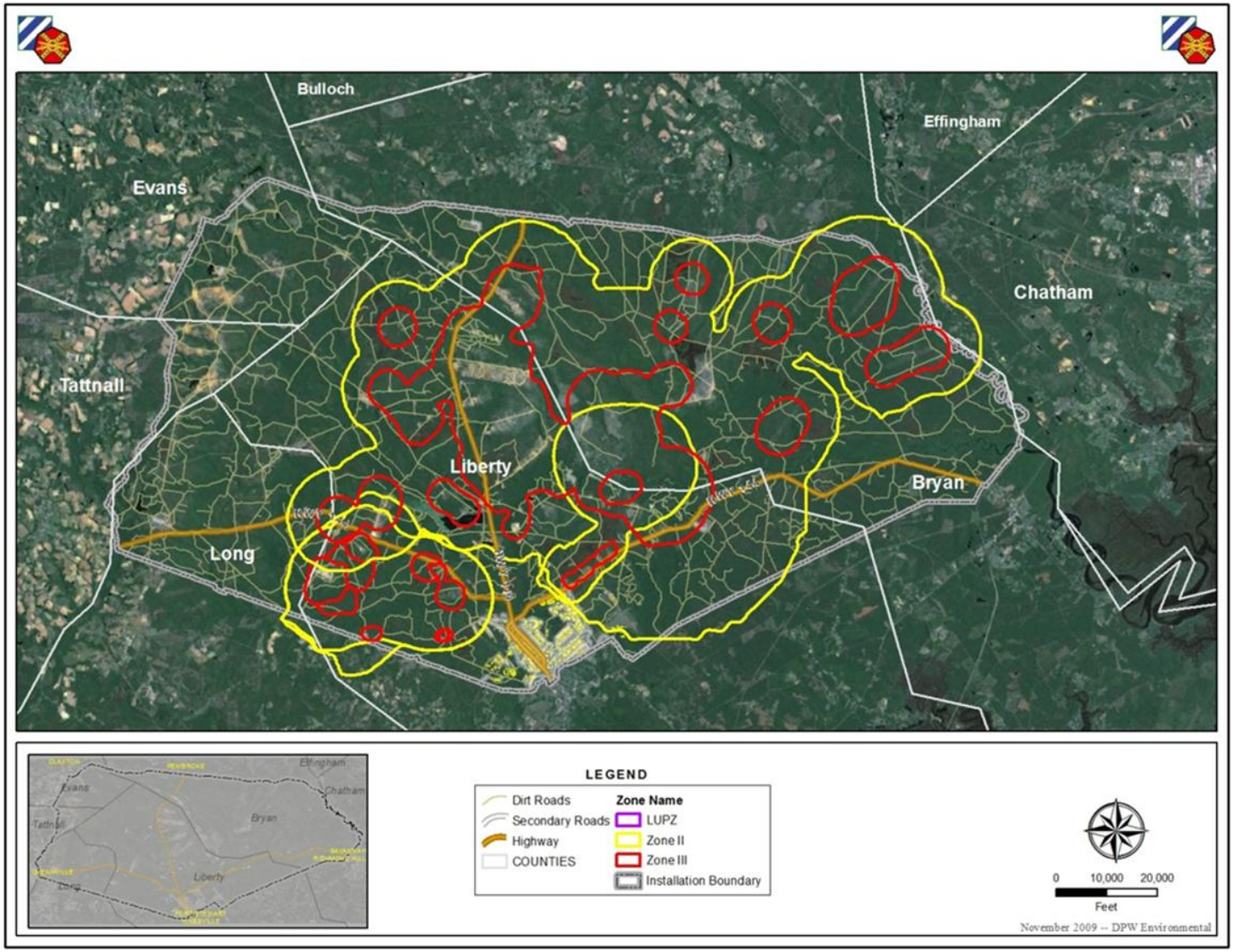


Figure 4-21: Anticipated Noise Contours from Alternative C.

The projected large-caliber operating environment for Alternative C, resulting from the DMPTR, would result in the Zone II noise contour extending beyond the northern boundary approximately 2,000 meters and approximately 1,000 meters into the Fort Stewart housing area. The Noise Zone III contour does not extend beyond the boundary or into the Fort Stewart housing area.

4.6.3.2 Garrison Construction

Construction and operation of these two facilities would result in minor adverse effects to the noise-affected environment. Noise from construction, operation, and maintenance activities associated with the Sky Warrior UAVS Facility and EN BN Facilities would not extend beyond the boundaries of Fort Stewart. These activities would result in temporary and short-term impacts to sensitive locations within that area. These impacts would be minor.

Noise from construction, operation, and maintenance activities associated with Alternative C would result in similar impacts as Alternative B. In general, construction, operation, and maintenance noise would be intermittent and short term in duration, and no long-term (recurring) adverse noise impacts would result from implementation of the action alternatives. Air operations proposed under Alternative C would be in the form of flights associated with the UAVS test and training events. These small aircraft would not be expected to result in an increase in A-weighted time-averaged noise levels.

4.7 LAND USE

Land use at Fort Stewart is divided into the following categories: Garrison, training lands, recreation, aesthetics and visual resources, and buffer/ joint use areas. The TLS for land use occurs if one or more of the following occurs:

- The action is incompatible with surrounding land use;
- The action changes land use in such a way that mission-essential training is degraded; or
- The action is inconsistent or in conflict with the environmental goals, objectives, or guidelines of a community or county comprehensive plan for the affected area.

Land use compatibility on both sides of Fort Stewart's boundary is always a consideration when the Master Planning Division, Environmental Division, and Range Division (utilizing the master planning process) are siting new projects on Post. Currently, land uses outside Fort Stewart's boundary consist of municipalities, open forested land, agricultural lands, and residential areas. Fort Stewart proactively works with its off-Post neighbors through several programs, such as the Installation Environmental Noise Management Plan (IENMP), Joint Land Use Study (JLUS), Army Compatible Use Buffer (ACUB) program, and the Hinesville Area Metropolitan Planning Organization's plans and programs, among others.

4.7.1 Alternative A: No Action

Overall, negligible adverse effects to land use are predicted as a result of Alternative A. Land use patterns within and outside Fort Stewart are unaffected and construction projects already underway will continue as planned and implement all land use-oriented requirements, such as adherence to Fort Stewart's Installation Design Guide, JLUS, and ACUB. These projects have already completed NEPA review and presented no land use concerns, as they are compatible with adjacent land uses and do not conflict with mission or environmental issues. Routine operations and maintenance activities also continue unaffected and result in no land use conflicts.

Training and its resulting impacts to the land and other environmental resources are also ongoing and present no land use concerns, occurring on already-designated training lands and ranges. Range construction, operation, and maintenance projects currently underway have completed NEPA review and presented only minor land use conflicts, if any, primarily from the conversion of land from timbered land to ranges. The conversions presented no adverse effects to land use, although the change in designation minimally affects forestry resource management, from the perspective of timber resources, prescribed burning, and similar perspectives. This does not affect the formal land use designation, however. This use of the land is actually beneficial to Fort Stewart's Mission, providing enhanced and realistic training opportunities for the Soldiers. No impacts to aesthetics or visual resources are predicted at these sites, because they are not accessible to the general public and are in line with adjacent aesthetics and visual resources. Minor adverse effects to recreation may occur, however, as these lands (once range construction,

operation, and maintenance is complete) will no longer be available for hunting, fishing, or hiking by the Fort Stewart residents or visitors.

Several recreation projects are also underway, to include construction, operation, and maintenance of a new Paintball Court and several improvements at the Holbrook Pond Outdoor Recreation Area. These resulted in minor adverse effects to land use, converting lands from "training" to "recreational;" however, these projects were coordinated with DPTMS and determined to not be a detriment to Fort Stewart's Mission. Potential impacts to environmental resources were also minimal and NEPA is complete for these actions. These projects have had a beneficial impact on aesthetics and visual resources, as they have contributed to the enhancement of the recreational resources on Post, even though tree clearance was involved.

4.7.2 Alternative B Siting (Preferred)

Overall, this alternative will have minor adverse effects to land use on Fort Stewart. Continuing to work with local jurisdictions to implement land use controls help minimize inconsistencies and/or conflicts with adjacent land uses. Fort Stewart's leaders address community concerns through these (and other) plans, with the objective of encouraging open, two-way dialogue regarding actions in the civilian and Fort Stewart communities, ensuring the two work and plan together. For additional details regarding the master planning process, refer to Chapter 1 of this EIS.

4.7.2.1 Range Construction

Construction of ranges in the Alternative B locations would be compatible with surrounding land use, as all are located within areas currently designated as training lands and/or ranges. Construction here would enhance, rather than degrade, mission-essential training. The proposed improvements/upgrades to existing ranges and maneuver areas and proposed new ranges would be sited to align with these existing assets where possible. In all cases, compatibility with other operational land uses, including safety, scheduling, and surface danger zone (SDZ) conflict were incorporated into the planned development of these facilities. Furthermore, Fort Stewart's master

planning process provides the justifications for the range requirements. There would potentially be less access and/or increased scheduling difficulties for environmental resource management activities, such as implementation of ITAM projects (e.g., land rehabilitation), wildlife and forestry projects (e.g., endangered species surveys, prescribed burns), and cultural resources surveys. These access concerns will be addressed as part of the resource management planning for Fort Stewart and potentially serve as proposed mitigation for any adverse effects.

Under this alternative, the construction, operation, and maintenance of new ranges would change the visual character of some training areas. Viewers' sensitivities to changes in form, line, color, and/or texture are not a consideration within training lands or ranges, as they are not allowed access to these areas. The only non-military users of the land potentially affected by this would be those no longer allowed to use it (or to use it only seasonally, not annually) for hunting, fishing, or hiking, since these activities are not allowed in and around active ranges.

Increasing urbanization surrounding Fort Stewart may increase encroachment pressures on Fort Stewart. Fort Stewart continues to implement the ACUB program with the operational premise of preventing encroachment and incompatible land use adjacent to training areas. The ACUB initiatives, noise management planning, and cooperative efforts with the community could reduce the likelihood that encroachment would occur if the recommendations provided in these plans are adopted by the adjacent communities. If these recommendations were adopted, there would be less possibility that mission-essential training would be degraded. Fort Stewart will continue to utilize its JLUS and ACUB programs, as well as work with the counties and communities surrounding Fort Stewart as they plan for their own future growth.

4.7.2.2 Garrison Construction

Garrison area development associated with implementation of Alternative A would be compatible with surrounding land use. Among the other factors considered when siting proposed facilities were natural resource constraints, cultural resource constraints, transportation and circulation, compliance with regulated environmental requirements (e.g., air quality, hazardous materials, water resources), and architectural/aesthetic compatibility. Multidisciplinary input

was obtained from the ultimate users of proposed facilities, Environmental Division, DPTMS, Master Planning Division, and others, as applicable to each project.

Within the Garrison area, various facilities and functions occur, including medical, administrative, unaccompanied personnel housing, family housing, community facilities, operational facilities, unit training areas, and airfields. The two actions under analysis, the UAVS Sky Warrior Facilities and EN BN Facilities, will fit in well with these existing uses of the Garrison area and result in no adverse effects to its land use.

Minor adverse effects to aesthetics and visual resources will occur from the construction, operation, and maintenance of these two projects, but will be offset by the adjacency of similar land uses, no disruption to Mission, and no significant impacts to environmental resources. For example, the UAVS Sky Warrior Facilities are being constructed on an existing airfield, Wright Army Airfield, therefore minimizing potential adverse effects. The JLUS program will continue to be utilized, as discussed under Range Construction, further minimizing potential effects to land use.

4.7.3 Alternative C Siting

Overall, Alternative C (construct at Alternative C locations) will have minor adverse effects to land use on Fort Stewart, and be virtually identical to those discussed under Alternative B. The alternatives differ primarily in the physical location of construction. Continuing to work with local jurisdictions to implement land use controls help minimize inconsistencies and/or conflicts with adjacent land uses, also as discussed under Alternative B.

4.8 INFRASTRUCTURE

The infrastructure at Fort Stewart consists of its utilities and transportation systems. Utilities include potable (drinking) water supply, wastewater, energy/power sources, communications, and solid waste. The TLS for utilities is the potential for change in demand that would adversely affect the ability of a utility provider to service existing customers; in addition, significance is

determined by the ability of the utility providers to accommodate the additional demand created by the proposed action.

Transportation resources consist of Fort Stewart roads, tank trails, and state of Georgia highways. This section describes the general traffic conditions within the affected environment in terms of access and circulation, and assesses any impacts related to these issues. Unless otherwise stated, information utilized to assess potential impacts to transportation is from the Fort Stewart 2007 Traffic Engineer Study, available at Appendix F of this EIS. The TLS for transportation impacts consists of changes to the traffic patterns that would cause a drop in level of service or that would cause an intersection to fail.

4.8.1 Alternative A: No-Action

This alternative will result in negligible effects to the infrastructure at Fort Stewart. Under Alternative A, Fort Stewart's ranges and Garrison area will continue to use and generate the same types and amounts of utilities as are described under the affected environment and for which Fort Stewart is already managing. Minor increases in utilities usage may occur, once facilities currently under construction, operation, and maintenance go on line, but this is a small increase only and will not tax the utility systems to beyond what they can currently accommodate. Maintenance of existing utility systems will continue, as will Installation of new utilities in current construction, operation, and maintenance projects, for which NEPA (and infrastructure) analysis is complete.

Surveys and studies conducted on the existing Fort Stewart transportation system determined that, although basically sufficient to meet current needs, it is congested, traffic intersection improvements are needed, and the roads themselves are beginning to physically degrade. Recommendations to improve the system were made, as discussed in Section 3.9.5, Transportation. The Installation has already completed both the NEPA review and/or construction for many of these projects, which are small, often less than half an acre, and occur at previously disturbed locations (existing roads). Minor positive impacts to transportation will occur under this alternative, as the noted deficiencies are being addressed.

4.8.2 Alternative B Siting (Preferred)

Overall, implementation of Alternative B would result in a minor adverse effect to utility systems/services and a negligible impact to transportation.

4.8.2.1 Range Construction

Communications. Expansions and updates to telephone, fiber optic, and similar information systems will occur as necessary. Current communication capacity will accommodate the proposed construction, operation, and maintenance and its associated communication requirement increases.

Energy. The Army Energy Program, with which Fort Stewart is fully compliant, set goals for all military Installations to make energy a consideration for all Army activities to reduce demand, increase efficiency, seek alternative sources, and create a culture of energy accountability while sustaining or enhancing operational capabilities (http://army-energy.hqda, accessed 5 NOV 09). Army construction, operation, and maintenance must also be compliant with Leadership in Energy and Environmental Design (LEED) and Low Impact Development (LID) protocols. The Installation adheres to policies set forth under the "Army Energy and Water Management Program" within the new Army Regulation 420-1 (Army Facilities Management), and Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management," which raises the bar for Federal leadership and performance in several areas:

- Reduce greenhouse gases 3% per year or 30% by end of FY 2015.
- At least 50% of renewable energy must come from new renewable sources.
- Reduce water consumption by 2% annually through FY 2015.
- New construction, operation, and maintenance/major renovation must meet high performance and sustainable standards.
- Reduce fleet petroleum use by 2% per year.
- Increase use of alternative fuels by 10% per year.
- Use plug-in hybrids vehicles.

Due to modernization of Army ranges, connections to energy sources (electrical and natural gas) are required. Many utility corridors run alongside existing roads and highways on Post, and the proposed range construction, operation, and maintenance projects are also located just off the same roads and highways. Therefore, running connecting lines from the existing to new facilities will not be problematic. Fort Stewart has ample capacity to accommodate these new connections, to include the new ranges (Thomas, 2009). Trenching for utility line connections will occur first in previously disturbed ground, then in undisturbed ground only if existing utility corridors are too far away for use.

Potable (drinking) water. Water service is provided to outlying areas, such as ranges, by 13 individual wells (Thomas, 2009). Additionally, some units bring their own water supplies to areas where they will camp or otherwise occupy for an amount of time greater than a day. New range construction, operation, and maintenance will either require development of a new well (one per range) or require Soldiers utilizing the range to bring their own water to the site. This additional usage and new well has a negligible effect on water supplies and no adverse effects are predicted (Thomas, 2009).

Wastewater. No wastewater line connections are part of these ranges' design. The CLFR and DMPTR will require a septic system; all other proposed ranges will utilize dry Vault Latrines and not affect any wastewater capacity issues, as these are physically pumped out regularly and the wastes disposed of off Post (Thomas, 2009).

Solid waste and recycling. The construction, operation, and maintenance of each range and its support facilities will generate demolition debris (generally concrete block or brick and metal). Under the LEED initiatives construction, operation, and maintenance contractors are required to minimize solid waste generation; this is also one of the three significant aspects of Fort Stewart's SMS program. Concrete or brick material must be crushed, which can then be utilized for road and tank trail stabilization projects throughout the Post. Asbestos may be encountered as structures are remodeled or demolished to accommodate new facilities. Asbestos, if encountered, would be removed by licensed contractors in accordance with applicable Federal and state laws

and regulations and disposed of in a local asbestos-permitted landfill (see also Section 4.10, Hazardous and Toxic Materials and Wastes).

Fort Stewart has four active landfills, located in the South Central Landfill Complex in the northwest corner of the Garrison area. Fort Stewart also has contracts with local refuse carriers that use landfills off-Post. All contractors involved in construction, operation, and maintenance, demolition, and renovation at Fort Stewart must dispose all waste generated from these projects in an off-Post permitted disposal facility in accordance with all Federal, state, and local rules and regulations.

Recycling reduces disposal cost, conserves natural resources, and minimizes environmental problems associated with land disposal. Fort Stewart's policy on recycling is governed by the June 11, 2003, Policy Memorandum #200-1-8 titled "Qualified Recycling Program." Under this policy, Fort Stewart personnel and contractors are required to actively participate in the recycling program, and all of the proceeds from the program are retained by Fort Stewart (Fort Stewart, October 2008).

Transportation. Most of the ranges proposed are located along existing roads, highways, and/or tank trails. New tank trails and access roads connecting the new ranges to these roads will, however, be required, as will roads and trails within some of the training ranges themselves. The CLFR, for example, will have a network of unfinished (non-asphalt) roads connecting one engagement box to the next. No transportation issues, such as traffic congestion, currently exist in these off-Garrison areas, so negligible impacts to this part of the infrastructure will occur.

4.8.2.2 Garrison Construction

Implementation of Alternative B would require the provision of infrastructure (utilities and transportation) to the UAVS Facilities and the EN BN. Utilities required include potable water, sanitary sewer, electricity, natural gas, and solid waste disposal and recycling.

Communications. Communication requirements on Post would be the same as required for construction, operation, and maintenance of the ranges and include provision of telephone, fiber optic, and similar information systems. Trenching for these utilities will utilize existing utility corridors on the Garrison area (servicing facilities adjacent to the Alternative B locations for the UAVS Facilities and EN BN facilities) and in previously disturbed ground.

Energy. Fort Stewart has sufficient energy capacity to accommodate needs of the UAVS facilities and EN BN Facilities. Additional utilities will be provided for the projects that would require increased capacity; otherwise, existing systems would be expected to have adequate capacity to provide for these changes. Additions to the utility systems that are privatized would be turned over to the owner in accordance with existing agreements. Measures under the Army Energy Program, Army Regulation 420-1, Executive Order 13423, LEED, and LID would be implemented as discussed under Range Construction.

Potable (drinking) water. Water service to the Garrison area is provided from five wells with a combined maximum rated capacity of 6.08 million gallons per day (mgd). Fort Stewart's permitted drinking water capacity is 4.5 mgd with a current use of 2.11 mgd (Thomas, personal communication, 2009) (information is based on all five wells pumping for a total of 16 hours continuously more if pumped for a 24 hour period). Water lines will be installed to connect the new facilities to the water supply in the existing Garrison area.

In 2009, Water Use was added as the second significant aspect of the Fort Stewart Sustainability Management System. Therefore, water use activities that cause negative impacts are properly managed to reduce those impacts. The Installation is focused on reducing potable water usage. In addition, it ensures compliance with Executive Order 13514, which requires that agencies reduce their water usage by 2% per year through 2020 (Frazier, personal communication, 2009).

Several goals with shorter term objectives and targets have been identified and are being implemented in the area of Water Conservation, such as low flow devices, leak detection, lower Floridan well Installation, and plans to conduct a study to determine other possible alternative water sources to reduce water withdrawals. Fort Stewart has an adequate withdrawal capacity to

support additional growth associated with incoming realignments of personnel and their Families (USAEC, 2007).

Wastewater. Fort Stewart is tied into and uses the Hinesville Wastewater Treatment Plant. By agreement, Fort Stewart can generate a maximum of 3.79 mgd of wastewater. Current use at the Post is 2.44 mgd (Fort Stewart, October 2008). Implementation of Alternative B would require connecting wastewater systems to the UAVS Facilities Maintenance Hangar, and the EN BN Facilities. This addition would not surpass the maximum allowable 3.79 mgd of wastewater.

Solid waste and recycling. Construction within the Garrison area would follow the same guidelines as discussed under Range Construction with regards to construction, operation, and maintenance, demolition, recycling of applicable debris, and use of off-Post landfills by the construction, operation, and maintenance contractor.

Transportation. The construction of the new UAVS and EN BN Facilities will require new access roads connecting the facilities to Fort Stewart's main roads. These will be part of the overall facility design and coordinated with all appropriate reviewers prior to approval. This includes ensuring they meet local and state requirements, as well as all Installation emergency response and other concerns. Other transportation projects were identified in the 2007 Fort Stewart Traffic Study, but have predominantly been completed already, resulting in negligible effects. Those pending will undergo similar review and considerations prior to approval and design.

4.8.3 Alternative C Siting

Overall, implementation of Alternative C would also result in a minor adverse effect to utility systems and services and a negligible impacts to transportation resources on Post. The projects will be constructed at different locations under Alternative C, but would still require connections to existing utility systems on Post. As with Alternative B, all the utility systems are capable of handling this additional demand. The projects' utility needs would not result in the violation of any permits (such as for Fort Stewart's WWTPs) or Fort Stewart exceeding any of its allowances

(such as the daily amount Fort Stewart is allotted under it potable water withdrawal allotment by the state of Georgia). Transportation impacts would also be similar to those discussed under Alternative B, as the needed tank trails and access roads will still be required for the ranges and Garrison facilities, differing only in their physical locations.

4.9 SAFETY

The TLS for safety is exceeded when the surface danger zone (SDZ) of a range extends off Fort Stewart, when a violation of Occupational Safety and Health Administration Act (OSHA) standards occurs, or when access to the construction, operation, and maintenance site is not adequately managed (unauthorized access).

4.9.1 Alternative A: No-Action

Overall, there would be a negligible effect to safety on Post as a result of this alternative. No change from existing conditions would occur. Soldiers, their Families, civilian employees, contractors, and visitors on Post will continue to adhere to Installation, local, state, and Federal safety requirements, as discussed in further detail below.

4.9.1.1 Public Safety

Safety briefings and orientation sessions are provided to all newly arriving Soldiers and civilian personnel with regards to the workplace. Safety and emergency contact information is also provided as part of the routine "welcome package" distributed to newly arriving Family members utilizing Army family housing on Post and attending DoD schools. Safety messages are distributed via e-mail (the MARNE Message System) and assigned safety officers at unit headquarters, barracks, administrative and organization offices (such as the DPW), DoD schools, and other facilities. Utilization of the Marquee Board at each Access Control Point (Garrison area) and the "Safety First" billboards along GA Highways 144 and 119 are effectively reducing motor vehicle accidents and driving while impaired both on and off Post.

4.9.1.2 Transportation Safety

The Fort Stewart Directorate of Emergency Services (DES) provides in-depth transportation safety and awareness training for on- and off-duty military and civilian personnel. Soldiers assigned to tank and heavy vehicle usage receive intense accident avoidance training; civilian transportation safety training primarily consists of attendance at the Defensive Drivers Course, offered by the DES. As mentioned under Public Safety, billboards and marquee sign usage continue to raise awareness of transportation-related safety needs for military and civilians alike.

4.9.1.3 Construction Safety

Construction, operation, maintenance. and demolition activities currently in progress (or for which NEPA is complete and implementation pending) follow the *USACE Safety and Health Manual* 386-1-1. These requirements also apply to all contracted activities, whether in-house or by contractors. This manual outlines all of the requirements for OSHA compliance during construction, operation, maintenance, and/or demolition processes, and applies to all projects in the Garrison area and surrounding training lands. Appropriate measures to limit unauthorized persons from accessing construction sites are also in place, to further minimize potential safety risks at these active sites.

4.9.1.4 Explosive Safety

Construction activities on known and/or on suspected range and training lands are conforming to guidance in the UXO Avoidance Plan written for each project. This is a requirement on Fort Stewart and construction in potentially UXO-containing areas does not proceed without it. Assistance with UXO clearance from Fort Stewart EOD further ensures safety of workers on site.

4.9.1.5 Range Safety - Surface Danger Zones

None of Fort Stewart's current ranges have SDZs extending across Fort Stewart's boundary or into the existing Garrison area. AR 385-63 allows for SDZs to extend past Fort Stewart's

boundary only if the area meets the requirements of AR 385-63 and if an agreement is made with the landowner, applicable environmental and local regulations are met, and controls are in place to prohibit entry by unauthorized personnel and to provide decontamination after use. These measures are in place, although currently no exceptions to the AR have been required.

4.9.2 Alternative B Siting (Preferred)

Overall, this alternative will also result in negligible adverse effects to safety on Post. This section's safety requirements would conform with existing practices, as discussed under Alternative A. As this alternative also consists of new construction, operations, and maintenance activities, however, it does differ in some ways, pointed out in the discussion below.

4.9.2.1 Public Safety

Military, civilian personnel, military Family members, and visitors would continue to receive applicable safety information, as discussed under Alternative A.

4.9.2.2 Transportation Safety

Basic transportation safety would be consistent with the discussion under Alternative A. This alternative, however, consists of new construction of ranges, and introduces new transportation safety issues. Some of the ranges will be constructed on top of existing ranges and some will be constructed in open, forested training lands. Timber harvest and site clearing vehicles (such as logging trucks, graders, and stump-grinders) will be more numerous on the roads adjacent to the construction site. Trucks will also be hauling fill materials from the closest borrow pit to the construction site. This may congest these roads, interfering with military and/or civilian traffic in the area, and result in safety concerns, such as an increased risk of vehicle accidents in the area.

Once construction is complete, Soldiers transporting to the range, either on foot or via convoy, may further exacerbate this situation. Coordination between the construction, operations, and

maintenance activities at these new ranges will be coordinated between DPTMS (who schedule use of the ranges) and the military and civilian population will be needed, possibly by email notifications when major actions (construction, operations) occur, so these areas are avoided and alternate routes utilized. This would minimize congestion and safety concerns. Similar traffic congestion and accident potential would exist for the two Garrison construction projects; however, the safety risk may also be minimized via the same communication and site avoidance measures utilized for actions in range areas.

4.9.2.3 Construction Safety

Construction, operation, maintenance, and demolition activities for Alternative B ranges and Garrison facilities must also comply with the *USACE Safety and Health Manual* 386-1-1, as discussed under Alternative A.

4.9.2.4 Explosive Safety

Construction activities on known and/or on suspected range and training lands must comply with each project's UXO Avoidance Plan and utilize the expertise of the EOD for UXO clearing activities. The Installation's Range Control Division provides a training class twice a month to soldiers and civilians so that they may be familiar with UXO identification, safety protocols, and reporting requirements if UXO is encountered. No new dudded impact areas will be created as a result of the proposed actions, so no explosive safety concerns are predicted from that aspect of UXO.

4.9.2.5 Range Safety - Surface Danger Zones

Under Alternative B, new ranges with new SDZs will be constructed. None of these ranges will result in the extension of an SDZ across Fort Stewart's boundary or within the existing Garrison area and no exception to AR 385-63 will be required. The Installation's range safety program is required to factor in SDZ calculations for use of specified munitions when siting ranges to ensure that there is an adequate buffer area to protect personnel from rounds that may be ricocheted during operation of the range. The Installation's range safety program also prohibits picking up,

tampering with, or removing UXO by unauthorized personnel. Only explosive ordnance disposal (EOD) personnel qualified in UXO identification and removal procedures will be involved in clearance operations. In summary, the new construction, operations, maintenance, and demolition at the range and Garrison construction sites will introduce new safety risks on Post, but implementation of all existing safety programs should minimize any safety hazards.

4.9.3 Alternative C: Construct at Alternative C Locations

Overall, negligible adverse effects are predicted as a result of this alternative, with potential impacts to safety similar to those discussed for Alternative B. This is due to the fact that, no matter which site is chosen (Alternative B or C), the same safety protocols and requirements apply.

4.10 HAZARDOUS AND TOXIC MATERIALS AND WASTE

The TLS for potential impacts to hazardous materials and wastes includes the degree to which its implementation would result in the following:

- Cause a spill or release of a hazardous substance;
- Expose the environment or public to any hazardous or harmful substance through release or disposal;
- Increase the risk of accident or release from existing or proposed vehicles, equipment, procedures, or training practices;
- Impact the existing capacity of a landfill;
- Increase amounts of stored hazardous materials/wastes to the point of noncompliance with Federal, state, or local environmental regulations;
- Cause the amount of hazardous materials/waste to exceed the capacity of satellite accumulation points or other authorized repositories;
- Subject personnel or members of the public to unsafe levels of radiation;
- Result in noncompliance with established radiation exposure limits;
- Cause a release of pesticides or potentially expose military personnel or the public to pesticides;

- Expose military personnel or the public to PCBs; or
- Cause a spill or release of petroleum-based products.

DOD Installations are required to comply with all these laws, statutes, and regulations, as well as Executive Orders 13101 and 13148. Military munitions used for their intended purposes on ranges or collected for further evaluation, such as recycling, are not considered waste per the MMR (40 CFR 266.202) as incorporated by the state of Georgia Environmental Rule 391-3-11.10(3).

Live-fire activities on new ranges generate expended small arms ammunition (.50 cal and below). Small arms munitions consist primarily of brass bullet casings and lead bullet cores. A majority of brass bullet casings are picked up and turned in. Following live-fire training activities, lead bullet cores can be found in earthen berms behind firing targets. There is limited potential for migration or leaching of this lead off firing ranges. As discussed in Chapter 3, the Fort Stewart Operational Range Phase I Qualitative Assessment Report of determined that none of the 274 operational ranges on Post indicated the presence of an off-range release potentially posing an unacceptable risk to human health or the environment. In order to effectively and proactively address environmental requirements on ranges, an organized or systematic approach to the management of range environmental compliance requirements was developed and is implemented via the Range Compliance Initiative, which is the environmental compliance portion of the Sustainable Range Management Plan.

The proposed action will not result in the accumulation of additional lead in areas where tungsten rounds have been fired in the past, with the exception of the MFR, as discussed in Chapter 3. Lead is inherently immobile in groundwater due to very slow dissolution rate and high capacity to adhere to clays, metal oxides, and organic material. Even though groundwater flows through highly permeable material, tracer tests show that lead is quickly attenuated and does not move readily through groundwater. Lead may be transported in surface water or wind in the absence of maintenance and management of the berms at firing ranges.

4.10.1 Alternative A: No-Action

Overall, negligible effects are predicted as a result of this alternative. There will be no change in Fort Stewart's management of hazardous materials, toxic substances, hazardous waste, or contaminated sites, continuing to manage existing sources of hazardous waste in accordance with the HWMP. Fort Stewart utilizes an aggressive RCRA compliance inspection program to ensure compliance, conducting an average of 500 formal inspections annually. Fort Stewart reduced the total amount of hazardous waste from 176,994 pounds in 2003 to 101,918 in 2009 and anticipates continued reductions.

Training units continue to comply with all applicable Installation policies, such as Spill Prevention Control and Countermeasure (SPCC) requirements, as well as all Federal, state, and DOD regulations pertaining to the handling, containment of spills, packaging, labeling, storage, and transportation of wastes generated by their activities on Fort Stewart.

Construction projects that are already in progress have the potential for POL spills because of the use of temporary fuel storage tanks. The potential for spills is mitigated by ensuring all temporary tanks are doubled walled or are set in secondary containment and the implementation of BMPs (drip pans, absorbent pads, etc) and are conformant to Fort Stewart's SPCC Plan.

4.10.2 Alternative B Siting (Preferred)

Overall, this alternative would have negligible adverse effects to hazardous and toxic materials and wastes on Post. All facility operations activities, including those that support Fort Stewart's training mission, require the provision of storage and disposal facilities for both hazardous wastes and non-hazardous solid wastes. The Installation use, storage, and disposal of construction, operation, and maintenance materials and waste is controlled by existing comprehensive Army policies, regulations, and guidelines that have, in the past, proven to be adequate to protect human health and the environment.

4.10.2.1 Range Construction

During the construction, operation, and maintenance of the ranges, there may be a temporary increase in the use and storage of hazardous materials at the construction site. Construction projects would increase the potential for POL spills because of the use of temporary fuel storage tanks, but is mitigated by doubled walled tank use, secondary containment of materials, implementation of BMPs (drip pans, absorbent pads, etc), and compliance with Fort Stewart's SPCC Plan. Construction within the footprint of an existing range (as in the case of the MFR, for example), will contain soils within the boundaries of the existing range footprint. Therefore, any potential contaminants within those soils, such as RDX, perchlorates, lead, tungsten, etc., as discussed in Section 3.11.1.2, will remain within the footprint and not migrate off site, resulting in neglible adverse effects. The Fort Stewart Environmental Office will conduct frequent inspections of the site to ensure compliance with all Federal, state, and local regulations. If demolition is involved (as in the case where a new range is being constructed on top of an existing one, requiring demolition of existing structures), the demolition debris and associated soils that exhibit any of the characteristics of hazardous waste are managed as hazardous waste and disposed of accordingly.

4.10.2.2 Garrison Construction

Management of hazardous and/or toxic materials and wastes would be in accordance with existing Installation policies and protocols as discussed earlier in this section. No building demolition is currently associated with the construction, operation, and maintenance of the UAVS or EN BN Facilities; otherwise, these projects will follow the same basic guidance as discussed under range construction.

4.10.3 Alternative C Siting

Overall, this alternative would have negligible adverse effects to hazardous and toxic materials and wastes due to construction, operation, and maintenance of the new ranges and Garrison facilities. Impacts would be in accordance with those discussed under Alternative B, as the alternatives differ in the physical location of each project only.

4.11 SOCIOECONOMICS

The TLS for socioeconomics consists of a combination of several factors, to include unusual population growth or reduction, unusual decrease or increase in demands on housing and public services, and the potential to increase/decrease employment opportunities substantially. Information in this section is summarized from the September 2009 Fort Stewart Command Data Summary (CDS), the U.S. Census, and/or the Hinesville Area Metropolitan Planning Organization (HAMPO) Long Range Transportation Plan. Information below is summarized for brevity, but full details are available in Section 3.11, Socioeconomics, Tables 3-13 through 3-16. Also, the full copy of each report cited in available for review in Appendix F.

4.11.1 Alternative A: No Action

Overall, this alternative will result in negligible effects to existing socioeconomic resources. Whether or not the new ranges and Garrison facilities are constructed, Fort Stewart will still receive approximately 1,000 Soldiers and their dependants over the next few years, in response to Army growth initiatives. This results in the need for additional family housing, schools, child services centers, and other quality of life facilities. To meet this current need, Fort Stewart is constructing one additional new DoD elementary school, two child development centers (one for ages birth-five years; one for ages six to 10), and one youth activity center (for all ages' use). These facilities are in the design phase, but have received preliminary NEPA review and will be built within the next two or three years. All high school-aged students currently attend schools off Post and will continue to do so in the future. Until the new facilities are constructed, however, this lack of adequate facilities represents a minor adverse effect.

Per the 2009 CDS, the number of Soldiers who work and train on Fort Stewart lands has risen from approximately 13,000 Soldiers in 1980 to 18,000 in 2009. Fort Stewart is actively working with its community partners to ensure community preparedness for this increase. The 2009 CDS indicates approximately 6,500 Soldiers' Family members live on Post and approximately 20,000 live off Post. Of these, the majority live in Hinesville (52 %) followed by Richmond Hill (13%).

Residents on Post include 4,174 military personnel in barracks. Additional RCI housing for Families and single Soldiers was recently constructed; this included some demolition of old, worn-down facilities with new, modernized houses and barracks. Other projects to enhance quality of life, such as shoppettes, gas stations, playgrounds, and similar sites have either been constructed or are pending (having completed NEPA review). This represents a beneficial impact.

In 2009, Fort Stewart contributed approximately $1.4 billion to the local economy, of which $1,187,395,200 was for gross pay to its military employees, $197,155,100 to civilian employees, $146,200 to retirees, and $111,000 on contracts. Fort Stewart's continuing operations therefore represent a beneficial source of regional economic activity and any increase from Soldier relocations will beneficially affect socioeconomics in the region. There would be no effects to minority and low-income populations or provisions for the handicapped. No current construction, operations, maintenance, or other activities occur at locations adverse to minority or low-income populations, either on or off Post. Provisions for the handicapped are required, per Federal law, for all newly constructed facilities and were incorporated into the design and implementation of all projects either underway or pending.

4.11.2 Alternative B Siting (Preferred)

Overall, this alternative would result in beneficial effects to socioeconomics. Construction of the new ranges and Garrison facilities may temporarily increase job opportunities for individuals living and/or working near Fort Stewart, resulting in potential temporary minor positive input into the local economy. Construction activities would add expenditures during the next few years. The construction, operation, and maintenance contracts may go to a company outside of the area; however, there is still the potential for utilization of the local workforce for the actual on-site work. Tax revenues would increase proportionally, especially through sales taxes. New construction, operation, and maintenance would result in additional non-military employees at the site as well, further increasing economic opportunities. The employment opportunities would provide a moderate beneficial effect on employment and economic growth. There would be short-term beneficial effects as a result of this alternative.

As discussed under Alternative A, an increase of 1,000 Soldiers and their dependents will occur on Post within the next few years. Additional schools, child care facilities, and other similar projects are planned for on Post to accommodate this demand. Liberty County also plans to construct a new middle school on Fort Stewart property for approximately 750 children, with the potential to expand to 1,000. It will be constructed on Fort Stewart lands, but funded, operated, and maintained by the county. This pending construction project will aid additionally in the accommodation of these new students. There would be no effect to minority, low-income populations, or the handicapped.

4.11.3 Alternative C Siting

Overall, this alternative would result in beneficial effects to socioeconomics, similar to effects discussed under Alternative B. Beneficial impacts are also predicted as a result of Alternative C because the same facilities would be built, differing only in their location.

5. CUMULATIVE EFFECTS

Past, present, and future actions at Fort Stewart and the surrounding region of influence (ROI) place a demand on its existing facilities, infrastructure, and training lands and ranges. As a large military Installation, Fort Stewart accommodates many activities while balancing them with the environment; however, because such effects from individual actions can be additive or cumulative, clearly identifying and understanding them is key. The CEQ states that a cumulative effects analysis must consider "the incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7)." Incremental, or cumulative, effects can result from individually minor, but collectively significant, actions taking place during a defined period of time and within a geographic proximity to one another. Actions geographically close to one another have more potential for cumulative effects than those farther away. Likewise, actions occurring at or near the same time may also affect one another and the area in which they occur.

Assessing cumulative effects involves defining the scope of the other actions and their interrelationship with the proposed action if they overlap in space and time. Cumulative effects are most likely to arise when a proposed action is related to others occurring in the same location or within a similar timeframe. Actions geographically overlapping or close have more potential for a relationship than those farther away. Similarly, actions coinciding in time have a greater potential for cumulative effects. To identify cumulative effects, the analysis needs to address three questions:

1. Could resources affected by the proposed action interact with resources affected by past, present, or reasonably foreseeable actions?
2. If one or more of the affected resources of the proposed action and another action could interact, would the proposed action affect or be affected by impacts of the other action?
3. If such a relationship exists, are there any adverse impacts not identified when the proposed action is considered alone?

Fort Stewart evaluates such cumulative effects on an ongoing and synergistic basis. To provide this capability, Fort Stewart utilizes both a cumulative impacts database (Microsoft Excel) and a computer-based program (GIS) to evaluate potential cumulative impacts. The cumulative impacts database defines Fort Stewart's assets and liabilities, assists with decision making, and supports identification of performance indicators in regards to sustainability efforts. This provides the capability to address these cumulative issues, which is essential to meeting environmental objectives.

5.1 REGION OF INFLUENCE

The overall ROI for Fort Stewart, Georgia, consists of the five-county area within which it resides. These counties are Liberty, Long, Bryan, Tattnall, and Chatham (where HAAF is located). Actions within Chatham County will not be discussed in this section, however, because no effects were predicted for the HAAF area as a result of this EIS's proposed action.

Each environmental resource has its own defined ROI and threshold level of significance (TLS). For example, impacts to air or water resources are broadly dispersed, so air quality and water quality and resources each have a large ROI, referred to as an air shed or watershed, respectively. Impacts to cultural resources or socioeconomics may be more limited and the ROI, therefore, smaller. Air or water impacts are often felt over a multi-county area; impacts to cultural resources or socioeconomics, on the other hand, are often more confined and city or site-specific. The Cumulative Impacts Assessment section discusses the ROI associated with each environmental resource and identifies the projects with the potential for cumulative impacts. The ROI and TLS for each environmental resource is indicated in Table 5-1 below. Designations of potential impact (negligible, minor, moderate, and significant) are the same as defined in Chapter 4. Impact designations for some resources, such as protected species, utilize both the NEPA effect verbiage and verbiage specific to the Endangered Species Act, also as discussed in Chapter 4.

Table 5-1: Threshold Levels of Concern and Significance (TLS).[1]

Areas of Concerns	ROI	TLS
Soils	Soils within and directly adjacent to Installation boundary	• Ground disturbance that violates applicable Federal, state, or local laws and regulations (such as the Georgia Erosion and Sedimentation Act) • Ground disturbance that results in Notices of Violation (NOVs), such as failure to obtain required permits
Air Quality	Airshed within Installation boundary and five counties in which it lies	• Violation of applicable Federal or state laws and regulations, such as the Clean Air Act • Potential for any new *stationary* source (i.e., a specific facility) to be considered a major source of emissions • Potential for an action to cause a violation of a national Ambient Air Quality Standard
Water Resources - streams, stormwater systems, floodplains	Water sources within the four Fort Stewart watersheds	• Actions causing long-term impacts (chemical, physical, or biological effects) that would alter the historical baseline or standard water quality conditions • Actions adversely impacting a water body currently considered impaired under the Clean Water Act (CWA)
Water Resources - Wetlands	Wetlands within the four Fort Stewart watersheds	• The TLS for wetlands occurs if the CWA is violated, such as failing to obtain a Section 404 Permit for fill of wetlands.
Biological Resources - Wildlife	Species habitat or migratory range within Fort Stewart's boundary	• Any action that violates applicable Federal laws, such as the Migratory Bird Treaty Act (MBTA) or Army regulations
Biological Resources – Protected Species	Habitat within Fort Stewart's boundary	• Any action that disrupts normal behavioral patterns or disturbs habitat at a level that substantially impedes Fort Stewart's's ability to either avoid jeopardy or conserve and recover the species
Biological Resources – Forestry Management	Forest resources within Installation boundary	• Use of weapons with a potential for causing timber damage and metal contamination in previously uncontaminated areas • Substantial acreage removed from timber management for other uses • Proposed activities precluding or restricting access for management of timber resources

Table 5-1: Threshold Levels of Concern and Significance[1] (continued).

Areas of Concerns	ROI	TLS
Biological Resources – Wildland Fire Management	Forest resources within Installation boundary	• Use of weapons with a potential of causing wildfires • Occurrence of activities in areas with higher fuel loads • Occurrence of training during high fire danger days • Proximity of sites to smoke sensitive areas • Activities that preclude or restrict access for wildland fire management.
Cultural Resources	Cultural Resources within Fort Stewart's boundary	• Violation of applicable Federal laws and regulations, such as the National Historic Preservation Act and Archeological Resources Protection Act
Noise	Lands within and directly adjacent to Fort Stewart's boundary	• If noise (during construction, operation, and maintenance) would exceed the noise limit guidelines published in AR 200-1, Chapter 14 (2007) by having Zone III levels impacting noise-sensitive receptors.
Land Use	Lands within and directly adjacent to Fort Stewart's boundary	• Incompatibility with surrounding land uses; • Changes land uses in such a way that mission-essential training is degraded • Inconsistency or in conflict with the environmental goals, objectives, or guidelines of a community or county comprehensive plan for the affected area.
Infrastructure (utilities and transportation)	Infrastructure within Fort Stewart's boundary	Utilities • Potential for change in demand that would adversely affect the ability of a utility provider to service existing customers • Ability of the utility providers to accommodate additional demand created by the proposed action. Transportation • Changes to traffic patterns that would cause a drop in level of service or that would cause an intersection to fail.
Safety	Lands within and directly adjacent to Fort Stewart's boundary	• Surface Danger Zone (SDZ) of a range extends off Fort Stewart • Violation of Occupational Safety and Health Administration Act (OSHA) standards • Unauthorized access to construction sites

Table 5-1: Threshold Levels of Concern and Significance[1] (continued).

Areas of Concerns	ROI	TLS
Hazardous and Toxic Materials and/or Wastes	Lands within Fort Stewart's boundary	• Cause a spill or release of a hazardous substance • Expose the environment or public to any hazardous or harmful substance through release or disposal • Increase the risk of accident or release from existing or proposed vehicles, equipment, procedures, or training practices • Impact the existing capacity of a landfill • Increase amounts of stored hazardous materials/wastes to the point of noncompliance with Federal, state, or local environmental regulations • Cause the amount of hazardous materials/waste to exceed the capacity of satellite accumulation points or other authorized repositories • Subject personnel or members of the public to unsafe levels of radiation • Result in noncompliance with established radiation exposure limits • Cause a release of pesticides or potentially expose military personnel or the public to pesticides • Expose military personnel or the public to PCBs • Cause a spill or release of petroleum-based products
Socioeconomics	The Installation and the five counties within which it lies	• Unusual population growth or reduction • Unusual decrease or increase in demands on housing and public services • Potential to increase/decrease employment opportunities substantially.

1. Although some thresholds have been so designated based on legal or regulatory limits or requirements, others reflect discretionary judgment and BMPs on the part of the Army accomplishing its primary mission of military readiness, while also fulfilling its conservation stewardship responsibilities. Quantitative/qualitative analyses may be used, if appropriate, in determining whether, and the extent to which, a threshold is exceeded.

5.2 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

Public documents and information prepared or transmitted by Federal, state, local, and/or military agencies are the source of data for each action discussed in the overall and resource-specific ROIs. Fort Stewart is an active military Installation that is continuously responding to changes in mission and in training requirements. This process of change is consistent with the United States defense policy that the Army must be ready to respond to threats to American interests throughout the world. Several recent mission and training requirements have resulted in facility construction and upgrades on Fort Stewart. Most of these changes derive from the

Army's transformation, growth, and realignment processes and have been programmatically or otherwise assessed in NEPA documents, both at the Fort Stewart and Army-wide level, as discussed in detail in Chapters 1 and 2.

In accordance with CEQ's guidance, this analysis focuses on those actions deemed relevant and useful in determining if the proposed action and its alternatives will have an incremental/cumulative impact to the ROI of these resources. These projects are indicated on Table 5-2.

Reasonably foreseeable future actions (PPRFFAs) with the potential for cumulative impacts (when combined with actions on Fort Stewart) are also occurring on lands outside the Fort Stewart boundary. Preliminary analysis of local and regional information sources resulted in the list below, which highlights major actions in the overall ROI for Fort Stewart. Other, more minor actions – such as small-scale construction, municipal, residential, education, and agricultural activities, and others – will also occur but are not listed or discussed in great detail.

(1) Hinesville Area Metropolitan Planning Organization (HAMPO) Actions. The Hinesville Area Metropolitan Planning Organization (HAMPO) is the designated Metropolitan Planning Organization (MPO) for the Hinesville urbanized area, all of Liberty County, and part of Long County. HAMPO develops and administers the urban transportation study, which is a comprehensive, cooperative, and continuing process and is the forum for decision making on regional transportation issues. HAMPO is responsible for developing the 20 year Long Range Transportation Plan (LRTP) and the four-year Transportation Improvement Program (TIP) (Appendix F).

Table 5-2: Past, Present, and Reasonably Foreseeable Future Actions on Fort Stewart.

Project or Activity	Time Frame	Spatial Extent (if known)
Convoy Live Fire Range	2004	
4th Unit of Action (now 2nd BCT) Facilities	2004	
Bridge 30/E12	2005	
Convoy Live Fire Road Widening	2006	
Digital Multipurpose Range Complex	2007	
Strum Bay Restoration	2008	
WWII Wood Buildings Demolition Program	Ongoing	
Garrison construction and expansion	Past-present	7,567 acres
Construction activities to support garrison and training functions (including tenant unit mobilizations) and projects for which NEPA is complete; list at Appendix E.	2008-present	
New and ongoing construction associated with the Installation Priority Board; list at Appendix E.	2010-future	
New and continuous training and major construction; list at Appendix E.	Future	FSGA Range and Maneuver Areas
Arrival of the EN BN (*Note: part of Alternatives B and C)*	Undetermined	Undetermined
Arrival of the Sky Warrior UAVS Unit (*Note: part of Alternatives B and C)*	2012	17 Soldiers
ITAM Projects, including low water crossings	Ongoing	
Range and Training Land Assessment Monitoring	Ongoing	
Installation resource management plans (Integrated Natural Resources Management Plan, Integrated Cultural Resource Management Plan, etc.)	1997-future	Range and Maneuver Areas for the purposes of timber harvesting, mowing, prescribed burning, data collection, etc.
Multipurpose Machine Gun Range (#2)	2016	2016
Infantry Squad Battle Course (#2)	2016	2016
Light Demo Range	2017	2017
Known Distance Range (#2)	Long Range	
Digital Multipurpose Training Range (#2)	Long Range	

Note: Fort Stewart contains sufficient land within its existing boundaries to accommodate these projects and has no plans for acquiring additional land outside its boundaries.

The HAMPO TIP consists of Federally funded highway and transit projects programmed for FYs 2010 to 2013. The TIP identifies transportation improvements recommended for advancement during the program period, groups the projects into appropriate staging periods, and includes realistic estimates of total costs and anticipated funding sources. Project-by-project review and approval by the Georgia Department of Transportation (GA DOT), the Federal Highway Administration (FHWA), and the Federal Transit Administration (FTA) are also necessary before Federal funds become available. Projects identified within the potential for cumulative impacts in the overall Fort Stewart ROI include the following:

- Hinesville Bypass Project (FY10-13) – Liberty County and the GA DOT propose construction of a four-lane bypass from U.S. Highway 84, one mile south of its intersection with Georgia state Road 196, to U.S. Highway 84 where it intersects South Flemington Street. This is also known as the "Eastern Bypass" and will direct traffic from the downtown Hinesville area.
- U.S. Highway 84 Safety Improvements – various, relatively small-scale improvements to various points along the highway to remedy traffic congestion and safety concerns.
- Wright Army Airfield (WAAF) Access Road – Construction of two-lane road to connect the joint-use portion of WAAF, located in the southeastern portion of Fort Stewart, to Hinesville. Currently, access to WAAF is via Fort Stewart's access control points; this access road would provide easier civilian access to the airfield.

(2) ***Improvements to Georgia Highway 196***. This road is currently being expanded from a two-lane highway to a four-lane highway, with two lanes in each direction and a grassed median at its center, to remedy traffic congestion and safety concerns at various points along the highway.

(3) Townsend Bombing Range / Savannah Combat Readiness Training Center. The Townsend Bombing Range in McIntosh County, GA., and belongs to the Marine Corps Air Station (MCAS)-Beaufort. The 5,182-acre range is part of the Georgia Air Guard's Combat Readiness Training Center in Savannah and directs more that 3,000 training flights each year. It is owned by the U. S. Marine Corps and operated by the Georgia Air National Guard.

Improvements to Georgia Highway 144 may also occur in the reasonably foreseeable future, although no funding source has been identified and no design has been initiated. The purpose of these improvements is to alleviate traffic congestion and safety concerns in the Hinesville area community. The first project, the Highway 144 Bypass, would involve construction of a two-land road, starting from the intersection of Highway 144 and Fort Stewart Road 47 and terminating at Highway 119. The second project, Highway 144 Widening, would expand the existing corridor to provide greater vehicle capacity while improving safety conditions for motorists along the route. The study options considered current and future traffic, possible future development along the corridor, and environmental concerns.

Fort Stewart has sufficient land within its existing boundaries to support the construction of all ranges discussed in the Final EIS and does not consider the acquisition of additional land a reasonably forseeable future action at this time. The Army's position is that Fort Stewart has sufficient land to train its current and future assigned Soldiers adequately, including the six FY16-17 range construction projects discussed in the cumulative portion of this Final EIS.

5.3 CUMULATIVE IMPACTS ASSESSMENT

Analysis of each alternative's potential to result in cumulative effects, when combined with those proposed for the Past, Present, and Reasonably Foreseeable Future Actions (PPRFFA) is presented in this section. For brevity, the term "currently ongoing activities" is utilized in lieu of defining each routine daily action in full for each resource and alternative. For Fort Stewart, this includes training on Installation ranges and training lands, facility operations and maintenance, and residential activities. Preliminary analysis resulted in a finding of either no cumulative effect or negligible cumulative effect for safety, hazardous and toxic materials and wastes, and socioeconomics, when combined with the PPRFFA in the overall Fort Stewart ROI. These resources are therefore not discussed in further detail in this EIS.

5.3.1 Geology and Soils

The TLS for soils occurs if (a) ground disturbance violates applicable Federal, state, or local laws and regulations (such as the Georgia Erosion and Sedimentation Act) or (b) result in Notices of Violation (NOVs) (such as failure to receive applicable permits). The ROI for geology and soils consists of all lands within and directly adjacent to Fort Stewart boundary.

5.3.1.1 Alternative A: No Action

Overall, implementation of this alternative would have negligible-to-minor adverse cumulative impacts to soils in the ROI. This alternative would not include the range and Garrison facility construction proposed under the action alternatives; however, currently ongoing activities are already resulting in minor adverse effects to soils, even without the addition of these projects. When combined with the PPRFFAs, this would result in additional adverse effects to soils within Fort Stewart.

Exposed soils would become more susceptible to erosion, soil productivity (i.e., the capacity of the soil to produce vegetative biomass) may decline in disturbed areas, and soil loss would occur within the footprint of paved or other hardened areas and new structures. Impacts from demolition activities and utilization of on Post borrow pits would be minimal, given the fact that these soils have been previously disturbed and in some areas are already covered by structures, concrete, or other surfaces. Utilization of local, state, and Federal laws, guidance, and regulations will minimize this potential for adverse effects in the ROI. For example, each project must comply with the requirements of its NPDES permit, implement all required BMPs for timber harvest and construction, and utilize Fort Stewart's ITAM program, INRMP implementation, and activity-specific stormwater management plans. This would ensure effects remain below a level of significance.

5.3.1.2 Alternatives B or C Sitings

Overall, implementation of Alternative B or C would result in moderate adverse cumulative impacts in the soil ROI. This alternative would include currently ongoing activities, the range

and Garrison facility construction projects (determined to have a minor adverse effect to soils), and all PPRFFAs both on and off Post, including their associated soil disturbance and borrow material needs. Even though this is substantially more soil disturbance than under the no action alternative, it is still not sufficient to meet a level of significance, as Fort Stewart would ensure adherence to existing laws, policies, and protocols.

5.3.2 Air Quality

The TLS for air quality impacts is the violation of applicable Federal or state laws and regulations, such as the Clean Air Act (CAA), the potential for any new *stationary* source (i.e., a specific facility) to be considered a major source of emissions, and the potential for an action to cause a violation of a NAAQS. The ROI for air quality consists of the airshed containing Fort Stewart and the five counties it lies within, all of which are in attainment.

5.3.2.1 Alternative A: No Action

Overall, this alternative would result in negligible-to-minor cumulative adverse impacts to air quality in the ROI. This alternative would not include the range and Garrison facility construction proposed under the action alternatives, but consist solely of the currently ongoing activities on post and those indicated as PPRFFAs.

As discussed in Chapter 4, an air emission inventory identified Installation sources for refrigerants, munitions, and prescribed burning. These emissions were estimated using the total area of the buildings and emission factors per building area for external combustion (hot water heaters, heating, etc.), electricity usage (cooling), and refrigerants. It is valid to compare Fort Stewart's emissions to the total U.S. emissions because greenhouse gas (GHG) emissions are a global issue. Local emissions from anywhere in the world contribute to this global phenomenon. The Army does not have good figures for world emissions, so a comparison to nation-wide emissions is representative and helpful to an understanding of the impacts of the proposed action. Prescribed burning emissions are not included in the totals of the greenhouse gas emissions because they are not regulated as significant emissions, per the Georgia EPD (Georgia Rule 391-3-1-.02(5)).

Short-term impacts due to increased emissions of criteria and hazardous air pollutants (HAPs) are likely to arise from the use of construction equipment and open burning for land clearing. Additionally, as the projects move from the construction to the operational phase, emissions may again increase slightly. This rise in emissions will not result in Fort Stewart having to substantially amend its opacity, fugitive dust, prevention of significant deterioration (PSD), or GHG protocols, change its existing operations with regards to air quality, or fall into a state of non-attainment for any criteria pollutants.

5.3.2.2 Alternative B and C Sitings

Overall, implementation of either Alternative B or C would result in minor cumulative adverse impacts to air quality. The difference between the two alternatives is in physical location only and would result in minor adverse effects of a similar nature and magnitude, as discussed in Chapter 4. A baseline GHG inventory was conducted to quantify the emissions for several sources at Fort Stewart. The projects analyzed in Alternatives B and C propose to add 12 new ranges to the existing ten ranges, an additional 288,000 square feet of buildings requiring external combustion for heating and hot water and electricity for cooling, and an assumed 15% increase in transportation from the new ranges and roads. This will also include the PPRFFAs both on and off Post, as well.

The total greenhouse gas emissions in 2007 for the U.S. are 8,027,472,000 STCO2e (see http://www.eia.doe.gov/oiaf/1605/ggrpt/). Compared to the carbon dioxide equivalent emissions from all sources in the United States in 2007, the proposed range and Garrison facility construction, plus the PPRFFA, will equal 58,465 STCO2e, which is approximately 0.00073 percent of the total carbon dioxide emissions generated in the United States. This is therefore not deemed significant.

The projects will not require any significant modification to Fort Stewart's Title V Permit, will be temporary in nature, related primarily to construction, not result in Fort Stewart having to

substantially amend its opacity, PSD, or GHG protocols, change its existing operations with regards to air quality, or fall into a state of non-attainment for any criteria pollutants.

5.3.3 Water Quality and Resources

The TLS for water resources is defined as any long-term impacts (chemical, physical, or biological effects) that would alter the historical baseline or standard water quality conditions. Additionally, project actions adversely impacting a water body currently considered impaired under CWA would be considered major. The ROI for water quality and resources is contained within the four watersheds in which Fort Stewart is contained.

5.3.3.1 Streams, Stormwater, and Floodplains

Alternative A: No Action. Overall, there is a potential for minor cumulative adverse impacts on streams, stormwater and floodplains when considered alone or in concert with the PPRFFAs in the Fort Stewart watersheds. Water quality is affected by changes to the environment that adversely affect aquatic life or impair human uses of a water body. Stormwater point sources consist of discharges to stormwater treatment systems or waters of the United States. Non-point sources consist of sediment, litter, bacteria, pesticides, fertilizers, metals, oils, grease, and a variety of other pollutants washed from rural and urban lands by stormwater runoff into drainage systems. Both have the potential to impact stormwater and surface water.

Impacts from municipal wastewater, agricultural, and industrial discharges were greater prior to the 1970s. Due to increased regulation, these discharges have slowed but continue to introduce pollutants into the system, which lower water quality when considered cumulatively. Georgia's "2004 303(d) List" for Bryan, Evans, Liberty, Long, and Tattnall counties have five waterways listed as impaired or partially impaired; they are listed in the table below with the causes of impairment (Table 5-3).

Table 5-3: Impaired Water Bodies on Fort Stewart.

Waterway	Cause of Impairment
Canoochee River	Trophic-weighted residue value (mercury in fish tissue)
Peacock Creek	Low dissolved oxygen and fecal coliform bacteria
Taylor's Creek	Low dissolved oxygen
Ogeechee River	Trophic-weighted residue value (mercury in fish tissue)
Canoochee Creek	Low dissolved oxygen

Residential, commercial, and industrial development results in an increase in impervious surfaces (roof tops, paved roads, parking lots, etc.). This affects stormwater discharges and results in an increase in non-point source contaminant loading through associated increases in urban landscaping (pesticides and fertilizers), increased traffic (oil, grease and metals), and other associated activities. There would be an anticipated incremental increase in adverse impacts to water quality as impervious surfaces increase. The following table is a summary of anticipated population growth-induced increases in impervious surfaces in the Altamaha watershed. As impervious surface area increases, water quality decreases.

Data accumulated by the USACE indicates that as the population of each county continues to increase, there will be an associated increase in impervious surfaces (see Appendix D for tables and associated data). All counties in the study area would experience an increase of less than one percent impervious surface by the year 2050. These counties' stormwater management programs should help to minimize the anticipated adverse impacts to water quality.

Alternative B and C Sitings. Overall, there is a potential for moderate adverse cumulative effects to streams, stormwater, and floodplains as a result of either alternative. Each has the potential to impact impaired water bodies and/or stream buffers; therefore, final designs must be thoroughly reviewed to minimize any potential impacts to streams. Designs must ensure NPDES pre/post construction requirements are being met by the implementation of Low Impact Development and proper BMPs during construction and for the Installation of low water

crossings, bridges, roads, and/or roadway drainage structures. Effective implementation of the NPDES permits requirements, and the Erosion and Sedimentation Pollution Control (ESPC) Plans during construction, and post construction BMPs will reduce the potential adverse impacts of stormwater, surface water, and floodplains. In summary, this action's effect, when combined with other projects in the ROI, does have the potential to result in adverse cumulative impacts; however, all projects will be undertaken in accordance with Federal, state, and local laws.

Also, it must be noted that many projects related to military training (e.g., firing ranges) do not feature impervious surfaces to the same degree as many civilian and private projects, and will not experience human activity and traffic of the same frequency and intensity, which might otherwise worsen local water quality. Furthermore, through the oversight of Environmental Compliance Officers, Army units self-monitor their training activities to avoid and minimize potentially harmful activities. Survey performed by Fort Stewart determined that the quality of water leaving Fort Stewart's geographic boundaries was of equal or better quality than that which entered Fort Stewart; the implementation of the currently ongoing activities, proposed actions, and PPRFFA are not anticipated to change this finding.

As noted in Chapter 4, much of the west-north-central, southeastern Garrison areas, and eastern portions of Fort Stewart would become inundated by floodwaters from Mill Creek, Taylors Creek, Savage Creek, and the Ogeechee and Canoochee Rivers, respectively during a 100-year storm event. Construction within floodplains may result in some increases in localized flooding, but are overall not significant. There were no practicable alternatives to siting these projects in floodplains due to the low elevations of the area and lack of non-floodplain construction sites.

5.3.3.2 Wetlands

The TLS for wetlands occurs if the CWA is violated, such as failing to obtain a Section 404 Permit for fill of wetlands. The ROI for wetlands impacts is contained within the same Fort Stewart watersheds listed at Section 3.3.3.

Alternative A: No Action. Overall, this alternative will result in minor adverse cumulative effects to wetlands. As discussed in Chapter 4.0, minor adverse effects to wetlands would occur as a result of projects already under construction, for which NEPA is complete and construction pending, and from ongoing training, administrative, and residential activities on Fort Stewart. Avoidance, minimization, and proposed mitigation efforts will be implemented to reduce adverse effects to the greatest extent possible. PPRFFA in the ROI include the ranges in Table 5-4 below, which are required to meet training demands. These ranges have not been sited at the time of writing, but an estimate of wetlands impact for each can be made based on the standardized acreage for each range footprint and the rule used by Fort Stewart of a typical site being one third wetland.

Table 5-4: Reasonably Foreseeable Future Actions on Fort Stewart with Wetlands Impacts.

Project	Wetland Impact (acres)
MPMGR #2 (2016)	77
Light Demo Range (2017)	2
DMPTR #2 (Long-range)	296
Known Distance Range # 2 (Long-range)	24
Urban Assault Course (2017)	21
Infantry Squad Battle Course # 2 (2016)	15
Total Impact	**435 acres**

Attempts will be made to site and design these future projects to avoid and minimize wetland impacts as much as possible. It is likely that the total impact figure will drop considerably once the siting process begins; in the cases of certain individual projects, wetlands may even be avoided entirely. As is the case for the sited projects addressed in this EIS, requests for Jurisdictional Determination and applications for Section 404 Permits will be submitted to the USACE as necessary and appropriate.

Alternative B Siting (Preferred). Overall, this alternative will result in minor-to-moderate adverse cumulative effects to wetlands. Currently, construction at the Alternative B locations would result in the following impacts to wetlands:

- **Range Construction**. The direct impact to wetlands for all the Alternative B range projects in this EIS is currently calculated at **179.03 acres.**
- **Garrison Construction.** The direct impact to wetlands for all the Alternative B Garrison projects in this EIS is currently calculated at **2.56 acres.**

Therefore, the total impact to wetlands for all the Alternative B projects is **181.59 acres.** The PPRFFA for the wetlands ROI was generated by adding the total projected wetland impact acreage for these future projects to the past known wetland impacts for Fort Stewart's watersheds (totaling 2636.87 acres, calculated from USACE and Fort Stewart Environmental Division records, including both permanent fill projects and low water crossings constructed during the review period.) The following analyses of the alternatives will add the projected wetlands impact for each alternative to the PPRFFA to generate cumulative impacts projections. When the acreages for Alternative B are added to the PPRFFA on Fort Stewart, this results in a cumulative impact of 2821.18 acres of wetlands on Fort Stewart. Avoidance, minimization, and proposed mitigation measures will be the same as those discussed for Alternative A.

Alternative C Siting. Overall, this alternative will result in moderate adverse effects to wetlands. Currently, implementation of the proposed action at the Alternative C locations would result in the following impacts to wetlands:

- **Range Construction**. The direct impact to wetlands for all the Alternative C range projects in this EIS is currently calculated at **409.86 acres.**
- **Garrison Construction.** The direct impact to wetlands for all the Alternative C Garrison projects in this EIS is currently calculated at **9.41 acres.**

Therefore, the total impact to wetlands for the Alternative C projects is 419.27 acres. When added to the PPRFFA on Fort Stewart, this results in a cumulative impact of 3056.14 acres, a slight increase from impacts predicted under Alternative B (Preferred). Avoidance, minimization, and proposed mitigation measures will be the same as those discussed for Alternative A.

Watershed Analysis. This watershed analysis has been prepared in conjunction with the USACE-Savannah District, who is a Cooperating Agency in this EIS. Excerpts from their Case Document (which consists of the 404(b)(1) analysis, as required by the Clean Water Act, for each project affecting wetlands on Fort Stewart) are included within this section of the EIS, with the entirety of the Case Document available for review in Appendix D. The excerpts only are presented in this chapter to meet the NEPA, CEQ, and Army regulations requiring an EIS be clear, concise, and easily understood by the public. Those requiring the full technical details presented in the Case Document may view it in its entirety at the appendix.

Table 5-5 provides information on all wetland impacts permitted by the USACE-Savannah District between January 1, 1990, and July 6, 2005, and the acres of wetland mitigation required. This information was generated by the Savannah District Regulatory Analysis and Management System (RAMS) database, including not only those specific projects requiring Individual or Nationwide permits, but also the Installation's low water crossings, which are covered by a Regional permit. There has undoubtedly been some additional loss of wetland during this time period from activities not regulated by the USACE, but no data exist on these losses.

In summary, since 1990, the USACE has documented approximately 1,467,774 acres of wetlands within Bryan, Bulloch, Chatham, Effingham, Emanuel, Jenkins, Screven, Liberty, Long, McIntosh, Appling, Evans, Glynn, Jeff Davis, Montgomery, Tattnall, Tombs, Wayne, Candler and Emanuel Counties. Of those 1,467,774 wetland acres, 1,982.87 acres of wetland impacts have occurred since 1990 (RAMS database). To date, there are at least 1,465,791.13 acres of un-impacted wetlands remaining in this area. This amounts to a loss of 0.14 percent of the wetlands since 1990, not a significant amount.

The USACE can document that 11,070.06 acres of wetland mitigation provided to offset the post-1990 wetland impacts in this area. The data on this table for stream impacts and stream mitigation is not representative. Most stream mitigation in coastal Georgia is in the form of land purchases from the Georgia Land Trust, which is not included in this data. In addition to the impacts described above, Fort Stewart itself has experienced some wetland impacts associated

with various projects in the review period 2005-2009 (Table 5-6). (Again, this includes projects constructed under Individual and Nationwide permits, as well as low water crossings constructed under the Installation's Regional permit.) Some major restoration projects, employed to mitigate wetland impacts, have also occurred within and after the review period, but have not been integrated into the data described above. The effects of these projects are outlined in the table below.

Table 5-5: Wetland Impacts from January 1, 1990, through July 6, 2005, in the Counties Included in the Fort Stewart Watersheds.

		Wetland	Wetland	Wetland
		Acres	Acres	Acres
County	**Acres**	**Requested**	**Permitted**	**Mitigated**
Bryan	111,509	38.15	41.81	236.29
Bulloch	81,797	114.67	119.28	205.28
Chatham	162,459	701.13	666.91	4,298.24
Effingham	127,318	175.13	205.08	633.59
Emanuel	42,158	67.78	67.78	269.26
Jenkins	35,292	55.74	55.74	230.22
Screven	85,270	47.99	57.19	92.08
Liberty	139,558	55.74	55.74	230.22
Long	93,629	117.9	117.9	1,343.68
McIntosh	149,942	16.86	16.85	69.64
Appling	39,963	34.02	34.02	70.39
Evans	12,493	21.28	21.28	34.81
Glynn	134,011	210.8	210.13	1,496.65
Jeff Davis	23,394	2.68	2.68	3.75
Montgomery	14,426	8.78	8.78	6.96
Tattnall	33,959	31.49	31.49	73.08
Toombs	21,718	3.45	3.45	2.43
Wayne	99,669	189.6	188.5	1,499.45
Candler	17,051	4.98	10.48	4.78
Emanuel	42,158	67.78	67.78	269.26
TOTALS	**1,467,774**	**1,965.95**	**1,982.87**	**11,070.06**

Table 5-6: Fort Stewart Wetland Impacts During the Review Period 2005-2009.

	Wetland	Wetland	Wetland
	Acres	Acres	Acres
County	**Requested**	**Permitted**	**Mitigated**
Bryan	5.73	5.73	0
Liberty	214.79	214.79	3,230
Long	0	0	0
Evans	0.2	0.2	0
Tattnall	0	0	0
TOTALS	**220.72**	**220.72**	**3,230**

Combining the impact figures from the 1990-2005 review period with those from Fort Stewart in 2005-2009, the following totals are reached for wetlands impacts in the Fort Stewart Watersheds (Table 5-7).

Table 5-7: Wetland Impacts from January 1, 1990, through July 6, 2005, in Fort Stewart Watersheds (with additional Fort Stewart projects integrated).

		Wetland	Wetland	Wetland
		Acres	Acres	Acres
	Acres	**Requested**	**Permitted**	**Mitigated**
TOTALS	1,470,785	2,186.67	2,203.5	14,300.06

In summary, these effects, when combined with other projects in the ROI, do have the potential to result in adverse cumulative impacts; however, it is expected that other projects in the ROI will be implemented as follows: projects will use erosion control measures, silt fencing, and other BMPs; sufficient storm water management structures will be constructed as part of new construction; erosion and sedimentation control plans will be filed in accordance with Georgia's Sedimentation Pollution Control Act; and all projects will be conducted in accordance/in

compliance with Federal, state, and local laws. This includes obtaining and adhering to appropriate wetland permits, including compliance with compensatory wetland mitigation requirements outlined in the wetland permit(s).

Compensatory Mitigation. As defined in the NEPA regulations, compensatory mitigation is "*compensation for the impact by replacing or providing substitute resources or environments*" (40 C.F.R. Part 1508.20). The compensatory wetland mitigation proposed for this action is discussed in more detail in Chapter 6, Proposed Mitigation and Monitoring.

The proposed projects supporting military training will adversely impact **179.03 acres** of Jurisdictional Wetlands. To mitigate for these impacts the applicant would obtain **mitigation credits** from a USACE approved mitigation bank that services the project area. Additionally, the Installation may mitigate some small future projects (currently unplanned) that may arise in response to the Installation's ongoing mission through debits from Fort Stewart's on-Post wetland mitigation bank. As such, it may offset any adverse impacts to wetlands and other waters of the US caused by the project by the proposed mitigation. Fort Stewart developed this mitigation strategy for these projects according to the 2008 Final Compensatory Mitigation Rule, and meets the requirements of the "no net loss" Federal Mandate.

The main public detriment that would result from this project would be the loss of 179.03 acres of jurisdictional wetlands. Many of the wetland functions and values important to the public, such as flood attenuation, sediment retention, fish and wildlife habitat, and others, would be replaced by the applicant's proposed mitigation plan. Additionally, Fort Stewart's past mitigation efforts (approximately 3,230 acres) have adequately offset impacts within the boundaries of Fort Stewart. Offsetting impacts through proposed mitigation for the current projects may occur through additional mitigation efforts, including the use of off-site USACE-approved wetland mitigation banks. The proposed mitigation plan would also provide adequate compensation for the impacted wetlands through the implementation of wetland creation, enhancement, and preservation.

In view of the above, the USACE determined that the proposed action, with proposed special permit conditions, would not have a significant cumulative impact on wetlands and/or other waters of the US when considered alone or in concert with the other past, present and reasonably foreseeable future projects in the Fort Stewart watersheds.

5.3.4 Biological Resources

Note: Determination of effect language and methodology within the ESA versus under NEPA is somewhat different. For example, ESA analysis may result in a finding of "may affect, but not likely to adversely affect." Under NEPA, this finding is expressed as "minor adverse effect." In the discussions and impact assessments below, both the ESA and NEPA determinations of effect will be expressed.

The definition of "substantial" is dependent on the species and habitats in question and the regional context in which the impact would occur. Impacts are considered more adverse if the action affects previously undisturbed habitat or if the impact would occur over a large portion of available habitat in the region. Direct and indirect effects of the proposed action, as discussed in Chapter 4, are available in the Biological Assessment, its modifications, and Biological Opinion from the USFWS for this EIS, located in Appendix B.

5.3.4.1 Wildlife, Fisheries, and Protected Species

The TLS for wildlife and fisheries occurs if an action violates applicable Federal laws, such as the Migratory Bird Treaty Act (MBTA) or Army regulations. The TLS for Federally protected species occurs if an alternative disrupts normal behavioral patterns or disturbs habitat at a level that substantially impedes Fort Stewart's ability to either avoid jeopardy or conserve and recover the species. The ROI for wildlife, fisheries, and protected species is the species home range, local habitat, or migratory range lying within Fort Stewart's boundary. Insufficient data exists outside Fort Stewart's boundary to make conclusions regarding protected species. Fort Stewart developed management plans for its populations of these species, as have other Federal and state agencies with recovery populations, but not for private or commercial lands off Post.

Alternative A: No Action. Overall, this alternative will result in minor adverse cumulative effects under NEPA and no cumulative impacts under the ESA. Under this alternative, training activities will continue across Fort Stewart, and all of its units are briefed prior to each training event regarding sensitive areas on Post, such as protected species habitat), and what is and is not allowed within certain areas (such as within the protective buffer surrounding individual RCW cavity trees). Historical use of training areas and ranges indicate unit compliance with these restrictions. Continued compliance is anticipated.

Construction activities, for which NEPA is complete, are also occurring around Fort Stewart on training lands, ranges, airfields, and Garrison area, as well as the operations and maintenance of these sites. The Installation FWB reviewed these actions and provided comment and guidance to ensure avoidance of adverse effects to wildlife and protected species. Temporary minor adverse effects (related to the period of construction) are predicted under NEPA and a finding of not likely to adversely affect predicted under the ESA.

Ongoing natural resources programs – such as those described in the INRMP – at Fort Stewart are providing mitigation for past (and ongoing) cumulative impacts associated with training and construction at Fort Stewart. The occurrence of sensitive species off Post is very limited and difficult to anticipate. No off-Post actions were determined to result in a cumulative impact to biological resources. This is mainly because the protected species either do not exist or are very limited in off-Post areas.

Alternative B and C Sitings. Overall, minor cumulative effects to wildlife and protected species may occur from a NEPA perspective and no cumulative impacts from an ESA perspective. Cumulative impacts to wildlife and protected species are not deemed likely, per the BA, even with the construction of the additional activities identified in the PPRFFAs.

Red-cockaded woodpecker (RCW). Fort Stewart will still have approximately 133,000 acres of potentially suitable RCW habitat after implementation of the PPRFFA that will not prevent the Installation from achieving its recovery goal of 350 potential breeding groups (circa 2013). The

Installation is not saturated with RCWs and Branch has identified 322 RCW recruitment sites that can be used to minimize impacts to existing RCW clusters. It will be possible to provision new recruitment clusters to accommodate any impacts related to the PPRFFA and future range construction. Fort Stewart will continue to maintain recruitment clusters in suitable unoccupied habitat at a rate of 15% of the number of active clusters each year until the recovery goal is achieved. Ongoing habitat management will continue to maintain and improve existing and potential RCW habitat. This statement is confirmed via findings in the recently received BO from the USFWS (see Chapter 6, Section 6.4.2).

Eastern indigo snake. Eastern indigo snakes use gopher tortoise burrows for winter refuge. Even though gopher tortoises may be relocated from the PPRFFA areas they are known to repopulate the same areas after construction as they have on existing Red Cloud Complex ranges. This area maintains a healthy population of gopher tortoise and eastern indigo snakes with no detriment to training. Thinning and burning for the benefit of RCWs benefits gopher tortoises and therefore, eastern indigo snakes. The FWB will continue to conduct winter surveys in gopher tortoise habitats and to perform mark-release studies of indigo snakes captured there. The Installation supported a radio-telemetry home range and health assessment study of individual indigo snakes (Hyslop, 2005) and will consider the implications of her study on future indigo snake management efforts. The Installation is also supporting Auburn University in a captive eastern indigo snake breeding program by providing gravid females for egg collection.

Frosted flatwoods salamander (FFS). The PPRFFA will not impact any confirmed breeding sites and project design will incorporate protection measures as required by the Clean Water Act and the Georgia ESCA to ensure appropriate wetland protection. Therefore, the proposed actions will not result in significant erosion, run-off, or other off-site impacts that might affect FFS habitat. Ongoing habitat management in support of RCWs and wetland conservation practices will continue to benefit FFS. The FWB will continue to search for new potential breeding ponds and to survey ponds for evidence of salamander reproduction.

Wood stork. Habitats in the PPRFFA appear to have suitable nesting habitat for wood storks, but no nests or rookeries are located on the Installation and no wood storks were observed foraging

in or near wetlands in the action areas. They occasionally are observed foraging in isolated wetlands, roadside ditches, and borrow pits when conditions are conducive to their foraging technique (i.e., when isolated wetlands dry down and concentrate large quantities of fish in small bodies of water). Although there are no known wood stork rookeries on Fort Stewart, FWB personnel will continue to investigate reports of foraging wood storks and inspect suitable wetlands for the presence of nesting wood storks. Ongoing wetland conservation practices will continue to provide suitable foraging habitat for wood storks, depending on precipitation patterns. No cumulative impacts are expected.

Shortnose sturgeon. Due to the distance between the PPRFFA areas and documented sturgeon sightings, erosion runoff into the river is not expected and project construction will have no cumulative impact on the shortnose sturgeon. The Installation will continue to support cooperative efforts to manage and monitor the Ogeechee River shortnose sturgeon population in partnership with NOAA-Fisheries and the GA DNR.

Of particular importance is Fort Stewart's involvement in regional efforts to address natural resource issues. Fort Stewart continues to be a leader in sustainability and ecosystem management by proactively seeking partners to facilitate natural resources conservation while concomitantly maintaining Fort Stewart's training mission. Fort Stewart actively manages the natural resources entrusted to it as a valuable member of a larger, regional land management team either by initiating regional natural resource protection and enhancement efforts or joining and cooperating in existing efforts.

Informal coordination between Fort Stewart staff and the USFWS occurs on a routine basis regarding sensitive species management. The outcome of these coordination and cooperative efforts has resulted in an outstanding, award-winning natural resources management program at Fort Stewart. Fort Stewart will continue to play a key role in sustaining native wildlife and vegetation in the region through its land management and natural resources programs to minimize these impacts.

5.3.4.2 Timber Resources and Wildland Fire Management

For this evaluation, there is no numeric TLS. The measure of significance for potential impacts resulting from implementation of Alternatives A, B, or C is based on many intangible factors. These include the extent or degree to which implementing the alternative would involve the following timber management issues:

- Use of weapons with a potential for causing timber damage and metal contamination in previously uncontaminated areas,
- Substantial acreage removed from timber management for other uses, and/or
- Proposed activities precluding or restricting access for management of timber resources

The TLS of potential impacts to wildland fire includes the degree to which implementing the alternative would involve the following issues:

- Use of weapons with a potential of causing wildfires
- Occurrence of activities in areas with higher fuel loads,
- Occurrence of training during high fire danger days,
- Proximity of sites to smoke sensitive areas, and
- Activities that preclude or restrict access for wildland fire management.

Alternative A: No Action. Overall, minor adverse cumulative effects to forestry and wildland fire management are predicted from this alternative. Currently ongoing activities on the Garrison would not greatly impact timber resources, even when combined with actions proposed as part of the PPRFFA. The Fort Stewart Timber Management Section would continue to manage and respond to the need for timber management actions to support construction projects already under way or for which NEPA is complete and construction pending, as well as lend support via thinning for training realism and the management of protected species. Impacts to wildland fire would persist, yet remain minor, and land use patterns would continue to be virtually static and unchanged with regards to wildland fire management. No off-Post actions were determined to result in a cumulative impact.

Alternative B and C Sitings. Overall, moderate adverse cumulative effects to forestry and wildland fire management are predicted as a result of this alternative. This alternative could also potentially limit the application of prescribed fire, increase the acreages of annual dormant season burns needed on ranges, potentially decrease growing season burn acreages in non-range woodlands, and significantly increase unwanted woodland vegetation, which would contribute to the buildup of forest fuels. The resulting buildup of fuels would impact the ability of Fort Stewart to manage wildfires effectively when ignited, as well as increase the smoke generated by wildfires and prescribed burns. Private land owners in this area surrounding Fort Stewart also conduct prescribed burns as a forest management tool. These activities can combine or add to the smoke from Fort Stewart's prescribed burns. Fort Stewart attempts to minimize cumulative effects by staggering and cycling prescribed burning locations to ensure the minimization of smoke density in a given area.

5.3.5 Cultural Resources

The TLS for cultural resources is the violation of applicable Federal laws and regulations, such as the National Historic Preservation Act, the Archeological Resources Protection Act, and others. The primary cumulative impacts to cultural resources are the result of ground-disturbing activities associated with timber harvesting, clear-cutting, construction, and increased susceptibility to vandalism or other unauthorized impacts to the resource. The ROI for cultural resources consists of all lands within and directly adjacent to the Installation boundary.

Through proactive inventorying of cultural resources prior to project execution, the Installation is capable of assessing both the direct and indirect impacts to cultural resources. Through early identification of cultural resources, coupled with avoidance and minimization efforts through site design, the likelihood of significant impacts to cultural resources are expected to be low and mitigation alternatives explored only when impacts to historic properties are unavoidable. Through these avoidance, minimization, and mitigation efforts, the Installation is able to reduce the impacts to cultural resources, reducing the level of impact to below a significant level.

Alternative A: No Action. Overall, this alternative would result in minor adverse cumulative impacts to cultural resources. Under this alternative, training activities will continue across Fort Stewart. One of the potential impacts to cultural resources that occur as the result of training is off-road maneuvers which always have the potential to impact resources; however, under the Alternative A, damage to archaeological sites as the result of off-road maneuver is expected to occur on a lesser degree. Furthermore, sensitive archaeological sites are marked as off-limits to maneuver, use of established tank trails is the norm, and the majority of maneuver occurs on the western side of Fort Stewart, where the majority of the training areas are previously surveyed. Cumulative impacts to archaeological historic properties are lessened to a degree by the process of site selection for major construction projects. During the review process, avoidance and site disturbance minimization are considered prior to proposed mitigation. In many cases, costs associated with proposed mitigation can far outweigh the costs of simple avoidance or minimization. No proposed mitigation through data recovery (when followed by destruction) of archaeological sites eligible for the NRHP have occurred at Fort Stewart. The reverse is often the case when architectural resources are affected by a proposed project. The costs associated with mitigating a resource is often more cost-effective; therefore, proposed mitigation is a viable option for resolving adverse effects. To date, four historic buildings (all 1950s era fire towers) have been mitigated for adverse effects on Fort Stewart. In addition, one segment of a historic structure (a historic tramline) was mitigated for adverse effects on Fort Stewart.

Alternative B Siting (Preferred). Overall, this alternative would result in minor adverse cumulative impacts to cultural resources. Under Alternative B, there is a potential for adverse impacts to historic properties as a result of the proposed actions and current military mission. The cumulative impact from all proposed actions and all foreseeable actions will result in a moderately low to moderate potential to affect historic properties. Only a relatively minor amount of additional cultural resource surveys are still required to fully address the impacts of the proposed projects. A total of five historic properties, three currently unevaluated cultural resources and three cemeteries are likely to be affected. Indirect impacts associated with SDZs of proposed ranges have the potential to affect five cemeteries; however, these actions were either modified to avoid the adverse impact or mitigated in accordance with 36 CFR 800, in consultation with the SHPO and/or other interested stakeholders. Therefore, cumulative adverse

impacts to cultural resources are not deemed likely, even with the construction of the additional training ranges, transportation projects, and other activities identified in the PPRFFAs. Similar to the No Action Alternative, all proposed projects were reviewed for potential impacts to cultural resources.

Alternative C Siting. Overall, this alternative would result in minor-to-moderate adverse cumulative impacts to cultural resources. Under Alternative C, there is a moderately higher potential for adverse impacts to historic properties as a result of the proposed actions and current military mission. The increased potential is largely due to the fact that portions of the proposed projects have not been fully inventoried for cultural resources and therefore additional effects to cultural resources may occur. Known potential impacts include a total of eight historic properties, three currently unevaluated properties, and three cemeteries. Indirect impacts associated with Safety Danger Zones of proposed ranges have the potential to adversely affect five cemeteries; however, similar to Alternative B, these actions would be either modified to avoid the adverse impact or mitigated in accordance with 36 CFR 800 in consultation with the SHPO and other interested stakeholders. Therefore, cumulative adverse impacts to cultural resources are not deemed likely even with the construction of the additional training ranges, transportation projects, and other activities identified in the PPRFFAs. Similar to the No Action Alternative and Alternative A, all proposed projects are reviewed for potential impacts to cultural resources.

5.3.6 Noise

The TLS under noise is the determination if noise (during construction, operation, and maintenance) would exceed the noise limit guidelines published in AR 200-1, Chapter 14 (2007). Noise contours would change as a result of the proposed action. An adverse cumulative impact could result from the use of additional proposed ranges. The occurrence (duration) of noise produced and noise generating activities would increase associated with ranges being added to Fort Stewart's training throughput.

Other range projects (i.e., range upgrades and construction) presented in Table 5-1 would also allow for additional training, potentially increasing the occurrence of noise within the training areas. The projects within Table 5-2 would occur within or adjacent to existing training ranges,

and would, therefore, not likely extend beyond existing noise contours or those contours generated from the proposed action. This is supported by USACHPPM's 2004 and 2009 noise studies, which evaluated existing noise conditions, assessed potential future actions, and concluded that there would be no significant change. Because a majority of noise energy generated by training activities remains within Fort Stewart's boundaries, there is little cumulative interaction with other off-Post sources of noise.

Alternative A: No Action. Overall, this alternative would result in minor adverse cumulative effects to noise. As stated in Chapter 4, the No-Action Alternative would have no minor adverse impacts to noise conditions within Fort Stewart. The reasonable foreseeable future ranges identified in Table 5-2 would cause minor adverse cumulative increases in noise. Siting of these future ranges, however, would take into consideration noise receptor areas, as is Fort Stewart's normal alternatives development process, to ensure sensitive land uses are not located within incompatible noise zones.

Alternative B and C Sitings. Overall, impacts of Alternative B or C will have moderate adverse cumulative effects to noise sensitive areas. As stated in Chapter 4, Alternative B would likely have additional minor adverse impacts to noise conditions; in general, noise-producing activities would occur in remote locations, where sensitive receptors would not be affected. Sites for the FY16-18 ranges have not been identified, and noise impacts from these areas would need to be assessed when locations are determined; however, it is unlikely they would be located in areas where noise would combine with other sources to result in larger cumulative impacts.

Noise impacts are inherently localized because sound levels decrease relatively quickly with increasing distance from the source. Cumulative noise impacts occur when multiple projects affect the same geographic areas simultaneously or when sequential projects extend the duration of noise impacts on a given area over a longer period of time.

Army training over the past decades has resulted in minor effects on noise levels. Effects from the past activities on noise levels were short-term, minor, and localized. Noise impacts under the alternatives would stem primarily from military vehicle training and ordnance impulse noise.

The PPRFFA include several construction projects that could coincide with training activities; however, spatial separation among these cumulative projects would minimize or preclude combined noise impacts within the ROI. There are no known projects off-Post that could contribute to the noise effects resulting from the project alternatives.

Potential indirect effects of noise on listed species caused by expansion, construction, operation, and maintenance in anticipated action areas are not likely to adversely affect listed species' populations based on the existence of stable or increasing populations on similar landscapes where listed species have existed for many years. Scientific studies on the effects of noise (Delaney et al. 2002) on RCW fecundity demonstrate that reproductive parameters of RCWs in or near noise areas are not statistically different from the reproductive parameters of RCWs in more protected habitats. A study on the effects of military maneuvers on the Fort Stewart RCW population (Hayden et al. 2002) detected a difference in the mean number fledglings produced per successful nest between RCW clusters that experienced "high activity" and those that experienced "low-activity," but the sample size of the "high activity" treatment was low (n=3) when compared to the "low activity" sample size (n=19) and these observed differences were considered inconclusive. Fort Stewart expects the RCW population to persist near ranges and infrastructure as they have historically persisted adjacent to existing developed areas.

5.3.7 Land Use

Potential cumulative impacts on land use are considered significant if one or more of the following occurs: they are incompatible with surrounding land uses; they change land uses in such a way that mission-essential training is degraded; or they are inconsistent or in conflict with the environmental goals, objectives, or guidelines of a community or county comprehensive plan for the affected area.

The ROI for land use consists of the lands lying within and immediately adjacent to Fort Stewart's boundary. Military Installations have been a major part of the definition of land use in the region, as well as contributing to the population growth that has led to development and increased urbanization in the region's communities. Although land use within the military

Installation has varied over time with changes in their missions, the overall proportion of land devoted to military use has not changed substantially since the Installations were established, and their primary uses have remained relatively constant. As new facilities and infrastructure have been developed, the aesthetic quality has changed, but the overall visual context has remained one of largely open space with few alterations compared to more developed areas.

Alternative A: No Action. Overall, this alternative would result in negligible-to-minor adverse cumulative effects to land use. It would result in the fewest construction projects (compared to Alternative B and C), and, therefore, fewer land use designation changes. Past and present development has framed the modern land use pattern for the ROI. For Fort Stewart, this includes the existing placement of facilities, training areas, infrastructure, and associated circulation patterns. For lands adjacent to Fort Stewart, this includes the trend of increasing urbanization resulting in development pressures on the principally rural agricultural lands surrounding Fort Stewart and comprehensive plans addressing the communities' goals and objectives directing growth. There have been long-standing interrelationships between the land use and development throughout the communities associated with Fort Stewart and the operations and growth of Fort Stewart. These are detailed in Army Compatible Use Buffer (ACUB) and Joint Land Use Study (JLUS) programs and initiatives.

Alternative B and C Sitings. Overall, implementation of either Alternative B or C will result in only minor cumulative adverse effects to land use at Fort Stewart. Regardless of which alternative is selected, the construction it includes will still occur, just at a different physical location. Siting processes within the master planning, environmental, and training divisions, as discussed in Chapters 1 and 2, occurs early in the project site development process, minimizing the potential for incompatible land uses adjacent to the new construction. This process has already occurred for the range and Garrison construction projects in the proposed action. The same process will be utilized when siting the PPRFFAs, minimizing potential adverse effects from these projects, as well.

Off Post, Fort Stewart utilizes its JLUS and ACUB programs, as well as its other partnerships with off-Post communities and organizations, to minimize incompatible land use adjacencies and

reduce the potential for encroachment of both military lands and restricted use airspace. The Installation utilizes these partnership opportunities when presented at, for example, HAMPO meetings, Installation town hall meetings, local municipal and county planning commission meetings, and other similar gatherings. The Installation JLUS/ACUB program also utilizes its state and private organization contacts to further minimize potential land use conflicts and work for mutually beneficial uses of on and off post lands.

5.3.8 Infrastructure – Utilities and Transportation

Potential cumulative impacts to infrastructure consist of the potential for change in demand that would adversely affect the ability of a utility provider to service existing customers; in addition, significance is determined by the ability of the utility providers to accommodate the additional demand created by the proposed action. The ROI for infrastructure consists of the utilities and transportation systems lying within Fort Stewart's boundary because this is the primary area of service. In a few cases, the ROI may extend slightly off Fort Stewart, such as where Fort Stewart ties into Hinesville's city wastewater treatment plant.

5.3.8.1 Utilities

Alternative A: No Action. Overall, implementation of Alternative A would result in negligible-to-minor adverse cumulative impacts to utilities on Post. There will be an increased use of utility systems and services; however, these impacts, when incrementally considered with other on- and off-Post actions, and are not significant because each utility system has the capacity to meet these increased demands. Based on approximate numbers of the current and pending realignment of military and civilian population – with actions in the past, present, and future – estimated utility use would increase accordingly, but easily managed, on Post. The Installation consistently communicates with the city of Hinesville regarding off-Post potable (drinking) water withdrawals and wastewater treatment, capacity, and usage. Available water withdrawal capacity may change as a result of the PPRFFAs on and off Post, as well as any future state regulatory actions, such as those that are implemented in times of drought. The Installation will continue to work with the city of Hinesville to develop plans for managing these needs.

Alternative B and C Sitings. Overall, implementation of either Alternative B or C would result in greater utility usage and demand than under Alternative A; however, each utility system has the capacity to meet these increased demands and would represent only minor potential cumulative adverse effects. The Installation currently has the permit capacity necessary to support current, proposed, and PPRFFA projects that are currently proposed and there are few, if any, off-Post actions that will affect Fort Stewart's potable water withdrawal capacity. The Installation also has sufficient capacity available at Hinesville's wastewater treatment plant to support the proposed Garrison area projects (range projects will use localized vault latrines and/or port-o-lets). As growth on and off Post continues, however, the Installation may need to request additional capacity at the city's wastewater treatment plant. The Installation will continue to work with the city of Hinesville to develop plans for managing these needs.

5.3.8.2 Transportation

Alternative A: No Action. Overall, this alternative will result in minor beneficial cumulative effects. Minor improvements to the Garrison area's transportation network are recently completed, in progress, or pending and will improve safety concerns and reduce traffic congestion in these busy areas. PPRFFAs on and off Post, such as those proposed under the HAMPO and to local highways, will further improve transportation resources on Post, improving safety standards, individual road levels of service, and minimizing congestion along heavily traveled highways. The proposed Highway 84 and Highway 144 bypasses will enhance safe and efficient travel in these areas by removing traffic from the downtown Hinesville and Fort Stewart Garrison area, respectively.

Alternative B and C Sitings. Overall, minor cumulative positive effects to transportation resources are predicted as a result of either Alternative B or C. Ranges proposed for construction under Alternatives B and C are located along existing roads, highways, and/or tank trails. Access roads connecting the new ranges to these roads will therefore not be difficult to integrate into Fort Stewart's existing transportation network. Safety improvements proposed for U.S. Highway 84 would also be beneficial. The bypass and widening of Georgia Highway 144, if implemented, would result in similar traffic congestion reductions and safety level increases.

6. PROPOSED MITIGATION AND MONITORING

This chapter summarizes proposed mitigation and monitoring measures aimed at reducing potential environmental impacts of the proposed action and its alternatives. Existing management plans and procedures (as specified in each resource analysis), as well as local, state, and Federal requirements are not considered specific proposed mitigation measures because they are already included as part of the existing management regime, and will be undertaken regardless of the level of impacts. These measures will be utilized to prepare a Mitigation, Monitoring, and Enforcement Plan (MMEP), implemented during the design, construction, operation, and maintenance phases of each range and Garrison facility construction project analyzed in the EIS. Monitoring of mitigation efforts is also vital and includes methods to measure both enforcement and effectiveness of the mitigation proposed. This will ensure mitigation is conducted as described in this Environmental Impact Statement (EIS) and its MMEP. Mitigation and monitoring measures may evolve and/or change as the NEPA process progresses and as consultation and coordination with the Federal, state, and local regulatory agencies proceeds, as well as input received from other stakeholders, such as the public.

6.1 INTRODUCTION

As discussed in 32 CFR Part 651 and 40 CFR 1508.20 (Army and CEQ NEPA-implementing regulations, respectively), mitigation may include measures that:

- Avoid the impacts by changing or eliminating the proposed action or parts of the proposed action;
- Minimize the impact by changing the degree, intensity, timing, duration, or magnitude of the proposed action and its implementation;
- Rehabilitate, repair, or restore the damage that may be caused by implementing the proposed action;
- Reduce or eliminate the impact over time with preservation and maintenance operations during the life of the proposed action; or
- Replace or compensate for the impact by providing substitute resources, improving the environment elsewhere, or providing funds to pay for the environmental impact.

The Army decision maker will identify the mitigation measures for the alternative selected in the Record of Decision (ROD). These measures must be funded and sources of funding will be tentatively identified in the MMEP. The final ROD and MMEP will be available for public review on the EIS website (www.fortstewart-mmp-eis.com). Enforcement of their implementation and monitoring their success are treated as compliance requirements.

6.2 PROJECT PLANNING

During the project planning phases, basic and routine local, state, and regulatory requirements, such as permits required by regulatory agencies and preferred local best management practices (BMPs) are identified early in the planning, design, construction, operation, and maintenance phases for the projects under study, long before any actual work begins on site. Through this process, many potentially adverse effects may be avoided, minimized, and often worked into the design of the facility. The following sub-sections further discuss this process. Mitigation is specifically discussed starting in Section 6.3.

6.2.1 Design and Planning Phase

During initial planning, considerable efforts are made to avoid siting proposed ranges or facilities in locations with particular environmental resources, such as wetlands, protected species habitat, and cultural resource sites. This siting process was explained thoroughly in Chapter 2 and is applied to all proposed actions on Post. Initial planning includes construction estimates and discusses some avoidance, minimization, and mitigation, although not its associated costs and sources of funding.

Proposed range and facility locations are fully characterized for potentially unavoidable environmental constraints before any construction begins. Buffer areas protecting sensitive species habitat are marked in the field, mapped, and protected species surveys and habitat/vegetation analyses conducted in areas that may impact Federally protected species, such as red-cockaded woodpecker and others, as discussed in previous chapters. Some state protected

species are also considered, such as the gopher tortoise, a Georgia protected species often found in associated with the eastern indigo snake, which may use tortoise burrows as refuge in winter months. The information is provided to the USFWS, and informal or formal coordination occurs as needed.

Environmental Division personnel, or their consultants, also conduct wetlands delineations, mark boundaries in the field, and coordinate with the U.S. Army Corps of Engineers (USACE) to verify potential impacts to jurisdictional wetlands. Archaeological and architectural surveys are conducted to determine if adverse effects will occur to cultural resources and consultation initiated with the Georgia State Historic Preservation Office (SHPO) and Native American Tribes. Through the review process, adverse effects to historic properties are taken into account and avoided, minimized, or mitigated in accordance with the NHPA. These are just some of the many coordination and consultation mechanisms utilized by the Army to plan for minimal impacts to the environment, while maximizing and sustaining operational use of its training lands.

6.2.2 Construction Phase

For the range areas, the initial construction phase will include timber harvest and slash removal. For the Garrison construction projects, the initial construction phase will include demolition of existing structures and/or clearing/grading of construction sites. Reuse of demolition and slash material is encouraged (concrete/brick crushed for road base and slash ground up or shredded for mulch).

Proposed timber harvests are coordinated with foresters to address conflicting issues before the harvest (INRMP, 2005). Translocation of some of the protected species from impacted areas is time-consuming and will require long-term planning. DPW personnel will mark the areas that would be clear-cut in support of construction. The DPW and USACE resident forester will monitor timber operations and timber vegetation removal for compliance with Georgia Forestry BMPs for water quality, streamside management zones, and timber vegetation removal. Timber harvesting within protected species habitat will occur outside the breeding seasons.

Soil disturbance is minimized and/or avoided in historic property sites, stream buffer zones, and wetlands (except where permitted by permit in construction areas). Low-impact methods of vegetation removal will be required in wetlands and stream buffers (as permitted). Prevention of soil erosion and maintenance of stream bank integrity is a high priority for work in these sensitive areas. During the construction phase, if archaeological sites are encountered that have not been previously identified, Fort Stewart will implement its SOP for inadvertent discoveries (see Appendix C, ICRMP).

6.2.3 Operation and Maintenance Phase

The operation and maintenance phase would begin after construction is complete. DPW and Range Division will continue to work to ensure that all mitigation requirements are implemented and maintained as planned.

6.3 MITIGATION AND MONITORING

Continuous monitoring of the implementation and effectiveness of mitigation measures is the key to successful mitigation. Informing the public and decision makers of monitoring results is equally important. Annual reviews will determine if adjustments to the plan are required. Fort Stewart will inform the public of the status of mitigation on the EIS website (www.fortstewart-mmp-eis.com).

6.4 PROPOSED SPECIFIC MITIGATION MEASURES

For the majority of the environmental resources potentially affected by the proposed action and its alternatives, adherence to existing management practices and compliance with required permits suffice and no additional mitigation is identified. For example: require all projects adhere to requirements of the Georgia Water Quality Act (WQA) and Erosion and Sedimentation Control Act (ESCA); require Erosion and Sedimentation Pollution Control Plan (ESPC Plan) and National Pollutant Discharge Elimination System (NPDES) permit to discharge stormwater from

a construction site; adhere to Installation INRMP and ICRMP; see Table 6-2. For others, such as wetlands and protected species, mitigation is more complicated and is discussed in detail in the sections that follow and summarized in Table 6-2.

6.4.1 Wetlands Mitigation Measures

As discussed in previous chapters, approximately one-third of Fort Stewart lands are wetlands. A challenge for the Army on Fort Stewart is the ability to provide the ranges and training facilities necessary to train Soldiers to standards without adversely impacting wetlands. The Army minimizes impacts during the siting and design process. If impacts are unavoidable, Fort Stewart develops a mitigation plan and applies for a Section 404 permit as required by the Clean Water Act. If issued, the Section 404 permit requires the Army to compensate for permitted watershed impacts in support of the national goal of "no overall net loss" of wetlands (EPA website, 2009). The Army created a compensatory mitigation bank on Fort Stewart in 1998, a site where aquatic resources such as wetlands or streams are restored, established, enhanced, and/or preserved to provide compensatory mitigation credits that may be applied against future projects that will result in unavoidable negative impacts to regulated wetlands (Federal Register 1995).

The Fort Stewart compensatory mitigation bank successfully restored a major wetland system on Fort Stewart. Having the compensatory mitigation bank already in place, allowed the Army to meet range construction timelines on Fort Stewart without the delays or costs overruns typically associated with mitigating unavoidable wetland impacts elsewhere in the Army. It generated sufficient compensatory mitigation credits to compensate for the unavoidable negative impacts to wetlands for a number of range and training land projects undertaken by the Army on Fort Stewart for well over a decade. To date, the bank has provided compensatory mitigation credit for 595 acres of unavoidable wetland impacts on Fort Stewart. There are sufficient credits left in the bank to compensate for around 160 acres of additional unavoidable wetland impacts for future range projects. Once these credits are used, the bank will not be replenished.

Although the Fort Stewart mitigation bank has sufficient credits to offset impacts from the two Garrison support construction projects, the Army has determined it is not sufficient to cover the unavoidable negative impacts to wetlands from the FY11-14 training range construction projects, for which the Installation must purchase credits from an off-site wetlands mitigation bank. The remaining acres within the Installation wetland bank allows Commanders to respond to emergency range training requirements, which surface from "In Theater" conditions and scenarios, or award Congressional Garrison or training additions that must be executed by Fort Stewart within one year or less. If Commanders did not have this flexibility, Installation projects with unavoidable wetland impacts would be cancelled or held up in significant delays awaiting Congressional funding to purchase "off-Post" wetland credits.

6.4.1.1 Proposed Mitigation

According to 33 CFR 332, *Compensatory Mitigation for Losses of Aquatic Resources*, mitigation bank credits may be used if the project is in the service area of a mitigation bank. Section 332.3 (b)(2) has a description of why mitigation bank credits are acceptable in compensating for wetland impacts:

"Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable." Fort Stewart followed these

requirements during the development of its expanded 404(b)(1) analyses for the FY11 Multipurpose Machine Gun Range (MPMGR), FY11 Infantry Platoon Battle Course (IPBC), FY13 Qualification Training Range (QTR), and FY13 Digital Multipurpose Training Range (DMTPR) located in Appendix D.

It is anticipated that the FY13 Modified Record Fire Range, FY13 10/25 Meter Zero Range, and FY14 Convoy Live Fire Range will likely avoid wetland impacts to Jurisdictional Wetlands; therefore, expanded 404(b)(1) analyses for these remaining ranges have not been prepared. If it is determined that wetland impacts cannot be avoided, a Section 404 permit and associated mitigation plan will be prepared. The FY11 MPMGR, FY11 IPBC, FY13 QTR, and FY13 DMPTR will adversely impact a total of **179.03 acres** of Jurisdictional Wetlands. To mitigate for these impacts Fort Stewart would purchase mitigation credits from a USACE approved mitigation bank that services the project area.

The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR. Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Fort Stewart's mitigation plan went out for public notice and it explained how impacts associated with the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR are to be avoided, minimized, and compensated for. This explanation addressed proposed avoidance and minimization and the amount, type, and location of the proposed compensatory mitigation, including an intention to use an approved mitigation bank. For projects beyond FY11, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs). Similar to the process outlined in the Compensatory Mitigation Rule, the Installation's standard procurement processes conduct market research in accordance with the Federal Acquisition Regulation to evaluate current market and availability of primary and secondary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11. The FY13-14 projects would look first for mitigation opportunities in the same watershed.

Fort Stewart must obtain wetland mitigation credits in advance in order to secure the funds necessary to build a proposed range, Headquarters Army requires each Installation to provide a proposed solution for anticipated environmental consequences that will likely be unavoidable at least two years prior to the proposed project's anticipated award date. If an Installation fails to provide a proposed solution to Headquarters Army within the given timeline, the project will not be funded. As a result, Fort Stewart determined it had a current valid need to pursue the purchase of mitigation credits to compensate for the potential unavoidable negative impacts to wetlands associated with the FY11 Multipurpose Machine Gun Range and FY11 Infantry Platoon Battle Course in FY09. The Fort Stewart Environmental Division then used the fact that one-third (1/3) of Fort Stewart lands are wetlands to establish a baseline for the number of mitigation credits the Army potentially needed to have available for purchase.

With that baseline, Fort Stewart estimated these projects had the potential on the high end to negatively impact wetlands across not more than one-third of their cumulative standard design footprints should the Army be unable to avoid or minimize these wetland impacts through refinements to the standard design or through siting. An Indefinite Quantity / Indefinite Delivery contract was used to assure that if the ROD determined the proposed ranges should not be built, the Army had not made irrevocable commitment of funds towards these projects. These actions were undertaken to assure Headquarters Army was aware Fort Stewart had a solution in place to address the anticipated unavoidable negative impacts to wetlands and receive the funding necessary to build the ranges under consideration.

During the month of June 2009, Fort Stewart contacted the known eight off-Post mitigation banks. Below is a list of the banks and the feedback the Army received (Table 6-1).

Table 6-1: Wetland Mitigation Banks in the Fort Stewart Area.

Bank	Service Area	Date Contacted	Approximate Distance	Credit Availability
Old Thorn	--	June 1, 2009	22 miles	None currently available.
Wilkinson-Oconee	Secondary	June 1, 2009	110 miles	Large quantity of wetland and stream credits available
Ogeechee River / Margin Bay	Primary	June 1, 2009	18 miles	None currently available.
Hog Creek	Secondary	June 1, 2009		300 to 400 credits available.
Black Creek	Primary	June 1, 2009	18 miles	Credits possibly available by late Summer 2009.
Wilhelmina Morgan	Primary	June 2, 2009	30 miles	None currently available.
Pine South	Primary	June 2, 2009		None currently available.
Ohoopee River	Secondary	June 2, 2009	84 miles	None currently available.

The Installation solicited a contract for the purchase of mitigation credits on the Federal BizOpps website, which is a web-based portal that allows vendors to review Federal Business Opportunities. This solicitation was open for a period of 16 days, starting 28 May 2009, to all mitigation banks that could service Fort Stewart with wetland mitigation credits acceptable by the USACE. The only bank that provided an offer to the solicitation and had credits available to support the FY11 MPMGR and FY11 IPBC was the Wilkinson-Oconee Bank (WOB).

The wetlands in the Wilkinson-Oconee Bank are “in-kind” to the wetlands on Fort Stewart. Consistent with the fact that both areas are on Georgia’s Coastal Plain, wetlands within the Wilkinson-Oconee are essentially identical to those slated for impact by the proposed Fort Stewart range projects. Surveys of the proposed range sites by Fort Stewart determined that

dominant vegetation communities consist of plants typical of wetlands in the Coastal Plain: mixtures of pond and bald cypress (*Taxodium ascendensand distichum, respectively*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), privet (*Ligustrum sinense*), American hornbeam/ironwood (*Carpinus caroliniana*), highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occur with varying frequency depending on the landform and hydrology of particular areas, and essentially identical communities with similar distribution are found in the Wilkinson-Oconee's Mitigaiton Bank. Animal communities are also supported by these areas – wading birds such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea Herodias*), amphibians such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*), and mammals such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites, and have been similarly reported in the Wilkinson-Oconee area. The American alligator (*Alligator mississippiensis*) is common throughout Fort Stewart and has also been observed at Wilkinson-Oconee. The locally endangered Wood Stork *Mycteria Americana* can also be found at both locations (though they are not expected to be impacted by the proposed projects.)

Soil types were also consistent between the two areas. The Ellabelle, Bibb, Pelham, and Leefield types predominated in the proposed project areas. Analysis of Natural Resources Conservation Service profiles show these to be comparable to the Chewacla, Chastain and Congaree soils which cover the Wilkinson-Oconee area. All are characterized by loamy surface layers and clayey or loamy subsoils, and all soils are on the National Hydric Soils list. Although the area of the Coastal Plain in which the Wilkinson-Oconee area is situated features more relief than that of Fort Stewart, the specific area of the restoration situated as it is in the Oconee River floodplain, is flatter than the surrounding general topography, resulting in a similar hydrologic profile to Fort Stewart. The bottomland hardwood wetland systems found at both locations share the typical functions of holding temporary storage surface water, maintenance of characteristic subsurface hydrology, removal and sequestration of elements, retention of particulates, export of organic carbon, maintenance of characteristic plant community, and habitat for wildlife. All this

indicates that despite the distance between the two areas, wetlands on Fort Stewart and at the Wilkinson-Oconee restoration area are, for all intents and purposes, identical. Based on this comparison, the Wilkinson-Oconee Mitigation Bank is more appropriate for mitigating Fort Stewart wetlands and meeting the "no net loss" requirement.

The Army also considered using compensatory credits from its proposed saltwater marsh mitigation bank located on Hunter Army Airfield for the proposed range projects on Fort Stewart; however, this alternative was determined unfeasible because the hydrology of saltwater marshes are not the same as freshwater wetlands, and using saltwater marsh mitigation credits would not compensate the ecosystem for the loss of freshwater wetlands in the watershed.

6.4.2 Protected Species Reasonable and Prudent Measures Summary

The Biological Opinion (BO), from which this summary is taken, covers projected impacts to the red-cockaded woodpecker (RCW) from the construction of 12 new ranges and an Unmanned Aerial System on Fort Stewart, Georgia, as discussed in Chapters 1-5 of this Final EIS. The BO did not analyze the construction of the Engineering Battalion, as it was assessed in prior ESA documentation. The full text of the Fort Stewart Biological Assessment (BA), its modifications, and the USFWS BO is at Appendix B of this Final EIS. A detailed analysis of potential impacts to RCW was performed by Fort Stewart in accordance with the USFWS May 5, 2005, memorandum entitled "Implementation Procedures for Use of Foraging Habitat Guidelines and Analysis of Project Impacts under the RCW Recovery plan: *Second revision.*" This analysis examined project impacts at the foraging partition, group, neighborhood and population levels and determined that:

- The construction, operation, and maintenance of the proposed actions will be a long term, permanent event that will directly impact eight active RCW clusters located within the project area. The proposed ranges will be cleared resulting in the loss of all cavity trees within RCW clusters 69, 105, 247, 256, and 361, and most of the foraging habitat for these clusters. The foraging partitions of three other RCW clusters (18, 34, and 124) will be directly impacted by project construction by not having foraging habitat after construction of the project.

- Five active clusters (38, 67, 96, 116, and 141) would fail to meet the Managed Stability Standard (MSS) due to inadequate pine stems less than 10 inches diameter at breast height (DBH), but would persist after the range construction because they will have adequate potential foraging acres available.
- Three clusters (66, 342, and 389) would fail to meet MSS due to an over abundance of pine greater than 10 inches DBH. However, Fort Stewart will thin this pine during construction of the ranges, and these clusters are expected to persist.
- Cluster 252 would not meet MSS due to an over-abundant midstory, however, the midstory will be removed during project construction so the cluster will then meet the MSS.
- Fourteen RCW clusters (5, 22, 70, 103, 130, 154, 179, 268, 300, 322, 334, 339, 356, and 407) will be indirectly affected by the range construction by having some of their foraging areas removed, however all these clusters would meet MSS and are expected to persist.

Reasonable and Prudent Measures (RMPs)

The USFWS believes the following RPMs are necessary and appropriate to minimize the impacts of incidental take:

- Establish eight (8) additional recruitment clusters established for the purpose of maintaining demographic continuity of the local population, thereby minimizing the adverse impacts of the incidental take.
- Improve habitat conditions in RCW habitat surrounding the proposed construction areas.
- Track incidental take of RCW individuals known to occupy clusters clusters 18, 34, 69, 105, 124, 247, 256, and 361 to facilitate a more accurate assessment of any future environmental baseline,
- Monitor any damage to the proposed unprotected clusters.

Terms and Conditions

In order to be exempt from prohibitions of section 9 of the ESA, the Army must comply with the following terms and conditions, which implement the RPMs described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

(1) Create eight additional RCW recruitment clusters. Existing unoccupied recruitment clusters within 0.5 mile of the project area can count towards this total. To prevent capture by neighboring groups, place recruitment clusters no closer than 0.25 miles of an existing cluster. To achieve beneficial spatial arrangement and density requirements, strive to locate recruitment clusters within two miles and preferably no farther than one mile from existing or newly created recruitment clusters.

(2) Conduct prescribed burns at least once every three years, preferably during the growing season; conduct timber thinning operations and conduct monitoring activities in RCW habitat surrounding the project area to determine the effectiveness of habitat management actions. Examples of monitoring activities to be conducted include inspecting cavities to determine activity status, banding adult and nestling RCWs, and determining group composition in recruitment clusters.

(3) Color band all RCWs occupying clusters identified in RPM #3 prior to impact. Monitor color banded RCWs post translocation. Record movements (e.g., as determined by confirmed presence in other RCW clusters) presence, and breeding status of color banded individuals during annual RCW monitoring. For a period of five years after range construction, provide annual reports to the USFWS's Coastal Georgia field office.

(4) Visit de-protected cavity trees once a year for five years and record any damage or destruction of trees in annual reports to the USFWS's Coastal Georgia field office.

6.4.3 Required Regulatory Measures and Proposed Mitigation for Remaining Environmental Resources

Table 6-2 presents a summary of required Federal, state, and local regulatory and/or routine requirements (such as adherence to permits), as well as mitigation (if needed) identified through the EIS process and under consideration by the Army to minimize potential impacts of the proposed action and alternatives. The table describes potential impacts, existing impact minimization measures and/or routine practices (such as permits), and potential mitigation measures that apply to each alternative.

Table 6-2: Summary of Environmental Impacts and Proposed Mitigation Measures.

Impacts by Resource	Existing Regulatory or Other Requirements	Proposed Mitigation Measures for Alternative B	Proposed Mitigation Measures for Alternative C
Geology and Soils			
• Temporary increase in potential for sedimentation and erosion because of ground disturbance associated with construction and operation of projects. These include timber harvesting, range and other facility construction, ground disturbance from vehicles, and munitions detonation.	• Adhere to Stormwater Pollution Prevention Plan (SWP3) and Municipal Separate Storm Sewer System (MS4) requirements, which include BMPs to maintain drainages and restore vegetative cover on the construction site as quickly as would be practicable. • Continue practices described in the INRMP for erosion control. • Adhere to requirements of the Georgia Water Quality Act (WQA) and Erosion and Sedimentation Control Act (ESCA). • All construction contractors must have an approved Erosion and Sedimentation Pollution Control Plan (ESPC Plan) and National Pollutant Discharge Elimination System (NPDES) permit to discharge stormwater from a construction site.	• None currently identified; mitigation may be identified as projects proceed through design, construction, operation, and maintenance phases.	• Same as for Alternative B.
• Accelerated soil erosion in training areas.	• Implement land management practices and procedures described in the ITAM to reduce erosion. • Adhere to SWP3 and MS4 requirements. • Continue practices described in the INRMP for erosion control	• None currently identified.	• Same as for Alternative B.
• Erosion of range access roads.	• Maintain range roads and tank trails to minimize erosion in accordance with ITAM and facilities management program requirements. • Adhere to SWP3 and MS4 requirements. • Continue practices described in the INRMP for erosion control	• None currently identified.	• Same as for Alternative B.
• Impacts to existing borrow pits from the quantities of soil removed for current, proposed, and future projects.	• With more than 60 borrow pits distributed throughout Fort Stewart, there is adequate fill material available to satisfy these projects' needs.	• None proposed.	• Same as for Alternative B.
• Potential leaks of POLs from training vehicles.	• Adhere to SPCC requirements.	• None currently identified.	• Same as for Alternative B.

Table 6-2: Summary of Environmental Impacts and Proposed Mitigation Measures, continued.

Impacts by Resource	Existing Regulatory or Other Requirements	Proposed Mitigation Measures for Alternative B	Proposed Mitigation Measures for Alternative C
Air Quality			
• Increased vehicular emissions on and off Post associated with additional personnel traveling around Fort Stewart and in the surrounding region.	• Continue pursuing alternative transportation methods through collaboration with surrounding cities and other organizations and encouraging carpooling to reduce vehicle travel miles.	• None proposed.	• Same as for Alternative B.
• Additional training could result in impacts to air quality from increased fugitive dust from more frequent off-road vehicle travel.	• Comply with Fort Stewart's Title V permit, which includes Georgia's regulations on fugitive dust.	• None proposed.	• Same as for Alternative B.
• Construction of facilities would result in impacts to air quality from exhaust emissions from construction equipment, fugitive dust from construction activities, and additional vehicle trips by construction workers. Construction impacts would be short term and limited to the duration and area of construction activities.	• Comply with Fort Stewart's Title V permit. • Implementation of BMPs, including dust suppression; establishment of speed limits in construction areas; and use of low sulfur diesel fuel to reduce its emissions.	• None currently identified; mitigation may be identified as projects proceed through design, construction, operation, and maintenance phase.	• Same as for Alternative B.
Water Quality and Resources			
• Construction, operation, and maintenance of ranges and other facilities could result in increased sedimentation from changes in streamside vegetation, alteration of stream hydrology from changes in runoff, changes in surface water quality, disturbances in aquatic habitat from relocation of stream channels, and additional impacts to impaired streams.	• Comply with the requirements of the CWA, WQA, and ESCA. • Comply with NPDES permit requirements. • Comply with the provisions of site-specific ESPC Plan BMPs. • Obtain a stream buffer variance when construction activities require crossing or encroaching within 25 feet of state waters.	• None currently identified; mitigation may be identified as projects proceed through design, construction, operation, and maintenance phase.	• Same as for Alternative B.

Table 6-2: Summary of Environmental Impacts and Proposed Mitigation Measures, continued.

Impacts by Resource	Existing Regulatory or Other Requirements	Proposed Mitigation Measures for Alternative B	Proposed Mitigation Measures for Alternative C
Water Quality and Resources (continued)			
• Construction of facilities could result in stormwater runoff from land disturbance, hazardous substances storage, and discharges of non-stormwater from the site. Construction impacts would be short term and limited to the duration of construction activities; however, the extent of impacts may go beyond the project site boundary.	• Pursuant to provisions in the CWA, work being performed at Fort Stewart that disturbs 0.75 acres or more is subject to the requirements of EPA and Georgia stormwater regulations. Project proponents must submit a Notice of Intent to EPA and develop and implement a SWP3 that includes mitigation strategies to reduce impacts associated with stormwater runoff during construction. • Continue use of BMPs. • Continue to manage hazardous materials in accordance with applicable Fort Stewart regulations and management plans.	• Use of LID practices and geo-grid foundations for LWCs.	• Same as for Alternative B.
• Design and construction of facilities could result in impacts to Fort Stewart's stormwater drainage system from sediment and other non-stormwater discharges and inadequate design of permanent stormwater controls.	• Comply with the requirements of Fort Stewart's Stormwater Management Plan to help mitigate negative impacts to water quality.	• None currently identified; mitigation may be identified as projects proceed through design, construction, operation, and maintenance phase.	• Same as for Alternative B.
• Construction, operation, and maintenance of ranges and other facilities could result in adverse impacts to wetlands.	• Comply with the provisions of activity-specific ESPC Plan and SWP3. • Continue use of BMPs. • Application for a Section 404 Permit as necessary	• Monitor and engage in design process to further avoid wetlands and minimize impacts whenever possible. (Engagement boxes in Infantry Platoon Battle Course and Convoy Live Fire will be particular areas of interest and opportunity.) • Mitigation of unavoidable impacts using either the on-Post Fort Stewart Wetlands Mitigation Bank or off-Post Wilkinson-Oconee Wetlands Mitigation Bank (as appropriate to project).	• Same as for Alternative B.

Table 6-2: Summary of Environmental Impacts and Proposed Mitigation Measures, continued.

Impacts by Resource	Existing Regulatory or Other Requirements	Proposed Mitigation Measures for Alternative B	Proposed Mitigation Measures for Alternative C
Biological Resources (Wildlife, Sensitive Species, and Forest Management)			
• Loss of habitat because of construction.	• Minimize construction site footprint. • Continue recommendations outlined in management plans and the INRMP. • Comply with the provisions of activity-specific ESPC Plan and SWP3, which include BMPs to maintain drainages and restore vegetative cover on the construction site as quickly as is practicable. • Comply with the provisions of the Migratory Bird Treaty Act. • Comply with the provisions of the Endangered Species Act.	• None currently identified; mitigation may be identified as projects proceed through design, construction, operation, and maintenance phase.	• Same as for Alternative B.
• Increase in nuisance species near construction projects.	• Limit construction of administrative and operational facilities in natural wildlife corridors. • Continue to educate Soldiers and civilians. • Use solid waste disposal practices that limit access by wildlife.	• None proposed.	• Same as for Alternative B.
• Impacts on sensitive species from construction, operations, maintenance, and training activities.	• Survey and monitor sensitive species habitat and conduct construction, operations, maintenance, and training activities in accordance with the INRMP, which describes appropriate species management and impact mitigation techniques.	• None currently identified; mitigation may be identified as projects proceed through design, construction, operation, and maintenance phase.	• Same as for Alternative B.
• Damage to vegetation and potential for contamination from training exercises and live fire.	• Incorporate berms downrange of the firing lines on ranges to lessen impacts of tree mortality and metal contamination of forest resources. • Use of short-range training ammunition rounds to reduce tree mortality and metal contamination of timber.	• None proposed.	• Same as for Alternative B.
• Siting of ranges in areas of merchantable timber would directly reduce the timber base upon which Army forestry programs depend for revenue.	• Continue timber management activities on Fort Stewart as planned in Fort Stewart's Timber Harvest Priority List.	• None proposed.	• Same as for Alternative B.

Table 6-2 Summary of Environmental Impacts and Proposed Mitigation Measures, continued.

Impacts by Resource	Existing Regulatory or Other Requirements	Proposed Mitigation Measures for Alternative B	Proposed Mitigation Measures for Alternative C
Biological Resources (Wildlife, Sensitive Species, and Forest Management) continued			
• Potential for wildland fires.	• Comply with the provisions of the Integrated Wildland Fire Management Plan. • Comply with the provisions of the INRMP. • Comply with the provisions of 1995 National Wildland Fire Policy. • Comply with the provisions of AR 200-1, "Environmental Protection and Enhancement." • Use prescribed burns as a means of reducing impacts from wildfires on live fire ranges. • Establish perimeter firebreaks and roads or use existing roads on live fire ranges to help contain wildfires. • Examine existing fuel breaks and the potential need for new ones.	• Close affected highway corridors when necessary to facilitate less restrictive prescribed burning. • Educate personnel and troops on the dangers of wildland fire, potential ignition sources, the prevention measures to which they must adhere, and benefits of prescribed burning. • Incorporate berms downrange of the firing lines on ranges to lessen impacts of wildfires to woodland resources. • Reduce the risk of wildfires through prescribed burns or mechanical fuel treatments in areas with high fuel loads or a high incidence of incendiary live fire. • Incorporate the "let burn" policy when feasible. • Restrict the use of pyrotechnics, campfires, and live fire mission activities during high fire danger.	Same as for Alternative B.
Cultural Resources			
• Potential adverse impacts to cultural resources from construction, operations, and maintenance of ranges and other facilities.	• Comply with the provisions of the ICRMP, the Programmatic Agreement, and the individual cultural resources action plans. • Comply with the provisions of Section 106 of the NHPA. • Consult with the Georgia SHPO, the Advisory Council on Historic Preservation (ACHP), Native American Tribes, and other interested stakeholders in accordance with the NHPA. Before project execution, all required stipulations of the mitigation will be complete. • Before project execution, all required stipulations of any mitigation required will be complete.	• Consider impacts to cemeteries during construction of ranges and SDZs. During the design phase of the proposed range, if it is determined there will likely be an impact to the cemeteries from live fire, protective berms or redesign will be considered. The Installation will consult with the appropriate stakeholders in accordance with the NHPA and NEPA to explore methods to avoid, minimize, or mitigate adverse effects to historic properties in accordance with 36 CFR 800. • Further evaluate site 9BN628, a moderate sized 19th-20th century homestead along the proposed route for the Convoy Live Fire Range. This site is considered potentially eligible for NRHP but is not anticipated to be affected by the proposed action. Appropriate site protection measures will be in place (e.g. signage, seibert stakes, etc…) and will be routinely monitored for impacts.	• Consider impacts to cemeteries during construction of ranges and SDZs. During the design phase of the proposed range, if it is determined there will likely be an impact to the cemeteries from live fire, protective berms or redesign will be considered. The Installation will consult with the appropriate stakeholders in accordance with the NHPA and NEPA to explore methods to avoid, minimize, or mitigate adverse effects to historic properties in accordance with 36 CFR 800. •

Table 6-2: Summary of Environmental Impacts and Proposed Mitigation Measures, continued.

Impacts by Resource	Existing Regulatory or Other Requirements	Proposed Mitigation Measures for Alternative B	Proposed Mitigation Measures for Alternative C
Cultural Resources (continued)			
		• Consult with the Georgia SHPO, the ACHP, Native American Tribes, and other interested stakeholders in accordance with the NHPA. Before project execution, all required stipulations of any mitigation required will be complete.	• Further evaluate site 9LG363 immediately south of the proposed footprint of the MPMGR. 9LG363, a historic early 20th century railroad tramline has been identified as the present location of Fort Stewart Road 91. Elements of 9LG363 were recommended eligible for the NRHP by the Georgia State Historic Preservation Office. Operation, maintenance, and use of this portion of FSR 91 that results in an adverse effect to the historic property would require consultation in accordance with 36 CFR 800. Maintaining the resource's linear feature and as a transportation route should not result in an adverse effect and therefore has a low to moderately low potential for being affected by Alternative C. If the proposed action is identified as having the potential to adversely affect this resource, efforts to avoid, minimize, or mitigate the adverse effects would be implemented. • Further evaluate site 9LI487, which is within 200 meters south of the proposed footprint of the Multipurpose Machine Gun Range. Site 9LI487 is the former town site of Pinholster and the associated Pinholster Cemetery and has been recommended potentially eligible for the NRHP. Formal surveys of the surrounding areas of the town of Pinholster have not been conducted, and, therefore, the extent of the town is unknown. The town site has been only identified through documentary evidence and is pending archaeological confirmation. Pinholster Cemetery is fenced, and training within 200 feet of each cemetery is prohibited in accordance with Fort Stewart Regulation 385-14. • Consult with the Georgia SHPO, the ACHP, Native American Tribes, and other interested stakeholders in accordance with the NHPA. Before project execution, all required stipulations of any mitigation required will be complete.

Table 6-2: Summary of Environmental Impacts and Proposed Mitigation Measures, continued

Impacts by Resource	Existing Regulatory or Other Requirements	Proposed Mitigation Measures for Alternative B	Proposed Mitigation Measures for Alternative C
Cultural Resources (continued)			
			• Further evaluate site 9LI256 within the proposed footprint of the Engineer Battalion Facility. 9LI256, where a remnant of a historic tramline crosses the southeastern portion of the proposed footprint. This tramline is one of the better-preserved portions of the complex of rail beds and tramline beds that are found on Fort Stewart. The portions within the wetland have been identified as a potential candidate for preservation as part of a larger mitigation project for all of the rail/tramlines on Fort Stewart. The Installation will take into account the impacts to this historic property. If the proposed action cannot avoid direct or indirect impacts, Fort Stewart will seek methods to minimize and/or mitigate the adverse effects to this historic property in accordance with the NHPA before committing to the course of action.
• Potential loss of unrecorded archaeological resources during construction and training activities.	• Stop all activities and immediately report the finds to the cultural resources manager in accordance with the ICRMP.	• None currently identified; mitigation may be identified as projects proceed through design, construction, operation, and maintenance phase.	• Same as for Alternative B.
Noise			
• Noise from rotary and fixed-wing aircraft.	• Continue to implement Installation Fly Neighborly program, which works to lessen the noise aircraft produce when flying in developed areas. • Continue to implement ACUB program to maximum extent possible to reduce, or limit increases in, development around Fort Stewart that would be incompatible with aircraft noise. • Adhere to Installation Environmental Noise Management Plan guidelines and procedures.	• None proposed.	• Same as for Alternative B.

Table 6-2: Environmental Impacts and Proposed Mitigation Measures, continued.

Impacts by Resource	Existing Regulatory or Other Requirements	Proposed Mitigation Measures for Alternative B	Proposed Mitigation Measures for Alternative C
Noise (continued)			
• Large and small-caliber weapons use during increased numbers of live-fire and qualification exercises.	• Continue to implement ACUB program to maximum extent possible to reduce, or limit increases in, development around Fort Stewart that would be incompatible with weapons noise. • Adhere to Installation Environmental Noise Management Plan guidelines and procedures.	• None proposed.	• Same as for Alternative B.
Land Use			
• Adding more Soldiers would create more demand for training areas. • Increased training may result in reduced recreational opportunities.	• Comply with the provisions of the INRMP. • Comply with the provisions of the ITAM.	• Consult with the public and Georgia Wildlife Resources Division to maximize public hunting opportunities.	• Same as for Alternative B.
Infrastructure			
• Expand and update communications systems.	• Make expansions and updates to telephone, fiber optic, and similar information systems as necessary.	• None currently identified; mitigation may be identified as projects proceed through design, construction, operation, and maintenance phase.	• Same as for Alternative B.
• Increased electrical and natural gas demands.	• Comply with the new Army Regulation 420-1 (“Army Facilities Management”) and Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management," which raises the bar for Federal leadership and performance. • Comply with Leadership in Energy and Environmental Design (LEED) and Low Impact Development (LID) protocols.	• None currently identified; mitigation may be identified as projects proceed through design, construction, operation, and maintenance phase.	• Same as for Alternative B.
• Increased personnel at Fort Stewart would increase demand for water supplies.	• Continue to implement water use reduction measures, such as low-flow toilets and waterless urinals, xeriscaping, and use of gray water for irrigation. • Continue to implement reductions in water use based on the Fort Stewart Sustainability Management System.	• Construct air vault latrines for new ranges. • New well being created at 4IBCT area to support new Soldiers’ usage in this part of the Garrison area.	• None currently identified; mitigation may be identified as projects proceed through design, construction, operation, and maintenance phase.
• Increased personnel at Fort Stewart would increase production of wastewater.	• Continue to operate under the agreement with the Hinesville Wastewater Treatment Plant. • Continue to operate in accordance with the NPDES permit.	• Construct and maintain air vault latrines at new ranges. • Upgrade of NCOA WWTP with construction of a land application system.	• Construct and maintain a septic system for the Convoy Live Fire Range and Digital Multipurpose Training Range.

Table 6-2: Environmental Impacts and Proposed Mitigation Measures, continued.

Impacts by Resource	Existing Regulatory or Other Requirements	Proposed Mitigation Measures for Alternative B	Proposed Mitigation Measures for Alternative C
Infrastructure (continued)			
• Solid waste generation would increase with additional personnel.	• Continue to follow LEED initiatives to minimize solid waste generation by construction contractors. • Continue to follow Fort Stewart's recycling program.	• None proposed.	• Same as for Alternative B.
• Increased personnel at Fort Stewart would lead to more traffic congestion. • Temporary traffic delays and alternate routes because of construction projects.	• Implement the recommendations of the 2007 *Fort Stewart Comprehensive Traffic Engineer Study* to improve traffic congestion/ control and meet current parking requirements. • Construct the planned Hinesville Bypass to ease traffic congestion in the area. • Make planned safety improvements to U.S. Highway 84.	• None currently identified.	• Same as for Alternative B.
Safety			
• Increased safety risks during construction of the ranges because of the potential for residual ordnance. • Increased use of training areas because of additional Soldiers and training vehicles.	• Continue to implement "The Army Safety Program" (AR 385-10) and "Accident Reporting and Records" (AR 385-40). • Meet all OSHA requirements. • Implementation of all existing Fort Stewart safety programs to minimize any safety hazards. These include public safety, transportation safety, construction safety, flight safety, explosives safety, and range safety.	• None currently identified; mitigation may be identified as projects proceed through design, construction, operation, and maintenance phase.	• Same as for Alternative B.
• Low impact to flight safety. • Increasing demands for military use of airspace from additional personnel for UAVS and re-stationed personnel.	• Continue to follow regulations for CZ, APZ I, and APZ II. • Continue to work with FAA on determining appropriate use of airspace.	• None currently identified; mitigation may be identified as projects proceed through design, construction, operation, and maintenance phase.	• Same as for Alternative B.

Table 6-2: Environmental Impacts and Proposed Mitigation Measures, continued.

Impacts by Resource	Existing Regulatory or Other Requirements	Proposed Mitigation Measures for Alternative B	Proposed Mitigation Measures for Alternative C
Hazardous and Toxic Materials and Waste			
• Hazardous materials use and potential releases would increase commensurately with personnel and equipment.	• Continue to manage existing sources of hazardous waste in accordance with the Hazardous Waste Management Plan. • Continue to implement the RCRA compliance inspection program. • Continue to manage hazardous materials in accordance with the Hazardous Material Management Program. • Continue to implement all Federal, state, and local laws, statutes, and regulations governing hazardous materials, toxic substances, and hazardous wastes, including AR 200-1 and AR 420-49.	• None proposed.	• Same as for Alternative B.
• Temporary increase in the use and storage of hazardous materials at the site for the operation and maintenance of construction equipment. • Increase in the potential for POL spills because of the use of temporary fuel storage tanks.	• Mitigate potential for spills by ensuring all temporary tanks are doubled walled or are set in secondary containment and the implementation of BMPs (drip pans, absorbent pads, etc.) that conform to Fort Stewart's Spill Prevention, Control, and Countermeasures Plan.	• None proposed.	• Same as for Alternative B.
Socioeconomics			
Minor temporary economic benefits to ROI associated with construction expenditures and employment. • Minor long-term economic benefits associated with population increases such as increased sales volume, employment, and income in the ROI.	• None.	• None proposed.	• Same as for Alternative B.
• Increased housing demand for Fort Stewart personnel.	• Construct additional on-Post housing. • Private construction is taking place in the off-Post housing market to satisfy the increased demand.	• None proposed.	• Same as for Alternative B.
• Increased student population in area school districts.	• Federal impact aid is provided on a per-student basis as an offset for the costs incurred by civilian school districts.	• None proposed.	• Same as for Alternative B.

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LIST OF PREPARERS	
Name	**Responsibility**
Larry D. Carlile Directorate of Public Works Environmental Division – FWB Wildlife Biologist	• Drafted sections of EIS (existing environment and determinations of effect) relating to wildlife and protected species • Co-wrote Biological Assessment (BA) analyzing Alternative B locations for projects in EIS • Coordinating with USFWS for review and decision on BA
Craig A. Carpenter Staff Judge Advocate's Office Environmental Law Attorney	• Assisted in drafting text for Background and Proposed Action discussions in EIS • Drafted Executive Summary for EIS • Provided reviews for legal sufficiency throughout EIS development • Coordinated with legal advisors at higher headquarters to ensure the Installation's EIS was legally defensible • Edited chapters for non-legal content flow, when requested
Craig W. Christopher Directorate of Public Works Environmental Division - PCB Hazardous Waste Program Manager	• Drafted portions of the Hazardous Materials and/or Wastes sections of EIS (existing environment and determinations of effect) relating to hazardous materials/wastes management
Jesse W. Coursey Directorate of Public Works Environmental Division - PCB Borrow Pit Manager	• Drafted portions of Soils sections of EIS (existing environment and determinations of effect) relating to borrow pit availability and borrow needs per project
Amber E. Franks Directorate of Public Works Environmental Division - PCB NEPA Group Leader	• Drafted Description of the Proposed Action and its Alternatives • Tracked project descriptions and requirements, editing when applicable • Drafted Noise sections of EIS (existing environment and determinations of

	effect) • Coordinated updating of Installation noise contours with USACHPPM • Drafted Wetlands mitigation section in Chapter 6
Veronica Frazier Directorate of Public Works Environmental Division - PCB Sustainability Program Manager	• Drafted sections of EIS (existing environment and determinations of effect) relating to Installation sustainability issues
Brian K. Greer Directorate of Public Works Environmental Division - PCB Cultural Resources Program Manager	• Drafted Cultural Resources sections of EIS (existing environment and determinations of effect) relating to archaeological and paleontological sites on Post • Provided current survey status of lands within each project footprints • Coordinating NHPA Section 106 review of projects with Georgia State Historic Preservation Office • Coordinating review of EIS by GA SHPO, when ready.
Roy B. Griggs Directorate of Plans, Training, Mobilization, and Security Training Division RTLP Manager	• Provided current (baseline) training data for Installation, to include current range inventory, current Soldiers' usage (throughput), and need for additional ranges • Provided range-related input for description of the proposed action and development of alternatives
Gary C. Hart Directorate of Public Works Environmental Division – FWB Biologist	• Co-wrote BA analyzing Alternative B locations for projects in EIS
Melissa B. Kendrick Directorate of Public Works Environmental Division Prevention and Compliance Branch (PCB) Cumulative Impacts Analyst and NEPA Specialist	• Drafted Introduction, Purpose and Need, and other portions of Chapter 1 • Drafted Land Use, Infrastructure, Safety, and Socioeconomics sections of EIS (existing environment and

	determinations of effect) • Coordinated efforts of subject matter experts in drafting their sections • Edited all chapters for content and format
Brandi H. Knoepful Directorate of Public Works Environmental Division - PCB GIS Support	• Created all maps/figures in EIS • Worked with subject matter experts to ensure most up-to-date information used to create maps/figures
Robert L. Lloyd Directorate of Public Works Environmental Division - PCB Wetlands Program Manager	• Drafted Wetlands sections of EIS (existing environment and determinations of effect) • Conducted delineations at all Alternative B locations for potential wetlands impacts • Analyzed National Wetlands Inventory data for all Alternative C locations for potential wetlands impacts • Coordinated with Cooperating Agency representative (Mark Padgett) to incorporate relevant data into EIS
Joseph P. Maggioni Directorate of Public Works Environmental Division - PCB Historic Architect	• Drafted Cultural Resources sections of EIS (existing environment and determinations of effect) relating to historic structures/architecture on Post • Provided current survey status of historic structures either within footprint of each project and/or scheduled for demolition within each project
Jeffrey S. Mangun Directorate of Public Works Environmental Division Chief, Forestry Branch (FB)	• Co-Drafted sections of EIS (existing environment and determinations of effect) relating to forestry management
Russell T. Moncrief Directorate of Public Works Environmental Division - PCB Stormwater Program Manager	• Drafted stormwater, streams, and floodplains sections of EIS (existing environment and determinations of effect) • Ensured applicable permit requirements

	and information (such as for stream buffer variances, etc.) incorporated
David A. Montano Directorate of Public Works Environmental Division - PCB Air Program Manager	• Drafted Air Quality sections of EIS (existing environment and determinations of effect) • Provided up-to-date calculations for air emissions on Post
Mark J. Padgett U.S. Army Corps of Engineers (USACE) Regulatory Branch Savannah District	• Served as representative for the USACE, which is a Cooperating Agency to this EIS • Provided information (data and some text) for wetlands discussions in the EIS • Edited wetlands sections of EIS
David E. Pope Directorate of Public Works Environmental Division – FB Forestry Technician	• Co-drafted sections of EIS (existing environment and determinations of effect) relating to wildland fire management
Randy D. Powell-Jones Directorate of Public Works Environmental Division - PCB Solid Waste/Recycling Program Manager	• Drafted Solid Waste and Recycling sections of EIS (existing environment and determinations of effect) • Provided up-to-date calculations for solid waste and recycling on Post
Willard A. Rahn Directorate of Public Works Environmental Division – FB Computer Specialist	• Co-drafted sections of EIS (existing environment and determinations of effect) relating to forestry management and wildland fire management
Algeana L. Stevenson Directorate of Public Works Environmental Division - PCB Restoration Program Manager	• Drafted portions of the Hazardous Materials and/or Wastes sections of EIS (existing environment and determinations of effect) relating to site contamination and clean-up
Andrea M. Stolba Directorate of Public Works Master Planning Division Master Planning Specialist	• Provided current (baseline) Installation master planning data, to include current Master Plan and Real Property Planning Board decisions • Provided input regarding Master

	Planning Division role in range and garrison construction project sitings
Stanley Thomas Directorate of Public Works Environmental Division - PCB Water/Wastewater Program Manager	• Drafted water quality, potable (drinking) water, and wastewater sections of EIS (existing environment and determinations of effect) • Ensured calculations for water and wastewater capacity on Post were up-to-date

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Name	**Responsibility**
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Doug Hawn	• Project Manager
David Stair	• Senior Environmental Scientist
Jane Tate	• Senior Environmental Scientist

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The Final Environmental Impact Statement (FEIS) For Training Range and Garrison Support Facilities Construction and Operation

Fort Stewart, Georgia

Volume II

Appendix A

Public Participation and Outreach Efforts

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Section I:

Public Participation Plan for the

Training Range and Garrison Support Facilities Construction and Operation Final Environmental Impact Statement

Fort Stewart, Georgia

11 June 2010

Prepared by
SpecPro Environmental Services LLC
1006 Floyd Culler Court
Oak Ridge, TN 37830

1. BACKGROUND FOR THE PROPOSED ACTION

The Army's mission is to fight and win our Nation's wars, accomplished by providing land dominance across the full range of military operations and spectrum of conflict. This occurs through organizing, equipping, and training forces for the conduct of prompt and sustained combat operations on land. The Army Vision is to remain the preeminent land-power on Earth - the ultimate instrument of national resolve - that is both ready to meet and relevant to the challenges of the dangerous and complex 21st century security environment (www.us.army.mil, accessed 20 OCT 09).

Fort Stewart is the home of the 3rd Infantry Division and well suited for training mechanized forces. Its mission is to "provide equitable, effective and efficient management of the installation in order to support mission readiness and execution, enable the well-being of soldiers, civilians and family members, improve infrastructure, and preserve the environment (www.stewart.army.mil., accessed 20 OCT 09)." Fort Stewart's military complex along with the port of Savannah also serves as a world-class military power projection for the United States. This dynamic platform allows military units in the region to deploy rapidly anywhere in the world.

1.1 PURPOSE AND NEED FOR THE FORT STEWART TRAINING RANGE AND GARRISON SUPPORT FACILITIES CONSTRUCTION AND OPERATION ENVIRONMENTAL IMPACT STATEMENT

The purpose and need of the Fort Stewart Training Range and Garrison Support Facilities Construction and Operation Environmental Impact Statement (EIS) is to examine the environmental impacts of the Installation's mission and master planning processes. This involves an examination of proposed and likely construction of range facilities, non-range facilities, and transportation improvement projects. Impacts on the environmental and socioeconomic resources present on the Installation and potential impacts to surrounding lands and/or local communities resulting from these actions are evaluated. Fort Stewart is an active military Installation and hosts various training activities, land rehabilitation, and range repairs on a daily basis. Specifically, this EIS will discuss and analyze the following:

- Discuss past, current, and future training operations on Fort Stewart (i.e., its Mission) and their impacts to the environment;
- Analyze range and Garrison construction projects scheduled to occur between Fiscal Year (FY) 11-14.
- Explain the master planning process and how it is utilized to determine where to locate projects. It will also explain how the siting of these projects is designed to promote the long-term sustainability of the Installation and the environment, and its role in resource-focused management (such as the Integrated Natural Resources Management Plan);
- Analyze potential direct, indirect, and cumulative (i.e., incremental) impacts to environmental and socioeconomic resources that may occur from training and construction activities on Fort Stewart; and
- Discuss methods used to avoid, minimize, and/or offset direct, indirect, and cumulative impacts of the training and construction.

1.2 NEED FOR PUBLIC AND STAKEHOLDER PARTICIPATION PLAN

The purpose of this Public Participation Plan (PPP) is to define how Fort Stewart, Georgia (FSGA), will solicit input, review, and comments from interested and affected parties on the environmental analysis of the Installation's Training Range and Garrison Support Facilities Construction and Operation EIS. The EIS is developed in accordance with the National Environmental Policy Act (NEPA), the regulations issued by the Council on Environmental Quality (CEQ), 40 CFR Parts 1505-1508 and the Army's implementing procedures, published in 32 CFR Part 651, *Environmental Analysis of Army Actions*.

NEPA mandates an analysis of the potentially significant environmental and socioeconomic impacts of actions occurring on Federal land, such as an Army Installation. The NEPA process also requires periodic public involvement during a scoping phase and during public comment periods. However, the Army is committed to facilitating and encouraging a continuous, two-way communication with the public and stakeholders. This communication will involve newspaper announcements of document availability and meetings, outreach to public officials and special interest groups, publicly accessible websites, invitations to comment at scoping meetings and

public hearings, distribution of fact sheets and/or newsletters, and possibly other actions as the EIS develops.

1.2.1 Public Participation Plan, as Required by National Environmental Policy Act

The Army's NEPA-implementing regulation (32 CFR Part 651) guides public participation opportunities with respect to the Draft and Final EIS and decision making on the proposed action. The regulation requires the preparation and implementation of a Public Participation Plan (PPP) to guide the public and stakeholder involvement process throughout the EIS process. The purpose of such a plan is to determine what actions to take during the course of the project to properly and most effectively conduct public communications and outreach.

The PPP includes a discussion of environmental and socioeconomic resources deemed important during the EIS process, as well as a discussion of the outreach techniques employed throughout the life of the process. These include: identification of newspapers to utilize for public notices or media releases; types and sizes of ads most effectively utilized in newspapers; the use of other public media, such as radio or television; the number of and best location for of public meetings; availability of the Draft and Final EIS for review; and other pertinent issues, such as the requirement for multilingual information. The PPP is updated periodically (as the EIS process progresses), is available for review at the EIS webpage (www.Fortstewart-mmp-eis.com.), and is located within Appendix A of all drafts of the EIS.

1.2.2 Other Laws and Regulations

There are several laws and regulations requiring public notices and participation during the planning phases of a Federal project. These requirements are incorporated into public outreach efforts for the Training Range and Garrison Support Facilities Construction and Operation EIS. For example, public notification and comment opportunities related to Section 404 Clean Water Act permits for impacts to wetlands can now include posting of these notices on the Training Range and Garrison Support Facilities Construction and Operation EIS website, thereby providing even more opportunities for the public to access this information. Although NEPA may address some of the topics and issues in the environmental analysis, FSGA must still satisfy the requirements of these other laws and regulations. Website utilization will be a secondary

method of this notification rather than a primary one. Similar public outreach opportunities may also be possible for endangered species, water/wastewater quality reports, and others.

1.2.3 Goals of the PPP

FSGA is committed to meeting NEPA requirements and taking measures for more meaningful communication and involvement of the public and stakeholders in the Training Range and Garrison Support Facilities Construction and Operation EIS process. Limitations in resources, personnel, and time impose constraints that necessitate an efficient and realistic PPP. This PPP must assist the planners and be realistic for implementation. Goals for this PPP include the following:

- providing methods by which stakeholders are informed and have an understanding of the process, issues, and possible solutions from the perspectives of various interests;
- creating an open and visible decision-making process, to which stakeholders have access and input;
- developing partnerships with local community leaders, groups, and organizations to provide an integrated, environmentally aware approach to planning;
- specifying steps needed to meet legal responsibilities for comment opportunities of the public and stakeholders;
- including public comments throughout the decision-making process while ensuring that adequate input is obtained for developing context sensitive solutions;
- listing realistic time frames and responsible persons or offices for each step;
- coordinating activities to maximize the quality of the information while ensuring that the information relates to planning actions in process and incorporates any resultant feedback into future participation or planning processes;
- incorporating opportunities to present information in order to partner with the community effectively and efficiently; and
- keeping the Installation Public Affairs Officer (PAO) and the Environmental Division's Public Relations (ENV PR) Section informed at all levels.

The FSGA NEPA and PR specialists will keep the Installation PAO informed and involved regarding environmental planning and scoping for the EIS. The approval process will first go through the PR specialists and then to the PAO. When the PR receives a call, e-mail, letter and/or

correspondence pertaining to the EIS, they will refer it to the NEPA specialists. The PR will maintain a log of public and stakeholder inquiries for the Administrative Record (AR) and for appending to the EIS. A monthly log will be forwarded to the EIS POC and copied to the PAO.

The FSGA Execution Section Leader (in charge of the EIS process, EIS POC) is –

- Chuck Walden (912-767-8642; Charles.Walden4@us.army.mil).
- Mailing address is Chuck Walden, Directorate of Public Works, Prevention and Compliance Branch, Environmental Division, 1550 Frank Cochran Drive, Building 1137, Fort Stewart, Georgia 31314-4928.

Public relation specialists assigned to this EIS are –

- Angie Eason (912-315-6912); Angi.Eason@us.army.mil) and
- Amanda Hinesley (912-767-4459); Amanda.Hinesley@us.army.mil).

PAO for this EIS is –

- Richard Olson (912-435-9870; Rich.Olson@us.army.mil).

1.2.4 Elements of the Plan

The PPP has several elements to inform and involve the public in a meaningful way during the development of the EIS. The study team will be accessible to the public, share information in a complete and understandable manner, and record and consider all public comments and concerns. The plan is implemented through activities falling into three broad but interrelated areas:

- ***Foundational*** (creating a network to support communication): A project website, a database with a mailing list for e-mail notices, and a schedule of newsletters and public events is established. The study team will also develop a media contact list for advertising public meetings.
- ***Civic Engagement*** (creating opportunities for dialogue): A Public Scoping Meeting is held to announce to the public, stakeholders, and regulatory community that the Installation is preparing an EIS, as well as its purpose, need, and actions analyzed. A formal public

hearing is also held after the publication of the Draft EIS to solicit comments on the document.

- ***Communication Tools*** (using many methods to obtain and distribute information): A variety of tools are used to reach out to and hear from the public. Newsletters, fact sheets, summary documents, direct mail, website, meetings, document availability, reading rooms, comment periods, and press releases are also utilized.

2. PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT

CEQ regulations require the preparation of an EIS when there is a potential for a significant effect to one or more environmental or socioeconomic resources on Federal lands; therefore, an EIS is the appropriate level of NEPA documentation for this action. Army Regulation 32 CFR 651 provides guidelines for the contents of an EIS and the processes required for full environmental analysis with participation by public, stakeholders, and regulators. This PPP will not restate the provisions of 32 CFR Part 651; therefore, attention to the specific requirements provided therein is required to fully comply with the Army's guidance on public and stakeholder participation. An EIS is prepared in a series of steps or milestones which include:

- conduct Internal Scoping to define the proposed action, its alternatives, and an initial level of analysis required for each of the environmental media (air, water, etc.);
- prepare a PPP to guide the public outreach efforts for the EIS;
- prepare and publish the Notice of Intent (NOI) in local media and the Federal Register;
- hold the Public Scoping Meeting to refine alternatives to the proposed action;
- prepare the Draft EIS and publish it for public, regulatory, and EPA review;
- hold the Public Meeting to gather additional input from the public who reviewed the Draft EIS;
- receive and respond to public comments on the Draft EIS;
- prepare and publish the Final EIS;
- respond to comments on the Final EIS;
- prepare and publish the Record of Decision (ROD); and
- proceed with the proposed action when all other non-NEPA requirements (permits, etc.) are obtained.

3. PUBLIC INVOLVEMENT

The sections of the Army's NEPA implementing regulations that describe requirements for scoping identify three phases: preliminary, public interaction, and final. These three scoping phases are used to organize the PPP. Although most of the actual public involvement occurs during the public interaction phase, the requirements of the preliminary phase are used to prepare for and respond to public and stakeholder involvement.

The scoping process is intended to aid in determining the level of the analyses and to identify significant issues of public concern that are related to the proposed action. Scoping participants are provided with information developed during the preliminary phase. They will be provided with as much information as is available on the existing environment at the affected location such as a description of the proposed alternatives, any related environmental assessments or impact statements (EAs or EISs), and any additional scoping issues or limitations. With FSGA approval, this information is presented in the scoping meeting, in updates on the website, and by periodic mailing of progress report newsletters to interested persons. Information is presented to the public in a straightforward and understandable manner. It is important to note that scoping does not end with a public meeting.

In addition to the interested and affected parties, participants in scoping should include:

- technical representatives that can describe the technical aspects of the proposed action and alternatives to other participants;
- Army contracted consulting firms that are writing the EIS or providing reports used to create substantial portions of the EIS;
- experts in various environmental disciplines or areas where impacts are expected and have not been represented by other scoping participants; and
- cooperating agencies, if/when identified, with expertise and/or regulatory input into the environmental processes at FSGA.

4. PRELIMINARY SCOPING PHASE

The preliminary scoping phase consists of internal scoping. Internal scoping begins with an initial Description of the Proposed Action and Alternatives (DOPAA) – a document potentially

revised based on public and stakeholder input. The DOPAA contains two sections. The first section will be the purpose and need for the proposed action; it will contain pertinent background information. The second section will be a description of the proposed action, preferred alternative, no-action alternative, and action alternatives. After refinement during the scoping phase, these two sections will become Chapters 1 and 2 of the Draft EIS.

4.1 IDENTIFY SIGNIFICANT ISSUES FOR ANALYSIS IN ENVIRONMENTAL IMPACT STATEMENT

The EIS analysis evaluates potential impacts of the proposed action (and its alternatives) on resources that are beneficial and valuable to the public. Processes to minimize or prevent the potential impacts are proposed as mitigation methods/actions. Initial alternatives to the proposed action are presented to the public and stakeholders during the scoping meetings. The scoping meeting seeks input on the issues which are relevant and significant to the public and stakeholders to modify the existing alternatives and/or to identify other alternatives.

The proposed action includes construction of range and Garrison facilities projects. Each construction project has more than one siting or course of action. Internal scoping has determined the two most favorable alternative locations, which are selected for detailed analysis. Resources potentially affected by the proposed action and its alternatives include (but are not limited to) the following : air quality, biological resources, soil conservation, water quality, wetlands/floodplains, cultural resources, noise, hazardous materials/wastes, utilities, traffic/transportation, land use, socioeconomics, disproportionately high impacts to minorities or low-income populations (environmental justice), protection of children, and provisions for individuals with disabilities.

4.2 IDENTIFY PROPONENT, LEAD, AND COOPERATING AGENCIES

The proponent is the person or activity that has initiated the action, has initiated a funding request, and makes the important decisions or recommendations regarding the project. For the Training Range and Garrison Support Facilities Construction and Operation EIS, the proponent is the FSGA Garrison Commander. The lead agency is the Department of the Army.

Agencies with a regulatory or other such associated status with Fort Stewart are invited to serve as Cooperating Agencies (CA) in this EIS. Invitations to be a CA were made via letter; copies of all such correspondence and replies are maintained in the Administrative Record for the EIS. The following agencies were approached regarding CA status:

- U.S. Fish and Wildlife Service (threatened and endangered species),
- U.S. Forest Service – Chattahoochee-Oconee National Forest,
- Savannah District Corps of Engineers – Regulatory Branch (wetlands),
- U.S. Environmental Protection Agency, Region 4,
- National Marine Fisheries Service – Southeast Regional Office,
- National Oceanic and Atmospheric Administration,
- Federally Recognized Tribes with an Ancestral Affiliation with the FSGA area,
    - Alabama-Quassarte Tribe of Oklahoma
    - Kialegee Tribal Town,
    - Miccosukee Tribe of Florida,
    - Muscogeee (Creek) Nation,
    - Poarch Band of Creek Indians,
    - Seminole Nation of OK,
    - Seminole Tribe of FL,
    - Thlopthlocco Tribal Town,
    - Georgia Department of Natural Resources,
    - Non-Game Wildlife and Natural Heritage Section,
    - State Historic Preservation Officer,
    - Coastal Resources Division,
    - Environmental Protection Division, and
    - Georgia State Clearinghouse.

Of these, only the U.S. Army Corps of Engineers-Regulatory Branch (Wetlands) (USACE) accepted the invitation. They now serve as a CA for this EIS and are providing valuable data for development of the determination of affect to water quality and resources, such as wetlands, in this EIS.

4.3 IDENTIFY METHODS TO INVITE PARTICIPATION OF STAKEHOLDERS

Methods to invite public and regulatory participation in the EIS process include the following:

1. ***Project Website***: A website (http://www.fortstewart-mmp-eis.com) is online, provides comprehensive information and the latest developments on the project, and helps the public understand the purpose and content of an EIS. The website has a library of background documents to read, print, or download; notices and reports of public meetings; and contact information for submitting comments or questions.
2. ***Mailing List***: The Installation developed and maintains a mailing list of all interested people, organizations, and government officials with an interest in this EIS. The list is used to distribute newsletters, fact sheets, notices of meetings, and other project mailings. The list will be based on lists from prior projects, public meeting sign-ins, and sign-up at the project website. A database comprised of residents, elected officials, businesses, and institutions in the general project area was created for the purpose of meeting document availability notifications and tracking of public comments.
3. ***Document Review***: A repository of informative documents is maintained on the project website and in local public libraries. All summaries, newsletters, and fact sheets will also be included.
4. ***Document Summaries***: To make the content of technical documents understandable to the public, the study team summarizes key points in terms that are meaningful to the general public, utilizing graphic visualizations as needed.
5. ***Presentations***: The study team is available to make presentations to groups requesting them.
6. ***Media***: The study team may provide material on the development of the EIS to the press and other media outlets. Senior staff is available to make appearances on local radio and television programs.
7. ***Public Comments***: The study team records and considers public comments made at public forums or submitted in writing either through the mail or as e-mail through the project website.

Website. An electronic project website is an increasingly useful tool for reaching the public and stakeholders. Functions on the website include announcements, a comment form, an electronic reading room, a request for e-mail notices or newsletters, links to informative videos, and draft documents for public/stakeholder review. In addition, visualizations and other useful information are on the website in response to both internal FSGA and external (public, regulatory agencies, etc.) comments and requests as the NEPA process proceeds. It also includes depictions of the various alternatives as overlays to maps. Additional useful visualizations include the locations of range alternatives, overlain with resource constraints. Information concerning upcoming events (such as school presentations and tours) is included. All questions from the public are answered in a timely manner.

Mailings. A mailing list was compiled to include Federal, state, and local government offices, Tribes, citizen advisory groups, special interest groups, and others specifically requesting correspondence (see Appendix A). This list is thoroughly reviewed and modified periodically in response to stakeholder input. An option for either electronic correspondence (e-mail) or traditional paper mail is available. Special interest groups and non-regulatory agencies are contacted when documents are ready for review and when meetings on the EIS are scheduled. The groups include:

- the cities of Hinesville, Savannah, Pooler, Bloomingdale, Pembroke, Richmond Hill, Glennville, Gum Branch, Allenhurst, Flemington, and Walthourville;
- the counties of Bryan, Effingham, Chatham, Liberty, Long, and Evans; and
- the Coastal Georgia Regional Development Center, the Heart of Georgia-Altamaha Regional Development Center, and the Savannah-Chatham Metropolitan Planning Commission.

Consultation was recommended for the following special interest groups:

- The Sierra Club – Coastal Group, Savannah (www.georgia.sierraclub.org/coastal/);
- The Audubon Society – Ogeechee Chapter, Savannah (www.savogeecheeaudubon.org/);
- The Savannah Riverkeeper (www.savannahriverkeeper.org/);
- The Ogeechee-Canoochee Riverkeeper (www.ogeecheecanoocheeriverkeeper.org/);
- Citizens for Environmental Justice, Savannah (www.theharambeehouse.com/);
- Coastal Conservation Association of Georgia, Savannah (www.ccaga.org/);
- Georgia Conservancy Incorporated, Savannah (www.georgiaconservancy.org/);
- Southern Alliance for Clean Energy, Savannah (www.cleanenergy.org/); and
- Savannah Tree Foundation (www.savannahtreefoundation.com/).

Document Review and Summaries. Informative background documents and drafts of the EIS will be available for review in either printed or electronic form. Electronic copies are accessible on the website to download the documents or read them online. Printed copies of relevant documents will be available at library reading rooms. Technical and non-technical summaries of the documents will be available to facilitate public review.

Printed Information. Informative project newsletters, brochures, or fact sheets are used to solicit public interest by distribution at area businesses, special events, or site tours. This information will also be available on the website and periodically updated as the NEPA process moves forward. The Environmental Division provides ideas for the contractor to produce briefing packets/graphics/posters/banner stands and other outreach support material, as deemed necessary for display at public meetings and workshops.

Presentations. Briefings for stakeholders will occur, as requested, to civic groups, such as the local Chamber of Commerce, Rotary, League of Women Voters, Parent-Teacher Associations, and other interested parties/groups/associations. To increase the public interest, informative videos may be available via links to video hosting websites, on the project website, in newsletters, or in e-mails.

Media. Media announcements produce additional public interest and awareness. All press and media contacts are coordinated with the PAO. All public notices go to the PAO prior to publication. Appearances on local radio and television may occur, as appropriate. Potential media contacts are in Appendix A.

Public Comments. Comments forms and surveys are available at all public meetings, on the project website, and included in project newsletters. Comment forms may be completed at the meetings, mailed to the Installation, or submitted online at the EIS webpage. All comments are compiled in a database for inclusion in the decision-making process and in Appendix A of the EIS.

4.4 NOTICE OF INTENT TO PREPARE AN EIS

On April 3, 2009, the Department of the Army issued a Notice of Intent (NOI) to prepare the Training Range and Garrison Support Facilities Construction and Operation EIS at Fort Stewart, Georgia, in the Federal Register (FR) (74 FR 15257) and local newspapers (*Savannah Morning News*, *Coastal Courier*, and *The Frontline*). Copies of the NOI and clippings validating its publication in these media sources are in Appendix A. Fort Stewart also mailed copies of the

NOI (including the notice of public scoping meetings) to local, county, State, Federal, and Tribal representatives, as well as other interested parties (such as local community organizations). The mailing list for the EIS is also included at Appendix A and updated regularly as the EIS process continues and people and/or organizations want to be added to or removed from the list.

4.5 PUBLIC SCOPING MEETINGS

The public scoping meetings were announced in the following newspapers: *Bryan County News* on April 4, 8, 11 and 15, 2009; in the *Savannah Morning News* on April 4, 9-14, and 16, 2009; *Coastal Courier* on April 12 and 15, 2009; *Glenville Sentinel* on April 9, 2009; and in the *Statesboro Herald* on April 8-12, 2009.

The scoping meetings were held on April 13, 2009, at the Mighty Eighth Air Force Museum in Pooler, Georgia; April 14, 2009, at the Georgia National Guard Armory in Hinesville, Georgia; and on April 16, 2009, at the Wetlands Education Center in Richmond Hill, Georgia. The public was informed of these meetings via the printing of the NOI and informed that comments are accepted throughout the entirety of the EIS process. They were encouraged to submit scoping comments at the meeting itself, by mailing in the handout comment forms, or by visiting the EIS webpage. Sign-in sheets and comments (both written and verbatim from the court reporter) are included in the public outreach appendix of this EIS (Appendix A).

Comments received after the meetings or submitted via the EIS website also are included in this appendix, as are articles from local, regional, or national newspapers, radio stations, and televised broadcasts, arranged in chronological order of publication.

4.6 COLLECTION AND ANALYSIS OF ENVIRONMENTAL DATA OR REQUIRED STUDIES

The timing of the preparation of the environmental analyses is important so that decision makers, the public, and stakeholders will have the information needed to determine and/or comment on the potential impacts of the alternatives on Installation resources. Supporting studies include:

- Transportation Surveys – Fort Stewart utilized information within its Comprehensive Transportation Study of 2007 and the Hinesville Area Planning Organization's (HAMPO) Transportation Improvement Plan for 2010-2013 to determine potential

projects of interest to the Fort Stewart infrastructure. The HAMPO operates under the leadership of a Policy Committee, comprised of elected officials and other decision makers from each participating jurisdiction, the Georgia Department of Transportation, and other state and federal agencies, such as Fort Stewart. Participation in this process provides an early insight into what the neighboring community of Hinesville is planning, to include transportation improvements, development of biking and pedestrian corridors within existing and future road systems, and other similar projects.

- Noise – Fort Stewart submitted its training data and other relevant information to U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) detailing current and future rounds fired on Fort Stewart; this information was used to generate noise contours which are presented in Section 4.8, Noise, of the EIS.
- Air Quality – Emissions generated from training, construction, and ongoing day-to-day operations on Fort Stewart are routinely captured in databases managed by the Installation Air Quality program manager. Recent studies include an Air Emission Inventory, Greenhouse Gas Emission Inventory, and Prevention of Significant Deterioration Analysis. Results of these database compilations \studies are summarized in Section 4.4, Air Quality, of the EIS.
- Wetlands Assessment – Wetlands delineation were conducted for all Alternative B (Preferred) sites in the EIS. The delineations were forwarded to the Savannah District Office of the U.S. Army Corps of Engineers (USACE)-Regulatory Branch, for verification. Results are presented in Section 4.4, Water Quality and Resources, Wetlands, of the EIS. The USACE is also a Cooperating Agency in this EIS and contributed to its development by providing watershed data and guidance in preparing the cumulative impact analysis for wetlands. For all Alternative C locations, the National Wetlands Inventory was utilized to predict potential impacts.
- Protected Species Surveys–surveys of the Installation's population of federally protected red-cockaded woodpecker, frosted flatwoods salamander, indigo snake, wood stork, and shortnose sturgeon, as well as for the state-protected gopher tortoise are routinely conducted for a variety of reasons, to include compliance with the INRMP and in support of pending construction projects. Results of these surveys are summarized in the Section 4.5, Biological Resources, Protected Species, of the EIS. The Fort Stewart Wildlife

Management Branch prepared a Biological Assessment (BA) for submittal to the U.S. Fish and Wildlife Service (USFWS) and initiated formal consultation with them regarding the actions analyzed in this EIS. The BA is available for review in Appendix B of the Draft EIS. Due to modification to the Infantry Platoon Battle Course and Multipurpose Machine Gun Range, a modification to the BA was submitted to the USFWS in April 2010. This is also available for review in Appendix A of the EIS, as well as USFWS responses, when received.

- Cultural Resource Management Surveys – surveys (Phase I and/or II) were previously conducted for most of the areas proposed for construction. Results are presented in Section 4.6, Cultural Resources, of the EIS. Formal consultation with both the Georgia State Historic Preservation Office (SHPO) and the Native American Tribes with whom the Installation consults is complete and available for review in Appendix C of the EIS, as well as supporting documentation for determinations of effect in this EIS. The sensitive information on archaeological sites are not distributed to the public in accordance with Section 9 of the Archaeological Resource Protection Act and Section 304 of the National Historic Preservation Act.

4.7 PREPARATION AND REVIEW OF DRAFT AND FINAL EIS

4.7.1 Draft EIS

The 45-day public comment period for the Draft EIS began with publication of the Notice of Availability (NOA) in the Federal Register on April 2, 2010. The NOA was also published in local media sources. Federal, State, local, and Tribal representatives, as well as other stakeholders and members of the public expressing interest in the Draft EIS, were mailed a copy of the NOA of the Draft EIS, providing information on its availability, the request for its review and comment, and details regarding the scheduled public meetings.

The Draft EIS was available to the public via the EIS webpage (www.Fortstewart-mmp-eis.com) and local libraries. The Army held three public meetings to receive comment on this Draft EIS on April 26, 2010 at the Mighty Eighth Air Force Museum in Pooler, Georgia; April 27, 2010 at the Liberty County Recreation Area in Hinesville, Georgia; and April 29, 2010 at the Richmond

Hill City Center, Richmond Hill, Georgia. Attendees were encouraged to submit comments at the meeting itself, by mailing in comment forms, or by visiting the EIS webpage. Sign-in sheets and comments (written and transcribed) are in Appendix A. Comments received after the meetings or submitted via the EIS website are in this appendix, as are articles from local, regional, or national newspapers, radio stations, and televised broadcasts, arranged in chronological order of publication.

4.7.2 Final EIS

Comments received on the Draft EIS were utilized to complete the Final EIS. An NOA will published in the Federal Register and local news media announcing its availability and where copies of the document may be obtained. This will mark the beginning of the 30-day public comment review period for the Final EIS. Federal, State, local, and Tribal representatives, as well as other stakeholders and members of the public expressing interest in the Final EIS, will receive a mailed copy of the NOA providing information on tits availability. All comments received during the public comment period will be considered in the preparation of the ROD. All comments on the Final EIS will be provided in Appendix A.

4.7.3 ROD

The ROD will document the decision made by the Installation and the basis for that decision. It will (32 CFR part 651)

(i) Clearly state the decision by describing it in sufficient detail to address the significant issues and ensure necessary long-term monitoring and execution;

(ii) Identify all alternatives considered by the Army in reaching its decision, specifying the environmentally preferred alternative(s). The Army will discuss preferences among alternatives based on relevant factors, including environmental, economic, and technical considerations and agency statutory missions;

(iii) Identify and discuss all such factors, including any essential considerations of national policy that were balanced by the Army in making its decision. Because economic and technical analyses are balanced with environmental analysis, the agency preferred alternative will not necessarily be the environmentally preferred alternative;

(iv) Discuss how those considerations entered into the final decision;

(v) State whether all practicable means to avoid or minimize environmental harm from the selected alternative have been adopted, and if not, why they were not; and

(vi) Identify or incorporate by reference the mitigation measures that were incorporated into the decision.

The ROD will be distributed to agencies with authority or oversight over aspects of the proposal, cooperating agencies, appropriate congressional, state, and district offices, all parties that are directly affected, and others upon request. No decision will be made on a proposed action until 30 days after EPA has published the Notice of Weekly Receipts (NWR) of the Final EIS in the FR or 90 days after the NWR of the Draft EIS, whichever is later.

4.8 PROCEED WITH PROPOSED ACTION

During the implementation of the decision, monitoring will be required to assure that the mitigation methods, or other conditions established in the EIS or during the decision-making process, are enacted. Specific mitigation requirements may be established in the Biological Opinion from US Fish and Wildlife Service, wetland permits (Section 404 Dredge and Fill Permit), water quality permits (National Pollutant Discharge Elimination System permit for construction), or stream buffer variances.

5. REFERENCES

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Cisar,H.R. and E.S. Rohr, 2004. Fort Stewart Watershed Impact Assessment. 2004 Update. LMI, Reston, VA, CE309T1/August 2004. [*140 pages*]

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Versar, 2003. Fort Stewart Stormwater Pollution Prevention Plan. Volume 1. Submitted by: Versar, Inc., Springfield, VA. Submitted to: Directorate of Public Works, Environmental Natural Resources Division, Fort Stewart, GA. 21 Apr 2003. [109 pages]

Weston Solutions, Inc., 2007. Final Stormwater Modeling Report. United States Army Garrison, Fort Stewart, Georgia. Prepared by: Weston Solutions, Inc., Norcross, GA. Prepared for: Directorate of Public Works, Environmental Protection and Compliance Branch, Fort Stewart, GA. July 2007. [7*6 pages*].

Section II:

Notice of Intent to Prepare an Environmental Impact Statement, Notification Letters and Cooperating Agency Invitations, Public Notifications, and EIS Mailing List

DEPARTMENT OF DEFENSE

Department of the Army

Notice of Intent To Prepare an Environmental Impact Statement for Mission and Master Planning Actions at Fort Stewart/Hunter Army Airfield, GA

AGENCY: Department of the Army, DoD.

ACTION: Notice of intent.

SUMMARY: The United States Army announces its intent to proceed with an Environmental Impact Statement (EIS) to address known and reasonably anticipated changes in missions and operations at Fort Stewart/Hunter Army Airfield. This is necessary to analyze the cumulative socioeconomic and environmental impacts associated with a number of recent personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. When the EIS is completed, it will also be used by Army decision makers as an important resource to consult when making future decisions about future land uses and operations at Fort Stewart/Hunter Army Airfield.

FOR FURTHER INFORMATION CONTACT: Ms. Melissa Kendrick, National Environmental Policy Act Specialist, Directorate of Public Works, Prevention and Compliance Branch, Environmental Division, 1550 Frank Cochran Drive, Building 1137–A, Fort Stewart, Georgia 31314–4928. Written comments may be mailed to that address or e-mailed to *Melissa.B.Kendrickus.army.mil.* For media queries please contact Fort Stewart Public Affairs Office at (912) 435–9874 during normal business hours (9 a.m. to 5 p.m.).

SUPPLEMENTARY INFORMATION: Fort Stewart/Hunter Army Airfield, located in southeastern Georgia, is the largest Army installation east of the Mississippi River covering approximately 280,000 acres. Updates to the installation's mission and master planning process will allow the installation to continue to train Soldiers, protect valuable environmental and cultural resources, and minimize negative impacts to neighboring communities. The Army's intent in moving forward with this EIS is to provide decision makers with a comprehensive planning tool, a public information source, and a reference for mitigation.

The proposed action involves constructing ranges and facilities to support military units assigned to Fort Stewart, accommodating current and future training requirements, and the updating of operational and management plans for training lands and infrastructure. The EIS will address the effects of the proposed activities beginning in FY11 and extending through FY14. Construction projects include ranges, cantonment expansion, Georgia Highway 144 by-pass, widening of Highway 144, and other transportation improvements on Fort Stewart. The EIS will also include an assessment of Fort Stewart's alternative energy potential and will evaluate alternative energy projects which may be implemented at Fort Stewart in the future.

Alternatives may consist of different locations on the installation for specific projects or modifications to those projects. Range projects will be located on areas currently dedicated to military training. The size of the cantonment area may increase. Alternatives will be developed during preparation of the Draft EIS and as a result of public input and environmental analysis.

Several areas present the potential for significant impacts. Fort Stewart/Hunter Army Airfield land provides known or potential habitat for protected plant and wildlife species. Fort Stewart/Hunter Army Airfield provides habitat for 40 percent of the protected red-cockaded woodpecker in Georgia and intensively manages installation land to protect their habitat. Approximately 60 percent of the installation has been surveyed for cultural resources. As a result of these surveys, numerous sites have been recommended as eligible or potentially eligible for the National Register of Historic Places. Another issue of concern is that approximately 30 percent of the installation is potentially wetlands.

The EIS will analyze the potential impacts of the proposed action and the alternatives. Impacts analyzed will include a wide range of environmental resource areas including, but not limited to, air quality, traffic, noise, water resources, biological resources, cultural resources, socioeconomic, utilities, land use, solid and hazardous materials/waste, and cumulative environmental effects. Additional resources and conditions may be identified as a result of the scoping process initiated by this Notice of Intent (NOI).

The public will be invited to actively participate in the EIS process, which includes three scoping meetings to provide input on the proposed actions and alternatives. The public will also be invited to review and comment on the Draft EIS. Dates and times for these public involvement opportunities will be announced in the local news media. Comments from the public will be considered before any decision is made regarding implementing the proposed action at Fort Stewart/Hunter Army Airfield.

The public scoping period will last for 30 days following the publication of this NOI in the **Federal Register**. Comments from the public will be considered before any decision is made regarding implementing the proposed action.

Dated: March 20, 2009.

Addison D. Davis, IV,

Deputy Assistant Secretary of the Army (Environment, Safety and Occupational Health).

[FR Doc. E9–7320 Filed 4–2–09; 8:45 am]

BILLING CODE 3710–08–M

PUBLIC NOTICE

Scoping Meetings to Prepare an Environmental Impact Statement Analyzing the Impacts of Mission and Master Planning Actions at Fort Stewart, Georgia

Fort Stewart/Hunter Army Air Field (FSGA) announces scoping meetings to engage members of the public and other interested parties in the environmental impact statement (EIS) process addressing its Mission and Master Planning (M&MP) actions. The EIS will address known and reasonably anticipated changes in missions and operations at FSGA. It will analyze the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. When the EIS is completed, it will be used by Army decision-makers as an important resource to consult when making major decisions about future land uses and operations at FSGA. To the degree possible, given existing data, it will also evaluate the potential environmental impacts of essential mission and supporting management activities on FSGA.

The FSGA M&MP actions have the potential to significantly impact certain natural, economic, social, and cultural resources of the FSGA community. The objective is to provide a comprehensive EIS that will serve as a planning tool, a public information source, and a reference for mitigation tracking. The EIS will analyze the impacts associated with construction of training ranges and other facilities as well as revisions to the M&MP process. Revisions to the M&MP process will allow the installation to continue to train soldiers, protect valuable environmental and cultural resources, and minimize adverse impacts to neighboring communities.
The proposed action involves constructing ranges and facilities to support the restationing of military units, accommodating the current and future training requirements, and revising operational and management plans for training lands and infrastructure.

The FSGA M&MP EIS will analyze the environmental and socioeconomic impacts of several alternatives including the No Action Alternative. Alternatives will be developed during preparation of the Draft EIS and as a result of public input and environmental analysis.
The scoping meeting will evaluate alternatives for constructing new and modifying existing training ranges and for expanding onsite facilities at FSGA. Discussions will include the assessment of potential environmental impacts from future land use changes, infrastructure development, and stationing decisions.
All members of the public; Federal, State, and local agencies; Tribes; and other interested parties are invited to actively participate in this EIS process. FSGA seeks comments on the alternatives proposed for analysis, on the proposed scope of the analysis for specific resource areas, and other comments participants wish to make addressing the proposed action. Additional alternatives may be developed in response to comments received during the public scoping period. Information about the EIS process as well as supporting documentation will also be available on the FSGA M&MP website at www.Fortstewart-mmeis.com.

Public Scoping meetings will be held on the dates and at the locations listed below. Meetings will begin at 5:00 p.m. with an informal poster display. Representatives will be available to describe the technical aspects of the proposed action and alternatives. Experts in environmental disciplines will also be available to discuss anticipated impacts. The meeting will end at 8:00 p.m., or when no further comments are forthcoming.

Mighty Eighth Air Force Museum
175 Bourne Avenue
Pooler, Georgia 31322
Monday, April 13, 2009

Georgia National Guard Bureau Armory
407 West Oglethorpe Highway
Hinesville, Georgia 31313
Tuesday, April 14, 2009

John W. Stevens
Wellonds Education Center Cedar Street
Richmond Hill, Georgia 31324
Thursday, April 16, 2009

***Savannah Morning News*, April 2009**

PUBLIC NOTICE

Scoping Meetings to Prepare an Environmental Impact Statement Analyzing the Impacts of Mission and Master Planning Actions at Fort Stewart, Georgia

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Mighty Eighth Air Force Museum 175 Bourne Avenue Pooler, GA 31322 Monday, April 13, 2009	Georgia National Guard Bureau Armory 607 West Oglethorpe HWY Hinesville, GA 31313 Tuesday, April 14, 2009	John W. Stevens Wetlands Education Center Cedar Street Richmond Hill, GA 31324 Thursday, April 16, 2009

For more information, please contact Mr. Charles Walden, Project Manager, Directorate of Public Works, Prevention and Compliance Branch, Environmental Division, 1550 Frank Cochran Drive, Building 1137-A, Fort Stewart, GA 31314-4928. Written comments may be mailed to that address or e-mailed to him at Charles.Walden4@us.army.mil.

***Bryan County News*, April 2009**

PUBLIC NOTICE

Scoping Meetings to Prepare an Environmental Impact Statement Analyzing the Impacts of Mission and Master Planning Actions at Fort Stewart, Georgia

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Monday, April 13, 2009

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607 West Oglethorpe Highway
Hinesville, Georgia 31313
Tuesday, April 14, 2009

John W. Stevens
Wetlands Education Center
Cedar Street
Richmond Hill, Georgia 31324
Thursday, April 16, 2009

For more information, please contact Mr. Charles Walden, Project Manager, Directorate of Public Works, Prevention and Compliance Branch, Environmental Division, 1550 Frank Cochran Drive, Building 1137-A, Fort

***Glennville Sentinel*, April 2009**

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Scoping Meetings to Prepare an Environmental Impact Statement Analyzing the Impacts of Mission and Master Planning Actions at Fort Stewart, Georgia

Fort Stewart/Hunter Army Air Field (FSGA) announces scoping meetings to engage members of the public and other interested parties in the environmental impact statement (EIS) process addressing its Mission and Master Planning (M&MP) actions. The EIS will address known and reasonably anticipated changes in missions and operations at FSGA. It will analyze the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. When the EIS is completed, it will be used by Army decision-makers as an important resource to consult when making major decisions about future land uses and operations at FSGA. To the degree possible, given existing data, it will also evaluate the potential environmental impacts of essential mission and supporting management activities on FSGA.

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Thursday, April 16, 2009

For more information, please contact Mr. Charles Walden, Project Manager, Directorate of Public Works, Prevention and Compliance Branch, Environmental Division, 1550 Frank Cochran Drive, Building 1137-A, Fort Stewart, GA 31314-4928. Written comments

***Coastal Courier*, April 2009**

PUBLIC NOTICE

Scoping Meetings to Prepare an Environmental Impact Statement Analyzing the Impacts of Mission and Master Planning Actions at Fort Stewart, Georgia

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For more information, please contact Mr. Charles Walden, Project Manager, Directorate of Public Works, Prevention and Compliance Branch, Environmental Division, 1520 Frank Cochran Drive, Building 1137-A, Fort Stewart, GA 31314-4928. Written comments may be mailed to that address or e-mailed to

***Statesboro Herald*, April 2009**

DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
100 W. OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3640

AUG 07 2009

Regulatory Division
200801442

Fort Stewart Directorate of Public Works
Attention: Mr. Robert Baumgardt
1587 Frank Cochran Drive
Fort Stewart, Georgia 31314

Dear Mr. Baumgardt:

I refer to your letter of July 21, 2009, requesting the US Army Corps of Engineers, Savannah District, Regulatory Division to be a Cooperating Agency in the preparation of the Fort Stewart Mission and Master Planning Environmental Impact Statement (M&MP EIS).

The US Army Corps of Engineers has been charged by Congress, under Section 404 of the Clean Water Act (33 U.S.C. 1344) with responsibility to regulate all construction and fill activities performed in waters of the United States and their adjacent wetland areas. There are a number of proposed range construction projects included in the M&MP EIS which would involve impacts to wetlands and require Department of the Army authorization.

By this letter we accept your invitation to be a Cooperating Agency on the M&MP EIS. As a cooperating agency the Regulatory Division may adopt without recirculating the EIS for our Section 404 permit processes for the wetland impacts associated with the proposed ranges. It is crucial to the success of this endeavor that we insure the document addresses all of the necessary elements to fulfill our Section 404 and National Environmental Policy Act requirements.

We look forward to assisting in the development of a document that can be utilized for all applicable environmental reviews and requirements. If you have any further questions concerning this matter, please contact Mark J. Padgett of the Regulatory Division at 912-652-5052.

Sincerely,

Richard W. Morgan
Acting Chief, Coastal Branch

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Alabama-Quassarte Tribe of Oklahoma
Attn: Chief Tarpie Yargee
PO Box 187
101 East Broadway
Wetumka, OK 74880

Dear Chief Tarpie Yargee:

The United States Army is drafting an Environmental Impact Statement (EIS) to address known and reasonably anticipated changes in missions and operations at Fort Stewart and Hunter Army Airfield, Georgia (FSGA). This is necessary to analyze the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. The attached Notice of Intent (NOI) to prepare this EIS contains a brief description of the proposed action, the development of alternatives, potential impacts, and the scoping process.

The Army is committed to facilitating and encouraging a continuous, two-way communication with the public and stakeholders. Comments from the public and Federal, state, and local agencies will be considered before any decision is made to implement the proposed action at FSGA. Areas of specific concern to you will be addressed, and your input will assist us in preparing this environmental document. Public scoping meetings will be from 6-8 p.m. at the locations and dates listed below.

a. Monday, April 13, 2009 at the Mighty Eighth Air Force Museum, 175 Bourne Avenue, Pooler, Georgia 31322.

b. Tuesday, April 14, 2009 at the Georgia National Guard Bureau Armory, 607 West Oglethorpe Highway, Hinesville, Georgia 31313.

c. Thursday, April 16, 2009 at the John W. Stevens Wetlands Education Center, Cedar Street, Richmond Hill, Georgia 31324.

For questions and/or additional information regarding the EIS, please contact Mr. Charles Walden, Project Manager, Directorate of Public Works, Protection and Compliance Branch, Environmental Division, 1550 Frank Cochran Street, Building 1137-A, Fort Stewart, Georgia 31314-4928. Written comments may be mailed to that address or e-mailed to him at Charles.Walden4@us.army.mil.

Sincerely,

Todd A. Buchs
Colonel, US Army
Commanding

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Georgia Department of Natural Resources
Attn: Dr. W. Ray Luce
Deputy State Historic Preservation Officer
34 Peachtree Street, NW, Suite 1600
Atlanta, GA 30303-2316

Dear Dr. Luce:

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c. Thursday, April 16, 2009 at the John W. Stevens Wetlands Education Center, Cedar Street, Richmond Hill, Georgia 31324.

For questions and/or additional information regarding the EIS, please contact Mr. Charles Walden, Project Manager, Directorate of Public Works, Protection and Compliance Branch, Environmental Division, 1550 Frank Cochran Street, Building 1137-A, Fort Stewart, Georgia 31314-4928. Written comments may be mailed to that address or e-mailed to him at Charles.Walden4@us.army.mil.

Sincerely,

Todd A. Buchs
Colonel, US Army
Commanding

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Georgia Department of Natural Resources
Coastal Resources Division
Attention: Ms. Susan Shipman, Dir
One Conservation Way, Suite 300
Brunswick, GA 31520-8687

Dear Ms. Shipman:

The United States Army is drafting an Environmental Impact Statement (EIS) to address known and reasonably anticipated changes in missions and operations at Fort Stewart and Hunter Army Airfield, Georgia (FSGA). This is necessary to analyze the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. The attached Notice of Intent (NOI) to prepare this EIS contains a brief description of the proposed action, the development of alternatives, potential impacts, and the scoping process.

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Colonel, US Army
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HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

U.S. Department of Interior
Fish and Wildlife Service
Attention: Sandra Tucker
4270 Norwich Street
Brunswick, GA 31520

Dear Ms. Tucker:

The United States Army is drafting an Environmental Impact Statement (EIS) to address known and reasonably anticipated changes in missions and operations at Fort Stewart and Hunter Army Airfield, Georgia (FSGA). This is necessary to analyze the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. The attached Notice of Intent (NOI) to prepare this EIS contains a brief description of the proposed action, the development of alternatives, potential impacts, and the scoping process.

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Colonel, US Army
Commanding

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HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

U.S. Forest Service
Attention: Ms. Kathleen Atkinson
Chattahoochee-Oconee National Forest
1755 Cleveland Highway
Gainesville, GA 30501

Dear Ms. Atkinson:

The United States Army is drafting an Environmental Impact Statement (EIS) to address known and reasonably anticipated changes in missions and operations at Fort Stewart and Hunter Army Airfield, Georgia (FSGA). This is necessary to analyze the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. The attached Notice of Intent (NOI) to prepare this EIS contains a brief description of the proposed action, the development of alternatives, potential impacts, and the scoping process.

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HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Georgia Department of Natural Resources
Attn: Ms. Betsy Shirk
34 Peachtree Street, NW
Suite 1600
Atlanta, GA 30303-2316

Dear Ms. Shirk:

The United States Army is drafting an Environmental Impact Statement (EIS) to address known and reasonably anticipated changes in missions and operations at Fort Stewart and Hunter Army Airfield, Georgia (FSGA). This is necessary to analyze the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. The attached Notice of Intent (NOI) to prepare this EIS contains a brief description of the proposed action, the development of alternatives, potential impacts, and the scoping process.

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US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Savannah District Corps of Engineers
Wetland Regulatory Division
Attn: Mark Padgett
100 W. Oglethorpe Ave.
Savannah, GA 31401

Dear Mr. Padgett:

The United States Army is drafting an Environmental Impact Statement (EIS) to address known and reasonably anticipated changes in missions and operations at Fort Stewart and Hunter Army Airfield, Georgia (FSGA). This is necessary to analyze the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. The attached Notice of Intent (NOI) to prepare this EIS contains a brief description of the proposed action, the development of alternatives, potential impacts, and the scoping process.

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HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

National Marine Fisheries Service
Southeast Regional Office
Attention: Mr. David Keys
263 13th Avenue, S.,
St. Petersburg, FL 33701

Dear Mr. Keys:

The United States Army is drafting an Environmental Impact Statement (EIS) to address known and reasonably anticipated changes in missions and operations at Fort Stewart and Hunter Army Airfield, Georgia (FSGA). This is necessary to analyze the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. The attached Notice of Intent (NOI) to prepare this EIS contains a brief description of the proposed action, the development of alternatives, potential impacts, and the scoping process.

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954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Georgia Department of Natural Resources
Non Game Wildlife & Natural Heritage Section
Attn: Ms. Trina Morris
2065 US Highway 278 SE
Social Circle, GA 30025

Dear Ms. Morris:

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954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

U.S. Environmental Protection Agency
Environmental Policy Section
Attn: Mr. Heinz J. Mueller
61 Forsyth Street, SW
Atlanta, GA 30303-3104

Dear Mr. Meuller:

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954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Georgia Department of Natural Resources
Environmental Protection Division
Attention: Dr. Carol Couch, Director
2 Martin Luther King Jr. Dr., Southeast
Atlanta, GA 30334-9000

Dear Dr. Couch:

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954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Thlopthlocco Tribal Town
Town King Vernon Yarholar
Clairview Road Exit 227
Building 103
Okemah, OK 74859

Dear Town King Vernon Yarholar:

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954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Kialegee Tribal Town
Attn: Mekko Jennie Lillard
PO Box 332
108 North Main Street
Wetumka, OK 74883

Dear Mekko Jennie Lillard:

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HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Miccosukee Tribe of Florida
Attn: Chairman Billy Cypress
Mile Marker 70
United States Highway 41
Tamiami Trail
Miami, FL 33144

Dear Chairman Billy Cypress:

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HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Muscogee Creek Nation
Chief A. D. Ellis
PO Box 580
1008 East Eufala
Okmulgee, OK 74447

Dear Chief A. D. Ellis:

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HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Poarch Band of Creek Indians
Chairman Buford L. Rolin
5811 Jack Springs Road
Atmore, AL 36502

Dear Chairman Buford L. Rolin:

The United States Army is drafting an Environmental Impact Statement (EIS) to address known and reasonably anticipated changes in missions and operations at Fort Stewart and Hunter Army Airfield, Georgia (FSGA). This is necessary to analyze the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. The attached Notice of Intent (NOI) to prepare this EIS contains a brief description of the proposed action, the development of alternatives, potential impacts, and the scoping process.

The Army is committed to facilitating and encouraging a continuous, two-way communication with the public and stakeholders. Comments from the public and Federal, state, and local agencies will be considered before any decision is made to implement the proposed action at FSGA. Areas of specific concern to you will be addressed, and your input will assist us in preparing this environmental document. Public scoping meetings will be from 6-8 p.m. at the locations and dates listed below.

a. Monday, April 13, 2009 at the Mighty Eighth Air Force Museum, 175 Bourne Avenue, Pooler, Georgia 31322.

b. Tuesday, April 14, 2009 at the Georgia National Guard Bureau Armory, 607 West Oglethorpe Highway, Hinesville, Georgia 31313.

c. Thursday, April 16, 2009 at the John W. Stevens Wetlands Education Center, Cedar Street, Richmond Hill, Georgia 31324.

For questions and/or additional information regarding the EIS, please contact Mr. Charles Walden, Project Manager, Directorate of Public Works, Protection and Compliance Branch, Environmental Division, 1550 Frank Cochran Street, Building 1137-A, Fort Stewart, Georgia 31314-4928. Written comments may be mailed to that address or e-mailed to him at Charles.Walden4@us.army.mil.

Sincerely,

Todd A. Buchs
Colonel, US Army
Commanding

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Seminole Nation of Oklahoma
Attn: Chief Enoch Kelly Haney
PO Box 1498
Junction 270 and 56 Highway
¼ Mile East on 270
Wewoka, OK 74884

Dear Chief Enoch Kelly Haney:

The United States Army is drafting an Environmental Impact Statement (EIS) to address known and reasonably anticipated changes in missions and operations at Fort Stewart and Hunter Army Airfield, Georgia (FSGA). This is necessary to analyze the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. The attached Notice of Intent (NOI) to prepare this EIS contains a brief description of the proposed action, the development of alternatives, potential impacts, and the scoping process.

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Sincerely,

Todd A. Buchs
Colonel, US Army
Commanding

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Georgia Department of Natural Resources
Coastal Resources Division
Attention: Ms. Kelie Moore
One Conservation Way, Suite 300
Brunswick, GA 31520-8687

Dear Ms. Moore:

The United States Army is drafting an Environmental Impact Statement (EIS) to address known and reasonably anticipated changes in missions and operations at Fort Stewart and Hunter Army Airfield, Georgia (FSGA). This is necessary to analyze the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. The attached Notice of Intent (NOI) to prepare this EIS contains a brief description of the proposed action, the development of alternatives, potential impacts, and the scoping process.

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For questions and/or additional information regarding the EIS, please contact Mr. Charles Walden, Project Manager, Directorate of Public Works, Protection and Compliance Branch, Environmental Division, 1550 Frank Cochran Street, Building 1137-A, Fort Stewart, Georgia 31314-4928. Written comments may be mailed to that address or e-mailed to him at Charles.Walden4@us.army.mil.

Sincerely,

Todd A. Buchs
Colonel, US Army
Commanding

Enclosure

Section III:

2009 Public Scoping Meetings and Public Comments Received

MONDAY, APRIL 13, 2008
MIGHTY EIGHTH

Environmental Impact Statement Scoping Meeting

Guest Log

STAFF

Name	Address	Phone	Organization
BRIAN GREER	DPW, ENV, CRM	767-0982	
Robert Hyd	DPW ENRD - Wetlands	767-9443	
Jennifer Frazier	DPW ENRD - P&C	767-6257	
Angi Eason	DPW ENRD - PTC	767-7863	
Larry Cerfile	DPW, Fish & W	767-8241	
Shalonda Pawtree	DPW, ENVIRON	767-7921	
Melissa Kendrick	DPW, ENV	767-2400	
Stanley Thomas	DPW, ENV	767-4139	
Ray GRIGGS	DPTMS, RNG CONTROL	435-8164	
Arte RAHN	DPW, ENV, Forestry	435-8024	
Anthony Rubino	DPW, ENV, Forestry	435-8089	
ANDREA STUBA	DPW, MASTER PLANNING	767-9149	
BRIAN MIXON	DPTMS, AIR TRAFFIC & AIRPORT	435-3130	
David Lavender	DPW, ENV, Fish & Wildlife	767-6765	
Tim Beaty	DPW, Env., Fish & Wildlife	767-7261	
Kevin Montano	DPW, Environmental	767-4937	
CHUCK [illegible]	DPW, ENV	228-7132	
George [illegible]	" "	767-2010	

MONDAY

Environmental Impact Statement Scoping Meeting

Guest Log

Name	Address	Phone	Organization
Nancy Gorrell	Hunter PAO		
JEFF COOK	219 PINE RIDGE DR ELLABELL, GA 31308	858-3473	LAKE LORRAINE HOMES ASSOC.
Glen Zipperer	881 Hodgeville Rd 31312	728-9485 313-8716 Cell	Diamond Concrete Prod
Keith Woods	883 Hodgeville Rd 31312	728-9477 313-2849	WOODS CONTRACT INC. PREMIER CONCRETE
JASON TOWNSEND	3431 Hwy 175 GUYTON	667-5239	PREMIER CONCRETE

Environmental Impact Statement Scoping Meeting

~~Guest~~ Log
Staff

Name	Address	Phone	Organization
Brian Geiser	DPW, ENV, CRM	767-0992	
Robert Lloyd	DPW ENRD Wetlands	767-9443	
Greg Eason	DPW ENV	767-7863	
Melissa Kendrick	DPW, Env. Div.	767-2400	
Arte Rahn	DPW ENV Forestry	435-8024	
Jeff Mangum	DPW, Env, Forestry	435-8125	
Shelly Thomas	DPW, ENV PLC Branch	767-8439	
Brian Nixon	DPTMS, AT&A Officer	435-3130	
Justin Chafin	DPW - Fish/Wildlife	767-4354	
Bruce Davis	DPW - Fish/Wildlife	767-8795	
Roy Griggs	DPTMS - Range Control	435-8164	
Shalonda Rountree	DPW Env	767-7921	
Tim Beaty			
George Harris			
Chuck Walden			
~~Shane~~			
Kevin Montana			

TUESDAY

Environmental Impact Statement Scoping Meeting

Guest Log

Name	Address	Phone	Organization
Pat Young	502 Heritage Drive, Hinesville, GA	271-3501	FSA Public Affairs
Frank Etheridge	202 Dubois Street Pembroke	706-949-9522	City of Pembroke
Don Greenwell	396 Harbour Lane Rh, GA 31324	912 727-4109	UGA Extension

THURSDAY

Environmental Impact Statement Scoping Meeting

Guest Log

STAFF

Name	Address	Phone	Organization
Veronica Frazier	1550 Frank Cochran Dr.	912-767-2010	DPW
Shalonda Raintree	" "	912-767-2010	DPW
Angi Eason	" "	912-767-2010	DPW
BRIAN GREER	"	"	"
Anthony Rhow	DPW - Forestry	435-8051	DPW
Jeff Mangum	" "	435-8125	"
Norman Osnoe	DPW Forestry	435-8050	
BOB MCCARTY	DPW FORESTRY	435-8019	
Ken Cook	DPW Master Planning	767-1070	DPW
Justin Chafin	DPW Fish + Wildlife	767-4354	DPW
Kevin Montano	DPW Environmental	767-4937	DPW
BRIAN MIXON	DPTMS, AIR TRAFFIC	435-3130	DPTMS

THURSDAY

Environmental Impact Statement Scoping Meeting

Guest Log

Name	Address	Phone	Organization
Joe Parker	259 Old Gun Rd Midway	884 2910	citizen
RANDY DYKES	PO.BOX 250 RICHMOND HILL GA 31324	756-7273	CITY OF RH
Bill Sanders	Bryan County Now	756-5566	BCN
Billy & Beth Muse	46 Yellow Bluff Midway Ga	572-2316	self
Del Ferguson	430 Dingers Rd, Bankhet, Ga 30415	912-823-3318	self
Tom Crafton	191 Briarwood Lane RH 31324	678-428-7691	self
PAUL MURESHAIK	607 STEELE WOOD DR	727-3485	"
Ross Blair	Bryan Cty Now	756-3454	
José Cantero	300 Liberty Oak Ln. Hinesville 31313	912 484-7107	Self.
DONNA WALDEN	966 KRISHA DR RICHMOND HILL	912 727-4417	SELF
BRIAN ODOM	790 LAUREL HILL CIRCLE RICHMOND HILL 31324	478 397-4906	CITIZEN
Tressa Rutland	P.O.BOX 1483, Richmond Hill	727-3044	Citizen
BRIAN HAKE	484 MIMER, RICHMOND HILL	756-7675	COLDWELL BANKER OF LC

Verbatim Comment #1

1 FORT STEWART AND HUNTER ARMY AIRFIELD

2

3 MISSION AND MASTER PLANNING

4

5 ENVIRONMENTAL IMPACT STATEMENT

6

7 SCOPING MEETING

8

9

10

11 Mighty Sighth Air Force Museum

12

13 Pooler, Georgia

14

15 April 13, 2009

16

17 6:00 p.m. - 8:00 p.m.

18

19

20 REPORTED BY: ANNETTE PACHECO, CSR, RPR, RMR

21

22

Transcript Prepared By:

23

McKEE COURT REPORTING, INC.
24 P. O. Box 9092
Savannah, Georgia 31401
25 (912) 232-8322

COPY

1 MR. JEFFRY C. COOK: I came this evening
2 because I'm a resident of Lake Lorraine, which is
3 a homeowner-association-owned lake in Ellabell in
4 Bryan County. And my concern this evening was
5 that our lake is fed by a creek called Malden
6 Branch, and Malden Branch drains out of Fort
7 Stewart in the C-1 through C-4 areas and up into
8 B-17 and B-18.
9 So, our concern with the master plan is
10 how any future development could affect the
11 drainage of those lands and the possible increase
12 of the water flow coming out of Fort Stewart into
13 our lake. And I have lived out there for 20 years
14 and hunted Fort Stewart for over 30 years. So, I
15 have seen that as certain projects are done, that
16 there is new ditching and larger ditches. So, we
17 know that the flow of water has increased over the
18 years.
19 We are currently making improvements to
20 the dam on the lake because we know as the years
21 go by, continued improvements and continued
22 drainage projects will occur on the Fort and the
23 amount of water will continue to increase. So,
24 we're making improvements to our dam now.
25 But all of that was in the planning over

1 the past two years. And upon seeing that this
2 meeting was going to take place and I brought it
3 to the attention of the board of directors, now
4 we're all wondering are we doing enough.
5 Shouldn't we know what's going to be happening in
6 the future? And by the same token, shouldn't the
7 people who are creating this plan know what the
8 possible effects of drainage programs and possible
9 paving of roads and, you know, different things
10 that they're going to do so that we can kind of
11 work in concert with each other a little bit so
12 that everyone is aware of what -- so that we're
13 aware of what's going to happen at Fort Stewart?
14 And Fort Stewart is aware that it has an impact on
15 our lake.
16 We're a very unique situation in that we
17 are the only impoundment of water that is
18 completely fed by water coming out of Fort
19 Stewart. We're it. Most all other waters on Fort
20 Stewart drains into the Canoochee and into the
21 Ogeechee Rivers, which just flow down rivers.
22 They're tidal affected and it really doesn't
23 affect anybody else. So, we're very unique in our
24 situation.
25 And my purpose is just so that we can be

as informed as possible of what the impacts of the master plan will have on the work we are doing now and whether the work that we are doing now to improve the dam is enough to carry us into the future without laying the burden on the next generation to do more because we were not informed enough. So, that's why I'm here.

- - - - -

1 CERTIFICATE

2 GEORGIA:

3 CHATHAM COUNTY:

4

5 I, Annette Pacheco, Registered Professional

6 Reporter and Certified Shorthand Reporter for the

7 State of Georgia, do hereby certify that the foregoing

8 transcript is a true, accurate and complete record.

9 I further certify that I am neither related to

10 nor counsel for any party to the cause pending or

11 interested in the events thereof.

12

13 This, the 24th of April, 2009.

14

15

16

17 Annette Pacheco

18 Annette Pacheco, CSR, RPR, RMR
B-2153

19

20

21

22

23

24

25

Verbatim Comment #2

1 FORT STEWART AND HUNTER ARMY AIRFIELD

2

3 MISSION AND MASTER PLANNING

4

5 ENVIRONMENTAL IMPACT STATEMENT

6

7 SCOPING MEETING

8

9

10

11 Georgia National Guard Bureau Armory

12

13 Hinesville, Georgia

14

15 April 14, 2009

16

17 6:00 p.m. - 8:00 p.m.

18

19

20 REPORTED BY: AMY JO KASKA, CCR-2531

21

22

Transcript Prepared By:

23 McKEE COURT REPORTING, INC.

24 P.O. Box 9092
Savannah, Georgia 31412-9092

25 (912) 691-4545

COPY

MR. DON GARDNER: My comment is I wondered what the incorporation of low impact design or LID is in the projects, particularly use of pervious paving and other techniques to use water retention on site to reduce downstream effects.

And also if there is any discussion of using water from sinks and showers to use that for irrigation purposes rather than putting it into the waste water treatment stream.

- - - - -

1 CERTIFICATE

2 GEORGIA:

3 CHATHAM COUNTY:

4

5 I, Amy Jo Kaska, Certified Court Reporter for
6 the State of Georgia, do hereby certify that the
7 foregoing transcript is a true, accurate and complete
8 record.

9 I further certify that I am neither related
10 to nor counsel for any party to the cause pending or
11 interested in the events thereof.

12

13 This, the 28th of April, 2009.

14

15

16 Amy Jo Kaska

17

18 AMY JO KASKA, CCR-2531

19

20

21

22

23

24

25

1
IN THE MATTER OF:)
2)
FT. STEWART & HUNTER ARMY)
3 AIRFIELD MISSION AND MASTER)
PLANNING ENVIRONMENTAL IMPACT)
4 STATEMENT SCOPING MEETING)
)
5 Date: April 16, 2009)
)
6)
)
7 _____)

COPY

8

9 FT. STEWART & HUNTER ARMY AIRFIELD MISSION
10 AND MASTER PLANNING ENVIRONMENTAL IMPACT STATEMENT
11 SCOPING MEETING, pursuant to notice and by agreement
12 of counsel, under the Georgia Civil Practice Act,
13 reported by Elise M. Napier, CCR-2492, at the John
14 Stevens Wetland Center, Cedar Street, Richmond Hill,
15 Georgia, on Thursday, April 16, 2009, commencing from
16 6:00 p.m. to 8:00 p.m. wherein no public comments
17 were presented.
18
19 _____
Transcript Prepared By:
20
McKEE COURT REPORTING, INC.
21 P.O. Box 9092
Savannah, Georgia 31412-9092
22 (912) 691-4545
23
24
25

1 CERTIFICATE

2 GEORGIA:

3 CHATHAM COUNTY:

4 I, Elise M. Napier, Certified Court Reporter
5 for the State of Georgia, do hereby certify:
6 That the foregoing deposition was taken
7 before me on the date and at the time and location
8 stated on Page 1 of this transcript; that the witness
9 was duly sworn to testify to the truth, the whole
10 truth and nothing but the truth; that the testimony
11 of the witness and all objections made at the time of
12 the examination were recorded stenographically by me
13 and were thereafter transcribed by computer-aided
14 transcription; that the foregoing deposition, as
15 typed, is a true, accurate and complete record of the
16 testimony of the witness and of all objections made
17 at the time of the examination.
18 I further certify that I am neither related
19 to nor counsel for any party to the cause pending or
20 interested in the events thereof.
21 Witness my hand, I have hereunto affixed my
22 official seal this 14th day of May 2010, at Savannah,
23 Chatham County, Georgia.
24
25 ELISE M. NAPIER CCR-2492

1 D I S C L O S U R E

2

3 Pursuant to Article 8.B. of the Rules and
4 Regulations of the Board of Court Reporting of the
5 Judicial Council of Georgia, I make the following
6 disclosure:
7 I am a Georgia Certified Court Reporter. I
8 was contacted by my office of McKee Court Reporting,
9 Inc. to provide court reporting services for this
10 deposition.
11 I will not be taking this deposition under
12 any contract that is prohibited by O.C.G.A.
13 15-14-37(a) and (b).
14 I have no contract/agreement to provide
15 reporting services with any party to the case, any
16 counsel in the case or any reporter or reporting
17 agency from whom a referral might have been made to
18 cover the deposition.
19 I will charge its usual and customary rates
20 to all parties in the case, and a financial discount
21 will not be given to any party to this litigation.
22
23
24
25 ELISE M. NAPIER CCR-2492

Fort Stewart Response to Public Comments Received at 2009 Public Scoping Meetings

Two verbatim comments were received at these meetings. They are summarized below, along with an identification of where in the Draft EIS the comments are best addressed. No other public comments were received, either at the meetings or via submittal of a comment by mail, email, or the EIS website.

Verbatim Comment #1, Mr. Jeffry Cooke, transcribed during Public Scoping Meeting in Pooler. Cooke was interested in acquiring information concerning stormwater, surface water, and water quality, and how projects within the scope of the Fort Stewart EIS may affect these resources in the communities downstream (such as his) from the Installation. He was referred to the appropriate subject matter experts (SMEs) at the meeting, who discussed these resources, Federal, state, and local laws protecting them, how this information would be presented in the pending Draft EIS, and how Fort Stewart would notify the public when the Draft EIS was ready for public review. **This information he requested is presented in Sections 3.4 (Existing Environment) and 4.3 (Environmental Consequences, Water Quality and Resources) of the Draft EIS.**

Verbatim Comment #2, Mr. John Gardner, transcribed during Public Scoping Meeting in Hinesville. Gardner was interested in acquiring information regarding the Installation's incorporation of Low Impact Design measures into the design and implementation phases of the projects addressed in this EIS. He was referred to the appropriate SME, who discussed how the Installation ensures compliance with LID requirements, as well as how this information would be presented in the pending Draft EIS, and how Fort Stewart would notify the public when the Draft EIS was ready for public review. **This information he requested is presented in Sections 3.4.4.1 (Existing Environment) and 4.3 Environmental Consequences, Water Quality and Resources) of the Draft EIS.**

No verbatim comments were received during the Public Scoping Meeting in Richmond Hill.

Section IV:

Notice of Availability of Draft EIS, Public Meetings, Public and Regulatory Comments Received, and Installation Response to Comments

make its comments on EISs issued by other Federal agencies public. Historically, EPA has met this mandate by publishing weekly notices of availability of EPA comments, which includes a brief summary of EPA's comment letters, in the Federal Register. Since February 2008, EPA has been including its comment letters on EISs on its Web site at: *http://www.epa.gov/compliance/nepa/eisdata.html*. Including the entire EIS comment letters on the Web site satisfies the Section 309(a) requirement to make EPA's comments on EISs available to the public. Accordingly, after March 31, 2010, EPA will discontinue the publication of this notice of availability of EPA comments in the Federal Register.

EIS No. 20100097, Final EIS, USFS, OR, EXF Thinning, Fuel Reduction, and Research Project, Proposal for Vegetation Management and Fuel Reduction within the Lookout Mountain Unit of the Pringle Falls Experimental Forest, Bend/Ft. Rock Ranger District, Deschates National Forest, Deschutes County, OR, Wait Period Ends: 05/03/2010, Contact: Beth Peer 541–383–4769.

EIS No. 20100098, Final EIS, FHWA, WA, WA–502 Corridor Widening Project, Proposes Improvements to Five Miles of WA–502 (NE.-219th Street) between NE. 15th Avenue and NE. 102nd Avenue, Funding, Clark County, WA, Wait Period Ends: 05/03/2010, Contact: Chris Tams 360–759–1310.

EIS No. 20100099, Final EIS, FHWA, FL, Interstate 395 (I–395) Development and Environment Study Project, From I–95 to West Channel Bridges of the MacArthur Causeway at Biscayne Bay, City of Miami, Miami-Dade County, FL, Wait Period Ends: 05/03/2010, Contact: Linda K. Anderson 850–942–9650 Ext. 3053.

EIS No. 20100100, Draft EIS, BLM, OR, West Butte Wind Power Project, Construction and Operation of Access Roads and a Transmission Line, Application for Right-of-Way (ROW) Grant, Deschutes and Crook Counties, OR, Comment Period Ends: 05/17/2010, Contact: Steve Storo 541–416–6700.

EIS No. 20100101, Draft EIS, FTA, TX, D2 Downtown Dallas Transit Study, To Support Increased Demand and Implementation of the 2030 Transit System Plan (TSP), Dallas Area Rapid Transit (DART), in the City of Dallas, Dallas County, TX, Comment Period Ends: 05/17/2010, Contact: Lynn

Construction, Operation and Decommission a Solar Thermal Facility on Public Lands, Approval for Right-of-Way Grant, Possible California Desert Conservation Area Plan Amendment, Riverside County, CA, Comment Period Ends: 07/01/2010, Contact: Holly Roberts 760–833–7149.

EIS No. 20100103, Draft EIS, FERC, 00, Apex Expansion Project, Proposal to Expand its Natural Gas Pipeline System, WY, UT and NV, Comment Period Ends: 05/17/2010, Contact: Julia Bovey 1–866–208–3372.

EIS No. 20100104, Draft EIS, USFS, NM, McKinley County Easement—Forest Roads 191 and 191D, Implementation, Cibola National Forest, McKinley County, NM, Comment Period Ends: 05/17/2010, Contact: Keith Baker 505–346–3820.

EIS No. 20100105, Draft EIS, USA, GA, Fort Stewart Training Range and Garrison Support Facilities Construction and Operation, Liberty, Long, Bryan, Evans and Tattnall Counties, GA, Comment Period Ends: 05/17/2010, Contact: Mike Ackerman 410–436–2522.

EIS No. 20100106, Draft EIS, BLM, CA, Granite Mountain Wind Energy Project, Proposed to Develop an up to 84-megawatt Wind Energy Plant and Associated Facilities on Public Land and Private Land, California Desert Conservation Areas Plan, San Bernardino County, CA, Comment Period Ends: 07/01/2010, Contact: Edythe Seehafer 760–252–6021.

EIS No. 20100107, Draft EIS, BLM, CA, Calico Solar Project, Proposed Solar Thermal Electricity Generation Facility Located Public Lands, Construction and Operation, Right-of-Way Grant, San Bernardino County, CA, Comment Period Ends: 07/01/2010, Contact: Jim Stobaugh 775–861–6478.

Amended Notices

EIS No. 20100018, Draft EIS, NPS, WV, New River Gorge National River Project, General Management Plan, Implementation, Fayette, Raleigh and Summers Counties, WV, Comment Period Ends: 04/02/2010, Contact: Deborah Darden 304–465–6509.

Revision to FR Notice Published 01/29/2010: Correction to Comment Period from 03/29/2010 to 04/02/2010.

EIS No. 20100054, Draft EIS, NASA, VA, Wallops Flight Facility, Shoreline Restoration and Infrastructure Protection Program, Implementation,

Revision to FR Notice Published 02/26/2010: Correction to Comment Period from 04/12/2010 to 04/19/2010.

Dated: March 30, 2010.

Robert W. Hargrove,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. 2010–7501 Filed 4–1–10; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–8989–6]

Environmental Impact Statements and Regulations; Availability of EPA Comments

Availability of EPA comments prepared pursuant to the Environmental Review Process (ERP), under section 309 of the Clean Air Act and Section 102(2)(c) of the National Environmental Policy Act as amended. Requests for copies of EPA comments can be directed to the Office of Federal Activities at 202–564–7146 or *http://www.epa.gov/compliance/nepa/*.

An explanation of the ratings assigned to draft environmental impact statements (EISs) was published in FR dated July 17, 2009 (74 FR 35754).

Final Notice

In accordance with Section 309(a) of the Clean Air Act, EPA is required to make its comments on EISs issued by other Federal agencies public. Historically, EPA has met this mandate by publishing weekly notices of availability of EPA comments, which includes a brief summary of EPA's comment letters, in the Federal Register. Since February 2008, EPA has been including its comment letters on EISs on its Web site at: *http://www.epa.gov/compliance/nepa/eisdata.html*. Including the entire EIS comment letters on the Web site satisfies the Section 309(a) requirement to make EPA's comments on EISs available to the public. Accordingly, this is the final publication of this notice of availability of EPA comments in the Federal Register.

Draft EISs

EIS No. 20090378, ERP No. D–COE–F09806–MN, NorthMet Project, Proposes to Construct and Operate an Open Pit Mine and Processing Facility, Located in Hoyt Lakes—Babbitt Area of St. Louis County, MN

Summary: The project as proposed

PUBLIC NOTICE

Public Meetings on the
Draft Environmental Impact Statement
For Training Range and Garrison Support Facilities Construction and Operation
at Fort Stewart, Georgia

Fort Stewart announces public meetings to provide information on the Draft Environmental Impact Statement (DEIS) and to provide opportunities for public involvement and comment. The DEIS addresses known and reasonably anticipated changes in missions and operations at Fort Stewart. It analyzes the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. When the EIS is completed, it will be used by Army decision-makers as an important resource to consult when making major decisions about future land uses and operations at Fort Stewart.

The proposed actions at Fort Stewart have the potential to significantly impact certain natural, economic, social, and cultural resources of the Fort Stewart community. The objective is to provide a comprehensive EIS that will serve as a planning tool, a public information source, and a reference for mitigation tracking. The DEIS analyzes the impacts associated with construction of training ranges and other facilities. Construction and operation of the proposed facilities will allow the Installation to continue to train soldiers, protect valuable environmental and cultural resources, and minimize negative impacts to neighboring communities.

The proposed actions involve constructing ranges and facilities to support the re-stationing of military units, accommodating the current and future training requirements, and revising operational and management plans for training lands and infrastructure.

The DEIS analyzes the environmental and socioeconomic impacts of several alternatives including the No Action Alternative. Alternatives examined in the DEIS consist of different siting locations within Fort Stewart for the training ranges and cantonment area support facilities.

Under the No Action Alternative, the current mission and support activities already occurring at Fort Stewart would continue. Soldiers, however, would not be trained to standard. Other alternatives considered were measured against a set of screening criteria to determine which would be operationally and environmentally preferred. Impacts analyzed include a wide range of environmental resource areas including, but not limited to, air quality, noise, water resources, biological resources, cultural resources, urban environment, infrastructure (utilities and transportation), land use, solid and hazardous materials/waste, and cumulative environmental effects.

The public is invited to participate and comment on the DEIS. The public comment period will last for 45 days following the publication of the Notice of Availability for the DEIS in the Federal Register by the Environmental Protection Agency. The DEIS is available for public review at local libraries near Fort Stewart and on the Fort Stewart website at www.Fortstewart-mmp-eis.com.

Public meetings will be held on the dates and at the locations listed below. Meetings will begin at 6:00 p.m. with an informal poster display. Representatives will be available to describe the technical aspects of the proposed action and alternatives. Experts in environmental disciplines will also be available to discuss anticipated impacts. The meeting will end at 8:00 p.m., or when no further comments are forthcoming.

Mighty Eighth Air Force Museum
175 Bourne Avenue
Pooler, Georgia 31322
Monday, April 26, 2010

Liberty County Recreational Center
607 East Oglethorpe Highway
Hinesville, Georgia 31313
Tuesday, April 27, 2010

Richmond Hill City Center
520 Cedar Street
Richmond Hill, Georgia 31324
Thursday, April 29, 2010

For more information, please contact: Dina McKain at (912) 435-9674, Fort Stewart Public Affairs Office. Written comments may be sent to Mr. Charles Walden, Project Manager, Directorate of Public Works, Prevention and Compliance Branch, Environmental Division, 1550 Frank Cochran Drive, Building 1137-A, Fort Stewart, GA 31314-4958

c93589 04/07/10

***Statesboro Herald*, April 2010.**

Public Meetings on the Draft Environmental Impact Statement For Training Range and Garrison Support Facilities Construction and Operation at Fort Stewart, Georgia

Fort Stewart announces public meetings to provide information on the Draft Environmental Impact Statement (DEIS) and to provide opportunities for public involvement and comment. The DEIS addresses known and reasonably anticipated changes in missions and operations at Fort Stewart. It analyzes the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. When the EIS is completed, it will be used by Army decision-makers as an important resource to consult when making major decisions about future land uses and operations at Fort Stewart.

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Richmond Hill, Georgia 31324
Thursday, April 29, 2010

For more information, please contact: Dina McKain at (912) 435-9874, Fort Stewart Public Affairs Office. Written comments may be sent to Mr. Charles Walden, Project Manager, Directorate of Public Works, Prevention and Compliance Branch, Environmental Division, 1550 Frank Cochran Drive, Building 1137-A, Fort Stewart, GA 31314-4928.

***Bryan County News*, April 2010**

MISCELLANEOUS

gpm14

PUBLIC NOTICE
Public Meetings on the Draft Environmental Impact Statement
For Training Range and Garrison Support Facilities Construction and Operation
at Fort Stewart, Georgia

Fort Stewart announces public meetings to provide information on the Draft Environmental Impact Statement (DEIS) and to provide opportunities for public involvement and comment. The DEIS addresses known and reasonably anticipated changes in missions and operations at Fort Stewart. It analyzes the cumulative socioeconomic and environmental impacts associated with a number of personnel stationing actions and changes in how the Army trains and deploys our nation's Soldiers. When the EIS is completed, it will be used by Army decision-makers as an important resource to consult when making major decisions about future land uses and operations at Fort Stewart.

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Liberty County Recreational Center
607 East Oglethorpe Highway
Hinesville, Georgia 31313
Tuesday, April 27, 2010
Richmond Hill City Center
520 Cedar Street
Richmond Hill, Georgia 31324
Thursday, April 29, 2010

For more information, please contact: Dina McKain at (912) 435-9874, Fort Stewart Public Affairs Office. Written comments may be sent to Mr. Charles Walden, Project Manager, Directorate of Public Works, Prevention and Compliance Branch, Environmental Division, 1550 Frank Cochran Drive, Building 1137-A, Fort Stewart, GA 31314-4928.

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For more information, please contact: Dina McKain at (912) 435-9874, Fort Stewart Public Affairs Office. Written comments may be sent to Mr. Charles Walden, Project Manager, Directorate of Public Works, Prevention and Compliance Branch, Environmental Division, 1550 Frank Cochran Drive, Building 1137-A, Fort Stewart, GA 31314-4928.

30450
(Apr.7,9,11,14,16,18,21,23,25,28

***Coastal Courier*, April 2010.**

Public Notice

Public Meetings on the
Draft Environmental Impact Statement
For Training Range and Garrison Support
Facilities Construction and Operation at Fort Stewart, Georgia

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***Glennville Sentinel*, April 2010.**

PUBLIC NOTICE

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Monday, April 26, 2010

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Highway
Hinesville, Georgia 31313
Tuesday, April 27, 2010

Richmond Hill
City Center
520 Cedar Street
Richmond Hill, Georgia
31324
Thursday, April 29, 2010

For more information, please contact: Dina McKain at (912) 435-9874, Fort Stewart Public Affairs Office. Written comments may be sent to Mr. Charles Walden, Project Manager, Directorate of Public Works, Prevention and Compliance Branch, Environmental Division, 1550 Frank Cochran Drive, Building 1137-A, Fort Stewart, GA 31314-4928.

***Savannah Morning News*, April 2010.**

The Draft Environmental Impact Statement (DEIS) for Training Range and Garrison Support Facilities Construction and Operation Meeting

Mighty-Eighth Air Museum - Monday, April 26, 2010

Guest Log

Name	Address	Phone	Organization
	NO GUESTS		
	ON MONDAY		
	APRIL 26, 2010		

The Draft Environmental Impact Statement (DEIS) for Training Range and Garrison Support Facilities Construction and Operation Meeting

Liberty County Recreation Center – Tuesday, April 27, 2010

Guest Log

Name	Address	Phone	Organization
Sunshine Ferngully	205 Cherokee Trail	368-8108	DDESS
Leslie Young	502 Heritage Drive	9713608	Guest

The Draft Environmental Impact Statement (DEIS) for Training Range and Garrison Support Facilities Construction and Operation Meeting

Richmond Hill City Center – Thursday, April 29, 2010

Guest Log

Name	Address	Phone	Organization
Jimmy Townsend	173 Davis Road	756-0201	County Commission
[illegible]	USACE Sav.	652-5835	USACE
Amanda Harness	2915 Fenwick Village Dr	8654560717	guest
Scott Nipp	127 Lakeview Dr	765-413-1590	guest
Jennifer Franks	120 Parkside Dr.	912-230-5497	guest

The Draft Environmental Impact Statement (DEIS) for Training Range and Garrison Support Facilities Construction and Operation Meeting

Mighty-Eighth Air Museum - Monday, April 26, 2010

STAFF

Name	Address	Phone	Organization
Amber Franks	Fort Stewart	767-1434	DPW ENV DIV
Stanley Thomas	Fort Stewart	767-4139	DPW Env Div
BRIAN MIXON	FORT STEWART - AT EA	435-3130	DPTMS, AIRFIELD DIV
Jeff Mangum	Ft. Stewart	435-8125	DPW, ENV, Forestry
Norma Osborne	Ft. Stewart	435 8050	DPW, ENV, Forestry
Tressa Rutland	"	767-2010	" P&C
JOHN DAVIDIAN	FORT STEWART	767-2010	DPW, ENV. DIV. MGMT.
Thomas Fry	" "	" "	" "
Kurt Flynn	F.S	767 1473	DPW/ED/
BRIAN GREER	FS	767-0992	DPW/ED/PTC/CRM
Kyle Wemett	FS	767-9776	DPW / Master Planning
BRENT RABON	FS	767 2090	DPW / ENV
Robert Hoyd	FS Env.	767-9443	DPW/ENV.
Tim Beaty	FS Env., F&W	767-7261	DPW, Env. Div., Fish & Wildlife
Jim Pearson	DPTMS, Trng. DV	767-8679	DPTMS, Trng. DV.
Veronica trazier		767-6237	DPW
Steve Hart	Hunter PAO	315-3739	PAO
George Harris	ENV. Ft. Stewart	767-2010	DPW ENV.
Amanda Hiresley	Fort Stewart	767-4469	DPW ENV. Div.
CHUCK WALDEN	FORT STEWART	767-8692	DPW ENV DIV
Tressa Rutland	Fort Stewart	767-2010	"

The Draft Environmental Impact Statement (DEIS) for Training Range and Garrison Support Facilities Construction and Operation Meeting

Liberty County Recreation Center – Tuesday, April 27, 2010

STAFF

Name	Address	Phone	Organization
ALLANDA HONESCEY	FORT STEWART	767-2010	
JOHN DAVIDIAN	FORT STEWART	"	
CHUCK WALDEN	FORT STEWART	767-8642	
Melissa Kendrick	Fort Stewart	315-5109	
BRIAN MIXON	FSGA	435-3130	DPTMS, AIRFIELD, ATC
Jeff Mangun	FSGA	435-8125	DPW, Forestry
Vincent B. James	Fort Stewart	767-4171	DPW, Environmental
Norma Osnoe	Ft. Stewart	435-8050	DPW, Forestry
DON KIZER	Ft Stewart	435-8002	Range Control
Michael Ethridge	Ft Stewart	435-8178	Range Control
BRIAN GREER	FT. STEWART	767 0992	DPW, P+C, CRM
Kurt Flynn	Ft. Stewart	767 1473	DPW / P+C / LMS
Will Ingram	FSGA	767 7864	DPW Master Planning
Veronica Frazier	FSGA	767-2010	
Joseph Dumbo	FS	767-3566	DPW Environmental
Pat Young	FS TAO	435-9572	PAO
George Hayes	FS ENV.	767-2010	Environmental
Robert Hoyd	FS Env.	767-9443	DPW Env.
Thomas Stanley	FS ENV	767-4139	DPW ENV.

The Draft Environmental Impact Statement (DEIS) for Training Range and Garrison Support Facilities Construction and Operation Meeting

Richmond Hill City Center – Thursday, April 29, 2010

STAFF

Name	Address	Phone	Organization
Amber Franks	DPW ENV DIV - FSGA	767-1434	DPW ENV
Brian Greer	DPW Env, CRM	767-0992	DPW Env
John Davidian	DPW Env, C	"	"
Kevin Montano	DPW ENV	767-4937	"
Dina McKain	FSGA PAO	435-9874	PAO
Brian Mixon	DPTMS, FSGA	435-3130	DPTMS, ATC BR
Veronica Frazier	DPW		DPW
George Harris	Ft. Stewart	767-2010	ENV
Norma Osgood	Ft. Stewart	435-8050	Env, forestry
Jeff Mangun	DPW, Env, Forestry	435-8125	Ft. Stewart
Chuck Walden	DPW ENV	767-8642	ENV
Ken Cook	DPW Master Planning	767-1070	Master Planning
Brent Rabon	DPW / ENV	767 2090	STEWART
Jim Pearson	DPTMS	767-8679	Stewart
Kim Flynn	Environmental	767 1473	Ft Stewart
Robert Hoyt	Fort Stewart Environmental	767-9443	DPW - Env.
Thomas Fry	" "	767-2010	" "
Melissa Kendrick	DPW - ENV	315-5109	DPW, ENV
Tressa Rutland	DPW - ENV.	767-2010	"
Robert Stewart	DPW - Env	767-2010	DPW - ENV

1 THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)
FOR TRAINING RANGE AND GARRISON SUPPORT
2 FACILITIES CONSTRUCTION AND OPERATION

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5 COPY

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8 Transcript of comments for the Public Scoping
9 meeting for the Fort Stewart Environmental Impact
10 Statement held on April 26, 2010, at the Mighty Eighth
11 Air Force Museum, 175 Bourne Avenue, Pooler, Georgia,
12 31322, beginning at 6:00 p.m.

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CERTIFICATE

GEORGIA:

CHATHAM COUNTY:

I, Angela S. Garrett, Certified Shorthand Reporter and Registered Professional Reporter, in and for the State of Georgia at Large, do hereby certify that I was employed to take down via stenographic transcription all comments from the public regarding the Fort Stewart Environmental Impact Statement at the Mighty Eighth Air Force Museum, 175 Bourne Avenue, Pooler, Georgia, 31322, on April 26, 2010, from 5:00 p.m. until 8:00 p.m., and that no comments were requested to be taken down.

Witness my hand and seal this 1st day of May, 2010, at Savannah, Chatham County, Georgia.

Angela Garrett

Angela S. Garrett, CSR, RPR

1
IN THE MATTER OF:)
2)
THE DRAFT ENVIRONMENTAL IMPACT)
3 STATEMENT (DEIS) FOR TRAINING)
RANGE AND GARRISON SUPPORT)
4 FACILITIES CONSTRUCTION AND)
OPERATING MEETING)
5)
Date: April 27, 2010)
6)
)
7)

COPY

8

9 THE DRAFT ENVIRONMENTAL IMPACT STATEMENT
10 (DEIS) FOR TRAINING RANGE AND GARRISON SUPPORT
11 FACILITIES CONSTRUCTION AND OPERATING MEETING,
12 pursuant to notice and by agreement of counsel, under
13 the Georgia Civil Practice Act, reported by Elise M.
14 Napier, CCR-2492, at the Liberty County Recreational
15 Center, 607 West Oglethorpe Highway, Hinesville,
16 Georgia, on Tuesday, April 27, 2010, commencing from
17 5:00 p.m. to 8:00 p.m. wherein no comments were
18 presented.
19
20
Transcript Prepared By:
21
McKEE COURT REPORTING, INC.
22 P.O. Box 9092
Savannah, Georgia 31412-9092
23 (912) 691-4545
24
25

1 CERTIFICATE

2 GEORGIA:

3 CHATHAM COUNTY:

4 I, Elise M. Napier, Certified Court Reporter
5 for the State of Georgia, do hereby certify:
6 That the foregoing deposition was taken
7 before me on the date and at the time and location
8 stated on Page 1 of this transcript; that the witness
9 was duly sworn to testify to the truth, the whole
10 truth and nothing but the truth; that the testimony
11 of the witness and all objections made at the time of
12 the examination were recorded stenographically by me
13 and were thereafter transcribed by computer-aided
14 transcription; that the foregoing deposition, as
15 typed, is a true, accurate and complete record of the
16 testimony of the witness and of all objections made
17 at the time of the examination.
18 I further certify that I am neither related
19 to nor counsel for any party to the cause pending or
20 interested in the events thereof.
21 Witness my hand, I have hereunto affixed my
22 official seal this 6th day of May 2010, at Savannah,
23 Chatham County, Georgia.
24
25 ELISE M. NAPIER CCR-2492

1 D I S C L O S U R E

2

3 Pursuant to Article 8.B. of the Rules and
4 Regulations of the Board of Court Reporting of the
5 Judicial Council of Georgia, I make the following
6 disclosure:
7 I am a Georgia Certified Court Reporter. I
8 was contacted by my office of McKee Court Reporting,
9 Inc. to provide court reporting services for this
10 deposition.
11 I will not be taking this deposition under
12 any contract that is prohibited by O.C.G.A.
13 15-14-37(a) and (b).
14 I have no contract/agreement to provide
15 reporting services with any party to the case, any
16 counsel in the case or any reporter or reporting
17 agency from whom a referral might have been made to
18 cover the deposition.
19 I will charge its usual and customary rates
20 to all parties in the case, and a financial discount
21 will not be given to any party to this litigation.
22
23
24
25 ELISE M. NAPIER CCR-2492

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FOR TRAINING RANGE AND GARRISON SUPPORT
2 FACILITIES CONSTRUCTION AND OPERATION

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5 COPY

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8 Transcript of comments for the Public Scoping
9 meeting for the Fort Stewart Environmental Impact
10 Statement held on April 29, 2010, at the Richmond Hill
11 City Center, 520 Cedar Street, Richmond Hill, Georgia,
12 31324, beginning at 6:00 p.m.

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1 CERTIFICATE

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3 GEORGIA:

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5 CHATHAM COUNTY:

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7 I, Angela S. Garrett, Certified Shorthand
8 Reporter and Registered Professional Reporter, in and
9 for the State of Georgia at Large, do hereby certify
10 that I was employed to take down via stenographic
11 transcription all comments from the public regarding the
12 Fort Stewart Environmental Impact Statement at the
13 Richmond Hill City Center, 520 Cedar Street, Richmond
14 Hill, Georgia, 31324, on April 29, 2010, from 5:00 p.m.
15 until 8:00 p.m., and that no comments were requested to
16 be taken down.
17 Witness my hand and seal this 1st day of May,
18 2010, at Savannah, Chatham County, Georgia.

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24 Angela S. Garrett, CSR, RPR

25

Fort Stewart Response to Public Comments Received at 2010 Scoping Meetings

No verbatim comments were received at these meetings.

Note: Formal responses to comments submitted by regulatory agencies and/or Tribes are addressed in the formal letters that follow this page.

GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Charles Walden
Dept. of the Army
DPW-P&CB, Environmental Div.
1550 Frank Cochran Drive, Bldg 1137
Fort Stewart, GA 31314-4928

FROM: Barbara Jackson

DATE: 4/5/2010

APPLICANT: Dept. of the Army - Fort Stewart, GA

PROJECT: Draft EIS: Training Range and Garrison Support Facilities Construction and Operation

CFDA #:

STATE ID: GA100405002

FEDERAL ID:

Correspondence related to the above project was received by the Georgia State Clearinghouse on 4/5/2010. The review has been initiated and every effort is being made to ensure prompt action. The proposal will be reviewed for its consistency with goals, policies, plans, objectives, programs, environmental impact, criteria for Developments of Regional Impact (DRI) or inconsistencies with federal executive orders, acts and/or rules and regulations, and if applicable, with budgetary restraints.

The initial review process should be completed by 5/4/2010 (*approximately*). If the Clearinghouse has not contacted you by that date, please call (404) 656-3855, and we will check into the delay. We appreciate your cooperation on this matter.

In future correspondence regarding this project, please include the State Application Identifier number shown above. If you have any questions regarding this project, please contact us at the above number.

Form SC-1
Oct. 2008

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
COASTAL RESOURCES DIVISION

CHRIS CLARK
COMMISSIONER

A.G. "SPUD" WOODWARD
DIRECTOR

April 22, 2010

Mr. Charles Walden, Project Manager
Directorate of Public Works
Prevention and Compliance Branch, Environmental Division
1550 Frank Cochran Drive, Bldg. 1137
Fort Stewart, Georgia 31314-4928

RE: Consistency Determination for Training Ranges and Garrison Support Facilities DEIS, Fort Stewart, Liberty County, Georgia

Dear Mr. Walden:

Staff of the Coastal Management Program has reviewed your April 5, 2010 letter and attached description. The proposed project includes construction and operation of twelve ranges and two Garrison area facilities at Fort Stewart.

The Program concurs with your consistency determination. This determination ensures that the proposed project has been designed to comply to the maximum extent practicable with the applicable enforceable policies of the Georgia Coastal Management Program.

Please feel free to contact Kelie Moore or me if we can be of further assistance.

Sincerely,

A.G. "Spud" Woodward
Director

SW/km

-----Original Message-----
From: John J Petrick [mailto:jpetrick@fs.fed.us]
Sent: Wednesday, April 14, 2010 4:04 PM
To: Walden, Charles L Mr CIV USA IMCOM
Subject: DEIS for Training Range and Garrison Support

The USDA Forest Service has no comments on your draft proposal.

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John J. Petrick

Forest Planner; NEPA; Inventory and Monitoring Chattahoochee-Oconee NF's, R8

ph/vmail: 770/297-3005

jpetrick@fs.fed.us

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Classification: UNCLASSIFIED
Caveats: FOUO

Georgia Department of Natural Resources

2 Martin Luther King, Jr. Dr., SE, Suite 1154, Atlanta, Georgia 30334-9000
Chris Clark, Commissioner
Environmental Protection Division
F. Allen Barnes, Director
Land Protection Branch
Mark Smith, Branch Chief
Phone: 404/656-7802 FAX: 404/651-9425

May 17, 2010

BY E-MAIL

Mr. Charles Walden
Project Manager
Directorate of Public Works
Prevention and Compliance Branch
Environmental Division
1550 Frank Cochran Drive
Building 1137
Fort Stewart, Georgia 31314-4928

RE: Comments on the *Draft Environmental Impact Statement (EIS) for Training Range and Garrison Support Facilities Construction and Operation at Fort Stewart, Georgia,* received April 6, 2010

Dear Mr. Walden:

The Georgia Environmental Protection Division (GA EPD) has completed its review of the above-referenced document. Thank you for the opportunity to comment. EPD has no comments at this time.

Sincerely,

Jim Ussery, P.E.
Assistant Director

JU:ap
File: Fort Stewart (R)
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
SAM NUNN
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA GEORGIA 30303-8960

May 14, 2010

Mr. Charles Walden,
Project Manager,
Directorate of Public Works
Prevention and Compliance Branch
Environmental Division
1550 Frank Cochran Drive,
Building 1137,
Fort Stewart, GA 31314-4928

Subject: Draft Environmental Impact Statement (DEIS) for Training Range and Garrison Support Facilities Construction and Operation at Fort Stewart, Georgia; CEQ Number 20100105

Dear Mr. Walden:

EPA has reviewed and is providing comments on the above referenced DEIS pursuant to its responsibilities under the Clean Air Act (CAA) § 309 and National Environmental Policy Act (NEPA) § 102 (2)(C) responsibilities. Based on our review we have given the DEIS a rating of EC -2"[1] environmental concerns with additional information requested. The concerns are primarily focused in the areas of noise, water quality, and aquatic resource impacts and they are briefly outlined below and in detail in the enclosed comments.

Background

Fort Stewart (Fort) comprises 279,270 acres (435.9 mi^2), is the largest military installation east of the Mississippi River, and the largest federal landholder in Georgia. The Fort is located on a relatively flat, coastal landscape of sandy soils, riparian areas, and marshland. The National Wetlands Inventory indicates 91,960 acres (30%) of the Fort are wetlands. The Fort has implemented a wetland mitigation banking program by restoring the Canoochee Creek reservoir, a 1,086-acre pond, to its original hydrologic regime of a free-flowing stream and the restoration of an adjacent ecosystem.

Over 400 acres of tank trails and 246,553 acres of training/maneuver areas, of which 123,335 acres is designated as contiguous heavy maneuver area, are used for training activities and 19,985 acres are designated as impact/restricted areas, including the cantonment area. The Fort has over 30,000 buildings, most of which are located in the cantonment area.

[1] See enclosed EPA rating system criteria definition document.

Proposed Action

The proposed action consists of two categories of projects: the construction and operation of ranges and garrison support facilities. Twelve new ranges are proposed to supplement the 10 existing ranges: Multipurpose Machine Gun Range, two Modified Record Fire Ranges (2011 & 2013), Qualification Training Range, Combat Pistol Qualification Range, Fire and Movement Range, a 10/25 meter Zero Range, Infantry Platoon Battle Course, Infantry Squad Battle Course, Digital Multipurpose Training Range, Known Distance Range, and Convoy Live Fire Range.

Two new garrison support facilities are proposed, involving an additional 288,000 ft^2 of buildings projected to require external combustion for heating and hot water and electricity for cooling. One facility's purpose is to support the unit designated to operate the Sky Warrior System associated unmanned Aerial Vehicle System (UAVS). The second facility would support the 10th Engineer Battalion (EN BN) or a similar-sized unit.

The proposed action is needed because the Fort's existing facilities have become inadequate to support its mission. Several range projects are needed to modernize ranges to create a more realistic training environment. The other range projects will increase the capacity of available ranges required to serve the number of soldiers and using the Fort as a training platform.

Alternatives Analysis

The alternatives analysis evaluated Alternative A, the no-action alternative of continuing the current mission using existing or previously programmed ranges and facilities, and two additional alternative site locations: Alternative B (the preferred alternative) and Alternative C.

Environmental Impacts

It is assumed the proposed actions will realize a 15% increase in transportation associated with the new ranges and roads. The preferred alternative will impact 3,115 total acres including 190.21 wetlands acres, removal of 997 acres of timber, and impacts to protected species habitat: 1,649.7 acres of Redcockaded Woodpecker (RCW) Habitat Management Units, 41 cavity trees, and 31 RCW foraging partitions; 186.2 acres of primary buffer, 518.4 acres of secondary buffer, and 14.4 acres of breeding ponds for the Frosted Flatwoods Salamander habit, 308.8 acres of Gopher Tortoise Habitat, and 452 acres of Eastern Indigo Snake habitat.

EPA Concerns

<u>Noise</u>

Documentation of the project actions' noise exposure impacts should be expanded in the FEIS by enumeration of the number and kinds of homes newly exposed to noise contours extending outside the Fort's boundaries, as well as the number of people experiencing such exposure while living in these newly exposed homes. Moreover, the noise levels of the noise

contours should be better defined and preferably compared to more conventional metrics such as the day-night sound level (DNL) used by the Federal Interagency Committee on Noise. Finally, the noise levels of the risk of complaints categories appear high. Also, the definition of "dBP" appears missing from the Glossary of Terms, and its use is unclear in the text. It should be defined in the FEIS as well as compared against more conventional metrics such as instantaneous maximum or DNL levels. The FEIS conclusions may therefore change depending on the metric of the noise levels associated with the risk level characterizations. In essence, the FEIS should better disclose noise exposure impacts at noise sensitive receptors and provide impacts and risk levels in more conventional metrics.

Water Quality/Quantity

- EPA's primary concerns are focused on the stormwater runoff associated with the construction and operation of the ranges and garrison support facilities, particularly the potential to detrimentally affect streams in the area including any listed impaired streams. Details of these concerns are provided in the enclosed comments.

- The FEIS should discuss whether any of the proposed new demands for water from one watershed and corresponding wastewater treatment discharge into another watershed may result in a significant transfer of water between watersheds.

- It is indicated in the DEIS that several of the ranges will be located in the 100-yr floodplain. The FEIS should include a figure that depicts all facilities in relation to the 100-yr floodplain. It is also recommended that an analysis be conducted to evaluate the hydrologic impacts of building these facilities in the 100-yr floodplain. This analysis should include predicted water surface elevations downstream of the ranges for various storm events and identify potential impacts.

- EPA also recommends an additional analysis and evaluation of the existing stormwater conveyance infrastructure to ensure that the existing system will not be undersized for any of the proposed projects, which could lead to indirect water quality impacts and potential flooding.

Aquatic Resource Impacts

- EPA is concerned with the substantial level of wetland impacts identified in the DEIS. EPA is also concerned that all impacts identified in the DEIS have been characterized as solely wetlands impacts when two projects recently noticed by the U.S. Army Corp of Engineers (IPBC and MPMGR) show impacts to streams on the 7.5-minute USGS topo quad maps. Stream impacts associated with any of the actions listed in the DEIS should also be appropriately mitigated.

- Because expanded Clean Water Act (CWA) § 404(b)(1) analyses have not been prepared for three ranges[2] EPA is unable to but would like to review and comment on these analyses

[2] P. 4-27.

before they appear in the FEIS. Please send them to Bob Lord, Region 4's Wetlands Program.

- The FEIS should discuss: the application of the Fort's regional permit for low water crossings, which allows for a maximum of 15 acres of cumulative wetlands impacts from low-water crossings, how the cumulative wetlands impacts are defined, and water quality impacts and other aquatic resources impacts associated with this permit.

- EPA disagrees with the DEIS' position that applying for a CWA § 404 permit is a minimization of wetlands impacts, implying wetlands mitigation. CWA 404 requires a permit for any dredge and fill impacts to jurisdictional waters of the U.S., including wetlands. The CWA is a regulatory requirement, not a mitigation option. The FEIS should clarify this fact.

- EPA recommends that the FEIS should also discuss how the proposed mitigation meets the requirements of the Compensatory Mitigation for Losses of Aquatic Resources Final Rule.[3]

- Given the opportunity, EPA would have discouraged the use of the Wilkinson - Oconee Mitigation Bank since it is out of the watershed, out of the ecoregion, and likely does not fully compensate for the functions lost at the project sites. EPA is also concerned that the Fort is not fully debiting its own mitigation bank before going to off-site alternatives. The Fort's mitigation bank is within the same watershed and ecoregion and thus more likely to replace the lost wetland functions. There appears to be ample time to expand this bank to accommodate the future needs, which is currently presented as a reason for not fully using it for these projects. Typically, EPA discourages applicants from purchasing mitigation credits until the Section 404 permit has been issued, because this precludes other, possibly preferable, mitigation actions.

- The FEIS should explain how the proposed mitigation will adequately compensate for lost wetland functions and values such that it results in no net loss of wetland functions and values. EPA is concerned that the credit calculations using the Savannah District Standard Operating Procedure (SOP) do not fully compensate for the impacts. The Savannah District has frequently indicated to EPA that the SOP is not applicable to large impacts, such as those over 10 acres. EPA agrees and has proposed a scaling factor to address the cumulative impacts of large projects such as the factor used in the Charleston District SOP. This is the approach used by the Georgia Department of Transportation for its projects that exceed the 10 acre threshold. For very large projects this scaling factor could be capped at an appropriate level. EPA has suggested 3.0 acres, which is equal to the next largest factor used in the SOP. Application of the SOP without a scaling factor for large impacts, particularly the 108.1 acres for the MPMGR is not appropriate, even according to past findings from the Savannah District.

[3] 33 CFR Parts 325 & 332 and 40 CFR Part 230

Cumulative Impacts

- The DEIS indicates the construction of six new ranges is reasonably foreseeable on the Fort 2016 and 2017. The EIS should mention whether there is sufficient land on the Fort to accommodate these new ranges or whether the Fort will have a training land shortfall requiring acquisition of new lands outside the Fort's boundaries.

Thank you for the opportunity to review and provided comments. If you wish to discuss this matter further, please contact Beth Walls (404-562-8309 or walls.beth@epa.gov) of my staff regarding NEPA issues and Bob Lord (404-562-9408 or lord.bob@epa.gov) for aquatic-resource-related issues.

Sincerely,

Heinz J. Mueller, Chief
NEPA Program Office
Office of Policy and Management

cc: District Engineer, Savannah District, U.S. Army Corps of Engineers

Enclosures: Summary of Rating Definitions
EPA's DEIS Comments

SUMMARY OF RATING DEFINITIONS AND FOLLOW UP ACTION [1]

Environmental Impact of the Action

LO-Lack of Objections
The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC-Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impacts. EPA would like to work with the lead agency to reduce these impacts.

EO-Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU-Environmentally Unsatisfactory
The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS sate, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1-Adequate
The EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alterative and those of the alternatives reasonably available to the project or action. No further analysis or data collecting is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2-Insufficient Information
The draft EIS does not contain sufficient information for the EPA to fully assess the environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3-Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant

[1] From EPA Manual 1640 Policy and Procedures for the Review of the Federal Actions Impacting the Environment.

EPA's Detailed Comments on the Draft Environmental Impact Statement (DEIS) for Training Range and Garrison Support Facilities Construction and Operation at Fort Stewart, Georgia: CEQ Number 20100105

EPA's concerns are primarily focused in the areas of noise, water quality impacts, and aquatic resource impacts and are discussed in detail below.

Water Quality – potential stormwater impacts

According to the DEIS each alternative has the potential for moderate to adverse cumulative impacts to streams, stormwater, and floodplains and to impact impaired water bodies and stream buffers.

Ranges

Stormwater runoff associated with the construction and operation of the ranges has the potential to detrimentally affect streams in the area, particularly any listed impaired streams. An example of a potential stream impact includes stormwater runoff from unfinished (i.e., dirt) range-associated roads.

The DEIS suggest that compliance with both the Clean Water Act (CWA) and the Georgia Erosion and Sedimentation Control Act (ESCA) will keep waters from being degraded or that compliance with these two laws is the maximum required for NEPA mitigation purposes. While the existence of both the CWA and ESCA and their implementing regulations are intended to prevent further water-resource degradation, inferring that these existing protections are 100 percent effective is not a substitute for demonstrating that impacts to water resources will be moderate. The DEIS does not describes the applicability and potential effectiveness of the Georgia Erosion and Sedimentation Control Act to military live-fire and maneuver ranges. For example, EPA notes that Table 6-2[1] lists as a mitigation measure- *the attainment of a stream buffer variance when construction activities require crossing or encroaching within 25 feet of state waters*. EPA does not consider a stream buffer variance as a NEPA mitigation measure nor a measure protective of water quality. The DEIS does not discuss the water-quality and aquatic-resource impacts associated with these anticipated buffer variances or identify how many of the variances will be pursued. These issues should be addressed in the Final EIS (FEIS).

Accumulation of Spent Ammunition

Of particular interest is the use of these lands for live fire training and the resulting cumulative impacts to the surrounding ecosystem. The Fort Stewart's (Fort) range areas, particularly now with the expected increase in use and their associated berms, represent a

[1] p. 6-11

potential for emerging mini-toxic sites. The soil berms serve to collect spent ammunition (lead and tungsten) that over time can accumulate into concentrations that will threaten surface and ground-water supplies, e.g., lead contamination associated with stormwater runoff, and will require costly clean up. Furthermore, the Department of Defense (DoD) Directive Number 3200.15 states DoD's policy that planning and management for the DoD range sustainment program shall identify range environmental considerations and safety factors that may influence current or future range activities, including reasonably anticipated future uses if the range has a finite withdrawal or lease period that shall not be renewed.

Additionally, DoD Directive Number 4715.11 states DoD's policy is to ensure the long term viability of operational ranges while protecting human health and the environment; limit the potential for explosive mishaps and the damaging effects of such to personnel, operational capability, property, and the environment; design and use operational ranges and the munitions used on them to minimize harmful environmental impacts; and to promote resource recovery and recycling. In light of these directives, EPA encourages the use of applicable technologies that would minimize or eliminate above concern.

Of additional interest is the potential for use, exposure to, and the accumulation of potentially toxic materials (e.g., beryllium, dicholorobenzenes, dioxin, 2,4-Dinitrotoluene (DNT), lead, nanomaterials, N-nitrosodimethylamine (NDMA), polybrominated diphenylethers (PBDEs)/polybrominated biphenyls (PBBs), perfluorooctanoic sulfonate (PFOS)/ perfluorooctanoic acid (PFOAs), trichloropropane (TCP), tetrachloroethylene, 1,4-dioxane, chromium VI, naphthalene, perchlorate, Cyclotrimethylenetrinitramine (RDX), and trichloroethylene (TCE)). These contaminants represent the potential for adverse health effects on operating forces, DoD employees, the public, and the surrounding ecosystem, potentially reducing training/readiness and use restrictions on ranges, and increased operation and maintenance and/or clean up costs, which may amount to a drain or diversion of resources from mission needs. Perchlorate is reportedly a growing issue that must be proactively addressed. The FEIS should discuss the potential for use and increased use of these contaminants in light of the proposed action and how they may pose human health and environmental risks.

Garrison Facilities

Construction and operation of the proposed facilities will likely increase the area of impervious surfaces. One concern with increased impervious surfaces is the potential of stormwater from recharging groundwater (i.e., aquifers) and channels it directly into surface waterbodies. The DEIS does not recognize the need to allow stormwater to recharge groundwater and avoid diverting all of the stormwater to surface waterbodies in the area.

Additionally, EPA is concerned with any reliance on sediment ponds for stormwater runoff control as these ponds can effectively capture, contain, and accumulate various chemical compounds into toxic levels requiring landfill disposal. For example, coal-tar sealants spread on driveways and parking lots contain chemical compounds classified as likely carcinogens, polycyclic aromatic hydrocarbons, which can be washed into stormwater runoff and accumulate in these ponds.

Noise Impacts

The DEIS states that both Alternatives B and C will have moderate adverse cumulative impacts to noise sensitive areas. It also states that, in general, noise-producing activities would occur in remote locations where sensitive receptors would not be affected.[2] The FEIS should discuss the noise durations and frequencies as part of the noise discussion. The following comments are based on the noise information provided in Appendix I.

General – The overall readability of the noise appendices should be simplified in the FEIS. Although glossaries are provided at the end of appendices, the glossary text should also provide definitions at first mention (e.g., "PK15(met)") as well as other additional information. For example, it is unclear why dBC (dB (decibels) at the C scale) was used when dBA is the conventional noise metric, relative to human ear perception. Also, the definition for the term "dBP" (used on page 14 to define the noise level of complaint risks) was not found and should be included in the FEIS.

More importantly, the noise metrics for the noise contours (noise exposure iso-lines generated by each proposed action) for Zones II and III is not clear to public or agency reviewers. These are defined as "PK15(met) 87 dB" for Zone II and "PK15(met) 104 dB" for Zone III. Apparently, these contours are the maximum instantaneous pressure levels (rather than averaged values) that can be expected from the actions. While these metrics may be typical descriptors for military facilities, we suggest that the significance of 87 dB and 104 dB be discussed and that a conversion to a more conventional metric (e.g., dBA DNL (day-night sound level) used by Federal Aviation Administration and other members of the Federal Interagency Committee on Noise (FICON) also be provided for public comparison.

Minimization of Impacts – It is unclear from the DEIS if any of the proposed actions could be minimized to prevent or reduce noise contours from extending beyond the Fort boundaries. That is, the FEIS should discuss if the location of the proposed training actions could be shifted centrally within the Fort boundaries to prevent extension of elevated noise exposures outside property lines, or if any contour extensions outside the property could be directed to only those areas without Noise Sensitive Receptors (NSRs). Also, if not already the case, could noise generation of these actions be limited to daytime hours so that they would not occur during nighttime sleeping hours for nearby NSRs?

Disclosure of Impacts – As suggested above, noise contours for several actions would extend beyond the boundaries of the Fort. EPA notes that portions of these noise contours incorporate NSRs such as Fort housing. The FEIS should enumerate the number and kinds of inhabited homes (single or multi-family homes) and number of affected people living in these homes to document the magnitude of the elevated noise exposure. These data should be presented by noise contour, location, and the noise source (small caliber, grenade launcher, etc.).

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[2] P. 5-29.

Risk of Complaints – Risks of Complaints were characterized as "Low", "Moderate", "High", or "Risk of Hearing Damage to Unprotected Ears." These risk levels were associated with distances from the noise source and noise levels presented in an undefined "dBP" metric (as suggested above, the FEIS should define dBP). Without a definition of dBP, the meaning of the associated noise levels for each risk level remains unclear. Even after dBP is defined, these values should also be presented as more conventional metrics such as instantaneous maximum dBA noise values and/or DNL averages. However, if dBP is similar to either metric, EPA finds them to be too high for their risk characterization. For example, EPA does not believe that values approaching 115 dB are a "low" risk of complaints or that a value of 115 dB should be considered a "moderate" risk of complaints. Similarly, a "high" risk of complaints would likely start before the listed >130 dB. The initial level for risking hearing damage is less certain and is also related to time of exposure, but is also likely to start before the listed >140 dB level. As such, the FEIS conclusions reached for the noise impacts of the proposed actions may change depending on the metric of the noise levels associated with the risk level characterizations.

Watersheds

The DEIS indicates the Fort's boundaries encompass four different watersheds. Water transfers between watersheds can be an issue of concern, e.g., during periods of drought. For example, water piped from one watershed for potable use and returned via a permitted wastewater treatment plant discharge or septic discharge to another watershed. The FEIS should discuss whether any of the proposed new demands for water and corresponding wastewater treatment realize a significant transfer of water between watersheds.

Aquatic Resource Impacts

Wetlands

EPA is currently reviewing a joint public notice dated April 21, 2010, for four individual permits for four projects (DMPTR, IPBC, MPMGR and QTR) with a total of 185.9 acres of wetland impacts. This is a substantial level of wetland impacts, particularly in relation to recently permitted impacts throughout Georgia. EPA is particularly concerned that all impacts have been characterized as wetland impacts when two of the four projects show the potential for streams impacts on the 7.5-minute USGS topo quad maps. EPA notes that while the Fort has had a significant cumulative impact to streams from past projects, these impacts have not been mitigated.

The FEIS should provide more discussion regarding the quality of the wetlands impacted. The DEIS mentions they're freshwater wetlands and that the Army has acquired mitigation credits to restore a historically but degraded hardwood wetland system.[3] It is unclear what type of wetlands ecosystems are being impacted by the ranges and garrison proposed projects.

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[3] P. 6-9.

EPA is unable to fully evaluate wetlands impacts, which is an area of CWA-designated responsibility for the Agency, in the DEIS because expanded CWA § 404(b)(1) analyses have not been prepared for three ranges: FY13 Modified Record Fire Range, FY 13 10/25 Meter Zero Range, and FY14 Convoy Live Fire Range.[4] This is a concern. EPA would like to review and comment on these analyses before they appear in the FEIS. Please coordinate with Bob Lord, Region 4's Wetlands Program to discuss further.

The DEIS states that the preferred alternative for the Engineer Battalion facilities has more wetland impacts than Alternative C, but the DEIS is unclear how much more impacts, i.e., no wetland acres are provided.[5] The DEIS does indicate that these wetlands are not pristine and are located in a portion of the cantonment area already impacted by previous construction, operation, and maintenance activities. The FEIS should address this issue.

The DEIS states that the Fort has a regional permit for low water crossings, developed in 2001 and renewed in 2006 for 5 years, which allows for a maximum of 15 acres of cumulative wetlands impacts from low-water crossings. Approximately 5 acres of wetlands have been impacted using this permit.[6] The FEIS should discuss the application of the Fort's regional permit for low water crossings, which allows for a maximum of 15 acres of cumulative wetlands impacts from low-water crossings, how the cumulative wetlands impacts are defined, and the water quality impacts and other aquatic resources impacts associated with this permit.

Wetlands Mitigation

EPA is concerned that the credit calculations using the Savannah District Standard Operating Procedure (SOP) do not fully compensate for the impacts. The Savannah District has frequently indicated to EPA that the SOP is not applicable to large impacts, such as those over 10 acres. EPA agrees and has proposed a scaling factor to address the cumulative impacts of large projects such as the factor used in the Charleston District SOP. This is the approach used by the Georgia Department of Transportation for its projects that exceed the 10 acre threshold. For very large projects this scaling factor could be capped at an appropriate level. EPA has suggested 3.0 acres, which is equal to the next largest factor used in the SOP. Application of the SOP without a scaling factor for large impacts, particularly the 108.1 acres for the MPMGR is not appropriate, even according to past finding from the Savannah District.

The DEIS indicates that approximately one-third of the Fort's lands are wetlands. It also states some of the remaining 160 credits contained in the Fort's on-site mitigation bank will be used for the Garrison construction projects. Additionally, the Army has previously purchased credits from an established off-Fort wetland mitigation bank in accordance with the Compensatory Mitigation Rule (33 CFR Part 332) to cover the proposed range projects.[7] The Fort canvassed the available mitigation banks nearly one year ago, which may not reflect the current banks and credit availability. Given the opportunity, EPA would have discouraged the

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[4] P. 4-27.
[5] P. 4-43.
[6] P. 3-40.
[7] P. 6-6.

use of the Wilkinson - Oconee Mitigation Bank since it is out of the watershed, out of the ecoregion, and likely does not fully compensate for the functions lost at the project sites. EPA is also concerned, despite the rationale provided in the DEIS, that the Fort is not fully debiting its own mitigation bank before going to off-site alternatives. The Fort's mitigation bank is within the same watershed and ecoregion and thus more likely to replace the lost wetland functions. There appears to be ample time to expand this bank to accommodate the future needs presented as a reason for not fully using it for these projects. Typically, EPA discourages applicants from purchasing mitigation credits until the Section 404 permit has been issued, because this precludes other, possibly preferable, mitigation actions.

EPA disagrees with the statement that applying for a CWA § 404 permit is a minimization of wetlands impacts. The DEIS states "While the Army strives to avoid negative impacts to wetlands when it sites new range and training facilities on Fort Stewart, if impacts to regulated wetlands cannot be avoided, the Army minimizes those impacts by applying for a Section 404 permit as required by the Clean Water Act."[8] CWA 404 requires a permit for any dredge and fill impacts to jurisdictional waters, including wetlands. The CWA is a regulatory requirement, not a mitigation option. The FEIS should clarify this misrepresentation of CWA § 404 permit program as a form of mitigation.

The DEIS discusses wetlands compensatory mitigation in context of NEPA-required mitigation when it should also discuss how the proposed mitigation meets the requirements of the Compensatory Mitigation for Losses of Aquatic Resources Final Rule.[9] NEPA requires that to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analyses and related surveys and studies required by the Fish and Wildlife Coordination Act, the National Historic Preservation Act of 1966, the Endangered Species Act of 1973, and **other environmental review laws and executive orders.**[10] The Compensatory Mitigation for Losses of Aquatic Resources Final Rule is considered to be a relevant "other environmental review law" as it is one of the CWA § 404 implementing regulations. The FEIS should discuss and apply the Final Rule in its wetlands mitigation discussion.

While EPA does not expect the precise replication of all wetlands adversely impacted by the proposed action, the FEIS should explain how the proposed mitigation will adequately compensate for lost wetland functions and values such that it results in no net loss of wetland functions and values. This discussion is absent from the DEIS. Furthermore since the U.S. Army Corp of Engineers (USACOE) cannot issue a CWA § 404 permit if there is a less damaging practicable alternative, the FEIS should discuss compliance with this provision.

Cumulative Impacts

The DEIS states that the USACOE documents approximately 1,467,774 acres of wetlands impacted within 20 Georgia counties and by deducting 1,982.87 acres of wetlands impacts since 1990 there are at least 1,465,791.13 acres of wetlands remaining. According to the

[8] P. 6-5.
[9] 33 CFR Parts 325 & 332 and 40 CFR Part 230
[10] 40 CFR § 1502.25 (a)

DEIS, this amounts to a loss of 0.14% of wetlands since 1990 – an insignificant amount.[11] It is unclear if the USACOE document referenced in the DEIS is referring to the 1,467,774 acres of wetlands as being impacted in the 20 Georgia counties or existing (un-impacted) wetlands in these counties. This paragraph needs to be clarified in the FEIS.

The DEIS indicates the construction of six new ranges is reasonably foreseeable on the Fort 2016 and 2017. The EIS should mention whether there is sufficient land on the Fort to accommodate these new ranges or whether the Fort suffers a training land shortfall requiring acquisition of new lands outside the Fort's boundaries.

[illegible]

Insert FSGA response to EPA comments when completed and signed

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Heinz J. Mueller, Chief
National Environmental Policy Act Program Office
Office of Policy and Management
United States Environmental Protection Agency, Region 4
Atlanta Federal Center
61 Forsyth Street
Atlanta, Georgia 30303-8960

Dear Mr. Mueller:

Thank you for your recent comments and questions regarding the *Draft Environmental Impact Statement (EIS) for Training Range and Garrison Support Facilities Construction and Operation at Fort Stewart, Georgia (hereafter, Fort Stewart EIS).* Your time and attention to the Fort Stewart EIS is greatly appreciated.

We have prepared formal responses to your comments in the enclosure to this letter. Please note that the information provided in this letter is also being incorporated into Fort Stewart's Final EIS, which will be issued for a 30-day public review and comment period in June 2010. Your letter and our response will be included in an appendix to the Final EIS. Your office will be provided with a CD copy of the Final EIS and we welcome your continued input and interest in this proposed action.

If you have any further questions, please contact Mr. Charles Walden, at (912) 767-8642 or Charles.Walden4@us.army.mil. Please also cc Ms. Amber E. Franks, at (912) 767-1434 or Amber.Franks@us.army.mil. If emailing a comment, please reference the *Fort Stewart EIS* in the subject line.

Sincerely,

KEVIN W. MILTON
Colonel, US Army
Commanding

Clarification and Response to Comments
Received from: Environmental Protection Agency (EPA)
(Mueller, May 14, 2010)

Answers to general comments regarding floodplains and stormwater are provided below.

General Comment A: It is indicated in the Draft EIS (DEIS) that several of the ranges will be located in the 100-yr floodplain. The Final EIS (FEIS) should include a figure that depicts all facilities in relation to the 100-yr floodplain. It is also recommended that an analysis be conducted to evaluate the hydrologic impacts of building these facilities in the 100-yr floodplain. This analysis should include predicted water surface elevations downstream of the ranges for various storm events and identify potential impacts.

Answer A: Two figures (4-1 and 4-2) have been inserted into Chapter 4, *Environmental Consequences*, of the FEIS to show the location of the proposed action in relation to floodplains on Fort Stewart. The discussion of the potential hydrologic impacts of building these facilities (i.e., the proposed action) and their results to floodplains, as well as the best management practices (BMPs) recommended by the state of Georgia for constructing within a floodplain, is in Sections 3.4.3 and 4.3.1 of the FEIS. These projects have not undergone complete design. The Installation's design process requires engineers to include stormwater flow calculations demonstrating that runoff from rain events will not adversely impact (a) existing streams, (b) upstream systems, and (c) downstream systems of the proposed site. Surface water elevations downstream of the ranges will be met by the requirements for stormwater flows to remain the same pre-construction and post-construction.

General Comment B: EPA also recommends an additional analysis and evaluation of the existing stormwater conveyance infrastructure to ensure that the existing system will not be undersized for any of the proposed projects, which could lead to indirect water quality impacts and potential flooding.

Answer B: The text in Section 4.3.1 has been updated to reflect that during the design stage for each action more precise studies will be conducted to analyze the capacity of the existing stormwater conveyance systems and what additional measures should be implemented as a result of new construction. In 2008, the Installation conducted stormwater modeling for the Mill Creek, Taylors Creek, and Peacock Creek Basins, and recommendations were made for pipe size increases and required maintenance for existing pipes/culverts to allow and maintain proper

flow. Fort Stewart has implemented these stormwater conveyance recommendations. Fort Stewart also adheres to the requirements of the Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) Permit requirements, the GA Stormwater Management Manual/Coastal Stormwater Supplement, the Energy Independence Security Act (EISA)-Section 438, and all applicable Executive Orders for all projects within the cantonment or range areas. In addition, Fort Stewart recommends the utilization of the United Facilities Criteria (UFC 3-210-10 October 2004) "*Design: Low Impact Development (LID) Manual*", and the United States Army Corp of Engineers (USACOE) Public Works Technical Bulletin (200-1-62 October 2008) "*LID for Sustainable Installations: Stormwater Design Planning Guidance for Development within Army Training Areas*." This text is located in Section 3.4.4 of the FEIS.

The remainder of the questions are more specific and are taken from the enclosure titled "EPA's Detailed Comments on the Draft Environmental Impact Statement (EIS) for Training Range and Garrison Support Facilities Construction and Operation at Fort Stewart, Georgia: CEQ Number 20100105."

Question #1: Stormwater runoff associated with the construction and operation of the ranges has the potential to detrimentally affect streams in the area, particularly any listed impaired streams. An example of a potential stream impact includes stormwater runoff from unfinished (i.e., dirt) range-associated roads.

Answer #1: The Installation proactively works to minimize impacts to all streams, impaired or not, from the construction, operation, and maintenance of new and existing ranges. Since 2001, the Installation has spent more than $15 million on erosion and sediment control projects for existing facilities, roads, tank trails, and other applicable structures in the cantonment area and range and training lands. For example, Fort Stewart hardened the tank trail crossing in the Metz Training Area, eliminating an estimated 300 tons of silts and sediments previously transferring to waters of the state (Canoochee Creek) during rain events. Similar environmental results were achieved by hardening tank trail crossings at Bridges 11, 28, and 29, and at Fort Stewart Road 29 (East and West). The Installation recently hardened and raised Fort Stewart Road 20, an old Colonial-era road, which always washed out during rain events. Since its hardening and raising, this road has not washed out again, providing not only an environmental benefit, but a dependable route for Soldiers training in that portion of Post. The Installation's stormwater maintenance standard operating procedures (SOPs) and the EPA's own Guidelines for Dirt Road

Installation and Turnouts/Maintenance are also utilized on range areas, dirt roads, and forestry trails. This information has been incorporated in Section 3.2.2 and Section 3.4.1.1of the FEIS.

Question #2: The DEIS suggests that compliance with both the Clean Water Act (CWA) and the Georgia Erosion and Sedimentation Control Act (GA ESCA) will keep waters from being degraded or that compliance with these two laws is the maximum required for NEPA mitigation purposes. While the existence of both the CWA and ESCA and their implementing regulations are intended to prevent further water-resource degradation, inferring that these existing protections are 100 percent effective is not a substitute for demonstrating that impacts to water resources will be moderate. The DEIS does not describe the applicability and potential effectiveness of the Georgia Erosion and Sedimentation Control Act to military live-fire and maneuver ranges. For example, EPA notes that Table 6-2 lists as a mitigation measure- *the attainment of a stream buffer variance when construction activities require crossing or encroaching within* 25 *feet of state waters.* EPA does not consider a stream buffer variance as a NEPA mitigation measure nor a measure protective of water quality. The DEIS does not discuss the water-quality and aquatic resource impacts associated with these anticipated buffer variances or identify how many of the variances will be pursued. These issues should be addressed in the Final EIS (FEIS).

Answer #2: To ensure full compliance with the GA ESCA on existing and future training ranges, the Installation mandates full utilization of Timber Harvest BMPs, NPDES permit requirements, site-specific Erosion and Sedimentation Pollution Control Plans (ESPCPs), and pre- and post-construction BMPs to reduce the potential adverse impacts to water bodies, such as streams. As mentioned earlier, these projects have not undergone complete design. The text in Sections 4.1 and 4.3.1 have been updated to reflect that the Installation has a resident Natural Resource Conservation Service (NRCS) advisor who provides technical expertise during preparation of ESPCPs prior to the Installation approving the final design. During this process, the Installation's stormwater specialist and NRCS advisor review ESPCPs for compliance with the GA ESCA and the CWA. These technical experts continually inspect and monitor on-going construction projects to assure compliance and that BMP's are being maintained. They will also do this during the construction of these proposed projects to ensure adherence to associated ESPCPs. In addition, training area inspectors (from the Installation's Environmental Division, Integrated Training Area Management team, and Range Control Division) routinely inspect tank trails, range access roads, range course roads, and dirt roads/trails to see if any damage is occurring (such as hardened tank trails or water crossings need repairs, to prevent sedimentation

of adjacent streams). These inspectors report these issues and the Installation works to get them fixed before they become a detriment to the environment or Soldier training.

Potential water quality and/or aquatic resource impacts of stream buffer variances (such as warming of streams due to tree canopy removal during construction or sedimentation from soil disturbance along the streamside) are minimized via many measures, to include proper stream bank stabilization (for prevention of erosion and scouring of stream banks) and implementation of appropriate LID BMPs, as noted in USACOE PWTB 200-1-62. These measures are also identified on the associated project's ESPCP. The GA EPD must approve the ESPCP when a stream buffer variance is requested. A need for a stream buffer variance is identified during the design process and any action that would include a stream buffer variance must be approved by the GA EPD. Often times, Fort Stewart obviates the need to apply for a variance, by working with engineers design the layout of a range to avoid stream impacts when possible and still meet the underlying training requirements. The text in Sections 3.4.5 and 4.3.1 have been updated with this information. All inferences equating compliance with the GA ESCA, other laws, or stream buffer variances with mitigation measures were removed from the text of the FEIS and the discussion clarified.

Question #3: Of particular interest is the use of these lands for live fire training and the resulting cumulative impacts to the surrounding ecosystem. The Fort Stewart's (Fort) range areas, particularly now with the expected increase in use and their associated berms, represent a potential for emerging mini-toxic sites. The soil berms serve to collect spent ammunition (lead and tungsten) that over time can accumulate into concentrations that will threaten surface and groundwater supplies, e.g., lead contamination associated with stormwater runoff, and will require costly clean up. Furthermore, the Department of Defense (DoD) Directive Number 3200.15 states DoD's policy that planning and management for the DoD range sustainment program shall identify range environmental considerations and safety factors that may influence current or future range activities, including reasonably anticipated future uses if the range has a finite withdrawal or lease period that shall not be renewed.

Answer #3: Earthen berms are often used on Fort Stewart to contain bullets for the protection of threatened and endangered species (TES). The 1992 Biological Opinion issued by the USFWS on effects of the military mission on TES required the construction of berms on all small arms ranges. Contouring the backstop, adding clay to the soil, and planting appropriate vegetation are ways to minimize lead migration (USAEC and USATSC 1998). The FEIS has additional discussion of tungsten at 3.11.1.2.

The Army Operational Range Assessment Program (ORAP) is currently assessing 378 facilities in the United States and territories with range complexes/ranges and will focus on off-range migration pathways and Munitions Constituents. The intent of the program is to keep ranges open and available for training and testing while protecting human health and the environment (www.ecos.org/files/1843_file_Army.PPT). The Military Munitions Rule states that used or fired munitions are considered a solid waste only when they are removed from their landing spot (www.epa.gov/epaoswer/hazwaste/military/index.htm). Therefore, since the proposed ranges will be constructed within existing impact areas and the munitions will be used for their intended purposes and will be left where they land, the munitions are not considered solid waste.

The best practices to minimize the impact of lead on the environment, are stormwater and erosion controls, vegetation management, soil amendments, bullet traps, and soil pH modifiers. The berms must be 12 feet high (Carlile 2009). To minimize soil erosion from the berms, sand/clay soil is the preferred construction material because it is more structurally stable. This material can be placed at a 45 degree slope, which better controls richochet. The sand clay has a higher pH, which substantially reduces the incidence of lead leachate release. Also, lime application and fertilization during berm construction helps establish good vegetative cover crops, which also greatly reduces erosion and leaching (Houston 2009). In addition, the berms are periodically maintained to keep their integrity. Therefore, the impact from lead at ranges on Fort Stewart are being minimized by all of the best management practices listed above.

The Installation maintains compliance with all applicable DoD Directives, Federal and state laws, and Army regulations and has an active, highly efficient Range Sustainability Program. Through it, the Environmental Division works closely with the Directorate of Planning, Training, Mobilization, and Security to ensure ranges maintain their operational efficiency, adhere to environmental requirements, and ensure optimal safety measures for Soldiers training on the ranges/training lands. Ranges are inspected, controlled, and certified by the Fort Stewart Range Control Division. The officer in charge (OIC) for the range is responsible for the operation of the range. The Range Safety Officer works for the OIC and ensures all Soldiers adhere to safety aspects, Risk Management procedures, and regulations. Spent casings from all small arms ranges are collected by the Soldiers after each use at the training range, which is then taken to the

Ammunition Supply Point for reuse or recycling. This text was incorporated into Section 3.11.1.2of the FEIS.

Question #4: Additionally, DoD Directive Number 4715.11 states DoD's policy is to ensure the long term viability of operational ranges while protecting human health and the environment; limit the potential for explosive mishaps and the damaging effects of such to personnel, operational capability, property, and the environment; design and use operational ranges and the munitions used on them to minimize harmful environmental impacts; and to promote resource recovery and recycling. In light of these directives, EPA encourages the use of applicable technologies that would minimize or eliminate above concern.

Answer #4: The Army strives to utilize the latest technologies whenever possible to protect human health and the environment. The discussion of Fort Stewart's range safety program may be found in Sections 3.10.1 and 3.10.3 of the FEIS.

Question #5: Of additional interest is the potential for use, exposure to, and the accumulation of potentially toxic materials (e.g., beryllium, dicholorobenzenes, dioxin, 2, 4-Dinitrotouluene (DNT), lead, nanomaterials, N-nitrosodimethylamine (NDMA), polybrominated diphenylethers (PBDEs) / polybrominated biphenyls (PBBs), perfluorooctanoic sulfonate (PFOS) / perfluorooctanoic acid (PFOAs), trichloropropane (TCP), tetrachloroethylene, 1,4-dioxane, chromium VI, naphthalene, perchlorate, Cyclotrimethylenetrinitramine (RDX), and trichloroethylene (TCE)). These contaminants represent the potential for adverse health effects on operating forces, DoD employees, the public, and the surrounding ecosystem, potentially reducing training readiness and use restrictions on ranges, and increased operation and maintenance and/or clean up costs, which may amount to a drain or diversion of resources from mission needs. Perchlorate is reportedly a growing issue that must be proactively addressed. The FEIS should discuss the potential for use and increased use of these contaminants in light of the proposed action and how they may pose human health and environmental risks.

Answer #5: The proposed firing range projects include a mix of small arm ranges and a multipurpose training range that will accommodate small and large caliber training rounds. Only the following four chemicals from the list above are associated with munition firing.

Perchlorate: The Army has stopped production and use of perchlorates in its two most prevalent systems that used the contaminant (Artillery Simulators and Practice Hand Grenades) and

replacements systems which do not utilize perchlorates have been created. By eliminating the use and production of these training aids the Army has reduced the potential release for perchlorate by 2/3. The Army monitors to ensure perchlorates do not leave Army ranges or represent a hazard to human health and is looking for ways to replace all of the systems in its inventories that may present a future perchlorate hazard.

Cyclotrimethylenetrinitramine **(**RDX): RDX is a common high explosive used in large caliber munitions and residues may increase as a result of the training range project. The DoD/Army continues to investigate and respond to RDX releases at installations as part of DoD's overall environmental restoration program. Existing RDX toxicity and carcinogenicity data are 20 years old; federal agencies are working together to generate new environmental health data. The EPA will use the new data in its IRIS process to refine the toxicity values for RDX used to protect human and environmental health.

Lead: The US Army has a three-fold approach to minimizing lead contamination at firing ranges. The Army has developed multiple types of lead-free ammunition to reduce dependence on lead-containing bullets in training. The Army also uses bullet traps to contain bullets and prevent range contamination. As a last line of defense, the Army also constructs impact berms to stop bullets from leaving the firing range. In addition to these preventative measures, the Army has aggressive cleanup goals for remediating existing contaminated sites. These mitigations are being considered as part of this EIS and a final determination will be made as part of the Record of Decision as to which measures will be utilized to best minimize lead contamination and potential for migration.

Dinitrotoluene (DNT): The US Army Environmental Command has performed research on the connection between small arms training and DNT contamination on ranges. The Army is also researching process changes and remediation technologies to meet regulatory requirements associated with applicable DNT drinking water standards. In the absence of a federal drinking water standard, risk based guidelines have been developed for DNT by several USEPA regional offices and state regulatory agencies. These guidelines are used in site screening—to identify areas, contaminants and conditions that do not require further attention—and to establish initial and final cleanup goals. The USEPA made a pre-regulatory determination that a national primary drinking water regulation would not present a meaningful opportunity for health risk reduction.

The information regarding potential toxic chemicals on training ranges has been expanded and included in Section 3.11.1.2 and Section 4.10 of the FEIS.

Question #6: Construction and operation of the proposed facilities will likely increase the area of impervious surfaces. One concern with increased impervious surfaces is the potential of stormwater from recharging groundwater (i.e., aquifers) and channels it directly into surface water bodies. The DEIS does not recognize the need to allow stormwater to recharge groundwater and avoid diverting all of the stormwater to surface water bodies in the area.

Answer #6: Because Fort Stewart is flat and the surficial (near the surface) water table is high, some portions of the collection system have groundwater infiltration. In addition, the Installation requires utilization of LID techniques in all construction projects, such as bioretention and infiltration basins, rain barrels, and permeable pavements to promote the natural movement of water within an ecosystem or watershed, instead of diverting all associated runoff to local surface water bodies. Furthermore, only a small amount of the proposed projects will include impermeable surfaces. For the proposed ranges, the only impermeable surfaces will consist of the range operations area and cover only 2% of each project footprint. The majority of the two garrison facilities will add impermeable surfaces; however, LID techniques help to reduce diverting all stormwater to surface water bodies. The Georgia Environmental Protection Division also requires maintaining pre construction stormwater runoff rates. This text can be found in Sections 3.4.4 and 4.3.1 of the FEIS.

Question #7: Additionally, EPA is concerned with any reliance on sediment ponds for stormwater runoff control as these ponds can effectively capture, contain, and accumulate various chemical compounds into toxic levels requiring landfill disposal. For example, coal-tar sealants spread on driveways and parking lots contain chemical compounds classified as likely carcinogens, polycyclic aromatic hydrocarbons, which can be washed into stormwater runoff and accumulate in these ponds.

Answer #7: Fort Stewart only utilizes sedimentation ponds and/or basins during the construction phase of a project. The existing retention ponds and detention basins on the Installation are post construction measures (basically, structural BMPs), meant to ensure NPDES permitting for runoff reduction, water quality, and total suspended solids removal of 80% are being met, as required. Additionally, as required under the MS4 NPDES Permitting, a Stormwater Checklist with inspection and maintenance schedule is implemented for these structural BMPs to ensure

optimal operation, proper maintenance, and proper disposal of any hazardous materials, if ever necessary. Text in Section 3.4.4 has been added to the Final EIS.

Question #8: The overall readability of the noise appendices should be simplified in the FEIS. Although glossaries are provided at the end of appendices, the glossary text should also provide definitions at first mention (e.g., "PK15 (met)") as well as other additional information. For example, it is unclear why dBC (dB (decibels) at the C scale) was used when dBA is the conventional noise metric, relative to human ear perception. Also, the definition for the term "dBP" (used on page 14 to define the noise level of complaint risks) was not found and should be included in the FEIS.

Answer #8: The text has been modified in Section 4.6 to clarify the noise appendices. The DEIS discussed that C-weighting is the appropriate weighting for sounds with low frequency that can generate vibration. The American National Standards Institute (ANSI) states that CDNL should be used for large caliber weapons' assessments. The C-weighting is also specified in Army Regulation 200-1 and was used in this assessment as was presented in the DEIS Table 3-7.

Question #9: More importantly, the noise metrics for the noise contours (noise exposures iso-lines generated by each proposed action) for Zones II and III is not clear to public or agency reviewers. These are defined as "PK15 (met) 87 dB" for Zone II and "PK15 (met) 104 dB" for Zone III. Apparently, these contours are the maximum instantaneous pressure levels (rather than averaged values) that can be expected from the actions. While these metrics may be typical descriptors for military facilities, we suggest that the significance of 87 dB and 104 dB be discussed and that a conversion to a more conventional metric (e.g., dBA DNL (day-night sound level)) used by Federal Aviation Administration and other members of the Federal Interagency Committee on Noise (FICON) also be provided for public comparison.

Answer #9: Table 3-7 has been updated in the FEIS and additional clarification has been provided regarding definitions for Zone II noise contour areas and metrics.

Question #10: It is unclear from the DEIS if any of the proposed actions could be minimized to prevent or reduce noise contours from extending beyond the Fort boundaries. That is, the FEIS should discuss if the location of the proposed training actions could be shifted centrally within the Fort boundaries to prevent extension of elevated noise exposures outside property lines, or if any contour extensions outside the property could be directed to only those areas without Noise Sensitive Receptors (NSRs). Also, if not already the case, could noise generation of these

actions be limited to daytime hours so that they would not occur during nighttime or sleeping hours for nearby NSRs?

Answer #10: Fort Stewart's siting criteria, discussed in Section 2.3.2, explains how the Installation must also utilize existing impact areas when analyzing potential range action alternatives. The text in Section 4.6.2.1 was updated to explain that the existing impact areas are located in the center and in the southwest of Fort Stewart. To the extent practicable, range footprints were modified to reduce noise impacts, as well as other sensitive resource impacts. For example, the proposed Convoy Live Fire Alternative B engagement boxes were originally sited in close proximity to the northeast boundary, which showed a Noise Zone III contour extending outside the boundary. The engagement boxes were moved south to prevent Zone III contours from extending beyond the Installation boundary. Fort Stewart reduces night-time training when possible but combat and peace keeping operations are not limited to daylight hours, so Soldiers must be afforded an opportunity for realistic training at night.

Question #11: As suggested above, noise contours for several actions would extend beyond the boundaries of the Fort. EPA notes that portions of these noise contours incorporate NSRs such as Fort housing. The FEIS should enumerate the number and kinds of inhabited homes (single or multi-family homes) and number of affected people living in these homes to document the magnitude of the elevated noise exposure. These data should be presented by noise contour, location, and the noise source (small caliber, grenade launcher, etc.).

Answer #11: Additional information regarding noise impacts has been added to Section 4.6 of the FEIS. However, since no significant impacts or changes to existing noise contours are projected to occur, the level of detail requested regarding number of people and homes effected by the proposed action is not seen as a critical element of this EIS analysis and has not been added to the EIS.

Question #12: Risk of Complaints were characterized as "Low," "Moderate," or "Risk of Hearing Damage to Unprotected Ears." These risk levels were associated with distances from the noise source and nose levels presented in an undefined "dBP" metric (as suggested above, the FEIS should define dBP). Without a definition of dBP, the meaning of the associated noise levels for each risk level remains unclear. Even after dBP is defined, these values should also be presented as more conventional metrics such as instantaneous maximum dBA noise values and/or DNL averages. However, if dBP is similar to either metric, EPA finds them to be too high for their risk characterization. For example, EPA does not believe that values approaching

115 dB are a “low” risk of complaints or that a value of 115 dB should be considered a “moderate” risk of complaints. Similarly, a “high” risk of complaints would likely start before the listed >130 dB. The initial level for risking hearing damage is less certain and is also related to time of exposure, but is also likely to start before the listed > 140 dB level. As such, the FEIS conclusions reaching for the noise impacts of the proposed actions may change depending on the metric of the noise levels associated with the risk level characterizations.

Answer #12: The text in Section 3.7.1 which defines unweighted decibel Peak (dBP) has been updated. As for the reason for using dBP as a measure instead of what others may consider to be a more conventional metric, the Army believes that dBP is a more acceptable standard measure for short impulsive sounds, such as the noise generated by the firing of weapons on ranges since these peak sound levels are last for approximately 35 milliseconds. Other metrics are employed to measure longer or more continuous sound, such as noise generated by a loud speaker (at 115 dBA).

OHSA guidelines even recognize that under a dBP metric for short impulsive sounds the upper limit is 140 dBP, not 115 dBP. (www.osha.gov).

The risk of receiving complaints as a result of noise generated from the live firing on Fort Stewart of weapons on ranges, was not a criterion used to determine the Threshold Level of Significance. In any case, the Army feels the risk of complaints is low. One reason is that, when the Installation consulted with citizens in the local communities during its public outreach conducted as part of this EIS, noise concerns were not raised. Also, the analysis of the noise contours indicates that the number of people potentially impacted by increased noise on these new ranges would not change appreciably. In addition, as discussed in the EIS, the Installation has been working with surrounding county and municipal governments as well as their zoning and land use planning boards for a number of years, to avoid the development of incompatible land uses, such as those that may be sensitive to the noise generated by live firing on Fort. This information is incorporated into Section 3.7.2, and Section 3.8of the FEIS. As a result of the 2004 Joint Land Use Study, many of the affected local governmental entities have taken measures to limit the development of incompatible land uses on lands located in noise sensitive areas off Post. For example, both Liberty County and Bryan County Georgia have entered into separate Memoranda of Agreement with the Installation which provide for better coordination and communication of proposed changes in land uses and zoning in or near noise prone areas.

And in Liberty County, as well as Chatham County, these efforts have resulted in at least two petitions to re-zone land from agricultural use to residential use.

Question #13: The DEIS indicates the Fort's boundaries encompass four different watersheds. Water transfers between watersheds can be an issue of concern, e.g., during periods of drought. For example, water piped from one watershed for potable use and returned via a permitted wastewater treatment plant discharge or septic discharge to another watershed. The FEIS should discuss whether any of the proposed new demands for water and corresponding wastewater treatment realize a significant transfer of water between watersheds.

Answer #13: This is typically only a concern when withdrawing drinking water from one watershed, then discharging wastewater into another, different watershed. Fort Stewart withdraws its drinking water supplies from groundwater sources, not surface water sources, and is not transferring water from one watershed into another. Additionally, Fort Stewart has partnered with the City of Hinesville to provide reuse water for irrigation of Fort Stewart golf course and cooling systems of the Installation's central energy plant, further minimizing wastewater releases into the watershed. This text has been added to Section 3.9.2.

Question #14: EPA is currently reviewing a joint public notice dated April 21, 2010, for four individual permits for four projects (DMPTR, IPBC, MPMGR and QTR) with a total of 185.9 acres of wetland impacts. This is a substantial level of wetland impacts, particularly in relation to recently permitted impacts throughout Georgia**.**

Answer #14: Fort Stewart avoids and minimizes wetlands impacts when possible. The implementation of the actions proposed in the preferred alternative (Alternative B Sitings) has the potential to negatively impact up to 0.2% of the Installation's nearly 91,000 acres of wetlands. More importantly, of the "up to 0.2% of the Installation's wetlands being impacted," most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement. As stated earlier in this reply, the Installation anticipates wetland impacts will be much less than projected through further avoidance and minimization incorporated during the design phases of each project after the site is selected. It is important to note, that despite the large amount of military training activity that occurs on Fort Stewart, because of the Installation's proactive efforts to avoid, enhance, and mitigate wetlands, its wetlands remain of a high quality, retaining and transmitting large amounts of fresh water and providing habitat for countless local species. Proactive

environmental stewardship programs also help to keep our wetlands pristine. As discussed in opening paragraphs in Chapter 3 of the FEIS, Fort Stewart's Integrated Training Area Management (ITAM) program conducts land rehabilitation through the construction of low water crossings and Soldier training related to sustainability of Fort Stewart lands.

Much of the avoidance and minimization takes place before actual site selection. Training ranges of this kind have fairly specific requirements and it is not always possible to build them without impacting every wetland in the footprint. Site designers may alter certain aspects of a proposed range in response to environmental concerns during various stages of the design process, typically reviewed at the 10%, 35%, 60%, 90%, and 100% stages of completion, if they can do so while still meeting the operational and training requirements of the range. For example, the currently on-going design process reduced the wetland impacts from the IPBC to a third of what they were at the time of writing the DEIS. Impacts from the MPMGR have also been slightly reduced. Several proposed range projects were sited without wetland impacts of any kind. It is hoped that impacts from the QTR and DMPTR may be reduced, but as they are not yet in the design process this cannot be precisely determined.

It is also important to note that not all of the 185.9 acres (now 179.03 acres) of wetlands will actually be cleared, grubbed, and/or filled. Rather, that is a maximum projected "up to" amount. The actual number of acres impacted will likely be reduced further at each design level for target placement, etc.). Therefore, although the "permitted impacts" of this project may seem large in relation to other recently permitted impacts in Georgia, they do not represent substantial impacts to Fort Stewart wetlands resources. This text has been added to Section 4.3.2.2 of the FEIS.

Question #15: EPA is particularly concerned that all impacts have been characterized as wetland impacts when two of the four projects show the potential for streams impacts on the 7.5-minute USGS topo quad maps. EPA notes that while the Fort has had a significant cumulative impact to streams from past projects, these impacts have not been mitigated.

Answer #15: The footprints of the MPMGR and IPBC on the 7.5-minute USGS topographic quads show "blue line" streams in the areas, however, a site visit by Fort Stewart and the Georgia Environmental Protection Division (GA EPD) on January 20, 2010, found no streams. The Savannah District also did not identify any streams within the range footprints. This information was added to Section 4.3.1, of the FEIS.

Over the years, Fort Stewart has worked diligently to mitigate impacts – direct and indirect, as well as cumulative – to the Installation's streams, as well as wetlands. During the development of the Installation's wetland bank, for example, thousands of feet of Canoochee Creek and Strum Bay were restored without being credited to the Installation's mitigation bankThe Installation takes pride in that fact and welcomes working with ORK and other local environmental stakeholders on future projects.

Question #16: The FEIS should provide more discussion regarding the quality of the wetlands impacted. The DEIS mentions they're freshwater wetlands and that the Army has acquired mitigation credits to restore a historically but degraded hardwood wetland system. It is unclear what type of wetlands ecosystems are being impacted by the ranges and garrison proposed projects.

Answer #16: Surveys of the proposed range and garrison sites by Fort Stewart determined these ecosystems were predominantly broadleaf hardwood palustrine wetlands consisting of vegetative communities typical of wetlands in the Coastal Plain: pond pine (Pinus serotina), pond cypress (*Taxodium ascendens*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), American hornbeam (*Carpinus caroliniana*), Highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occur with varying frequency depending on the landform and hydrology of particular areas. Animal communities are also supported by these areas – wading birds such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea herodias*), amphibians such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*), and mammals such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites. Soil types are hydric sand-loam mixtures of the Ellabelle, Bibb, Pelham, and Leefield types. Text reflecting this information was incorporated into Section 6.4.1, of the FEIS.

Question #17: EPA is unable to fully evaluate wetlands impacts, which is an area of CWA-designated responsibility for the Agency, in the DEIS because expanded CWA 404(b)(l) analyses have not been prepared for three ranges: FY 13 Modified Record Fire Range, FY 13 10/25 Meter Zero Range, and FY 14 Convoy Live Fire Range. This is a concern. EPA would like to review and comment on these analyses before they appear in the FEIS. Please coordinate with Bob Lord, Region 4's Wetlands Program to discuss further.

Answer #17: As we mentioned in Section 4.3.2.2. of the FEIS, the Installation has not prepared §404(b)(1) analyses for the FY13 MRFR, FY13 10/25 Meter Zero Range, and FY14 CLFR because some or all impacts to wetlands will likely be avoided during the design phase of these projects. The wetlands located on these sites are less than 5 acres each. If, however, wetlands cannot be avoided, the Installation will prepare §404(b)(1) analyses for these projects and request a §404(b) permit at that time.

Question #18: The DEIS states that the preferred alternative for the Engineer Battalion facilities has more wetland impacts than Alternative C, but the DEIS is unclear how much more impacts, i.e., no wetland acres are provided. The DEIS does indicate that these wetlands are not pristine and are located in a portion of the cantonment area already impacted by previous construction, operation, and maintenance activities. The FEIS should address this issue.

Answer #18: Construction of the Engineer Battalion at the Alternative C Siting would impact 5.41 acres, compared to 0.9 acres under the Alternative B Siting. For this reason, the Alternative B Siting was determined the better option of the two. The language regarding “pristine” and “already impacted” characteristics was removed to make the section easier to read and instead focused on the amount of wetlands affected. The text in Section 4.3.2.3 was modified accordingly.

Question #19: The DEIS states that the Fort has a regional permit for low water crossings, developed in 2001 and renewed in 2006 for 5 years, which allows for a maximum of 15 acres of cumulative wetlands impacts from low-water crossings. Approximately 5 acres of wetlands have been impacted using this permit. The FEIS should discuss the application of the Fort's regional permit for low water crossings, which allows for a maximum of 15 acres of cumulative wetlands impacts from low-water crossings, how the cumulative wetlands impacts are defined, and the water quality impacts and other aquatic resources impacts associated with this permit.

Answer #19: Low water crossings are not a part of the proposed action and there are no new low water crossings anticipated in the foreseeable future. As discussed in Section 3.4.4.2, only routine maintenance and repair of existing low water crossings in the range and training areas will be conducted.

Question #20: EPA is concerned that the credit calculations using the Savannah District Standard Operating Procedure (SOP) do not fully compensate for the impacts. The Savannah District has frequently indicated to EPA that the SOP is not applicable to large impacts, such as those over 10 acres. EPA agrees and has proposed a scaling factor to address the cumulative impacts of large projects such as the factor used in the Charleston District SOP. This is the approach used by the Georgia Department of Transportation for its projects that exceed the 10 acre threshold. For very large projects this scaling factor could be capped at an appropriate level. EPA has suggested 3.0 acres, which is equal to the next largest factor used in the SOP. Application of the SOP without a scaling factor for large impacts, particularly the 108.1 acres for the MPMGR is not appropriate, even according to past finding from the Savannah District.

Answer #20: While a scaling factor may be appropriate to use in many large scale projects where a great deal of fill is being introduced into the wetland system and where the projects require large amounts of impermeable surfaces, neither of these considerations constitute significant components of any of the projects under consideration in the FEIS. Of this filled acreage only a small amount will include the introduction of impermeable surfaces. The only impermeable surfaces will consist of the range operations area and cover only 2% of each project footprint. As noted in Answer #14 above, while maximum projected "up to" amounts have been provided, most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement. This information is located in Section 4.3.2.2.

As a result, it is the Installation's position that use of any scaling factor is not necessary to compensate for the cumulative impacts associated with these types of projects and applying a scaling factor, as called for in the Charleston District's SOP, to these types of projects would appear to be arbitrary and capricious as it would not appear to be based on any sound engineering or hydrologic rational but would appear to be more punitive than compensatory in nature.

Moreover, the Installation always takes into account secondary wetland impacts. In reference to the MPMGR, which is the project that contains the majority of the 179.03 acres of wetlands to be potentially impacted, the Installation has evaluated potential secondary / cumulative impacts. In our planning process, as noted above, the Installation took a "worst case scenario" approach when determining how to compensate for the quantity of wetlands loss. The Installation is planning to off-set secondary / cumulative wetland effects from this range and has obtained an additional 287 mitigation credits from the Wilkinson-Oconee Bank. The Installation did account for the lost functions and values impacted by the project with respect to direct and indirect impacts.

As noted in Sections 3.4.5 and 4.3.2, the Savannah District is a cooperating agency to this EIS, and was consulted with regard to the factors noted above. Additionally, Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Having reviewed these documents and the associated 404(b)(1), the Savannah District did not suggest a need to utilize a scaling factor.

Question #21: The DEIS indicates that approximately one-third of the Fort's lands are wetlands. It also states some of the remaining 160 credits contained in the Fort's on-site mitigation bank will be used for the Garrison construction projects. Additionally, the Army has previously purchased credits from an established off-Fort wetland mitigation bank in accordance with the Compensatory Mitigation Rule (33 CFR Part 332) to cover the proposed range projects. The Fort canvassed the available mitigation banks nearly one year ago, which may not reflect the current banks and credit availability. Given the opportunity, EPA would have discouraged the use of the Wilkinson - Oconee Mitigation Bank since it is out of the watershed, out of the ecoregion, and likely does not fully compensate for the functions lost at the project sites. EPA is also concerned, despite the rationale provided in the DEIS, that the Fort is not fully debiting its own mitigation bank before going to off-site alternatives. The Fort's mitigation bank is within the same watershed and ecoregion and thus more likely to replace the lost wetland functions. There appears to be ample time to expand this bank to accommodate the future needs presented as a reason for not fully using it for these projects. Typically, EPA discourages applicants from purchasing mitigation credits until the Section 404 permit has been issued, because this precludes other, possibly preferable, mitigation actions.

Answer #21: Although the Fort Stewart mitigation bank has sufficient credits to offset impacts from the two Garrison support construction projects, the Army has determined it is not sufficient

to cover the unavoidable negative impacts to wetlands from the FY11-14 training range construction projects, for which the Installation must purchase credits from an off-site wetlands mitigation bank. The remaining acres within the Installation wetland bank allows Commanders to respond to emergency range training requirements, which surface from "In Theater" conditions and scenarios, or award Congressional Garrison or training additions that must be executed by Fort Stewart within one year or less. If Commanders did not have this flexibility, Installation projects with unavoidable wetland impacts would be cancelled or held up in significant delays awaiting Congressional funding to purchase "off-Post" wetland credits.

As discussed in Chapter 6 of the DEIS, despite the physical distance between the Wilkinson - Oconee Bank (WOB) restoration area and Fort Stewart, looking at the choice from a more holistic watershed perspective shows that the two locations are rooted in an interconnected complex of wetlands and open water bodies. The WOB wetlands were determined to be an ecologically acceptable replacement for the small portion of Fort Stewart wetlands impacts due to the proposed action. Hydrologic and habitat wetland functions will remain unimpaired. .

At the time the credits were purchased, there were no other readily available mitigation banks open in the primary service area with the quantity and quality of credits needed to cover the Installation's projected needs. The Federal appropriations process did not provide the Installation with the flexibility to wait until Section 404 permits were issued to initiate the required solicitation process to purchase the credits without putting the funding for the specific FY 2011 range projects in jeopardy. As part of the Installation's standard procurement processes, market research is conducted in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11.

For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs). For instance, the Installation is actively seeking opportunities to incorporate off-site compensatory mitigation projects into its private lands conservation initiatives in partnership with the Georgia Land Trust and will continue to do so to further provide compensatory mitigation within the primary service area and watershed. Under the Savannah District's SOP, the Wilkinson-Oconee Bank (WOB) is grandfathered as a pre-existing bank created prior to the

Compensatory Mitigation Final Rule (please refer to Answer 23). As such, the WOB is an acceptable mitigation alternative that is in full compliance with the policy and purpose of mitigation required by the CWA, the Savannah District SOP, and the Compensatory Mitigation Final Rule. The information contained in this answer has been added to Section 6.4.1.1 of the FEIS.

Question #22: EPA disagrees with the statement that applying for a CWA Section 404 permit is a minimization of wetlands impacts. The DEIS states "While the Army strives to avoid negative impacts to wetlands when it sites new range and training facilities on Fort Stewart, if impacts to regulated wetlands cannot be avoided, the Army minimizes those impacts by applying for a Section 404 permit as required by the Clean Water Act. CWA 404 requires a permit for any dredge and fill impacts to jurisdictional waters, including wetlands. The CWA is a regulatory requirement, not a mitigation option. The FEIS should clarify this misrepresentation of CWA Section 404 permit program as a form of mitigation.

Answer #22: The information in the text and tables located in Section 6.4.3 of the FEIS has been edited to identify more accurately and clearly the differences between what is a required measure, such as a regulatory permit, and what is a mitigation option.

Question #23: The DEIS discusses wetlands compensatory mitigation in context of NEPA-required mitigation when it should also discuss how the proposed mitigation meets the requirements of the Compensatory Mitigation for Losses of Aquatic Resources Final Rule. NEPA requires that to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analyses and related surveys and studies required by the Fish and Wildlife Coordination Act, the National Historic Preservation Act of 1966, the Endangered Species Act of 1973, and other environmental review laws and executive orders. The Compensatory Mitigation for Losses of Aquatic Resources Final Rule is considered to be a relevant "other environmental review law" as it is one of the CWA Section 404 implementing regulations. The FEIS should discuss and apply the Final Rule in its wetlands mitigation discussion.

Answer #23: The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR. Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Section 6.4.1.1 of the FEIS has been revised to clearly explain that a mitigation decision has not yet been made for the FY13

QTR and the FY13 DMPTR. For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs). Similar to the process outlined in the Compensatory Mitigation Rule, the Installation's standard procurement processes conducts market research in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary and secondary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11.

According to 33 CFR 332, *Compensatory Mitigation for Losses of Aquatic Resources*, mitigation bank credits may be used if the project is in the service area of a mitigation bank. Section 332.3 (b)(2) has a description of why mitigation bank credits are acceptable in compensating for wetland impacts:

"Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable." Fort Stewart followed these requirements during the development of its mitigation plan.

Question #24: While EPA does not expect the precise replication of all wetlands adversely impacted by the proposed action, the FEIS should explain how the proposed mitigation will adequately compensate for lost wetland functions and values such that it results in no net loss of wetland functions and values. This discussion is absent from the DEIS. Furthermore, since the

U.S. Army Corp of Engineers (USACOE) cannot issue a CWA 404 permit if there is a less damaging practicable alternative, the FEIS should discuss compliance with this provision.

Answer #24: The wetlands in the Wilkinson-Oconee Bank (WOB) are "in-kind" to the wetlands on Fort Stewart. Consistent with the fact that both areas are on Georgia's Coastal Plain, wetlands within the WOB are very similar to those slated for impact by the proposed Fort Stewart range projects. Surveys of the proposed range sites by Fort Stewart determined that dominant vegetation communities consist of plants typical of wetlands in the Coastal Plain: mixtures of pond and bald cypress (*Taxodium ascendensand distichum, respectively*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), privet (*Ligustrum sinense*), American hornbeam/ironwood (*Carpinus caroliniana*), highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occur with varying frequency depending on the landform and hydrology of particular areas, and essentially identical communities with similar distribution are found in the Wilkinson-Oconee's Mitigation Bank. Animal communities also supported by these areas are: wading birds, such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea Herodias*); amphibians, such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*); and mammals, such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites, and have been similarly reported in the Wilkinson-Oconee area. The American alligator (*Alligator mississippiensis*) is common throughout Fort Stewart and has also been observed at Wilkinson-Oconee. The locally endangered Wood Stork *Mycteria Americana* can also be found at both locations (though they are not expected to be impacted by the proposed projects).

Soil types were also consistent between the two areas. The Ellabelle, Bibb, Pelham, and Leefield types predominated in the proposed project areas. Analyses of the Natural Resources Conservation Service profiles show these to be comparable to the Chewacla, Chastain and Congaree soils which cover the Wilkinson-Oconee area. All are characterized by loamy surface layers and clayey or loamy subsoils, and all soils are on the National Hydric Soils list.

Although the area of the Coastal Plain in which the Wilkinson-Oconee area is situated features more relief than that of Fort Stewart, the specific area of the restoration situated as it is in the Oconee River floodplain, is flatter than the surrounding general topography, resulting in a similar hydrologic profile to Fort Stewart. The bottomland hardwood wetland systems found at both locations share the typical functions of holding temporary storage surface water, maintenance of

characteristic subsurface hydrology, removal and sequestration of elements, retention of particulates, export of organic carbon, maintenance of characteristic plant community, and habitat for wildlife. Based on this comparison, despite the distance between the two areas, wetlands on Fort Stewart and at the Wilkinson-Oconee restoration area are very similar and, therefore, their use for mitigation fully supports the requirement for “no net loss”. Text reflecting this information was incorporated into Section 6.4.1.1 of the FEIS.

Question #25: The DEIS states that the USACOE documents approximately 1,467,774 acres of wetlands impacted within 20 Georgia counties and by deducting 1,982.87 acres of wetlands impacts since 1990 there are at least 1,465,791.13 acres of wetlands remaining. According to the DEIS, this amounts to a loss of 0.14% of wetlands since 1990 - an insignificant amount." It is unclear if the USACOE document referenced in the DEIS is referring to the 1,467,774 acres of wetlands as being impacted in the 20 Georgia counties or existing (un-impacted) wetlands in these counties. This paragraph needs to be clarified in the FEIS.

Answer #25: There are 1,467,774 existing acres of existing wetlands within the 20 Georgia counties referenced, of which 1,465,791.13 acres of wetlands are un-impacted. This is how the Installation calculated a loss of 0.14% of wetlands since 1990 and the determination of “insignificant” derived. Text clarifying this information was incorporated into Section 5.3.3.2 of the FEIS.

Question #26: The DEIS indicates the construction of six new ranges is reasonably foreseeable on the Fort [during] 2016 and 2017. The EIS should mention whether there is sufficient land on the Fort to accommodate these new ranges or whether the Fort suffers a training land shortfall requiring acquisition of new lands outside the Fort's boundaries.

Answer #26: Currently, Fort Stewart has sufficient land within its existing boundaries to support the construction of all ranges discussed in the EIS. The EIS does not consider the expansion of land holdings at Fort Stewart as a reasonably forseeable future action at this time. The Army’s position is that Fort Stewart currently has sufficient land to train assigned Soldiers and units adequately, including the necessary land for the six FY 16 and FY 17 range construction projects discussed in Section 5.2 of the FEIS.

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Savannah District Army Corps of Engineers
Wetland Regulatory Division
Attention: Mark Padgett
100 W. Oglethorpe Avenue
Savannah, Georgia 31401

Dear Mr. Padgett:

Thank you for forwarding the recent Southern Environmental Law Center (SELC) comments and questions regarding the Savannah District Army Corps of Engineers (ACOE) Joint Public Notice (JPN) for projects analyzed in the *Draft Environmental Impact Statement (EIS) for Training Range and Garrison Support Facilities Construction and Operation at Fort Stewart, Georgia (hereafter, Fort Stewart EIS).*

As you requested, we have prepared formal responses to the SELC comments on the JPN in the enclosure to this cover letter. Some of the information provided in our response will be incorporated into Fort Stewart's FEIS, which we anticipate will be issued for a 30-day public review in July 2010. The SELC letter, our response, and the Savannah District ACOE position will also be included in an appendix to the FEIS.

If you have any further questions, please contact Mr. Charles Walden, at (912) 767-8642 or Charles.Walden4@us.army.mil. Please also cc Ms. Amber E. Franks at (912) 767-1434 or Amber.Franks@us.army.mil. If emailing a comment, please reference the *Fort Stewart EIS* in the subject line.

Sincerely,

KEVIN W. MILTON
Colonel, US Army
Commanding

Fort Stewart's Response to Comments
Received from Southern Environmental law Center (SELC),
Sent to Mark Padgett, U.S. Army Corp of Engineers - Regulatory Branch
(Hunt, May 21, 2010)

Digital Multi-Purpose Training Range

Question #1: The applicant's alternatives analysis in the DEIS includes alternative COA 3 which is a "heavily utilized" existing multipurpose range complex (MPRC) (*Fort Stewart note: the range proposed for construction is actually a Digital Multi-Purpose Training Range, or DMPTR*). DEIS, Appendix D at 10. This, of course, begs the question as to why the Applicant is including as an alternative a site that could never be used even if it determined that the site would have fewer environmental impacts. Alternative COA 3 is not a practicable alternative at all.

Answer #1: Transforming the existing MPRC was an option legitimately considered as a practical alternative but rejected due to current and expected military operations and training demands. Transforming the existing MPRC and other operational ranges will remain a consideration on future range projects as the types of military training and weapon systems evolve over time and possibly render older ranges obsolete. An example of this is the COA 1 for the DMPTR, which involves the transformation of another existing range, Red Cloud Foxtrot. In siting the DPMTR over top of an existing range, we are attempting to minimize and avoid the wetland impacts that would be associated with constructing the DPMTR elsewhere on Fort Stewart.

Question #2: The other alternative which the Applicant examined yielded wetlands impacts of 240 acres. It is difficult to accept that there were no other practicable alternatives at Fort Stewart for this proposed range. Two-hundred forty acres is more than the combined wetlands impacts of all four of the proposed ranges.

Answer #2: Based on the Installation's location in a relatively flat coastal plain and the location of pre-existing military training ranges and facilities on high ground, impacts to 240 acres of wetlands to build a new 995 acre range is not beyond the realm of reasonable consideration as a viable alternative. The fact that wetland impacts in the preferred alternative are less than five percent of the overall range size demonstrates the Installation's efforts to avoid and minimize wetland impacts associated with the siting of new military ranges and training facilities. Army Installations, including Fort Stewart, must maintain their training lands to fully sustain mission

requirements for national security. The way the Army does this is through its master planning process. It is important to note that the Installation's planning efforts to minimize wetland impacts begins with attempts to select a site with the least amount of wetlands. At this point in the planning process, the range design is limited to placement on site of a footprint of the proposed range. This footprint shows the maximum number of wetland impacts and that is why we state "up to" so many acres; however, once a final site is selected, further attempts are made to avoid and minimize negative impacts to wetlands inside the range footprint through the range design process.

The final range design cannot be prepared prior to a site being selected. Also, despite Fort Stewart's large size, much of its lands are already committed to other training, recreational, and environmental activities. Maneuver and dismounted maneuver training areas occupy large portions of the Installation, where the integration of large firing ranges is not suitable. The west side of the Installation is devoted to maneuver training and, in its entirety, is necessary to meet Brigade mission training requirements. Maneuver training is necessary in upland areas to reduce wetland impacts resulting from heavy wheeled and tracked military vehicles, as well as to avoid vehicles from getting stuck in wet areas. The southeast side of the Installation is devoted to dismounted maneuver training (i.e. training on foot) and also contains a wooded recreational area for campers. More than 100,000 acres are devoted to the restoration and management of environmentally sensitive areas, such as habitat for threatened and endangered species (including the red-cockaded woodpecker (RCW) and gopher tortoise) and wetlands.

During the planning process for the FY13 DMPTR, which Fort Stewart initiated in 2006, the Installation developed a total of eight siting alternatives. This process allowed both operational and environmental aspects, including impacts to wetlands, to be thoroughly analyzed in a collective manner by members of the Installation's Environmental Division, Range Control Division, and Master Planning Division. As the analysis progressed, these siting alternatives were ranked using screening criteria, as discussed in Chapter 2, *Description of the Proposed Action and Alternatives*, of the FEIS. Minimization of environmental impacts, including wetlands, was a factor in which alternatives were considered viable and which were not. One DMPTR discounted alternative, not discussed in the FEIS, contained 673 acres of wetlands impact. Another site, also not considered any further, contained 313 acres of wetland impact and would have resulted in the elimination of 683 acres of RCW habitat (compared to an RCW habitat loss of 22.4 acres and 31 acres as a result of Alternatives B and C, respectively). Even

though these eliminated sites were operationally viable, they were removed from consideration after environmental impacts were determined to be significant.

Multi Purpose Machine Gun Range (MPMGR)

Question #3: As an alternative for this range, the Applicant proposed course of action (COA) 5 which would have yielded wetlands impacts of less than 9 acres had it been chosen as the preferred alternative. However, the Applicant eliminated this alternative because it emerged as the preferred alternative for DMPTR. As such, COA 5 should not be discussed as a viable alternative for the MPMGR.

Answer #3: As a large military training and deployment complex, Fort Stewart must examine and analyze the cumulative effects of all its proposed ranges within its training platform as constrained by the Installation borders, adjacent and associated training facilities, and surface danger zones relative to one another. This analysis is in addition to examining other resources, such as wetlands, to optimize training while minimizing the overall impact to our environment. The decisions made on the siting of each range and what are practical alternatives are inherently intertwined and interdependent. This may not have been reflected well in Section 404 permit applications, but is more fully explained in Section 6.4.1.1 of the FEIS. The possibility remains that the MPMGR could be selected to occupy that site currently under consideration for the DMPTR if the DMPTR is ultimately selected to occupy another site.

Also, many other impacts, in addition to wetland impacts, are examined and analyzed in the siting of new ranges and training facilities, including other environmental factors (such as threatened and endangered species) and non-environmental factors (such as the impact the site has on the ability to conduct timely and realistic military training based on current threats to our nation's armed forces when engaged in combat or peace keeping operations overseas). Both the MPMGR and DMPTR were approved for funding, and as has been noted, COA 2 for the DMPTR would have carried a level of wetland impact even greater than the current impacts from both the MPMGR and the DMPTR. Given the many constraints (see Appendix D for siting criteria) at play in siting both ranges, the preferred COAs for the two ranges were seen as a necessary compromise for ensuring all needed ranges are built and military training requirements met.

Question #4: Notwithstanding the above, the Applicant needs to more adequately explain why it did not select COA 5 as the preferred alternative for MPMGR considering it would have reduced the wetlands impacts from 116.7 acres down to 9 acres.

Answer #4: Unfortunately, it would not be possible to ignore the fact that the site was already selected as the preferred site for the DMPTR, as suggested. Two independently proposed ranges cannot have the same preferred site. The Installation agrees that nine acres of impact for a 250-acre range is far more desirable than 116.7 acres of wetland impacts (which we now have down to 103.3 acres); however, wetlands impacts for this specific range were only one factor examined and analyzed in selecting this site as the preferred alternative. Selection of this site as the preferred alternative helps the Installation's ability to avoid and minimize the overall and cumulative impacts to all wetlands associated with planned or reasonably anticipated range construction, as reflected in Sections 4.3.2, 5.3.3.2, and 6.4.1 of the FEIS.

Qualification Training Range (QTR)

Question #5: For this proposed range, the Applicant discusses but then rules out COA 3, which would have less wetlands impacts than the Preferred Alternative B. The Applicant rules out this alternative site because it is the proposed location for a future Modified Record Fire (MRF) range, which is not before the Corps at this time. Again, given the significant size of Fort Stewart, alternatives for one range should not be eliminated for future potential ranges, or, such a site should never be discussed as an alternative. The Applicant is required under the Section 404(b)(1) guidelines to indentify "practicable alternatives," not alternatives that could never be chosen regardless of how favorable they might be from an environmental standpoint.

Answer #5: Again, as a large military training and deployment complex, Fort Stewart must examine and analyze the cumulative effects of all its proposed ranges within its training platform as constrained by the Installation borders, adjacent and associated training facilities, and surface danger zones relative to one another. This analysis is in addition to examining other resources, such as wetlands, to optimize training while minimizing the overall impact to our environment. The decisions made on the siting of each range and what are practical alternatives are inherently intertwined and interdependent. This may not have been reflected well in Section 404 permit applications; but is more fully explained in the FEIS. One reason the COA 3 was deemed unsuitable was the fact the site is currently an operational range that is projected for reuse or transformation as a future MRF range. While Fort Stewart has a large land mass, much of its land mass is not environmentally or operationally suitable for range construction or for a number of considerations. Although significant, wetland impacts are only one of several significant

factors considered when examining the suitability for siting of a range. The remaining lands that are suitable for future range construction are limited because the best locations are currently being used to capacity as military ranges or training areas. The Installation contains many sensitive resources, such as wetlands and protected species habitat, which limit the locations suitable for constructing new military training ranges that are capable of maximizing military training while minimizing environmental impacts. Because of the operational impacts examined and analyzed when siting ranges, and because the Installation was able to minimize impacts and mitigate those that did occur, the decision was made to retain the COA 3 site for a future project. The alternative was practicable but was not chosen in this instance.

Inadequate Mitigation

Question #6: Ogeechee Riverkeeper (ORK) is concerned with several flaws in the Application's proposed mitigation measures. Considering the Project's significant destruction and alteration of wetlands, it is imperative that the value and functions of wetlands on Fort Stewart are mitigated. ORK shares the concerns expressed by the Environmental Protection Agency (EPA) in its comments on the Draft Environmental Impact Statement dated May 14, 2010. First, the Applicant's usage of the Savannah District's Standard Operating Procedure (SOP) for calculation of mitigation credits is inconsistent with the district's position that the SOP should not be applied to projects with large wetlands impacts. Given the Project's substantial wetlands impact of 190 acres, we urge the Corps to apply the SOP, but do so with a scaling factor to address the cumulative impact of the Project, an approach that is followed by the Charleston District. The Applicant's use of the SOP without a scaling factor will not successfully and adequately replace the lost functions and values of wetlands impacted by the Project.

Answer #6: The implementation of the actions proposed in the preferred alternative (Alternative B Sitings) has the potential to negatively impact up to 0.2% of the Installation's nearly 91,000 acres of wetlands. More importantly, of the up to 0.2% of the Installation's wetlands being impacted, most of those impacts are not the result of adding fill to the wetlands, and as stated earlier, the Installation anticipates wetland impacts will be much less than projected through further avoidance and minimization incorporated during the design phases of each project after the site is selected. It is important to note, that despite the large amount of military training activity that occurs on Fort Stewart, because of the Installation's proactive efforts to avoid, enhance and mitigate wetlands, its wetlands remain of a high quality, retaining and transmitting large amounts of fresh water and providing habitat for countless local species.

While a scaling factor may be appropriate to use in many large scale projects where a great deal of fill is being introduced into the wetland system and where the projects require large amounts of impermeable surfaces, neither of these considerations constitute significant components of any of the projects under consideration in the FEIS. Of this filled acreage only a small amount will include the introduction of impermeable surfaces. The only impermeable surfaces will consist of the range operations area and cover only 2% of each project footprint. As noted above, while maximum projected "up to" amounts have been provided, most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement. This information is located in Section 4.3.2.2.

As a result, it is the Installation's position that use of any scaling factor is not necessary to compensate for the cumulative impacts associated with these types of projects and applying a scaling factor, as called for in the Charleston District's SOP, to these types of projects would appear to be arbitrary and capricious as it would not appear to be based on any sound engineering or hydrologic rational but would appear to be more punitive than compensatory in nature.

Moreover, the Installation always takes into account secondary wetland impacts. In reference to the MPMGR, which is the project that contains the majority of the 190 acres (now 179.03 acres) of wetlands to be potentially impacted, the Installation has evaluated potential secondary / cumulative impacts. In our planning process, as noted above, the Installation took a "worst case scenario" approach when determining how to compensate for the quantity of wetlands loss. The Installation is planning to off-set secondary / cumulative wetland effects from this range and has obtained an additional 287 mitigation credits from the Wilkinson-Oconee Bank. The Installation did account for the lost functions and values impacted by the project with respect to direct and indirect impacts.

As noted in Sections 3.4.5 and 4.3.2 of the FEIS, the Savannah District is a cooperating agency to this EIS, and was consulted with regard to the factors noted above. Additionally, Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Having reviewed these documents and the associated 404(b)(1), the Savannah District did not suggest a need to utilize a scaling factor.

Question #7: Second, the Applicant's choice of the Wilkinson-Oconee Mitigation Bank conflicts with the policy and purpose of mitigation required by the CWA. Under the Corp's regulation, the Applicant's "compensatory mitigation should be located within the same watershed as the impact site ...." 33 C.F.R. § 332.3. The purpose of this rule is to preserve and maintain water resources within a watershed, and ensure that wetlands lost are compensated by wetlands with similar characteristics, values, and functions. The Application, however, proposes mitigation outside of Fort Stewart and in another watershed at the Wilkinson-Oconee Mitigation Bank. This choice not only conflicts with the Corps' policy but also ignores the available 160 credits contained in Fort Stewart's on-site mitigation bank. ORK believes that the Corps should require the Applicant's use of the on-site mitigation.

Answer #7: Mitigation credits generated from the on-Post compensatory mitigation bank are not being used because there are insufficient credits available to satisfy requirements associated with the projects and the Installation needs to retain the few credits remaining for potential use to compensate for last minute and unanticipated Congressional add-on projects that occur on the Installation on a not-infrequent basis. Regarding use of mitigation banks, the Compensatory Mitigation for Losses of Aquatic Resources Final Rule states, "In many cases, the environmentally preferable compensatory mitigation may be provided through mitigation banks or in-lieu fee programs because they usually involve consolidating compensatory mitigation projects where ecologically appropriate, consolidating resources, providing financial planning and scientific expertise (which often is not practical for permittee-responsible compensatory mitigation projects), reducing temporal losses of functions, and reducing uncertainty over project success." The rule then lists types of compensatory mitigation measures in order of preference. The rule states that "[in] general, the required compensatory mitigation should be located within the same watershed as the impact site." But mitigation bank credits may be used if the project is in the service area of the bank. Section 332.3 (b)(2) has a description of why mitigation bank credits are given in the regulation:

"Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger,

more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable." Fort Stewart followed these requirements during the development of its mitigation plan.

Under the Savannah District's SOP, the Wilkinson-Oconee Bank is "grandfathered" as a pre-existing bank created prior to the Compensatory Mitigation Final Rule. As such, the Wilkinson-Oconee Bank is an acceptable mitigation alternative that is in full compliance with the policy and purpose of mitigation required by the CWA, the Savannah District SOP, and the Compensatory Mitigation Final Rule. Fort Stewart's use of the Wilkinson-Oconee Bank as mitigation for the proposed FY11 range projects was fully coordinated with the Savannah District, which was a cooperating agency on the EIS.

The wetlands in the Wilkinson-Oconee Bank are "in-kind" to the wetlands on Fort Stewart. Consistent with the fact that both areas are on Georgia's Coastal Plain, wetlands within the Wilkinson-Oconee are essentially identical to those slated for impact by the proposed Fort Stewart range projects. Surveys of the proposed range sites by Fort Stewart determined that dominant vegetation communities consist of plants typical of wetlands in the Coastal Plain: mixtures of pond pine (Pinus serotina), pond cypress (*Taxodium ascendens*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), American hornbeam (*Carpinus caroliniana*), Highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occur with varying frequency depending on the landform and hydrology of particular areas, and essentially identical communities with similar distribution are found in the Wilkinson-Oconee's Mitigaiton Bank. Animal communities also supported by these areas are: wading birds, such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea Herodias*); amphibians, such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*); and mammals, such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites, and have been similarly reported in the Wilkinson-Oconee area.

Soil types were also consistent between the two areas. Hydric sand-loam mixtures of the Ellabelle, Bibb, Pelham, and Leefield types predominated in the proposed project areas. Analyses of Natural Resources Conservation Service profiles show these to be comparable to the Chastain and Congaree soils which cover the Wilkinson-Oconee area. All soils are on the National Hydric Soils list. Although the area of the Coastal Plain in which the Wilkinson-Oconee area is situated features more relief than that of Fort Stewart, the specific area of the restoration is flatter than the surrounding general topography, resulting in a similar hydrologic profile to Fort Stewart. The bottomland hardwood wetland systems found at both locations share the typical functions of holding temporary storage surface water, maintenance of characteristic subsurface hydrology, removal and sequestration of elements, retention of particulates, export of organic carbon, maintenance of characteristic plant community, and habitat for wildlife. Based on this comparison, despite the distance between the two areas, wetlands on Fort Stewart and at the Wilkinson-Oconee restoration area are very similar and, therefore, their use for mitigation fully supports the requirement for "no net loss". Text reflecting this information was incorporated into Section 6.4.1.1 of the FEIS.

Question #8: Before seeking compensatory mitigation in a different watershed, the Applicant should explore the use of existing and new mitigation banks in Ogeechee River Watershed. According to the DEIS's evaluation of mitigation banks in 2009, the Ogeechee River/Margin Bay and Black Creek Banks may now have available credits. DEIS at 6-8. Also, given the significant amount of wetlands within the boundaries of Fort Stewart as well as Fort Stewart's experience in the creation of mitigation banks, the Corps should require the Applicant to take a hard look at a potential onsite mitigation bank that would ensure the compensation of the wetlands' lost values and functions.

Answer #8: Existing and new mitigation banks within this watershed were not available at the time Fort Stewart was required to begin planning for the required wetlands credit acquisition for its FY 2011 range projects with known and/or anticipated wetlands impacts (see answer to Question #9, below, for additional details). On-site wetlands mitigation was not a viable option because, as discussed in Section 5.3.3.2 of the FEIS, although Fort Stewart has an existing mitigation bank and an on-site wetlands restoration project, it is running out of new places where additional on-site mitigation can be conducted. If credits are available in the primary service area in the future, however, then Fort Stewart will work to try and obtain these credits, in accordance with the Compensatory Mitigation Rule For Losses of Aquatic Resources (33 CFR

332) and the Federal Acquisition Regulation. For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs).

After exploring and selecting reasonable site alternatives for the proposed FY11-FY14 range projects, the Installation determined that the last remaining on-site mitigation bank (Pond 4) could not support the wetland mitigation requirements for these facilities and sustain itself for mitigation of proposed and future garrison construction, and other unplanned projects that arise out of mission changes. The remaining acres within the Installation Wetland Bank allows Command to respond to emergency range training requirements which surface from "In Theater" conditions and scenarios, or award Congressional garrison or training additions that must be executed by Fort Stewart within one year or less. If Commanders did not have this flexibility, Installation projects with unavoidable wetland impacts would be cancelled or held up in significant delays awaiting Congressional funding to purchase "off-Post" wetland credits.

Question #9: The Applicant's proposed mitigation plan is based on mitigation credits purchased a year ago from the Wilkinson-Oconee Bank which was the "only bank that provided an offer to the solicitation...." DEIS at 6-8. It is our understanding that Section 404 permit applicants are discouraged from procuring mitigation credits in advance of receiving a permit so that the Applicant is not limited in its mitigation options, such as the use of new mitigation banks. This reasoning is at play here. It has been a year since the Applicant solicited a mitigation contract and, according to the Applicant's DEIS mitigation bank table 6.1, at least two Ogeechee River Watershed banks may now have credits available.

Answer #9: The timeline associated with Congressional Budget approval and Federal Appropriation process for military construction requires advance planning to enable construction to be implemented in the timeframe appropriation was made. The timeline for planning and construction of these projects is quite early (two years out or more) and did not allow for a later solicitation. To secure the funds necessary to build a proposed range, Headquarters-Department of the Army (HQDA) requires the Installation to budget for wetland impacts that will be unavoidable at least two years prior to the proposed project's anticipated contract award date. If an Installation fails to provide this to HQDA within the given timeline, the project is not funded. In the past, Fort Stewart has been able to mitigate using its on-Post wetland mitigation bank; however, as mentioned above, the on-Post bank no longer has an adequate amount of credits available to support these ranges while also meeting the requirements of the Installation's "In-

Theater" mission requirements. The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR. Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Section 6.4.1.1 of the FEIS has been revised to clearly explain that a mitigation decision has not yet been made for the FY13 QTR and the FY13 DMPTR.

Question #10: Furthermore, we share EPA's concerns that the Applicant is not sufficiently mitigating impacts on streams. It is our understanding that Fort Stewart's projects in the past have significantly affected streams that were not mitigated. ORK urges the Corps to ensure that stream impacts are assessed separately from wetlands impacts and that the loss of streams is compensated appropriately. Overall, ORK is concerned that the Applicant's proposed mitigation plan simply does not include adequate compensation for Fort Stewart's wetlands and streams that will be significantly impacted by the Project.

Answer #10: No streams will be lost as a result of the proposed project. The footprints of the MPMGR and IPBC on the 7.5-minute USGS topographic quads show "blue line" streams in the areas; however, a site visit by Fort Stewart and the Georgia Environmental Protection Division (GA EPD) on January 20, 2010, found no streams. The Savannah District also did not identify any streams within the range footprints. This information was added to Section 4.3.1, of the FEIS.

Over the years, Fort Stewart has worked diligently to mitigate impacts – direct and indirect, as well as cumulative – to the Installation's streams, as well as wetlands. During the development of the Installation's wetland bank, for example, thousands of feet of Canoochee Creek and Strum Bay were restored without being credited to the Installation's mitigation bank. The Installation takes pride in that fact and welcomes working with ORK and other local environmental stakeholders on future projects.

Failure to Minimize Impacts to Marine Resources

Question #11: Section 404(b)(1) guidelines prohibit issuance of a permit where "[t]he proposed discharge does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem." 40 C.F.R. § 230.12(a)(3)(iii) (emphasis added). None of the information that we have reviewed demonstrates that the Applicant has tried to adequately

minimize the impacts of the Project. The Applicant repeatedly contends that because it is utilizing existing range footprints the Project will "avoid and minimize impacts to more pristine and un-fragmented wetlands systems" on Fort Stewart. See e.g. Public Notice at 3. While ORK appreciates the Applicant's utilization of existing ranges for the Project, this reuse of range areas does not ensure minimization of harm to aquatic ecosystems or satisfy the regulation's mandate that the Project includes "all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem." 40 C.F.R. § 230. 12(a)(3)(iii).

Answer #11: In addition to avoiding and minimizing impacts to more pristine and un-fragmented wetlands systems, as noted in the comment, Fort Stewart consistently seeks to minimize and avoid wetland impacts at each stage of the design process. It is also important to note that the proposed ranges would be constructed on existing ranges that are operational and already cleared of vegetation. First, much of the avoidance and minimization process takes place before actual site selection. (See response to Question #2.) Training ranges of this kind have fairly specific requirements and it is not always possible to build them without impacting every wetland in the footprint; however, site designers may alter certain aspects in response to environmental concerns during various stages of the design process (10%, 35%, 60%, 90%, and 100% stages of design completion). This is easiest if they can do so while still meeting the operational and training requirements of the range. For example, the currently on-going design process reduced the wetland impacts from the IPBC to a third of what they were at the time of writing the DEIS. Impacts from the MPMGR were also slightly reduced during that time and several proposed range projects were sited without wetland impacts of any kind. It is hoped that impacts from the QTR and DMPTR may be reduced, but as they are not yet in the design process, this cannot be precisely determined.

To ensure compliance with the Georgia (GA) Erosion and Sedimentation Control Act (ESCA) and the CWA on existing and future training ranges, Fort Stewart mandates full utilization of Timber Harvest best management practices (BMPs), National Pollutant Discharge Elimination System (NPDES) permit requirements, site-specific Erosion and Sedimentation Pollution Control Plans (ESPCPs), and pre- and post-construction BMPs to reduce the potential adverse impacts to water bodies, such as streams. The projects discussed in the JPN and FEIS have not undergone complete design. During this process, however, Fort Stewart stormwater specialists review ESPCPs for compliance with the GA ESCA and the CWA. The Installation also utilizes the Natural Resources Conservation Service (NRCS) to provide technical expertise during preparation of ESPCPs prior to Fort Stewart providing construction approval. Fort Stewart

stormwater compliance assessors and NRCS consistently inspect and monitor on-going construction actions. They will also do this during the construction of these proposed projects to ensure adherence to associated ESPCPs. Fort Stewart inspectors also routinely inspect tank trails, range access roads, range course roads, and dirt roads/trails to see if any damage is occurring (such as hardened tank trails or water crossings need repairs, to prevent sedimentation of adjacent streams).

Question #12: The Applicant-specifically, in Appendix D to the DEIS, fails to adequately describe measures intended to minimize impacts besides asserting that the ranges will be placed in existing disturbed areas. The proposed plans for MPMGR and QTR consist of wetlands impacts of 116.7 acres and 26.7 acres, respectively. Contrary to the Applicant's assertion that these proposed impacts are not extensive, the two ranges impact all wetlands within MPMGR and QTR areas. Thus, when all wetlands in each project area are destroyed or altered, the Applicant has failed to demonstrate that it has adequately minimized impacts to the aquatic ecosystem. The Applicant's failure to offer measures to minimize impacts to wetlands and streams violates the Section 404(b)(1) guidelines and the CWA. ORK urges the Corps to require the Applicant to set forth specific measures intended to minimize wetlands impacts on each of the four proposed ranges.

Answer #12: As noted in previous response, Fort Stewart attempts to avoid and minimize wetland impacts throughout the siting and design process. The most substantial avoidance and minimization occurs during the siting process as part of the site alternatives to carry forward for detailed analysis. Please note that, at the initial siting phase, the amount of wetland acres impacted attributed to each range is simply a total of all wetland acres that *would be located within the range footprint that could potentially be impacted*, and it is likely not *all of the wetlands within the footprint will be impacted by the project because avoiding and minimizing negative impacts wetland are carried forward as a consideration into the actual range design process after the site is selected.* Efforts are made to reduce these impacts as the design progresses and, it is anticipated that, as design proceeds, additional wetlands avoidance and minimization of effect will be achieved. Again as an example, the currently on-going design process for the IPBC range has reduced the wetland impacts to a third of what they were at the time of writing the DEIS. Design efforts for the MPMGR have produced similar results, as well. Furthermore, little-to-no impervious surfaces will exist on these ranges, so runoff will not increase appreciably. The primary areas of “hardened surfaces” will consist of concrete turning pads, hardened stream crossings, etc., but not hardened roads and/or completely paved areas.

The range surfaces will still be permeable, and, after construction, will acquire a covering of grasses and light herbaceous vegetation. Furthermore, wildlife may still traverse the ranges and graze during periods (sometimes weeks or more) the ranges are not in use.

In regard to the general issues of siting ranges and orienting them to avoid wetlands, further mention must be made of the Surface Danger Zone, or SDZ. Every range has an SDZ, an area within which people, property, and wildlife are in danger of being struck by projectiles during live fire exercises. Because of this danger, safety of Fort Stewart personnel, the public, and wildlife is a primary consideration in range siting. As previously noted, an SDZ may cover hundreds or even thousands of acres, and ranges must be sited to ensure areas of habitation, daily operations, traffic, and environmental sensitivity do not fall within them. A further limitation to siting is the fact that Fort Stewart is essentially cut into quarters by two major Georgia highways conveying regular civilian traffic. Injury or loss of human life during live fire exercises due to an improperly placed SDZ would be unacceptable to any party. Therefore, all organizations involved in siting ranges are forced to site ranges and their attendant SDZs very carefully. Efforts are made to ensure SDZs overlap. This maximizes land use and minimizes areas impacted by live fire; in part this is itself an environmental consideration as vegetation and animal populations may suffer losses from carelessly directed live fire.

Deposition of Munitions

Question #13: Finally, to our knowledge the Applicant fails to discuss the impact to water quality of any munitions landing in any waters of the United States on the proposed ranges. Under the Section 404(b)(1) guidelines, the Corps has an independent duty to evaluate water quality impacts before it issues a permit. The deposition of the munitions in such waters will be an indirect impact of the proposed Project.

Answer #13: The Military Munitions Rule states that used or fired munitions are considered a solid waste only when they are removed from their original landing spot (www.epa.gov/epaoswer/hazwaste/military/index.htm). Therefore, since the proposed ranges will utilize existing impact areas and the munitions will be used for their intended purposes and will be left where they land, the munitions are not considered solid waste. The best practices to minimize the impact of lead on the environment are stormwater and erosion controls, vegetation management, soil amendments, bullet traps, and soil pH modifiers which are utilized.

Section V:

Notice of Availability of Final EIS

response to reports and notification of incidents involving assigned personnel.

ROUTINE USES OF RECORDS MAINTAINED IN THE SYSTEM, INCLUDING CATEGORIES OF USERS AND THE PURPOSES OF SUCH USES:

In addition to those disclosures generally permitted under 5 U.S.C. 552a(b) of the Privacy Act of 1974, these records contained therein may specifically be disclosed outside the DoD as a routine use pursuant to 5 U.S.C. 552a(b)(3) as follows:

The DoD 'Blanket Routine Uses' set forth at the beginning of the DISA's compilation of systems of records notices apply to this system.

POLICIES AND PRACTICES FOR STORING, RETRIEVING, ACCESSING, RETAINING, AND DISPOSING OF RECORDS IN THE SYSTEM:

STORAGE:

Records are stored in file folders.

RETRIEVABILITY:

Information is retrieved by name of the individual.

SAFEGUARDS:

Records are maintained in a locked security file container and may be accessed only by the Commander, Deputy Commander, Chief, Command Support Division, or other persons specifically designated by the Commander.

RETENTION AND DISPOSAL:

Records are maintained in an active file during the period of the individual's assignment to DISA Europe and destroyed on his or her departure.

SYSTEM MANAGER(S) AND ADDRESS:

Command Support Division, EU1, Defense Information Systems Agency-Europe, APO AE 09131–4103.

NOTIFICATION PROCEDURE:

Individuals seeking to determine whether information about themselves is contained in this system should address written inquiries to the Command Support Division, EU1, Defense Information Systems Agency-Europe, APO AE 09131–4103.

The full name of the requesting individual will be required to determine if the system contains a record about him or her. As proof of identity, the requester must present a current DISA identification badge or driver's license.

RECORD ACCESS PROCEDURES:

Individuals seeking access to information about themselves contained in this system should address written inquiries to the Command Support Division, EU1, Defense Information Systems Agency-Europe, APO AE 09131–4103.

The full name of the requesting individual will be required to determine if the system contains a record about him or her. As proof of identity, the requester must present a current DISA identification badge or driver's license.

CONTESTING RECORD PROCEDURES:

DISA's rules for accessing records, for contesting contents and appealing initial agency determinations are published in DISA Instruction 210–225–2; 32 CFR part 316; or may be obtained from the system manager.

RECORD SOURCE CATEGORIES:

Information is obtained from reports, documents, and correspondence received from Civilian and Military Police Service Investigative Agencies, Military Exchange and Commissary systems, or any other agency or individual that reports information of an incident nature to the Commander DISA Europe.

EXEMPTIONS CLAIMED FOR THE SYSTEM:

None.

[FR Doc. 2010–19989 Filed 8–12–10; 8:45 am]

BILLING CODE 5001–06–P

DEPARTMENT OF DEFENSE

Department of the Army

Notice of Availability of the Final Environmental Impact Statement (FEIS) for Training Range and Garrison Support Facilities Construction and Operation at Fort Stewart, GA

AGENCY: Department of the Army, DoD.

ACTION: Notice of Availability (NOA).

SUMMARY: The Department of the Army announces the availability of an FEIS to analyze the environmental and socioeconomic impacts resulting from the proposed construction and operation of 12 range projects and two garrison support facilities at Fort Stewart, Georgia.

DATES: The waiting period for the FEIS will end 30 days after the publication of an NOA in the **Federal Register** by the U.S. Environmental Protection Agency.

ADDRESSES: For further information regarding the FEIS, please contact Mr. Charles Walden, Project Manager, Directorate of Public Works, Prevention and Compliance Branch, Environmental Division, 1550 Frank Cochran Drive, Building 1137–A, Fort Stewart, Georgia 31314–4928 or via e-mail at: *Charles.Walden4@us.army.mil.*

FOR FURTHER INFORMATION CONTACT: Ms. Dina McKain, Public Affairs Office, at (912) 435–9874 during normal business hours.

SUPPLEMENTARY INFORMATION: To meet the needs of Soldiers at Fort Stewart, additional ranges and garrison support facilities are required. This Final EIS examines the potential environmental and socioeconomic impacts of the construction and operation of 12 ranges (a Multipurpose Machine Gun Range, an Infantry Platoon Battle Course, a Known Distance Range, two Modified Record Fire Ranges, a Qualification Training Range, an Infantry Squad Battle Course, a Fire and Movement Range, a Digital Multipurpose Training Range, a 25 Meter Zero Range, a Combat Pistol Range, and a Convoy Live-Fire Course and associated engagement boxes) and two garrison support facilities (a Sky Warrior Unmanned Aerial System (UAS) facility and a 10th Engineering Battalion Complex) to be constructed over a 4-year time period. It also examines potential impacts to surrounding lands and/or local communities.

In addition to consideration of a No Action Alternative (Alternative A), under which the construction and operation of the ranges and facilities would not take place, the FEIS analyzed two action alternatives. Alternative B includes project sites which predominantly utilize footprints of existing ranges, limit construction and restrictions to existing maneuver terrain, are located in relatively close proximity to the cantonment area to reduce unit transit time, and have fewer overall environmental impacts. Alternative C includes sites that are not predominantly pre-existing range sites and generally are located at greater distances from the cantonment area. These locations generally have a higher level of environmental impacts. After consideration of all anticipated operational and environmental impacts, the Army has selected Alternative B as its preferred alternative.

Impacts were analyzed for a wide range of environmental resource areas including, but not limited to, air quality, noise, water resources, biological resources (to include protected species), cultural resources, socioeconomics, infrastructure (utilities and transportation), land use, and solid and hazardous materials/waste, as well as cumulative environmental effects. No significant impacts are anticipated on any environmental resources. Moderate adverse impacts have been identified for soils, water quality, protected species, timber resources, wildland fire, and noise. Adverse impacts to other resource areas were negligible or minor.

The Final EIS is available at local libraries surrounding Fort Stewart and

may also be accessed at *http://www.Fortstewart-mmp.eis.com.*

Dated: July 28, 2010.

Addison D. Davis, IV,

Deputy Assistant Secretary of the Army (Environment, Safety and Occupational Health).

[FR Doc. 2010–19987 Filed 8–12–10; 8:45 am]

BILLING CODE 3710–08–P

DEPARTMENT OF EDUCATION

Office of Postsecondary Education; Asian American and Native American Pacific Islander-Serving Institutions (AANAPISI), Native American-Serving Nontribal Institutions (NASNTI), Hispanic Serving Institutions-STEM and Articulation (HSI–STEM), and Predominantly Black Institutions (PBI) Programs

AGENCY: Office of Postsecondary Education, Department of Education.

ACTION: Notice reopening the application for eligibility for AANAPISI, NASNTI, HSI–STEM, and PBI fiscal year (FY) 2010 competitions.

SUMMARY: On December 7, 2009, we published in the **Federal Register** (74 FR 64059–64062) a notice inviting applications for eligibility for the programs authorized under Titles III and Title V of the Higher Education Act of 1965, as amended (FY 2010 Eligibility Notice). The FY 2010 Eligibility Notice established a January 6, 2010 deadline date for applicants to apply for designation as an eligible institution under the Title III and Title V programs.

SUPPLEMENTARY INFORMATION: In this notice, the Department announces the reopening of the period for submitting an application for a designation of eligibility. This reopening of the application period applies only to those institutions that intend to apply for new awards in competitions to be announced this fall under the AANAPISI, NASNTI, HSI–STEM, and PBI programs. This limited reopening is intended to ensure that all potential applicants to the AANAPISI, NASNTI, HSI–STEM, and PBI programs have the opportunity to submit applications for eligibility prior to the announcement of these competitions. (While HSI–STEM was not included in the FY 2010 Eligibility Notice, it has been added to this notice due to funds made available by the Student Aid and Fiscal Responsibility Act.) If you have already submitted an application for eligibility based on the FY 2010 Eligibility Notice and were designated as eligible, you do not need to resubmit your application. Deadline for Transmittal of Applications: September 13, 2010.

Note: Applications for designation of eligibility must be submitted electronically using the following Web site: *https://opeweb.ed.gov/title3and5.*

To enter the Web site, you must use your institution's unique eight-digit identifier, *i.e.,* your Office of Postsecondary Education Identification Number (OPE ID Number). Your business office or student financial aid office should have the OPE ID Number. If not, contact the Department using the e-mail addresses of the contact persons listed in this notice under **FOR FURTHER INFORMATION CONTACT**.

You will find detailed instructions for completing the application form electronically under the "Eligibility" link at the following Web site: *http://www.ed.gov/programs/iduestitle3a/index.html.*

FOR FURTHER INFORMATION CONTACT: Kelley Harris or Carnisia Proctor, Institutional Development and Undergraduate Education Service, U.S. Department of Education, 1990 K Street, NW., room 6033, Request for Eligibility Designation, Washington, DC 20006–8513. You may contact these individuals at the following e-mail addresses or phone numbers: *Kelley.Harris@ed.gov,* 202–219–7083. *Carnisia.Proctor@ed.gov,* 202–502–7606.

If you use a telecommunications device for the deaf (TDD), call the Federal Relay Service (FRS), toll-free, at 1–800–877–8339.

Accessible Format: Individuals with disabilities can obtain this notice in an accessible format (*e.g.,* braille, large print, audiotape, or computer diskette) by contacting the persons listed in this section.

Electronic Access to This Document: You can view this document, as well as other Department of Education documents published in the **Federal Register**, in text or Adobe Portable Document Format (PDF), on the Internet at the following site: *http://www.ed.gov/news/fedregister.*

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Program Authority: 20 U.S.C. 1057–1059d, 1101–1103g, 20 U.S.C. 1059e (PBI), 20 U.S.C. 1069f (NASNTI), 20 U.S.C. 1059g (AANAPISI) and 20 U.S.C. 1067q (HSI–STEM) including amendments to these sections made by Public Law 110–315 and Public Law 111–152.

CFDA Numbers: 84.031C, 84.382A, 84.382B, and 84.382C

Dated: August 10, 2010.

Eduardo M. Ochoa,

Assistant Secretary for Postsecondary Education.

[FR Doc. 2010–20064 Filed 8–12–10; 8:45 am]

BILLING CODE 4000–01–P

DEPARTMENT OF EDUCATION

Office of Postsecondary Education; Overview Information; Jacob K. Javits Fellowship Program; Notice Inviting Applications for New Awards for Fiscal Year (FY) 2011

Catalog of Federal Domestic Assistance (CFDA) Number: 84.170A.

Dates Applications Available: August 13, 2010.

Deadline for Transmittal of Applications: September 30, 2010.

Deadline for Transmittal of the Free Application for Federal Student Aid (FAFSA): January 31, 2011.

Full Text of Announcement

I. Funding Opportunity Description

Purpose of Program: The purpose of the Jacob K. Javits (JKJ) Fellowship Program is to award fellowships to eligible students of superior ability, selected on the basis of demonstrated achievement, financial need, and exceptional promise, to undertake graduate study in specific fields in the arts, humanities, and social sciences leading to a doctoral degree or to a master's degree in those fields in which the master's degree is the terminal highest degree awarded to the selected field of study at accredited institutions of higher education. The selected fields in the arts are: Creative writing, music performance, music theory, music composition, music literature, studio arts (including photography), television, film, cinematography, theater arts, playwriting, screenwriting, acting, and dance. The selected fields in the humanities are: Art history (including architectural history), archeology, area studies, classics, comparative literature, English language and literature, folklore, folk life, foreign languages and literature, history, linguistics, philosophy, religion (excluding study of religious vocation), speech, rhetoric, and debate. The selected fields in the social sciences are: Anthropology, communications and media, economics, ethnic and cultural studies, geography, political science, psychology (excluding clinical psychology), public policy and

APPENDIX B

BIOLOGICAL ASSESSMENT AND OPINION

United States Department of the Interior

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June 11, 2010

Colonel Kevin W. Milton
Office of the Garrison Commander
Department of the Army, Installation Management Command
Headquarters, U.S. Army Garrison
954 William H. Wilson Avenue
Fort Stewart, GA 31314

FWS Log No: 2010-0137

Dear Colonel Milton:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion (BO) based on our review of the proposed construction, operation, and maintenance of 12 new ranges and an Unmanned Aerial System (UAS) site on Fort Stewart Military Installation in Liberty, Long, and Bryan Counties, Georgia, and its effects on the red-cockaded woodpecker (RCW, *Picoides borealis*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your request for formal consultation was received on February 4, 2010.

Based on information available to the Service, we concur with the Army's February 1, 2010, biological assessment (BA) which concludes that the subject action is not likely to adversely affect the federally-endangered wood stork (*Mycteria americana*), the threatened eastern indigo snake (*Drymarchon corais couperi*), and the threatened frosted flatwoods salamander (*Ambystoma cingulatum*). There are no wood stork nests, rookeries, or consistent foraging areas present in the action area. There have been no recent eastern indigo snake sightings and no known frosted flatwoods salamander breeding ponds within the action area. Therefore, these species will not be considered further in this BO.

This BO is based on information provided in the February 1, 2010, BA; the Fort Stewart/Hunter Army Airfield (FSHAA) Integrated Natural Resources Management Plan 2001-2005 (FSHAA 2001); meetings, telephone conversations with DOA staff, field investigations and other sources of information. A complete administrative record of this consultation is on file at our Coastal Georgia Sub-office in Townsend.

Consultation History

February 4, 2010, the Service received Fort Stewart's request for formal consultation and accompanying BA, dated February 1, 2010, for the proposed action. The Army issued a "may affect" determination for the RCW and a determination of "not likely to adversely affect" for the eastern indigo snake, frosted flatwoods salamander, and wood stork.

March 4, 2010, the Service, by letter dated same, acknowledged receipt of a complete initiation package and notified Fort Stewart of the anticipated delivery date of this BO of no later than June 19, 2010.

April 8, 2010, the Service made a site visit to Fort Stewart, meeting with personnel from the Fish and Wildlife Branch of the Army's Environmental Division. Several of the sites that were to be impacted by the proposed project were visited and the project was discussed.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Project Description

As identified in the February 1, 2010, BA, the action being evaluated is the proposed construction, operation, and maintenance of 12 new ranges and an Unmanned Aerial System (UAS) site on Fort Stewart Military Installation in Liberty, Long, and Bryan Counties, Georgia. Each range project is described in detail in the Army's BA and a summary of the proposed actions is as follows:

- Multipurpose Machine Gun Range (MPMGR) – A standard automated MPMGR will be constructed that will lie within Training Areas D7, D8, and D11 in Liberty and Long Counties. The range and its associated buildings, electrical service, paving, other site improvements, and 100 foot buffer will require clear cutting and grading of 282.4 acres of which 115.6 of these acres are within a RCW Habitat Management Unit (HMU), as described in Fort Stewart's Multi-Species Endangered Species Management Plan (ESMP) (FSHAA 2001).
- Infantry Platoon Course (IPBC) – A standard automated IPBC will be constructed in Training Area C1 in Bryan County. This course will include a Helicopter Landing Zone, targets, power line, staging areas, several buildings, and a buffer zone. This project will require the clearing and grading of 1773.4 acres of which 908.6 are within an existing RCW HMU.
- Modified Record Fire Range Delta (MRFRD) – This range will be constructed within Training Area D6 in Liberty County on Fort Stewart and will consist of the range, several buildings, trails, firing positions, electrical service, roads, parking areas, other site improvements, and a buffer around the range. A total of about 34 acres will be cleared and graded, of which 31.5 acres are within an existing RCW HMU.
- Infantry Squad Battle Course (ISBC) – This range will be constructed in Training Area B3 in Liberty County and will consist of the range, targets, electrical systems, several

buildings, a vehicle staging area, parking area, and 100 foot buffer. This project totals 300.7 acres of which 153.8 acres are in an existing RCW HMU.

- Qualification Training Range (QTR) – This range will be constructed in Training Area D7 in Liberty County and consists of the range, several buildings, electrical service, utilities, paving, other site improvements, and a 100-foot buffer. This project totals 261.3 acres of which 183.9 acres are in an existing RCW HMU.
- Digital Multipurpose Training Range (DMPTR) – This range will be located in Training Areas B9 and B10 in Liberty County on Fort Stewart. This project involves modernizing and existing range with new targets, replacing existing facilities, and adding new buildings. This project consists of constructing this 1057.4 acre range which includes an 100-foot buffer. Construction of this range will remove 22.4 acres of existing RCW HMU.
- 10/25M Zero Range – This 3.8 acre proposed range will be constructed in Training Area D5 in Liberty County and it includes a 100-foot buffer. All 3.8 acres are in an existing RCW HMU.
- Combat Pistol/Military Police Firearms Qualification Course (CPMPQC) – This 4.0 acre range will be constructed in Training Area D5 in Liberty County on Fort Stewart. Facilities include the range, several buildings, and a 50-foot buffer. All 4.0 acres are located in an existing RCW HMU.
- Known Distance Range (KDR) – This proposed range will be located within Training Areas D8, D9, and D10 in Liberty and Long Counties. This project will encompass 68.5 acres and include the range, several buildings, electrical services, and a 100-foot buffer. Construction of this range will remove 39.7 acres from an existing RCW HMU.
- Fire and Movement Range (FMR) – This proposed 5.1 acre range will be constructed within Training Area C3 in Bryan County and include the range, several buildings, electrical service, and other site improvements. Construction of this range will not impact the RCW HMU.
- Modified Record Fire Range Bravo (MRFRB) – An existing range in Training Area B4 in Liberty County will be upgraded with new targets, firing positions, several buildings, electrical service, utilities, other site improvements, and a 100-foot buffer. This project will consist of construction on 33 acres which include 22.2 acres of RCW HMU.
- Convoy Live Fire Course (CLFC) – This project consists of seven small ranges connected by a convoy road and includes several new buildings, electrical services, staging area, other site improvements, and a 100-foot buffer around all the ranges. Construction of this course will impact 193 acres of which 150.4 acres occur in an existing RCW HMU.
- Unmanned Aerial System (UAS) – This project will be constructed in Training Area A19 in Liberty County and consists of an Aviation unit Maintenance Hanger with shops and other related facilities including a 100-foot buffer. This project totals 103.5 acres, of which 33.7 acres occur in an existing RCW HMU.

Construction of these projects is scheduled to begin FY 2011 and will consist of clear-cutting most of the timber, stumping, grubbing. and grading on each project site. Complete removal of timber on these areas is not anticipated; however, effective management of endangered and threatened species will be precluded by range development.

Based on the installation's Multi-Species Endangered Species Management Plan (ESMP) (FSHAA 2001), three Habitat Management Units (HMUs) have been designated for RCWs on Fort Stewart. Unit boundaries are delineated based on military land use and compatibility with

RCW conservation and protection requirements. Of the 4,120.1 acres to be impacted by this project, 1,669.6 acres are within an RCW HMU (equal to 1.24% of the 134,000 acres of HMU), and the remainder are considered non-forested or wetlands. Non-forested habitat is habitat with or without standing timber that is considered unsuitable for endangered species management due to an incompatibility with present or projected future military use. Open spaces such as artillery firing points, borrow pits, live fire ranges, or wildlife food plots also fall within this category.

Project construction will impact habitats typical of the Lower Atlantic Coastal Plain to include wetlands, pine flatwoods and sandhill communities. In general, wetlands are dominated by pond cypress (*Taxodium ascendens*), black gum (*Nyssa sylvatica*), and sweetgum (*Liquidambar styraciflua*) while typical upland vegetation includes longleaf (*Pinus palustris*), slash (*Pinus elliottii*) and loblolly pine (*Pinus taeda*). The open understory is characterized by pyrogenic grass species of the genera *Aristida* and *Sporobolus* along with gallberry (*Ilex glabra*) and species of the family Ericaceae (e.g., *Vaccinium* and *Gaylussacia* spp.). Prescribed fire is frequently used in the project area.

Fort Stewart proposes to implement the 2007 revision of the 1996 Management Guidelines for the Red-cockaded woodpecker on Army Installations (Guidelines). The 2007 revision calls for gradual removal of training restrictions as the number of potential breeding groups (PBGs) in the population grows. Installations may remove training restrictions from 1 cluster for each PBG over 250. Restrictions may be removed from 2 clusters for each PBG from 275-300, and from 3 clusters for each PBG over 300. Training restrictions may be removed on all RCW clusters when the Installation's population recovery goal is reached (350 PBGs for Fort Stewart). At the end of the 2009 nesting season, Fort Stewart had 315 PBGs of RCWs, so they are proposing having 75 clusters, plus 3 clusters for every PBG in excess of 300, or an additional 45 clusters, for a total of 120 clusters to be removed from protection. The locations of the clusters to be removed from protection will be determined by Fort Stewart in coordination with the Service. Status and performance of clusters will continue to be monitored under the sampling scheme designated in the 2007 revision of the Guidelines.

For the purpose of consultation under section 7 of the Act, the action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. The Service has determined that the action area for this project consultation consists of all of Fort Stewart since the Installation is proposing the use of the 2007 Guidelines.

Conservation measures proposed by Fort Stewart to minimize potential impact of the project on RCWs and considered a part of this action include:

1. capturing and relocating all RCW's residing in clusters 247, and 361, before clear-cutting begins, to suitable habitat elsewhere on Fort Stewart
2. continue the intensive RCW habitat management and monitoring of RCWs on Fort Stewart in accordance with the 2007 Guidelines. Since 1994, the number of active clusters has increased on the installation by 110% (from 157 active clusters in 1994 to 330 in 2009). Fort Stewart will continue intensive RCW management, which includes application of prescribed fire and timber thinning to maintain the longleaf pine/wiregrass-communities.

3. continue the implementation of artificial cavity provisioning as described in the 2001 ESMP.
4. conduct thinning operations in RCW foraging partitions that have excess pine or hardwood according to the RCW Foraging Matrix (Matrix).
5. inspect forest stands downrange from live fire facilities to determine if significant damage if resulting from bullet impacts and if so, construct earthen berms or other protective measures in coordination with the Service.

Fort Stewart promotes conservation of threatened and endangered (T & E) species through several different avenues (pers. comm., Larry Carlile, DOA, 2005). Soldiers new to Fort Stewart receive T & E species identification and awareness training during in-processing and have open access to T & E species information (e.g., T & E posters, etc) at key sites on the installation, such as Range Control. Soldiers are also issued personal T & E cards by the Integrated Training Area Management Section. Cards contain critical information needed by soldiers to avoid impacting sensitive species and their habitats. Environmental Compliance Officers are also designated for each civilian and military unit and are required to take T & E species training once a quarter.

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

The RCW is a territorial, non-migratory, cooperative breeding species (Lennartz et al. 1987, Walters et al. 1988) and is the only North American woodpecker that exclusively excavates its roost and nest cavities in living pines. In 1970, the Service listed the RCW as endangered (*Federal Register* 35:16047), and in 1973, the RCW was provided protection as an endangered species with the passage of the Endangered Species Act. No critical habitat has been designated for the RCW.

Historically, the RCW occupied a wide range throughout old-growth, fire-maintained pine ecosystems of the southern United States. Although still widely distributed, the range of the RCW is now limited and fragmented as a result of past and present human activities (such as resource extraction activities, fire suppression, and urban development) and natural factors (such as hurricanes and pine beetle outbreaks). The remaining RCW populations exist primarily on Federal lands located in the Coastal Plain from North Carolina to Texas, the Piedmont of Georgia and Alabama, the Sandhills of North Carolina and South Carolina, and the interior highlands of Arkansas, Oklahoma, and until recently, Kentucky (Costa and Walker 1995).

Life history

The RCW has an advanced social system that revolves around family groups. A typical RCW group includes one pair of breeding birds, the current year's offspring (if any), and zero to four helpers. Helpers are usually male offspring from previous breeding seasons that assist the breeding pair by incubating eggs, feeding the young, excavating cavities, and defending the territory (Ligon 1970, Lennartz and Harlow 1979, Lennartz et al. 1987, Walters et al. 1988). The RCW nesting season occurs from April to July. Incubation lasts approximately 10 days, and the young fledge 24 to 26 days after hatching. Some juvenile males disperse from their natal territory prior to the next breeding season in an attempt to find vacant territories, or to establish their own

(Hooper et al. 1980, USFWS 2003). Others may remain and become helpers during subsequent nesting seasons. Most juvenile females disperse after fledging, although some may remain with the group as helpers (Walters et al. 1988). The average dispersal distance of fledgling males and females is about 3 miles (Walters 1991, Letcher et al. 1998).

Each group of RCWs occupies a discrete territory consisting of its cavity trees, called a cluster, and adjacent foraging habitat (Walters 1990). The RCW requires mature (usually 60 or more years old), live pine trees to excavate its nesting and roosting cavities. The cavity trees are essential to the RCW because they provide shelter and a place to nest and raise young (Ligon 1970). A typical cluster contains between one and 20 cavity trees, and the breeding male usually chooses the most recently excavated natural cavity as the nest tree, or selects cavity trees with higher resin yields (Conner and Rudolph 1989). Such cavity trees may enhance the survival of the nestlings by decreasing the parasite load of nestlings and incubating adults, and providing a resin barrier to deter snake predation.

RCW cluster stands are typically less dense than surrounding stands and may be the least dense stands available (USFWS 2003). For clusters, basal areas as low as 40 feet^2/acre in longleaf stands and from 40 to 60 feet^2/acre in shortleaf/loblolly stands are suitable (Conner et al. 1991). Seedtree and shelterwood cuts with excessive pine or hardwood midstory, however, are not acceptable as nesting habitat. Once established, clusters are often utilized for many consecutive years or even decades (Walters 1990). Hardwood midstory lessens the habitat quality, eventually leading to cavity abandonment when the hardwood midstory reaches cavity height (Conner and O'Halloran 1987, Costa and Escano 1989). Cluster abandonment may also occur as a result of displacement by competing cavity dwellers, or stochastic events such as hurricanes (Conner and O'Halloran 1987).

RCWs scale and probe bark on the trunks and limbs of living pine trees while foraging for insects. The amount of foraging area used by a group is dependent upon the quality of the habitat and population density. Research indicates that birds generally forage within one-half mile of the cluster (USFWS 2003). RCW home ranges may vary seasonally, and encompass 60 to 300 acres. Habitat typically consists of open pine and/or pine/hardwood forests. Although in some habitats RCWs will use smaller pine trees as foraging substrate (DeLotelle et al. 1987), they prefer pines greater than 10 inches in diameter at breast height (dbh) (USFWS 2003). Groups may forage on pines scattered through hardwood stands, but pure hardwood stands are of little value to the RCW (Conner and O'Halloran 1987). The highest populations of the birds occur on areas with active prescribed burning programs that control hardwoods. Many complex and interrelated factors, such as condition of the understory plant community, annual weather fluctuations, forest type, soils, physiographic province, season of the year, fire frequency and intensity, are important in determining foraging habitat quality.

The RCW is territorial and defends its home range from adjacent groups (Hooper et al. 1982, Ligon 1970). Territories tend to be smaller in areas with few hardwoods, presumably because of higher quality habitat. Home range size is related to both habitat and demographic (e.g., group size and population density) variables (Hooper et al. 1982, Lennartz et al. 1987) and has been found to be inversely related to habitat quality (DeLotelle et al. 1987, 1995). Studies by Hardesty et al. (1997) and James et al. (2001) suggested that habitat structure, and not just the quantity of total resources, is an important determinant of home range size, territory quality, and reproductive success. The availability, quantity, and quality of foraging habitat affects RCW cluster status,

group size, home range size, and reproductive success (Conner and Rudolph 1991, DeLotelle et al. 1987, 1995, Hardesty et al. 1997). Low-quality foraging habitat and large reductions in available foraging habitat can cause RCWs to abandon clusters, reduce fledging rates, and disrupt social interactions (Conner and Rudolph 1991, DeLotelle et al. 1995, Jackson and Parris 1995).

Population dynamics

According to the RCW Recovery Plan: *Second Revision* (Recovery Plan), the recovery of the RCW is directly linked to the viability of discrete populations within selected southeastern states. Populations required for recovery are distributed among 11 recovery units based on physiographic region to ensure the representation of broad geographic and genetic variation in the species. Viable populations within each recovery unit, to the extent allowed by habitat limitations, are essential to recovery of the species as a whole. Until recently, most RCW populations were considered stable at best or declining. RCW population trends since the early 1990's are improving, with an estimated 5,627 active RCW clusters range-wide (USFWS 2003). The species can be delisted when five criteria are met that establish a tier of populations within the 11 recovery units that contain sufficient suitable nesting and foraging habitat and are not dependent on the installation of artificial cavities to remain stable.

Long-term viability of an RCW population, in genetic terms, depends on the presence of an adequate number of breeding individuals for the natural processes that increase genetic variability (e.g., mutation and recombination) to offset the natural processes that decrease genetic variability (e.g., genetic drift and inbreeding). Additionally, any prediction of a population's viability should also consider the population's ability to survive population fluctuations due to demographic and environmental fluctuations (Koenig 1988) or natural catastrophes. Reproductive rates, population density, and recolonization rates may influence RCW population variability more than mortality rates, sex ratios, and genetic viability. Therefore, dispersal of adult birds into breeding vacancies is essential for population persistence (Daniels et al. 2000, Schiegg et al. 2002). RCWs exhibit relatively low adult mortality rates; annual survivorship of breeding males and females is high, ranging from 72 to 84 percent and 51 to 81 percent, respectively (Lennartz and Heckel 1987, Walters et al. 1988, DeLotelle and Epting 1992).

Although the relationship between RCW population variability and density is not well understood, recent studies indicate spatial distribution of territories is important in long-term population stability. Conner and Rudolph (1991) found that, in sparse populations, RCW group size and the number of active clusters decreased as fragmentation increased. Hooper and Lennartz (1995) suggested that populations with less than 4.7 active clusters within 1.25 miles on average had critically low densities that inhibited population expansion. Results from a spatially explicit simulation model of RCW population dynamics suggest that population growth rate may depend more on the number and spatial distribution of territories, than on the initial composition of the population (Letcher et al. 1998). Achieving a self-sustaining population required fivefold more territories when territories were randomly spaced than when they were maximally clumped, and populations with as few as 49 territories were stable when those territories were highly aggregated. Populations of more maximally aggregated groups are likely to persist over the short term (i.e., 20 years) (Crowder et al. 1998).

Natural population growth (i.e., without recruitment clusters) occurs at extremely low rates (one to two percent per year) in this species (Walters 1991) and the availability of cavity trees is limiting

(Copeyon 1990, Allen 1991). New groups or new territories arise by two processes, pioneering and budding (Hooper 1983). Pioneering is the occupation of vacant habitat by construction of a new cavity tree cluster and is relatively rare. Budding is the splitting of a territory, and the cavity tree cluster within it, into two. Budding is more common than pioneering in RCWs, since the new territory contains cavities from the outset (USFWS 2003). Inactive clusters are important to maintaining extant populations of RCWs and may provide a short-term opportunity to enhance habitat available to RCWs and, thus, increase the number of groups in populations (Doerr et al. 1989). After a territory is abandoned for two or more years, however, it is almost never reoccupied, typically because cavities are unsuitable due to deterioration or hardwood encroachment (Beckett 1971, Conner and Locke 1982, Copeyon et al. 1991).

However, the technology to create new territories at desired locations exists and management for optimum territory clumping is, therefore, possible (Letcher et al. 1998). Artificial cavities can be installed in unoccupied habitat that is otherwise suitable (Copeyon 1990, Allen 1991), with subsequent occupancy by dispersing birds, typically subadults (Carrie et al. 1999, Conner et al. 1999). Adding artificial cavities to sites already occupied may increase group size (Carrie et al. 1999). Artificial cavities provide additional roosting opportunities for subadult males, encouraging them to remain in their natal clusters and potentially inherit the territory (Carrie et al. 1999). Females may also benefit when additional cavities are provided because they are the most subordinate members of the RCW social group and, therefore, may not always be able to secure adequate roost cavities.

Inducing the formation of RCW groups in restored habitat with artificial cavities is an established and successful technique (Copeyon et al. 1991, Walters et al. 1992, Gaines et al. 1995, Watson et al. 1995). Within 1 year of restoring habitat and providing artificial cavities at 20 unoccupied territories in the Sandhills of North Carolina, 90 percent of the sites were occupied by RCWs (Copeyon et al. 1991). Translocating RCWs is another method successfully used to establish new groups (Rudolph et al. 1992, Allen et al. 1993, Hess and Costa 1995, Costa and Kennedy 1994, Franzreb 1999). Translocation can include augmenting a solitary-bird group or translocating a pair of subadult RCWs [i.e., unrelated male and female (Costa and Kennedy 1994)]. Franzreb (1999) found that 63.2 percent of translocated birds (including adults and juveniles) remained at the release site for at least 30 days and 51.0 percent reproduced.

Status and distribution

The RCW was listed as endangered due to documented declines in local populations and massive reduction in foraging and nesting habitat. The life history of RCWs is closely tied to the occurrence of fire-maintained old growth pine forests that once dominated the southeastern United States. Only three million acres of longleaf pine forest remain of the estimated 60 to 92 million acres once in existence (Frost 1993). Timber clearing for agriculture, short timber rotations and the suppression of fire has reduced the amount and quality of RCW foraging and nesting habitat.

At the time of listing, the total number of individuals had declined to less than 10,000 in widely scattered and isolated populations (USFWS 2003). Most RCW populations (regardless of location or land ownership) were considered stable at best, but more likely declining (Costa 1995). Costa and Escano (1989) documented RCW population declines in at least ten, and perhaps as many as 17, populations on National Forests. James (1995) estimated that the number of active clusters

range-wide declined 23 percent between the early 1980s and 1990. Recently, numerous RCW populations have increased, particularly on Federal lands, as a result of management activities.

Currently, 5,903 active clusters are known across 11 States in the southeast United States. National Forests (NF), military installations, and National Wildlife Refuges (NWR) contain the majority of extant populations and most of the habitat that is potentially suitable for RCWs. Conservation of RCWs as a species will depend on prudent management of habitats on those Federal lands. National Forests support the majority of the core populations required for delisting of the species, and therefore, have a uniquely important role in the species' recovery. Prior to the 1980s, most populations on National Forests were declining, but management efforts during the past decade, especially prescribed burning and cavity management, have stabilized most of those populations and led to increases in some (USFWS 2003).

The Service, in response to the apparent range-wide decline of the species on private lands, developed a private lands conservation strategy that has been aggressively implemented, modified as necessary based on new scientific findings, and regularly evaluated to ensure objectives are being achieved. The RCW recovery objectives of the private lands strategy are to increase the acreage of private land habitat being managed for RCWs, maintain or increase the larger existing RCW population on private lands, rescue RCW groups from private lands that would be lost as a result of demographic and/or genetic uncertainty, foster and develop cooperative partnerships between and among Federal, State, and private parties responsible for and/or interested in, RCW recovery, and increase the size of designated recovery and support populations while pursuing those objectives (Costa 1995). To achieve those strategic objectives, the Service has implemented three types of agreements involving private landowners: Safe Harbor Agreements, Habitat Conservation Plans (HCPs), and "no-take" management plans implemented via Memoranda of Agreement (Costa 1995).

In Georgia, the largest and most stable populations are on Federal lands, including Fort Stewart, Fort Benning, Piedmont NWR and Oconee NF. The Georgia Department of Natural Resources (GDNR) has an active and successful RCW Safe Harbor program for private landowners. To date, 103 baseline groups have been enrolled and the program has assisted in the creation of 22 new RCW groups through the installment of recruitment clusters.

Fort Stewart Army Installation provides habitat for 40% of the RCWs in Georgia and is one of 13 Primary Core Recovery Populations identified in the Service's RCW Recovery Plan. The amount of available habitat and delisting criteria or population size determines the designation as a primary or secondary core population (USFWS 2003). As a primary core population, Fort Stewart has two recovery objectives. One objective is the Installation Regional Recovery Goal (IRRG) which, according to the installation's ESMP (FSHAA 2001), is 500 clusters. An estimated 400-500 active clusters is believed to be the cluster equivalent of 350 potential RCW breeding groups, the preferred measure of RCW population size and a number thought highly robust to demographic and environmental stochasticity as well as inbreeding depression (USFWS 2003). This goal is achievable due to the large amount of suitable RCW habitat (136,929 acres) (FSHAA 2001) on Fort Stewart. However, imposition of training restrictions on 500 RCW clusters would have unacceptable adverse impacts to the installation's training mission. Therefore, the Management Guidelines for the Red-cockaded Woodpecker on Army Installations (U.S. Army 1996) provides for a second objective, the Installation Mission Compatible Goal (IMCG). The

IMCG is the number of protected clusters thought compatible with the current military mission, which in the case of Fort Stewart is 411 active clusters (FSHAA 2001). Artificial cavities and other habitat improvements will be used to create 89 SRCs, satisfying the difference between the IMCG and required IRRG. SRCs are not subject to military training restrictions nor or they held to foraging habitat protection requirements (FSHAA 2001).

Fort Stewart currently supports a total of 330 active RCW clusters and the success of their intensive management efforts is reflected in the high growth rate documented for the installation. According to USFWS (2003), RCW growth rates documented during the 1990's on Fort Stewart and Camp Lejeune Marine Corps Base were among the highest yet documented in the absence of translocation. Projected population trends based on a recommended growth rate of at least 5 percent per year are outlined at five-year intervals in USFWS (2003; Table 10). Fort Stewart projects it will reach its IRRG (350 PBGs) in the breeding season of 2013 (February 1, 2010, BA).

ENVIRONMENTAL BASELINE

Status of the species within the Action Area (AA)

RCW populations on Fort Stewart are stable or increasing (February 1, 2010, BA). There are currently 330 active RCW clusters on Fort Stewart, with about 315 of them being potential breeding groups (PBGs). RCW populations on Fort Stewart increased at a rate of about 5% a year from 1994 until 2009. Fort Stewart expects to achieve recovery of its population in 2013, slightly ahead of expected population trends outlined in the RCW Recovery Plan (USFWS 2003). Of the 4,120.1 acres to be impacted by this range construction project, 1,669.6 acres are within an RCW HMU (equal to 1.24% of the 134,000 acres of HMU).

Factors affecting species environment in the AA

Fort Stewart comprises 279,270 acres, the majority of which were acquired during 1941 and 1945 from individual landowners (FSHAA 2001). Although slight boundary adjustments occurred within the first 20 years, there are no past or present State, tribal, local, or private actions affecting the species within the AA.

The installation's ESMP (FSHAA 2001) sets forth conservation goals, management actions and prescriptions needed to effectively manage for the RCW, which consists of commercial thinning, control of hardwood midstory, prescribed burning, native ground cover re-establishment and conservation and regeneration of longleaf pine. Several of these management actions have been implemented in the past within the AA, including prescribed burning, midstory control, and commercial thinning to improve habitat for the RCW. The ESMP designates three Habitat Management Units (HMUs) for RCWs on Fort Stewart, and these HMUs are about 134,000 acres in size.

EFFECTS OF THE ACTION

Because of the environmental due diligence required of major Federal construction projects, the resultant tight construction deadlines, and the critical training need this Congressionally-funded project will satisfy, this review is being performed well in advance of the final construction design. Therefore, this opinion is based on the Army's assessment of a "worst case scenario" relative to the project's potential impact to federally-listed species.

Under Section 7(a)(2) of the ESA, "effects of the action" refers to the direct and indirect effects of an action on the species, together with the effects of other activities that are interrelated or interdependent with that action. The effects of the proposed action are added to the environmental baseline to determine the future baseline, which serves as the basis for the determinations in this document. The Service has determined that there are no interrelated or interdependent actions apart from the action under consideration.
Using the Foraging Matrix (Matrix), a detailed analysis of potential impacts to RCW was performed by Fort Stewart in accordance with the Service's May 5, 2005, memorandum entitled "Implementation Procedures for Use of Foraging Habitat Guidelines and Analysis of Project Impacts under the Red-cockaded Woodpecker (*Picoides borealis*) Recovery plan: *Second revision.*" This analysis, which appears in Fort Stewart's BA, examined project impacts at the foraging partition, group, neighborhood and population levels and determined that:

1. The construction, operation and maintenance of the proposed ranges will be a long term, permanent event that will directly impact eight active RCW clusters located within the project area. The proposed ranges will be cleared resulting in the loss of all cavity trees within RCW clusters 69, 105, 247, 256, and 361, and most of the foraging habitat for these clusters. The foraging partitions of three other RCW clusters (18, 34, and 124) will be directly impacted by project construction by not having adequate foraging habitat after construction of the project.
2. Five active clusters (38, 67, 96, 116, and 141) would fail to meet the Managed Stability Standard (MSS) due to inadequate pine stems > 10 inches DBH, but would persist after the range construction because they will have adequate potential foraging acres available.
3. Three clusters (66, 342, and 389) would fail to meet MSS due to an over abundance of pine< 10 inches DBH. However, Fort Stewart will thin this pine during construction of the ranges, and these clusters are expected to persist.
4. Cluster 252 would not meet MSS due to an over-abundant midstory, however, the midstory will be removed during project construction so the cluster will then meet the MSS.
5. Fourteen RCW clusters (5, 22, 70, 103, 130, 154, 179, 268, 300, 322, 334, 339, 356, and 407) will be indirectly affected by the range construction by having some of their foraging areas removed, however all these clusters would meet MSS and are expected to persist.

Presented in Table 1 is a summary of expected cluster impacts due to the proposed project, based on the Army's assessment of a worst case scenario. Opportunities to manage for this species still exist on the installation, and the proposed impacts are not expected to impede recovery of the Fort Stewart RCW population.

Table 1. Summary of RCW cluster impacts

Cluster #	Status	Loss of cluster expected	Impact due to loss of:		
			Cavity Trees	Foraging Habitat	Demographic Isolation
5	Active	no		X	
18	Active	yes		X	
22	Active	no		X	
34	Active	yes		X	
38	Active	no		X	
66	Active	no		X	
67	Active	no		X	
69	Active	yes	X	X	
70	Active	no		X	
96	Active	no		X	
103	Active	no		X	
105	Active	yes	X	X	
116	Active	no		X	
124	Active	yes		X	
130	Active	no		X	
141	Active	no		X	
154	Active	no		X	
179	Active	no		X	
247	Active	yes	X	X	
252	Active	no		X	
256	Active	yes	X	X	
268	Active	no		X	
300	Active	no		X	
322	Active	no		X	
334	Active	no		X	
339	Active	no		X	
342	Active	no		X	
356	Active	no		X	
361	Active	yes	X	X	
389	Active	no		X	
407	Active	no		X	

Clear-cutting cavity trees in active clusters will result in cluster abandonment and the dissolution of the potential breeding group (PBG) occupying that cluster. A PBG, as defined in USFWS (2003), consists of an adult male and adult female that occupy the same cluster, with or without helpers and whether or not the breeding pair attempts to nest or successfully fledges young. Though possible, it is highly unlikely that displaced RCW groups will abandon clusters and disperse to a vacant territory as a group. Therefore, breeding vacancies, where there were none,

could occur post-project. These vacancies could last for several years, lowering reproduction in affected territories until breeding vacancies become filled.

RCWs displaced by the proposed project will be forced to seek out new territories and/or breeding vacancies. In general, RCWs exhibit high survival rates but the costs of dispersal can be high and competition for suitable territories or breeding vacancies is intense. For example, breeding females that disperse suffer higher mortality rates than those who remain in a group (Daniels and Walters 2000). Survival of RCWs during the first year is much lower than in subsequent years and is influenced primarily by the number of birds dispersing and the number of available breeding vacancies (USFWS 2003). Dispersal of young birds and adult breeders occurs naturally within RCW populations, and typically takes place just before or just after the breeding season.

An RCW Neighborhood Level Analysis was completed for several of the individual ranges and this project and is more completely described in the BA.

In an attempt to minimize impacts to birds occupying clusters 69, 105, 247, 256, and 361, Fort Stewart will translocate RCWs to suitable but unoccupied habitat, subject to USFWS concurrence. Techniques and benefits of translocation are discussed in Carrie et al. (1999). Translocated birds can be particularly vulnerable during the transport process. Injury or death can occur from the time birds are placed in transport boxes to the time they are removed and released into the recipient cavity tree. Such death or injury results in a loss of potential breeders or helpers in the vicinity of the proposed release site and the translocation itself reduces the pool of potential breeders and helpers in the vicinity of the donor (impact) site (Franzreb 1999).

It is important to note that the majority of death, if any, is expected to occur post-translocation. Birds may die from exposure or predation if after release they disperse back to their capture territory (where habitat is severely degraded or no longer available) or become floaters [i.e., never establish a new territory or occupy an existing one, being forced to compete for roost cavities]. Dispersal to a population outside the recipient population is also a possibility (Carrie et al. 1999).

Accounting for post translocation death, however, is difficult because dead birds are never found. They simply remain unaccounted for, and are assumed dead unless monitoring efforts at the release site or elsewhere document the bird's presence.

Potential indirect effects (e.g., noise, dust, traffic, etc.) caused by the construction, operation, and maintenance in the action area is not expected to adversely impact RCW populations due to the existence of stable or increasing RCW populations on similar landscapes for many years. A study on the effect of noise on RCW fecundity (Delaney et al. 2002) demonstrated that reproduction of RCWs in or near noisy areas was not statistically different from the reproduction of RCWs in more protected habitats. A study of the effects of military maneuver on the Fort Stewart RCW population (Hayden et al. 2003) was inconclusive.

Fort Stewart also proposes to implement the 2007 revision of the 1996 Management Guidelines for the Red-cockaded woodpecker on Army Installations (Guidelines). The revision calls for removal of training restrictions in RCW clusters based on the number of PBGs in the population with a goal of removing training restrictions on all RCW clusters when the Installation's population recovery goal is reached. Fort Stewart proposes to remove training restrictions on 120 RCW clusters, with the locations of the clusters to be determined by Fort Stewart in coordination

with the Service. Status and performance of clusters will continue to be monitored under the sampling scheme designated in the 2007 revision of the Guidelines. Fort Stewart has had several unprotected supplemental recruitment clusters since 2001 and has not had any clusters damaged or destroyed since then.

Training impacts due to Fort Stewart's ongoing training mission were analyzed in detail in the Service's 2001 biological opinion on Fort Stewart's ESMP and INRMP. Since up to 120 RCW clusters could now be left unprotected, impacts from munitions could kill or injure RCWs that happen to enter into a live-fire area, or damage their habitat by destroying their trees. Accidental detontation of unexploded ordinance could kill or injure individual RCWs or damage their habitat. Vehicle impacts from training could also do the same. Wildfires caused by munition impacts or other training could impact RCW's (harass) or their habitat. Any of these impacts would be rare, but could occur. Fort Stewart has not lost any RCW groups due to training impacts since 1992, however, they have lost individual RCWs (two birds have been known to have died from wildfires) (pers. comm., Tim Beaty, DOA, 2010).

Construction of the ranges and removing training restrictions on 120 RCW clusters are not expected to prevent Fort Stewart from reaching its RCW recovery goal of 350 PBGs.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this BO. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Actions adjacent to Fort Stewart, such as logging and clear-cutting operations, urban development, and associated activities, will all continue to reduce and degrade available habitat for the RCW. However, there is no State or private land within the action area considered in this consultation. Consequently, the Service did not identify any State or private activities that are reasonably certain to occur within the action area that would constitute cumulative effects.

CONCLUSION

After reviewing the current status of the RCW; the environmental baseline for the AA; the effects of the proposed construction, operation, and maintenance of the proposed ranges; and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the RCW. Critical habitat for the RCW has not been designated; therefore none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered to be a prohibited taking under the Act, provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the DOA for the exemption in section 7(o)(2) to apply. The DOA has a continuing duty to regulate the activity covered by this incidental take statement. If the DOA fails to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Fort Stewart must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

Fort Stewart analyzed the impacts of the proposed range construction projects in accordance with the Service's May 5, 2005, memorandum entitled "Implementation Procedures for Use of Foraging Habitat Guidelines and Analysis of Project Impacts under the Red-cockaded Woodpecker (*Picoides borealis*) Recovery plan: *Second revision.*" Based on the results of this analysis, the Service anticipates incidental take in the form of harassment, harm, wound, kill, and/or capture of **eight active RCW groups** (clusters 18, 34, 69, 105, 124, 247, 256, and 361) due to the construction of the ranges. This take will result from one or more of the following:

- harm due to loss of cavity trees and foraging habitat from timber clearing for project construction,
- capture of birds for transport and harassment, harm, wounding, or killing of birds during the transport process,
- harassment of translocated birds due to forced changes in normal behavior patterns such as breeding, feeding and/or sheltering. We anticipate that most, if not all of the take will be associated with post- translocation dispersal. However, because dead birds are never found after translocation, quantifying such take is impossible. Birds are simply assumed dead, if after release, they remain unaccounted for. Therefore, under the worst case scenario, all translocated birds (i.e., 8 RCW groups) will suffer mortality.

For implementing the 2007 Guidelines and removing120 RCW clusters from protection, the Service anticipates the incidental take in the form of harassment, harm, wound, kill, and or capture of **one additional active RCW group** as a result of training activities, wildfires, or training accidents. This take may be in the form of harass, harm, wound, or kill. This figure equals 1% of the proposed deprotected clusters.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that the anticipated level of incidental take is not likely to result in jeopardy to the species.

REASONABLE AND PRUDENT MEASURES (RPMs)

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of incidental take.

(1) Establish 8 additional recruitment clusters established for the purpose of maintaining demographic continuity of the local population, thereby minimizing the adverse impacts of the incidental take.
(2) Improve habitat conditions in RCW habitat surrounding the proposed construction areas.
(3) Track incidental take of RCW individuals known to occupy clusters 18, 34, 69, 105, 124, 247, 256, and 361 to facilitate a more accurate assessment of any future environmental baseline..
(4) Determine the stability of the Fort Stewart RCW population.
(5) Monitor any damage to the proposed unprotected clusters.

TERMS AND CONDITIONS (TCs)

In order to be exempt from prohibitions of section 9 of the Act, the Army must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

(1) [RPM(1)] Create eight additional RCW recruitment clusters. Existing unoccupied recruitment clusters within 0.5 mile of the project area can count towards this total. To prevent capture by neighboring groups, place recruitment clusters no closer than 0.25 miles of an existing cluster. To achieve beneficial spatial arrangement and density requirements, strive to locate recruitment clusters within 2 miles and preferably no farther than 1 mile from existing or newly created recruitment clusters (see 8B, USFWS 2003).
(2) [RPM (2)] Conduct prescribed burns at least once every 3 years, preferably during the growing season; conduct timber thinning operations and conduct monitoring activities in RCW habitat surrounding the project area to determine the effectiveness of habitat management actions. Examples of monitoring activities to be conducted include inspecting cavities to determine

activity status, banding adult and nestling RCWs, and determining group composition in recruitment clusters.

(3) [RPM (3)] Color band all RCWs occupying clusters identified in RPM #3 prior to impact. Monitor color banded RCWs post translocation. Record movements (e.g., as determined by confirmed presence in other RCW clusters) presence, and breeding status of color banded individuals during annual RCW monitoring. For a period of five years after range construction, provide annual reports to the Service's Coastal Georgia field office.

(4) [RPM (4)] Conduct a simulation study (e.g., Letcher et al. 1998) of the Fort Stewart RCW population to estimate stability such that the spatial distribution of territories and foraging partitions can be accounted for and perhaps maximized in future management plans and military construction projects.

(5) [RPM (5)] Visit deprotected cavity trees once a year for 5 years and record any damage or destruction of trees in annual reports to the Service's Coastal Georgia field office.

Upon locating a dead, injured, or sick individual of an endangered or threatened species, initial notification must be made to the Coastal Georgia Fish and Wildlife Service Ecological Services Field Office at 4980 Wildlife Drive, Townsend, Georgia 31331. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

These reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no more than **nine RCW groups**, will be incidentally taken. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking, and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on a listed species or critical habitat, to help implement recovery plans, or to develop information. We recommend implementation of the following conservation recommendation: assist private landowners adjacent to Fort Stewart in restoring native longleaf pine habitats for the benefit of wildlife species that utilize these habitats, such as the RCW.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the February 1, 2010, request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Army involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount of incidental take is exceeded; (2) new information reveals effects of the agency action

that may affect listed species in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species not considered in this opinion; or, (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease pending reinitiation of consultation.

The Service appreciates the cooperation of Fort Stewart personnel during this consultation. We would like to continue working with you and your staff regarding this proposed project. For further coordination please contact staff biologist Robert Brooks at (912) 832-8739.

Sincerely,

Sandra S. Tucker
FOR Field Supervisor

cc: file
FWS, ES, Townsend, GA
FWS, ES, Jackson, MS (RCW Coordinator)
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United States Department of the Interior

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March 4, 2010

Colonel Kevin W. Milton
Office of the Garrison Commander
Department of the Army, Installation Management Command
Headquarters, U.S. Army Garrison
954 William H. Wilson Avenue
Fort Stewart, Georgia 31314
Attn: Mr. Tim Beary,
DPW, Fish and Wildlife Branch

Re: FWS Log # 2010-0137

Dear Colonel Milton:

This letter acknowledges the U.S. Fish and Wildlife Service's (Service's) February 4, 2010, receipt of your letter requesting initiation of formal section 7 consultation under the Endangered Species Act. This consultation concerns the possible effects from the proposed construction, operation, and maintenance of 12 new ranges and an Unmanned Aerial System (UAS) site on Fort Stewart, Georgia, on the red-cockaded woodpecker (*Picoides borealis*), frosted flatwoods salamander (*Ambystoma cingulatum*), eastern indigo snake (*Drymarchon corais couperi*), and wood stork (*Mycteria americana*).

The Service has determined that all information required of you to initiate formal consultation has been received or is otherwise accessible for our consideration and reference. We have assigned log number 2010-0137 to this consultation. Please refer to this number in future correspondence on this consultation. Section 7 allows the Service up to 90 calendar days to conclude formal consultation with your agency and an additional 45 calendar days to prepare our biological opinion (unless we mutually agree to an extension). Therefore, we expect to provide you with our biological opinion no later than June 19, 2010.

As a reminder, the Endangered Species Act requires that after initiation of formal consultation, the Federal action agency may not make any irreversible or irretrievable commitment of resources that limits future options. This practice insures agency actions do not preclude the formulation or implementation of reasonable and prudent alternatives that avoid jeopardizing the continued existence of endangered or threatened species or destroying or modifying their critical habitats.

If you have any questions about this consultation or the consultation process in general, please feel free to contact me or staff biologist Robert Brooks of our Coastal office at (912) 832-8739, extension 107.

Sincerely,

Sandra S. Tucker

Sandra S. Tucker
Field Supervisor

cc: File
FWS, ES, Townsend, GA

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

FEB 01 2010

Office of the Garrison Commander

US Department of the Interior
Fish and Wildlife Service
ATTN: Sandra Tucker
4270 Norwich Street
Brunswick, Georgia 31520

Dear Ms. Tucker:

Fort Stewart proposes to construct and operate12 ranges and an Unmanned Aerial System site. Additionally, Fort Stewart will implement the 2007 Guidelines for the Management of the Red-cockaded Woodpecker (RCW) on Army Installations. A Biological Assessment (BA) has been prepared in accordance with the requirements of the Endangered Species Act. The conclusion reached in this BA is that the proposed action will adversely affect the RCW, will not adversely affect the eastern indigo snake, frosted flatwoods salamander, or wood stork, and will not affect the shortnose sturgeon. The proposed action will not prevent Fort Stewart from achieving its RCW recovery goal of 350 potential breeding groups because Fort Stewart will have enough suitable or potentially suitable RCW habitat to support 665 clusters post-project.

If additional information is needed, please contact Mr. Tim Beaty, Directorate of Public Works, Fish and Wildlife Branch at telephone (912) 767-7261. Your continued cooperation and assistance are appreciated.

Sincerely,

Kevin W. Milton
Colonel, US Army
Commanding

Enclosures

BIOLOGICAL ASSESSMENT

For Range and Infrastructure Construction Projects Associated with the Fort Stewart Mission and Master Planning Environmental Impact Statement

Fort Stewart, Georgia

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Approved By:

THOMAS C. FRY
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Directorate of Public Works
Fort Stewart, GA

Biological Assessment for Range and Infrastructure Construction Projects Associated with the Fort Stewart Mission and Master Planning Environmental Impact Statement

Project Descriptions

The action area for each project in this Biological Assessment consists of the proposed range opening plus, at a minimum, a 100-foot buffer.

Multipurpose Machine Gun Range (MPMGR)

The proposed action is to construct a standard design Automated MPMGR that will lie within Fort Stewart Training Areas (FSTA) D7.2, D8.1, and D11.2 (Figure 1). Primary facilities include the MPMGR, site development, classroom building, ammunition breakdown building, bleacher enclosure, range control tower, range operations and storage building, latrine, covered mess and building and information systems. Supporting facilities include electric service, paving, site improvements, storm drainage, and information systems. This action consists of constructing a 302.6-acre range that includes a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing Red-cockaded Woodpecker (RCW) Habitat Management Unit (HMU). The 134,000 acre RCW HMU is defined in Fort Stewart's Integrated Natural Resource Management Plan (INRMP 2001).

Infantry Platoon Battle Course (IPBC)

The proposed action is to construct a standard design Automated IPBC in FSTA C1 (Figure 1). Primary facilities include the Battle Course and the Helicopter Landing Zones. The battle course includes the target emplacements, downrange electrical, vehicle staging area, range operations tower, operations/storage building, classroom building, latrine, covered mess, ammunition breakdown building, bleacher enclosure, and building information systems. Supporting facilities include electrical service, site improvements, and information systems. This action consists of constructing a range that will total 1,761 acres including a buffer where bullet impact may degrade habitat quality. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

Modified Record Fire Range Delta (MRFRD)

The proposed action is to construct a MRFRD in FSTA D6.1 and D6.2 (Figure 1). Primary facility includes all construction within the perimeter of the range complex and consists of a control tower, range operations and storage, latrine, instruction building, ammunition breakdown building, covered mess, maintenance trails, firing positions, target emplacements, secondary power, and data distribution systems. Supporting facilities include electric service, storm drainage, subsurface unexploded ordnance, gravel and asphalt roads and parking, signs and barricades, and site improvements. This action consists of constructing a 34-acre range including a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

Infantry Squad Battle Course (ISBC)

The proposed action is to construct an ISBC within FSTA B3 (Figure 1). Primary facilities include: target systems, downrange power and instrumentation, Range Operations Center, operations/storage building, latrine, and General Instruction building, bleacher enclosure, covered mess building, ammunition breakdown building, vehicle staging area, and vehicle parking. This action consists of constructing a 300.7-acre range that includes a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

Qualification Training Range (QTR)

The proposed action is to construct a QTR in FSTA D7 (Figure 1). Primary facilities include range control towers, general instruction building, range operations and storage building, ammunition breakdown building, covered mess, bleacher enclosure, and latrine. Supporting facilities include electrical service, storm drainage, paving, utilities, and site improvements. Antiterrorism measures will be provided. This action consists of constructing a 261.3-acre range that includes a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

Digital Multipurpose Training Range (DMPTR)

The proposed action is to construct a DMPTR in FSTA B9 and B10 (Figure 1). This proposed action involves modernizing an existing range with additional targets, new target emplacements, automated scoring and scenarios, replacing existing support facilities, and adding needed buildings. This action consists of constructing a 1,057.4-acre range that includes a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

10/25M Zero Range

The proposed action is to construct a 10/25M Zero Range in FS TA D5 (Figure 1). This action consists of constructing a 3.8-acre range including a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

Combat Pistol/Military Police Firearms Qualification Course (CPMPQC)

The proposed action is to construct an Automated CPMPQC within FSTA D5 (Figure 1). Primary facilities include the Automated CP/MPQC, site development, range operations tower, general instruction building, range operations and storage building, ammunition breakdown building, covered mess, bleacher enclosure, and latrine. This action consists of constructing a 4.0- acre range including a 50-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of RCW HMU.

Known Distance Range (KDR)

The proposed action is to construct a KDR within FSTA D8, D9, and D10 (Figure 1). Primary facilities include the KDR, range operations control area, and ammunition breakdown building.

Antiterrorism measures will be provided. Supporting facilities include electric service. This action consists of constructing a 68.5-acre range that includes a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

Fire and Movement Range (FMR)

The proposed action is to construct a FMR with target systems within FSTA C3 (Figure 1). Primary facilities include the FMR, range operations center, operations/storage building, bleacher enclosure, ammunition breakdown building, and latrine. Supporting facilities include electrical service, information systems, and site improvements. This action consists of constructing a 5.1-acre range within existing non-forested area.

Modified Record Fire Range Bravo (MRFRB)

The proposed action is to upgrade the existing range to a MRFRB in FSTA B4 (Figure 1). Primary facilities include: upgrading firing lanes to standard width, target emplacements, downrange power and data, walk-in firing positions, stationary infantry target emplacements, range operation control tower, operations and storage building, classroom building, ammunition breakdown building, covered mess, latrine, covered bleachers, and building information systems. Supporting facilities include electrical service, water, sewer and gas, site improvements, and information systems. This action constructing a range on 10.8 acres of non-forested area and 22.2 acres of RCW HMU, including a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

Convoy Live Fire Course (CLFC)

The proposed action is to construct a standard CLFC (Figure 1). Primary facilities include the CLFC with multiple training stations, convoy road, range operations and storage building, range operations control area, latrine, and unit staging area. Supporting facilities include electric service and site improvements.

a. **Task 1 Entry Control Point -** This action consists of constructing a 10.1-acre range including a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

b. **Task 2 Sniper -** This action consists of constructing a 15.6-acre range including a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

c. **Task 3 Rocket-Propelled Grenade (RPG) Team -** This action consists of constructing a 10.9-acre range including a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

d. **Task 4 Ambush Blocked -** This action consists of constructing a 40.9-acre range including a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

e. **Task 5 Urban Ambush -** This action consists of constructing a 39.4-acre range including a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

f. **Task 6 Tech Trucks -** This action consists of constructing a 31.0-acre range including a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

g. **Task 7 Near Ambush -** This action consists of constructing a 45.1-acre range including a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

Unmanned Aerial System (UAS)

The proposed action is to construct standard design facilities to support an UAS unit in FSTA A19.1 (Figure 1). Primary facilities include a standard design Aviation unit Maintenance hangar with shops and aprons. Also, included are an aircraft tie down area, hangar apron, resurfaced taxiway, aircraft wash rack, oil/water separator and access road, warm-up pads, container storage yard, and an elevated water storage tank. Supporting facilities include electrical distribution, taxiway, lighting, water distribution system, sanitary sewer collection system, natural gas line, parking lot, paving, walks, curbs, gutters, storm drainage system, wetland mitigation, information systems, landscaping, and site improvements. This action consists of constructing a 103.5-acre aerial system that includes a 100-foot buffer around the facility. Construction will require clear cutting, grubbing, and grading of existing RCW HMU.

Implementation of the 2007 Army Guidelines for Management of the RCW

For Stewart will implement the 2007 revision of the Management Guidelines for the Red-cockaded Woodpecker on Army Installations (1996). The 2007 revision calls for removal of training restrictions in RCW clusters based on the number of PBGs in the population with the goal of removing training restrictions on all RCW clusters at the time the Installation's population recovery goal is reached, according to the following schedule (Table 1).

Table 1. Schedule of training restriction removal based on the number of PBGs.

Total PBGs	Restrictions Removed	Cumulative Total*
251-275	25 clusters	25 clusters
276-300	50 clusters	75 clusters
301-350	150 clusters	225 clusters
>350	Restrictions removed on all clusters	

*These are in addition to recruitment clusters established with no training restrictions in accordance with the 1996 or 2007 Army RCW Guidelines (aka supplemental recruitment clusters).

Fort Stewart had 315 PBGs at the end of the 2009 nesting season, so the number of cluster sites to be deprotected will be 75 plus 3 clusters for every PBG in excess of 300, or an additional 45 clusters for a total of 120 clusters to be deprotected. The locations of clusters slated for training restriction removal will be determined by the Fish and Wildlife Branch in coordination with the Directorate of Plans, Training, Mobilization, and Security, and will be coordinated with the USFWS. Locations of clusters with training restrictions will be based on minimizing effects on training operations, risk of disturbance to clusters, and minimizing demographic isolation. Status and performance of clusters, whether protected or unprotected, will continue to be monitored under the sampling scheme designated in the 2007 revision of the 1996 RCW management guidelines.

Site Descriptions

MPMGR

Habitat within the proposed action area is composed of a canopy dominated by slash pine (*Pinus elliottii*), longleaf pine (*P. palustris*), and loblolly pine (*P. taeda*), with a midstory of sweetgum (*Liquidambar styraciflua*), water oak (*Quercus nigra*), live oak (*Q. virginiana*), wax myrtle (*Myrica cerifera*), and red bay (*Persea borbonia*). The groundcover is characterized by saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*), shiny blueberry (*Vaccinium myrsinites*), huckleberry (*Gaylusaccia frondosa*), runner oak (*Q. pumila*.), rusty lyonia (*Lyonia ferruginea*), wiregrass (*Aristida stricta*), and switch-cane (*Arundinaria gigantea*). Wetland systems adjacent to the proposed project are dominated by pond cypress (*Taxodium ascendens*), blackgum (*Nyssa sylvatica*), pond pine (*P. serotina)*, red maple (*Acer rubrum*), black titi (*Cliftonia monophylla)*, and red bay. The dominant soil types within the project area are Leefield loamy sand, Mascotte fine sand, Stilson loamy sand, Ellabelle loamy sand, Pelham loamy sand, and Johnston and Bibb soils.

IPBC

Habitat within the proposed action area is composed of a canopy dominated by slash pine, longleaf pine, and loblolly pine, with a midstory of sweetgum, water oak, live oak, wax myrtle, and red bay. The groundcover is characterized by saw palmetto, gallberry, shiny blueberry, huckleberry, runner oak, rusty lyonia, wiregrass, and switch-cane. Wetland systems adjacent to the proposed project are dominated by pond cypress, blackgum, pond pine, red maple, black titi, and red bay. Dominant soils in the action area are Pelham loamy sand, Stilson loamy sand, Ellabelle loamy sand, Mascotte sand, and Olustee fine sand.

MRFRD

Habitat within the proposed action area consists of a canopy dominated by loblolly pine, slash pine, longleaf pine, and a midstory of sweetgum, water oak, live oak, wax myrtle, and red bay. The groundcover is characterized by saw palmetto, gall berry, shiny blueberry, huckleberry, Virginia chain-fern (*Woodwardia virginica*), oaks, rusty lyonia, wiregrass, cinnamon fern (*Osmunda cinnamomea)*, and switch grass. Wetland systems adjacent to the proposed project are dominated by pond cypress, blackgum, red maple, and swamp bay (*Persea palustris*). The

prominent soil types within the project area are Fuquay loamy sand, Mascotte fine sand, Pelham loamy sand, and Stilson loamy sand.

ISBC

Habitat within the proposed action area consists of a mix of loblolly pine and slash pine interspersed with live oak and southern magnolia (*Magnolia grandiflora*). Wetlands in the proposed action area are forested by pond cypress, black gum, red maple, and sweetgum. The groundcover in the action area is sparse and mostly herbaceous. Soils types in and adjacent to the action area are Johnston and Bibb, Echaw and Centenary fine sands, and Chipley sand.

QTR

Habitat within the proposed action area is composed of a canopy dominated by slash pine, longleaf pine, and loblolly pine, with a midstory of sweetgum, water oak, live oak, wax myrtle, and red bay. The groundcover is characterized by saw palmetto, gallberry, shiny blueberry, huckleberry, runner oak, rusty lyonia, wiregrass, and switch-cane). Wetland systems adjacent to the proposed project are dominated by pond cypress, blackgum, pond pine, red maple, black titi, and red bay. The dominant soil types within the project area are Leefield loamy sand, Mascotte fine sand, and Pelham loamy sand.

DMPTR

The proposed action area consists of open areas with low, sparse vegetation with some forested areas. Wetlands on Fort Stewart typically are forested by pond cypress, black gum, and sweetgum, while sandhills and flatwoods communities are dominated by longleaf, slash, and loblolly pine with an open understory dominated by pyrogenic grass species that are characteristic of pine forests in the lower Atlantic coastal plain prior to European settlement (e.g., *Aristida* and *Sporobolus*). Ericaceous species (e.g., *Vaccinium*, *Gaylussacia*) and gallberry also are common in these habitats. Old fields are characterized by an understory of broom-sedge species (*Andropogon*) and leaf litter, and often have heavy hardwood (e.g., water oak) midstory components and an overstory composed primarily of loblolly pine. The proposed project area burns frequently by application of prescribed fire predominately in the dormant season (November-February), or by wildfire in all seasons. Soil types in the action areas include Albany loamy fine sand, Blanton sand, Chipley sand, Echaw and Centenary fine sand, Johnston and Bibb soils, Leefield loamy sand, Mandarin fine sand, Mascotte fine sand, and Pelham loamy sand.

10/25M Zero Range

Habitat within the proposed action area is composed of a canopy dominated by longleaf pine and slash pine. Wetlands in the proposed action area are forested by pond cypress, black gum, and sweetgum. The groundcover in flatwoods systems is dominated by pyrogenic grass species (*Aristida* and *Sporobolus*) that are characteristic of pine forests in the lower Atlantic coastal plain prior to European settlement. Ericaceous species (*Vaccinium*, *Gaylussacia*) and gallberry also are common in these habitats. Soils types in and adjacent to the action area are Ellabelle loamy sand, Johnston and Bibb soils, and Mascotte fine sand.

CPMPQC

Habitat within the proposed action area is dominated by longleaf pine and slash pine. Wetlands in the proposed action area are forested by pond cypress, black gum, and sweetgum. The groundcover in flatwoods systems is dominated by pyrogenic grass species (*Aristida* and *Sporobolus*) that are characteristic of pine forests in the lower Atlantic coastal plain prior to European settlement. Ericaceous species (*Vaccinium*, *Gaylussacia*) and gallberry also are common in these habitats. Soils types in and adjacent to the action area are Ellabelle loamy sand and Mascotte fine sand.

KDR

Habitat within the proposed action area is a mix of loblolly pine and slash pine interspersed with live oak and southern magnolia. Wetlands in the proposed action area are forested by pond cypress, black gum, red maple and sweetgum. The groundcover in the action area is sparse and, where present, mostly herbaceous. Soils types in and adjacent to the action area are Leefield loamy sand, Pelham loamy sand, and Mascotte fine sand.

FMR

This is an open area with regions of sparse vegetation that includes slash pine. The groundcover in the action area is sparse and includes gallberry and saw palmetto. Soils types in and adjacent to the action area are Olustee fine sand, Chipley fine sand, and Mascotte sand.

MRFRB

This area is primarily composed of open areas that are currently used as a small arms firing range. Within the forested areas the overstory is a mixed pine flatwoods with a canopy composed of loblolly, slash, and longleaf pine with a groundcover of saw palmetto, gallberry, shiny blueberry, huckleberries, bracken fern (*Pteridium aquilinum*), rusty lyonia, and wiregrass. Soil types in the action areas include Echaw and Centenary fine sand and Mandarin fine sand.

CLFC

Habitat within the entire proposed action area is composed of forested areas of a canopy dominated by slash pine, longleaf pine, and loblolly pine, with a midstory of sweetgum, water oak, live oak, wax myrtle, and red bay. The groundcover is characterized by saw palmetto, gallberry, shiny blueberry, huckleberry, runner oak, rusty lyonia, wiregrass, and switch-cane. Wetland systems adjacent to the proposed project are dominated by pond cypress, blackgum, pond pine, red maple, black titi, and red bay. Dominant soil types in action area are Mascotte sand, Albany fine sand, Ellabelle loamy sand, Chipley fine sand, Olustee fine sand, and Leon fine sand.

UAS

The proposed action area consists of forested habitat and open areas including an airstrip. Forested habitat with the proposed action area is composed of a canopy dominated by slash pine, pond pine and loblolly pine, with a midstory of sweetgum, water oak, live oak, wax myrtle, and red bay. The groundcover in the action area is dominated by saw palmetto, gallberry, shiny blueberry, huckleberry, rusty lyonia, and switch-cane. Soil types in the action area consists of Ocilla loamy fine sand, Mandarin fine sand, Rutlege fine sand, and Stilson loamy sand.

SPECIES CONSIDERED

The following species occur or may occur in the proposed action area and were considered in this assessment:

Red-cockaded Woodpecker (*Picoides borealis*) - Endangered

Eastern Indigo Snake (*Drymarchon corais couperi*) -Threatened

Frosted Flatwoods Salamander (*Ambystoma cingulatum*) – Threatened

Wood Stork (*Mycteria americana*) – Endangered

Shortnose Sturgeon (*Acipenser brevirostrum*) – Endangered

Life history, habitat, distribution, status, and threats that may affect listed species survival are discussed in Fort Stewart's Endangered Species Management Plan (2001).

EFFECTS OF THE ACTIONS

Red- Cockaded Woodpecker

Fort Stewart has an active management and monitoring program for the RCW (Integrated Natural Resource Management Plan [INRMP], Directorate of Public Works [DPW] 2001). Much research has been conducted on the RCW and the results of this research were compiled in the Red-cockaded Woodpecker (*Picoides borealis*) Recovery Plan: *Second Revision* (USFWS 2003). Fort Stewart abides by the most current research and management recommendations contained in the RCW Recovery Plan.

A May 2005 memorandum from Noreen Walsh, Assistant Regional Director, Ecological Services, USFWS, Atlanta, GA entitled "Implementation Procedures for Use of Foraging Habitat Guidelines and Analysis of Project Impacts under the Red-cockaded Woodpecker (RCW) Recovery Plan: Second Revision" describes parameters and concepts to be considered when federal properties analyze projects that may affect RCWs. There are potentially 5 levels of analysis to consider in the preparation of biological assessments, with the analyses conducted in the following order: 1) foraging partition, 2) group, 3) neighborhood, 4) population, and 5) recovery unit. The results of each level of analysis predicate the necessity to conduct subsequent analyses.

Foraging Partition Level Analysis

The RCW Recovery Plan requires that a foraging analysis be performed using the Foraging Matrix (hereafter, Matrix) analysis tool for all active RCW clusters that may be impacted by a project. Federal agencies must perform an analysis of all affected foraging partitions to determine if they meet the RCW Recovery Standard (RS) of Good Quality Foraging Habitat (GQFH). If foraging partitions fail to meet the RS, then the foraging partition must be analyzed to determine if it meets the Managed Stability Standard (MSS) that is applicable on private lands. All active partitions within the project areas were analyzed using the Matrix for the RS and for the MSS. No stands within any foraging partition met the RS (i.e., there were no acres of GQFH) for pre-project analyses, therefore we analyzed the pre and post-project stands of all active clusters receiving indirect impacts (i.e., loss of a portion of their foraging partition) using the MSS requirements (Table 3).

RCW Group Level Analysis

Since 1995, RCW population demographics have been intensively monitored in a 25% randomly selected sample of clusters as well as in RCW recruitment clusters that have been active for < 5 years. Additionally, we band many chicks opportunistically in order to provide juvenile birds for translocations. Specifically, Fish and Wildlife Branch biologists and interns account for the number of RCW adults, eggs, chicks, fledglings, and helpers in each of the clusters either by capture, or by colored leg band identification with a spotting scope. Also included in the Group Analyses are the numbers of active clusters within 1.25 miles of affected clusters (Density Analyses, Table 1). Conner and Rudolph (1991) determined that an active cluster that has < 2.5 active clusters within 1.25 miles has a low probability of persistence due to critically low density of neighboring RCWs. They also implied that an active cluster with > 4.7 active clusters within 1.25 miles has a high probability of persistence due to a high density of neighboring RCWs. We created another category (moderate density) for active clusters that have between 2.5 and 4.7 active clusters within 1.25 miles and would be expected to have a moderate probability of persistence.

RCW Neighborhood Level Analysis

The neighborhood analysis requires knowledge of RCW dispersals that may have crossed the project area. Once dispersals are accounted for and dispersal distances are calculated, a mean action area dispersal rate (AADR) is defined. The intent of the neighborhood analysis is to account for the potential negative impacts to which RCWs are vulnerable when landscapes are fragmented. Not only can this condition negatively affect the ability of adjacent RCWs to occupy a cluster when breeding vacancies occur, it also has the potential for significant impacts to foraging behavior and efficiency (Conner and Rudolph 1991).

Population Level Analysis

The Population Level Analysis requires estimates of the percent of: 1) inactive clusters, 2) solitary bird groups, and 3) captured clusters at the time when the habitat-based population goal is likely to be achieved such that values for these parameters can be subtracted from the population goal (measured in active clusters), along with the number of groups predicted to be

lost due to project-related impacts. Analysis of Fort Stewart data determined on average, 41% of clusters sites are inactive (n=15 years of data), 7% of active clusters are occupied by a solitary RCW (n=12), and 2% of active clusters are captured by adjacent clusters (n=9). However, we do not believe that subtracting these estimates from the Regional Recovery Goal of 500 active clusters is illustrative for the Fort Stewart RCW population for the following reasons:

1) The percent of inactive clusters is unnaturally high because of Fort Stewart's aggressive recruitment cluster program. Per the Fort Stewart INRMP, we provide new recruitment sites or maintain existing unoccupied recruitment sites at a rate of 15% of active clusters every year. At the end of the 2009 RCW breeding season there were 416 RCW cluster sites, 403 of which were under active management. Of the 403 managed clusters, 330 (82%) were active. Therefore, we are required to maintain at least 50 (15% of 330) vacant recruitment clusters going into the 2010 RCW breeding season. We consistently exceed the 15% vacant recruitment cluster requirement and will do so again for the breeding season of 2010 by having 73 (22% of active clusters) managed recruitment clusters for dispersing RCWs. There are another 13 inactive, unmanaged clusters that eventually will be relocated geographically to more suitable locations.

The effect of having a large number of unoccupied recruitment clusters is that it diminishes the percentage of overall managed clusters identified as active. Regardless of appearances, we believe our aggressive recruitment cluster program enhances the RCW population growth rate on the installation.

There are an additional 322 sites that Fish and Wildlife Branch personnel have located on the landscape that will serve as future recruitment sites. In any given year, the decision as to which of these 322 sites, or which of the existing unoccupied recruitment sites, will be provisioned with artificial cavities and count toward the 15% goal is determined by the performance of RCW groups adjacent to the recruitment sites. As the performance of RCW groups changes from year to year based on stochastic events (e.g., cluster activation or abandonment, loss or gain of a PBG, etc.), our plans for recruitment cluster establishment may change, resulting in an "excess" of inactive clusters.

2) As described in the RCW Recovery Plan (USFWS 2003), an increasing proportion of solitary RCW groups or captured clusters within a population are indicators of population decline. Percent of solitary RCW groups at Fort Stewart has fluctuated, ranging from as low as 7% to as high as 15% (it was 7% during the 2009 breeding season). Likewise, the percent of captured clusters has fluctuated, ranging from 1% to 5% (2% during the 2009 breeding season). For Fort Stewart's RCW population, both the percent solitary individuals and percent captured clusters exhibit declining trend lines (R^2 = 0.53 and 0.66, respectively), indicating a robust and increasing population. However, "excess" recruitment clusters on the landscape could confound the actual population parameters by providing ample sites for dispersing RCWs that, on a landscape with fewer recruitment clusters, would perish for lack of a roosting cavity or would be undetectable floaters in the population with a low probability of detection. Because of the equivocal nature of these 3 population parameters in the Fort Stewart population, we believe percent of active clusters with a PBG (91% as of the 2009 breeding season), in conjunction with the amount of suitable or potentially suitable RCW habitat, are better predictors of our ability to achieve population recovery, which would be achieved at 385 active clusters. Assuming a 15% inactive

cluster rate, 453 clusters would be required. Fort Stewart will have enough suitable or potentially suitable RCW habitat to support 665 clusters post-project.

Impacts to RCWs arising from each individual project are summarized below. Some clusters are impacted by > 1 project. A summary of impacts to each cluster is provided at Table 3.

MPMGR

Fort Stewart Fish and Wildlife Branch personnel surveyed the proposed action area for RCW cavity and start trees and no new RCW cavity trees were found. The proposed project lies within the foraging partitions of clusters 124, 247, 300, 356, and 381. Construction of the project will remove 130.7 acres of existing RCW HMU as identified in Fort Stewart's INRMP (DPW 2001) (Figure 3).

Foraging Partition Level Analysis

Clear-cutting to facilitate construction of the action area will impact 5 active RCW clusters (Figure 2). Clusters 124 and 247 will receive direct impacts from the MPMGR and the QTR that will result in incidental take. Cluster 247 will be directly impacted by the removal of all RCW cavity trees. After action, Cluster 124 will be directly impacted by the removal of 1 RCW cavity tree and will fail to meet MSS due to having only 28.4 acres of foraging habitat remaining. Three clusters (300, 356, and 381) will lose a portion of their foraging habitat, but will continue to meet MSS and are expected to persist after range construction because they will have adequate foraging resources available and will have > 4.7 active clusters within 1.25 miles (Table 2 and RCW Group Level Analysis, below).

RCW Group Level Analysis

Cluster 124: This cluster has been active every year since 1994. This group nested in 1994, and from 1997-2005. However, this cluster was monitored for activity only for 2008-09 breeding seasons. It successfully fledged chicks from 1997-2002. One helper was present during the breeding seasons of 2000-2002.

Cluster 247: This cluster has been active every year since 1995. This group nested from 1995-1996 and in 2008. It fledged young from 1999-2005. There was 1 helper present in 1999-2000, 2003, and 2006-2008.

Cluster 300: This cluster was initiated in the winter of 2000. Since then it has been active every year except 2005. It nested every year from 2003 to 2007 except for 2005. It has not fledged any chicks.

Cluster 356: This cluster was created in the winter of 2003. It has been active and has nested every year except 2007. It successfully fledged chicks in 2003, 2006, and 2008. It had a helper for the 2003-2004 and 2006-2007 breeding seasons.

Cluster 381: This cluster was initiated in the fall of 2004. It has been active every year since 2006. It nested in 2008-2009 and it fledged 2 birds in 2008.

RCW Neighborhood Level Analysis

Since 1994, 712 Fort Stewart RCW dispersals have been documented, including 5 that crossed the proposed action area. The mean dispersal distance for Fort Stewart's RCW population is 3.96 miles (range 0.20 – 24.11 miles). Therefore, the neighborhood for this project area is 3.96 miles from the boundary of the proposed action area and encompasses 32,667acres, 18,685 acres of which lie within RCW HMU. Currently, there are 45 active RCW clusters within the dispersal neighborhood (excluding the affected clusters analyzed in the Group Level Analysis). Although 45 active clusters fall within the average dispersal distance, it is unlikely that these clusters will receive a direct or indirect effect. In addition to dispersal events that crossed the proposed action area, we documented 52 other dispersal events (range 5.98 – 23.45 miles) "across" existing Red Cloud Range openings and the Artillery Impact Area (AIA), a much larger forest opening (5 miles x 5 miles). It is unlikely that RCWs actually crossed these large blocks of unsuitable habitat, but rather went around the existing openings in suitable forested habitat. Consequently, the number of groups estimated to be affected due to construction of the MPMGR is less than the 45 groups occurring in the project neighborhood. Clusters that are considered to be most vulnerable to the effects of habitat fragmentation are those lying within 0.5 miles (Rudolph and Conner 1991), however, we expect that all of clusters in the project neighborhood will persist after construction because there will be sufficient habitat remaining after construction to support all RCW groups indirectly affected by construction. Additionally, the MPMGR is relatively small compared to the AIA and dispersal events of RCWs should be only minimally impacted.

To summarize the impacts of construction, operation, and maintenance of the MPMGR to RCWs, we expect that 2 RCW groups will be lost (Cluster 247 due to clear-cutting of the cluster site and Cluster 124 due to lack of adequate foraging habitat). Three other clusters (300, 356, and 381) will lose some portion of their foraging habitat but will continue to meet MSS.

IPBC

Fort Stewart Fish and Wildlife Branch personnel surveyed the proposed action area for other RCW cavity and start trees and no new RCW cavity trees were found. The proposed project area lies within the foraging partitions of Clusters 18, 38, 67, 69, 70, 105, 179, 256, 342, and 361. Construction and operation of the IPBC will remove 900 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 7).

Foraging Partition Level Analysis

Clear-cutting to facilitate construction of the IPBC and the building of berms for habitat protection will impact 10 active RCW clusters (Figure 6). Five clusters (18, 69, 105, 256, and 361) will receive direct impacts from the IPBC that will result in incidental take. Clusters 69, 105, 256, and 361 will be directly impacted by the removal of all trees from the clusters. Cluster 18 will not meet MSS post-construction because of inadequate acreage (< 75 acres) in its foraging partition. Cluster 38 will lose 1 inactive RCW tree (808) and does not meet MSS. However, Cluster 38 will have 108.2 acres of habitat remaining after construction and should persist long-term. Currently, Cluster 67 does not meet MSS due to a paucity of pines >10 inches diameter breast high (DBH). However, Cluster 67 should persist long-term because it will exceed 75 acres of habitat. Currently, Cluster 342 does not meet MSS but would pass if pines <

10 inches DBH were thinned. Pines < 10 inches DBH will be thinned to bring this cluster to MSS. Clusters 70 and 179 meet MSS and will lose a portion of their foraging partition but are expected to persist after construction of the proposed action because they will have adequate foraging resources remaining post-construction. Clusters 38, 67, 70, 179, and 342 will have > 4.7 active clusters within 1.25 miles post-construction and should persist long term (Table 2 and RCW Group Level Analysis, below).

To summarize the Foraging Partition Level Analysis, direct impacts from construction will result in the incidental take of Clusters 18, 69, 105, 256, and 361. Clusters 38, 67, and 342 failed MSS, but will have adequate foraging acres post-project and we expect them to persist long-term. Indirect impacts from construction (loss of foraging habitat) will affect clusters 70 and 179 but they should persist post-construction.

RCW Group Level Analysis

Cluster 18: This cluster has been active every year since 1996. It nested in 2002, 2004, 2006, and 2009. It has not fledged any juveniles.

Cluster 38: This cluster has been active every year since 1994. It has nested every year since 1995 except for 2008. It has fledged juveniles every year since 1995 except for 1998, 2008, and 2009. It has had helpers for the 1997, and 1999-2008 breeding seasons.

Cluster 67: This cluster has been active and nested since 1994. It has fledged juveniles every year except the 2009 breeding season. It has had helpers every year except the 2009 breeding season.

Cluster 69: This cluster has been active every year since 2003 except for 2004. It nested in 2006, 2007, and 2009. It has not fledged any juveniles and has no helpers.

Cluster 70: This cluster has been active every year since 1996. It nested in 1997, 1999-2001, 2003-2005, 2007 and 2009. It fledged juveniles in 1997, 1999-2000, and 2003. It had a helper for the 2009 breeding season.

Cluster105: Cluster was relocated from FSTA C1.1 in 2005. It was active in 2007 -2009. It nested in 2009. It had helpers for the 2008 breeding season.

Cluster 179: This cluster has been active every year since 1994. It has nested in 1996-2002, 2004-2005, and 2007-2009. It fledged juveniles in 1996-1999, 2001-2002, and 2009. It had helpers for the 2000 breeding season.

Cluster256: This cluster was provisioned during the fall of 1997. This cluster has been active every year since 2001. It has nested every year since 2001 except for 2006 and 2008 breeding season. It has fledged juveniles for 2001, and 2003-2004. It had helpers for the 2002, 2005, and 2008-2009 breeding seasons.

Cluster 342: This cluster was provisioned during the fall of 2002. It was active during the 2003, 2005-2007, and the 2009 breeding season and nested 2005-2007. It fledged juveniles in 2005-2007. It had helpers during the 2006 and 2009 breeding seasons.

Cluster361: This cluster was provisioned in the fall of 2003. It has been active every year since 2005 and has nested every year except for 2008 breeding season. It fledged juveniles in 2006-2007. It had helpers for the 2006-2007 breeding seasons.

RCW Neighborhood Level Analysis

Since 1994, 712 Fort Stewart RCW dispersals have been documented, including 11 that crossed the proposed action area. The mean dispersal distance for Fort Stewart's RCW population is 3.96 miles (range 0.20 – 24.11 miles). Therefore, the neighborhood for this project area is 3.96 miles from the boundary of the proposed action area and encompasses 36,276.2 acres, 16,407 acres of which lie within RCW HMU. Currently, there are 70 active RCW clusters within the dispersal neighborhood (excluding the affected clusters analyzed in the Group Level Analysis). Although 70 active clusters fall within the average dispersal distance, it is unlikely that these clusters will receive a direct or indirect effect. In addition to dispersal events that crossed the proposed action area, we documented 52 other dispersal events (range 5.98 – 23.45 miles) "across" existing Red Cloud Range openings and the Artillery Impact Area (AIA), a much larger forest opening (5 miles x 5 miles). It is unlikely that RCWs actually crossed these large blocks of unsuitable habitat, but rather went around the existing openings in suitable forested habitat. Consequently, the number of groups estimated to be affected due to construction of the IPBC is less than the 70 groups occurring in the project neighborhood. Clusters that are considered to be most vulnerable to the effects of habitat fragmentation are those lying within 0.5 miles (Rudolph and Conner 1991), however, we expect that all of the clusters in the project neighborhood will persist, because there will be sufficient habitat remaining after construction to support all RCW groups indirectly affected by construction. Additionally, the IPBC is relatively small compared to the AIA and dispersal events of RCWs should be only minimally impacted.

To summarize the impacts of construction, operation, and maintenance of the IPBC to the RCW, 6 RCW groups will be lost (18, 69, 105, 256, and 361) due to inadequate foraging habitat or removal of trees. One RCW tree will be lost from Cluster 38. Two foraging partitions (Clusters 38 and 67) do not meet MSS due to inadequate pine BA > 10 inches, but we expect them to persist long-term because they have been active since 1994 and will have adequate foraging resources remaining post-construction. One foraging partition (Cluster 342) does not meet MSS due to an over abundance of pine BA < 10 inches. However, during construction of the IPBC stand 1453 will be thinned of pine BA < 10 inches and this partition will meet MSS. Two RCW groups currently meet MSS (Clusters 70 and 179) and will lose a portion of their foraging habitat, but will continue to meet MSS (Table 3).

MRFRD

Fort Stewart Fish and Wildlife Branch personnel surveyed the proposed action area for RCW cavity and start trees and none were found. The proposed project lies within the foraging partition of Cluster 407. The project will remove 31.5 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 1).

Foraging Partition Level Analysis

Clear-cutting to facilitate construction of the MRFRD will impact 1 active RCW cluster (407) (Figure 10), which will lose a portion of its foraging partition. Pre- and post-project foraging habitat for Cluster 407 meets the threshold for MSS (Table 3) and is expected to persist after construction of the MRFRD because it will all have adequate foraging resources available and will have a moderate density of active RCW clusters within 1.25 miles (Table 2 and RCW Group Level Analysis, below).

To summarize the Foraging Partition Level Analysis, indirect impacts from construction (loss of foraging habitat) will affect cluster 407 but it is expected to persist post-construction of the MRFRD.

RCW Group Level Analysis

Cluster 407: This cluster was provisioned in the fall of 2006. It was active 2008 and 2009. It has not nested since it was provisioned.

RCW Neighborhood Level Analysis

Since 1994, 712 Fort Stewart RCW dispersals have been documented; however none crossed the proposed action area. The mean dispersal distance for Fort Stewart's RCW population is 3.96 miles (range 0.20 – 24.11 miles). Therefore, the neighborhood for this project area is 3.96 miles from the boundary of the proposed action area and encompasses 32,670 acres, 16,520 acres of which lie within the RCW HMUs. There currently are 27 active RCW clusters within the dispersal neighborhood (excluding the affected cluster analyzed in the Group Level Analysis). Although 27 active clusters fall within the average dispersal distance, it is unlikely that these clusters will receive a direct or indirect effect. In addition to dispersal events that crossed the proposed action area, we documented 52 other dispersal events (range 5.98 – 23.45 miles) "across" existing Red Cloud Range openings and the Artillery Impact Area (AIA), a much larger forest opening (5 miles x 5 miles). It is unlikely that RCWs actually crossed these large blocks of unsuitable habitat, but rather went around the existing openings in suitable forested habitat. Consequently, the number of groups estimated to be affected due to construction of the MRFRD is less than the 27 groups occurring in the project neighborhood. Clusters that are considered to be most vulnerable to the effects of habitat fragmentation are those lying within 0.5 miles (Rudolph and Conner 1991), however, we expect that all of the clusters in the project neighborhood will persist, because there will be sufficient habitat remaining after construction to support all RCW groups indirectly affected by construction. Additionally, the MRFRD is relatively small compared to the AIA and dispersal events of RCWs should be only minimally impacted.

To summarize the impacts of construction, operation, and maintenance of the MRFRD to RCWs: Cluster 407 will lose a portion of its foraging habitat but will continue to meet MSS and is expected to persist.

ISBC

Fort Stewart Fish and Wildlife Branch personnel surveyed the proposed action area for RCW cavity and start trees and none were found. A portion of the proposed project lies within the foraging partitions of Clusters 103 and 268. Construction of the project will remove 153.8 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 15).

Foraging Partition Level Analysis

Clear-cutting to facilitate construction of the ISBC will impact the foraging partitions of 2 RCW groups (103 and 268) (Figure 14). Clusters 103 and 268 will receive indirect impacts from construction due to the loss of foraging habitat. Pre- and post-project foraging habitat meets the threshold for MSS (Table 3) and are expected to persist after construction of the ISBC because they will all have adequate foraging resources available and will have > 4.7 active clusters within 1.25 miles (Table 2 and RCW Group Level Analysis, below).

RCW Group Level Analysis

Cluster 103: This cluster has been active since 1994 and has nested every year since 1999, except 2008 and had a helper during the breeding seasons of 1999-2000, 2003, and 2005-2007.

Cluster 268: This cluster was provisioned in 1998 and has been active since 2000. This cluster has nested every year since activation except 2006 and 2007, and had 1 helper in the 2009 breeding season.

RCW Neighborhood Level Analysis

Since 1994, 712 Fort Stewart RCW dispersals have been documented, including 5 that crossed the proposed action area. The mean dispersal distance for Fort Stewart's RCW population is 3.96 miles (range 0.20 – 24.11 miles). Therefore, the neighborhood for this project area is 3.96 miles from the boundary of the proposed action area and encompasses 38,674 acres, 12,991 acres of which lie within the RCW HMUs. There currently are 33 active RCW clusters within the dispersal neighborhood (excluding the affected cluster analyzed in the Group Level Analysis). Although 33 active clusters fall within the average dispersal distance, it is unlikely that these clusters will receive a direct or indirect effect. In addition to dispersal events that crossed the proposed action area, we documented 52 other dispersal events (range 5.98 – 23.45 miles) "across" existing Red Cloud Range openings and the Artillery Impact Area (AIA), a much larger forest opening (5 miles x 5 miles). It is unlikely that RCWs actually crossed these large blocks of unsuitable habitat, but rather went around the existing openings in suitable forested habitat. Consequently, the number of groups estimated to be affected due to construction of the ISBC is less than the 33 groups occurring in the project neighborhood. Clusters that are considered to be most vulnerable to the effects of habitat fragmentation are those lying within 0.5 miles (Rudolph and Conner 1991), however, we expect that all of the clusters in the project neighborhood will persist, because there will be sufficient habitat remaining after construction to support all RCW groups indirectly affected by construction. Additionally, the ISBC is relatively small compared to the AIA and dispersal events of RCWs should be only minimally impacted.

To summarize the impacts of construction, operation, and maintenance of the ISBC to RCWs, Clusters 103 and 268 will lose a portion of their foraging habitat but will continue to meet the MSS threshold. They are expected to persist long-term.

QTR

Fort Stewart Fish and Wildlife Branch personnel surveyed the proposed action area for RCW cavity and start trees and no new trees were found. The proposed project lies within the foraging partitions of clusters 124, 154, 247, 252, 322, and 356. The project will remove 183.9 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 3). A portion of the QTR overlaps the MPMR.

Foraging Partition Level Analysis

Clear-cutting to facilitate construction of the action area will impact 6 active RCW clusters (124, 154, 247, 252, 322, and 356) (Figure 2). Direct impacts from construction of the QTR and the MPMGR will result in the incidental take of Cluster 124 (only 28.4 acres of foraging habitat remaining post-construction), and Cluster 247 (removal of all RCW trees). Cluster 154 will be directly impacted by the removal of 2 RCW cavity trees, but will continue to meet MSS and is expected to persist long-term. Cluster 252 does not meet MSS due to excessive hardwood midstory, but removal of excessive hardwood midstory will cause this cluster to pass MSS. It is expected to persist with management. Cluster 322 and 356 will continue to meet MSS.

To summarize the Foraging Partition Level Analysis, direct impacts from construction (clear-cutting of cluster sites) will result in the incidental take of 1 RCW Cluster (247). Post construction, RCW Cluster 124 will no longer have adequate foraging habitat and will result in an incidental take. Indirect impacts from construction (loss of foraging habitat) will affect 4 additional RCW clusters (154, 252, 322, and 356), but they are expected to persist post-construction of the QTR with management.

RCW Group Level Analysis

Cluster 124: See previous group level analysis.

Cluster 154: This cluster has been active every year since 1994. This group has nested every year except 2000, when no nest was initiated. The group successfully fledged chicks from 1998-2002. This cluster was only monitored for nest initiation from 2003-2007, and 2009. It is unknown whether the group initiated a nest in 2008 because this cluster was only monitored for activity in that year. One helper was present during the breeding season of 2003.

Cluster 247: See previous group level analysis.

Cluster 252: This cluster was created in the winter of 1997. This cluster was active from 1997 till 2003, and then in 2009. The group nested from 1998-2002 and successfully fledged chicks from 1998-2000. One helper was present during the breeding season of 2001.

Cluster 322: This cluster was created in the winter of 2002. This cluster became active in 2005 with a potential breeding group that did not initiate a nest. The cluster nested from 2006-2009 and fledged 2 juveniles each year.

Cluster 356: See previous group level analysis.

RCW Neighborhood Level Analysis

Since 1994, 712 Fort Stewart RCW dispersals have been documented, including 22 that crossed the proposed action area. The mean dispersal distance for Fort Stewart's RCW population is 3.96 miles (range 0.20 – 24.11 miles). Therefore, the neighborhood for this project area is 3.96 miles from the boundary of the proposed action area and encompasses 33,938 acres, 19,105 acres of which lie within the RCW HMUs. There currently are 44 active RCW clusters within the dispersal neighborhood (excluding the affected cluster analyzed in the Group Level Analysis). Although 44 active clusters fall within the average dispersal distance, it is unlikely that these clusters will receive a direct or indirect effect. In addition to dispersal events that crossed the proposed action area, we documented 52 other dispersal events (range 5.98 – 23.45 miles) "across" existing Red Cloud Range openings and the Artillery Impact Area (AIA), a much larger forest opening (5 miles x 5 miles). It is unlikely that RCWs actually crossed these large blocks of unsuitable habitat, but rather went around the existing openings in suitable forested habitat. Consequently, the number of groups estimated to be affected due to construction of the QTR is less than the 22 groups occurring in the project neighborhood. Clusters that are considered to be most vulnerable to the effects of habitat fragmentation are those lying within 0.5 miles (Rudolph and Conner 1991), however, we expect that all of the clusters in the project neighborhood will persist, because there will be sufficient habitat remaining after construction to support all RCW groups indirectly affected by construction. Additionally, the QTR is relatively small compared to the AIA and dispersal events of RCWs should be only minimally impacted.

To summarize the impacts of construction, operation, and maintenance of the QTR to RCWs, 2 RCW groups will have direct impacts that will result in an incidental take (Cluster 247 will be lost due to clear-cutting of the cluster site and Cluster 124 falls below the acreage requirement for MSS). One RCW cluster (252) will have an indirect impact due to the loss of a portion of its foraging habitat but with management will meet MSS. Three RCW clusters (154, 322, and 356) will have a direct impact due to the loss of a portion of their foraging habitat but will continue to meet MSS (Table 3).

DMPTR

Fort Stewart Fish and Wildlife Branch personnel surveyed the proposed action area for RCW cavity and start trees and none were found. The nearest active RCW cluster (90) is approximately 0.4 miles southwest of the proposed action area in FSTA B9, but the project will not affect the foraging partition of this or any other active cluster. Construction of the DMPTR will remove 22.4 acres of existing RCW HMU as identified in the Installation's INRMP (Figure 17). Because of the project's proximity to existing military infrastructure, the proposed project may affect, but is unlikely to adversely affect RCWs.

10/25M Zero Range

Fort Stewart Fish and Wildlife Branch personnel surveyed the proposed action area for RCW cavity and start trees and none were found. The nearest active RCW cluster (214) is approximately 0.9 miles northwest of the proposed action area in FSTA D5, but the project will not affect the foraging partition of this or any other active cluster. Construction of the project will remove 3.8 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 19). Because of the small acreage required for this project and its proximity to existing military infrastructure, the proposed project may affect, but is unlikely to adversely affect RCWs. The proposed project will not prevent the Installation from achieving its RCW population recovery goal of 350 potential breeding groups.

CPMPQC

Fort Stewart Fish and Wildlife Branch personnel surveyed the proposed action area for RCW cavity and start trees and none were found. The nearest active RCW cluster (214) is approximately 0.8 miles northwest of the proposed action area in FSTA D5, but the project will not affect the foraging partition of this or any other active cluster. Construction of the project will remove 4.0 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 19). Because of the small acreage required for this project and its proximity to existing military infrastructure, the proposed project may affect, but is unlikely to adversely affect RCWs.

KDR

Fort Stewart Fish and Wildlife Branch personnel surveyed the proposed action area for RCW cavity and start trees and none were found. The nearest active RCW cluster (263) is approximately 0.8 miles northwest of the proposed action area in FSTA D10.1, but the project will not affect the foraging partition of this or any other active cluster. Construction of the project will remove 39.7 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 3). Because of the relatively small acreage required for this project and its proximity to existing military infrastructure, the proposed project may affect, but is unlikely to adversely affect RCWs.

FMR

Fort Stewart Fish and Wildlife Branch personnel surveyed the proposed action area for RCW cavity and start trees and none were found. The nearest active RCW foraging partition (cluster 142) is approximately 0.1 miles north of the proposed action area in FSTA D12.1, but the project will not affect the foraging partition of this or any other active cluster. No RCW HMU acreage will be removed from the action area. This area was designated as non-forested habitat in Fort Stewart's INRMP. Because of the relatively small acreage required for this project and its proximity to existing military infrastructure, the proposed project may affect, but is unlikely to adversely affect RCWs.

MRFRB

Fort Stewart Fish and Wildlife Branch personnel surveyed the proposed action area for RCW cavity and start trees and no new RCW cavity trees were found. The proposed project lies within

the foraging partition of Cluster 66. Construction of the project will remove 22.2 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 23).

Foraging Partition Level Analysis

Clear-cutting to facilitate construction of the MRFRB will impact 1 RCW partition (Cluster 66) (Figure 22). Cluster 66 fails to meet MSS because of an over abundance of pine BA <10 inches (Table 3). However, this cluster is expected to persist after construction of the MRFRB because it will have adequate foraging resources available and will have > 4.7 active clusters within 1.25 miles (Table 2 and RCW Group Level Analysis, below).

To summarize the Foraging Partition Level Analysis, indirect impacts from construction (loss of foraging habitat) will affect Cluster 66. This cluster does not meet MSS because of an over abundance of pines <10 inches DBH, but it is expected to persist post-construction of the MRFRB because it will have an adequate acreage of foraging habitat.

RCW Group Level Analysis

Cluster 66: This cluster has been active every year since 1994. It nested every year except 2001, 2006, and 2008. It had helpers for 2000-2002 breeding season.

RCW Neighborhood Level Analysis

Since 1994, 712 Fort Stewart RCW dispersals have been documented; however, none crossed the proposed action area. The mean dispersal distance for Fort Stewart's RCW population is 3.96 miles (range 0.20 – 24.11 miles). Therefore, the neighborhood for this project area is 3.96 miles from the boundary of the proposed action area and encompasses 32,844 acres, 13,089 acres of which lie within the RCW HMUs. There currently are 34 active RCW clusters within the dispersal neighborhood (excluding the affected cluster analyzed in the Group Level Analysis). Although 34 active clusters fall within the average dispersal distance, it is unlikely that these clusters will receive a direct or indirect effect. In addition to dispersal events that crossed the proposed action area, we documented 52 other dispersal events (range 5.98 – 23.45 miles) "across" existing Red Cloud Range openings and the Artillery Impact Area (AIA), a much larger forest opening (5 miles x 5 miles). It is unlikely that RCWs actually crossed these large blocks of unsuitable habitat, but rather went around the existing openings in suitable forested habitat. Consequently, the number of groups estimated to be affected due to construction of the MRFR B4 is less than the 34 groups occurring in the project neighborhood. Clusters that are considered to be most vulnerable to the effects of habitat fragmentation are those lying within 0.5 miles (Rudolph and Conner 1991), however, we expect that all of the clusters in the project neighborhood will persist, because there will be sufficient habitat remaining after construction to support all RCW groups indirectly affected by construction. Additionally, the MRFRB is relatively small compared to the AIA and dispersal events of RCWs should be only minimally impacted.

To summarize the impacts of construction, operation, and maintenance of the MRFRB to RCWs, Cluster 66 fails to meet MSS, but during construction pine < 10 inch DBH in stand 400021 will be thinned and this cluster will meet MSS. This cluster is expected to persist long term due to adequate foraging habitat acreage remaining post-project (Table 3).

CLFC

Fort Stewart Fish and Wildlife Branch personnel surveyed the proposed action area for RCW cavity and start trees and no new RCW cavity trees were found.

a. Task 1 Entry Control Point - The proposed project lies within the foraging partition of cluster 334. A total of 1.1 acres will be removed from RCW HMU as identified in Fort Stewart's INRMP (Figure 27).

b. Task 2 Sniper – Construction of the project will remove 12.7 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 27). The action area is not within an RCW partition. The nearest active cluster (96) and is 0.1 miles south of action area.

c. Task 3 Rocket-propelled Grenade Team – The proposed project lies within the foraging partitions of Clusters 34 and 96. Construction of the project will remove 9.2 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 27).

d. Task 4 Ambush Blocked – The proposed project lies within the foraging partitions of Clusters 96 and 116. Construction of the project will remove 25.7 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 27).

e. Task 5 Urban Ambush – The proposed project lies within the foraging partitions of Clusters 34, 141, and 339. Construction of the project will remove 37.4 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 27).

f. **Task 6 Tech Trucks –** The proposed project lies within the foraging partitions of Clusters 22 and 130. Construction of the project will remove 24.3 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 27).

g. Task 7 Near Ambush – The proposed project lies within the foraging partitions of clusters 5 and 22. Construction of the project will remove 40.0 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 27).

Foraging Partition Level Analysis

a. Task 1 Entry Control Point

Clear-cutting to facilitate construction of the action area and the building of berms for habitat protection will impact 1active RCW Cluster (334) (Figure 26). No other active clusters will be affected as a result of this range. Cluster 334 meets MSS pre- and post-construction and is expected to persist after range construction due to having adequate foraging resources available and having > 4.7 active clusters within 1.25 miles (Table 2 and RCW Group Level Analysis, below).

b. Task 2 Sniper

Clear-cutting to facilitate construction of the action area and the building of berms for habitat protection will not impact any active cluster partition.

c. Task 3 Rocket-propelled Grenade Team

Clear-cutting to facilitate construction of the action area and the building of berms for habitat protection will impact 2 RCW foraging partitions (34 and 96) and 2 RCW trees in cluster 34 (Figure 26). No other active clusters will be affected as a result of this action. Impacts from range construction will result in the incidental take of Cluster 34 due to inadequate acres of foraging habitat (68.7 acres remaining post-construction). Cluster 96 failed to meet the MSS (inadequate number of pines >10 inches DBH), but is expected to persist long-term due to adequate foraging resources available and > 4.7 active clusters within 1.25 miles (Table 2 and RCW Group Level Analysis, below).

d. Task 4 Ambush Blocked

Clear-cutting to facilitate construction of the range and the building of berms for habitat protection will impact 2 RCW foraging partitions (96 and 116) (Figure 26). No other active clusters will be affected as a result of this action. Direct impacts from this action will result in the loss of 1 RCW tree in Cluster 96. Cluster 96 and 116 failed MSS due to an inadequate number of pines >10 inches DBH. Despite failing MSS, these clusters are expected to persist after construction of the Task 4 Ambush Blocked due to having adequate foraging resources available and > 4.7 active clusters within 1.25 miles (Table 2 and RCW Group Level Analysis, below).

e. Task 5 Urban Ambush

Clear-cutting to facilitate construction of the action area and the building of berms for habitat protection will impact 3 RCW foraging partitions (34, 141, and 339) (Figure 26, Table 3). No other active clusters will be affected as a result of this action. Direct impacts from this action will result in the incidental take of Cluster 34 (fails MSS due to inadequate foraging habitat acreage). Cluster 141 also failed MSS due to an inadequate number of pines >10 inches DBH. However, Cluster 141 is expected to persist after construction of the Task 5 Urban Ambush range due to adequate foraging resources and > 4.7 active clusters within 1.25 miles (Table 2 and RCW Group Level Analysis, below). Cluster 339 meets MSS and is expected to persist after construction of the Task 5 Urban Ambush range and will have > 4.7 active clusters within 1.25 miles (Table 2 and RCW Group Level Analysis, below).

f. Task 6 Tech Trucks

Clear-cutting to facilitate construction of the action area and the building of berms for habitat protection will impact 2 active RCW foraging partitions (Clusters 22 and 130) (Figure 26). No other active clusters will be affected as a result of this action. Both clusters meet MSS, and will have > 4.7 active clusters within 1.25 miles and are expected to persist long term (Tables 2 and 3).

g. Task 7 Near Ambush

Clear-cutting to facilitate construction of the action area and the building of berms for habitat protection will impact 2 RCW foraging partitions (Clusters 5 and 22) (Figure 26). No other active clusters will be affected as a result of this action. These clusters will lose a portion of their foraging partitions. Direct impacts from this action will result in the loss of 2 RCW trees in Cluster 22. Both clusters meet MSS. These clusters are expected to persist after construction of the Near Ambush because they will have adequate foraging resources available and will have > 4.7 active clusters within 1.25 miles (Table 2 and RCW Group Level Analysis, below).

To summarize the Foraging Partition Level Analysis for the CLFC, direct impacts from construction will result in the loss of 5 RCW trees in Clusters 22, 34, and Cluster 96. Habitat loss in Cluster 34 will result in an incidental take due to insufficient foraging habitat (68.7 acres) remaining post-construction. Clusters 96, 116, and 141 (inadequate pines >10 inches DBH), failed to meet MSS, but we expect them to persist long-term because they will have adequate foraging partition acreage. Clusters 5, 22, 130, 334, and 339 meet MSS and are expected to persist. Indirect impacts from construction (loss of foraging habitat) will affect 9 RCW clusters (Clusters 5, 22, 96, 116, 130, 141, 334, and 339). An additional 12.7 acres will be removed from RCW HMU that does not impact any foraging partition. All clusters except Cluster 34 are expected to persist after construction of the Convoy Live Fire range due to adequate foraging resources available and having > 4.7 active clusters within 1.25 miles (Table 2 and RCW Group Level Analysis, below).

RCW Group Level Analysis

Cluster 5: This cluster has been active since 1994 and has nested every year since 1995. It has fledged juveniles every year except 1994, 1997, 2007, and 2009. It had helpers during the 2003 and 2008-2009 breeding seasons.

Cluster 22: This cluster has been active since 1997 except for 2002. It nested in 2001 and 2005-2009. It fledged juveniles in 2005-2008. I had helpers for the 2001 and 2009 breeding season.

Cluster 34: This cluster has been active since 1994 and has nested in 1995-1996, 1998-2005, 2007 and 2009. It fledged juveniles in 1996, 1998-2001, and 2003-2004. It had helpers for the 2000-2001 and 2004-2007 breeding season.

Cluster 96: This cluster has been active since 1994 and has nested in 1995-1999, 2001-2002, 2004-2005, and 2009. It fledged juveniles in 1996-1997, 1999, and 2001-2002. It had helpers in 1999, 2001-2002 and 2007.

Cluster116: This cluster has been active since 1994 and nested in 1998-1999, 2001-2005 and 2007. It fledged juveniles in 2001-2004. It had helpers in 2002, 2007 and 2009.

Cluster130: This cluster has been active since 1995 and has nested in 1996-1999 and 2001-2008. It fledged juveniles in 1998 and 2001-2006. It had helpers in 2002 and 2008.

Cluster141: This cluster has been active since 1994 and has nested in 1996-2005 and 2007-2008. It fledged juveniles in 1999-2002 and 2007-2008. It had helpers in 1999.

Cluster334: This cluster was provisioned in the fall of 2001. It has been active since 2002 and has nested every year except 2005 and 2007. If fledged juveniles in 2003-2004 and 2006-2008. It had helpers in 2003-2004 and 2006-2008.

Cluster 339: This cluster was provisioned in the winter of 2003. It has been active since 2003 and has nested every year except 2008. It fledged juveniles in 2003-2004. It had helpers in 2005 and 2009.

RCW Neighborhood Level Analysis

Since 1994, 712 Fort Stewart RCW dispersals have been documented, including 40 that crossed the proposed action area. The mean dispersal distance for Fort Stewart's RCW population is 3.96 miles (range 0.20 – 24.11 miles). Therefore, the neighborhood for this project area is 3.96 miles from the boundary of the proposed action area and encompasses 40,748.2 acres, 20,028.9 acres of which lie within the RCW HMUs. There currently are 58 active RCW clusters within the dispersal neighborhood (excluding the affected cluster analyzed in the Group Level Analysis). Although 58 active clusters fall within the average dispersal distance, it is unlikely that these clusters will receive a direct or indirect effect. In addition to dispersal events that crossed the proposed action area, we documented 52 other dispersal events (range 5.98 – 23.45 miles) "across" existing Red Cloud Range openings and the Artillery Impact Area (AIA), a much larger forest opening (5 miles x 5 miles). It is unlikely that RCWs actually crossed these large blocks of unsuitable habitat, but rather went around the existing openings in suitable forested habitat. Consequently, the number of groups estimated to be affected due to construction of the CLFC is less than the 58 groups occurring in the project neighborhood. Clusters that are considered to be most vulnerable to the effects of habitat fragmentation are those lying within 0.5 miles (Rudolph and Conner 1991), however, we expect that all of the clusters in the project neighborhood will persist, because there will be sufficient habitat remaining after construction to support all RCW groups indirectly affected by construction (See Foraging Partition Level Analysis). Additionally, the CLFC is relatively small compared to the AIA and dispersal events of RCWs should be only minimally impacted.

To summarize the impacts of construction, operation, and maintenance of the CLFC to RCWs, direct impacts will result in the incidental take of 1 RCW group (Cluster 34) due to inadequate acres of foraging habitat (68.7 acres), the loss of 5 RCW trees (Clusters 22, 34, and 96). Clusters 96, 116, and 141failed to meet the MSS, but are expected to persist long-term. Five other clusters (5, 22, 130, 334, and 339) will continue to meet MSS post-construction.

UAS

Fort Stewart Fish and Wildlife Branch personnel surveyed the proposed action area for RCW cavity and start trees and none were found. The nearest active RCW cluster (10) is approximately 0.5 miles northwest of the proposed action area in FSTA A18, but the project will not affect the foraging partition of this or any other active cluster. Construction of the UAS will remove 33.7 acres of existing RCW HMU as identified in Fort Stewart's INRMP (Figure 30). Because of the relatively small acreage required for this project and its proximity to existing military infrastructure, the proposed project may affect, but is unlikely to adversely affect RCWs.

Population Level Analysis

Range and infrastructure construction will result in the incidental take of 8 RCW clusters (18, 34, 69, 105, 124, 247, 256, and 361) and the loss of an additional 9 RCW trees (Table 3). Eight clusters (38, 66, 67, 96, 116, 141, 252, and 342) fail to meet MSS due to insufficient pine stems > 10 inches DBH or excessive midstory. However, we expect these clusters to persist because we intend to remove the midstory and/or because they have persisted for many years despite having < 40 sq. ft. of basal area of pines > 10 inches DBH (Tables 2 and 3). Fifteen clusters (5, 22, 70, 103, 130, 154, 179, 268, 300, 322, 334, 339, 356, 381, and 407) meet MSS and are expected to persist long-term (Table 3). Though the proposed action will result in the loss of 1,676 acres of existing RCW HMU, it will not prevent Fort Stewart from achieving its recovery goal of 350 PBGs. After these projects are complete, Fort Stewart will have approximately 133,000 acres of suitable or potentially suitable RCW habitat. This acreage should be capable of supporting 665 groups. Demographic data from the past 5 years demonstrate that approximately 91% of active clusters on Fort Stewart have a PBG in residence. Applying historic demographic data to current RCW population growth rates and accounting for the take of 8 RCW groups indicates that the Fort Stewart population will still achieve 350 potential breeding groups (the recovery benchmark) in the breeding season of 2013. Ongoing management and monitoring programs at the Installation have resulted in a well-documented population increase with ample habitat to support continued growth to achieve recovery.

Eastern Indigo Snake

MPMGR

The proposed MPMGR does not lie within the Fort Stewart eastern indigo snake HMU. No eastern indigo snakes have ever been detected in the project area. The nearest known occurrence of an eastern indigo snake is 6.2 miles west of the action area in FSTA E21 (Figure 5). Eastern indigo snakes often use gopher tortoise burrows as winter refugia. The proposed action area does not lie within gopher tortoise habitat. The nearest gopher tortoise habitat is located 1.5 miles west in FSTA D10 (Figure 5). The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

IPBC

The proposed action area does not lie within eastern indigo snake HMU. There are 23.2 acres of gopher tortoise habitat that lie within the proposed action area that eastern indigo snakes may use as winter refugia (Figure 9). Prior to construction, the area will be surveyed for gopher tortoises and any found will be re-located to appropriate habitat. The nearest known occurrence of an eastern indigo snake is 0.3 miles south of the proposed action area in FSTA B17 (Figure 9). The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

MRFRD

The proposed action area does not lie within the Fort Stewart eastern indigo snake HMU. No eastern indigo snakes have ever been detected in the action area. The nearest known occurrence of an eastern indigo snake is 5.4 miles east of the action area in FSTA B4 (Figure 13). The

action area lies within gopher tortoise HMU (6.4 acres) (Figure 13). However, prior to any construction, gopher tortoises that are found in action area will be captured, burrows collapsed, and tortoises translocated to suitable habitat. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

ISBC

The entire action area lies within the Fort Stewart eastern indigo snake HMU. An eastern indigo snake has been detected within the project area. This individual was seen on 1 October 2003 and was a small adult (Figure 16). Eastern indigo snakes often use gopher tortoise burrows as winter refugia. The proposed action area lies within gopher tortoise habitat (Figure 16). The ISBC lies within gopher tortoise habitat. Prior to construction, area will be surveyed for gopher tortoises and eastern indigo snakes, burrows will be scoped, collapsed, and individuals will be relocated to appropriate habitat. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

QTR

The proposed action area does not lie within the Fort Stewart eastern indigo snake HMU. No eastern indigo snakes have ever been detected in the action area. The nearest known occurrence of an eastern indigo snake is 6.8 miles west northwest of the action area in FSTA E21 (Figure 5). The nearest gopher tortoise habitat that eastern indigo snakes may use as winter refugia is 1.5 miles north located in FSTA E6 (Figure 5). This project will not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refugia. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

DMPTR

The majority of this project lies within non-forested area as described in Fort Stewarts INRMP (DPW 2001). There have been 7 sightings within the proposed action area (Figure 18). Prior to construction, area will be surveyed for gopher tortoises and eastern indigo snakes, burrows will be scoped, collapsed, and individuals will be relocated to appropriate habitat. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

10/25M Zero Range

The action area does not lie within the Fort Stewart eastern indigo snake HMU. No eastern indigo snakes have ever been detected in the project area. The nearest known occurrence of an eastern indigo snake is 5.8 miles northeast of the action area in FSTA B4 (Figure 20). The nearest gopher tortoise colony that eastern indigo snakes may use as winter refuge lies approximately 2.3 miles west northwest of the action area in FSTA D5 (Figure 20). This project will not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refugia. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

CPMPQC

The action area does not lie within the Fort Stewart eastern indigo snake HMU. No eastern indigo snakes have ever been detected in the project area. The nearest known occurrence of an eastern indigo snake is 5.9 miles northeast of the action area in FSTA B4 (Figure 20). The nearest gopher tortoise colony that eastern indigo snakes may use as winter refuge lies approximately 2.2 miles west of the action area in FSTA D5 (Figure 20). This project will not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refugia. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

KDR

The action area does not lie within the Fort Stewart eastern indigo snake HMU. No eastern indigo snakes have ever been detected in the project area. The nearest known occurrence of an eastern indigo snake is 5.9 miles west of the action area in FSTA E21 (Figure 5). The nearest gopher tortoise colony that eastern indigo snakes may use as winter refuge lies approximately 1.1 miles northwest of the action area in FSTA D10 (Figure 5). This project will not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refugia. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

FMR

The action area does not lie within the Fort Stewart eastern indigo snake HMU. No eastern indigo snakes have ever been detected in the project area. The nearest known occurrence of an eastern indigo snake is 1.7 miles north of the action area in FSTA C4 (Figure 21). The nearest gopher tortoise colony that eastern indigo snakes may use as winter refuge lies approximately 1.3 miles east of the action area in FSTA C6 (Figure 21). This project will not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refugia. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

MRFRB

The proposed action area does not lie within the Fort Stewart eastern indigo snake HMU. The nearest known sighting of an eastern indigo snake is approximately 1.2 miles to the northwest of the action area in FSTA B4 (Figure 25). The nearest gopher tortoise colony that eastern indigo snakes may use as a winter refuge is 1.0 miles east-southeast of the action area in FSTA A16 (Figure 25). This project will not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refugia. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

CLFC

a. **Task 1 Entry Control Point –** The entire action area (10.1 acres) lies within the Fort Stewart eastern indigo snake HMU. No eastern indigo snakes have ever been detected in the project area. The nearest known occurrence of an eastern indigo snake is 2.7 miles west of the action area in FSTA C4 (Figure 29). The nearest gopher tortoise colony that eastern indigo snakes may use as winter refuge lies approximately 0.1 miles northwest of the action area in FSTA C5 (Figure 29). This project will not impact any gopher tortoise

burrows that eastern indigo snakes might use as winter refugia. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

b. **Task 2 Sniper** – A portion (5.6 acres) of the action area lies within the Fort Stewart eastern indigo snake HMU. The nearest known occurrence of an eastern indigo snake is 2.3 miles north northwest of action area in FSTA C4 (Figure 29). The nearest gopher tortoise HMU that eastern indigo snakes may use as winter refuge is located 0.3 miles northeast of action area in FSTA C6 (Figure 29). This project will not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refugia. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

c. **Task 3 Rocket-propelled Grenade Team –** The entire action area lies within the Fort Stewart eastern indigo snake HMU (10.9 acres). The nearest known occurrence of an eastern indigo snake is 2.6 miles north of action area in FSTA C4 (Figure 29). The nearest gopher tortoise habitat that eastern indigo snakes may use as winter refuge is located 0.5 miles northeast of action area in FSTA C6 (Figure 29). This project will not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refugia. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

d. **Task 4 Ambush Blocked –** A portion (12.1 acres) of the action area lies within the Fort Stewart eastern indigo snake HMU. The nearest known occurrence of an eastern indigo snake is 2.2 miles west-southwest of the action area in FSTA B17 (Figure 29). The nearest gopher tortoise HMU that eastern indigo snakes may use as winter refuge is located 1.2 miles northeast of action area in FSTA C6 (Figure 29). This project will not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refugia. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

e. **Task 5 Urban Ambush –** The entire action area lies within the Fort Stewart eastern indigo snake HMU (39.4 acres). The nearest known occurrence of an eastern indigo snake is 3.0 miles north northwest of action area in FSTA C4 (Figure 29). The nearest gopher tortoise HMU that eastern indigo snakes may use as winter refuge is located 0.3 miles northeast of action area in FSTA C6 (Figure 29). This project will not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refugia. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

f. **Task 6 Tech Trucks –** The entire action area lies within the Fort Stewart eastern indigo snake HMU (31.0 acres). The nearest known occurrence of an eastern indigo snake is 2.5 miles north northwest of action area in FSTA C4 (Figure 29). The action area lies within gopher tortoise HMU that eastern indigo snakes may use as winter refuge. The action area lies within 2.0 acres of gopher tortoise HMU (Figure 29). Prior to construction, area will be surveyed for gopher tortoises and relocated to appropriate habitat. This project will not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refugia. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

g. **Task 7 Near Ambush –** The entire action area lies within the Fort Stewart eastern indigo snake HMU (45.1 acres). The nearest known occurrence of an eastern indigo snake is 2.3 miles north northwest of action area in FSTA C4 (Figure 29). The nearest gopher tortoise HMU that eastern indigo snakes may use as winter refuge is located 0.2 miles southeast of action area in FSTA C7 (Figure 29). This project will not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refugia. The proposed project may affect, but is not likely to adversely affect the eastern indigo snake.

UAS

The proposed action area does not lie within the Fort Stewart eastern indigo snake HMU as identified in the Installation's INRMP. The nearest known sighting of an eastern indigo snake is approximately 2.9 miles north of the action area in FSTA B4 (Figure 31). The nearest gopher tortoise colony that eastern indigo snakes may use as a winter refuge is 0.3 miles northwest of the action area in FSTA A18 (Figure 31). The proposed action may affect, but is unlikely to adversely affect the eastern indigo snake.

Frosted Flatwoods Salamander

A comprehensive threatened and endangered species survey, including surveys for FFS and their habitat, was performed on Fort Stewart by The Nature Conservancy (1995). Additionally, Palis (2002) surveyed and ranked 1427 isolated wetlands for their suitability as FFS breeding sites. The 6 categories for Fort Stewart FFS ponds in descending order of suitability are: 1) confirmed breeding site; 2) highly likely breeding site; 3) potential breeding site (mesic); 4) potential breeding site (dry); 5) unlikely breeding site; and 6) unsuitable. The Fish and Wildlife Branch also conducts in-house surveys of potential FFS breeding sites in a continuing effort to gather presence/absence data in 500 potentially suitable FFS ponds identified in the Palis (2002) survey. The Fort Stewart Fish and Wildlife Branch continue to add newly discovered potential breeding ponds and to rank them in accordance with the Palis (2002) protocol.

Project design will incorporate protection measures as required by the Clean Water Act and the Georgia Erosion and Sedimentation Control Act to ensure appropriate wetland protection. Therefore, the proposed actions will not result in significant erosion, run-off, or other off-site impacts that might affect FFS habitat.

MPMGR

The entire proposed action area lies within the Fort Stewart FFS HMU. A portion of the proposed action area lies within a highly likely breeding site (0.7 acres) and a potential breeding site (0.4 acres). The area lies within their associated primary (25.2 acres) and secondary (49.5 acres) buffers (Figure 4). No FFS have ever been detected in the action area. The nearest historical sighting of a FFS is approximately 1.6 miles northeast of the action area in FSTA D7 (Figure 5). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

IPBC

The proposed action area lies within 17.0 acres of FFS HMU. Also, 2 ponds that account for 5.3 acres, are potential breeding sites and lie completely within the proposed action area. The action area lies within 67.7 acres of primary FFS pond buffers and 272.6 acres of secondary FFS pond buffers (Figure 8). No FFS have ever been detected in the action area. The nearest recent sighting of a FFS is approximately 6.1 miles southeast of the action area in FSTA B19 (Figure 9). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

MRFRD

The entire proposed project area lies within the Fort Stewart FFS HMU. A portion of the project area (1.6 acres) lies within a mesic potential breeding pond site for the FFS and intersects both a primary (19.7 acres) and secondary (12.6 acres) buffers of 2 potential mesic breeding ponds (Figure 12). No records of FFS have ever been identified in the action area. The nearest historical sighting of a FFS is approximately 1.3 miles northwest of the proposed action area in FSTA D7 (Figure 13). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect, FFS or the landscape's ability to support FFS.

ISBC

The proposed action area does not lie within the Fort Stewart FFS HMU and will not impact any FFS ponds or their associated buffers. No FFS have ever been detected in the action area. The nearest historical sighting of a FFS is approximately 0.9 miles south of the action area in FSTA B4 (Figure 16). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect, FFS or the landscape's ability to support FFS.

QTR

The entire proposed project area lies within the Fort Stewart FFS HMU. A portion of the action area lies within unlikely breeding ponds (7.3 acres), 2 mesic potential breeding ponds (4.3 acres) and 2 unsuitable breeding ponds (5.7 acres). A portion of the project area intersects primary pond buffers (40.6 acres) and secondary pond buffers (121.6 acres) of potential FFS breeding ponds (Figure 4). No records of FFS have ever been identified in the action area. The nearest historical sighting of a FFS is approximately 1.2 miles east of the proposed action area in FSTA D7 (Figure 5). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

DMPTR

A portion of the proposed action area lies within FFS HMU (56 acres). This proposed action does not affect any known FFS breeding ponds or their buffers. The nearest historical sighting of a FFS is 5.4 miles southeast of the proposed action area in FSTA B4.10 (Figure 18). The proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

10/25M Zero Range

The entire proposed action area lies within the Fort Stewart FFS HMU but will not impact any FFS ponds or their associated buffers. No FFS have ever been detected in the action area. The nearest historical sighting of a FFS is approximately 2.9 miles northeast of the action area in FSTA B6 (Figure 20). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

CPMPQC

The entire proposed action area lies within the Fort Stewart FFS HMU but will not impact any FFS ponds or their associated buffers. No FFS have ever been detected in the action area. The nearest historical sighting of a FFS is approximately 3.0 miles northeast of the action area in FSTA B6 (Figure 20). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

KDR

A portion of the proposed action area (8.9 acres) lies within the Fort Stewart FFS HMU but will not impact any FFS ponds or buffers. No FFS have ever been detected in the action area. The nearest historical sighting of a FFS is approximately 2.7 miles northwest of the action area in FSTA E7 (Figure 5). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

FMR

The proposed action area does not lie within the Fort Stewart FFS HMU and will not impact any FFS ponds or their associated buffers. No FFS have ever been detected in the action area. The nearest recent sighting of a FFS is approximately 5.3 miles southeast of the proposed action area in FSTA B19 (Figure 21). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect, FFS or the landscape's ability to support FFS.

MRFRB

The entire proposed action area lies within the Fort Stewart FFS HMU. The proposed project lies within both FFS primary (6.1 acres) and secondary (28.2 acres) buffers of a potential breeding site (Dry) (Figure 24). No records of FFS have ever been identified in the action area. The nearest known historic sighting is approximately 0.8 miles northeast of the action area in FSTA B4 (Figure 25). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect, FFS or the landscape's ability to support FFS.

CLFC

a. **Task 1 Entry Control Point -** The proposed project area does not lie within the Fort Stewart FFS HMU. All of the action area (10.1 acres) lies within a secondary buffer of a

potential breeding site (dry) (Figure 28). No records of FFS have ever been identified in the action area. The nearest recent sighting of a FFS is approximately 5.4 miles south of the proposed action area in FSTA B19 (Figure 29). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

b. **Task 2 Sniper** – The proposed project area lies within the Fort Stewart FFS HMU (15.6 acres). The project does not affect any ponds or buffers for the FFS. No records of FFS have ever been identified in the action area. The nearest recent sighting of a FFS is approximately 4.1 miles southeast of the proposed action area in FSTA B19 (Figure 29). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

c. **Task 3 Rocket-propelled Grenade Team –** The entire proposed project area lies within the Fort Stewart FFS HMU. The project does not affect any ponds or buffers for the FFS. No records of FFS have ever been identified in the action area. The nearest recent sighting of a FFS is approximately 3.9 miles southeast of the proposed action area in FSTA B19 (Figure 29). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

d. **Task 4 Ambush Blocked –** A portion of the proposed project area lies within the Fort Stewart FFS HMU (13 acres). A portion of the action area (2.0 acres) lies within the secondary buffers of 3 potential breeding sites (Figure 28). No records of FFS have ever been identified in the action area. The nearest recent sighting of a FFS is approximately 3.6 miles southeast of the proposed action area in FSTA B19 (Figure 29). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

e. **Task 5 Urban Ambush –** The entire proposed project area lies within the Fort Stewart FFS HMU. The project lies within a potential breeding site (1.6 acres) and 1 unsuitable site (0.3 acres) for the FFS. It also lies within the primary (17.4 acres) and secondary (20.2 acres) pond buffers for the FFS (Figure 28). No records of FFS have ever been identified in the action area. The nearest recent sighting of a FFS is approximately 3.2 miles southeast of the proposed action area in FSTA B19 (Figure 29). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

f. **Task 6 Tech Trucks –** The entire proposed project area lies within the Fort Stewart frosted FFS HMU. The project does not affect any ponds or buffers for the FFS. No records of FFS have ever been identified in the action area. The nearest recent sighting of a FFS is approximately 3.7 miles south southeast of the proposed action area in FSTA B19 (Figure 29). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

g. **Task 7 Near Ambush –** The whole proposed project area lies within the Fort Stewart FFS HMU. The portion of the proposed action area (11.2 acres) lies within a secondary buffer of a potentially breeding site (Dry) (Figure 28). No records of FFS have ever been identified in the action area. The nearest recent sighting of a FFS is approximately 4.0 miles south southeast of the proposed action area in FSTA B19 (Figure 29). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

UAS

A portion of the proposed action area lies within the Fort Stewart FFS HMU (37.7 acres). The area is not within FFS ponds or their associated primary or secondary buffers. No FFS have ever been detected in the action area. The nearest historical sighting of a FFS is approximately 1.5 miles northwest of the action area in FSTA A18 (Figure 31). Because of its distance from confirmed FFS sightings, the proposed action may affect, but is not likely to adversely affect the FFS or the landscape's ability to support FFS.

Wood Stork

While wood storks often exploit wetland habitats for foraging, there are no known nesting areas on Fort Stewart.

MPMGR

No wood storks were observed in the proposed project area, nor have they been observed foraging in the action area. The nearest area where foraging wood storks have been observed is approximately 5 miles east of the action area in FSTA E1 at Pond 34 (Figure 5). The proposed project may affect, but is not likely to adversely affect the wood stork.

IPBC

No wood storks were observed in the proposed project area, nor have they been observed foraging in the action area. The nearest sighting of a wood stork from the proposed action area is approximately 3.6 miles west of action area in FSTA F20 (Figure 9). The proposed project may affect, but is not likely to adversely affect the wood stork.

MRFRD

No wood storks were observed in the action area, nor have they ever been observed foraging in the action area. The nearest area where foraging wood storks have been observed is approximately 2.2 miles east of the action area in FSTA E1 (Pond 34) (Figure 13). The proposed project may affect, but is not likely to adversely affect the wood stork.

ISBC

No wood storks were observed in the proposed project area, nor have they been observed foraging in the action area. The nearest area where foraging wood storks have been observed is approximately 2.4 miles south of the action area in FSTA A16 (Figure 16). The proposed project may affect, but is not likely to adversely affect the wood stork.

QTR

No wood storks were observed in the action area, nor have they ever been observed foraging in the action area. The nearest area where foraging wood storks have been observed is approximately 4.7 miles east of the action area in FSTA E1 at Pond 34 (Figure 5). The proposed project may affect, but is not likely to adversely affect the wood stork.

DMPTR

No wood storks were observed in the proposed project area, nor have they been observed foraging in the action area. The nearest area where foraging wood storks have been observed is approximately 1.9 miles northwest of the action area in FSTA F17 (Figure 18). The proposed project may affect, but is not likely to adversely affect the wood stork.

10/25M Zero Range

No wood storks were observed in the proposed project area, nor have they been observed foraging in the action area. The nearest area where foraging wood storks have been observed is approximately 2.8 miles east southeast of the action area in FSTA D2(Figure 20). The proposed project may affect, but is not likely to adversely affect the wood stork.

CPMPQC

No wood storks were observed in the proposed project area, nor have they been observed foraging in the action area. The nearest area where foraging wood storks have been observed is approximately 2.8 miles east southeast of the action area in FSTA D2 (Figure 20). The proposed project may affect, but is not likely to adversely affect the wood stork.

KDR

No wood storks were observed in the proposed project area, nor have they been observed foraging in the action area. The nearest area where foraging wood storks have been observed is approximately 6.2 miles east northeast of the action area in Pond 34 (Figure 5). The proposed project may affect, but is not likely to adversely affect the wood stork.

FMR

No wood storks were observed in the proposed project area, nor have they been observed foraging in the action area. The nearest area where foraging wood storks have been observed is approximately 6.7 miles west of the action area in FSTA F20 (Figure 21). The proposed project may affect, but is not likely to adversely affect the wood stork.

MRFRB

No wood storks were observed in the proposed action area, nor have they been observed foraging in the action area. The nearest area where foraging wood storks have been observed is approximately 1.0 miles southeast of the action area in FSTA A16 (Figure 25). The proposed project may affect, but is unlikely to adversely affect the wood stork.

Convoy Live Fire Range Tasks 1-7

No wood storks have been observed within the proposed convoy live fire complex area, nor have they been observed foraging within the action area. The nearest area where foraging wood storks have been observed is approximately 7.7 miles south southeast of the complex area in FSTA A2(Figure 29). The proposed project may affect, but is not likely to adversely affect the wood stork.

UAS

No wood storks were observed in the proposed project area, nor have they been observed foraging in the action area. The nearest area where foraging wood storks have been observed is approximately 1.4 miles northeast of the action area in FSTA A16 (Figure 31). The proposed project may affect, but is not likely to adversely affect the wood stork.

Shortnose Sturgeon

Telemetry and capture data, which was collected as part of Fort Stewart's ongoing shortnose sturgeon monitoring program, indicate these fish do not travel > 2 miles up the Canoochee River or 20 miles up the Ogeechee River from the Canoochee/Ogeechee River confluence. The Canoochee River flows diagonally through the Installation while the Ogeechee River forms much of the Installation's eastern boundary.

MPMGR

The action area lies approximately 25.3 miles west northeast from the nearest shortnose sturgeon occurrence on the Canoochee River (Figure 39). Due to the distance between the proposed project area and documented sturgeon sightings, erosion runoff into the river is not expected and will have no affect on the shortnose sturgeon.

IPBC

The action area lies approximately 14.4 miles northwest from the nearest shortnose sturgeon occurrence on the Canoochee River (Figure 39). Due to the distance between the proposed project area and documented sturgeon sightings, erosion runoff into the river is not expected and will have no affect on the shortnose sturgeon.

MRFRD

The only records for shortnose sturgeons on Fort Stewart occur in or near the confluence of the Ogeechee and Canoochee Rivers, approximately 22 miles northeast of the project area (Figure 39). Suitable habitat for shortnose sturgeons does not occur in or near the action areas and therefore, the proposed project will not affect shortnose sturgeons.

ISBC

The proposed action area lies approximately 14.5 miles east northeast from the nearest shortnose sturgeon occurrence on the Canoochee River (Figure 39). Due to the distance between

the proposed project area and documented sturgeon sightings, erosion runoff into the river is not expected and is expected to have no affect on the shortnose sturgeon.

QTR

The only records for shortnose sturgeons on Fort Stewart occur in or near the confluence of the Ogeechee and Canoochee Rivers, approximately 24.7 miles east of the project area (Figure 39). Suitable habitat for shortnose sturgeons does not occur in or near the action areas and therefore, the proposed project will not affect the shortnose sturgeon.

DMPTR

The only records for shortnose sturgeons on Fort Stewart occur in or near the confluence of the Ogeechee and Canoochee Rivers, approximately 17.5 miles east of the project area (Figure 39). Suitable habitat for shortnose sturgeons does not occur in or near the action areas and therefore, the proposed project is not expected to affect the shortnose sturgeon.

10/25M Zero Range

The only records for shortnose sturgeons on Fort Stewart occur in or near the confluence of the Ogeechee and Canoochee Rivers, approximately 22.9 miles west of the project area (Figure 39). Suitable habitat for shortnose sturgeons does not occur in or near the action areas and therefore, the proposed project is not expected to affect the shortnose sturgeon.

CPMPQC

The proposed action area lies approximately 22.5 miles west from the nearest shortnose sturgeon occurrence on the Canoochee River (Figure 39). Suitable habitat for shortnose sturgeons does not occur in or near the action areas and therefore, the proposed project is not expected to affect the shortnose sturgeon.

KDR

The proposed action area lies approximately 26.1 miles east northeast from the nearest shortnose sturgeon occurrence on the Canoochee River (Figure 39). Suitable habitat for shortnose sturgeons does not occur in or near the action areas and therefore, the proposed project is not expected to affect the shortnose sturgeon.

FMR

The action area lies approximately 13.1 miles northwest from the nearest shortnose sturgeon occurrence on the Canoochee River (Figure 39). Suitable habitat for shortnose sturgeons does not occur in or near the action areas and therefore, the proposed project is not expected to affect the shortnose sturgeon.

MRFRB

The only records for shortnose sturgeons on Fort Stewart occur in or near the confluence of the Ogeechee and Canoochee Rivers, approximately 16 miles east-northeast of the proposed action

area (Figure 39). Suitable habitat for shortnose sturgeons does not occur in or near the proposed action area and therefore, the proposed project is not expected to affect the shortnose sturgeon.

CLFC

The entire CLFC complex lies approximately 10.8 miles northwest from the nearest shortnose sturgeon occurrence on the Canoochee River (Figure 39). Suitable habitat for shortnose sturgeons does not occur in or near the action areas and therefore, the proposed project is not expected to affect the shortnose sturgeon.

UAS

The only records for shortnose sturgeons on Fort Stewart occur in or near the confluence of the Ogeechee and Canoochee Rivers, approximately 16.3 miles east of the project area (Figure 39). Suitable habitat for shortnose sturgeons does not occur in or near the action areas and therefore, the proposed project is not expected to affect the shortnose sturgeon.

Cumulative Effects

There are no foreseeable state, local, tribal, or private actions that would have a cumulative effect when combined with the impacts of the proposed actions. No adverse cumulative effects are anticipated.

Conservation Measures

The following conservation actions will be undertaken or continued as a part of the proposed action and will have a beneficial effect on listed species.

- All RCWs in clusters to be clearcut (69, 105, 247, 256, and 361) will be captured and relocated to suitable habitat elsewhere on Fort Stewart.
- Fort Stewart will continue to conduct prescribed burning, stand improvement thinning, and artificial RCW cavity provisioning IAW the INRMP.
- Selective thinning will be conducted in RCW foraging partitions that fail to meet the MSS due to excess pine or hardwood midstory or overstory so that they meet MSS criteria.
- Fort Stewart, in coordination with USFWS, will annually inspect stands downrange from live fire facilities to determine if significant damage is resulting from bullet impacts. If significant damage (i.e. tree mortality rate threatens to reduce stand density below threshold for RCW foraging habitat), construction of earthen berms or other effective protective measures will be implemented. Acreage required for berm construction is included in the figures for total acres impacted by each facility in this BA.
- Fort Stewart will continue to manage and monitor its RCW population IAW the 2007 Guidelines for Management of RCWs on Army Installations.
- Fort Stewart will continue to conduct a mark-release monitoring program for indigo snakes IAW the INRMP.

- Fort Stewart will continue to monitor known and potential FFS breeding ponds IAW the INRMP.
- Fort Stewart will capture gopher tortoises and eastern indigo snakes from facilities where they are threatened by construction activities (IPBC, MRFRD, ISBC, DMPTR, and CLFC) and relocate them to suitable habitat elsewhere on Fort Stewart.
- Fort Stewart will manage and monitor the installation's gopher tortoise population IAW the Management Guidelines for the Gopher Tortoise on Army Installations (2008).

Conclusion

Potential injury to wood storks resulting from the Range and Infrastructure Construction is unlikely to occur, virtually impossible to detect, and consequently the impacts of the projects on this species is discountable. The proposed action is not likely to adversely affect wood storks because there are no rookeries on Fort Stewart. Wood storks occasionally forage on the Installation, and construction after the proposed projects, suitable wetland foraging habitat will remain for the wood stork. The projects will not affect the shortnose sturgeon because habitat in the project areas is not suitable. Critical habitat has been proposed for the FFS, but no FFS critical habitat was proposed for designation on Fort Stewart. Burning and thinning to improve FFS habitat will continue. The Range and Infrastructure Construction will impact 895.4 acres of FFS HMU, 0.7 acres of highly likely breeding ponds, 13.2 acres of potential breeding ponds, 180.8 acres of primary buffers, and 529 acres of secondary buffers for the FFS. However, due to Fort Stewart's ongoing monitoring efforts for the FFS, no FFS have been observed in the project areas, and project design will incorporate protection measures as required by the Clean Water Act and the Georgia Erosion and Sedimentation Control Act to ensure appropriate wetland protection. The proposed projects may affect but is not likely to adversely affect the FFS. Eastern indigo snake sightings have been detected within some of the proposed project areas. Gopher tortoise habitat will be impacted by the proposed actions. However, prior to construction all gopher tortoise habitat will be inspected for their presence and any that are found will be captured, burrows will be collapsed, and relocated to suitable habitat. Construction of the Range and Infrastructure Construction may affect, but is not likely to adversely affect the eastern indigo snake.

Due to clear cutting of the cluster sites or falling below the minimum acreage needed per partition, the proposed projects will result in the incidental take of 8 active RCW clusters (18, 34, 69, 105, 124, 247, 256, and 361) and the loss of 9 RCW trees. Five clusters (38, 67, 96, 116, and 141) fail to meet MSS due to inadequate pine >10 inches DBH, but these clusters are expected to persist after the construction of the Ranges and Infrastructure because they will have adequate potential foraging acres available. Two clusters (66 and 342) fail to meet MSS due to an over abundance of pine <10 inches DBH. However, during the construction of the Ranges and Infrastructure, this pine will be removed and the clusters will meet MSS and are expected to persist. One cluster (252) fails to meet MSS due to an over abundant midstory. However, with mechanical removal of this midstory, this cluster will meet MSS and is expected to persist. Fifteen clusters (5, 22, 70, 103, 130, 154, 179, 268, 300, 322, 334, 339, 356, 381, and 407) meet MSS and are expected to persist. Additionally, the Ranges and Infrastructure Construction will remove 1,676 acres of RCW HMU. Construction of the Ranges and Infrastructure will not

prevent the Installation from achieving its RCW recovery goal, and Fort Stewart's aggressive monitoring and management activities for the benefit of listed species will continue to maintain and improve endangered species populations and their habitats on other parts of the Installation.

Potential indirect effects (e.g., noise, dust, traffic, etc.) on listed species caused by expansion, construction, operation, and maintenance in the action areas are not likely to adversely affect listed species' populations based on the existence of stable or increasing populations on similar landscapes where listed species have existed for many years. Scientific studies on the effects of noise (Delaney et al. 2002) on RCW fecundity demonstrate that reproductive parameters of RCWs in or near noise areas are not statistically different from the reproductive parameters of RCWs in more protected habitats. A study on the effects of military maneuvers on the Fort Stewart RCW population (Hayden et al. 2002) detected a difference in the mean number fledglings produced per successful nest between RCW clusters that experienced "high activity" and those that experienced "low-activity", but the sample size of the "high activity" treatment was low (n=3) when compared to the "low activity" sample size (n=19) and these observed differences were considered inconclusive. We expect the RCW population to persist near the Ranges and Infrastructure as they have historically persisted adjacent to existing developed areas.

In summary, the proposed action will adversely affect the RCW. It will not affect the shortnose sturgeon, and it is not likely to adversely affect the FFS, wood stork, or eastern indigo snake. No critical habitat will be adversely modified by this action. The Army did not draw on the regulatory definition of destruction or adverse modifications of critical habitat at 50 CFR 402.02 with respect to the conclusions and analysis made in this BA. Instead, the Army has incorporated into the critical habitat effects analysis the conservation of species principals found in the statutory provisions of the ESA.

Figure 1. Location of proposed MCA Projects, Fort Stewart, GA.

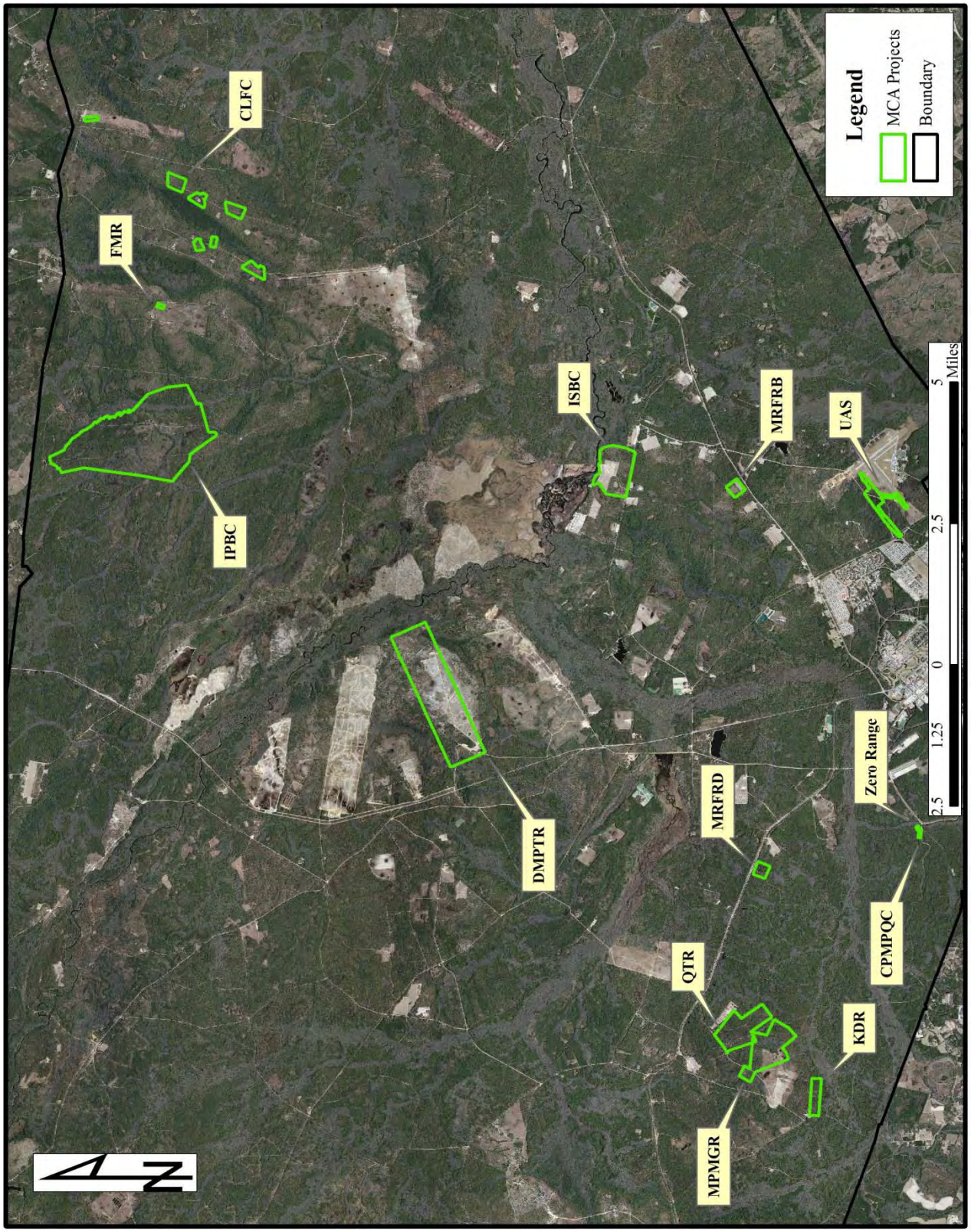

Figure 2. RCW forage partitions and trees affected by the MPMGR, QTR, and KDR, Fort Stewart, GA.

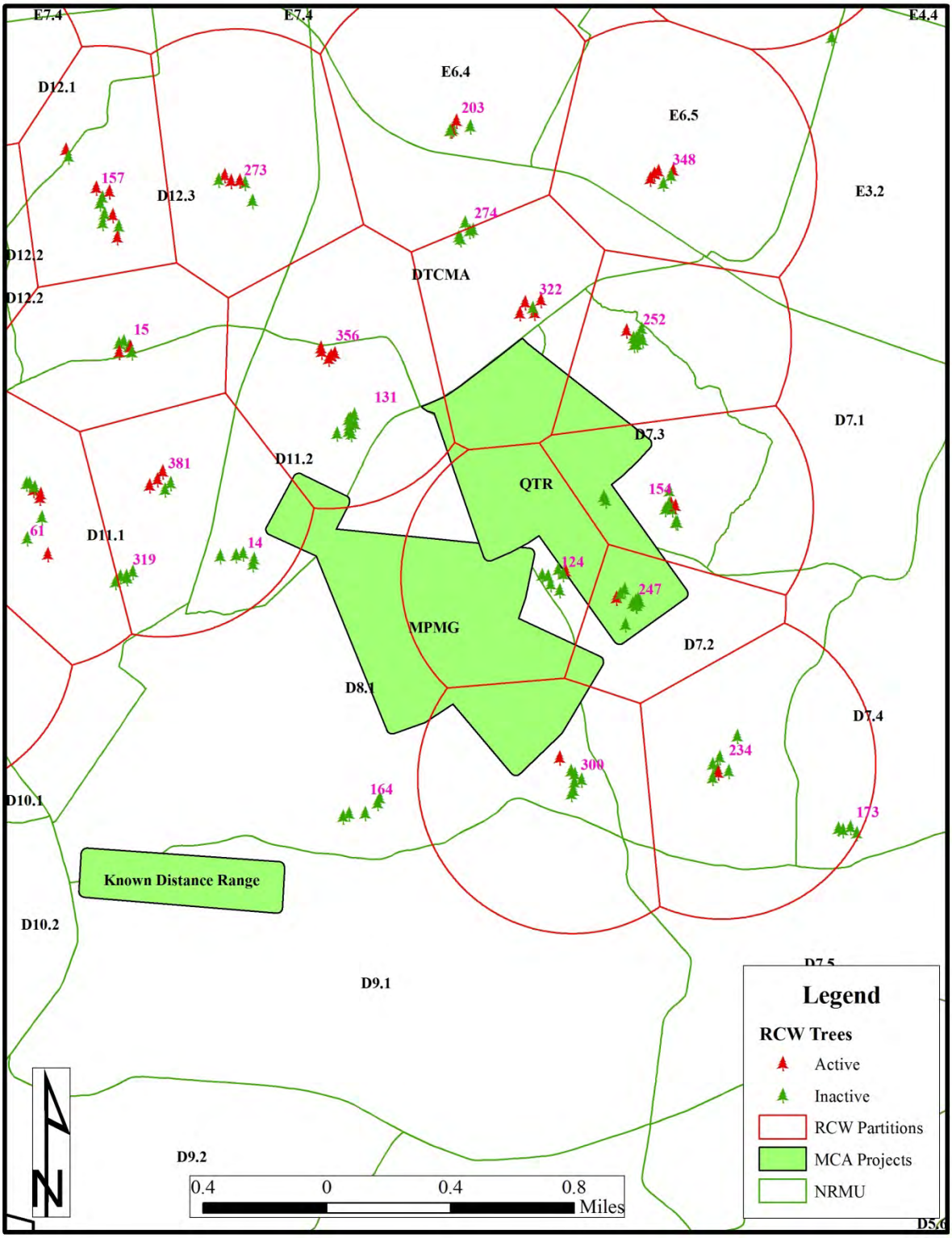

Figure 3. RCW HMU affected by the MPMGR, QTR, and KDR, Fort Stewart, GA.

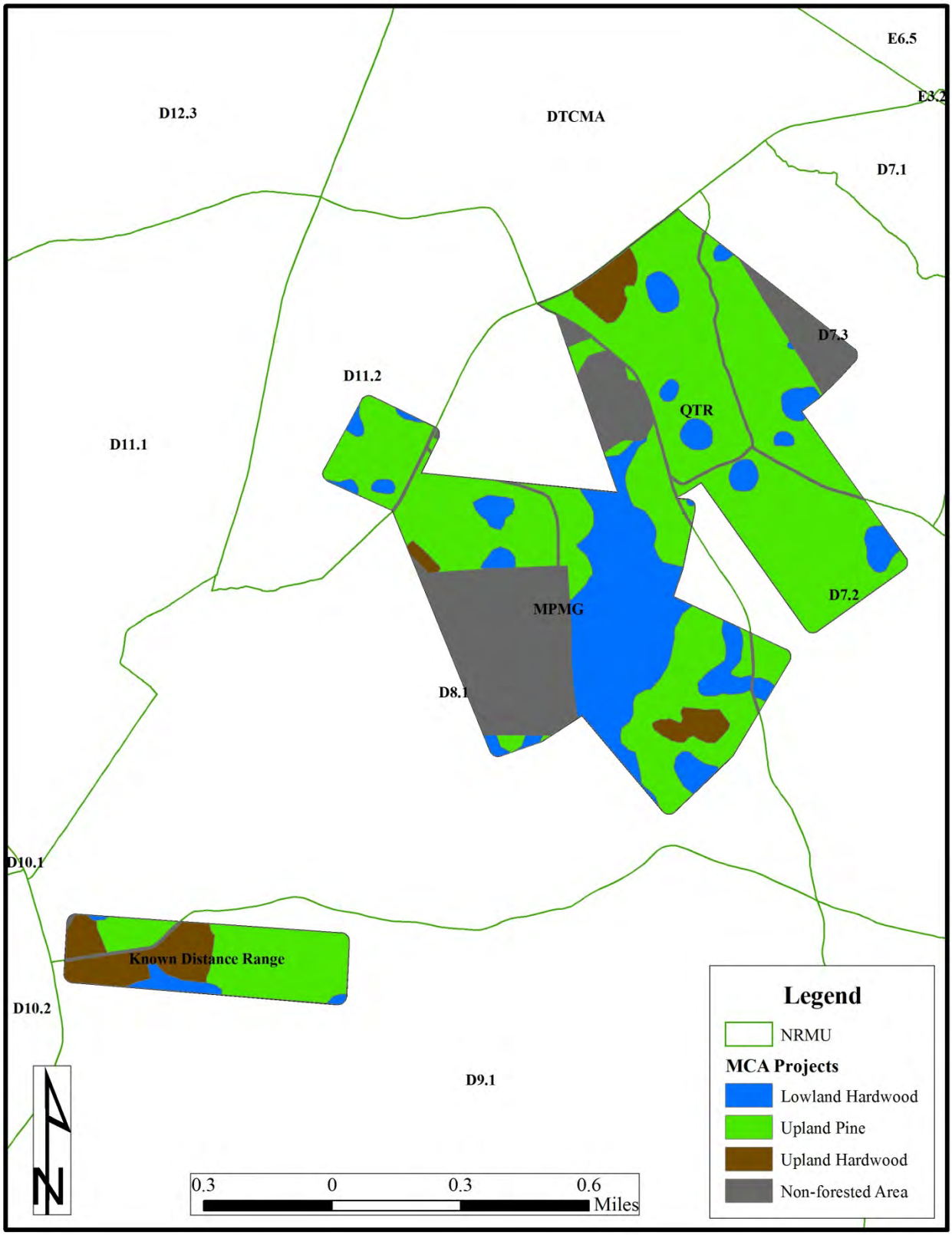

Figure 4. FFS affected by the MPMG, QTR, and KDR, Fort Stewart, GA.

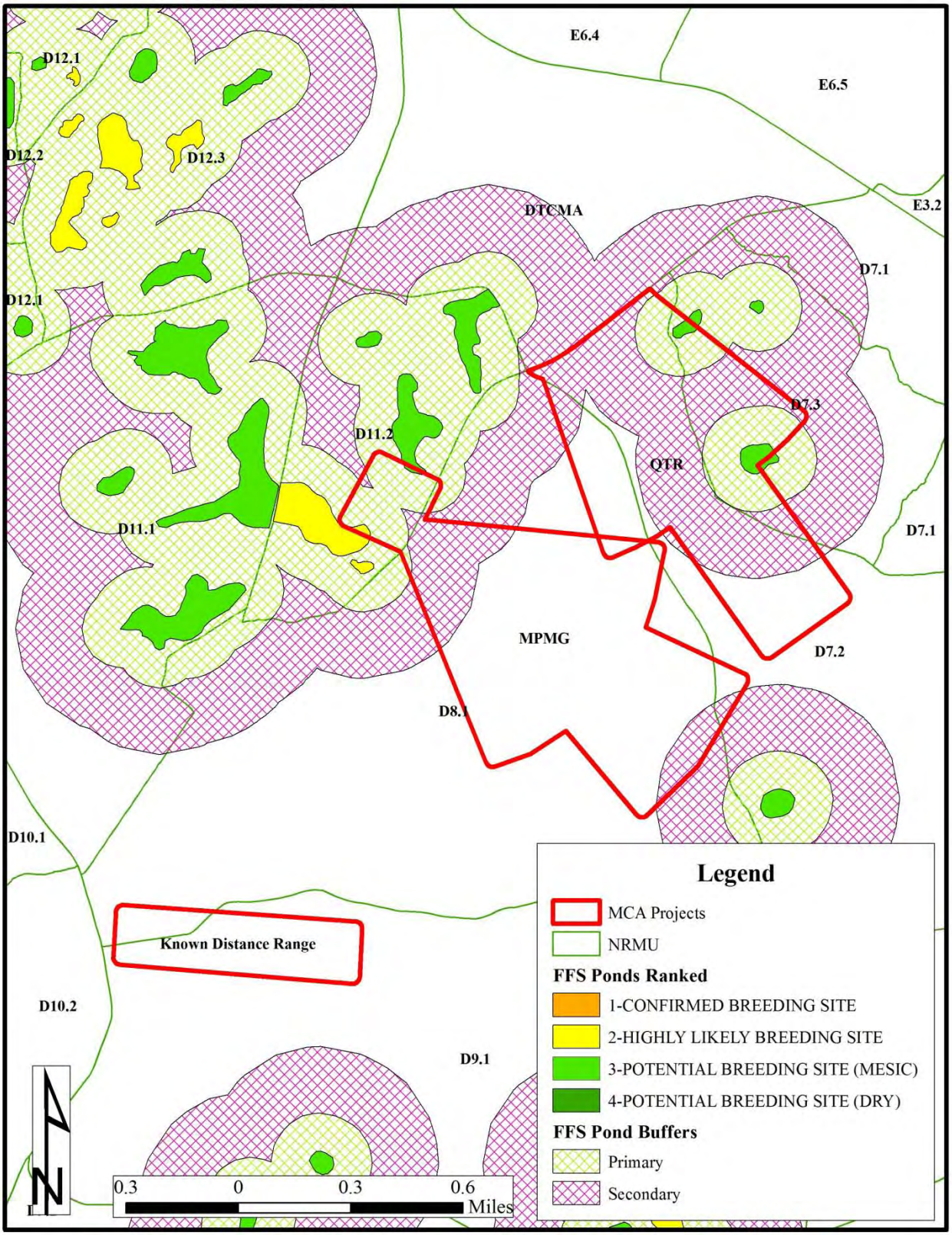

Figure 5. TES near the MPMGR, QTR, and KDR, Fort Stewart, GA.

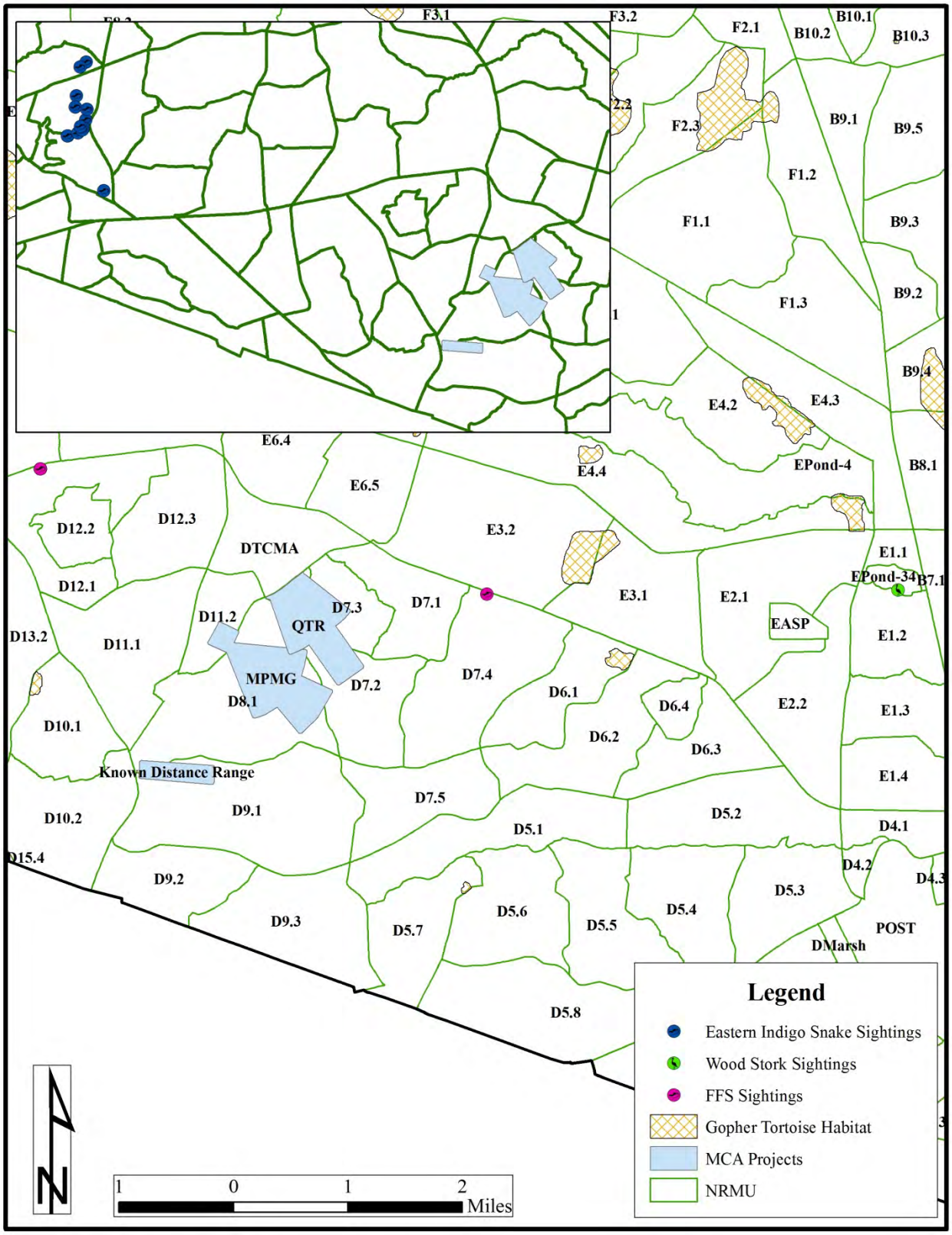

Figure 6. RCW forage partitions and trees affected by the IPBC, Fort Stewart, GA.

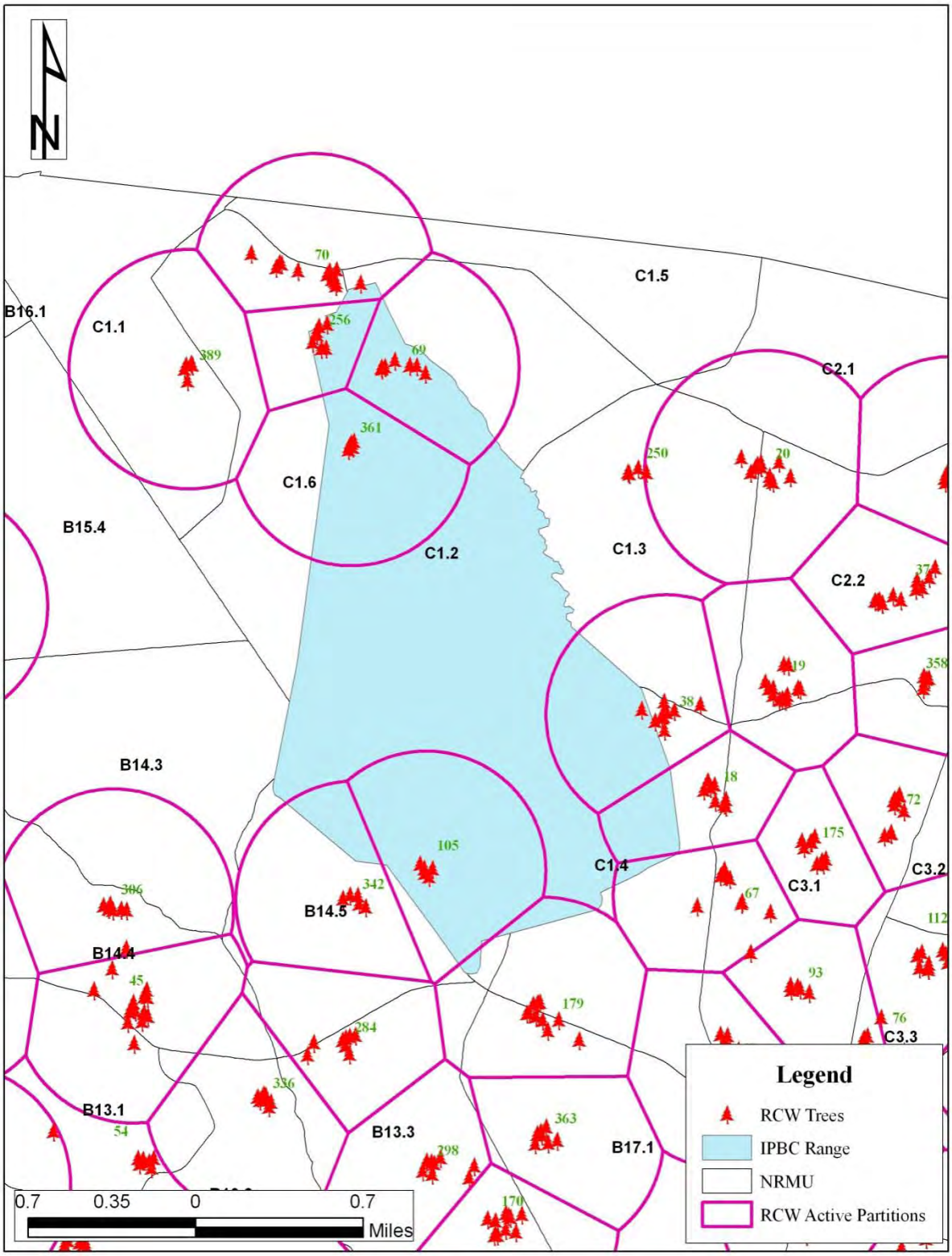

Figure 7. RCW HMU affected by the IPBC, Fort Stewart, GA.

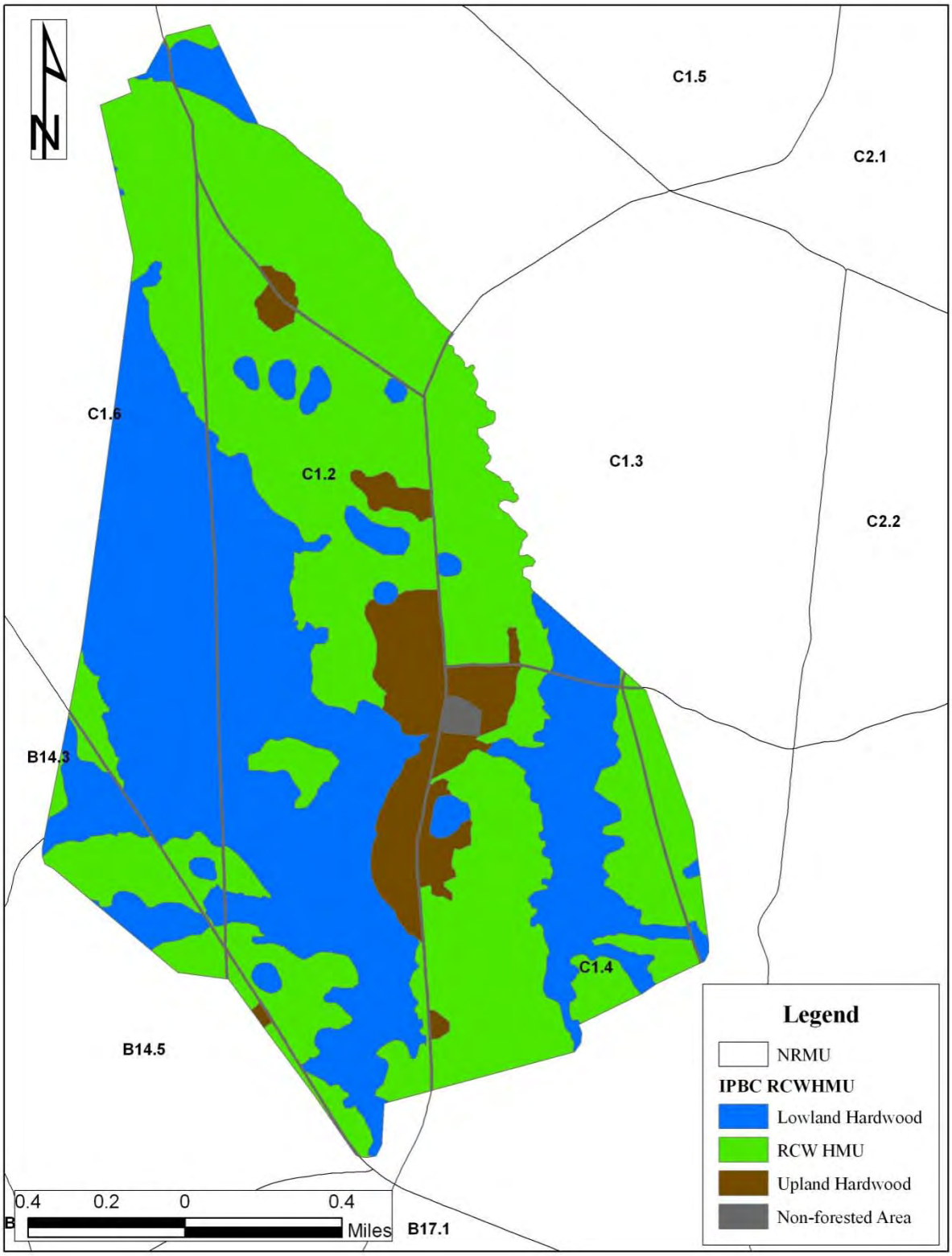

Figure 8. FFS affected by the IPBC, Fort Stewart, GA.

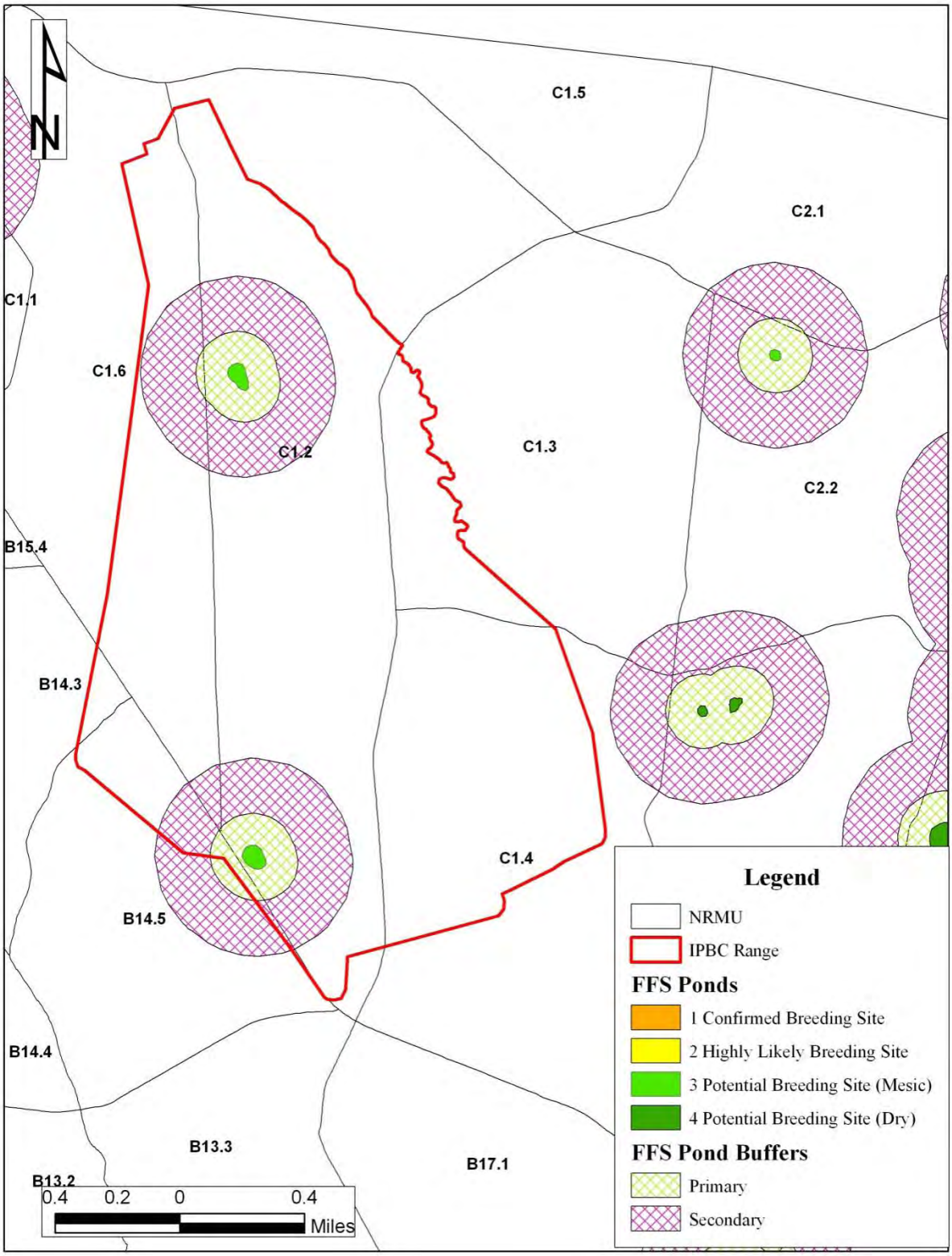

Figure 9. TES near the IPBC, Fort Stewart, GA.

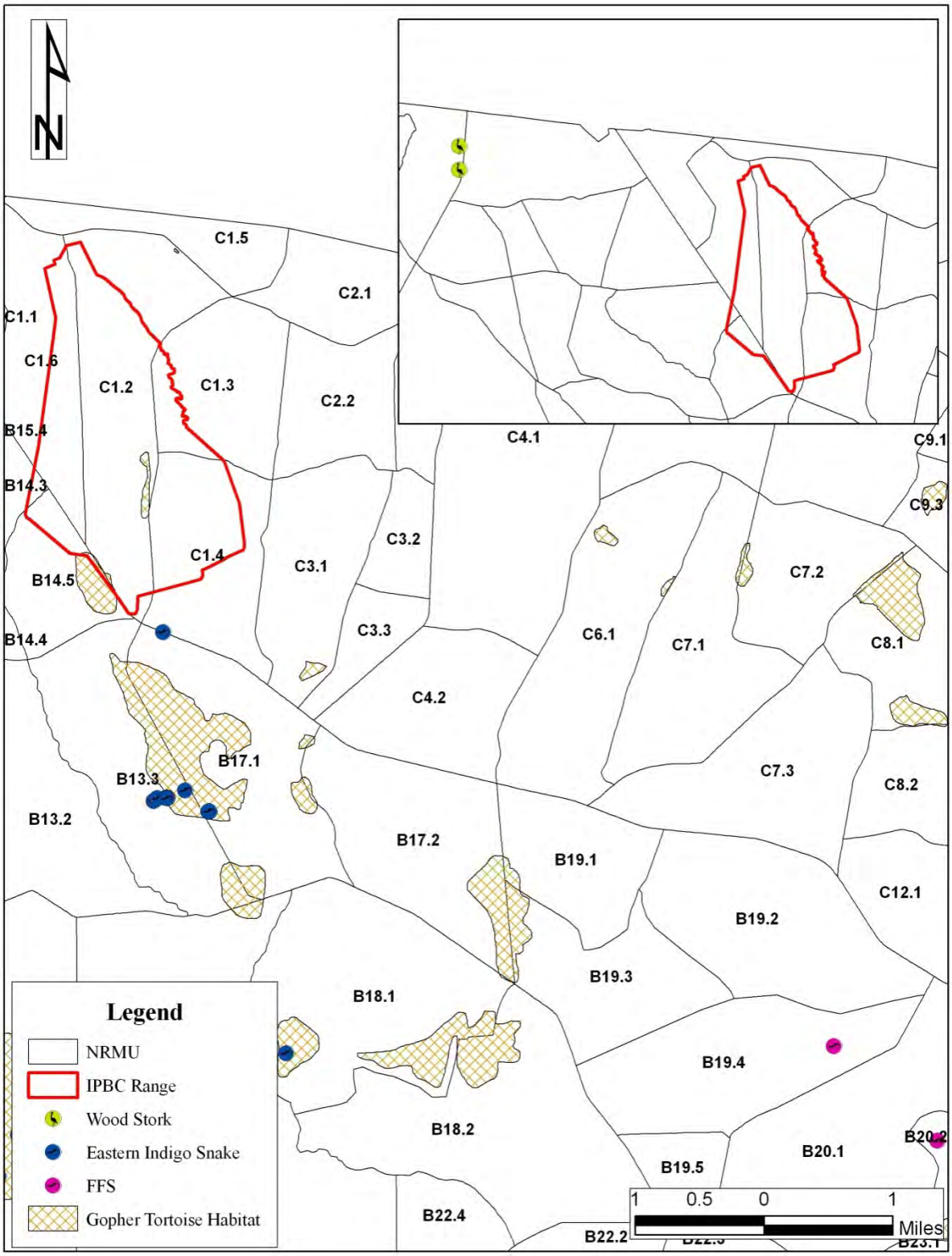

Figure 10. RCW partitions affected by the MRFRD, Fort Stewart, GA.

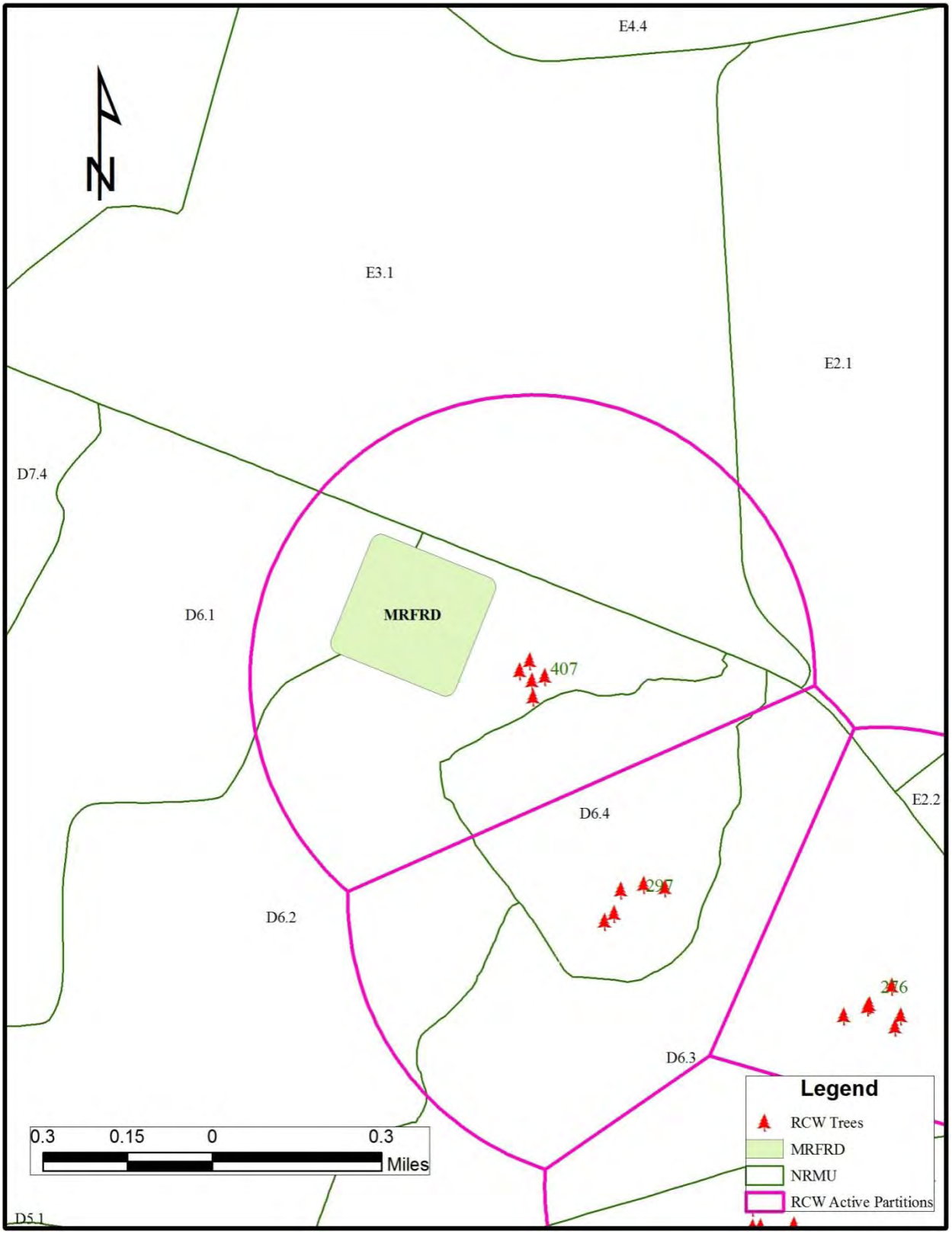

Figure 11. RCW HMU affected by the MRFRD, Fort Stewart, GA.

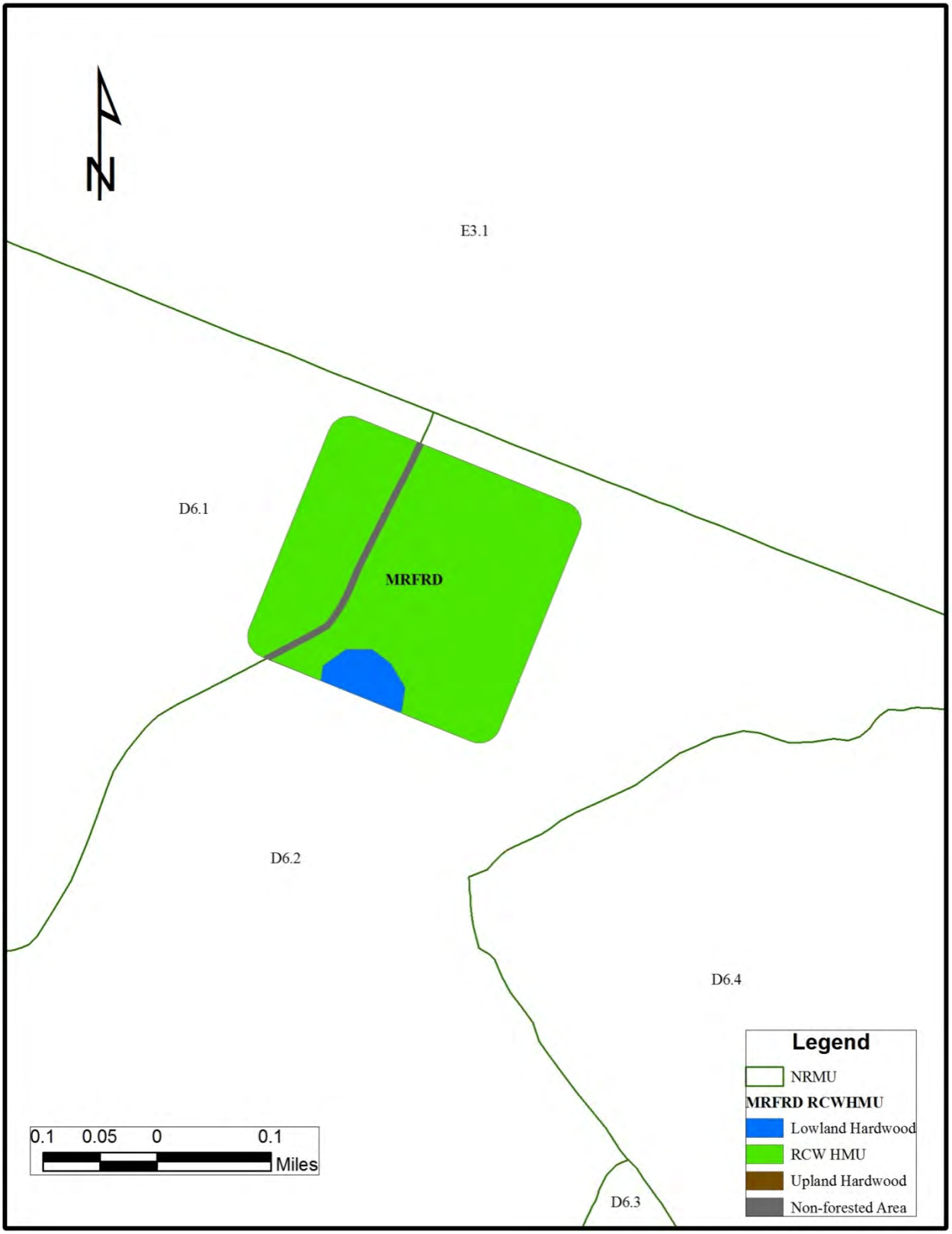

Figure 12. FFS affected by the MRFRD, Fort Stewart, GA.

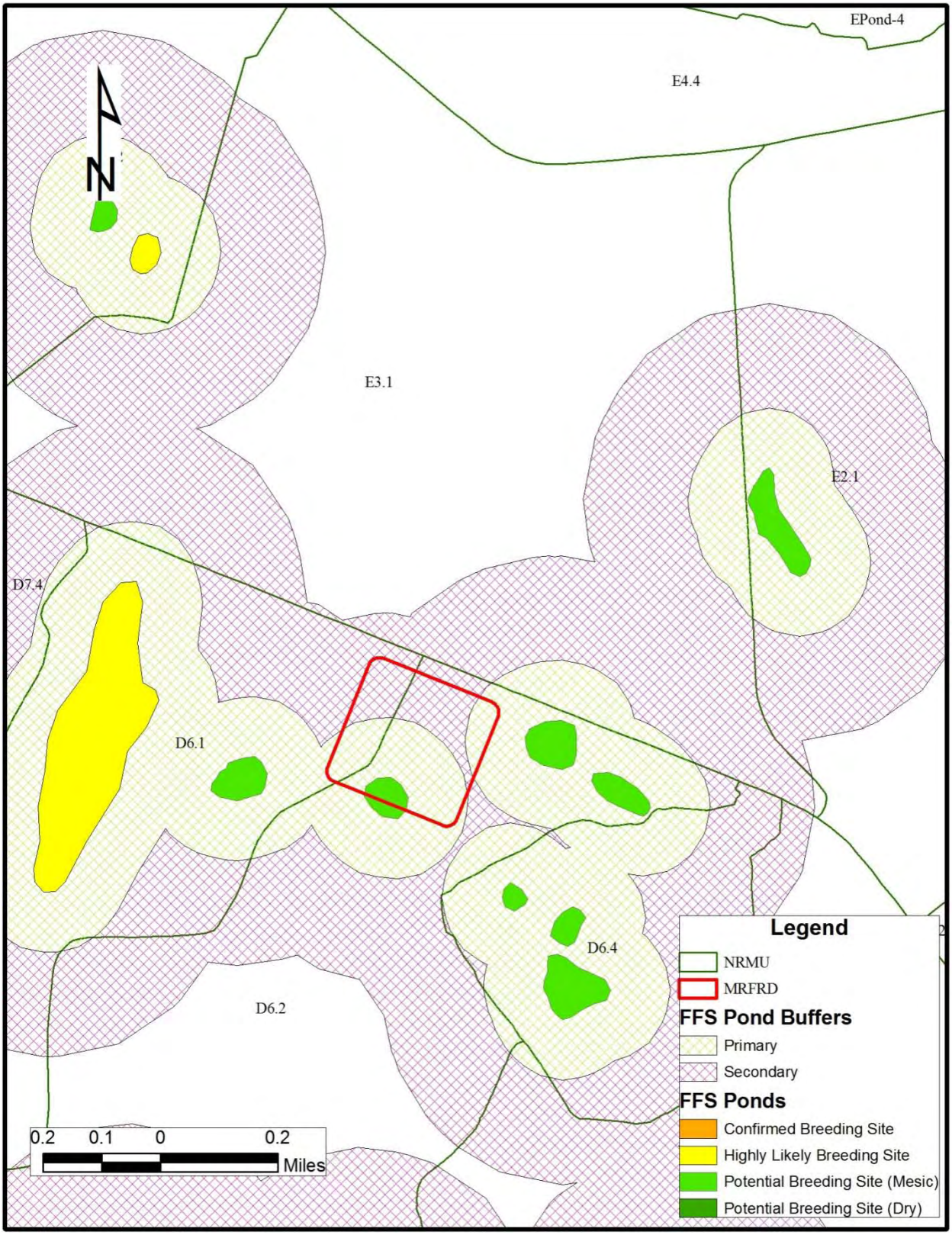

Figure 13. TES near the MRFRD, Fort Stewart, GA.

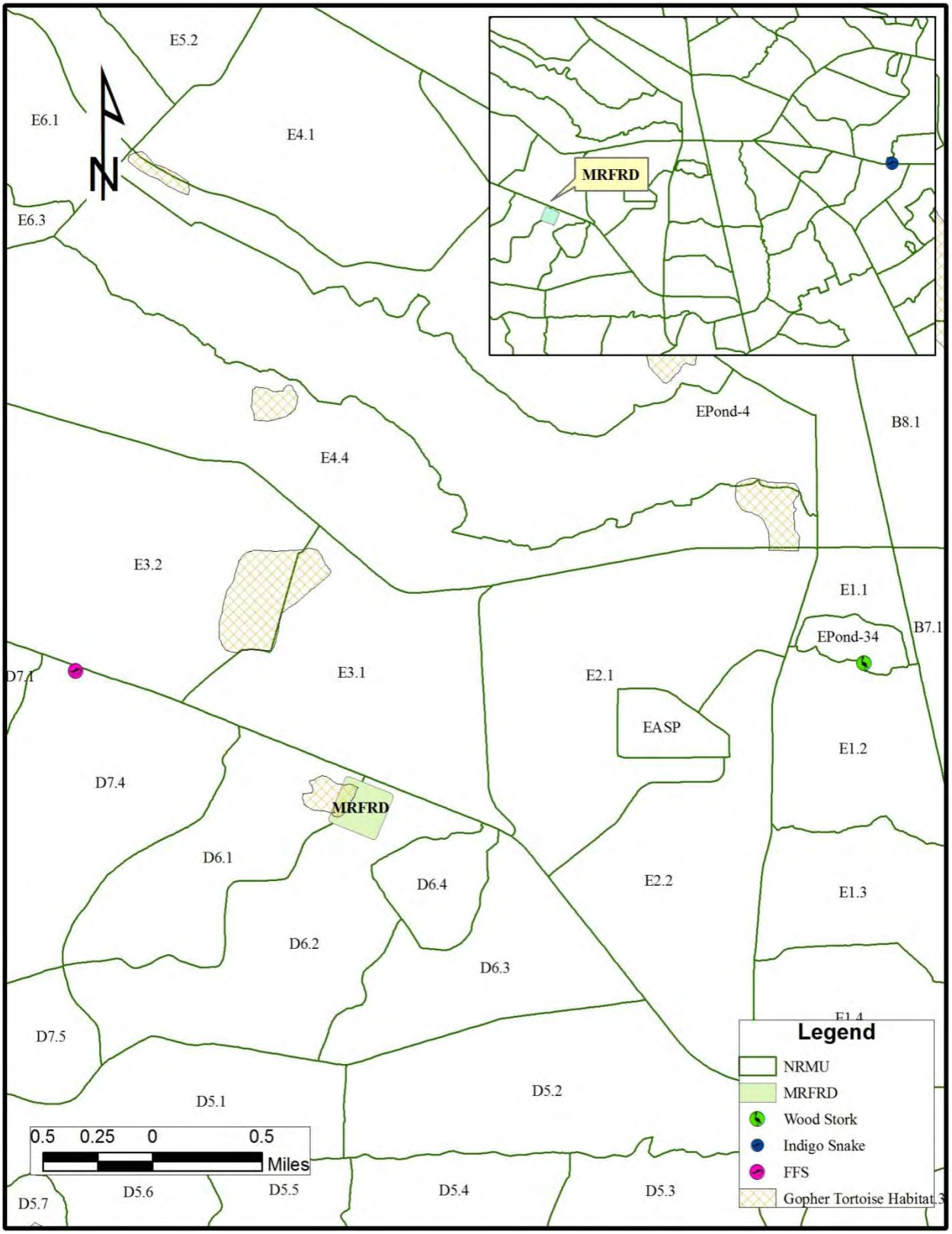

Figure 14. RCW partitions affected by the ISBC, Fort Stewart, GA.

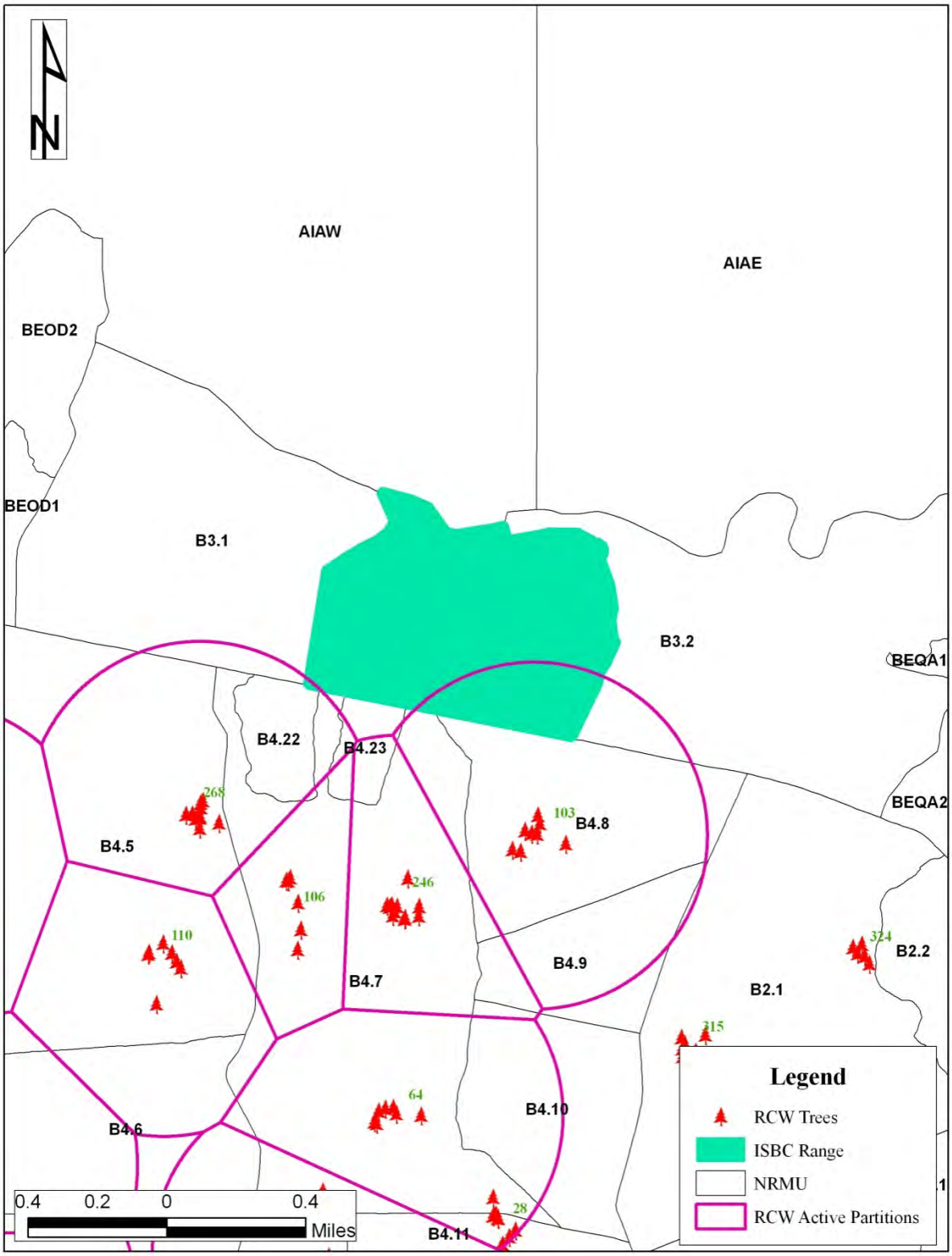

Figure 15. RCW HMU affected by the ISBC, Fort Stewart, GA.

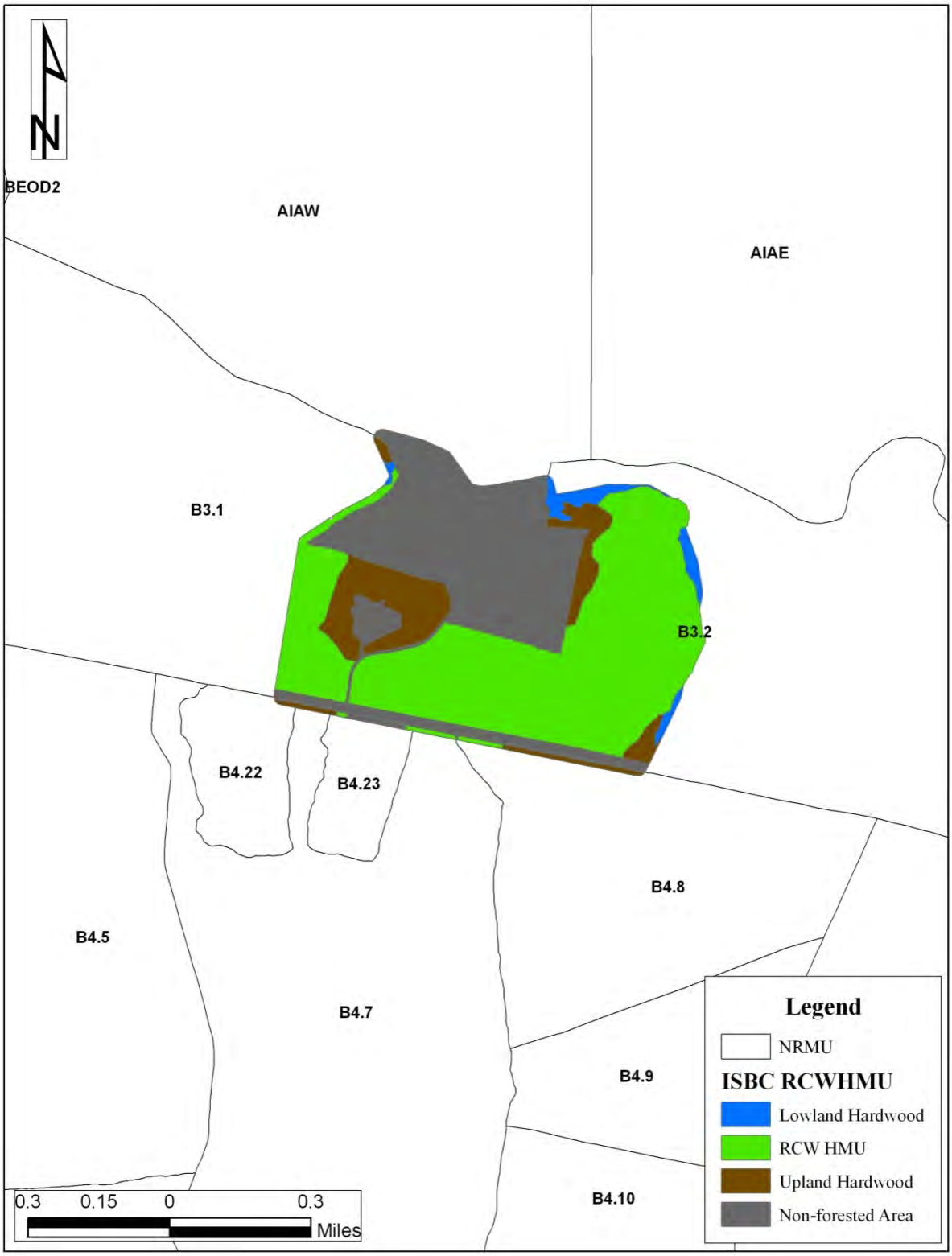

Figure 16. TES near the ISBC, Fort Stewart, GA.

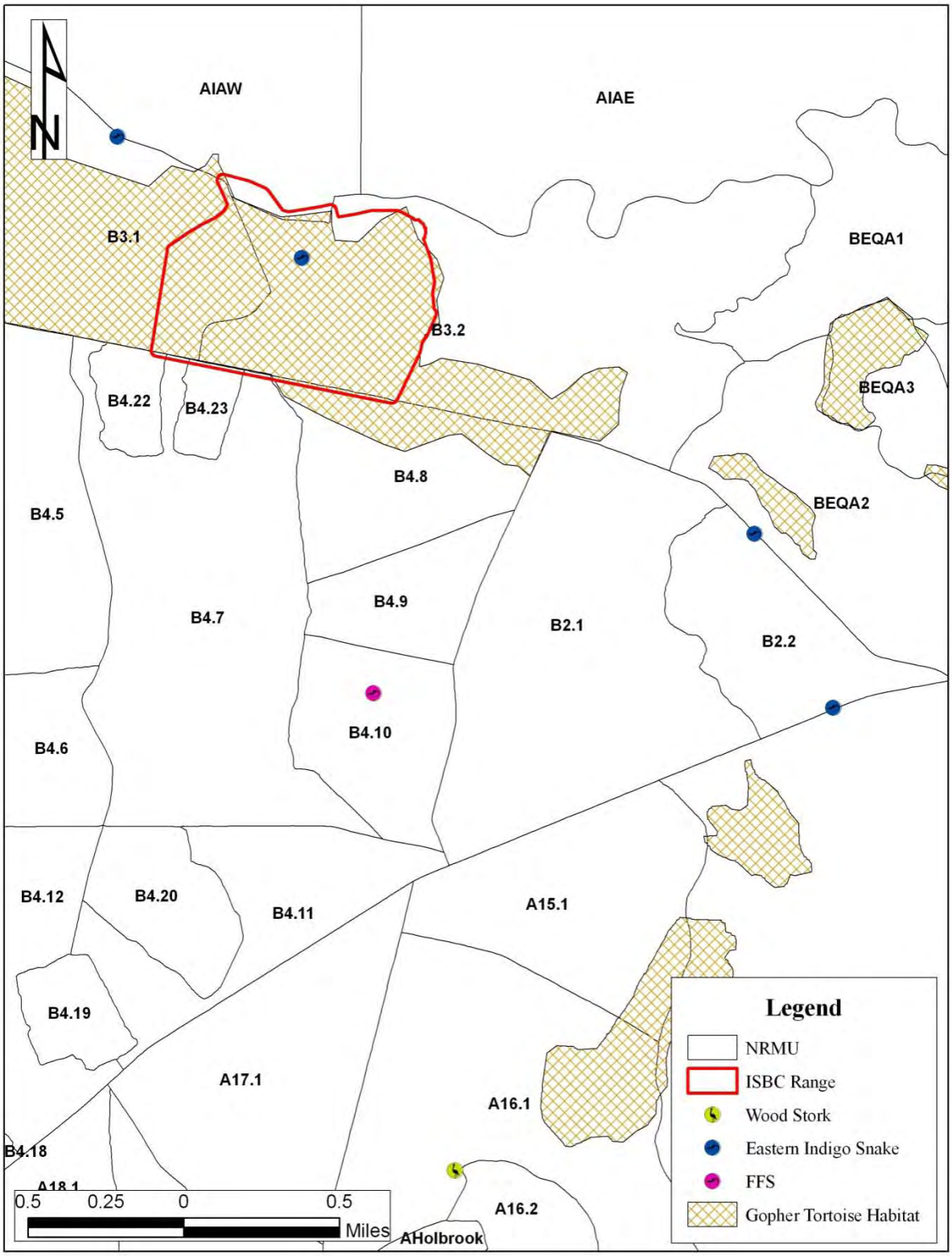

Figure 17. RCW HMU affected by the DMPTR, Fort Stewart, GA.

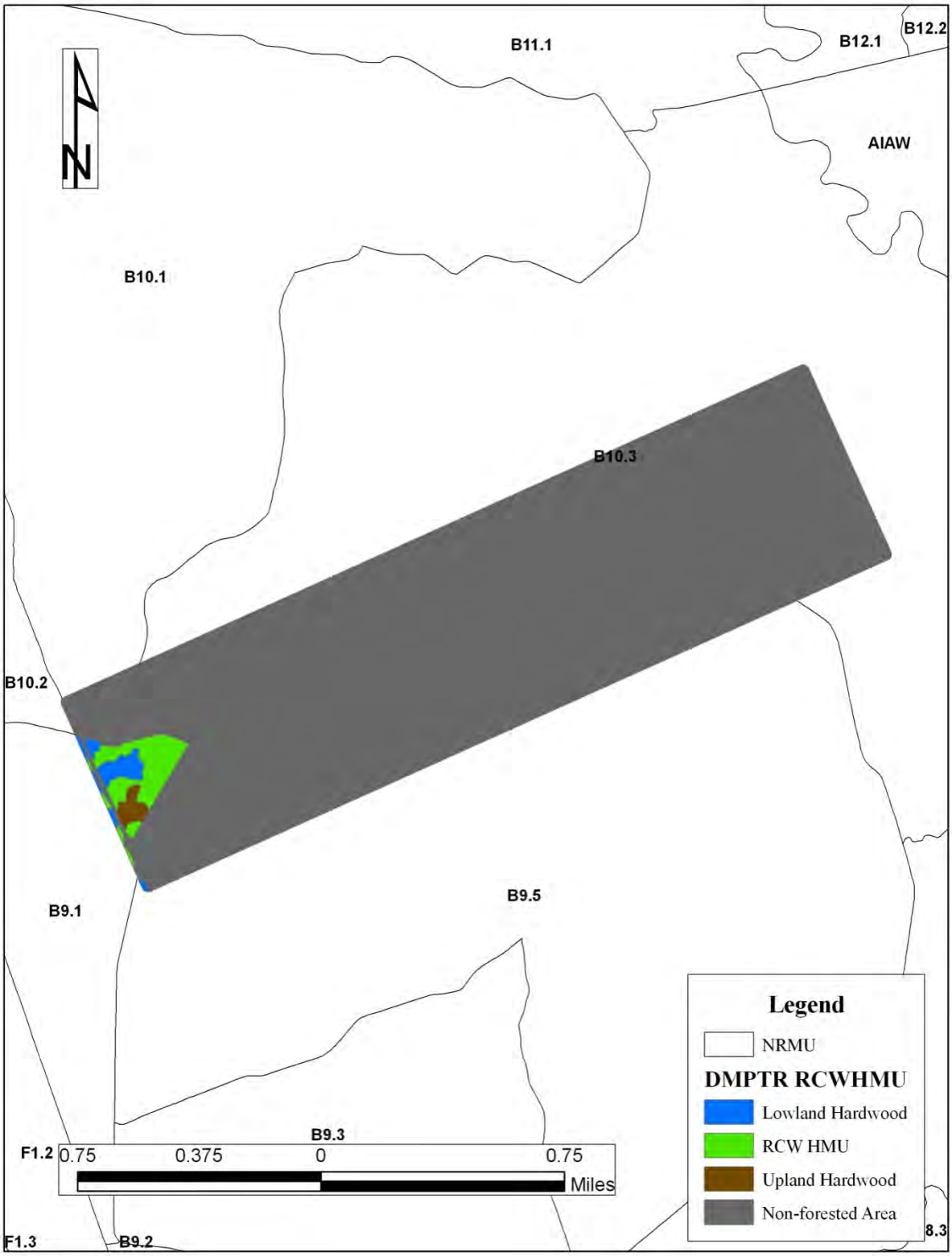

Figure 18. TES near the DMPTR, Fort Stewart, GA.

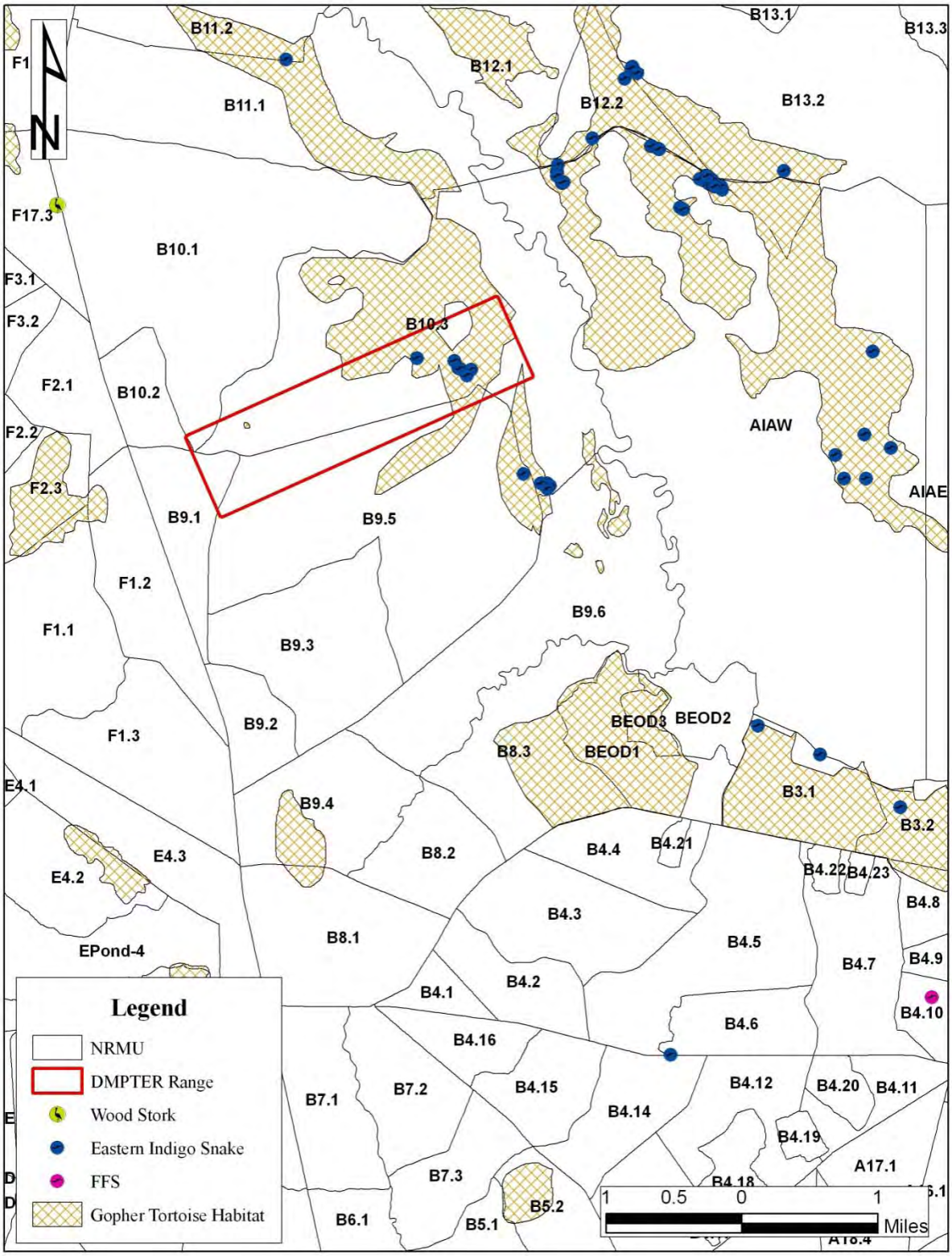

Figure 19. RCW HMU affected by the CPMPQC and Zero Range, Fort Stewart, GA.

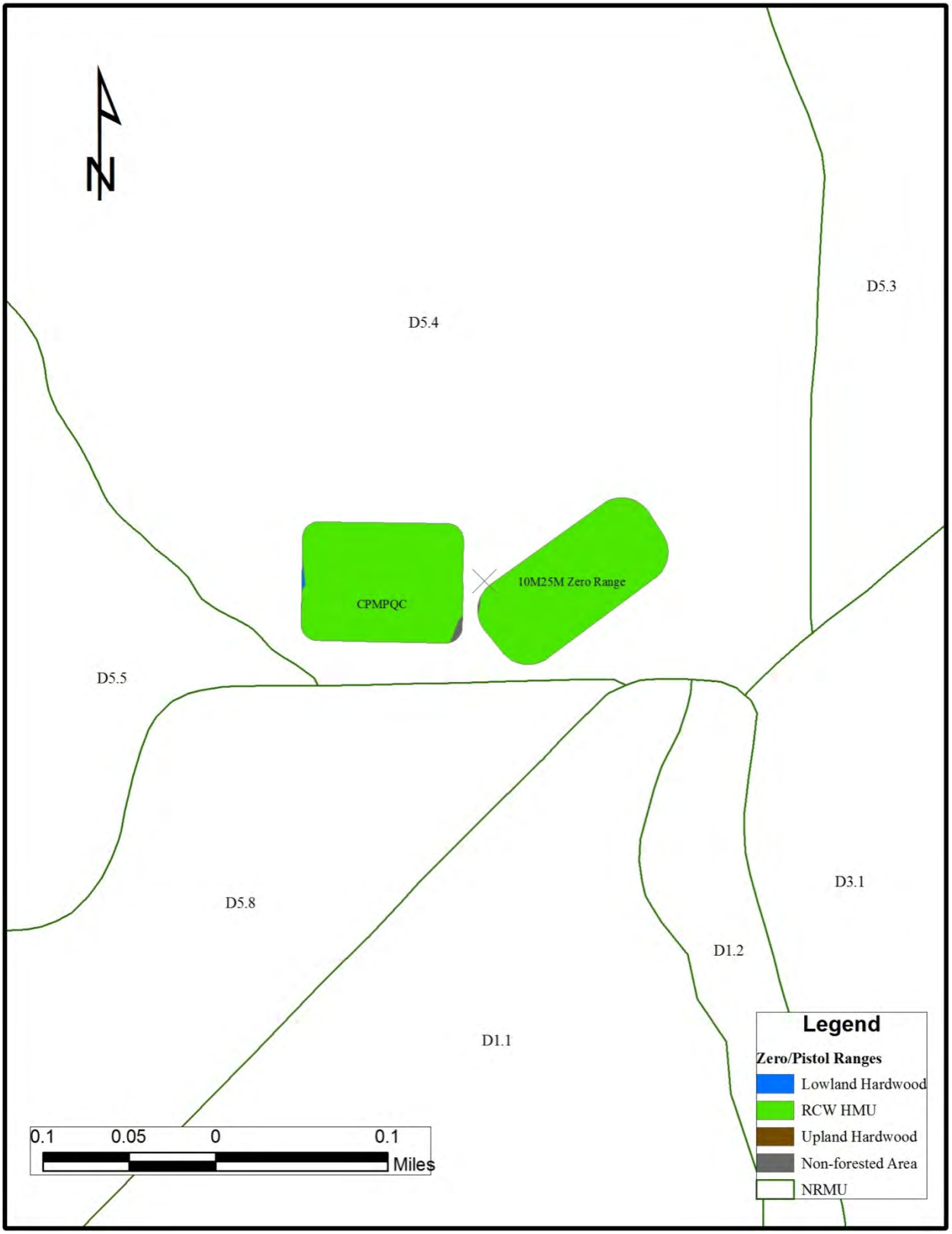

Figure 20. TES near the CPMPQC and Zero Range, Fort Stewart, GA.

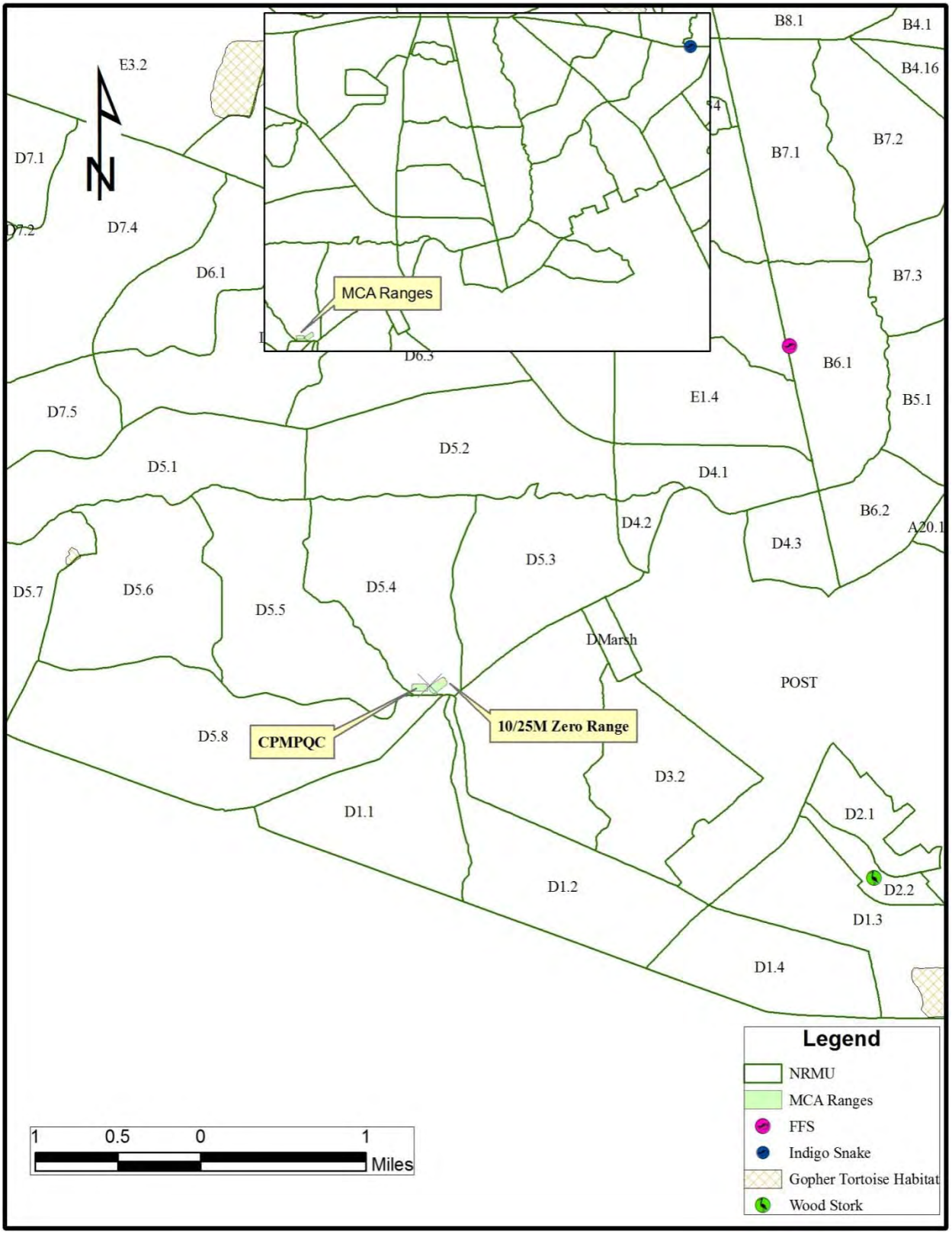

Figure 21. TES near the FMR, Fort Stewart, GA.

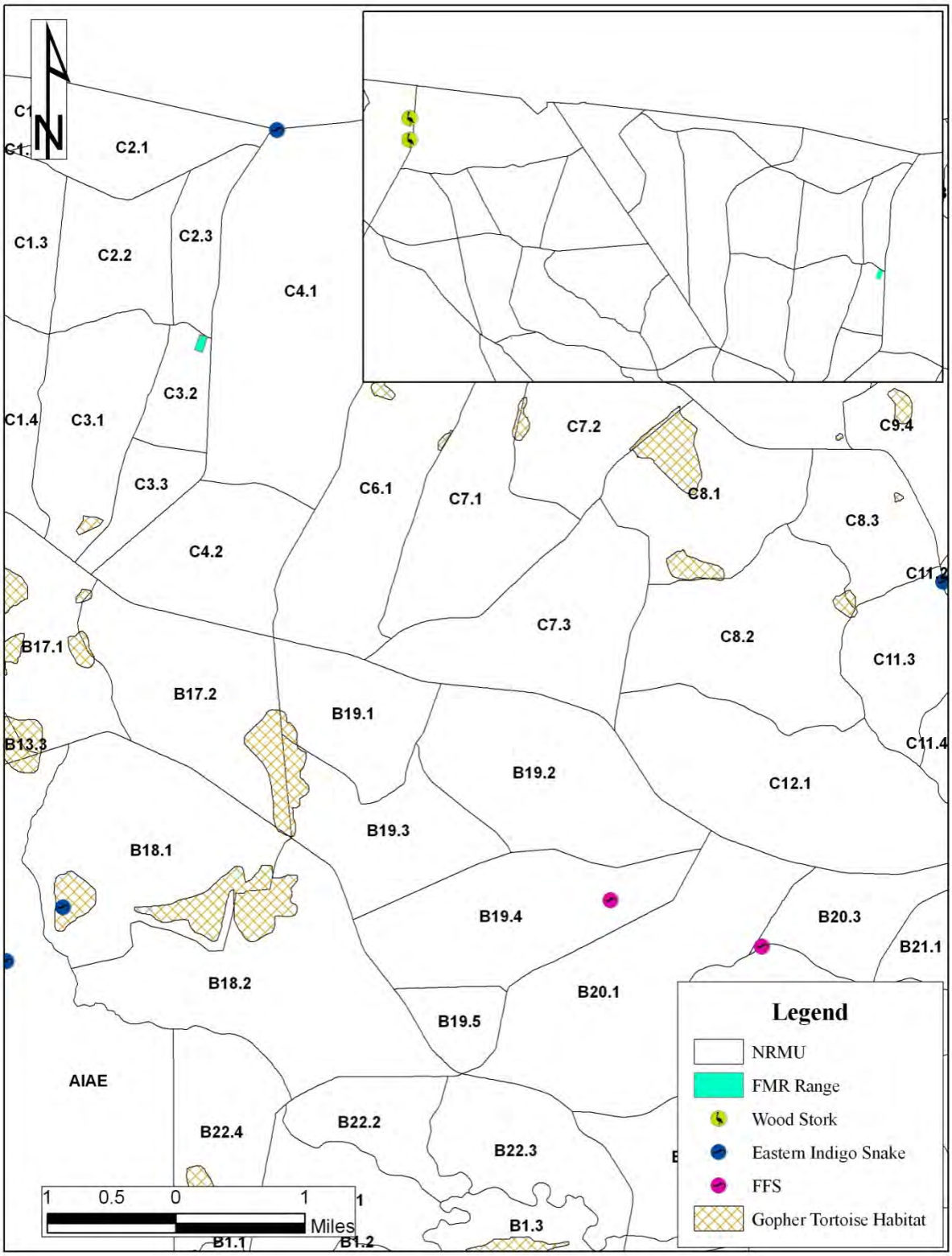

Figure 22. RCW partitions affected by the MRFRB, Fort Stewart, GA.

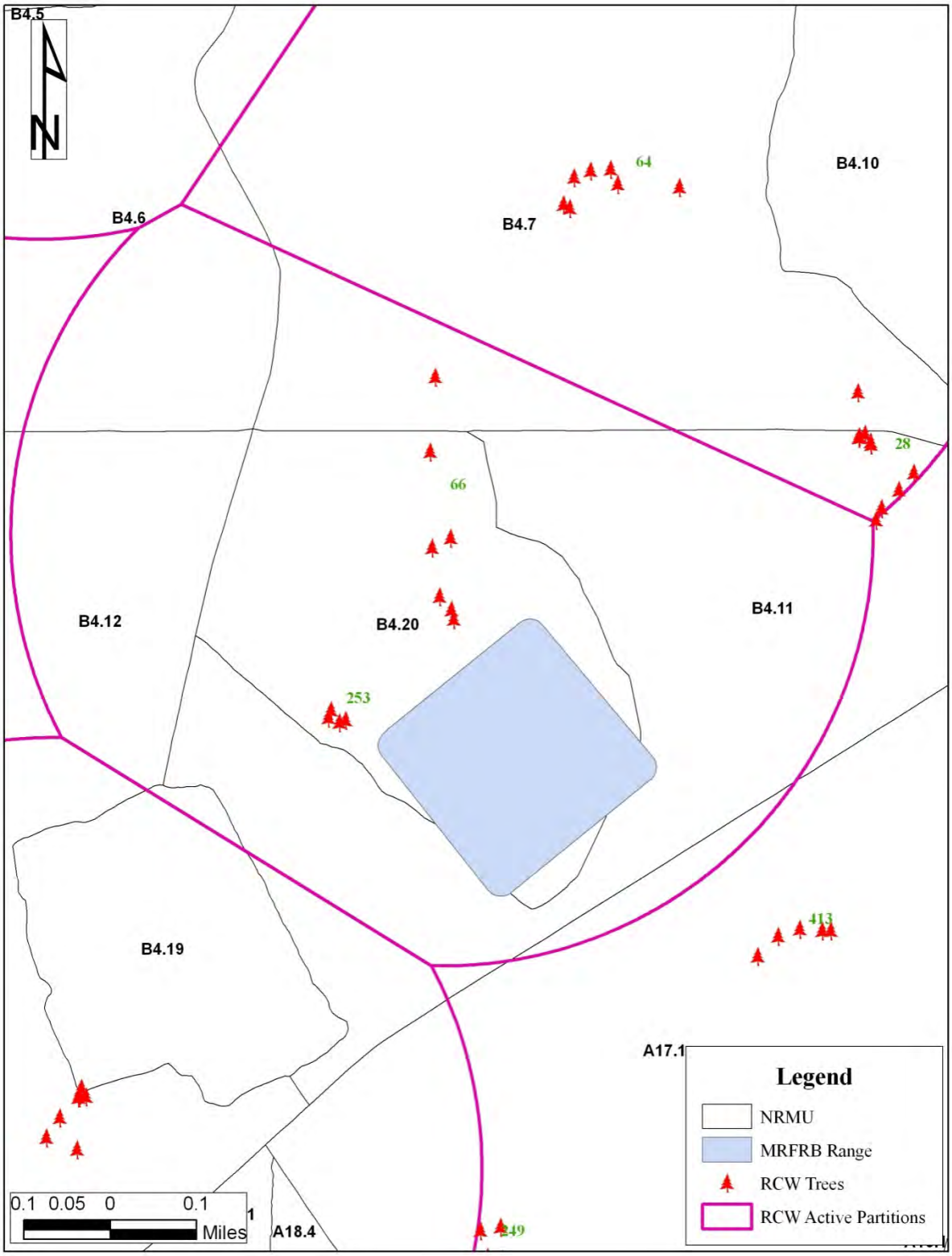

Figure 23. RCW HMU affected by the MRFRB, Fort Stewart, GA.

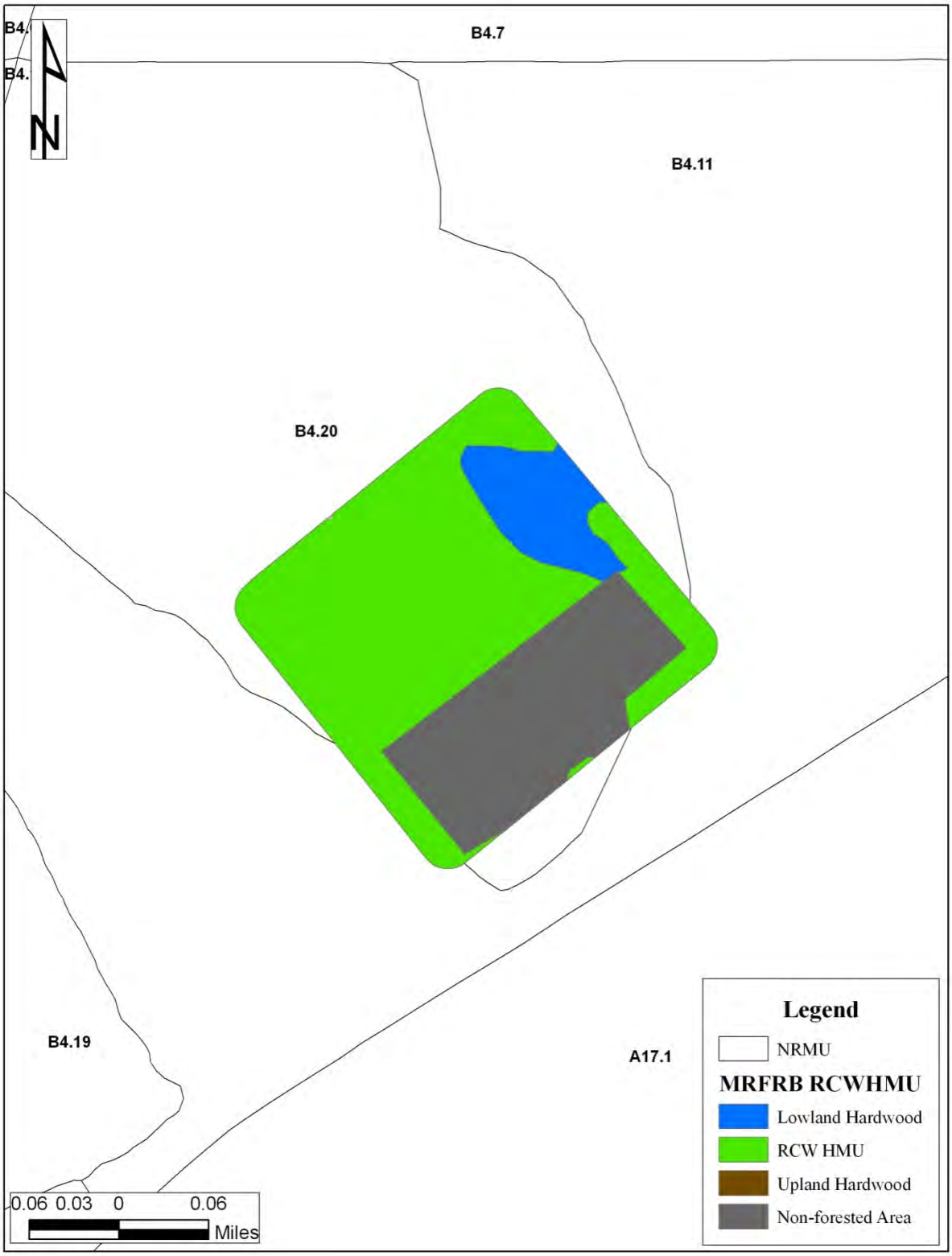

Figure 24. FFS affected by the MRFRB, Fort Stewart, GA.

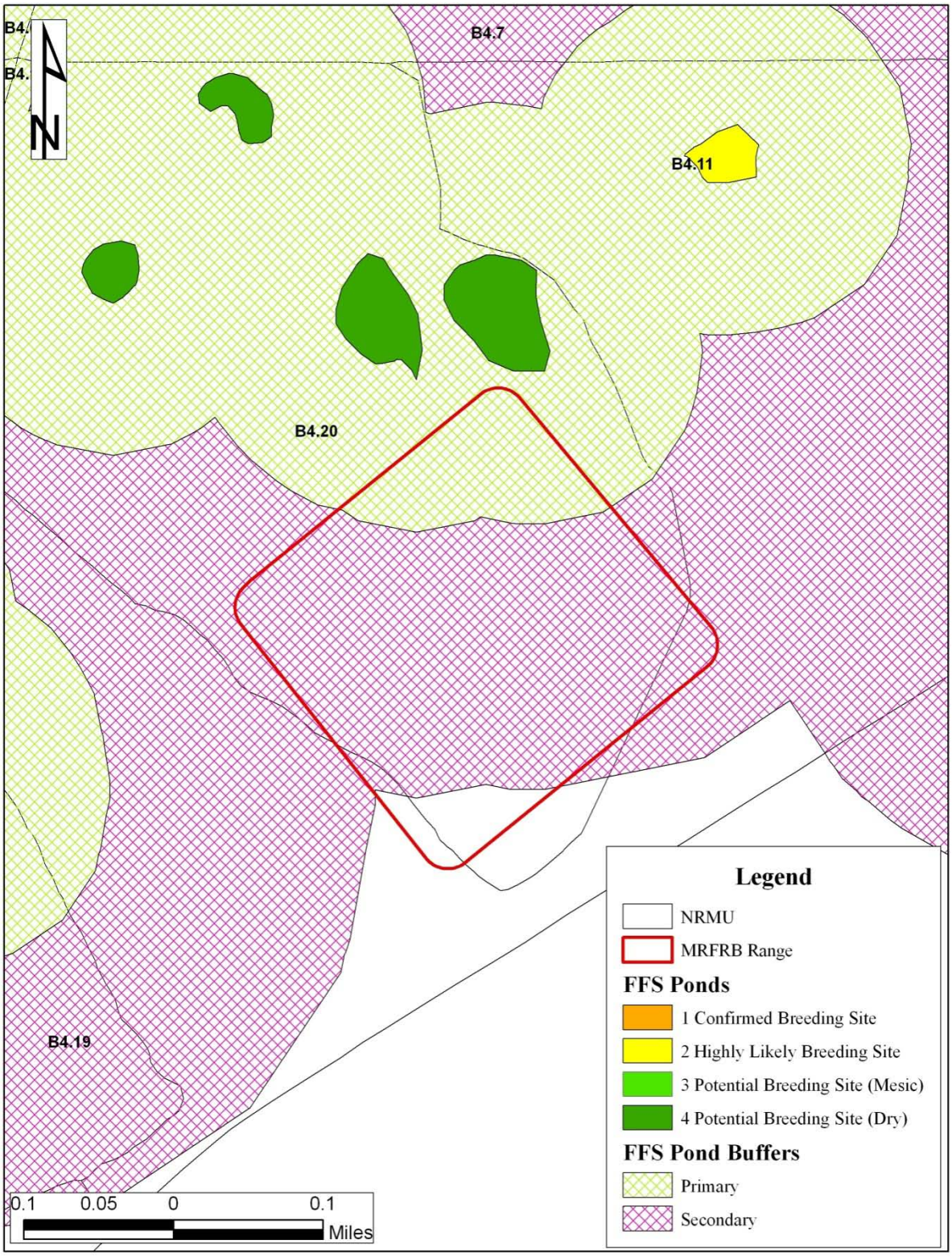

Figure 25. TES near the MRFRB, Fort Stewart, GA.

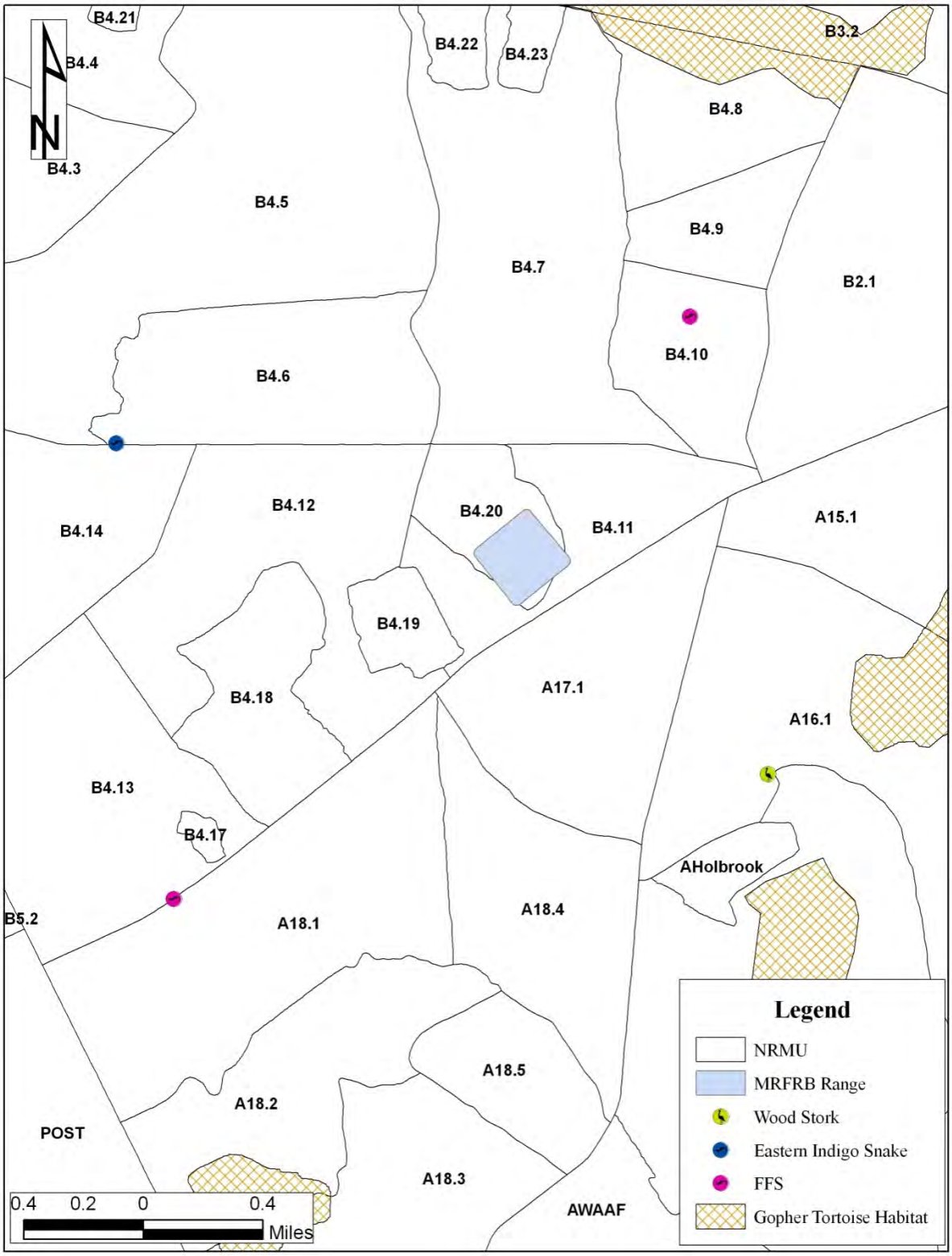

Figure 26. RCW partitions and trees affected by the CLFC, Fort Stewart, GA.

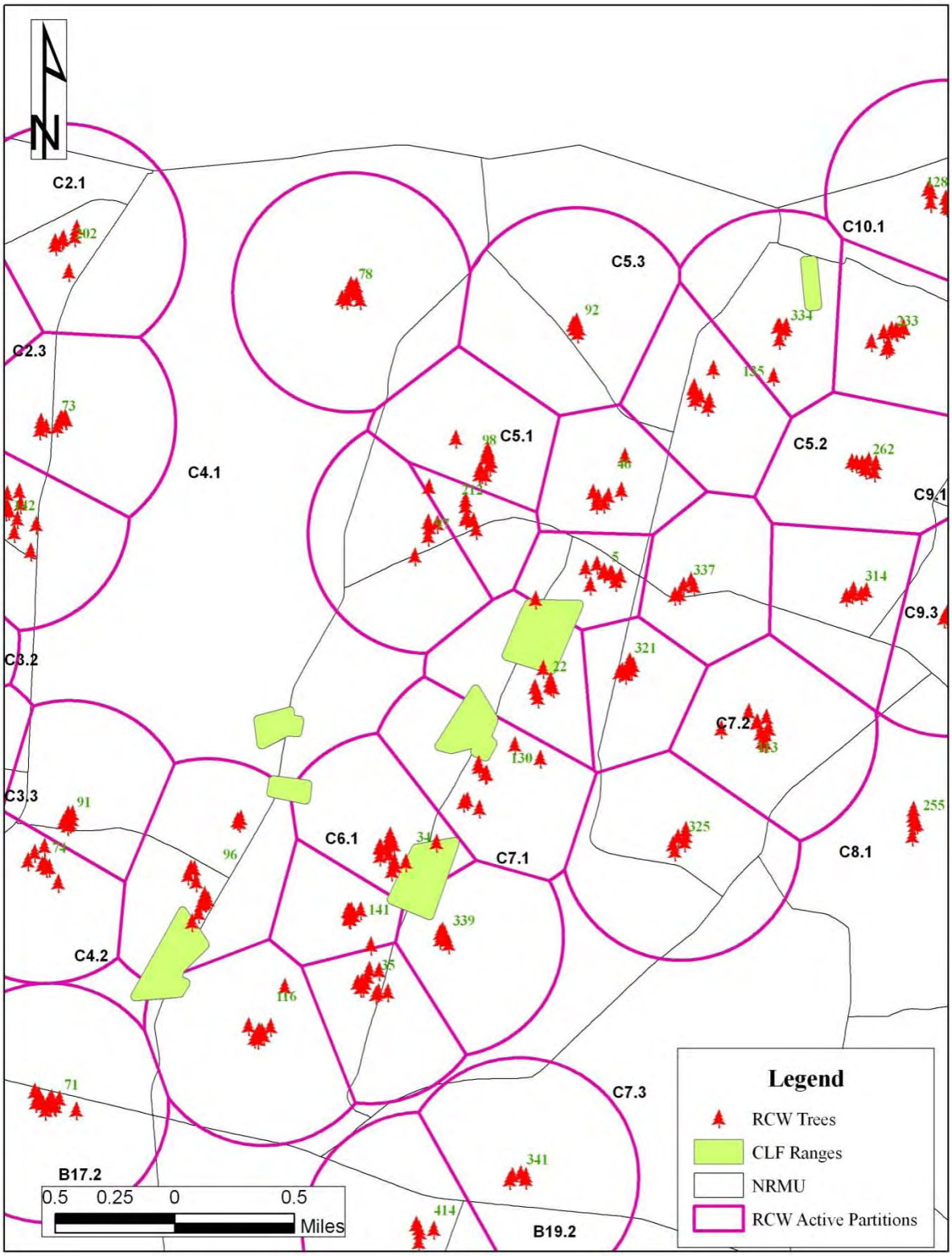

Figure 27. RCW HMU affected by the CLFC, Fort Stewart, GA.

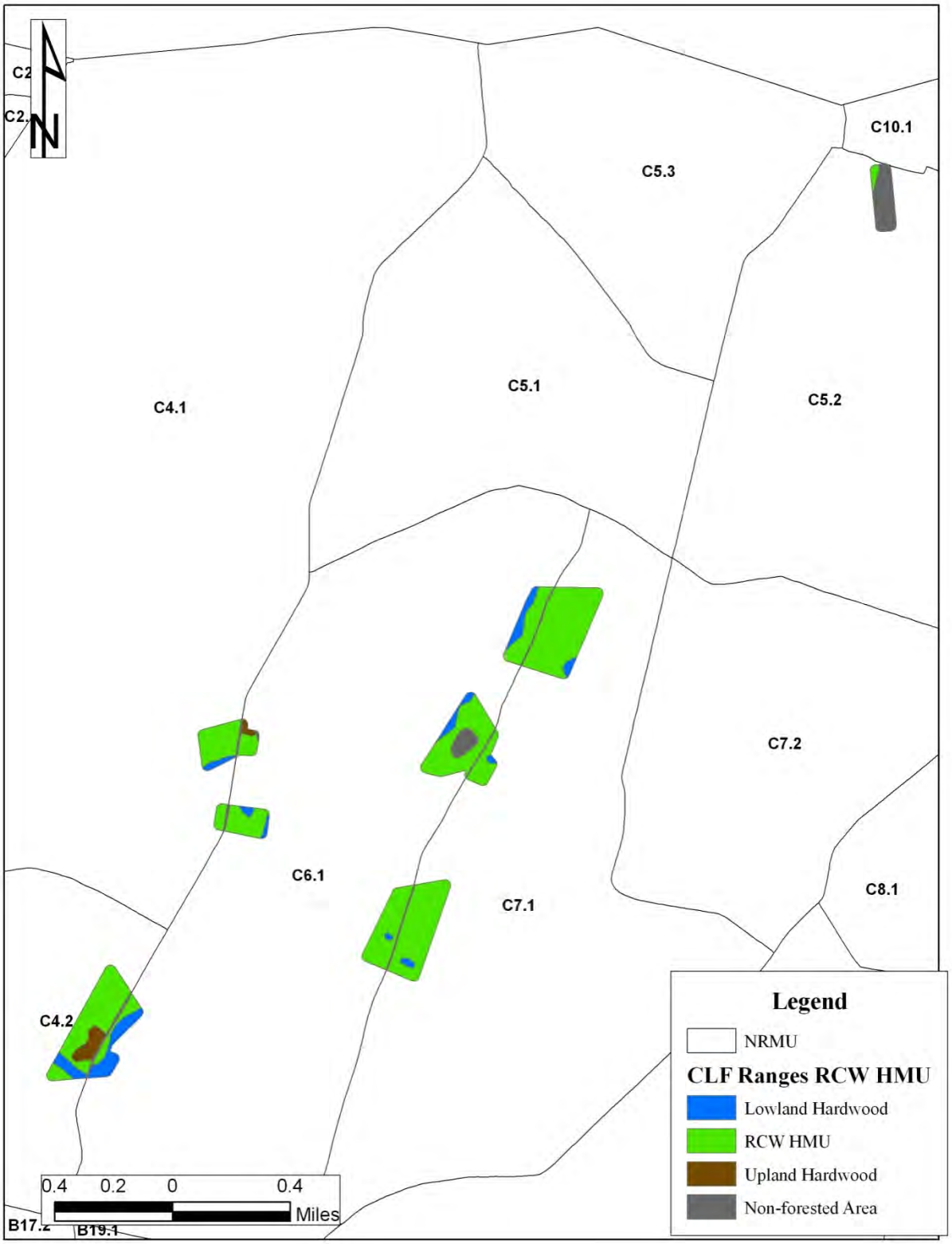

Figure 28. FFS affected by the CLFC, Fort Stewart, GA.

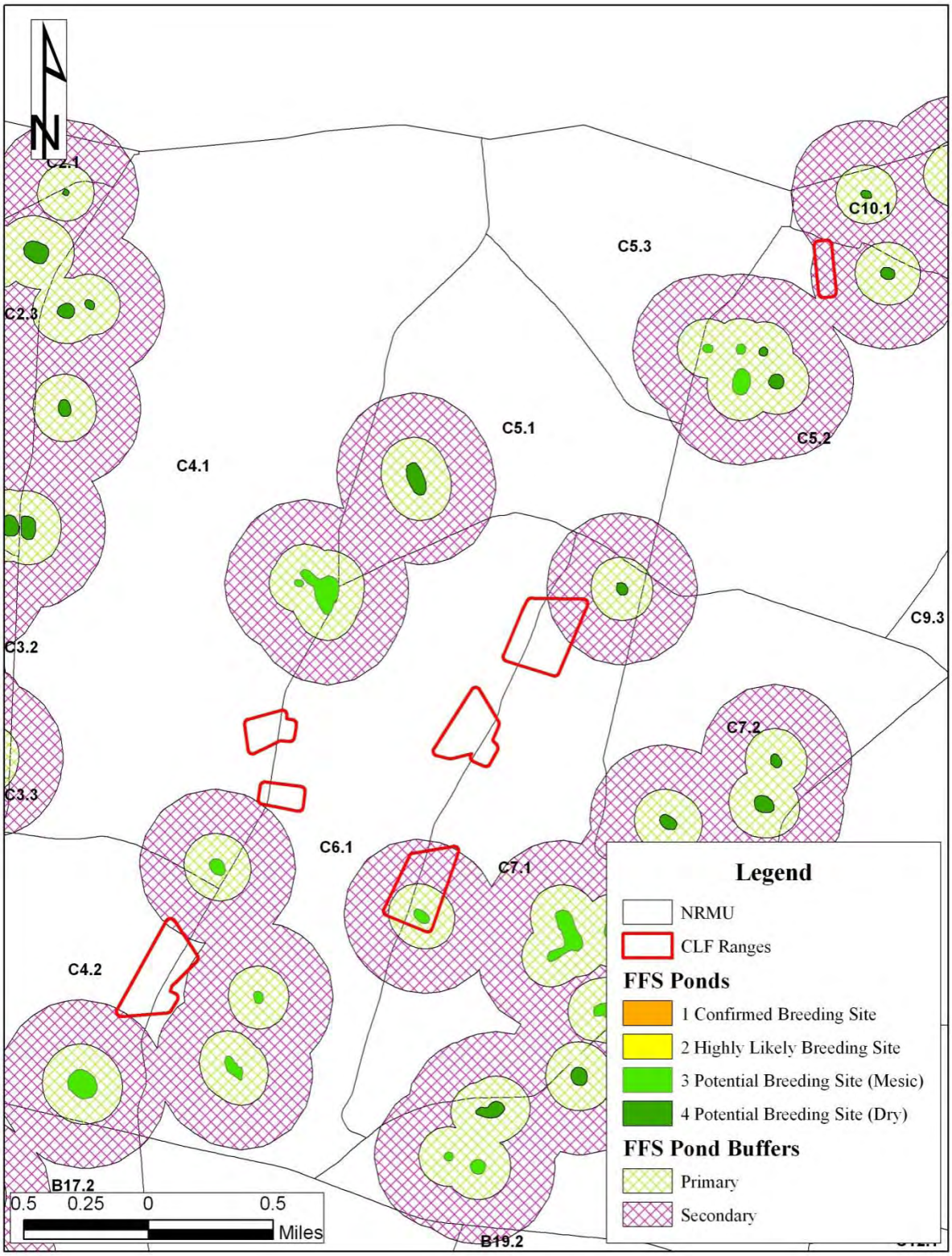

Figure 29. TES near the CLFC, Fort Stewart, GA.

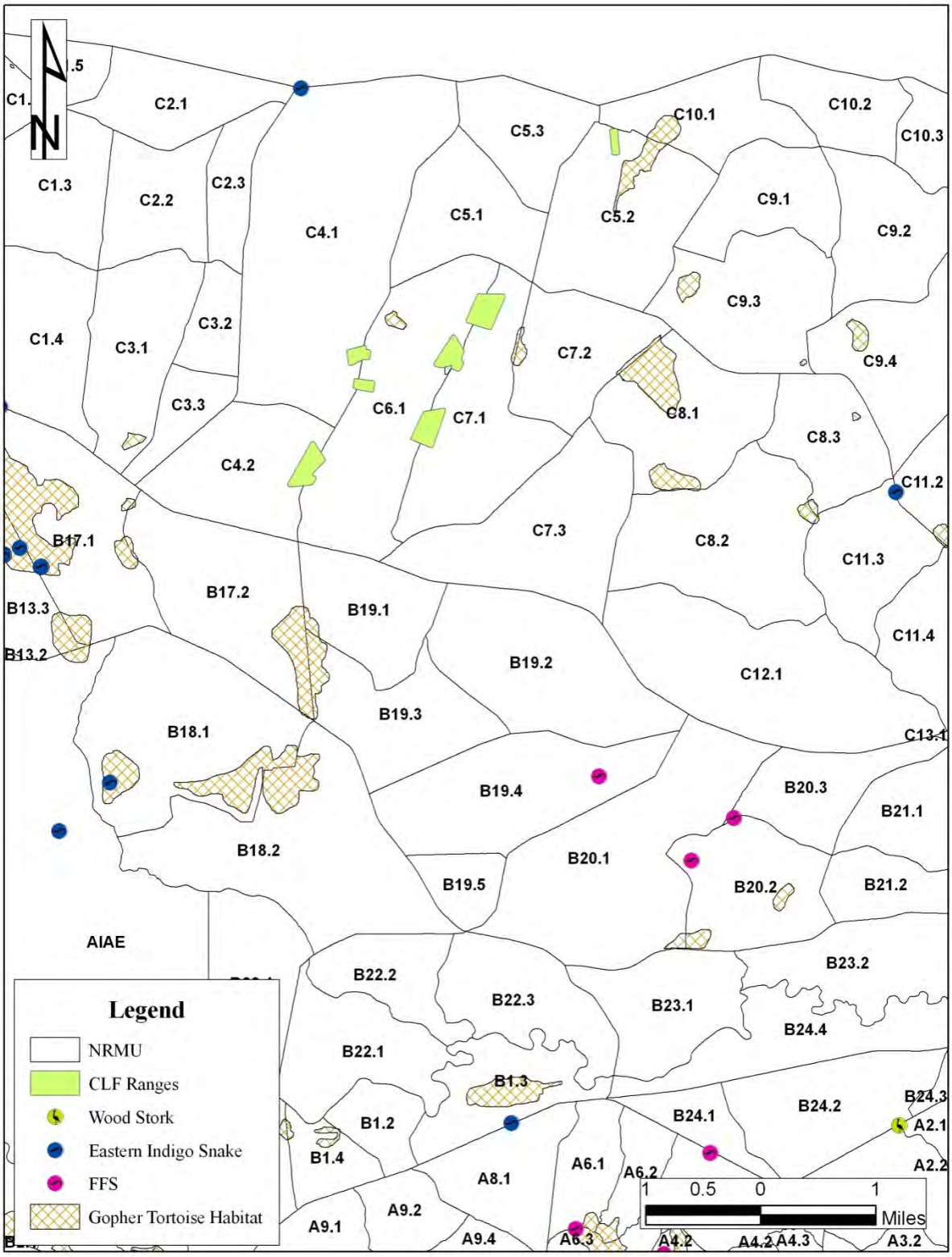

Figure 30. RCW HMU affected by the UAS, Fort Stewart, GA.

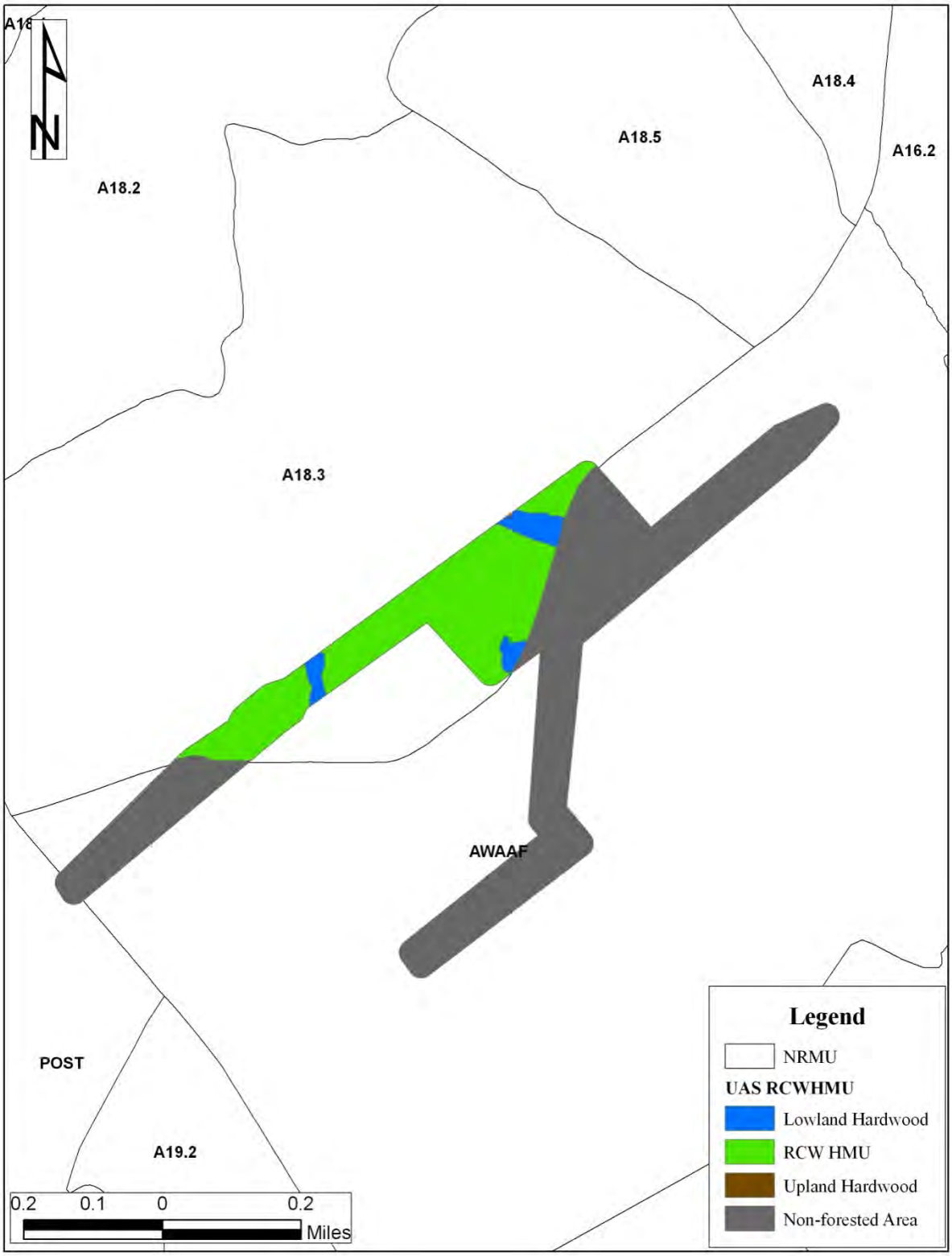

Figure 31. TES near the UAS, Fort Stewart, GA.

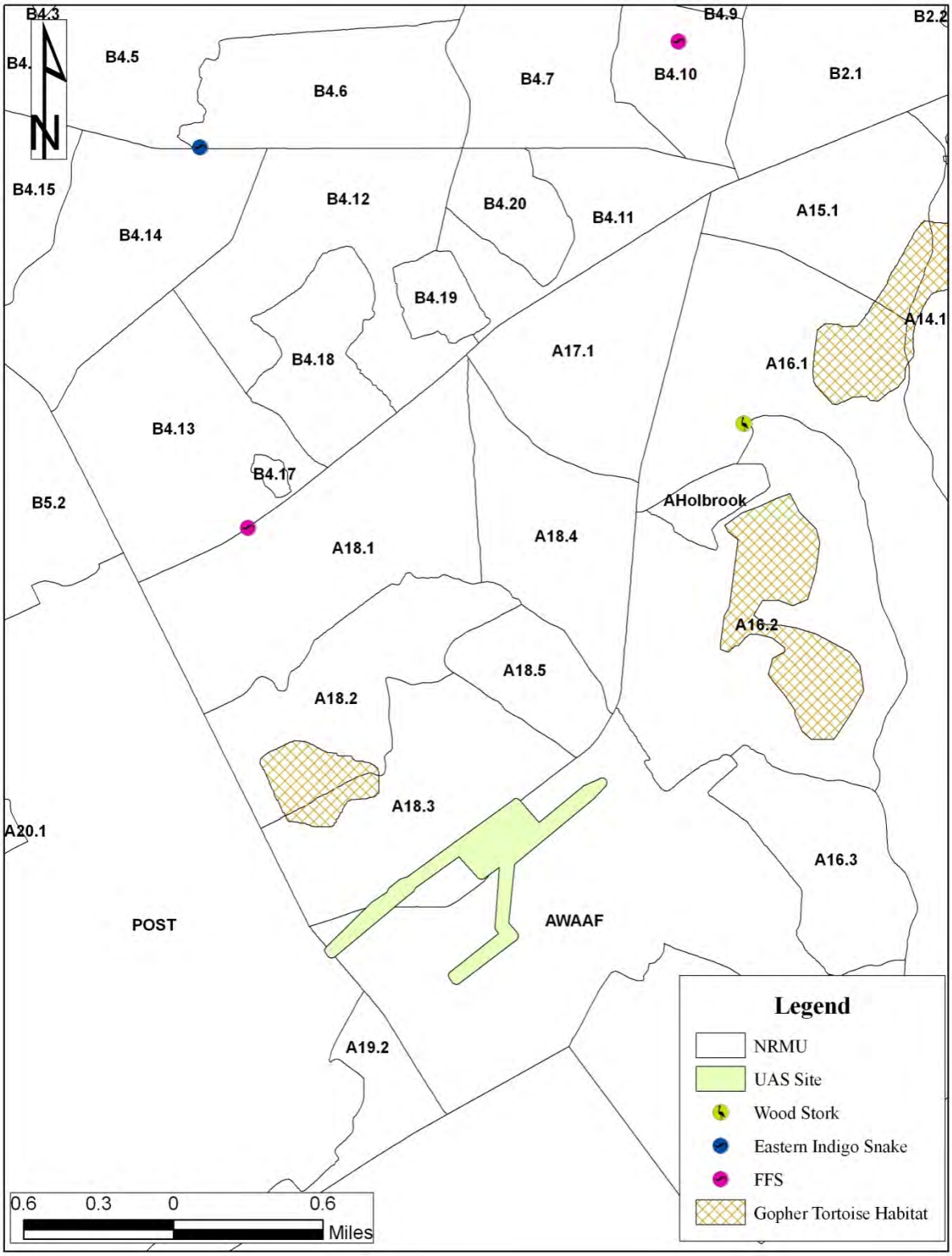

Figure 39. Shortnose Sturgeon locations relative to the MCA Projects, Fort Stewart, GA.

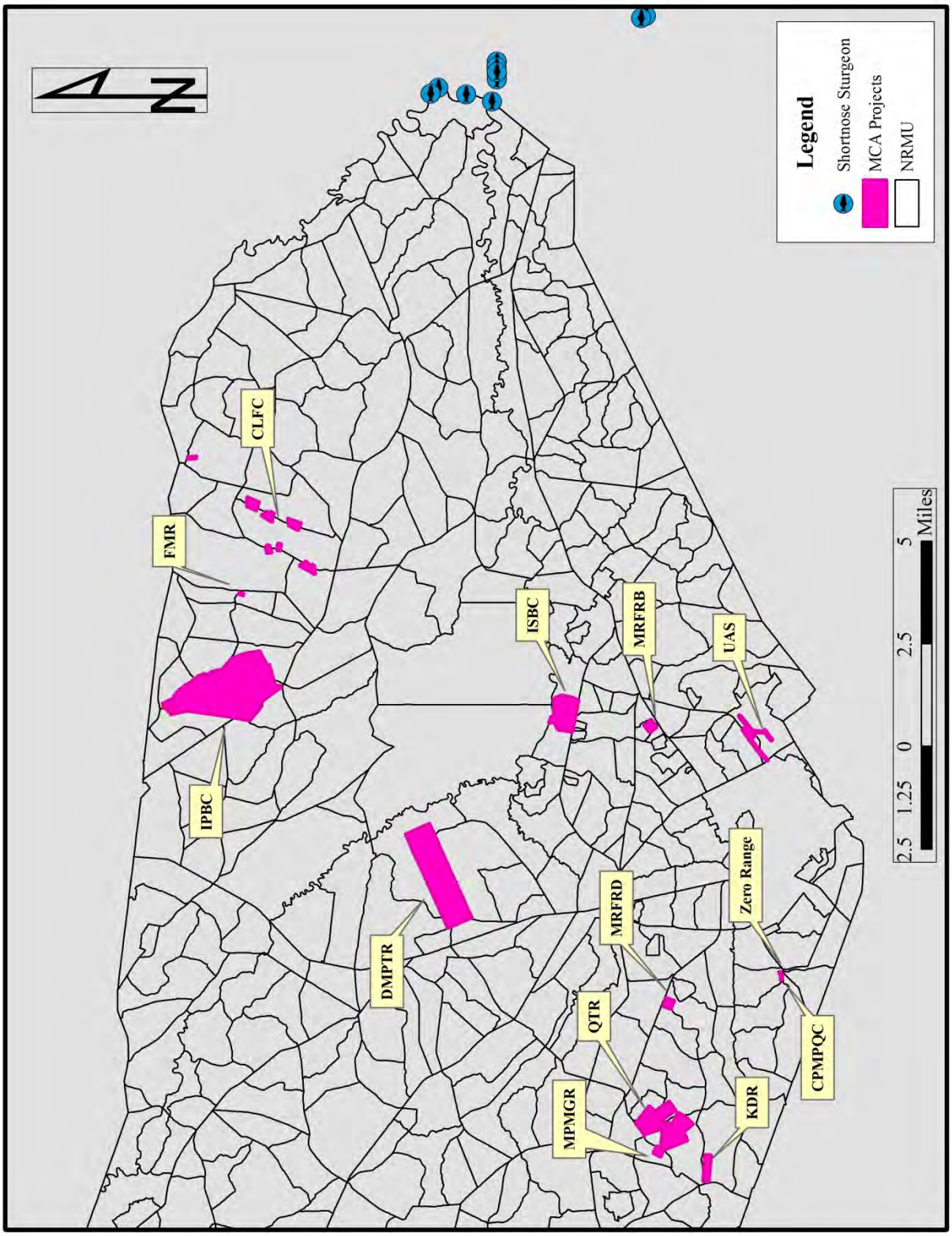

Table 2. Density analyses of active RCW clusters within 0.5 miles of proposed ranges and infrastructure construction, Fort Stewart, Georgia.

Range or Construction Project	Cluster w/in 0.5 miles of Project Area (impacted clusters)	Number of pre-project active clusters w/in 1.25 miles of impacted cluster	Number of post-project active clusters w/in 1.25 miles of impacted cluster	Post-Project Density Rating: Dense - >4.7 Clusters w/in 1.25miles Moderate - 2.5-4.7 w/in 1.25 miles Low - <2.5 w/in 1.25 miles
MPMGR	124	7	6	Dense
	247	6	5	Dense
	300	4	2	Low
	356	11	10	Dense
	381	8	8	Dense
IPBC	18	12	12	Dense
	38	9	9	Dense
	69	4	4	Moderate
	70	4	4	Moderate
	105	7	7	Dense
	256	4	4	Moderate
	361	4	4	Moderate
MRFRD	407	3	3	Moderate
ISBC	103	6	6	Dense
	268	8	8	Dense
QTR	124	7	5	Dense
	154	8	6	Dense
	247	6	4	Moderate
	252	7	5	Dense
	322	8	6	Dense
MRFRB	66	9	9	Dense
CLF	5	14	14	Dense
	22	12	12	Dense
	34	9	9	Dense
	96	10	10	Dense
	116	10	10	Dense
	130	13	13	Dense
	141	6	6	Dense
	334	8	8	Dense
	339	10	10	Dense

Table 3. Acreage impacts to the RCW. Highlighted clusters are not expected to persist and incidental take is requested for these RCW groups.

RCW Cavity Tree Impacts		Meets MSS		Incidental Take Requested	Acreage Impacts		
					Total RCW Partition Acres Impacted	RCW HMU Partition Acres	
RCW Cluster #	# Cavity Trees Impacted	Pre-project	Post-project			Pre-Project	Post-Project
5	0	Yes	Yes	No	7.8	95.0	87.2
18	0	No	No	Yes	35.7	100.5	64.9
22	2	Yes	Yes	No	35.7	121.2	85.5
34	2	No	No	Yes	31.6	100.3	68.7
38	1	No	No	No	67.6	175.9	108.2
66	0	No	No	No	22.2	294.9	272.7
67	0	No	No	No	5.9	123.7	117.8
69	7 (All)	No	No	Yes	105.6	217.1	111.5
70	0	Yes	Yes	No	3.1	169.6	166.5
96	1	No	No	No	25.0	204.0	179.0
103	0	Yes	Yes	No	39.6	242.8	203.2
105	5 (All)	No	No	Yes	141.1	165.7	24.7
116	0	No	No	No	2.3	226.3	224.0
124	1	Yes	No	Yes	108.7	137.1	28.4
130	0	Yes	Yes	No	20.8	182.3	161.5
141	0	No	No	No	1.3	77.2	76.1
154	2	Yes	Yes	No	39.4	117.9	78.5
179	0	Yes	Yes	No	18.9	204.1	185.2
247	11 (All)	Yes	No	Yes	41.8	97.7	55.9
252	0	No	No	No	9.0	117.9	108.9
256	7 (All)	No	No	Yes	34.3	67.4	33.1
268	0	Yes	Yes	No	0.02	141.4	141.4
300	0	Yes	Yes	No	27.4	188.3	160.9
322	0	Yes	Yes	No	54.3	185.0	130.8
334	0	Yes	Yes	No	1.1	130.6	129.5
339	0	Yes	Yes	No	8.6	140.9	132.4
342	0	No	No	No	28.1	192.2	164.2
356	0	Yes	Yes	No	9.4	202.3	192.8
361	5 (All)	No	No	Yes	137.5	170.8	33.3
381	0	Yes	Yes	No	10.7	155.4	144.8
407	0	Yes	Yes	No	32.3	261.9	229.6
Totals	44	17	15	8	1106.8	5007.4	3901.2

Table 4. Project impacts to frosted flatwoods salamander, eastern indigo snake, and gopher tortoise, Fort Stewart, GA.

	Frosted Flatwoods Salamander				Eastern Indigo Snake	Gopher Tortoise
Project	Highly Likely Pond Acres	Potential Breeding Pond Acres	Primary Buffer Acres	Secondary Buffer Acres	Sightings	Habitat Acres
MPMGR	0.7	0.4	25.2	49.5	No	0
IPBC	0	5.3	67.7	272.6	No	23.2
MRFRD	0	1.6	19.7	12.6	No	6.4
ISBC	0	0	0	0	Yes (1)	277.2
QTR	0	4.3	40.6	121.6	No	0
DMPTR	0	0	0	0	Yes (7)	0
Zero	0	0	0	0	No	0
CPMPQC	0	0	0	0	No	0
KDR	0	0	0	0	No	0
FMR	0	0	0	0	No	0
MRFRB	0	0	6.1	28.2	No	0
CLFC	0	1.6	17.4	43.5	No	2.0
UAS	0	0	0	0	No	0

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IPBC Power Line ROW

The power line construction and corresponding right-of-way (ROW) for the Infantry Platoon Battle Course (IPBC) in FSTA C-1 (Figure 1) will occupy 12.4 acres and will require clear cutting, grubbing, grading, and future maintenance for the ROW. The total acreage consists of 0.4 acres of wetland, 8.6 acres of RCW HMU, and 3.4 acres of non-forested area. Habitat within the proposed action area is composed of a canopy dominated by slash pine (*Pinus elliottii*), longleaf pine (*P. palustris*), and loblolly pine (*P. taeda*), with a midstory of sweetgum (*Liquidambar styraciflua*), water oak (*Quercus nigra*), live oak (*Q. virginiana*), wax myrtle (*Myrica cerifera*), and red bay (*Persea borbonia*). The groundcover is characterized by saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*), shiny blueberry (*Vaccinium myrsinites*), huckleberry (*Gaylusaccia frondosa*), runner oak (*Q. pumila*.), rusty lyonia (*Lyonia ferruginea*), wiregrass (*Aristida stricta*), and switch-cane (*Arundinaria gigantea*). Wetland systems adjacent to the proposed project are dominated by pond cypress (*Taxodium ascendens*), blackgum (*Nyssa sylvatica*), pond pine (*P. serotina)*, red maple (*Acer rubrum*), black titi (*Cliftonia monophylla)*, and red bay. Soils in the action area consist of Ellabelle loamy sand, Mascotte sand, Olustee fine sand, Pelham loamy sand, and Stilson loamy sand.

RCW

Of the 8.6 acres of RCW HMU being removed, 4.1 acres will impact partition 70 and 1.3 acres will impact partition 389. The remaining 3.2 acres of RCW HMU do not affect any RCW partition. Fort Stewart still expects to achieve 350 potential breeding groups (the recovery benchmark) in the breeding season of 2013. The RCW Matrix was previously run on partition 70 with 166.5 acres of PGQFH passing. The new total for partition 70 is 162.4 acres of PGQFH and still passes.

Partition 389 was not previously impacted. Partition 389 does not pass the RCW Matrix due to too much pine basal area (PBA) < 10 inches in stands 15793, 16598, and 18239 and too much PBA > 10 inches in stand 16598 (see table below). This PBA will be thinned at the start of the project and all four stands will pass the RCW Recovery Standard with 220.2 acres of GQFH. Furthermore, 23 acres of stand 15793 was mowed during January and February 2009 to remove excessive mid-story (Figure 1).

Partition 389 - Stand Values (MS) 4/1/2010									
Stand ID	Age	PBA >10	PBA<10	Hdwd Midstory	Total BA	% Groundcover	Burn Interval	Burn Season	Total Acres
15793	75	46	39.8	2	88	14.7	4	2	149.21
16598	75	80	20	3	102.5	14.8	4	2	14.09
16599	75	18	1.6	1	22	0	4	2	69.11
18239	75	47.4	56.3	1	107.4	11.8	1	2	58.15

Cluster 389 was provisioned 12/06/2005 and was inactive until the 2009 breeding season where it had 1 active RCW tree with 1 adult. At the start of the 2010 breeding season the cluster has 3active trees and 2 adults were heard.

FFS

No FFS HMU or ponds will be affected by the IPBC Power Line ROW construction. However, 1.0 acres of the primary buffer and 4.3 acres of the secondary buffer for a potential breeding of the FFS will be impacted (Figure 2). Project design will incorporate protection measures as required by the Clean Water Act and the Georgia Erosion and Sedimentation Control Act to ensure appropriate wetland protection. Therefore, the proposed actions will not result in significant erosion, run-off, or other off-site impacts that might affect FFS habitat. The nearest recent occurrence of a FFS was 8.5 miles southeast of the proposed project area in FSTA B-19.4 (Figure 3).

Eastern Indigo Snake

No eastern indigo snake HMU or gopher tortoise habitat will be impacted by the Power Line ROW. The nearest sighting for an eastern indigo snake was 2.5 miles west of the action area in FSTA C-1.4 and the nearest gopher tortoise habitat is located 1.7 miles southeast of the action area in FSTA C-1.2 (Figure 3).

Wood Stork

No wood storks were observed in the proposed project area, nor have they been observed foraging in the action area. The nearest area where foraging wood storks have been observed is approximately 2.7 miles west of the action area in FSTA F-20.4 (Figure 3).

Shortnose Sturgeon

The only records for shortnose sturgeons on Fort Stewart occur in or near the confluence of the Ogeechee and Canoochee Rivers, approximately 16.9 miles southeast of the project area. Suitable habitat for shortnose sturgeons does not occur in or near the action area.

Conclusion

The inclusion of the IPBC Power Line ROW into the Mission and Master Planning EIS BA does not affect our initial findings which are the proposed actions will adversely affect the RCW, will not affect the shortnose sturgeon, and it is not likely to adversely affect the FFS, wood stork, or eastern indigo snake. No critical habitat will be adversely modified by this action.

Figure 1. IPBC Power Line ROW location and RCW HMU and partitions affected.

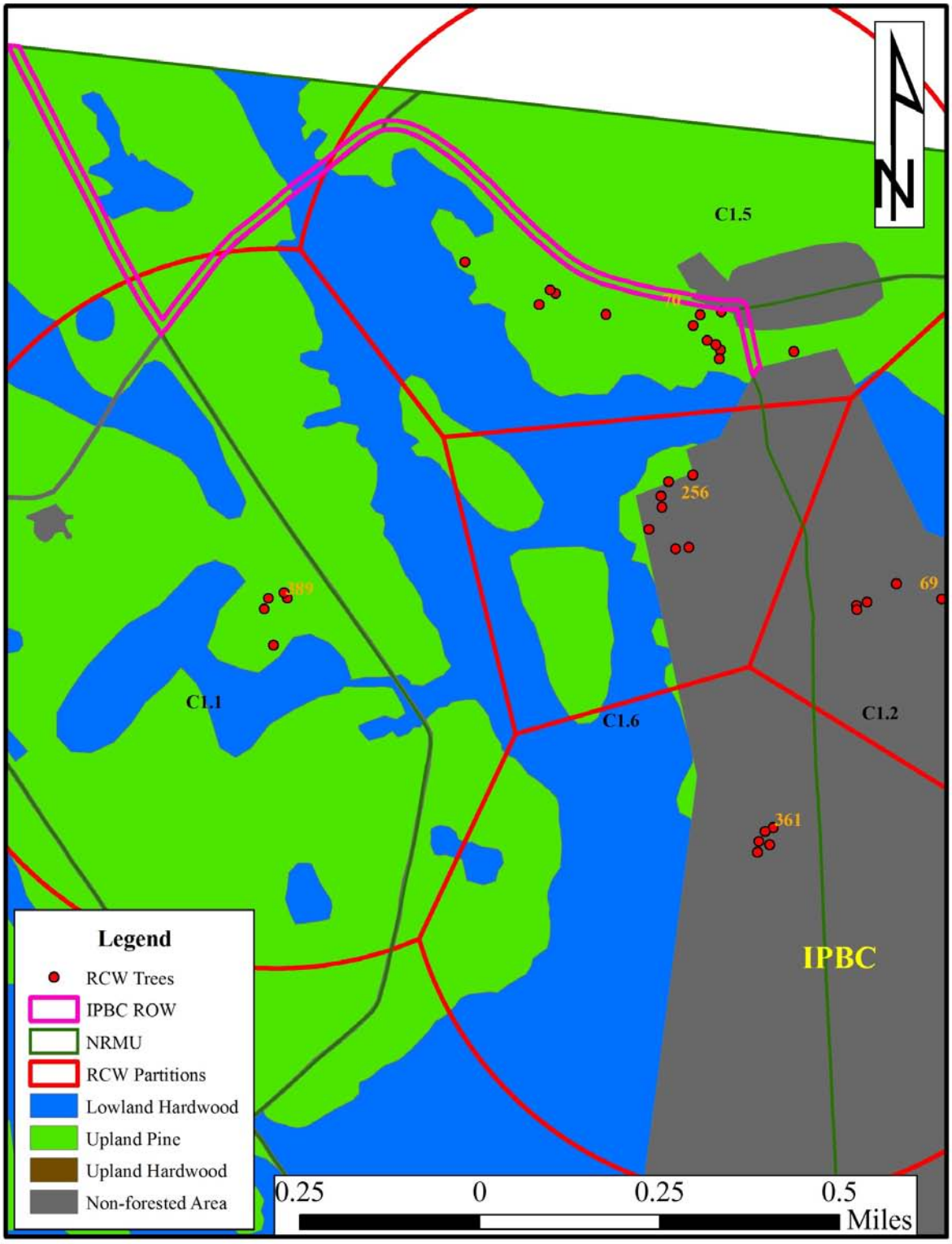


Figure 2. FFS Buffers affected by the IPBC Power Line ROW.

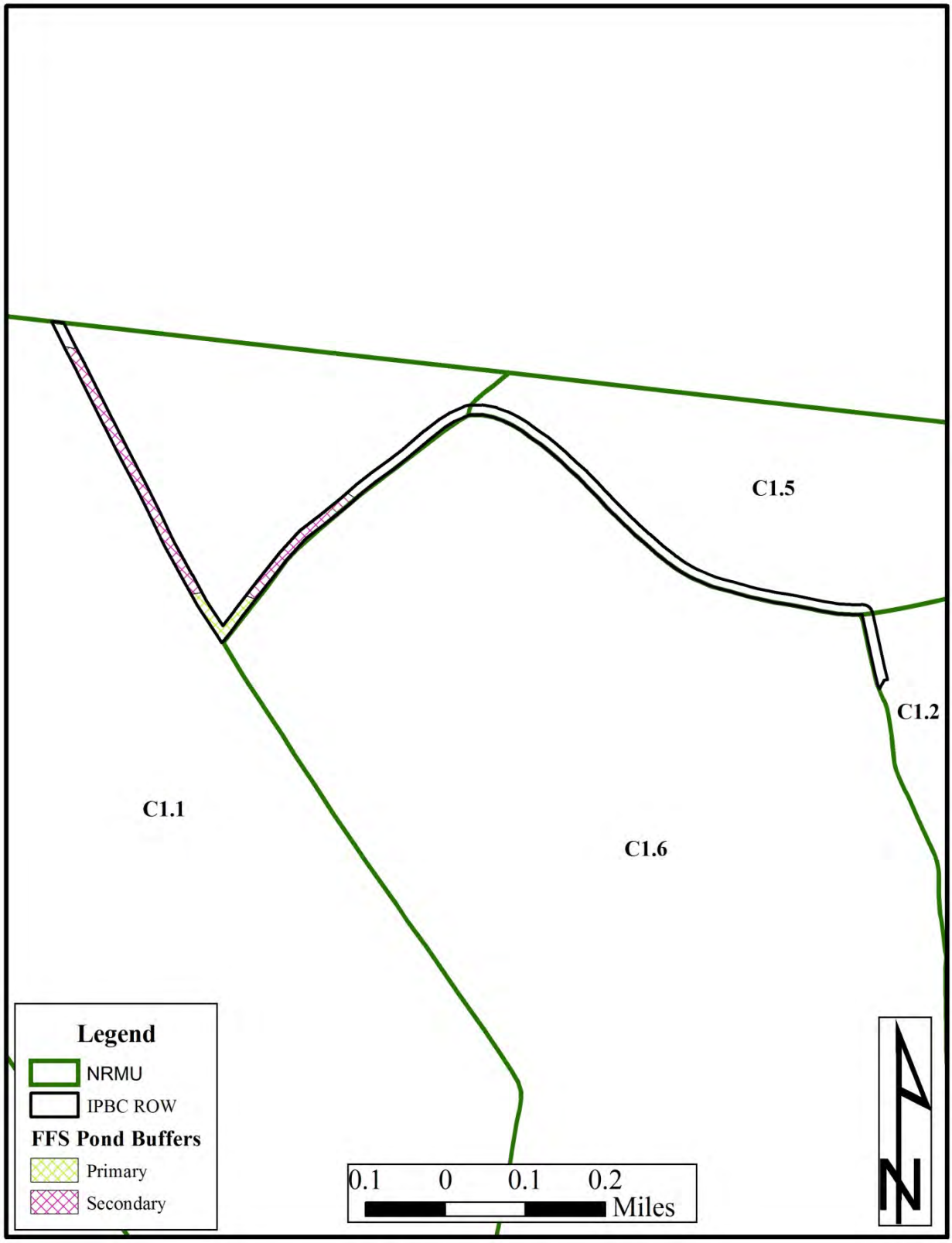
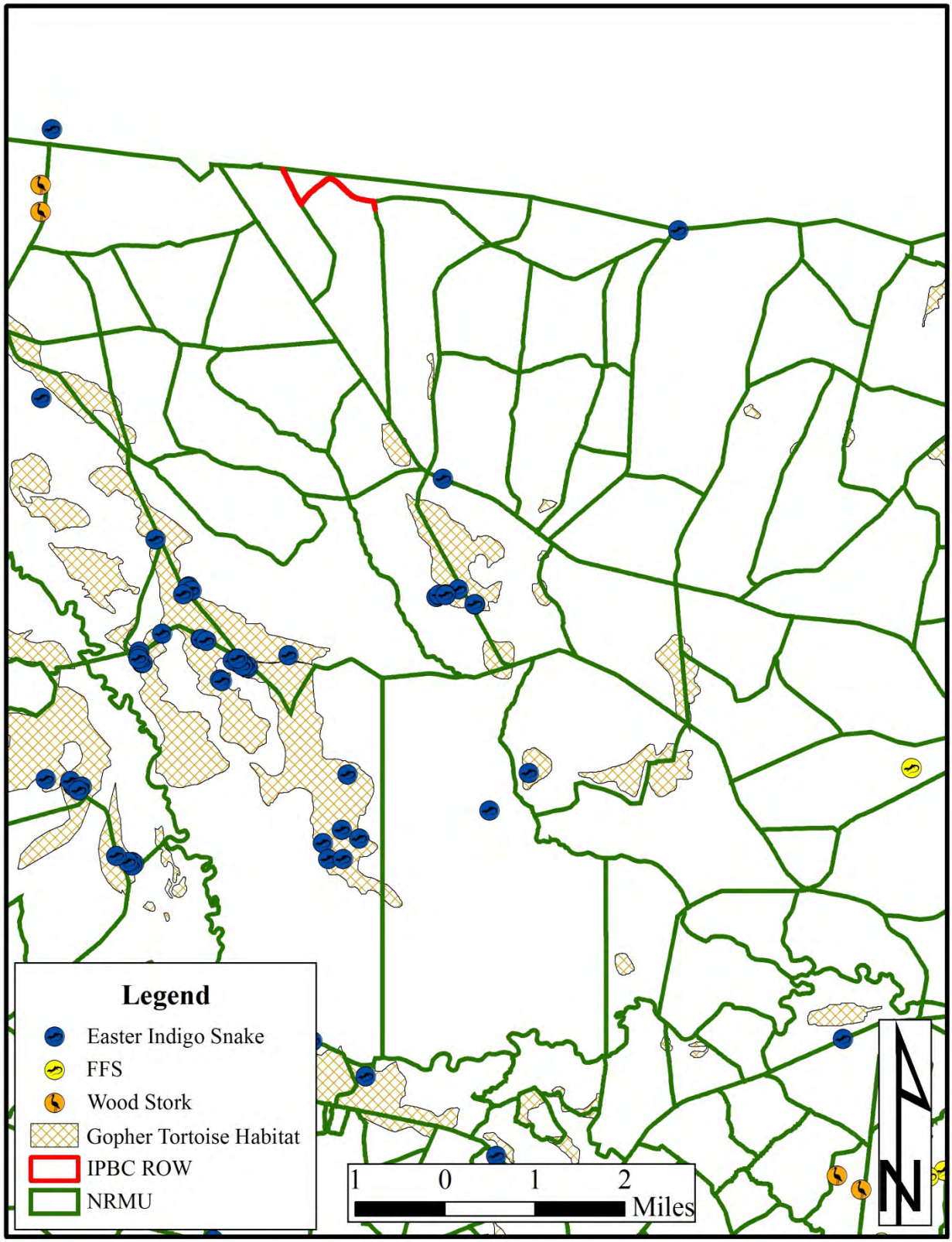


Figure 3. TES affected by the IPBC Power Line ROW.



MPMGR MOD

A design change for the Multi-Purpose Machine Gun Range (MPMGR) will require a modification in the Mission and Master Planning EIS BA. The original design footprint was 302.6 acres and the new design footprint will encompass 282.4 acres (Figure 1). The new footprint acreage consists of 82.8 acres of wetland, 115.6 acres of RCW HMU, 9.5 acres of hardwood management area, and 74.5 acres of non-forested area. Habitat within the proposed action area is composed of a canopy dominated by slash pine (*Pinus elliottii*), longleaf pine (*P. palustris*), and loblolly pine (*P. taeda*), with a midstory of sweetgum (*Liquidambar styraciflua*), water oak (*Quercus nigra*), live oak (*Q. virginiana*), wax myrtle (*Myrica cerifera*), and red bay (*Persea borbonia*). The groundcover is characterized by saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*), shiny blueberry (*Vaccinium myrsinites*), huckleberry (*Gaylusaccia frondosa*), runner oak (*Q. pumila*.), rusty lyonia (*Lyonia ferruginea*), wiregrass (*Aristida stricta*), and switch-cane (*Arundinaria gigantea*). Wetland systems adjacent to the proposed project are dominated by pond cypress (*Taxodium ascendens*), blackgum (*Nyssa sylvatica*), pond pine (*P. serotina)*, red maple (*Acer rubrum*), black titi (*Cliftonia monophylla)*, and red bay. The dominant soil types within the project area are Leefield loamy sand, Mascotte fine sand, Stilson loamy sand, Ellabelle loamy sand, Pelham loamy sand, and Johnston and Bibb soils.

RCW

The original MPMGR design was removing 130.7 acres of RCW HMU. The current design will remove 115.6 acres of RCW HMU. RCW Partition 381 will no longer be impacted by the MPMGR or any other project in the BA and should be removed from consultation. Partition 356 will no longer be impacted by the MPMGR but will still be affected by the Qualification Training Range. This partition will gain 4.1 acres of PGQFH (195.5 to 199.6 acres) and still passes the RCW Matrix for Managed Stability Standard (MSS). Partition 124 will gain 8.9 acres of PGQFH (28.4 to 37.3 acres), 1 RCW tree will still be removed, and still fails to meet MSS. Partition 247 will lose an additional 1.2 acres of PGQFH (55.9 to 54.7 acres), all RCW trees will still be removed, and it still fails MSS. Partition 300 will gain 1.9 acres of PGQFH (160.9 to 162.8 acres) and still passes MSS (Figure 2) (Table 1).

FFS

The entire proposed action area still lies within the Fort Stewart FFS HMU. The new project design will not impact any FFS ponds. This design will impact 7.6 acres of the primary buffer and 24.1 acres of the secondary buffer of a highly likely breeding pond and 22.7 acres of the secondary buffer for potential breeding pond for the FFS. Project design will incorporate protection measures as required by the Clean Water Act and the Georgia Erosion and Sedimentation Control Act to ensure appropriate wetland protection. Therefore, the proposed actions will not result in significant erosion, run-off, or other off-site impacts that might affect FFS habitat (Figure 3) (Table 2).

Eastern Indigo Snake

No changes.

Wood Stork

No changes.

Shortnose Sturgeon

No changes.

Conclusion

The design change to the MPMGR for the Mission and Master Planning EIS BA does not affect our initial findings which are the proposed actions will adversely affect the RCW, will not affect the shortnose sturgeon, and it is not likely to adversely affect the FFS, wood stork, or eastern indigo snake. No critical habitat will be adversely modified by this action.

Figure 1. Design changes for the MPMGR.

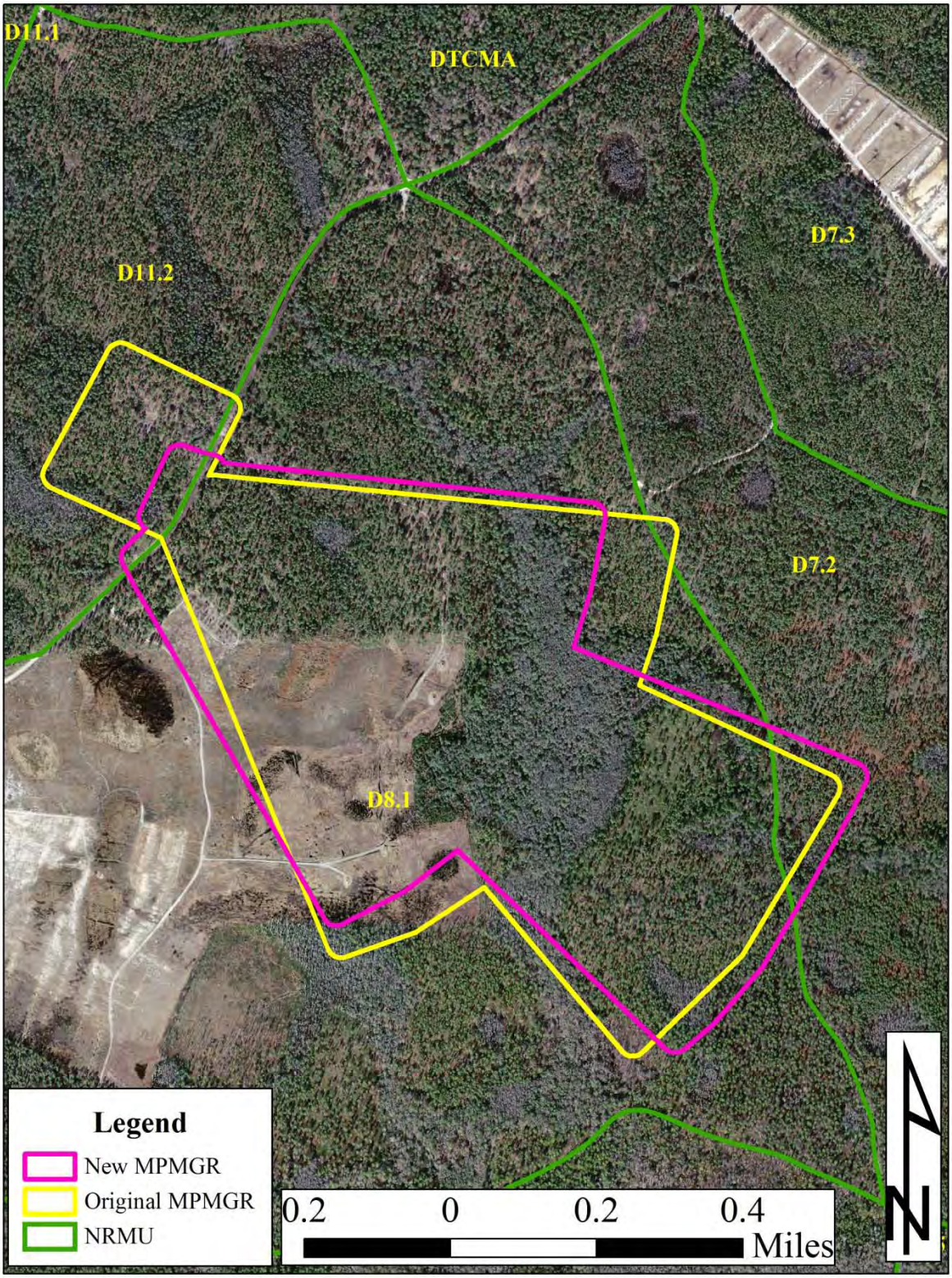


Figure 2. RCW HMU and Partition impacts.

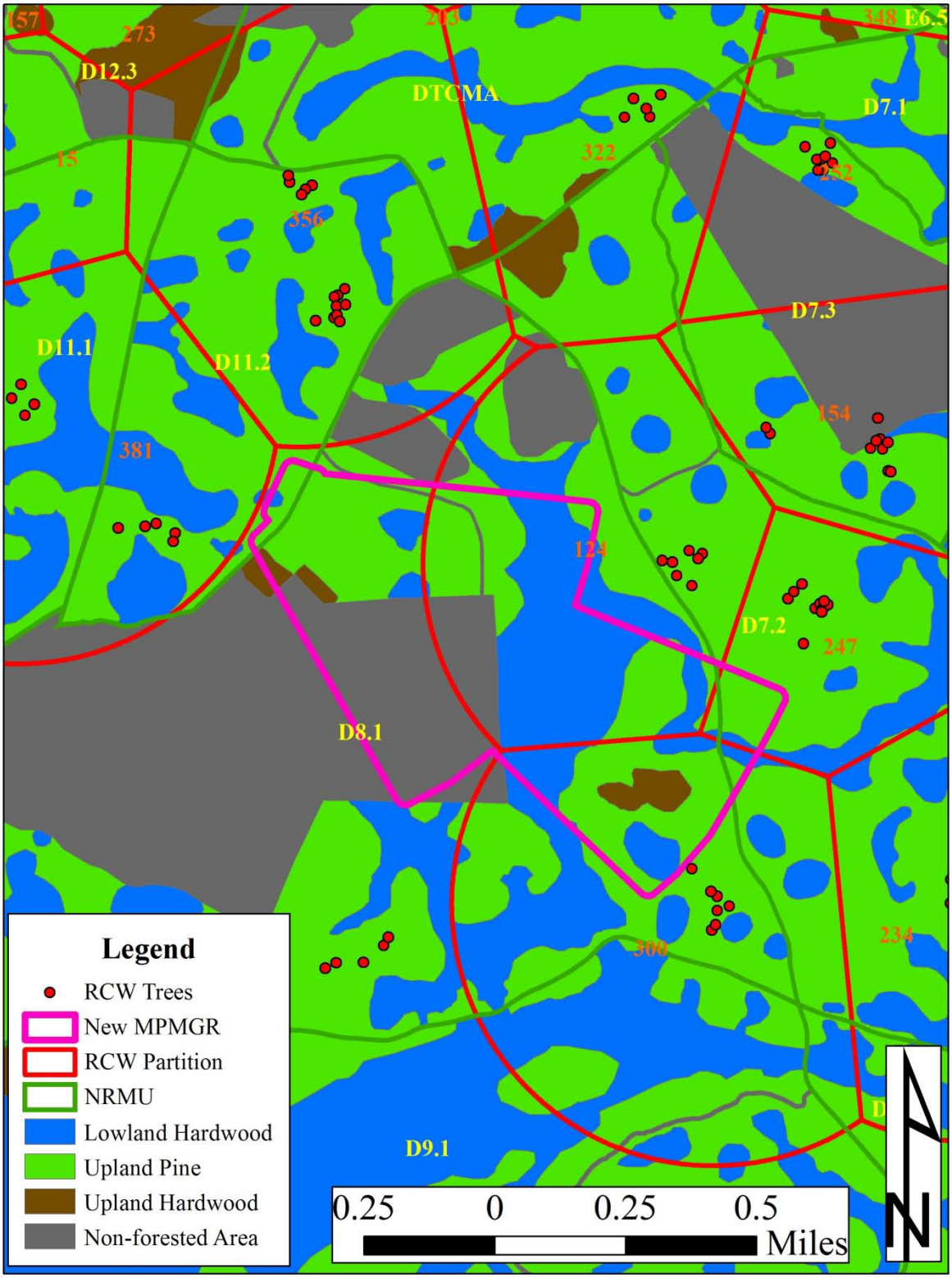


Figure 3. FFS Buffers affected by the MPMGR design change.

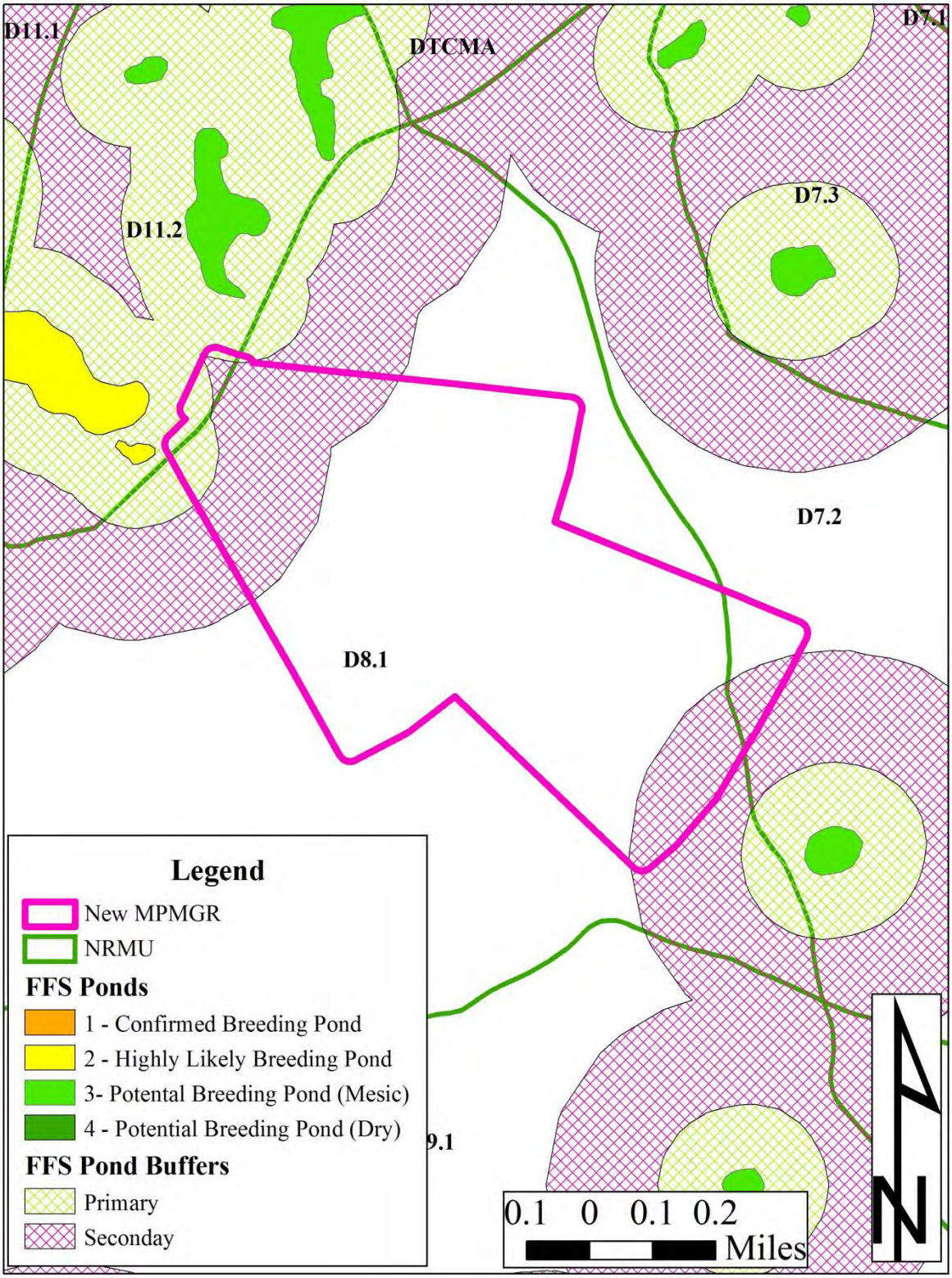


Table 1. Acreage impacts to the RCW for the design changes in the MPMGR.

RCW Cavity Tree Impacts			Forage Partition Impacts				
MPMGR			MPMGR		RCW HMU Partition Acres		
RCW Cluster #	# Cavity Trees Impacted	Meets MS	Original	Re-design	Original Pre-Project	Original Post-Project	Re-Design Post-Project
124	0	No	87.0	99.8	137.1	50.1	37.3
247	11 (All)	No	33.9	43.0	97.7	63.9	54.7
300	0	Yes	27.4	25.5	188.3	160.9	162.8
356	0	Yes	6.8	2.7	202.3	195.5	199.6
381	0	Yes	10.7	0	155.4	144.8	155.4

Table 2. Impacts to the FFS, eastern indigo snake, and gopher tortoise for the design changes in the MPMGR.

	Frosted Flatwoods Salamander				**E. Indigo Snake**	**Gopher Tortoise**
Project	Highly Likely Pond Acres	Potential Breeding Pond Acres	Primary Buffer Acres	Secondary Buffer Acres	Sightings	Habitat Acres
MPMGR Original	0.7	0.4	25.2	49.5	No	0
MPMGR Redesign	0	0	7.6	22.7	No	0

APPENDIX C

CULTURAL RESOURCES

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
DIRECTORATE OF PUBLIC WORKS
1587 FRANK COCHRAN DRIVE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Director

DEC 2 1 2009

Dr. David Crass
Acting State Historic Preservation Officer
Historic Preservation Division
Georgia Department of Natural Resources
254 Washington Street SW
Ground Level
Atlanta, Georgia 30334

Dear Dr. Crass,

The purpose of this letter is to consult with your office regarding the *Fort Stewart Range and Garrison Development Environmental Impact Statement (EIS)* and the proposed actions outlined within the document. The EIS identifies 15 projects that are proposed for Fiscal Year 2011 through 2014 (referred to as Projects A through O in the attached assessment of effects). The proposed actions include a variety of cantonment area construction projects and range construction projects. In order to take into account the effects to historic properties, the Installation has analyzed the potential effects to cultural resources for the preferred course of action (COA) for each of the proposed actions.

In addition to the consideration of cultural resources under the National Historic Preservation Act (NHPA), an EIS, as required under the National Environmental Policy Act, is currently in draft and will be forwarded to your office for review with an anticipated submittal date of February 2010. Cultural resource impact evaluations have been included as part of the EIS and include known and predicted impacts to cultural resources. Furthermore, the EIS outlining the impacts to cultural resources provides an opportunity for the public to comment on the proposed actions and their effects to cultural resources.

The purpose of this letter is to provide your office with additional detail regarding the potential impacts to cultural resources, which are otherwise excluded from an EIS's public format due to sensitivity of site location. Comments received from your office and the public will be considered before any decision is made to implement the proposed actions under this review. Areas of specific concern to your office will be addressed and your input will assist us in preparing this environmental document. As such, the findings discussed within the enclosure have been outlined within the forthcoming *Fort Stewart Range and Garrison Development EIS* and it is requested that you review the enclosed summary of effects to cultural resources, maps, and description of work proposed. Per 36 CFR 800, the Installation requests that you furnish this office with your comments within 30 days of receiving this letter. Should you have any questions or need further information, please contact Mr. Brian Greer, M.A. Consulting Archaeologist, and this

directorate at telephone (912) 767-0992/2010. Email correspondence can be directed to brian.greer@us.army.mil.

Sincerely,

Robert R. Baumgardt
Director, Public Works

Enclosure

Potential Impacts to Cultural Resources Affected by the Proposed Actions Analyzed within the Fort Stewart Mission and Master Plan Environmental Impact Statement

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Project A: Construct Multipurpose Machine Gun Range (MPMGR)

The proposed action is to construct, operate, and maintain a MPMGR range which will train tenant and reserve Soldiers in basic machine gun live-fire training tasks required to sustain combat proficiency; specifically, to identify, engage with a machine gun, and defeat stationary infantry targets. Weapons used on this range include the M249 squad automatic weapon (SAW) (5.56mm), the M60 machine gun (7.62mm), the M240B machine gun, the MK19 automatic grenade launcher, the M42 sniper weapon and the M2 machine gun (.50 caliber).

Primary features of this range include 180 stationary infantry targets, 20 moving infantry targets, 20 stationary armor targets, and 10 firing lanes. In addition, the range will include two 800-square-foot buildings, one ammunition breakdown building, one air-vaulted latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with enclosure. The actual range will be 320 meters in width by 300 meters in depth. Site disturbance would total approximately 250 acres.

The preferred COA has been identified as affecting Natural Resource Management Unit (NRMU) D7.2 and D8.1 (see Figure A-1). NRMU D7.2 has been previously surveyed for cultural resources (Trinkley & Hacker 2000) and no cultural resources were identified within the proposed footprint in NRMU D7.2. NRMU D8.1 was previously surveyed for cultural resources (Trinkley et al. 1998). Three sites were identified within the proposed footprint in NRMU D8.1 and included the following: 9LI494, a 19th/20th century historic scatter; 9LI490, an undifferentiated prehistoric scatter; and 9LI491, a prehistoric Deptford component scatter. All three sites were determined ineligible for the National Register of Historic Places (NRHP).

Project B: Construct Infantry Platoon Battle Course (IPBC)

The proposed action is to construct, operate, and maintain an IPBC at Fort Stewart. The IPBC supports infantry platoon live-fire collective training to test infantry platoons (mounted or dismounted) on the skills necessary to conduct tactical movement techniques, and detect, identify, engage, and defeat stationary and moving infantry and armor targets in a tactical array. In addition to live fire, this range can also be used for training with sub-caliber and/or laser training devices.

The IPBC includes 6 stationary armor targets, 1 moving armor target, 43 stationary infantry targets, 14 moving infantry targets, 1 trench obstacle, 9 machine-gun bunkers (with sound effects simulator), 2 landing zones and 1 assault/defend house. Target locations are site adapted to meet established training requirements. All trenches, bunkers, and target emplacements must simulate typical threat scenarios. Eight mortar simulation device emplacements are located in areas from which unfriendly mortar fire is to be simulated. Each emplacement will contain one battle/sound effects simulator each. The IPBC footprint totals approximately 1000 acres. The entire footprint would undergo selective tree removal to enhance training realism and for target placement. The site would not be completely cleared. Landing and drop zone areas would be completely cleared. If necessary, an unexploded ordnance survey will be conducted prior to range construction.

Primary facility structures at the range include large two 800-square-foot buildings, an air-vaulted latrine facility, ammo breakdown area, a range tower, enclosed bleachers, and a covered mess facility.

The Preferred COA has been identified as affecting NRMUs C1.2, C1.3, C1.4, and C1.6 (see figure B-1). All areas available for cultural resource survey of the proposed IPBC under the preferred COA have been previously surveyed for cultural resources (Cain et al. 2009; Kennedy et al. 2004). Portions of NRMU C1.2, C1.3, and C1.4 are considered unavailable to be surveyed due to the elevated risk of unexploded ordnance (UXO) associated with the former Aerial Gunnery Range impact area. One ineligible

archaeological site BN1138 (an historic surface scatter) was identified within the proposed footprint. No direct impacts will occur as a result of the Preferred COA.

Indirect impacts from the range construction may include potential for small arms fire damage to historic period cemeteries within the Safety Danger Zones (SDZs) associated with the engagement boxes. Little Creek Cemetery, located in Training Area B13 and is 1.1km away from the proposed range. Due to the large amount of vegetation between the proposed range and the cemetery, it is very unlikely that a protective berm is necessary. Bonnet Bay Cemetery, located in Training Area B13, is 3.5km away from the proposed range. There is extremely low potential to affect this cemetery due to the fact that the Bonnet Bay Cemetery has only been identified as the remnants of a single broken headstone displaced from an unknown location. Shuman Cemetery, located in B12, is 4.7km away from the proposed range. Due to the large amount of vegetation between the proposed range and the cemetery, it is very unlikely that a protective berm is necessary. During the design phase of the proposed range, if it is determined that there will likely be an impact to the cemeteries from live fire, protective berms or redesigns to the engagement boxes will be considered. As with all cemeteries, the Installation routinely monitors the cemeteries on the Installation for any damage.

Project C: FY11 Modified Record Fire Range (FY11 MRF)

The proposed action is to construct, operate, and maintain a MRF range on Fort Stewart. The MRF range will be designed to train individual Soldiers in the basic live-fire training tasks they require to sustain combat proficiency. Primary features of this range include 144 stationary infantry targets and 16 foxholes. In addition, the range will include two 800-square-foot buildings, one ammunition breakdown building, one air-vaulted latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with enclosure. The actual range will be 320 meters in width by 300 meters in depth. This project will require 25 acres of site clearing.

The Preferred COA has identified as affecting NRMU B4.20 and Small Arms Delta Range which have been previously surveyed for cultural resources (Ross 2004b) (see figure C-1). No cultural resources were identified within the proposed footprint in B4.20. Therefore, no direct impacts to historic properties will occur under the Preferred COA. Examination of adjacent areas to the proposed location of Alternative B did not indicate any historic properties in proximity. The project is within the viewshed of Buildings 8178, a range/target house built in 1982 along with its associated bleachers and ammunition supply point were determined ineligible for the NRHP (Fortune & Maggioni 2002). Therefore, no direct or indirect impacts to historic properties are anticipated from the Preferred COA.

Project D: FY13 Digital Multi-Purpose Training Range (DMPTR)

The proposed action is to construct, operate, and maintain a standard DMPTR at Fort Stewart. The DMPTR is necessary to support the crew qualification tasks of M1A1 tank crews, M2 and M3 Bradley vehicle crews, and Stryker vehicle crews. This range is used to train and evaluate vehicle crews on the skills necessary to detect, identify, engage, and defeat an enemy doctrinal tactical array of stationary and moving infantry and armor targets. Command and control of the vehicles firing is done in a digital manner replicating how the vehicle crew would actually operate in a combat situation. The range can also be used to train weapons crews operating in HMMWVs in the same tasks outlined above. In addition to live-fire, this range can also be used for training with sub-caliber and/or laser training devices.

The range supports dismounted infantry squad tactical live-fire operations either independently of, or simultaneously with, supporting vehicles. The DMPTR accommodates the full range of target practice munitions employed by the armor, Bradley, and Stryker vehicles. The range would consist of a standard one lane DMPTR with four roads with midpoint cross over capability and five battle positions per road. The DMPTR would contain 105 stationary infantry targets (SITs), 35 stationary armor targets (SATs), 6 moving armor targets (MATs), 6 Moving infantry Targets (MITs), 4 facades to replicate urban targets, and five firing positions per road on the range. The range would provide the digital interface needed by digitally equipped forces to properly exercise command and control on the modern battlefield. The range

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would have television cameras strategically placed on the range to aid in the after-action review (AAR) process.

Primary facility structures at the range include large Range Operations Control Area (ROCA) facility, a small AAR facility, an air-vaulted latrine facility, ammo breakdown area, an ops storage building, an instrumentation loading dock, a general instruction building, and a surfaced staging area. The project would include a Screening Range that is required to support the armor and infantry fighting vehicle systems alignment and synchronization of their weapons systems, weapons sights, and computer systems. The screening range would be capable of functioning simultaneously with the DMPTR and will have the minimum required targetry and instrumentation.

The Preferred COA for the DMPTR has been identified as affecting NRMUs B10.3, B9.5, B10.1, and B9.1 (see figure D-1). NRMU B10.3 has been previously surveyed for cultural resources (Cain et al. 2005, 2009). NRMU B9.5 has been previously surveyed for cultural resources (Ross 2004a). The existing range floor was excluded from cultural resource survey in accordance with the categorical exclusion of survey requirements for previously disturbed special use facilities (such as range floors) in accordance with the Installation's Programmatic Agreement with the Georgia SHPO. NRMU B9.1 was previously surveyed for cultural resources (Morehead et al. 2008b). NRMU B10.1 was previously surveyed for cultural resources (Cain et al. 2009).

From these surveys, a total of 12 cultural resources were identified within the proposed footprint and included the following: 9LI1656, an early 20th century historic scatter; 9LI1652, an early 20th century Historic subsurface scatter; 9LI1657, an early 20th century Historic find; 9LI1653, an early 20th century Historic find; 9LI1621, a prehistoric lithic scatter; 9LI1622, a prehistoric and historic artifact scatter; 9BN145, a historic artifact find; 9LI1593, a historic isolated find; 9LI1610, a prehistoric isolated find; 9LI1611, a late 19th/early 20th century historic isolated find; 9LI1612, a prehistoric isolated find; and 9LI1592, a late 19th/early 20th century historic site. All sites were determined ineligible for the NRHP. Therefore, no direct impacts to historic properties are anticipated under the Preferred COA.

Buildings 18508 and 18510 are within the footprint of the Preferred COA. Bldg 18508 (built 1975) was assessed by the 2002 building survey, and determined ineligible for the NRHP (Fortune & Maggioni 2002). Bldg 18510 was constructed in 1999 and is not historic. Also within the footprint are bleachers, and ammunition supply point, and another tower associated with these buildings.

Examination of adjacent areas to the proposed location of the Preferred COA did not indicate any historic properties in proximity. Not all areas outside of the proposed footprint of Preferred COA have been previously surveyed for cultural resources. Areas not surveyed outside the proposed footprint predominately have a low potential for cultural resources. Should the project be altered to impact the areas not surveyed for cultural resources, additional cultural resource surveys would be conducted and impacts to historic properties would be assessed in accordance with the NHPA and other applicable laws. Therefore, no indirect impacts are anticipated from Preferred COA.

Project E: FY13 Qualification Training Range (QTR)

The proposed action is to construct, operate, and maintain a QTR at Fort Stewart. The QTR would be designed to train individual Soldiers in the basic live-fire training tasks they require to sustain combat proficiency. This range is used to train Soldiers on the skills necessary to detect, identify, engage, and defeat stationary and moving infantry targets in a tactical array with their prescribed weapons. This range enhances throughput capability for units with multiple weapons densities by consolidating unit efforts to operating one live-fire training facility. This range combines the capabilities of a MRF range, an Automated Sniper Field Fire (SFF) range, a combat pistol qualification Course (CPQC) range, and the Multipurpose Machine Gun (MPMG) range. Primary features of this range include 429 stationary infantry targets (SITs), 20 stationary armor targets (SATs), 20 moving infantry targets (MITs), and 10 stationary infantry target emplacements with multiple targets. In addition, the range will include two 800-square-foot buildings, one ammunition breakdown building, one air-vaulted latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with enclosure.

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The Preferred COA for the QTR has been identified as affecting NRMU D7.2 and D7.3 (see figure E-1). NRMUs D7.2 and D7.3 have been previously surveyed for cultural resources (Trinkley & Hacker 2000). From these surveys, no cultural resources were identified within the proposed footprint. Therefore, no direct impacts to historic properties will occur under the Preferred COA. Examination of adjacent areas to the proposed location of the Preferred COA did not indicate any historic properties in proximity. Therefore, no indirect impacts are anticipated from the Preferred COA.

Project F: FY13 Known Distance Range (KDR)

The proposed action is to construct, operate, and maintain a KDR at Fort Stewart. The KD range would be designed to train and test individual Soldiers in the small arms weapons systems live-fire training tasks they require to sustain combat proficiency. This range is designed for training advanced rifle marksmanship and target engagement techniques with immediate downrange feedback and competition. This range is used to train and familiarize Soldiers on the skills necessary to identify, calculate distance, engage, and hit targets in a static array with small arms weapons systems out to 1,000 meters. It is also used for Squad Designated Marksmanship (SDM) training and certification. The range firing points are graduated in 100-meter increments from 100 to 1,000 meters. Additionally, the KD range can be used for automatic rifle practice; basic and advance rifle marksmanship, designated marksman; and sniper training. The ARRM shows that Fort Stewart requires one KD range to meet its training requirements.

Primary features of this range include 32 target-lifting devices and 32 firing lanes. All targets are sliding target frames, paraleg carrier or fully automated based on Installation Army Command and the Installation senior mission commander. In addition, the range will include two 800-square-foot buildings, one ammunition breakdown building, one air-vaulted latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with enclosure. The actual range is 1,000 meters in depth.

The Preferred COA has identified as affecting NRMU D8.1 and D9.1 (see figure F-1). NRMU D8.1 and D9.1 have been previously surveyed for cultural resources (Trinkley et al. 1998). One cultural resource was identified within the proposed footprint and was identified as 9LI486, an early/mid 20th century artifact scatter. This site was determined ineligible for the NRHP. Therefore no direct impacts to historic properties will occur under the Preferred COA.

Examination of adjacent areas to the proposed location of the Preferred COA did not indicate any historic properties in proximity. However, one historic period cemetery, Golden Family Cemetery, is located within the SDZ of the proposed range. Golden Family Cemetery is located in Training Area D5 and is 4.9km away from the proposed range. Due to the large amount of vegetation between the proposed range and the cemetery, it is very unlikely that a protective berm is necessary. During the design phase of the proposed range, if it is determined that there will likely be an impact to the cemeteries from live fire, protective berms or redesigns to the engagement boxes will be considered. As with all cemeteries, the Installation routinely monitors the cemeteries on the Installation for any damage. In summary, there is a low potential for indirect impacts to nearby cultural resources and can be avoided or minimized for the Preferred COA.

Project G: FY13 Fire and Movement Range (FMR)

The proposed action is to construct, operate, and maintain a FMR at Fort Stewart. The range would be used to train individual Soldiers and buddy teams on basic fire and movement techniques against stationary infantry targets replicating enemy soldiers on the battlefield. Soldiers show their ability to select covered and concealed positions, move while under fire, apply principles of teamwork, and use suppressive fire on enemy soldier targets.

Primary features of this range include four lanes, six stationary infantry targets per lane, and 3-meter-high berms along each side of each lane. All lanes would have natural vegetation and features that offer the Soldier covered or concealed positions from which he can select to move from one to the other while

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under enemy fire. In addition, the range will include two 800-square-foot buildings, one ammunition breakdown building, one air-vaulted latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with enclosure. Site disturbance would total 10 acres.

The Preferred COA has been identified as affecting NRMU C3.2 and is off-limits to cultural resource survey due to elevated risk of unexploded ordnance associated with the former Aerial Gunnery Range IV. No previously discovered cultural resources have been identified within the proposed footprint. Therefore, no direct impacts to historic properties will occur under the Preferred COA. Examination of adjacent areas to the proposed location of the Preferred COA did not indicate any historic properties in proximity. A watchtower and unknown structure are within the viewshed of the proposed construction. These structures will require evaluation but are anticipated to be circa 1970s era or later range support structures. Therefore, a low potential for indirect impacts are anticipated from the Preferred COA.

Project H: FY11 Infantry Squad Battle Course (ISBC)

The proposed action is to construct, operate, and maintain a live-fire ISBC at Fort Stewart. This complex is used to train and test infantry squads on the skills necessary to conduct tactical movement techniques, detect, identify, engage, and defeat an enemy doctrinal tactical array of stationary and moving infantry and armor targets.

In addition to live-fire, this range can also be used for training with sub-caliber and/or laser training devices. All targets are fully automated and the event specific target scenarios are computer driven and scored from the range operations center on the range. The range operating system is fully capable of providing immediate performance feedback to the using units. The ISBC includes 6 different objective areas and will contain a total of 20 stationary infantry targets (SITs), 6 stationary armor targets (SATs), 1 moving armor targets (MATs), 6 Moving infantry Targets (MITs), 2 trench obstacles, and 5 machinegun/observation bunkers with sound effects simulators.

Primary facility structures at the range include two 800-square-foot buildings, one ammunition breakdown building, one air-vaulted latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with enclosure. To produce a realistic training environment, this range uses thermal targets, night illumination devices, and visual flash simulators.

The Preferred COA has been identified as affecting NRMU B3.1, B3.2, and the Artillery Impact Area West (AIAW) (see figure H-1). NRMU B3.1 and B3.2 has been previously surveyed for cultural resources (Ambrosino and Reginier 2003). The AIAW is off limits to cultural resource surveys due to the elevated risk of unexploded ordnance. 11 sites have been identified within the proposed footprint of the ISPBC and are as follows: 9L706, an historic 19th/20th century isolated find; 9LI707, a prehistoric undifferentiated find; 9LI680, a prehistoric undifferentiated find; 9LI703, a historic 19th/20th century find; 9LI687, a historic 19th/20th century find; 9LI718, a prehistoric undifferentiated find; 9LI719, a Late Paleo Prehistoric find; 9LI720, a 19th century historic find; 9LI710, a historic 19th/20th century find; 9LI717, a 19th century historic find; and 9LI897, a historic ceramic scatter. All 11 sites were determined ineligible for the NRHP. Therefore, no direct impacts to historic properties are anticipated under the Preferred COA.

Examination of adjacent areas to the proposed location of the Preferred COA did not indicate any historic properties in proximity. Large portions of the adjacent training areas have been previously surveyed for cultural resources. Architectural evaluations of buildings associated with the Small Arms Range Mike to the south of NRMU B3.1 indicate a typical Small Arms range support building common to the various Small Arms Ranges across the Installation. Building 8556, constructed in 1975, is less than 50 years old and is not considered exceptionally significant under Criterion Consideration G. Associated with Building 8556 are bleachers and an ammunition supply point which are also considered ineligible for the NRHP.

Project I: Modified Record Fire Range (MRFR)

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The proposed action is to construct, operate, and maintain an additional MRFR at Fort Stewart. The MRF range would be designed to meet the same requirements previously detailed in the FY11 MRF range description. Primary features would include the same target and supporting facility layout as with the proposed FY11 MRF range. The FY13 MRF range would total 320 meters in width by 300 meters in depth.

The Preferred COA for the MRFR has been identified as affecting NRMU D6.1 and D6.2 (see figure H-1). NRMU D6.1 has been previously surveyed for cultural resources (Kennedy et al. 2004). A portion of NRMU D6.2 has been previously surveyed for cultural resources (Cain et al. 2009) and approximately 10 acres remain to be surveyed. No cultural resources have yet to be identified within the proposed footprint in D6.1 and D6.2. Examination of adjacent areas to the proposed location of the Preferred COA did not indicate any historic properties in proximity. Not all areas outside of the proposed footprint of the Preferred COA have been previously surveyed for cultural resources. Areas not surveyed outside the proposed footprint predominately have a low potential for cultural resources. Should the project be altered to impact the areas not surveyed for cultural resources, additional cultural resource surveys would be conducted and impacts to historic properties would be assessed in accordance with the NHPA and other applicable laws. Therefore, no indirect impacts are anticipated from the Preferred COA.

Project J: FY13 Automatic Combat Pistol Qualification Course (CPQC)

The proposed action is to construct, operate, and maintain a CPQC at Fort Stewart. The CPQC would be designed to train individual Soldiers and military police in the basic live-fire training tasks they require to sustain combat proficiency. Primary features of this range include 105 stationary infantry targets, 15 firing lanes and 15 stationary silhouette targets. In addition, the range will include two 800-square-foot buildings, one ammunition breakdown building, one air-vaulted latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with enclosure. The actual range would be 120 meters in width by 31 meters in depth.

The preferred COA for the CPQC has been identified as affecting NRMU D5.4 (see figure I-1). NRMU D5.4 has not been previously surveyed for cultural resources. 13 acres require cultural resource surveys and have been identified as predominately having a low potential for cultural resources. If historic properties are encountered, efforts to avoid the resource or minimization and mitigation efforts will be conducted in accordance with the NHPA. All cultural resource surveys and evaluation of impacts will be conducted prior to project execution.

Examination of adjacent areas to the proposed location of the Preferred COA did not indicate any historic properties in proximity. Not all areas outside of the proposed footprint of the Preferred COA have been previously surveyed for cultural resources. Areas not surveyed outside the proposed footprint predominately have a low potential for cultural resources. Should the project be altered to impact the areas not surveyed for cultural resources, additional cultural resource surveys would be conducted and impacts to historic properties would be assessed in accordance with the NHPA and other applicable laws. Therefore, little to no indirect impacts is anticipated from the Preferred COA.

Project K: FY 13 Basic 10-meter/25-meter Firing Range (10/25 FR)

The proposed action is to construct, operate, and maintain a Basic10/25 FR at Fort Stewart. It would be designed to train individual Soldiers and zero weapons in the basic M-16 and M-4 rifle live-fire training tasks and crew served machine guns they require to sustain combat proficiency. Primary features of this range include 32 frames at 25 meters, 16 target frames at 10 meters, and 32 foxholes. This range requires no automation. All targets are fixed at 25 meters from the firing line for M16/M4 and fixed at 10 meters for machine gun. In addition, the range will include one ammunition breakdown building (120-square-feet), one air-vaulted latrine (120-square-feet), one covered mess facility (800-square-feet), one range operations tower (248-square-foot), and covered bleachers with enclosure (800-square-feet). The actual range footprint is 25 meters in depth.

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The Preferred COA for the 10/25 FR has been identified as affecting NRMU D5.4 (see figure J-1). NRMU D5.4 has been previously surveyed for cultural resources (Cain et al. 2009). From these surveys no cultural resources were identified within the proposed footprint. Therefore, no direct impacts to historic properties will occur under the Preferred COA.

Examination of adjacent areas to the proposed location of the Preferred COA did not indicate any historic properties in proximity. Approximately 40 acres in proximity of the proposed footprint of the Preferred COA have not been previously surveyed for cultural resources. Areas not surveyed outside the proposed footprint predominately have a low potential for cultural resources. Should the project be altered to impact the areas not surveyed for cultural resources, additional cultural resource surveys would be conducted and impacts to historic properties would be assessed in accordance with the NHPA and other applicable laws. Therefore, there is a low potential for indirect impacts anticipated from the Preferred COA.

Project L: FY14 Convoy Live Fire Range (CLFR)

The proposed action is to construct, operate, and maintain a CLFR at Fort Stewart. The CLF range would be designed to train individual Soldiers, crews, platoons, and companies in the basic live-fire training tasks they require to sustain combat proficiency during convoy operations. These include the skills necessary to detect, identify, engage, and defeat stationary and moving vehicle and infantry targets from a stationary or moving vehicle using all assigned weapons and weapons systems. The range also trains Soldiers and units to identify Improvised Explosive Devices (IED) and procedures for dealing with IEDs. This complex is also used to train and test Soldiers to engage and defeat vehicle and infantry targets from multiple firing points as part of an entry control point (ECP).

Engagement boxes would be constructed along the CLF route for target placement. These entry points will not require complete site clearing. Selective tree thinning will be conducted for target placement and to increase training realism. During training, firing would occur from both sides of the military vehicle. To also enhance a realistic training environment, this range uses thermal targets, night illumination devices, and visual flash simulators. This simulation technology provides Soldiers with the best realistic training environment. This range will incorporate state-of-the-art technology to support all phases of training, from ground maneuver and target engagement to the critical after-action review (training feedback) phase. This support and timely feedback are critical to effective training. Because of the training on this proposed range, Soldiers will go into battle with the best possible training for threats the Army expects to encounter during combat operations.

Primary features of this range include 5 stationary armor targets, 4 moving armor target, 43 stationary infantry targets, 3 moving infantry targets, 6 facades, 1 entry control point (ECP), and 1 course road. The ECP targets are fully automated, and the event-specific target scenario is computer-driven and scored from the range operations center. The range operating system is fully capable of providing immediate performance feedback to the using participants. All other targets are reconfigurable/RF and controlled with a hand-held device.

Primary facility structures at the range include one 800-square-foot building, an air-vaulted latrine facility, and ammo breakdown area. Primary facility force protection measures consist of laminated and safety glass. Supporting facilities include electric service, transformers and lighting, surfaced roads and tank trails, parking, drainage ditch, and latrine facility. Supporting facility force protection includes security fencing and gates. If necessary, an unexploded ordnance survey will be conducted prior to range construction.

The Preferred COA for the CLFR has been identified as affecting NRMUs C4.1, C4.2, C5.1, C5.2, C6.1 and C7.1 (see figure K-1). NRMU C5.1 has been partially surveyed for cultural resources (Maggioni et al. 2009a). No cultural resources were identified within the proposed footprint in NRMU C5.1 thus far. 121 acres of high probability and 227 acres of low probability to encounter cultural resources require subsurface investigations within the proposed footprint. 129 acres of high probability and 132 acres of

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low probability to encounter cultural resources require surface investigations (due to elevated risk of unexploded ordnance). This NRMU is scheduled for survey in February 2010.

NRMU C5.3 has been partially surveyed for cultural resources (Morehead et al. 2008a). Two historic period sites (9BN678 & 9BN679) were identified within the proposed footprint in NRMU C5.3. Both sites were determined ineligible for the NRHP. The remainder to be surveyed include: 43 acres high probability shovel test survey; 221 acres of low probability shovel test survey; and 18 acres low probability walkover survey. This area is scheduled for survey in February 2010.

NRMU C6.1 has been partially surveyed for cultural resources (Mallory et al. 2006; Maggioni et al. 2009a). 11 sites that were determined ineligible for the National Register of Historic Places were identified during survey and include: 9BN629, a late Archaic to early Woodland hunting station and a late 19th/early 20th century homestead; 9BN630, a 20th century isolated find; 9BN669, a prehistoric hunting camp and an early 20th century historic refuse dump; 9BN670, a 20th century artifact scatter; 9BN671, a prehistoric artifact scatter and a 20th century artifact scatter; 9BN672, a 20th century artifact scatter; 9BN673, a prehistoric collection area; 9BN674, a historic isolated find; 9BN675, a historic isolated find; 9BN676, a prehistoric hunting station; and 9BN677, a 20th century military occurrence. One potentially eligible site is also located within NRMU C6.1. 9BN628, a moderate sized 19th-20th century homestead is located along the proposed route and will likely be affected by the proposed action. Therefore, the site is scheduled for further NRHP evaluation in FY10.

The Task 2 Sniper engagement box is located within NRMUs C4.1 and C6.1. Neither locations have been surveyed for cultural resources and will require 8.5 acres of low probability walkover survey. Based upon the low potential for encountering historic properties within this engagement box, direct impacts to historic properties are not anticipated. Little Creek Cemetery is within the Safety Danger Zone (SDZ) of the proposed engagement box. The cemetery is located in Training Area B13 and is 5.6km from the engagement box. Due to the large amount of vegetation between the proposed range and the cemetery, it is very unlikely that a protective berm is necessary. During the design phase of the proposed range, if it is determined that there will likely be an impact to the cemeteries from live fire, protective berms or redesigns to the engagement boxes will be considered. As with all cemeteries, the Installation routinely monitors the cemeteries on the Installation for any damage. In summary, there is a low potential for indirect impacts to nearby cultural resources and can be avoided or minimized.

The Task 3 RPG Team engagement box is located within NRMUs C4.1 and C6.1. Neither locations have been surveyed for cultural resources and will require 5 acres of low probability walkover survey. This area is scheduled for survey in February 2010. Based upon the low potential for encountering historic properties within this engagement box, direct impacts to historic properties are not anticipated.

The Task 4 Ambush Blocked engagement box is located within NRMUs C4.1 and C6.1. Neither locations have been surveyed for cultural resources and will require 6 acres of high probability walkover survey and 22 acres of low probability walkover survey. This area is scheduled for survey in February 2010. Little Creek Cemetery is within the Safety Danger Zone (SDZ) of the proposed engagement box. The cemetery is located in Training Area B13 and is 4.6km from the engagement box. Due to the large amount of vegetation between the proposed range and the cemetery, it is very unlikely that a protective berm is necessary. During the design phase of the proposed range, if it is determined that there will likely be an impact to the cemeteries from live fire, protective berms or redesigns to the engagement boxes will be considered. As with all cemeteries, the Installation routinely monitors the cemeteries on the Installation for any damage. In summary, there is a low potential for indirect impacts to nearby cultural resources and can be avoided or minimized.

The Task 5 Urban Ambush engagement box is located within NRMUs C6.1 and C7.1. NRMU C6.1 has not been surveyed for cultural resources and will require 4 acres of high probability walkover survey and 6 acres of low probability walkover survey. This area is scheduled for survey in February 2010. NRMU C7.1 has been previously surveyed for cultural resources (Ambrosino et al. 2001). No historic properties have been identified within this engagement box. Based upon the low potential for encountering historic properties within this engagement box, direct impacts to historic properties are not anticipated.

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The Task 6 Tech Trucks engagement box is located within NRMUs C6.1 and C7.1. NRMU C6.1 has not been surveyed for cultural resources and will require 7 acres of high probability walkover survey and 11 acres of low probability walkover survey. This area is scheduled for survey in February 2010. NRMU C7.1 has been surveyed for cultural resources (Ambrosino et al. 2001). No historic properties have been identified within this engagement box. Based upon the low potential for encountering historic properties within this engagement box, direct impacts to historic properties are not anticipated.

The Task 7 Near Ambush engagement box NRMUs C6.1 and C7.1. NRMU C6.1 has not been surveyed for cultural resources and will require 8 acres of low probability walkover survey. This area is scheduled for survey in February 2010. NRMU C7.1 has been surveyed for cultural resources (Ambrosino et al. 2001). Two sites were identified within the engagement box and were early 20th century artifact scatters (9BN218 and 9BN219). Both sites were determined ineligible for the NRHP. Liberty Chapel Cemetery (located in Training Area C7 and is 2km away) and W.H. Strickland Cemetery (located in Training Area C9 and is 3km away) are located within the SDZ. Due to the large amount of vegetation between the proposed range and the cemetery, it is very unlikely that a protective berm is necessary. During the design phase of the proposed range, if it is determined that there will likely be an impact to the cemeteries from live fire, protective berms or redesigns to the engagement boxes will be considered. As with all cemeteries, the Installation routinely monitors the cemeteries on the Installation for any damage. In summary, there is a low potential for indirect impacts to nearby cultural resources and can be avoided or minimized.

AGR 1 is located within NRMUs C5.2 and C7.1. These NRMUs have not been surveyed for cultural resources but are considered off limits for survey due to their elevated risk of unexploded ordnance associated with the AGR. No previously discovered sites have been documented within the AGR 1. Liberty Chapel Cemetery is within the SDZ for AGR 1. Due to the large amount of vegetation between the proposed range and the cemetery, it is very unlikely that a protective berm is necessary. During the design phase of the proposed range, if it is determined that there will likely be an impact to the cemeteries from live fire, protective berms or redesigns to the engagement boxes will be considered. As with all cemeteries, the Installation routinely monitors the cemeteries on the Installation for any damage. In summary, there is a low potential for indirect impacts to nearby cultural resources and can be avoided or minimized.

Examination of adjacent areas to the proposed location of the Preferred Alternative did not indicate any historic properties in proximity. Other than previous reference to down-range potential impacts to cemeteries, little to no indirect impacts are anticipated from the Preferred Course of Action.

<u>Project M: FY11 Unmanned Aerial System (UAS) Facilities</u>

The proposed action is to construct, operate, and maintain facilities to support the Sky Warrior Company that will activate to Fort Stewart in FY 2013. The Sky Warrior Company's mission will be to provide dedicated UAS support to the Combat Aviation Brigade (CAB). Construction would entail building Company Operations Facilities (COFs), a maintenance hangar, barracks, and associated parking. The project would also require an access control point, vehicle washrack, oil/water separator, and elevated water storage tank.

The Preferred COA for the UAS Facilities have been identified as affecting NRMU A18.3 and Wright Army Airfield (WAAF) (see figure L-1). NRMU A18.3 and the survey-able portions of WAAF have been previously surveyed for cultural resources (Morehead et al. 2008). Two cultural resources were identified within the proposed footprint in NRMU A18.3 and included 9LI1372, a 19th/20th century isolated find and 9LI1533, an isolated lithic scatter. Both sites were determined ineligible for the NRHP. Five cultural resources were identified within the proposed footprint in NRMU AWAAF and included the following: 9LI1520, an isolated prehistoric lithic flake; 9LI1522, a historic period ceramic scatter; 9LI1525, an isolated historic scatter; 9LI1528, a mid-20th century military debris scatter; and 9LI1531, a prehistoric and historic artifact scatter. All sites were determined ineligible for the NRHP. No direct impacts to historic

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properties will occur under the Preferred COA. Examination of adjacent areas to the proposed location of the Preferred COA did not indicate any archaeological historic properties in proximity.

Construction of the UAS will affect the viewsheds of thirteen buildings southeast of the project footprint: 7703, 7704, 7706, 7707, 7727, 7728, 7730, 77732, 7733, 7734, 7754, 7778, and 7781. The majority of these buildings were assessed as ineligible by the 2002 architectural survey or subsequent survey codicils (Fortune and Maggioni 2002; Maggioni 2007:4; Cain et al. 2008; Cain et al. 2009).

Buildings 7704 (built in 1967) and 7754 (built 1968) were assessed as ineligible by the 2002 historic building survey. However, because the buildings were less than fifty years old at the time (2002), they could only be assessed for exceptional historic significance, which it did not possess. Buildings 7704 and 7754 are now nearly fifty years old and in accordance with Department of the Interior standards must be reassessed again for NRHP-eligibility once they reach the fifty-year mark. The buildings will require reassessment once they reach 45 years of age (i.e. 2011 and 2012 respectively), so there is a possibility of indirect impacts from the Preferred COA, dependent on the NRHP reassessment of Buildings 7704 and 7754.

Project N: FY11 10th Engineers Battalion Facilities (10th ENG BN)

The proposed action is to station the 40th Engineering Battalion (ENG BN) at Fort Stewart. The 40th ENG BN will then be re-designated as the 10th ENG BN. The 10th ENG BN's mission will be to increase the combat effectiveness of a Heavy Brigade by providing mobility and general engineering tasks. The 10th ENG BN will activate to Fort Stewart in 2010 and will temporarily occupy existing company operations facilities until the proposed battalion complex is constructed. Fort Stewart is proposing to construct the 10th ENG BN to fully support this incoming unit. The proposed complex would include company operations facilities with covered hardstand, headquarters building with classrooms, and organizational vehicle and POV parking. Approximately 25 to 50 acres of disturbance would be necessary to construct the proposed complex.

The Preferred COA has been identified as affecting NRMU B5.1 (see figure M-1). NRMU B5.1 has been previously surveyed for cultural resources (Morehead et al. 2008). Seven cultural resources were identified within the proposed footprint in B5.1 and included the following: 9LI1549, a Late Archaic and Middle to Late Woodland short term camp; LI1555, a Late Archaic to Mississippian lithic and sherd scatter; 9LI1556, a Late Archaic to Early Woodland hunting station or collection station; 9LI1558, a Mississippian-Savannah Phase component site; 9LI1560, a single tar kiln site; 9LI1562, a small lithic scatter; and 9LI1563, a lithic isolated find. All seven sites were determined ineligible for the NRHP. No historic buildings will be affected by the project. No direct impacts to historic properties will occur under the Preferred COA.

Project O: FY12 Highway 144 Bypass

The proposed action is to construct a bypass to Georgia Highway 144 at Fort Stewart, Georgia. The bypass is necessary to incorporate the newly constructed 4th Infantry Brigade Combat Team (IBCT) facilities in Training Area B-5 and proposed 10th Engineering Battalion Complex within the cantonment area. The bypass would include access control points, similar to the force protection measures surrounding the existing cantonment area's main road network. Bridges would be constructed where needed.

Highway 144 is a well-traveled civilian and military east-west connector between the cities of Richmond Hill and Glennville, which passes through Fort Stewart. The highway is currently routed along the northern perimeter of the Installation's cantonment area. Access to the existing cantonment area from Highway 144 is protected by secure access control pints. The 4IBCT complex in the B-5 training area separated from the existing secure cantonment area.

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The Preferred COA for the Highway 144 Bypass has been identified as affecting Training Lands adjacent to Fort Stewart Roads 47, Old 144, 38, and an unnamed tank trail connecting Old 144 and Highway 144 (see figure N-1). Natural Resource Management Units (NRMU) affected by the proposed action include: B4.13, B5.2, B4.15, B7.3, B4.16, B7.2, B8.1, B7.1, E1.1, E4.4, E2.1, and E3.3.

Within the proposed footprint, the following NRMUs have been previously surveyed for cultural resources: B4.13 (Cain et al. 2009); B5.2 (Morehead et al. 2008); B4.14 (Maggioni et al. 2009); B7.3 (Campo et al. 1999a); B7.2 (Campo et al. 1999a); B8.1 (Little et al. 2000); B7.1 (Cain et al. 2008); E1.1 (Trinkley et al. 1996); E4.4 (Trinkley et al. 1996); E2.1 (Trinkley et al. 1996); and E3.3 (Ambrosino et al. 2001). 15 cultural resources were encountered within the proposed footprint and include the following: 9LI1650, a historic artifact scatter; 9LI337, a late 19th/early 20th century artifact scatter; 9LI375, a Woodland/Mississippian site with a 19th/20th century historic component; 9LI508, an undifferentiated prehistoric scatter and a 19th/20th century historic scatter; 9LI585, a 19th century farmstead; 9LI1244, a mid 19th-20th century historic scatter; 9LI1245, a mid 19th-20th century historic scatter; 9LI1247, an 18th – 20th century historic scatter; 9LI1569, a prehistoric scatter; 9LI1570, a prehistoric scatter; 9LI1578, an isolated historic ceramic; 9LI1579, a prehistoric artifact scatter; 9LI1581, an isolated historic find; 9LI1583, a prehistoric lithic scatter; and 9LI931, a prehistoric scatter.

All sites were determined ineligible for the NRHP with the exception of 9LI585 which has been determined eligible for the NRHP (Matthews et al. 2005a). This 19th through early 20th century farmstead is located north of the existing Fort Stewart Road Old 144. If the proposed Highway 144 Bypass is constructed south of Fort Stewart Road Old 144 and no modifications are required to Fort Stewart Road Old 144, there is a moderately low to low potential for adverse impacts to 9LI583. If the bypass is required to be constructed north of the Fort Stewart Road Old 144 or modifications will require alterations to Old 144, there will be a direct impact to 9LI583. During the Phase II NRHP evaluation of 9LI583, a mitigation plan was proposed based upon unknown future impacts. This mitigation plan will be updated to take into account the proposed action and if 9LI583 will be adversely affected, the Installation will seek methods to avoid, minimize or mitigate the adverse effects in accordance with the NHPA.

Small portions of the proposed Highway Bypass have not been previously surveyed. NRMU B4.15 and B4.16 have not been formally surveyed and is scheduled for completion in FY10. Approximately 2.5 kilometers remain to be surveyed and have been identified as having a high potential for cultural resources. However, these locations are within the Small Arms Impact area and have an elevated risk of unexploded ordnance and increased likelihood of previous disturbance. Therefore, there is a decreased likelihood of encountering historic properties within these areas. As a result of the surveys and the need for additional surveys, there is a moderate potential to directly impact historic properties under the Preferred COA.

Although not within the proposed footprint of the Highway Bypass, the Taylors Creek Cemetery located in NRMU E1.1 is immediately adjacent. The Taylors Creek Cemetery, an early 19th century cemetery, has been determined eligible for the NRHP as a Traditional Cultural Property. Construction of the Highway 144 Bypass within the proposed location will have an adverse effect to this historic property. Although the Traditional Cultural Property's boundaries are confined to the cemetery property, the setting, feeling, and association will be adversely affected (in accordance with applying the criteria for adverse effect per 36 CFR 800).

The Taylors Creek Association meets annually in October to celebrate their traditional homecoming in a manner consistent with the original Taylors Creek Campground meetings since 1804. Construction of a highway within 30 meters of the existing cemetery will substantially impact the characteristics of this Traditional Cultural Resource. In order to take into account how the proposed action will affect the resource, the Installation will consult with the Taylors Creek Association and the Pleasant Grove Church in accordance with the NHPA and NEPA in order to explore methods to avoid, minimize, or mitigate the adverse effects.

Shifting the proposed path to either the north or the south of the cemetery is one alternative to resolve adverse effects. Currently, the cemetery is located approximately 300 meters west of the existing

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Georgia Highway 119. Sufficient vegetation between the cemetery and Georgia Highway 119 allows the Traditional Cultural Property to maintain the maximum amount of original setting, feeling, and association under current conditions. If it is determined that avoidance of adverse impacts by shifting the road significantly to the north or south of the cemetery, the Installation would seek means to maximize the amount of vegetation to reduce the cumulative visual and noise impacts associated with the existing Georgia Highway 119 and the proposed Georgia Highway 144 Bypass.

If avoidance is not a viable alternative, efforts to minimize the impacts will require further consultation with the appropriate stakeholders. Due to the proximity of this resource, minimization efforts may be limited. Since the Taylors Creek Campground meeting is only held one Sunday a year, alternatives to minimize the impacts during the ceremony could be employed (e.g. re-routing traffic, placement of signs to slow traffic to an acceptable noise level similar to church zones, etc…).

If avoidance or minimization efforts are not viable alternatives, then the Installation will seek methods to mitigate the adverse effects in accordance with the NHPA. Due to the nature of the resource type, typical data recovery or HABS/HAER documentation are not applicable. Only through consultation with the appropriate stakeholders will mitigation alternatives be adequately developed. One possible alternative mitigation effort would be to re-establish the original Taylors Creek Campground (located approximately 1.7 kilometers to the east in NRMU B8.1) as an alternative area to meet. The original Taylors Creek Campground was utilized from 1804 to 1940. When the Installation acquired the land, there was a hiatus for 5 years. After World War II, the Taylors Creek Association continued to meet but changed their location to the Taylors Creek Cemetery. This was necessary due to the structures being removed from the original site and the cemetery remaining as the only visual reminder of their former community. Furthermore, access to the cemeteries on the Installation was granted to citizens as part of the original land acquisition agreements. No live fire training occurs within this location and therefore impacts from training or to training would be moderate to low.

If mitigation efforts required movement of the meetings to the original campground, additional mitigation may be required to the existing grounds of the Taylors Creek Campground (9LI267). This site was determined eligible for the NRHP, however only based upon its prehistoric component (the original historic component's integrity was compromised). The prehistoric component would likely require data recovery in order to avoid adverse effects unless the activities of the new location could be integrated into the long term preservation of the site. If this could not be avoided, a data recovery plan developed through the Phase II NRHP evaluation of 9LI267 could be implemented.

Similar to the Taylors Creek Traditional Cultural Property, the Pleasant Grove Cemetery has been determined eligible for the NRHP as a Traditional Cultural Property. Pleasant Grove Cemetery is located in NRMU E21.1 and approximately 115 meters south of the proposed Highway 144 Bypass. Similar impacts to this historic property are likely to occur, however on a slightly lesser degree due to the existing vegetation between the cemetery and the proposed highway. If efforts to avoid adverse impacts to this cemetery require shifting the highway to the north, consideration of shifting requirements potentially associated with the Taylors Creek Cemetery must also be taken into account. Examination of the surrounding area indicates no other historic properties in the vicinity.

If avoidance is not feasible, consultation with the Pleasant Grove Church and the Taylors Creek Association would be required to seek methods of minimizing impacts. Alternatives explored for the Taylors Creek Cemetery would likely be applicable to the Pleasant Grove Cemetery. If minimization could not be adequately accomplished, mitigation measures would be required in accordance with the NHPA. Similar to the Taylors Creek Cemetery, alternative mitigation strategies would be required due to the resource type. The Pleasant Grove Camp Meetings originated in the late 1800s and have continued on a bi-annual basis since that time. Initially, the Camp Meetings were held at the Strumbay Cemetery and were eventually moved to the present location of Pleasant Grove Cemetery. Although there is an association with the Strumbay Cemetery, that historical tie has diminished over time. Consequently, the Strumbay Cemetery was evaluated for its eligibility as a Traditional Cultural Property and was determined ineligible for the NRHP. Similar to the mitigation strategies of the Taylors Creek Cemetery, one alternative would be to establish another location for the bi-annual meeting. Only through consultation

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with both the Taylors Creek Association and the Pleasant Grove Church can alternative mitigation strategies be developed.

This project will not affect historic buildings. All buildings within the viewshed of the project are ineligible for the NRHP: new family housing development (2004), 7901 (1940), 7917 (2008), 8073 (built 1999), 8074 (built 2001), 8076 (built 2002), 8081 (built 1940), 8084 (built 1984), 8085, 8086 (built 1987). Buildings 7901, 8081, 8084, 8085, and 8086 were determined ineligible for the NRHP by the 2002 building survey (Fortune & Maggioni 2002). The balance was constructed after 1990 and is ineligible for the NRHP.

Examination of adjacent areas to the proposed location of Alternative B did not indicate any other historic properties in proximity. Other than the previous areas mentioned that require cultural resource surveys to address direct impacts, all other areas have been previously surveyed in proximity the proposed bypass. Including the impacts to the Taylors Creek Cemetery, the Pleasant Grove Cemetery, and site 9LI585, there is a high potential for indirect impacts anticipated from the Preferred COA.

Project P: FY12 Georgia Highway 144 East Road Widening

Georgia Highway 144 serves as the primary deployment route for the 3rd Infantry Division, as well as the primary route for personal vehicle traffic traveling between Fort Stewart and Savannah or Richmond Hill. The construction of the 4th Brigade Combat Team (BCT) facilities off Highway 144 is expected to increase traffic on the road by 50 percent. The current speed limit for the existing two-lane road is 55 miles per hour (MPH). In a normal calendar year, there are approximately six training exercises with duration of thirty to sixty days each. During these exercises, the speed limit on Highway 144 is reduced to 45 MPH for safety due to the large number of military vehicle convoys on the road. Consequently, non-military vehicles are stacked behind the convoys during morning and evening rush hour. The large line of vehicles reduces the line of sight ahead and around the convoys, creating dangerous passing conditions. Vehicles passing a convoy must travel in the opposite lane, which causes non-military traffic to become intermingled with the convoy. During these training periods, there is an overall increase in the amount of frustration and aggressive driving on Highway 144. Therefore, Fort Stewart proposes to widen Highway 144 East, within the Installation boundary.

The Preferred COA for the Highway 144 Widening has been identified as affecting Natural Resource Management Units (NRMU): D4.3, B6.2, A20.1, Cantonment, B5.1, B5.2, B4.13, A18.1, B4.18, B4.19, B4.11, A17.1, B2.1, A15.1, B2.2, A14.1, BEQA2, A12.1, A12.4, B1.1, A9.1, B1.4, A9.2, B1.3, A8.1, B24.4, B24.1, A6.1, A6.2, A4.1, A3.1, A2.1, B24.2, B24.3, A2.4, A12, A1.4, A1.6, C18.5, C18.6, C18.4, C18.3, and A1.1 (see figure O-1).

The following NRMUs have been previously surveyed for cultural resources: D4.3 (Morehead et al. 2008a); B6.2 (Morehead et al. 2008a; Maggioni and Grover 2002, 2003); A20.1 (Morehead et al. 2008a); B5.1 (Morehead et al. 2008a); B5.2 (Kennedy et al. 2004); B4.12 (Maggioni and Grover 2002, 2003); A18.1 (Little et al. 2000); A18.4 (Mallory et al. 2006); B4.11(Ross 2004b); A17.1 (Kennedy et al. 2004); A15.1 (Morehead 2009); B2.2 (Little et al. 2000); A12.1 (Campo et al. 1999); A12.4 (Campo et al. 1999); A9.1 (Campo et al. 1999); A9.2 (FSCRM 2002, 2003); A8.1(Campo et al. 1999b); B.12 (Maggioni and Grover 2002, 2003); B1.2 (Maggioni and Grover 2002, 2003); A6.1 (Holland 1998); B24.4 (FSCRM 2002, 2003); B24.1 (Ross 2004a); A6.2 (Holland 1998); A4.1 (Maggioni and Grover 2002, 2003); B24.2 (Campo 1999b); A3.1 (Maggioni and Grover 2002, 2003); B24.3 (Ross 2004a); A2.1 (Ross 2004a); A2.4 (Ross 2004a); A1.2 (Morehead et al. 2008b); A1.4 (Morehead et al. 2008b); C18.5 (Maggioni and Grover 2002, 2003); C18.6 (Maggioni and Grover 2002, 2003); A1.6 (Morehead et al. 2008b); C18.4 (Maggioni and Grover 2002, 2003); A1.1 (Morehead et al. 2008b); and C18.3 (Morehead et al. 2008b). The following NRMUs have been partially surveyed for cultural resources B2.1 (Little et al. 2000); B4.13 (Maggioni and Grover 2002, 2003); and B1.1 (Morehead et al. 2009). The following NRMUs have not been surveyed for cultural resources: B4.17; B4.18; A14.1; BEQA2;

From these surveys, a total of 47 cultural resources were identified within the proposed footprint and included the following: 9LI643, a late 19th/early 20th century historic and an undifferentiated prehistoric

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site; 9LI1132, a early 20th century historic scatter; 9LI1133, an early 20th century historic and an undifferentiated prehistoric isolated find; 9LI644, an undifferentiated prehistoric find; 9LI645, a late 19th early 20th century historic site; 9LI1347, a historic artifact scatter; 9LI1189, a late 19th early 20th century historic site; 9LI1185, a late 19th early 20th century historic find; 9LI1376, a late 19th early 20th century historic site; 9LI577, a late 18th early 19th century historic site; 9LI519, a late 19th early 20th century historic site; 9LI521, a late 19th early 20th century historic site; 9LI520, a late 19th century early 20th century site; Evans BPL-1, a historic artifact scatter; 9LI349, a historic artifact scatter; 9LI525, an early 20th century historic site; 9LI526, an early 20th century historic site; 9LI613, a historic home site; 9LI1350, a prehistoric camp and artifact scatter; 9LI271, a Late Archaic/Early Woodland prehistoric site; 9LI422, an early 20th century historic site; 9BN476, a historic artifact scatter; 9BN479, a historic artifact scatter; 9BN117, a historic site; 9BN136, a historic site; 9BN408, a historic artifact scatter; 9BN186; a World War II era historic site; 9BN537, a 19th/20th century isolated historic find; 9BN400, a 20th century isolated historic find; 9BN536, a 20th century isolated historic find; 9BN381, a prehistoric isolated find; 9BN538, a 19th/20th century isolated historic scatter; 9BN503, a 20th century historic site; B24.4-3, a historic/prehistoric site; 9BN418, a prehistoric and historic artifact scatter; 9BN508, a domestic historic site; 9BN916, a prehistoric artifact scatter; 9BN999, a isolated prehistoric find; 9BN929, a isolated prehistoric find; 9BN1078, a historic isolated find; 9BN934, a prehistoric artifact scatter; 9BN995, a isolated historic find; 9BN930, a historic artifact scatter; 9BN931, a historic artifact scatter; and 9BN518, a prehistoric and historic artifact scatter. All sites were determined ineligible for the NRHP. Therefore, no direct impacts to historic properties will occur under the Preferred COA.

The following sites fall into the footprint and are currently pending analysis to determine eligibility for the NRHP: A15.1-15, historic site, A15.1-4, historic site possibly associated with Abraham Chapel and A15.1-9, a historic site (Morehead et al 2009 [Draft]).

Site 9LI1350, located in NRMU B1.4 was initially assessed as potentially eligible for the NRHP during Phase I evaluation. Accordingly, a Phase II NRHP evaluation was conducted and was recommended ineligible by (Morehead et al. 2005). However, the SHPO review of the initial Phase II draft report of investigation resulted in a recommendation of eligible which was based upon the draft recommendations by Prentice Thomas & Associates, Inc (Bellew 8 JUL 2004). Upon further review and analysis, Prentice Thomas & Associates, Inc. recommended the site ineligible. In 2005, the Installation concurred with the contractor's recommendation that 9LI1350 was ineligible. Therefore, the Installation has determined that there will be no known adverse effect to historic properties.

Regarding architectural resources, two buildings are potentially within the footprint, Buildings 8091 and 8094 both built in 2007. This project will be within the viewsheds of much of the new family housing development at Fort Stewart. These buildings were constructed in 2004. COA1 will also be within the viewsheds of the following buildings, all of which are ineligible for the NRHP, either as a result of the 2002 historic building survey (Fortune & Maggioni 2002), or due to their age (less than fifty years old): 7901 (1940), 7917 (2008) 8011, 8021, 8031 (built in 1940), 8064, 8065, 8066 (built 2001), 8073 (built 1999), 8074 (built 2001), 8076 (built 2002), 8081 (built 1940), 8082 (built 1998), 8083 (built 1994), 8085, 8086 (built 1987), 8089 (built 2000), 8093 (built 2007), 8099 (built 1970), Buildings 8120, 8122, 8123, 8124, (built 1993), 8126 (built 1999), 8153 (built 1980) and associated bleachers and ammunition storage point.

Examination of adjacent areas to the proposed location of the Preferred Course of Action did not indicate any historic properties in proximity. Areas not surveyed outside the proposed footprint predominately have a low potential for cultural resources. Should the project be altered to impact the areas not surveyed for cultural resources, additional cultural resource surveys would be conducted and impacts to historic properties would be assessed in accordance with the NHPA and other applicable laws. Cultural resource surveys are scheduled to be conducted in FY10. Therefore, a low potential for indirect impacts is anticipated from the Preferred COA.

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Enclosures [Maps omitted from public format to protect sensitive cultural resources]

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2004b Archaeological Investigations at Fort Stewart: An Intensive Archaeological Survey of 10,000 Acres (NRMUs A3.1, A3.2, A4.1, A4.2, A9.1, A9.2, A9.3, A19.1, A20.2, A20.3, B4.11, B19.1, C11.1, C15.1, C17.1, C17.2, C17.3, D2.2, E8.2, A18.1, F5.1, and F12.2 in Bryan, Evans, Liberty and Long Counties) at Fort Stewart, Georgia. Panamerican Consultants, Inc. Submitted to the National Park Service, Southeast Archeological Center, Tallahassee, and the Directorate of Public Works, Environmental Branch, Fort Stewart, Georgia.

Trinkley, Michael, William B. Barr, and Debi Hacker
1996 An Archaeological Survey of the 522 Ha JAECK Drop Zone and 241 Ha Taylors Creek Tract, Fort Stewart, Long and Liberty Counties, Georgia. Chicora Research Contribution 186. Chicora Foundation, Columbia, South Carolina. Prepared for the National Park Service, Southeast Regional Office, Atlanta, Georgia with funds by the United States Army under Contract Number: 1443CX500095044.

1997 Fort Stewart 2 and 3: An Archaeological Survey of the 809 Ha Survey Tract “A” (Portions of Training Areas E-16 and E-20) and the 804 Ha Survey Tract “B” (Portions of Training Areas E-14 and E-15), Brigade Maneuver Area, Fort Stewart, Long and Tattnall Counties, Georgia. Chicora Research Contribution

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208. Chicora Foundation, Inc., Columbia, South Carolina. Prepared for the National Park Service, Southeast Regional Office, Atlanta, Georgia with funds by Fort Stewart, United States Army under Contract Number: 1443CX500095044. [CHI 2]; [CHI 3]

Trinkley, Michael, Debi Hacker, and William B. Barr
1998 Fort Stewart 4, 5, 6, and 7: An Archaeological Survey of 3,078.27 Ha Survey Tracts "A" Through "N" (Portions of Training Areas A-11, B-9, D-8, D-9, D-11, D-14, E-7, E-8, E-11, E-13, E-14, E-15, E-19, E-20, and E-21), Fort Stewart, Liberty, Long and Tattnall Counties, Georgia. Chicora Research Contribution 242. Chicora Foundation, Inc., Columbia, South Carolina. Prepared for the National Park Service, Southeast Regional Office, Atlanta, Georgia with funds by Fort Stewart, United States Army under Contract Number: 1443CX500095043.

Trinkley, Michael, and Debi Hacker
2000 Fort Stewart 12: A Survey of a Portion of Natural Resource Management Unit D7.2, Fort Stewart, Liberty County, Georgia. Chicora Research Contribution 300. Chicora Foundation, Columbia, South Carolina. Submitted to the Southeast Archeological Center, National Park Service, Tallahassee.

CONFIDENTIAL DRAFT - Do Not Release

GEORGIA
DEPARTMENT OF NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION

CHRIS CLARK
COMMISSIONER

DR. DAVID CRASS
ACTING DIVISION DIRECTOR

January 20, 2010

Robert R. Baumgardt
Director, Public Works
US Army Installation Management Command
HQ, US Army Garrison, Fort Stewart/ Hunter Army Airfield
Directorate of Public Works
1587 Frank Cochran Drive
Fort Stewart, Georgia 31314
Attn: Brian Greer, brian.greer@us.army.mil

RE: Fort Stewart: Range & Garrison Development, 15 Projects, 2011-2014
Liberty County, Georgia
HP-091222-001

Dear Mr. Baumgardt:

The Historic Preservation Division (HPD) has reviewed the information provided concerning the above-referenced projects at Fort Stewart. Our comments are offered to assist the U.S. Army and Fort Stewart in complying with the provisions of Section 106 of the National Historic Preservation Act of 1966, as amended.

Based on the provided information, HPD concurs with the findings and recommendations concerning archaeological resources located within the 15 projects' areas of potential effect. In regards to historic structures located within the multiple areas of potential effect, HPD concurs that Projects A, C, D, E, H, I, J, K, M, and N will result in **no effect** to historic structures that are listed in or eligible for listing the National Register of Historic Places (NRHP), as defined in 36 CFR Part 800.4(d)(1). HPD notes that Projects B, F, and L may have concerns for effects to historic cemeteries, but Fort Stewart will be closely monitoring the project plans as they develop and minimize any potential effects to cemeteries that may be eligible for listing in the NRHP, as appropriate. HPD should be consulted if plans evolve to include minimization efforts, such as the construction of berms, so that we may be able to comment on cemetery eligibility and effects of the projects, as well as the efforts to minimize effects. Additionally, the description of potential effects resulting from Project G was inconclusive, as an examination of a few structures in the viewshed of the project has not been completed. However, it is stated that there will likely be no concern to historic properties in the APE; once this is confirmed, please let us know so that we will be able to provide conclusive comments for this project.

Please refer to project number **HP-091222-001** in any future correspondence regarding this undertaking. If we may be of further assistance, please do not hesitate to contact Elizabeth Shirk, Environmental Review Coordinator at (404) 651-6624, or Jackie Tyson, Environmental Review Historian, at (404) 651-6777.

Sincerely,

Karen Anderson-Córdova
Manager, Planning & Local Assistance Unit

KAC:jht

cc: Jason Kotarski, Coastal Regional Commission of Georgia

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

FEB 05 2010

Office of the Garrison Commander

The Honorable Tarpie Yargee
Alabama-Quassarte Tribal Town
101 East Broadway
Wetumka, Oklahoma 74880

Dear Chief Tarpie Yargee:

In accordance with the National Environmental Policy Act, the National Historic Preservation Act, and the American Indian Religious Freedom Act, the Alabama-Quassarte Tribal Town is requested to review and provide comments regarding 14 projects currently proposed by Fort Stewart. The enclosed work summary describes the proposed and alternative action for each project as well their potential effects to cultural resources.

The analysis of the potential environmental impacts of the 14 projects is under development and will be documented in the *Fort Stewart Range and Garrison Support Facilities Environmental Impact Statement* (EIS). In order to ensure your comments are included in the EIS, comments must be received within thirty days of the receipt of this letter.

A copy of the draft EIS will be sent to the Alabama-Quassarte Tribal Town, and other stakeholders, around February 2010. As more completely described in the draft EIS, additional comments will be requested from the Alabama-Quassarte Tribal Town. Please note that the enclosure includes sensitive site location information that will not be published in the EIS. We request that this information be treated with confidentiality.

If the Alabama-Quassarte Tribal Town requires further information, please contact Mr. Brian K. Greer, M.A., Cultural Resource Management Specialist, or Mr. Kurt Flynn, Land Management Section Leader, Environmental Division, Directorate of Public Works at (912) 767-2010. We look forward to your response.

Sincerely,

Kevin W. Milton
Colonel, US Army
Commanding

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

FEB 05 2010

REPLY TO
ATTENTION OF

Office of the Garrison Commander

The Honorable Billy Cypress
Miccosukee Tribe of Indians of Florida
Mile Marker 70, U.S. 41 Tamiami Trail
Miami, Florida 33144

Dear Chairman Cypress:

In accordance with the National Environmental Policy Act, the National Historic Preservation Act, and the American Indian Religious Freedom Act, the Miccosukee Tribe of Indians of Florida is requested to review and provide comments regarding 14 projects currently proposed by Fort Stewart. The enclosed work summary describes the proposed and alternative action for each project as well their potential effects to cultural resources.

The analysis of the potential environmental impacts of the 14 projects is under development and will be documented in the *Fort Stewart Range and Garrison Support Facilities Environmental Impact Statement* (EIS). In order to ensure your comments are included in the EIS, comments must be received within thirty days of the receipt of this letter.

A copy of the draft EIS will be sent to the Miccosukee Tribe of Indians of Florida, and other stakeholders, around February 2010. As more completely described in the draft EIS, additional comments will be requested from the Miccosukee Tribe of Indians of Florida. Please note that the enclosure includes sensitive site location information that will not be published in the EIS. We request that this information be treated with confidentiality.

If the Miccosukee Tribe of Indians of Florida requires further information, please contact Mr. Brian K. Greer, M.A., Cultural Resource Management Specialist, or Mr. Kurt Flynn, Land Management Section Leader, Environmental Division, Directorate of Public Works at (912) 767-2010. We look forward to your response.

Sincerely,

Kevin W. Milton
Colonel, US Army
Commanding

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

FEB 05 2010

Office of the Garrison Commander

The Honorable A.D. Ellis
Muscogee Creek Nation of Oklahoma
1008 East Eufaula
Okmulgee, Oklahoma 74447

Dear Chief Ellis:

In accordance with the National Environmental Policy Act, the National Historic Preservation Act, and the American Indian Religious Freedom Act, the Muscogee Creek Nation of Oklahoma is requested to review and provide comments regarding 14 projects currently proposed by Fort Stewart. The enclosed work summary describes the proposed and alternative action for each project as well their potential effects to cultural resources.

The analysis of the potential environmental impacts of the 14 projects is under development and will be documented in the *Fort Stewart Range and Garrison Support Facilities Environmental Impact Statement* (EIS). In order to ensure your comments are included in the EIS, comments must be received within thirty days of the receipt of this letter.

A copy of the draft EIS will be sent to the Muscogee Creek Nation of Oklahoma, and other stakeholders, around February 2010. As more completely described in the draft EIS, additional comments will be requested from the Muscogee Creek Nation of Oklahoma. Please note that the enclosure includes sensitive site location information that will not be published in the EIS. We request that this information be treated with confidentiality.

If the Muscogee Creek Nation of Oklahoma requires further information, please contact Mr. Brian K. Greer, M.A., Cultural Resource Management Specialist, or Mr. Kurt Flynn, Land Management Section Leader, Environmental Division, Directorate of Public Works at (912) 767-2010. We look forward to your response.

Sincerely,

Kevin W. Milton
Colonel, US Army
Commanding

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

FEB 05 2010

Office of the Garrison Commander

The Honorable Buford L. Rolin
Poarch Band of Creek Indians
5811 Jack Springs Road
Atmore, Alabama 36502

Dear Chairman Rolin:

In accordance with the National Environmental Policy Act, the National Historic Preservation Act, and the American Indian Religious Freedom Act, the Poarch Band of Creek Indians is requested to review and provide comments regarding 14 projects currently proposed by Fort Stewart. The enclosed work summary describes the proposed and alternative action for each project as well their potential effects to cultural resources.

The analysis of the potential environmental impacts of the 14 projects is under development and will be documented in the *Fort Stewart Range and Garrison Support Facilities Environmental Impact Statement* (EIS). In order to ensure your comments are included in the EIS, comments must be received within thirty days of the receipt of this letter.

A copy of the draft EIS will be sent to the Poarch Band of Creek Indians, and other stakeholders, around February 2010. As more completely described in the draft EIS, additional comments will be requested from the Poarch Band of Creek Indians. Please note that the enclosure includes sensitive site location information that will not be published in the EIS. We request that this information be treated with confidentiality.

If the Poarch Band of Creek Indians requires further information, please contact Mr. Brian K. Greer, M.A., Cultural Resource Management Specialist, or Mr. Kurt Flynn, Land Management Section Leader, Environmental Division, Directorate of Public Works at (912) 767-2010. We look forward to your response.

Sincerely,

Kevin W. Milton
Colonel, US Army
Commanding

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

FEB 05 2010

Office of the Garrison Commander

The Honorable Mitchell Cypress
Seminole Tribe of Florida
34725 West Boundary Road
Clewiston, Florida 33440

Dear Chairman Cypress:

In accordance with the National Environmental Policy Act, the National Historic Preservation Act, and the American Indian Religious Freedom Act, the Seminole Tribe of Florida is requested to review and provide comments regarding 14 projects currently proposed by Fort Stewart. The enclosed work summary describes the proposed and alternative action for each project as well their potential effects to cultural resources.

The analysis of the potential environmental impacts of the 14 projects is under development and will be documented in the *Fort Stewart Range and Garrison Support Facilities Environmental Impact Statement* (EIS). In order to ensure your comments are included in the EIS, comments must be received within thirty days of the receipt of this letter.

A copy of the draft EIS will be sent to the Seminole Tribe of Florida, and other stakeholders, around February 2010. As more completely described in the draft EIS, additional comments will be requested from the Seminole Tribe of Florida. Please note that the enclosure includes sensitive site location information that will not be published in the EIS. We request that this information be treated with confidentiality.

If the Seminole Tribe of Florida requires further information, please contact Mr. Brian K. Greer, M.A., Cultural Resource Management Specialist, or Mr. Kurt Flynn, Land Management Section Leader, Environmental Division, Directorate of Public Works at (912) 767-2010. We look forward to your response.

Sincerely,

Kevin W. Milton
Colonel, US Army
Commanding

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

FEB 05 2010

REPLY TO
ATTENTION OF

Office of the Garrison Commander

The Honorable Enoch Kelly Haney
Seminole Nation of Oklahoma
Junction 270 and 56 Highway, ¼ Mile East on 270
Wewoka, Oklahoma 74884

Dear Chief Haney:

In accordance with the National Environmental Policy Act, the National Historic Preservation Act, and the American Indian Religious Freedom Act, the Seminole Nation of Oklahoma is requested to review and provide comments regarding 14 projects currently proposed by Fort Stewart. The enclosed work summary describes the proposed and alternative action for each project as well their potential effects to cultural resources.

The analysis of the potential environmental impacts of the 14 projects is under development and will be documented in the *Fort Stewart Range and Garrison Support Facilities Environmental Impact Statement* (EIS). In order to ensure your comments are included in the EIS, comments must be received within thirty days of the receipt of this letter.

A copy of the draft EIS will be sent to the Seminole Nation of Oklahoma, and other stakeholders, around February 2010. As more completely described in the draft EIS, additional comments will be requested from the Seminole Nation of Oklahoma. Please note that the enclosure includes sensitive site location information that will not be published in the EIS. We request that this information be treated with confidentiality.

If the Seminole Nation of Oklahoma requires further information, please contact Mr. Brian K. Greer, M.A., Cultural Resource Management Specialist, or Mr. Kurt Flynn, Land Management Section Leader, Environmental Division, Directorate of Public Works at (912) 767-2010. We look forward to your response.

Sincerely,

Kevin W. Milton
Colonel, US Army
Commanding

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

FEB 05 2010

Office of the Garrison Commander

The Honorable Vernon Yarholar
Thlopthlocco Tribal Town
Clairview Road Exit 227, Building 103
Okemah, Oklahoma 74859

Dear Town King Yarholar:

In accordance with the National Environmental Policy Act, the National Historic Preservation Act, and the American Indian Religious Freedom Act, the Thlopthlocco Tribal Town is requested to review and provide comments regarding 14 projects currently proposed by Fort Stewart. The enclosed work summary describes the proposed and alternative action for each project as well their potential effects to cultural resources.

The analysis of the potential environmental impacts of the 14 projects is under development and will be documented in the *Fort Stewart Range and Garrison Support Facilities Environmental Impact Statement* (EIS). In order to ensure your comments are included in the EIS, comments must be received within thirty days of the receipt of this letter.

A copy of the draft EIS will be sent to the Thlopthlocco Tribal Town, and other stakeholders, around February 2010. As more completely described in the draft EIS, additional comments will be requested from the Thlopthlocco Tribal Town. Please note that the enclosure includes sensitive site location information that will not be published in the EIS. We request that this information be treated with confidentiality.

If the Thlopthlocco Tribal Town requires further information, please contact Mr. Brian K. Greer, M.A., Cultural Resource Management Specialist, or Mr. Kurt Flynn, Land Management Section Leader, Environmental Division, Directorate of Public Works at (912) 767-2010. We look forward to your response.

Sincerely,

Kevin W. Milton
Colonel, US Army
Commanding

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
954 WILLIAM H. WILSON AVENUE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

FEB 05 2010

Office of the Garrison Commander

The Honorable Tiger Harjo
Kialegee Tribal Town
108 North Main Street
Wetumka, Oklahoma 74883

Dear Mekko Harjo:

In accordance with the National Environmental Policy Act, the National Historic Preservation Act, and the American Indian Religious Freedom Act, the Kialegee Tribal Town is requested to review and provide comments regarding 14 projects currently proposed by Fort Stewart. The enclosed work summary describes the proposed and alternative action for each project as well their potential effects to cultural resources.

The analysis of the potential environmental impacts of the 14 projects is under development and will be documented in the *Fort Stewart Range and Garrison Support Facilities Environmental Impact Statement* (EIS). In order to ensure your comments are included in the EIS, comments must be received within thirty days of the receipt of this letter.

A copy of the draft EIS will be sent to the Kialegee Tribal Town, and other stakeholders, around February 2010. As more completely described in the draft EIS, additional comments will be requested from the Kialegee Tribal Town. Please note that the enclosure includes sensitive site location information that will not be published in the EIS. We request that this information be treated with confidentiality.

If the Kialegeee Tribal Town requires further information, please contact Mr. Brian K. Greer, M.A., Cultural Resource Management Specialist, or Mr. Kurt Flynn, Land Management Section Leader, Environmental Division, Directorate of Public Works at (912) 767-2010. We look forward to your response.

Sincerely,

Kevin W. Milton
Colonel, US Army
Commanding

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
DIRECTORATE OF PUBLIC WORKS
1587 FRANK COCHRAN DRIVE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Directorate

MAR 25 2010

Georgia DNR Office of
Historic Preservation Division
MAR 26 2010
RECEIVED

Dr. David Crass
Deputy State Historic Preservation Officer
Historic Preservation Division
Georgia Department of Natural Resources
254 Washington Street SW
Ground Level
Atlanta, Georgia 30334

Dear Dr. Crass,

The purpose of this letter is to continue consultation with your office regarding the *Fort Stewart Range and Garrison Environmental Impact Statement* and the proposed actions outlined within the document (Reference: Fort Stewart: Range & Garrison Development, 15 Projects, 2011-2014; Liberty County, Georgia; HP-091222-001).

Per your office's letter dated January 20, 2010, the Historic Preservation Division concurred with the Installation's findings and recommendations regarding archaeological resources located within the 15 project areas of potential effect. As described in our submittal "Fort Stewart Range and Garrison Support Facilities Cultural Resource Analysis Report", the Installation identified an additional need for cultural resource surveys associated with the following Projects: Project I (FY13 Modified Record Fire Range); Project J (FY13 Automatic Combat Pistol Qualification Course); and Project L (FY14 Convoy Live Fire Range). Since our last letter, the area of potential effect for these projects has been further refined and all cultural resource surveys have been completed (see enclosure). As a result of these surveys, the Installation has determined that construction and utilization of Project I, Project J, and Project L would not adversely affect archaeological resources eligible for listing on the National Register of Historic Places (NRHP) as defined in 36 CFR 800.

Your office identified Project G's (FY13 Fire and Movement Range) potential effects as inconclusive based upon the information provided. Specifically, there was a need to evaluate a few structures in the viewshed of the project area. Since our last letter, these structures have been evaluated and are described in the enclosed Report of Findings. The

Installation has confirmed construction and use of Project G would not result in an adverse effect to historic structures eligible for listing on the NRHP.

Regarding Project B (Infantry Platoon Battle Course), Project F (FY13 Known Distance Range), and Project L (FY14 Convoy Live Fire Route), your office expressed a desire to further consult should the Installation determine it would be necessary to minimize potential effects to cemeteries that may be eligible for listing in the NRHP. The Installation will continue to monitor project plans for the ranges as they develop and will consult with your office as appropriate. At this time, cemeteries that may be eligible for listing in the NRHP are not anticipated to be affected by the construction and utilization of the proposed ranges.

Please note, the original project design was modified since our previous submittal. In addition to the features already described, the project now includes the proposed construction and operation of three Range Operations and Control Areas (ROCAs) and a new access road. Project A (FY11 Multipurpose Machine Gun Range), Project B (FY11 Infantry Platoon Battle Course), and Project I (FY11 Modified Record Fire Range) would include ROCAs and Project N (FY11 10th Engineers Battalion) would include an access road. The area of potential effect of these modifications was surveyed for cultural resources and the Installation has confirmed that these modifications would not result in an adverse effect to historic properties (see enclosed Report of Findings).

Per 36 CFR 800, the Installation requests your comments within 30 days of receiving this letter. Should you have questions or need further information, please contact Mr. Brian Greer, Cultural Resource Program Manager, or Mr. Kurt Flynn, Land Management Section Leader at (912) 767-2010. Email correspondence can be directed to brian.greer@us.army.mil.

Sincerely,

Thomas C. Fry
for Robert R. Baumgardt
Director, Public Works

Enclosure

GEORGIA
DEPARTMENT OF NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION

CHRIS CLARK
COMMISSIONER

DR. DAVID CRASS
DIVISION DIRECTOR

April 22, 2010

Robert R. Baumgardt
Director, Public Works
Department of the Army
Fort Stewart/ Hunter Army Airfield
1587 Frank Cochran Drive
Fort Stewart, Georgia 31314
Attn: Brian Greer, brian.greer@us.army.mil

RE: Ft. Stewart: Range & Garrison Development, 15 Projects, 2011-2014
Liberty County, Georgia
HP-091222-001

Dear Mr. Baumgardt:

The Historic Preservation Division (HPD) has reviewed the additional information provided regarding the above-referenced project. Our comments are offered to assist the U.S. Department of the Army and Fort Stewart/ Hunter Army Airfield (HAAF) in complying with the provisions of Section 106 of the National Historic Preservation Act of 1966, as amended.

Thank you for the additional information further clarifying the proposed project. HPD understands that the project has been modified to include the construction and operation of three Range Operations and Control Areas and a new access road. Based on the information provided, HPD concurs that no archaeological sites or historic structures that are listed in or eligible for listing in the National Register of Historic Places (NRHP) will be affected by the proposed Range Operations and Control Areas and access road project, as defined in 36 CFR Part 800.4(d)(1). In addition, HPD concurs that no archaeological resources or historic structures that are listed in or eligible for listing in the NRHP will be affected by proposed Projects A, G, I, J, and N, as defined in 36 CFR Part 800.4(d)(1). HPD also agrees that, at this time and in conjunction with routine monitoring, Projects B, F, and L will result in **no adverse effect** to potentially eligible historic cemeteries, as defined in 36 CFR Part 800.5(d)(1).

Please refer to project number **HP-091222-001** in any future correspondence regarding this undertaking. If we may be of further assistance, please do not hesitate to contact Elizabeth Shirk, Environmental Review Coordinator at (404) 651-6624.

Sincerely,

Elizabeth Shirk

for Karen Anderson-Cordova
Program Manager
Environmental Review & Preservation Planning

KAC:jht

cc: Jason Kotarski, Coastal Regional Commission of Georgia

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART / HUNTER ARMY AIRFIELD
DIRECTORATE OF PUBLIC WORKS
1587 FRANK COCHRAN DRIVE
FORT STEWART, GEORGIA 31314

REPLY TO
ATTENTION OF

Office of the Directorate

Dr. David Crass
Deputy State Historic Preservation Officer
Historic Preservation Division
Georgia Department of Natural Resources
254 Washington Street SW
Ground Level
Atlanta, Georgia 30334

Dear Dr. Crass,

The purpose of this letter is to consult with your office regarding an additional action to the proposed activities in the *Fort Stewart Range and Garrison Draft Environmental Impact Statement* (Reference HP-091222-001). In letters dated January 20 and April 22, 2010, the Historic Preservation Division concurred with the Installation's findings and recommendations regarding archaeological resources located within the 15 project areas of potential effect. Subsequent to our last consultation, the area of potential effect has expanded for Project H (FY11 Infantry Squad Battle Course) to include an electrical right-of-way from the Installation boundary to the proposed range facility.

The electrical right-of-way will be established north of the proposed range along portions of Fort Stewart Roads 43 and 44 (see map). The right-of-way will include the placement of overhead power poles and timber harvesting along the route. The right of way is anticipated to be approximately 2.5 kilometers long and approximately 30 meters wide. The area of potential effect was surveyed for cultural resources on April 5, 2010 utilizing subsurface investigations at 30 meter intervals for high probability areas and 45 meter intervals for low probability areas.

No cultural resources were previously discovered within the area of potential effect and no cultural resources were encountered during the investigation. As a result, the Installation has determined that construction and utilization of the electrical right-of way would not adversely affect archaeological resources eligible for listing on the National Register of Historic Places. Per 36 CFR 800, the Installation requests your comments within 30 days of receiving this letter.

If you have any questions or require further information, please contact the following individuals at the Fort Stewart Directorate of Public Works Prevention and Compliance Branch: Mr. Brian Greer, Cultural Resource Program Manager, at (912) 767-0992 or Mr. Kurt Flynn, Land Management Section Leader, at (912) 767-2010. Email correspondence can be directed to brian.greer@us.army.mil.

Sincerely,

Thomas C. Fry
Robert R. Baumgardt
Director, Public Works

Enclosure

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
HISTORIC PRESERVATION DIVISION

CHRIS CLARK
COMMISSIONER

DR. DAVID CRASS
DIVISION DIRECTOR

June 10, 2010

Robert R. Baumgardt
Director, Public Works
Department of the Army
Fort Stewart/Hunter Army Airfield
1587 Frank Cochran Drive
Fort Stewart, Georgia 31314
Attention: Brian Greer
brian.greer@us.army.mil

RE: Ft. Stewart: Range & Garrison Development, 15 Projects, 2011-2014
Liberty County, Georgia
HP-091222-001

Dear Mr. Baumgardt:

The Historic Preservation Division (HPD) has reviewed the additional information provided regarding the above-referenced project. Our comments are offered to assist the U.S. Department of the Army and Fort Stewart/Hunter Army Airfield in complying with the provisions of Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA).

Thank you for the additional information further clarifying the proposed project. HPD understands that the area of potential effect has expanded for Project H to include an electrical right-of-way from the Installation boundary to the proposed range facility. Based on the information provided, HPD concurs that no historic properties that are listed in or eligible for listing in the NRHP will be affected by the proposed expansion of Project H, as defined in 36 CFR Part 800.4(d)(1).

Please refer to project number **HP-091222-001** in any future correspondence regarding this undertaking. If we may be of further assistance, please do not hesitate to contact Bob Entorf, Review Archeologist at (404) 651-6433.

Sincerely,

Karen Anderson-Córdova
Program Manager
Environmental Review and Preservation Planning

KAC:mn

APPENDIX D

WETLANDS

CASE DOCUMENT FOR: DIGITAL MULTIPURPOSE TRAINING RANGE
APPLICATION NUMBER 200900885
FOR A DEPARTMENT OF THE ARMY PERMIT
BY
FORT STEWART ARMY INSTALLATION, SAVANNAH, GEORGIA

PART I - INTRODUCTION

A. NAME AND ADDRESS OF APPLICANT:

U.S. Army, Fort Stewart Army Installation
Directorate of Public Works
1550 Frank Cochran Drive, Bldg. 1137
Fort Stewart, Georgia 31414

B. APPLICATION NUMBER: 200900885

C. LOCATION OF PROPOSED ACTIVITY: The site is located at Fort Stewart, in Liberty County, Georgia. The site is located in the Red Cloud Foxtrot (RC-F), B-9 and B-10 Training Areas (in the vicinity of latitude 31º 59' 57" north and longitude 81º 37' 56" west). A location map is provided in Appendix A to this document.

D. PROJECT DESCRIPTION: The Digital Multipurpose Training Range (DMPTR) is a large caliber range (utilizing ammunition cartridges with a bullet diameter, or caliber, of greater than 0.75 inches) is used to meet critical training needs for both active and reserve component units that train on Fort Stewart. The DMPTR is necessary to support the crew qualification tasks of M1A1 tank crews, M2 and M3 Bradley vehicle crews, and Stryker vehicle crews. This range is used to train and evaluate vehicle crews on the skills necessary to detect, identify, and engage an enemy doctrinal tactical array of stationary and moving infantry and armor targets. The range can also be used to train weapons crews operating in the same tasks. In addition to live-fire, this range can also be used for training with sub-caliber and/or laser training devices.

The range would consist of a standard one lane DMPTR with four roads with midpoint cross over capability and five battle positions per road. The DMPTR contains 105 stationary infantry targets (SITs), 35 stationary armor targets (SATs), six moving armory targets (MATs), six moving infantry targets (MITs), four urban target facades, five firing positions per road, one Range Operations Control Area facility, one After Action Review (AAR) facility, an air-vault

latrine facility, ammo breakdown area, ops storage building, instrumentation loading dock, general instruction building, and surfaced staging area.

The applicant has not completed final site design for the above described range project. The standard site layout for this type of range would require the filling and/or mechanized clearing of all 43.6 acres of bottomland hardwood wetlands on the 981-acre project site. The applicant will likely be able to avoid some of the wetlands on the project site as final site design is completed for the project. However, for the purposes of this permit evaluation, the US Army Corps of Engineers (USACE) will assume that all 43.6 acres of wetlands on the proposed project site would be impacted. In addition, the applicant's proposed wetland mitigation plan is to purchase 337 mitigation credits to offset unavoidable impact to 43.6 acres of wetlands.

E. BASIC PURPOSE AND NEED: The basic purpose of the proposed project is to provide the Soldiers of Fort Stewart, Reserve and National Guard units with new facilities that are critical in the training of both active and reserve component units that train on the Installation, while maintaining maneuver terrain and minimizing wetland impacts. The DMPTR is necessary to support the crew qualification tasks of M1A1 tank crews, M2 and M3 Bradley vehicle crews, and Stryker vehicle crews, while utilizing existing SDZ within the boundaries of Fort Stewart.

F. APPLICANT'S SUPPLEMENTAL INFORMATION: The following information is part of the administrative record for the project.

1. Project Narrative
2. Project Purpose and Need
3. Description of Resources Occurring within the Project Area, Potential Impacts, and Mitigation
4. Vicinity Map
5. Additional Studies and Response to Comments:

G. PROPOSED WORK SUBJECT TO THE JURISDICTION OF THE US ARMY CORPS OF ENGINEERS: The applicant proposes to perform work in, or affecting waters of the United States.

H. APPLICABLE STATUTORY AUTHORITY: The applicant is making application pursuant to Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344).

PART II - COORDINATION

A. JOINT PUBLIC NOTICE (JPN): On April 21, 2010, the United States Army Corps of Engineers Savannah District (USACE) issued a JPN on the proposed work. Copies of the notice were provided to federal, state, and local agencies and the public. The notice was also posted on USACE public web page.

B. RESPONSE TO JOINT PUBLIC NOTICE: A summary of the comments received in response to the Joint Public Notice is presented in Table 1 below.

Table 1. Summary of Comments

COMMENTOR	OBJECT	3(b) Y/N	NO OBJECT	NO OBJECT W/CONDITION	DATE
Federal Agencies					
1. National Marine Fisheries Services			X		05-24-10
2. US Environmental Protection Agency (EIS comments)				X	04-21-10
3. US Fish and Wildlife Service					*
State of Georgia					
4. State Clearing House					*
5. Coastal Resources Division, Federal Consistency					*
6. Environmental Protection Division					*
Other					
7. Southern Environmental Law Center - Ogeechee River Keeper				X	05-21-10

* No date indicates no comment received.

C. DISCUSSION OF RESPONSES:

1. National Marine Fisheries Service (NMFS): By letter dated May 24, 2010, the NMFS stated "Based on the information in the public notice, the proposed project would not occur in the vicinity of essential fish habitat designated by the South Atlantic Fishery Management Council or NMFS. Present staffing levels preclude further analysis of the proposed activities and no further action is planned. This position is neither supportive of nor in opposition to your authorization of the proposed work."

2. Georgia State Clearinghouse: By memorandum dated June 8, 2010, the Georgia State Clearinghouse stated that the request has been found to be consistent with state goals, policies, plans, objectives, and programs, with which the state is concerned.

3. Environmental Protection Agency (EPA): There were no comments received pursuant the USACE Joint Public Notice dated April 21, 2010, from the EPA. However, Fort Stewart did receive comments and questions from the EPA Region 4, pursuant to the Draft Environmental Impact Statement (EIS) for Training Range and Garrison Support Facilities Construction and Operation at Fort Stewart, Georgia. The following are EPA comments relevant to the Section 404 permit notifications:

a. Issue 1: EPA is currently reviewing a joint public notice dated April 21, 2010, for four individual permits for four projects (DMPTR, IPBC, MPMGR and QTR) with a total of 185.9 acres of wetland impacts. This is a substantial level of wetland impacts, particularly in relation to recently permitted impacts throughout Georgia.

(1) Applicants Response: Fort Stewart avoids and minimizes wetlands impacts when possible. The implementation of the actions proposed in the preferred alternative (Alternative B Sitings) has the potential to negatively impact up to 0.2% of the Installation's nearly 91,000 acres of wetlands. More importantly, of the "up to 0.2% of the Installation's wetlands being impacted," most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement. As stated earlier in this reply, the Installation anticipates wetland impacts will be much less than projected through further avoidance and minimization incorporated during the design phases of each project after the site is selected. It is important to note, that despite the large amount of military training activity that occurs on Fort Stewart, because of the Installation's proactive efforts to avoid,

enhance, and mitigate wetlands, its wetlands remain of a high quality, retaining and transmitting large amounts of fresh water and providing habitat for countless local species. Proactive environmental stewardship programs also help to keep our wetlands pristine. As discussed in opening paragraphs in Chapter 3 of the FEIS, Fort Stewart's Integrated Training Area Management (ITAM) program conducts land rehabilitation through the construction of low water crossings and Soldier training related to sustainability of Fort Stewart lands.

Much of the avoidance and minimization takes place before actual site selection. Training ranges of this kind have fairly specific requirements and it is not always possible to build them without impacting every wetland in the footprint. Site designers may alter certain aspects of a proposed range in response to environmental concerns during various stages of the design process, typically reviewed at the 10%, 35%, 60%, 90%, and 100% stages of completion, if they can do so while still meeting the operational and training requirements of the range. For example, the currently on-going design process reduced the wetland impacts from the IPBC to a third of what they were at the time of writing the DEIS. Impacts from the MPMGR have also been slightly reduced. Several proposed range projects were sited without wetland impacts of any kind. It is hoped that impacts from the QTR and DMPTR may be reduced, but as they are not yet in the design process this cannot be precisely determined.

It is also important to note that not all of the 185.9 acres (now 179.03 acres) of wetlands will actually be cleared, grubbed, and/or filled. Rather, that is a maximum projected "up to" amount. The actual number of acres impacted will likely be reduced further at each design level for target placement, etc.). Therefore, although the "permitted impacts" of this project may seem large in relation to other recently permitted impacts in Georgia, they do not represent substantial impacts to Fort Stewart wetlands resources. This text has been added to Section 4.3.2.2 of the FEIS.

(2) <u>USACE Position</u>: The combined wetland impact associated with the four proposed range projects has been reduced from 185.9 acres to 179.03 acres. In addition, as these projects approach final design, combined wetland impacts are expected to be reduced further. With regard to the amount of proposed wetland impact for these four projects relative to projects recently permitted by the Savannah District, there have been residential, commercial and reservoir projects authorized within the past five years with impacts in excess of 100 acres.

Based on the extensive experience of the USACE in review of permit applications for project located in the lower coastal plain of Georgia, most sites are typically comprised by approximately thirty percent wetlands. Fort Stewart is typical of site in the lower coastal plain and is also approximately thirty percent wetlands. Fort Stewart is the only military base with large range construction in Coastal Georgia. Proposed wetland impacts associated with the size of this proposed range are comparable to the wetland impacts associated with past range development on Fort Stewart.

a. Issue 2: EPA is particularly concerned that all impacts have been characterized as wetland impacts when two of the four projects show the potential for streams impacts on the 7.5-minute USGS topo quad maps. EPA notes that while the Fort has had a significant cumulative impact to streams from past projects, these impacts have not been mitigated.

(1) Applicants Response: The footprints of the MPMGR and IPBC on the 7.5-minute USGS topographic quads show "blue line" streams in the areas, however, a site visit by Fort Stewart and the Georgia Environmental Protection Division (GA EPD) on January 20, 2010, found no streams. The Savannah District also did not identify any streams within the range footprints. This information was added to Section 4.3.1, of the FEIS.

Over the years, Fort Stewart has worked diligently to mitigate impacts – direct and indirect, as well as cumulative – to the Installation's streams, as well as wetlands. During the development of the Installation's wetland bank, for example, thousands of feet of Canoochee Creek and Strum Bay were restored without being credited to the Installation's mitigation bank. The Installation takes pride in that fact and welcomes working with ORK and other local environmental stakeholders on future projects.

(2) USACE Position: The USACE has completed an expanded preliminary jurisdictional determination for the project site. This determination verified there are no jurisdictional streams located on the project site.

a. Issue 3: The FEIS should provide more discussion regarding the quality of the wetlands impacted. The DEIS mentions they're freshwater wetlands and that the Army has acquired mitigation credits to restore a historically but degraded hardwood wetland system. It is unclear what type of wetlands ecosystems are being impacted by the ranges

and garrison proposed projects.

(1) Applicants Response: Surveys of the proposed range and garrison sites by Fort Stewart determined these ecosystems were predominantly broadleaf hardwood palustrine wetlands consisting of vegetative communities typical of wetlands in the Coastal Plain: pond pine (Pinus serotina), pond cypress (*Taxodium ascendens*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), American hornbeam (*Carpinus caroliniana*), Highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occur with varying frequency depending on the landform and hydrology of particular areas. Animal communities are also supported by these areas – wading birds such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea herodias*), amphibians such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*), and mammals such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites. Soil types are hydric sand-loam mixtures of the Ellabelle, Bibb, Pelham, and Leefield types. Text reflecting this information was incorporated into Section 6.4.1 of the FEIS.

(2) USACE Position: The description of the wetlands proposed to be impacted, which was submitted by the applicant and summarized above, is sufficient for the USACE to base an assessment of the wetland quality. In addition, the USACE has made multiple visits to Fort Stewart and is very familiar with the quality of wetlands located within the proposed project site(s). The USACE used this information and its knowledge of wetland habitats on Fort Stewart in its assessment of proposed wetland impacts and the adequacy of the applicant's proposed mitigation plan.

a. Issue 4: EPA is unable to fully evaluate wetlands impacts, which is an area of CWA-designated responsibility for the Agency, in the DEIS because expanded CWA 404(b)(l) analyses have not been prepared for three ranges: FY 13 Modified Record Fire Range, FY 13 10/25 Meter Zero Range, and FY 14 Convoy Live Fire Range. This is a concern. EPA would like to review and comment on these analyses before they appear in the FEIS. Please coordinate with Bob Lord, Region 4's Wetlands Program to discuss further.

(1) Applicants Response: As we mentioned in Section 4.3.2.2. of the FEIS, the Installation has not prepared §404(b)(1) analyses for the FY13 MRFR, FY13 10/25 Meter Zero Range, and FY14 CLFR because some or all impacts to wetlands will likely be avoided during the design phase of these projects. The wetlands located on these sites are less than 5 acres each. If, however, wetlands cannot be avoided, the Installation will prepare §404(b)(1) analyses for these projects and request a §404(b) permit at that time.

(2) USACE Position: Wetland impacts pursuant to the construction of the FY 13 Modified Record Fire Range, FY 13 10/25 Meter Zero Range, and FY 14 Convoy Live Fire Range have not been determined by Fort Stewart. When these proposed projects are sited and designs are complete, and if there are any proposed wetland impacts associated with them, Fort Stewart will apply for a Section 404 permit with the USACE. Any proposed wetland impacts will be evaluated at that time and coordinated through the USACE permit process. The USACE is preparing an analysis of the proposed IPBC, MPMGR, DMPTR and QTR pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for the IPBC, MPMGR, DMPTR and QTR projects.

a. Issue 5: The DEIS states that the Fort has a regional permit for low water crossings, issued in 2001 and renewed in 2006 for 5 years, which allows for a maximum of 15 acres of cumulative wetlands impacts from low-water crossings. Approximately 5 acres of wetlands have been impacted using this permit. The FEIS should discuss the application of the Fort's regional permit for low water crossings, which allows for a maximum of 15 acres of cumulative wetlands impacts from low-water crossings, how the cumulative wetlands impacts are defined, and the water quality impacts and other aquatic resources impacts associated with this permit.

(1) Applicants Response: Low water crossings are not a part of the proposed action and there are no new low water crossings anticipated in the foreseeable future. As discussed in Section 3.4.4.2, only routine maintenance and repair of existing low water crossings in the range and training areas will be conducted.

(2) USACE Position: As part of this document, the USACE has prepared a cumulative impact assessment of all known past, presently proposed, and reasonably

foreseeable future impacts to aquatic resources. This assessment takes into consideration impacts associated with low water crossings.

a. Issue 6: EPA is concerned that the credit calculations using the Savannah District Standard Operating Procedure (SOP) do not fully compensate for the impacts. The Savannah District has frequently indicated to EPA that the SOP is not applicable to large impacts, such as those over 10 acres. EPA agrees and has proposed a scaling factor to address the cumulative impacts of large projects such as the factor used in the Charleston District SOP. This is the approach used by the Georgia Department of Transportation for its projects that exceed the 10 acre threshold. For very large projects this scaling factor could be capped at an appropriate level. EPA has suggested 3.0 acres, which is equal to the next largest factor used in the SOP. Application of the SOP without a scaling factor for large impacts, particularly the 108.1 acres for the MPMGR is not appropriate, even according to past finding from the Savannah District.

(1) Applicants Response: While a scaling factor may be appropriate to use in many large scale projects where a great deal of fill is being introduced into the wetland system and where the projects require large amounts of impermeable surfaces, neither of these considerations constitute significant components of any of the projects under consideration in the FEIS. Of this filled acreage only a small amount will include the introduction of impermeable surfaces. The only impermeable surfaces will consist of the range operations area and cover only 2% of each project footprint. As noted in Answer #1 above, while maximum projected "up to" amounts have been provided, most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement. This information is located in Section 4.3.2.2.

As a result, it is the Installation's position that use of any scaling factor is not necessary to compensate for the cumulative impacts associated with these types of projects and applying a scaling factor, as called for in the Charleston District's SOP, to these types of projects would appear to be arbitrary and capricious as it would not appear to be based on any sound engineering or hydrologic rational but would appear to be more punitive than compensatory in nature.

Moreover, the Installation always takes into account secondary wetland impacts. In reference to the MPMGR, which is the project that contains the majority of the 179.03

acres of wetlands to be potentially impacted, the Installation has evaluated potential secondary cumulative impacts. In our planning process, as noted above, the Installation took a "worst case scenario" approach when determining how to compensate for the quantity of wetlands loss. The Installation is planning to off-set secondary cumulative wetland effects from this range and has obtained an additional 287 mitigation credits from the Wilkinson-Oconee Bank. The Installation did account for the lost functions and values impacted by the project with respect to direct and indirect impacts.

As noted in Sections 3.4.5 and 4.3.2, the Savannah District is a cooperating agency to this EIS, and was consulted with regard to the factors noted above. Additionally, Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Having reviewed these documents and the associated 404(b)(1), the Savannah District did not suggest a need to utilize a scaling factor.

(2) USACE Position: The present total proposed wetland impact for the four proposed ranges is 179.03 acres. As discussed by the applicant above, not all of these proposed impacts are for fill, but a certain percentage would involve mechanized land clearing impacts. Clearing wetlands of vegetation and maintaining them in scrub/shrub vegetation results in a change in function, but not a total loss in function. The mitigation credits proposed by Fort Stewart are assuming a total loss in function. The proposed mitigation plan is to purchase 1,391credits to compensate for a total of 179 acres of wetland impact for all four ranges. This is a credit to impact ratio of 7.8:1. On average, three credits are generated for each acre of wetland restoration at the Wilkinson/Oconee Mitigation Bank, where credits will be purchased for the FY11 ranges. Therefore, the effective mitigation ratio for the FY11 Multipurpose Machine Gun Range and FY11 Infantry Platoon Battle Course projects would be approximately 2.6:1 of wetland restoration. The Applicant has not ruled out other acceptable compensatory mitigation alternatives to mitigate wetlands impact (provided through mitigation banks or in-lieu fee programs) for the FY13 Digital Multipurpose Training Range and the FY13 Qualification Training Range. Therefore, it is the position of the USACE that the mitigation proposed for this DPMTR project would meet the requirements of the new mitigation rule.

a. Issue 7: The DEIS indicates that approximately one-third of the Fort's lands are wetlands. It also states some of the remaining 160 credits contained in the Fort's on-site mitigation bank will be used for the Garrison construction projects. Additionally, the Army has previously purchased credits from an established off-Fort wetland mitigation bank in accordance with the Compensatory Mitigation Rule (33 CFR Part 332) to cover the proposed range projects. The Fort canvassed the available mitigation banks nearly one year ago, which may not reflect the current banks and credit availability. Given the opportunity, EPA would have discouraged the use of the Wilkinson - Oconee Mitigation Bank since it is out of the watershed, out of the ecoregion, and likely does not fully compensate for the functions lost at the project sites. EPA is also concerned, despite the rationale provided in the DEIS, that the Fort is not fully debiting its own mitigation bank before going to off-site alternatives. The Fort's mitigation bank is within the same watershed and ecoregion and thus more likely to replace the lost wetland functions. There appears to be ample time to expand this bank to accommodate the future needs presented as a reason for not fully using it for these projects. Typically, EPA discourages applicants from purchasing mitigation credits until the Section 404 permit has been issued, because this precludes other, possibly preferable, mitigation actions.

(1) Applicants Response: Although the Fort Stewart mitigation bank has sufficient credits to offset impacts from the two Garrison support construction projects, the Army has determined it is not sufficient to cover the unavoidable negative impacts to wetlands from the FY11-14 training range construction projects, for which the Installation must purchase credits from an off-site wetlands mitigation bank. The remaining acres within the Installation wetland bank allows Commanders to respond to emergency range training requirements, which surface from “In Theater” conditions and scenarios, or award Congressional Garrison or training additions that must be executed by Fort Stewart within one year or less. If Commanders did not have this flexibility, Installation projects with unavoidable wetland impacts would be cancelled or held up in significant delays awaiting Congressional funding to purchase “off-Post” wetland credits.

As discussed in Chapter 6 of the DEIS, despite the physical distance between the Wilkinson - Oconee Bank (WOB) restoration area and Fort Stewart, looking at the choice from a more holistic watershed perspective shows that the two locations are rooted in an interconnected complex of wetlands and open water bodies. The WOB wetlands were determined to be an ecologically acceptable replacement for the small portion of Fort Stewart wetlands impacts due to the proposed action. Hydrologic and habitat wetland

functions will remain unimpaired.

At the time the credits were purchased, there were no other readily available mitigation banks open in the primary service area with the quantity and quality of credits needed to cover the Installation's projected needs. The Federal appropriations process did not provide the Installation with the flexibility to wait until Section 404 permits were issued to initiate the required solicitation process to purchase the credits without putting the funding for the specific FY 2011 range projects in jeopardy. As part of the Installation's standard procurement processes, market research is conducted in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11.

For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs). For instance, the Installation is actively seeking opportunities to incorporate off-site compensatory mitigation projects into its private lands conservation initiatives in partnership with the Georgia Land Trust and will continue to do so to further provide compensatory mitigation within the primary service area and watershed. Under the Savannah District's SOP, the Wilkinson-Oconee Bank (WOB) is grandfathered as a pre-existing bank created prior to the Compensatory Mitigation Final Rule (please refer to Answer 9 below). As such, the WOB is an acceptable mitigation alternative that is in full compliance with the policy and purpose of mitigation required by the CWA, the Savannah District SOP, and the Compensatory Mitigation Final Rule. The information contained in this answer has been added to Section 6.4.1.1 of the FEIS.

(2) <u>USACE Position</u>: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. At the time of the pre-application meeting, the USACE agreed to allow the applicant to purchase credits from the secondary mitigation zone of the Wilkinson-Oconee Bank, which was the only bank with available credits. The agreement was made with the applicant in order to allow them time to procure funds necessary to provide mitigation when needed. The on-base Pond Four Mitigation Bank will be used to mitigate smaller on-post projects in the future that would likely be on a short time-line for planning, permitting and construction. The Army procurement process takes too long to allow for the purchase of mitigation credits for

these small, short, time-line projects. Therefore, the USACE agrees with the applicant to save Pond Four credits for these future small projects.

a. Issue 8: EPA disagrees with the statement that applying for a CWA Section 404 permit is a minimization of wetlands impacts. The DEIS states "While the Army strives to avoid negative impacts to wetlands when it sites new range and training facilities on Fort Stewart, if impacts to regulated wetlands cannot be avoided, the Army minimizes those impacts by applying for a Section 404 permit as required by the Clean Water Act. CWA 404 requires a permit for any dredge and fill impacts to jurisdictional waters, including wetlands. The CWA is a regulatory requirement, not a mitigation option. The FEIS should clarify this misrepresentation of CWA Section 404 permit program as a form of mitigation.

(1) Applicants Response: The information in the text and tables, located in Section 6.4.3 of the FEIS, has been edited to identify more accurately and clearly the differences between what is a required measure, such as a regulatory permit, and what is a mitigation option.

(2) USACE Position: The applicant made the suggested correction.

a. Issue 9: The DEIS discusses wetlands compensatory mitigation in context of NEPA-required mitigation when it should also discuss how the proposed mitigation meets the requirements of the Compensatory Mitigation for Losses of Aquatic Resources Final Rule. NEPA requires that to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analyses and related surveys and studies required by the Fish and Wildlife Coordination Act, the National Historic Preservation Act of 1966, the Endangered Species Act of 1973, and other environmental review laws and executive orders. The Compensatory Mitigation for Losses of Aquatic Resources Final Rule is considered to be a relevant "other environmental review law" as it is one of the CWA Section 404 implementing regulations. The FEIS should discuss and apply the Final Rule in its wetlands mitigation discussion.

(1) Applicants Response: The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR. Fort Stewart participated in

pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Section 6.4.1.1 of the FEIS has been revised to clearly explain that a mitigation decision has not yet been made for the FY13 QTR and the FY13 DMPTR. For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs). Similar to the process outlined in the Compensatory Mitigation Rule, the Installation's standard procurement processes conducts market research in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary and secondary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11.

According to 33 CFR 332, *Compensatory Mitigation for Losses of Aquatic Resources*, mitigation bank credits may be used if the project is in the service area of a mitigation bank. Section 332.3 (b)(2) has a description of why mitigation bank credits are acceptable in compensating for wetland impacts:

"Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable." Fort Stewart followed these requirements during the development of its mitigation plan.

(2) <u>USACE Position</u>: See USACE Position on USEPA issue 7 above.

a. <u>Issue 10</u>: While EPA does not expect the precise replication of all wetlands

adversely impacted by the proposed action, the FEIS should explain how the proposed mitigation will adequately compensate for lost wetland functions and values such that it results in no net loss of wetland functions and values. This discussion is absent from the DEIS. Furthermore, since the U.S. Army Corp of Engineers (USACOE) cannot issue a CWA 404 permit if there is a less damaging practicable alternative, the FEIS should discuss compliance with this provision.

(1) Applicants Response: The wetlands in the Wilkinson-Oconee Bank (WOB) are "in-kind" to the wetlands on Fort Stewart. Consistent with the fact that both areas are on Georgia's Coastal Plain, wetlands within the WOB are very similar to those slated for impact by the proposed Fort Stewart range projects. Surveys of the proposed range sites by Fort Stewart determined that dominant vegetation communities consist of plants typical of wetlands in the Coastal Plain: mixtures of pond and bald cypress (*Taxodium ascendensand distichum, respectively*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), privet (*Ligustrum sinense*), American hornbeam/ironwood (*Carpinus caroliniana*), highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occur with varying frequency depending on the landform and hydrology of particular areas, and essentially identical communities with similar distribution are found in the Wilkinson-Oconee's Mitigation Bank. Animal communities also supported by these areas are: wading birds, such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea Herodias*); amphibians, such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*); and mammals, such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites, and have been similarly reported in the Wilkinson-Oconee area. The American alligator (*Alligator mississippiensis*) is common throughout Fort Stewart and has also been observed at Wilkinson-Oconee. The locally endangered Wood Stork *Mycteria Americana* can also be found at both locations (though they are not expected to be impacted by the proposed projects).

Soil types were also consistent between the two areas. The Ellabelle, Bibb, Pelham, and Leefield types predominated in the proposed project areas. Analyses of the Natural Resources Conservation Service profiles show these to be comparable to the Chewacla, Chastain and Congaree soils which cover the Wilkinson-Oconee area. All are

characterized by loamy surface layers and clayey or loamy subsoils, and all soils are on the National Hydric Soils list.

Although the area of the Coastal Plain in which the Wilkinson-Oconee area is situated features more relief than that of Fort Stewart, the specific area of the restoration situated as it is in the Oconee River floodplain, is flatter than the surrounding general topography, resulting in a similar hydrologic profile to Fort Stewart. The bottomland hardwood wetland systems found at both locations share the typical functions of holding temporary storage surface water, maintenance of characteristic subsurface hydrology, removal and sequestration of elements, retention of particulates, export of organic carbon, maintenance of characteristic plant community, and habitat for wildlife. Based on this comparison, despite the distance between the two areas, wetlands on Fort Stewart and at the Wilkinson-Oconee restoration area are very similar and, therefore, their use for mitigation fully supports the requirement for "no net loss". Text reflecting this information was incorporated into Section 6.4.1.1 of the FEIS.

(2) USACE Position: As discussed above, the mitigation proposed by the applicant would comply with the new mitigation rule. The USACE is preparing an analysis of the proposed project pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for this proposed project. This analysis would also confirm that the final proposed site development plan for this range, as well as the other three ranges being reviewed, was the least environmentally damaging practicable alternative that would meet the basic project purpose.

a. Issue 11: The DEIS states that the USACOE documents approximately 1,467,774 acres of wetlands impacted within 20 Georgia counties and by deducting 1,982.87 acres of wetlands impacts since 1990 there are at least 1,465,791.13 acres of wetlands remaining. According to the DEIS, this amounts to a loss of 0.14% of wetlands since 1990 - an insignificant amount." It is unclear if the USACOE document referenced in the DEIS is referring to the 1,467,774 acres of wetlands as being impacted in the 20 Georgia counties or existing (un-impacted) wetlands in these counties. This paragraph needs to be clarified in the FEIS.

(1) Applicants Response: There are 1,467,774 existing acres of existing wetlands

within the 20 Georgia counties referenced, of which 1,465,791.13 acres of wetlands are un-impacted. This is how the Installation calculated a loss of 0.14% of wetlands since 1990 and the determination of "insignificant" derived. Text clarifying this information was incorporated into Section 5.3.3.2 of the FEIS.

(2) USACE Position: Fort Stewart corrected the FEIS, and clarified the information that EPA questioned.

3. US Fish and Wildlife Service (USFWS): No comments received. The US Army, Fort Stewart is the lead federal agency for this proposed action and has completed consultation with the USFWS. The Final Biological Opinion can be found in Appendix B of the FEIS..

4. Georgia State Clearinghouse: By memorandum dated June 8, 2010, the Georgia State Clearinghouse stated that the request has been found to be consistent with state goals, policies, plans, objectives, and programs, with which the state is concerned.

5. Georgia Department of Natural Resources, Coastal Resource Division (Georgia CRD): No comments were received from Georgia CRD. However, this office must certify that the project is consistent with the Georgia Coastal Management Program prior to the USACE completing its review of the subject application.

6. Georgia Department of Natural Resources, Environmental Protection Division (Georgia EPD): No comments were received from Georgia EPD. Fort Stewart is in consultation with the Georgia Environmental Protection Division regarding a water quality certification pursuant to Section 401 of the Clean Water Act. The USACE would include a copy of the 401 water quality certification with any permit issued. In addition, the special condition of any permit issued would require the permittee to adhere to the conditions of the 401 water quality certification.

7. Southern Environmental Law Center (SELC): By letter dated May 21, 2010, the SELC provided the following comments on behalf of the Ogeechee Riverkeeper, Inc. (ORK):

a. Issue 1: The applicant's alternatives analysis in the DEIS includes alternative COA 3 which is a "heavily utilized" existing multipurpose range complex (MPRC) (*Fort Stewart note: the range proposed for construction is actually a Digital Multi-Purpose Training Range, or DMPTR*). DEIS, Appendix D at 10. This, of course, begs the question as to why the Applicant is including as an alternative a site that could never be

used even if it determined that the site would have fewer environmental impacts. Alternative COA 3 is not a practicable alternative at all.

(1) Applicants Response: Transforming the existing MPRC was an option legitimately considered as a practical alternative but rejected due to current and expected military operations and training demands. Transforming the existing MPRC and other operational ranges will remain a consideration on future range projects as the types of military training and weapon systems evolve over time and possibly render older ranges obsolete. An example of this is the COA 1 for the DMPTR, which involves the transformation of another existing range, Red Cloud Foxtrot. In siting the DPMTR over top of an existing range, we are attempting to minimize and avoid the wetland impacts that would be associated with constructing the DPMTR elsewhere on Fort Stewart.

(2) USACE Position: Given the amount of development on the base as a whole, the re-use of an existing range should be considered as a potential alternative. The elimination of alternatives as not being practicable is a standard part of the Section 404(b)(1) Guidelines.

b. Issue 2: The other alternative which the Applicant examined yielded wetlands impacts of 240 acres. It is difficult to accept that there were no other practicable alternatives at Fort Stewart for this proposed range. Two-hundred forty acres is more than the combined wetlands impacts of all four of the proposed ranges.

(1) Applicants Response: Based on the Installation's location in a relatively flat coastal plain and the location of pre-existing military training ranges and facilities on high ground, impacts to 240 acres of wetlands to build a new 995 acre range is not beyond the realm of reasonable consideration as a viable alternative. The fact that wetland impacts in the preferred alternative are less than five percent of the overall range size demonstrates the Installation's efforts to avoid and minimize wetland impacts associated with the siting of new military ranges and training facilities. Army Installations, including Fort Stewart, must maintain their training lands to fully sustain mission requirements for national security. The way the Army does this is through its master planning process. It is important to note that the Installation's planning efforts to minimize wetland impacts begins with attempts to select a site with the least amount of wetlands. At this point in the planning process, the range design is limited to placement on site of a footprint of the proposed range. This footprint shows the maximum number

of wetland impacts and that is why we state "up to" so many acres; however, once a final site is selected, further attempts are made to avoid and minimize negative impacts to wetlands inside the range footprint through the range design process.

The final range design cannot be prepared prior to a site being selected. Also, despite Fort Stewart's large size, much of its lands are already committed to other training, recreational, and environmental activities. Maneuver and dismounted maneuver training areas occupy large portions of the Installation, where the integration of large firing ranges is not suitable. The west side of the Installation is devoted to maneuver training and, in its entirety, is necessary to meet Brigade mission training requirements. Maneuver training is necessary in upland areas to reduce wetland impacts resulting from heavy wheeled and tracked military vehicles, as well as to avoid vehicles from getting stuck in wet areas. The southeast side of the Installation is devoted to dismounted maneuver training (i.e. training on foot) and also contains a wooded recreational area for campers. More than 100,000 acres are devoted to the restoration and management of environmentally sensitive areas, such as habitat for threatened and endangered species (including the red-cockaded woodpecker (RCW) and gopher tortoise) and wetlands.

During the planning process for the FY13 DMPTR, which Fort Stewart initiated in 2006, the Installation developed a total of eight siting alternatives. This process allowed both operational and environmental aspects, including impacts to wetlands, to be thoroughly analyzed in a collective manner by members of the Installation's Environmental Division, Range Control Division, and Master Planning Division. As the analysis progressed, these siting alternatives were ranked using screening criteria, as discussed in Chapter 2, *Description of the Proposed Action and Alternatives*, of the FEIS. Minimization of environmental impacts, including wetlands, was a factor in which alternatives were considered viable and which were not. One DMPTR discounted alternative, not discussed in the FEIS, contained 673 acres of wetlands impact. Another site, also not considered any further, contained 313 acres of wetland impact and would have resulted in the elimination of 683 acres of RCW habitat (compared to an RCW habitat loss of 22.4 acres and 31 acres as a result of Alternatives B and C, respectively). Even though these eliminated sites were operationally viable, they were removed from consideration after environmental impacts were determined to be significant.

(2) <u>USACE Position</u>: There are variety of safety, noise, and other constraints that limit where a live fire range could be located on Fort Stewart. The Army is the "expert"

for siting ranges and conducted an intensive alternatives analysis for locating this, and the other three range projects; to avoid wetland impacts, while meeting other site constraints. The Section 404(b)(1) analysis to be prepared for this action will fully address this issue.

c. Issue 3: Multi Purpose Machine Gun Range (MPMGR). As an alternative for this range, the Applicant proposed course of action (COA) 5 which would have yielded wetlands impacts of less than 9 acres had it been chosen as the preferred alternative. However, the Applicant eliminated this alternative because it emerged as the preferred alternative for DMPTR. As such, COA 5 should not be discussed as a viable alternative for the MPMGR.

(1) Applicants Response: As a large military training and deployment complex, Fort Stewart must examine and analyze the cumulative effects of all its proposed ranges within its training platform as constrained by the Installation borders, adjacent and associated training facilities, and surface danger zones relative to one another. This analysis is in addition to examining other resources, such as wetlands, to optimize training while minimizing the overall impact to our environment. The decisions made on the siting of each range and what are practical alternatives are inherently intertwined and interdependent. This may not have been reflected well in Section 404 permit applications, but is more fully explained in Section 6.4.1.1 of the FEIS. The possibility remains that the MPMGR could be selected to occupy that site currently under consideration for the DMPTR if the DMPTR is ultimately selected to occupy another site.

Also, many other impacts, in addition to wetland impacts, are examined and analyzed in the siting of new ranges and training facilities, including other environmental factors (such as threatened and endangered species) and non-environmental factors (such as the impact the site has on the ability to conduct timely and realistic military training based on current threats to our nation's armed forces when engaged in combat or peace keeping operations overseas). Both the MPMGR and DMPTR were approved for funding, and as has been noted, COA 2 for the DMPTR would have carried a level of wetland impact even greater than the current impacts from both the MPMGR and the DMPTR. Given the many constraints (see Appendix D for siting criteria) at play in siting both ranges, the preferred COAs for the two ranges were seen as a necessary compromise for ensuring all needed ranges are built and military training requirements met.

(2) USACE Position: See discussion for SELC issue 2 above.

d. Issue 4: Notwithstanding the above, the Applicant needs to more adequately explain why it did not select COA 5 as the preferred alternative for MPMGR considering it would have reduced the wetlands impacts from 116.7 acres down to 9 acres.

(1) Applicants Response: Unfortunately, it would not be possible to ignore the fact that the site was already selected as the preferred site for the DMPTR, as suggested. Two independently proposed ranges cannot have the same preferred site. The Installation agrees that nine acres of impact for a 250-acre range is far more desirable than 116.7 acres of wetland impacts (which we now have down to 103.3 acres); however, wetlands impacts for this specific range were only one factor examined and analyzed in selecting this site as the preferred alternative. Selection of this site as the preferred alternative helps the Installation's ability to avoid and minimize the overall and cumulative impacts to all wetlands associated with planned or reasonably anticipated range construction, as reflected in Sections 4.3.2, 5.3.3.2, and 6.4.1 of the FEIS.

(2) USACE Position: See discussion for SELC issue 2 above.

e. Issue 5: Qualification Training Range (QTR). For this proposed range, the Applicant discusses but then rules out COA 3, which would have less wetlands impacts than the Preferred Alternative B. The Applicant rules out this alternative site because it is the proposed location for a future Modified Record Fire (MRF) range, which is not before the Corps at this time. Again, given the significant size of Fort Stewart, alternatives for one range should not be eliminated for future potential ranges, or, such a site should never be discussed as an alternative. The Applicant is required under the Section 404(b)(1) guidelines to indentify "practicable alternatives," not alternatives that could never be chosen regardless of how favorable they might be from an environmental standpoint.

(1) Applicants Response: Again, as a large military training and deployment complex, Fort Stewart must examine and analyze the cumulative effects of all its proposed ranges within its training platform as constrained by the Installation borders, adjacent and associated training facilities, and surface danger zones relative to one another. This analysis is in addition to examining other resources, such as wetlands, to optimize training while minimizing the overall impact to our environment. The decisions made on the siting of each range and what are practical alternatives are inherently

intertwined and interdependent. This may not have been reflected well in Section 404 permit applications; but is more fully explained in the FEIS. . One reason the COA 3 was deemed unsuitable was the fact the site is currently an operational range that is projected for reuse or transformation as a future MRF range. While Fort Stewart has a large land mass, much of its land mass is not environmentally or operationally suitable for range construction or for a number of considerations. Although significant, wetland impacts are only one of several significant factors considered when examining the suitability for siting of a range. The remaining lands that are suitable for future range construction are limited because the best locations are currently being used to capacity as military ranges or training areas. The Installation contains many sensitive resources, such as wetlands and protected species habitat, which limit the locations suitable for constructing new military training ranges that are capable of maximizing military training while minimizing environmental impacts. Because of the operational impacts examined and analyzed when siting ranges, and because the Installation was able to minimize impacts and mitigate those that did occur, the decision was made to retain the COA 3 site for a future project. The alternative was practicable but was not chosen in this instance.

(2) USACE Position: See discussion for SELC issue 2 above.

f. Issue 6: Inadequate Mitigation. Ogeechee Riverkeeper (ORK) is concerned with several flaws in the Application's proposed mitigation measures. Considering the Project's significant destruction and alteration of wetlands, it is imperative that the value and functions of wetlands on Fort Stewart are mitigated. ORK shares the concerns expressed by the Environmental Protection Agency (EPA) in its comments on the Draft Environmental Impact Statement dated May 14, 2010. First, the Applicant's usage of the Savannah District's Standard Operating Procedure (SOP) for calculation of mitigation credits is inconsistent with the district's position that the SOP should not be applied to projects with large wetlands impacts. Given the Project's substantial wetlands impact of 190 acres, we urge the Corps to apply the SOP, but do so with a scaling factor to address the cumulative impact of the Project, an approach that is followed by the Charleston District. The Applicant's use of the SOP without a scaling factor will not successfully and adequately replace the lost functions and values of wetlands impacted by the Project.

(1) Applicants Response: The implementation of the actions proposed in the preferred alternative (Alternative B Sitings) has the potential to negatively impact up to 0.2% of the Installation’s nearly 91,000 acres of wetlands. More importantly, of the up to

0.2% of the Installation's wetlands being impacted, most of those impacts are not the result of adding fill to the wetlands, and as stated earlier, the Installation anticipates wetland impacts will be much less than projected through further avoidance and minimization incorporated during the design phases of each project after the site is selected. It is important to note, that despite the large amount of military training activity that occurs on Fort Stewart, because of the Installation's proactive efforts to avoid, enhance and mitigate wetlands, its wetlands remain of a high quality, retaining and transmitting large amounts of fresh water and providing habitat for countless local species.

While a scaling factor may be appropriate to use in many large scale projects where a great deal of fill is being introduced into the wetland system and where the projects require large amounts of impermeable surfaces, neither of these considerations constitute significant components of any of the projects under consideration in the FEIS. Of this filled acreage only a small amount will include the introduction of impermeable surfaces. The only impermeable surfaces will consist of the range operations area and cover only 2% of each project footprint. As noted above, while maximum projected "up to" amounts have been provided, most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement. This information is located in Section 4.3.2.2.

As a result, it is the Installation's position that use of any scaling factor is not necessary to compensate for the cumulative impacts associated with these types of projects and applying a scaling factor, as called for in the Charleston District's SOP, to these types of projects would appear to be arbitrary and capricious as it would not appear to be based on any sound engineering or hydrologic rational but would appear to be more punitive than compensatory in nature.

Moreover, the Installation always takes into account secondary wetland impacts. In reference to the MPMGR, which is the project that contains the majority of the 190 acres (now 179.03 acres) of wetlands to be potentially impacted, the Installation has evaluated potential secondary / cumulative impacts. In our planning process, as noted above, the Installation took a "worst case scenario" approach when determining how to compensate for the quantity of wetlands loss. The Installation is planning to off-set secondary / cumulative wetland effects from this range and has obtained an additional 287 mitigation credits from the Wilkinson-Oconee Bank. The Installation did account for the lost

functions and values impacted by the project with respect to direct and indirect impacts.

As noted in Sections 3.4.5 and 4.3.2 of the FEIS, the Savannah District is a cooperating agency to this EIS, and was consulted with regard to the factors noted above. Additionally, Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Having reviewed these documents and the associated 404(b)(1), the Savannah District did not suggest a need to utilize a scaling factor.

(2) <u>USACE Position</u>: The USACE does not require the usage of the Savannah District's Standard Operating Procedure (SOP) for calculation of mitigation credits for projects of this size. The USACE does not use any scaling factor in association with the USACE SOP. The present total proposed wetland impact for the four proposed ranges is 179.03 acres. As discussed by the applicant above, not all of these proposed impacts are for fill, but a certain percentage would involve mechanized land clearing impacts. Clearing wetlands of vegetation and maintaining them in scrub/shrub vegetation results in a change in function, but not a total loss in function. The mitigation credits proposed by Fort Stewart are assuming a total loss in function. The proposed mitigation plan is to purchase 1,391credits to compensate for a total of 179 acres of wetland impact for all four ranges. This is a credit to impact ratio of 7.8:1. On average, three credits are generated for each acre of wetland restoration at the Wilkinson/Oconee Mitigation Bank, where credits will be purchased for the FY11 ranges. Therefore, the effective mitigation ratio for the FY11 Multipurpose Machine Gun Range and FY11 Infantry Platoon Battle Course projects would be approximately 2.6:1 of wetland restoration. The Applicant has not ruled out other acceptable compensatory mitigation alternatives to mitigate wetlands impact (provided through mitigation banks or in-lieu fee programs) for the FY13 Digital Multipurpose Training Range and the FY13 Qualification Training Range. Therefore, it is the position of the USACE that the mitigation proposed for this DPMTR project would meet the requirements of the new mitigation rule.

g. <u>Issue 7</u>: Second, the Applicant's choice of the Wilkinson-Oconee Mitigation Bank conflicts with the policy and purpose of mitigation required by the CWA. Under the Corp’s regulation, the Applicant's "compensatory mitigation should be located within

the same watershed as the impact site ...." 33 C.F.R. § 332.3. The purpose of this rule is to preserve and maintain water resources within a watershed, and ensure that wetlands lost are compensated by wetlands with similar characteristics, values, and functions. The Application, however, proposes mitigation outside of Fort Stewart and in another watershed at the Wilkinson-Oconee Mitigation Bank. This choice not only conflicts with the Corps' policy but also ignores the available 160 credits contained in Fort Stewart's on-site mitigation bank. ORK believes that the Corps should require the Applicant's use of the on-site mitigation.

(1) Applicants Response: Mitigation credits generated from the on-Post compensatory mitigation bank are not being used because there are insufficient credits available to satisfy requirements associated with the projects and the Installation needs to retain the few credits remaining for potential use to compensate for last minute and unanticipated Congressional add-on projects that occur on the Installation on a not-infrequent basis. Regarding use of mitigation banks, the Compensatory Mitigation for Losses of Aquatic Resources Final Rule states, "In many cases, the environmentally preferable compensatory mitigation may be provided through mitigation banks or in-lieu fee programs because they usually involve consolidating compensatory mitigation projects where ecologically appropriate, consolidating resources, providing financial planning and scientific expertise (which often is not practical for permittee-responsible compensatory mitigation projects), reducing temporal losses of functions, and reducing uncertainty over project success." The rule then lists types of compensatory mitigation measures in order of preference. The rule states that "[in] general, the required compensatory mitigation should be located within the same watershed as the impact site." But mitigation bank credits may be used if the project is in the service area of the bank. Section 332.3 (b)(2) has a description of why mitigation bank credits are given in the regulation:

"Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger, more ecologically

valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable." Fort Stewart followed these requirements during the development of its mitigation plan.

Under the Savannah District's SOP, the Wilkinson-Oconee Bank is "grandfathered" as a pre-existing bank created prior to the Compensatory Mitigation Final Rule. As such, the Wilkinson-Oconee Bank is an acceptable mitigation alternative that is in full compliance with the policy and purpose of mitigation required by the CWA, the Savannah District SOP, and the Compensatory Mitigation Final Rule. Fort Stewart's use of the Wilkinson-Oconee Bank as mitigation for the proposed FY11 range projects was fully coordinated with the Savannah District, which was a cooperating agency on the EIS.

The wetlands in the Wilkinson-Oconee Bank are "in-kind" to the wetlands on Fort Stewart. Consistent with the fact that both areas are on Georgia's Coastal Plain, wetlands within the Wilkinson-Oconee are essentially identical to those slated for impact by the proposed Fort Stewart range projects. Surveys of the proposed range sites by Fort Stewart determined that dominant vegetation communities consist of plants typical of wetlands in the Coastal Plain: mixtures of pond pine (Pinus serotina), pond cypress (*Taxodium ascendens*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), American hornbeam (*Carpinus caroliniana*), Highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occur with varying frequency depending on the landform and hydrology of particular areas, and essentially identical communities with similar distribution are found in the Wilkinson-Oconee's Mitigaiton Bank. Animal communities also supported by these areas are: wading birds, such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea Herodias*); amphibians, such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*); and mammals, such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites, and have been similarly reported in the Wilkinson-Oconee area.

Soil types were also consistent between the two areas. Hydric sand-loam mixtures of the Ellabelle, Bibb, Pelham, and Leefield types predominated in the proposed project areas. Analyses of Natural Resources Conservation Service profiles show these to be comparable to the Chastain and Congaree soils which cover the Wilkinson-Oconee area. All soils are on the National Hydric Soils list. Although the area of the Coastal Plain in which the Wilkinson-Oconee area is situated features more relief than that of Fort Stewart, the specific area of the restoration is flatter than the surrounding general topography, resulting in a similar hydrologic profile to Fort Stewart. The bottomland hardwood wetland systems found at both locations share the typical functions of holding temporary storage surface water, maintenance of characteristic subsurface hydrology, removal and sequestration of elements, retention of particulates, export of organic carbon, maintenance of characteristic plant community, and habitat for wildlife. Based on this comparison, despite the distance between the two areas, wetlands on Fort Stewart and at the Wilkinson-Oconee restoration area are very similar and, therefore, their use for mitigation fully supports the requirement for "no net loss". Text reflecting this information was incorporated into Section 6.4.1.1 of the FEIS.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. At the time of the pre-application meeting, the USACE agreed to allow the applicant to purchase credits from the secondary mitigation zone of the Wilkinson-Oconee Bank, which was the only bank with available credits. The agreement was made with the applicant in order to allow them time to procure funds necessary to provide mitigation when needed. The on-base Pond Four Mitigation Bank will be used to mitigate smaller on-post projects in the future that would likely be on a short time line for planning, permitting and construction. The Army procurement process takes too long to allow for the purchase of mitigation credits for these small, short-time-line projects. Therefore, the USACE agrees with the applicant to save Pond Four credits for these future small projects.

h. Issue 8: Before seeking compensatory mitigation in a different watershed, the Applicant should explore the use of existing and new mitigation banks in Ogeechee River Watershed. According to the DEIS's evaluation of mitigation banks in 2009, the Ogeechee River/Margin Bay and Black Creek Banks may now have available credits. DEIS at 6-8. Also, given the significant amount of wetlands within the boundaries of

Fort Stewart as well as Fort Stewart's experience in the creation of mitigation banks, the Corps should require the Applicant to take a hard look at a potential onsite mitigation bank that would ensure the compensation of the wetlands' lost values and functions.

(1) Applicants Response: Existing and new mitigation banks within this watershed were not available at the time Fort Stewart was required to begin planning for the required wetlands credit acquisition for its FY 2011 range projects with known and/or anticipated wetlands impacts (see answer to Issue #9, below, for additional details). On-site wetlands mitigation was not a viable option because, as discussed in Section 5.3.3.2 of the FEIS, although Fort Stewart has an existing mitigation bank and an on-site wetlands restoration project, it is running out of new places where additional on-site mitigation can be conducted. If credits are available in the primary service area in the future, however, then Fort Stewart will work to try and obtain these credits, in accordance with the Compensatory Mitigation Rule For Losses of Aquatic Resources (33 CFR 332) and the Federal Acquisition Regulation. For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs).

After exploring and selecting reasonable site alternatives for the proposed FY11-FY14 range projects, the Installation determined that the last remaining on-site mitigation bank (Pond 4) could not support the wetland mitigation requirements for these facilities and sustain itself for mitigation of proposed and future garrison construction, and other unplanned projects that arise out of mission changes. The remaining acres within the Installation Wetland Bank allows Command to respond to emergency range training requirements which surface from “In Theater” conditions and scenarios, or award Congressional garrison or training additions that must be executed by Fort Stewart within one year or less. If Commanders did not have this flexibility, Installation projects with unavoidable wetland impacts would be cancelled or held up in significant delays awaiting Congressional funding to purchase “off-Post” wetland credits.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. The credits purchased were in the secondary service area of the Wilkinson-Oconee Bank which was the only bank with available credits. The on base Pond Four Mitigation Bank would not have enough acreage needed for these projects. Fort Stewart has conducted an in-depth

review of potential wetland mitigation sites on the base and is in the process of developing additional areas connected to the existing Pond Four Mitigation Bank; however, no additional mitigation is available at this time.

h. Issue 9: The Applicant's proposed mitigation plan is based on mitigation credits purchased a year ago from the Wilkinson-Oconee Bank which was the "only bank that provided an offer to the solicitation...." DEIS at 6-8. It is our understanding that Section 404 permit applicants are discouraged from procuring mitigation credits in advance of receiving a permit so that the Applicant is not limited in its mitigation options, such as the use of new mitigation banks. This reasoning is at play here. It has been a year since the Applicant solicited a mitigation contract and, according to the Applicant's DEIS mitigation bank table 6.1, at least two Ogeechee River Watershed banks may now have credits available.

(1) Applicants Response: The timeline associated with Congressional Budget approval and Federal Appropriation process for military construction requires advance planning to enable construction to be implemented in the timeframe appropriation was made. The timeline for planning and construction of these projects is quite early (two years out or more) and did not allow for a later solicitation. To secure the funds necessary to build a proposed range, Headquarters-Department of the Army (HQDA) requires the Installation to budget for wetland impacts that will be unavoidable at least two years prior to the proposed project's anticipated contract award date. If an Installation fails to provide this to HQDA within the given timeline, the project is not funded. In the past, Fort Stewart has been able to mitigate using its on-Post wetland mitigation bank; however, as mentioned above, the on-Post bank no longer has an adequate amount of credits available to support these ranges while also meeting the requirements of the Installation's "In-Theater" mission requirements. The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR. Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Section 6.4.1.1 of the FEIS has been revised to clearly explain that a mitigation decision has not yet been made for the FY13 QTR and the FY13 DMPTR.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the

Wilkinson-Oconee Bank was an acceptable mitigation alternative. The USACE recognized the time restraints associated with the proposed projects and the military's appropriation and allocation of funds needed for potential wetland impacts and agreed to the use of the Wilkinson-Oconee Bank for these projects. Any future projects mitigation requirements would fall within the guidelines and mitigation availability in place at that time.

i. Issue 10: Furthermore, we share EPA's concerns that the Applicant is not sufficiently mitigating impacts on streams. It is our understanding that Fort Stewart's projects in the past have significantly affected streams that were not mitigated. ORK urges the Corps to ensure that stream impacts are assessed separately from wetlands impacts and that the loss of streams is compensated appropriately. Overall, ORK is concerned that the Applicant's proposed mitigation plan simply does not include adequate compensation for Fort Stewart's wetlands and streams that will be significantly impacted by the Project.

(1) Applicants Response: No streams will be lost as a result of the proposed project. The footprints of the MPMGR and IPBC on the 7.5-minute USGS topographic quads show "blue line" streams in the areas; however, a site visit by Fort Stewart and the Georgia Environmental Protection Division (GA EPD) on January 20, 2010, found no streams. The Savannah District also did not identify any streams within the range footprints. This information was added to Section 4.3.1, of the FEIS.

Over the years, Fort Stewart has worked diligently to mitigate impacts – direct and indirect, as well as cumulative – to the Installation's streams, as well as wetlands. During the development of the Installation's wetland bank, for example, thousands of feet of Canoochee Creek and Strum Bay were restored without being credited to the Installation's mitigation bank. The Installation takes pride in that fact and welcomes working with ORK and other local environmental stakeholders on future projects.

(2) USACE Position: The USACE has completed an expanded preliminary jurisdictional determination for the project site. This determination verified there are no jurisdictional streams located on the project site.

j. Issue 11: Failure to Minimize Impacts to Marine Resources. Section 404(b)(1) guidelines prohibit issuance of a permit where "[t]he proposed discharge does not include

all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem." 40 C.F.R. § 230.12(a)(3)(iii) (emphasis added). None of the information that we have reviewed demonstrates that the Applicant has tried to adequately minimize the impacts of the Project. The Applicant repeatedly contends that because it is utilizing existing range footprints the Project will "avoid and minimize impacts to more pristine and un-fragmented wetlands systems" on Fort Stewart. See e.g. Public Notice at 3. While ORK appreciates the Applicant's utilization of existing ranges for the Project, this reuse of range areas does not ensure minimization of harm to aquatic ecosystems or satisfy the regulation's mandate that the Project includes "all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem." 40 C.F.R. § 230. 12(a)(3)(iii).

(1) Applicants Response: In addition to avoiding and minimizing impacts to more pristine and un-fragmented wetlands systems, as noted in the comment, Fort Stewart consistently seeks to minimize and avoid wetland impacts at each stage of the design process. It is also important to note that the proposed ranges would be constructed on existing ranges that are operational and already cleared of vegetation. First, much of the avoidance and minimization process takes place before actual site selection. (See response to Issue #2.) Training ranges of this kind have fairly specific requirements and it is not always possible to build them without impacting every wetland in the footprint; however, site designers may alter certain aspects in response to environmental concerns during various stages of the design process (10%, 35%, 60%, 90%, and 100% stages of design completion). This is easiest if they can do so while still meeting the operational and training requirements of the range. For example, the currently on-going design process reduced the wetland impacts from the IPBC to a third of what they were at the time of writing the DEIS. Impacts from the MPMGR were also slightly reduced during that time and several proposed range projects were sited without wetland impacts of any kind. It is hoped that impacts from the QTR and DMPTR may be reduced, but as they are not yet in the design process, this cannot be precisely determined.

To ensure compliance with the Georgia (GA) Erosion and Sedimentation Control Act (ESCA) and the CWA on existing and future training ranges, Fort Stewart mandates full utilization of Timber Harvest best management practices (BMPs), National Pollutant Discharge Elimination System (NPDES) permit requirements, site-specific Erosion and Sedimentation Pollution Control Plans (ESPCPs), and pre- and post-construction BMPs to reduce the potential adverse impacts to water bodies, such as streams. The projects discussed in the JPN and FEIS have not undergone complete design. During this process,

however, Fort Stewart stormwater specialists review ESPCPs for compliance with the GA ESCA and the CWA. The Installation also utilizes the Natural Resources Conservation Service (NRCS) to provide technical expertise during preparation of ESPCPs prior to Fort Stewart providing construction approval. Fort Stewart stormwater compliance assessors and NRCS consistently inspect and monitor on-going construction actions. They will also do this during the construction of these proposed projects to ensure adherence to associated ESPCPs. Fort Stewart inspectors also routinely inspect tank trails, range access roads, range course roads, and dirt roads/trails to see if any damage is occurring (such as hardened tank trails or water crossings need repairs, to prevent sedimentation of adjacent streams).

(2) USACE Position: The USACE is preparing an analysis of the proposed project pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for this proposed project. This analysis will document that all requirements of the Guidelines have been met.

k. Issue 12: The Applicant-specifically, in Appendix D to the DEIS, fails to adequately describe measures intended to minimize impacts besides asserting that the ranges will be placed in existing disturbed areas. The proposed plans for MPMGR and QTR consist of wetlands impacts of 116.7 acres and 26.7 acres, respectively. Contrary to the Applicant's assertion that these proposed impacts are not extensive, the two ranges impact all wetlands within MPMGR and QTR areas. Thus, when all wetlands in each project area are destroyed or altered, the Applicant has failed to demonstrate that it has adequately minimized impacts to the aquatic ecosystem. The Applicant's failure to offer measures to minimize impacts to wetlands and streams violates the Section 404(b)(1) guidelines and the CWA. ORK urges the Corps to require the Applicant to set forth specific measures intended to minimize wetlands impacts on each of the four proposed ranges.

(1) Applicants Response: As noted in previous response, Fort Stewart attempts to avoid and minimize wetland impacts throughout the siting and design process. The most substantial avoidance and minimization occurs during the siting process as part of the site alternatives to carry forward for detailed analysis. Please note that, at the initial siting phase, the amount of wetland acres impacted attributed to each range is simply a total of

all wetland acres that *would be located within the range footprint that could potentially be impacted*, and it is likely not *all of the wetlands within the footprint will be impacted by the project because avoiding and minimizing negative impacts wetland are carried forward as a consideration into the actual range design process after the site is selected*. Efforts are made to reduce these impacts as the design progresses and, it is anticipated that, as design proceeds, additional wetlands avoidance and minimization of effect will be achieved. Again as an example, the currently on-going design process for the IPBC range has reduced the wetland impacts to a third of what they were at the time of writing the DEIS. Design efforts for the MPMGR have produced similar results, as well. Furthermore, little-to-no impervious surfaces will exist on these ranges, so runoff will not increase appreciably. The primary areas of "hardened surfaces" will consist of concrete turning pads, hardened stream crossings, etc., but not hardened roads and/or completely paved areas. The range surfaces will still be permeable, and, after construction, will acquire a covering of grasses and light herbaceous vegetation. Furthermore, wildlife may still traverse the ranges and graze during periods (sometimes weeks or more) the ranges are not in use.

In regard to the general issues of siting ranges and orienting them to avoid wetlands, further mention must be made of the Surface Danger Zone, or SDZ. Every range has an SDZ, an area within which people, property, and wildlife are in danger of being struck by projectiles during live fire exercises. Because of this danger, safety of Fort Stewart personnel, the public, and wildlife is a primary consideration in range siting. As previously noted, an SDZ may cover hundreds or even thousands of acres, and ranges must be sited to ensure areas of habitation, daily operations, traffic, and environmental sensitivity do not fall within them. A further limitation to siting is the fact that Fort Stewart is essentially cut into quarters by two major Georgia highways conveying regular civilian traffic. Injury or loss of human life during live fire exercises due to an improperly placed SDZ would be unacceptable to any party. Therefore, all organizations involved in siting ranges are forced to site ranges and their attendant SDZs very carefully. Efforts are made to ensure SDZs overlap. This maximizes land use and minimizes areas impacted by live fire; in part this is itself an environmental consideration as vegetation and animal populations may suffer losses from carelessly directed live fire.

(2) <u>USACE Position</u>: The USACE is preparing an analysis of the proposed project pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be

completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for this proposed project. This analysis will document that all requirements of the Guidelines have been met.

l. Issue 13: Deposition of Munitions. Finally, to our knowledge the Applicant fails to discuss the impact to water quality of any munitions landing in any waters of the United States on the proposed ranges. Under the Section 404(b)(1) guidelines, the Corps has an independent duty to evaluate water quality impacts before it issues a permit. The deposition of the munitions in such waters will be an indirect impact of the proposed Project.

(1) Applicants Response: The Military Munitions Rule states that used or fired munitions are considered a solid waste only when they are removed from their original landing spot (www.epa.gov/epaoswer/hazwaste/military/index.htm). Therefore, since the proposed ranges will utilize existing impact areas and the munitions will be used for their intended purposes and will be left where they land, the munitions are not considered solid waste. The best practices to minimize the impact of lead on the environment are stormwater and erosion controls, vegetation management, soil amendments, bullet traps, and soil pH modifiers which are utilized.

(2) USACE Position: A certain percentage of the munitions that are used or fired on this range, and the other three ranges under review, would likely land in waters of the United States. The USACE would assume that most of this exploded ordinance would be comprised of lead, copper, zinc and other inert metals. Fragments of inert metal would not dissolve in water or otherwise become bio-available. Therefore, there would be a very low probability of munitions resulting in a more than minimal impact on water quality. The Georgia Environmental Protection Agency is reviewing the proposed project under Section 402 of the Clean Water Act, for compliance with the state's Water Quality Certification program. Prior to the USACE issuing a final permit for this proposal, the Georgia EPD must first issue Water Quality Certification. With issuance of Water Quality Certification, Georgia EPD would confirm that the proposed project would meet all applicable state standards.

PART III - ALTERNATIVES/SECTION 404(b)(1) ANALYSIS

A. ALTERNATIVES:

1. No Action: The no action alternative is one in which the proposed DMPTR facility would not be built on Fort Stewart. Without this range, the units that are stationed on or habitually train on the Installation would not be able to train critical, individual crew live-fire and command and control tasks in a digital mode. This would force units to train critical tasks in a degraded mode and therefore, resulting in a decrease in the readiness posture and overall deployability of a unit. The Army strategy is to train individual crews on a DMPTR and collective training tasks (section and platoon level gunnery) on a Digital Multi-purpose Range Complex (DMPRC). The Installation has a DMPRC that is currently being constructed to train tank and Bradley crews in collective gunnery skills (section and platoon level) in a digital environment. The DMPRC, however, is not capable of supporting the training through-put of the units that train on the installation for both individual crew qualification and collective (squad and platoon level) training. It would take 522 range days (each day the range is used is considered one range day) a year to train all the individual and collective live-fire tasks on the DMPRC for the 3 Heavy Brigade Combat Teams (BCTs) on the Installation. The 522 range days includes maintenance days on the range where targets, target mechanisms, and other sensitive equipment is maintained by range operations personnel. The National Guard units that train on the installation would cause the number of days to exceed 522 range days a year. The DMPRC cannot, therefore, be used to support both the individual live-fire training requirements and the annual collective live-fire training requirements. Without the DMPTR, the individual tank and Bradley crews would not be trained in the individual crew live-fire skills needed prior to moving into collective gunnery training skills.

2. Off-Post Locations: Consideration was given to siting the DMPTR in an Off-Post location. Duplicating the infrastructure at a location Off-Post would incur considerable costs beyond the capability of the applicant's budget constraints. The DMPTR would at a minimum require a large tract of land in an appropriate shape to co-locate the surface danger zones (SDZ) and associated facilities (see further discussion below). Estimates and surveys have shown to acquire such a track of land would require an Environmental Impact Statement. An Off-Post facility would be difficult to locate and still meet the Proximity requirements, especially given the logistics, cost, and scheduling required. Additionally, there are no other Public Lands available nearby that would be compatible with the DMPTR training requirements.

3. On-Post Location: The proposed project is for the construction of a DMPTR that utilizes existing SDZs, does not isolate useful maneuver terrain, cut off impact areas, create a new

impact area, or make Unexploded Ordnance (UXO) clearance operations difficult, while avoiding impacts to wetlands. The DMPTR is a large caliber range (utilizing ammunition cartridges with a bullet diameter, or caliber, of greater than 0.75 inches) is used to meet critical training needs for both active and reserve component units that train on Fort Stewart. The DMPTR is necessary to support the crew qualification tasks of M1A1 tank crews, M2 and M3 Bradley vehicle crews, and Stryker vehicle crews. This range is used to train and evaluate vehicle crews on the skills necessary to detect, identify, and engage an enemy doctrinal tactical array of stationary and moving infantry and armor targets. The range can also be used to train weapons crews operating in the same tasks. In addition to live-fire, this range can also be used for training with sub-caliber and/or laser training devices.

The range would consist of a standard one lane DMPTR with four roads with midpoint cross over capability and five battle positions per road. The DMPTR contains 105 SITs, 35 SATs, six MATs, six MITs, four urban target facades, five firing positions per road, one Range Operations Control Area facility, one AAR facility, an air-vault latrine facility, ammo breakdown area, ops storage building, instrumentation loading dock, general instruction building, and surfaced staging area.

The applicant identified <u>three</u> potential DMPTR sites located within the Fort Stewart reservation. Each of these sites contains the area needed to support the range and accompanying SDZ. The three sites, which are discussed in more detail below, were identified and evaluated using the following criteria:

1. Allow Anti-Terrorism and Force Protection. The site must be able to accommodate appropriate anti-terrorism measures and standoff distances.

2. Compatibility with Wildfire and Control (Prescribed) Burning Programs. The risk of wildfires is taken into consideration when siting projects. Areas to be avoided are those that are infrequently burned, because of safety concerns and for adherence to protected species habitat management plans include parcels near major highways (State and Interstate) and adjacent communities. Constructing facilities in locations that hinder Fort Stewart's prescribed burn program must be avoided.

3. Minimization of Environmental Impacts. Consideration of environmental impacts when siting projects include the following: avoid or minimize impacts to cultural and natural resources (such as wetlands and protected species); avoid direct impacts to creeks and

streams; limit expansion of noise cones into existing residential areas and off-post communities; minimize adverse air quality impacts; and limit new metal contamination in standing timber (ranges).

4. Further Sustainability Goals. The Army incorporates sustainability principals into the planning, development, and upgrade of its facilities. From the outset, site selection and design follow sustainability principals, starting with design "charrettes" to ensure stakeholder collaboration toward optimal design, fiscal constraints, local characteristics and constraints, environmental issues, and consideration of functional adjacencies/relationships and land use compatibility. Site selection is based on functional adjacencies/relationships and land use compatibility. Ensure development near Fort Stewart's Garrison/cantonment (living and working) areas flow well with existing infrastructure, protecting green fields and preserving habitat and natural resources. Minimize negative impacts on the site and on neighboring properties and structures; avoid or mitigate excessive noise, shading on green spaces, additional traffic, obscuring significant views, etc.

The Army Range Requirements Model (ARRM) is an Army-wide planning tool used by Army Headquarters to determine range requirements at each Army Installation. The ARRM provides an automated capability to take doctrinal requirements and accurately calculate live training throughput capacities and throughput requirements for each Installation. Ranges must be identified in the Installation's ARRM for it to receive Department of the Army (DA) funding. In addition to the four siting criteria listed above, which are applicable to all facilities at Fort Stewart, the MPMGR has been identified in the ARRM and was sited based the following Range-specific criteria:

1. Ability to Meet Training Requirements. There should be sufficient range capacity to ensure each unit meets its training requirements as set forth in the following: Army regulation (AR) 350-1, *Army Training and Leader Development*; Training Circular (TC) 7-9, *Infantry Live-Fire Training*; DA Pamphlet (PAM) 350-38, *Standards in Weapons Training*; TC 25-8, *Training Ranges*; the 3rd Infantry Division's Live Fire Guidance; and the unit's related Mission Essential Task List.

2. Range Design. Based on each proposed range's training purpose, each range must be of sufficient acreage to accommodate the SDZs for use of the specified munitions, as required by DA PAM 385-64, *Ammunition and Explosive Safety Standards*. The SDZ is

a temporary safety boundary that surrounds the firing range and associated impact area that provides a buffer to protect personnel from the non-dud producing rounds that may be ricocheted during operation of the range. It includes an ordnance dispersion area, ricochet area, and an added safety buffer zone. This area is closed to all unauthorized personnel during each training exercise on the range. In addition, each range must have an existing impact area sufficient to support live-fire munitions used at Fort Stewart and be configured (e.g., course and targets) in a manner lending itself to achieving offensive and defensive training objectives.

3. Proximity. Range assets must be available for access by all Fort Stewart-stationed units to meet their reoccurring training requirements and to achieve combat readiness status before they deploy. This means sufficient ranges must be available within a geographic distance that allows each unit to get equipment to and from range locations to complete essential tasks in a timely manner. The time and cost of transporting units to a training area must not interfere with the overall training levels for a unit. Each unit has a limited amount of time and cost resources to achieve training requirements. The time and cost of transport cannot be so excessive that it compromises the unit's ability to meet all mission essential tasks and readiness requirements. Quality of life may be affected if troops have to travel too far for training.

The Corps has performed an analysis of the three identified Courses of Action (COAs) and determined that COA 1 is the preferred alternative because the site minimizes both operation constraints and environmental impacts. A table is shown below for each proposed range, comparing each COA against the operational feasibility criteria is shown below. The overall screening criteria discussed in more detail below.

Summary of Screening Analysis for FY1 QTR				
Criteria	**No-Action**	**COA 1**	**COA 2**	**COA 3 (Eliminated)**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without	n/a	✔	✔	✔

infringing on adjacent training facilities or ranges?				
Has the range been sited to maximize use of the Installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	✔	✖
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	✔
Does this course of action avoid and minimize adverse environmental impacts?	✔	●	⊘	✔
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔	✔
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	✔
Does this course of action minimize construction costs for the range? [1]	✔	●	●	●
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Course of Action Feasibility	✖	●	⊘	✖

[1] *For this criterion, that may arise for mitigating potential environmental impacts. It represents only the relative cost of construction for each particular location.*

LEGEND:

✖ = Not Feasible – Unacceptable limitations
⊘ = Feasible – Moderate limitations and challenges
● = Feasible – Minor limitations and challenges
✔ = Feasible – No limitations or challenges
n/a = Not Applicable

The Directorate of Public Works (DPW) Environmental Division, working in conjunction with the Directorate of Plans, Training, Mobilization, and Security (DPTMS) Training Division, the DPW Fish & Wildlife Branch, the DPW Forestry Branch, and the DPW Master Planning Division were able to identify two separate locations on Fort Stewart for the placement of this DMPTR. Each of the four sites is discussed in more detail below:

a. **COA 1 is located in the Red Cloud Foxtrot, B-9 and B-10 Training Areas (TA)**

within Alternative B and is the preferred site.

Allow Anti-Terrorism and Force Protection. Appropriate anti-terrorism measures and standoff distances are met by siting DMPTR at COA 1.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the DMPTR at COA 1 would not create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities.

Minimization of Environmental Impacts. COA 1 would construct the DMPTR on the top of the existing RC-F range, avoiding significant impacts to previously unimpacted wetlands. This COA would allow 75 to 85 percent of the DMPTR's SDZ to overlap the SDZ of adjacent ranges, which would reduce environmental impacts and would keep timber metal contamination in this general location. The COA 1 site would impact approximately 43.6 acres of jurisdictional wetlands and would require wetland mitigation and 404 permitting. Since approximately 75 to 85 percent of this site falls within a previously disturbed site, this COA significantly reduced the potential for the finding sites of archeological significance. Direct impacts to the Strum Bay wetland restoration area would be avoided. A low-water-crossing will be constructed on an existing tank trail that crosses this Strum Bay wetland restoration area. Isolated wetlands will be completed avoided by the targets and will only be impacted by line-of-sight. After survey of the COA 1 site, it was determined that there are no historic properties within the proposed footprint and all sites were determined ineligible for the National Register of Historic Places (NRHP).

COA 1 would impact Red-cockaded Woodpecker (RCW) foraging habitat. The entire footprint lies within Eastern Indigo snake habitat. There have been seven sightings within the proposed project area. A portion of COA 1 (267.8 acres) lies within Gopher Tortoise habitat. Prior to construction, COA 1 would be surveyed for Gopher Tortoises and relocated to appropriate habitat. This action is likely to affect but not adversely affect the Eastern Indigo snake. A portion of COA 1 lies within frosted flatwoods salamander habitat (56 acres), but would not affect any known breeding ponds or their buffers. Formal consultation with the US Fish and Wildlife Service (USFWS) will be conducted for these impacts. However, it is anticipated that these impacts would not impede recovery of the Fort Stewart RCW or Salamander populations. Noise Zones II and III would not occur beyond the Installation boundary as a result of COA 1.

Further Sustainability Goals. As discussed above, COA 1 was sited to on top of the existing RC-F range to avoid development of an inappropriate site and reduce environmental impacts. COA 1 was selected based on compatibility with the adjacent land use.

Ability to Meet Training Requirements. COA 1 would be accessible to meet annual training requirements and to achieve combat readiness status before they deploy. The siting of the DMPTR at this location would prevent live fire rounds from crossing major roads and also prevent the SDZ from extending beyond the Installation's boundary. SDZ coordination would have to be conducted by Range Safety personnel during operation of the range. However, the SDZ conflict between other ranges was looked at closely and minimized to allow for complete use of adjacent ranges to the north and south. COA 1 would be available and would not interfere with the training requirements of other military units.

Range Design. COA 1 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use on Fort Stewart. COA 1 was configured to achieve offensive and defensive training objectives. This location does not constrain training within Fort Stewart. The COA 1 location does not impact existing maneuver areas, nor does it create a new contaminated impact area. Furthermore, the site does not isolate useful maneuver terrain, cut off impact areas, or make UXO clearance operations difficult. When the proposed range requires maintenance, the site should provide easy access once all safety requirements are conducted. It would not result in live fire rounds crossing state highways nor would it result in the SDZ extending beyond the Installation's boundary. The range is in close proximity to utilities, such as power and fiber optics cable parallel Georgia Highway 119.

Proximity. The time and cost of transporting units to COA 1 would not have a major impact on the overall training levels for a unit. COA 1 was sited within a geographic distance that allows each unit to deploy its Soldiers logistically and equipment to and from the DMPTR to complete essential life-fire tasks within established timeframes.

The DMPTR COA 1 site would be easily accessible to using units. The Installation considered the overall training requirements and the flow to and from ranges when determining this site location. The preferred DMPTR location is sited near an existing tank trail (FS 36) and a state highway which would allow easy transport of Soldiers & Armor vehicles to the range to maintain operational tempo and minimize operational constraints. Therefore, this site is carried forward as a viable COA, as the Installation's preferred DMPTR site.

Advantages/Disadvantages: Based upon the information gathered, COA 1 is the preferred alternative because does not impact existing maneuver areas, isolate useful maneuver terrain, cut off impact areas, or make UXO clearance operations difficult, while minimizing environmental impacts.

b. **COA 2 is located RC-F, B-9 and B-10 TAs in Alternative C.**

Allow Anti-Terrorism and Force Protection. Appropriate anti-terrorism measures and standoff distances are met by siting DMPTR at COA 2.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the DMPTR at COA 2 would not create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities.

Minimization of Environmental Impacts. Similar to COA 1, COA 2 would construct the DMPTR on the top of the existing RC-F range. Originally, COA 2 was preferred by DPTMS Training Division; however, the site contained approximately 240 acres of wetland that would be impacted as a result of this project. Therefore, the site was shifted northwest to minimize adverse impacts to wetland areas and this shift developed into COA 1, the Installation preferred site for the DMPTR. This still reduces new adverse environmental impacts, but not to the extent of COA 1. Impacts to threatened and endangered species would be similar to COA 1. After survey of the COA 2 site, it was determined that there are no historic properties within the proposed footprint and all sites were determined ineligible for the NRHP.

Further Sustainability Goals. As discussed above, COA 2 was sited to on top of the existing RC-F range to avoid development of an inappropriate site and for compatibility with the adjacent land use. However, the location of COA 2 would not reduce environmental impacts and does not meet the sustainability criteria.

Ability to Meet Training Requirements. COA 2 would be accessible to meet annual training requirements and to achieve combat readiness status before they deploy. The siting of the DMPTR at this location would prevent live fire rounds from crossing major roads and also prevent the SDZ from extending beyond the Installation's boundary. Unlike COA 1, COA 2 would also allow for down range maintenance and target repairs when surrounding ranges are in use. COA 2 would not result in cross fire beyond the down range tank trails and the associated

SDZ would overlap adjacent RC ranges, but with a smaller percentage (approximately 55 to 60 percent) than that of COA 1. SDZ coordination would still have to be conducted by Range Safety personnel during operation of the range. COA 2 would be available and would not interfere with the training requirements of other military units.

Range Design. COA 2 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use at Fort Stewart. COA 2 was configured to achieve offensive and defensive objectives. This location does not constrain training within Fort Stewart. The COA 2 location does not impact existing maneuver areas, nor does it create a new contaminated impact area. Furthermore, the site does not isolate useful maneuver terrain, cut off impact areas, or make clearance operations difficult. When the proposed range requires maintenance, the site should provide easy access once all safety requirements are conducted. The range is in close proximity to utilities, such as power and fiber optics cable parallel Georgia Highway 119.

Proximity. COA 2 would be accessible to meet annual training requirements and to achieve combat readiness status before they deploy. The time and cost of transporting units to COA 2 would not have a major impact on the overall training levels for a unit. COA 2 was sited within a geographic distance that allows each unit to deploy its Soldiers logistically and equipment to and from the DMPTR to complete essential life-fire tasks within established timeframes.

Like COA 1, the COA 2 site would be easily accessible to using units. The Installation considered the overall training requirements and the flow to and from ranges when determining this site location. COA 2 is sited near a state highway which would allow easy transport of Soldiers & Armor vehicles to the range to maintain operational tempo and minimize operational constraints.

Advantages/Disadvantages: Based upon the information gathered, construction at the COA 2 site in the B-9/B-10 Training Areas was initially preferred by the Fort Stewart DMPTR; however, construction would impact approximately 240 acres of wetlands, requiring extensive mitigation and permitting. Therefore, the DMPTR was shifted northwest to minimize adverse impacts to wetlands, as well as protected species habitat RCW, while maintaining operational constraints. This shifted alignment became COA 1, the Installation preferred site for the DMPTR. COA 2 is still viable however and is carried forward for analysis.

c. **COA 3 is located on the Multipurpse Range Complex (MPRC)**

Allow Anti-Terrorism and Force Protection. Appropriate anti-terrorism measures and standoff distances are met by siting DMPTR at COA 3.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the DMPTR at COA 3 would not create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities.

Minimization of Environmental Impacts. The placement of the DMPTR on top of the currently heavily utilized MPRC would result in minimal environmental issues. The MPRC is sufficient in width and length to place the entire DMPTR inside of the existing range without affecting previously undisturbed areas. Given the type of training which currently takes place at this facility there would be no new noise impacts or other new environmental constraints.

Further Sustainability Goals. As discussed above, COA 3 was sited to on top of the MPRC range to avoid development of an inappropriate site and to reduce environmental impacts.

Ability to Meet Training Requirements. COA 3 would be a substantial detriment to Soldier training, as this facility is critical in meeting the Mission Essential Task List (METL). Solders must obtain in order to be proficient in the weapons platform they must utilize in theatre. Therefore, construction on top of this existing range would remove it from the Installation's training cycle, where it is needed. Fort Stewart is currently constructing a Digital MPRC that will help alleviate throughput needs. This alternative was determined unfeasible.

Range Design. COA 3 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use at Fort Stewart. COA 3 was configured to achieve offensive and defensive objectives.

Proximity. COA 3 was sited within a geographic distance that allows each unit to deploy its Soldiers logistically and equipment to and from the DMPTR to complete essential life-fire tasks within established timeframes.

<u>Advantages/Disadvantages</u>: Given these considerations, the placement of the DMPTR within the existing MPRC footprint is an environmentally sound siting option; however, this siting would be a substantial detriment to Soldier training, as this facility is critical in meeting the METL.

Solders must obtain in order to be proficient in the weapons platform they must utilize in theatre. Therefore, construction on top of this existing range would remove it from the Installation's training cycle, where it is needed. Fort Stewart is currently constructing a Digital MPRC that will help alleviate throughput needs. This alternative was determined unfeasible.

B. AVOIDANCE:

1. Total wetland avoidance on-site is not possible based on the layout and size of range complexes. Also, the layout of adjacent wetland areas made total avoidance impossible. Any further reduction in proposed impacts would not meet the applicant's purpose and would not be practicable.

2. The applicant has not completed final site design for the proposed project. The standard site layout for this type of range would require the filling and/or mechanized clearing of all 43.6 acres of bottomland hardwood wetlands on the 981-acre project site. The applicant will likely be able to avoid some of the wetlands on the project site as final site design is completed for the project. However, for the purposes of this permit evaluation, the US Army Corps of Engineers (USACE) will assume that all 43.6 acres of wetlands on the proposed project site would be impacted. As an additional avoidance measure, the USACE would include the following special condition in any draft permit issued for this project:

> The site design for this project has not been finalized. Authorized wetland impacts are based on a standard range design. Prior to conducting any work in wetlands on this project site, the permittee shall submit final site development plans to the USACE for review and approval. It is anticipated that once final design is completed, there will be a minor reduction in the amount of wetland area that will be impacted by the project. This anticipated change in the footprint of authorized wetland impact is authorized under this permit and modification of the permit will not be required for this change in site design.

C. MINIMIZATION ALTERNATIVES:

1. Minimizing Wetland Footprint: As required by Section 404(b) 1 of the CWA, minimization of adverse impact to wetlands was documented within the footprint the project site, based on the current design configuration of the proposed project. As the project continues through the design process, to the point of final design, it is anticipated that there

will be the potential for avoiding impacts to some wetland areas. Side slopes of wetland fills will be at a 3:1 minimum, to avoid unnecessary impacts. Wetland boundaries and project limits will be clearly marked to prevent inadvertent impacts to adjacent wetland areas.

2. Erosion Control Techniques: The applicant has indicated that best management practices (BMPs) would be utilized while performing any construction activities on the subject property. In addition, the applicant has indicated that activities would be performed in a manner to minimize turbidity and/or erosion. Any permit that would be issued by the USACE would also include the following special condition, "All work conducted under this permit shall be located, outlined, designed, constructed and operated in accordance with the minimal requirements as contained in the Georgia Erosion and Sedimentation Control Act of 1975, as amended. Utilization of plans and specifications as contained in "Manual for Erosion and Sediment Control, (Latest Edition)," published by the Georgia Soil and Water Conservation Commission or their equivalent will aid in achieving compliance with the aforementioned minimal requirements."

D. COMPENSATORY MITIGATION: Fort Stewart determined that at least 336.79 credits are required to compensate for the proposed impacts. Fort Stewart will evaluate acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs) for the FY13 DMPTR. Similar to the process outlined in the Compensatory Mitigation Rule, the Installation's standard procurement processes conducts market research in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary and secondary service area mitigation credits. This process will be implemented when seeking mitigation options for ranges beyond FY11.

E. CONCLUSIONS: Based on the above, an off-post facility would be difficult to locate and still meet the proximity requirements, especially given the logistics, cost, and scheduling required. Also, duplicating the infrastructure at a location off-post would incur considerable costs beyond the capability of the applicant's budget constraints. The applicant provided an adequate analysis of on-post locations for sighting this range and mitigation, as well as three other proposed new ranges.

F. SECTION 404(b)(1) ANALYSIS: This project must be evaluated for compliance with the Section 404(b)(1) Guidelines (40 CFR Section 230). The goal of the 404(b)(1) Guidelines is "to restore and maintain the chemical, physical, and biological integrity of waters of the United States through the control of discharges of dredges or fill material." An expanded 404(b)(1) analysis will be conducted prior to making any permit decision.

PART IV - PUBLIC INTEREST REVIEW

A. ENVIRONMENTAL SETTING/EXISTING CONDITIONS: The DA owns and manages the area in which the proposed DMPTR is located. The preferred COA is located with Delta Small Arms Impact Area, specifically located to the west of the existing Garrison at Fort Stewart.

B. ENVIRONMENTAL IMPACTS: The Corp's Regulatory Program considers the full public interest, reflecting the protection and utilization of important resources. Table 3 is a summary of our public interest review for the proposed activity, which assesses the impacts of the proposed permit action on environmental and other public interest factors
(33 CFR 320.1(a)(1), 320.4 and 325.3(c)).

Table 3. Summary of Project Impacts

FACTORS	No Effect	Negligible	Undetermined	Beneficial Major/ Minor		Adverse Major/ Minor	
1. Economics/Social	X						
2. Education/Scientific	X						
3. Aesthetics	X						
4. Food-Fiber Production	X						
5. Historical/Architectural/ Archaeological	X						
6. Recreation	X						
7. Land Use	X						
8. Mineral Resources	X						
9. Soil Conservation							X
10. Water Supply Conservation	X						
11. Water Quality		X					
12. Air Quality		X					
13. Noise Levels							X
14. Public Safety		X					
15. Energy Needs							X
16. National Security	X						
17. Navigation	X						
18. Shoreline Erosion Accretion	X						
19. Flood Hazards	X						
20. Flood Plain	X						
21. Wetlands							X
22. Refuges	X						
23. Fish	X						
24. Wildlife			X				
25. Food Chain Organisms	X						
26. Shellfish Production	X						
27. Threatened and Endangered Species			X				
28. General Environmental Concerns							X
29. Property Ownership	X						
30. Mineral Needs	X						
31. Other	X						

C. DISCUSSION: We have evaluated the permit application regarding the need for the proposed activities, the practicability of project alternatives, and the beneficial and detrimental effects, including cumulative impacts. Complete descriptions of the 31 public interest factors can be found in the Range and Garrison Construction Environmental Impact Statement (RGCEIS) for Fort Stewart. Each public interest factor is referenced to specific sections within the EIS.

1. Economics/Social – The proposed project will have no effect to the local economy or local social environment. (RGCEIS Section 4.11 Social and Economics)

2. Education/Scientific – The proposed project will have no effect to educational or scientific resources. The project footprint is within an Army Installation artillery impact area. (RGCEIS Section 4.11 Social and Economics)

3. Aesthetics – The proposed project will have no effect to aesthetics. The project footprint is within an Army Installation artillery impact area and is off-limits to unauthorized personnel. (RGCEIS Section 4.7 Land Use)

4. Food-Fiber Production – The proposed project will have no effect to food or fiber production. The project site is within an existing artillery impact area. (RGCEIS Section 4.4.3 Forestry Management)

5. Historical/Architectural/Archaeological – The US Army, Fort Stewart is the lead federal agency for this proposed action. Impact analysis for historic properties follow guidelines set forth in Section 106 of the National Historic Preservation Act (NHPA) implementing regulations (36 CFR 800), Fort Stewart's Programmatic Agreement with the Georgia SHPO. Fort Stewart would complete required consultation and make any necessary Section 106 of the NHPA determination, if required, prior to any work occurring in waters of the US subject to the jurisdiction of the USACE on a project site where cultural resources have been identified. (RGCEIS Section 4.5 Cultural Resources)

6. Recreation – The proposed project will have no effect to recreational areas. The footprint is located with a land use designated for range and training lands. (RGCEIS Section 4.7 Land Use)

7. Land Use – The proposed project is compatible to the existing land use category of range and

training lands. Therefore, there will be no effect to land use. (RGCEIS Section 4.7 Land Use)

8. Mineral Resources – The proposed project is located within the confines of an Army Installation that is designated for Soldier training. There are no minerals mined at Fort Stewart. Therefore, there will be no effect to mineral resources at the project site. (RGCEIS Section 4.1 Geology and Soils)

9. Soil Conservation – The project will undergo tree removal and grubbing and grading during construction of the proposed range. However, standard erosion and sedimentation control measures will be implemented to prevent sedimentation from leaving the confines of the project site. Erosion and sedimentation control best management practices (BMPs) will also be implemented throughout the duration of the project and after construction to ensure stormwater leaving the range has been filtered before reaching nearby wetland areas. Furthermore, an erosion and sedimentation control plan will be prepared for this project. A National Pollution Discharge Elimination System (NPDES) permit will be obtained for this project. At a minimum, a Level 1A Erosion and Sedimentation (E&S) Control Certified or Subcontractor Awareness E&S trained individual is required to be on site during any land disturbance activity. Adverse impacts to soil are expected to be minor and temporary in nature until construction is completed. (RGCEIS Section 4.1 Geology and Soils)

10. Water Supply Conservation – The proposed project will not require use of the Installation's water supply. Therefore, water supply will have no effect. (RGCEIS Section 4.3 Water Quality and Resources)

11. Water Quality – During the construction phase of the proposed project, some wetland areas will be filled within the range footprint. All necessary permitting and mitigation will be conducted. See number 21, Wetlands, for additional information regarding impacts to wetland areas. Impacts to nearby surface water would likely not be impacted since necessary erosion and sedimentation control measures, as required by the Georgia Environmental Protection Division, will be implemented to prevent sedimentation from leaving the site. Turbidity samples will be taken during and after construction to ensure sedimentation in outfall areas do not increase from what the area currently experiences. Total Maximum Daily Load (TMDL) regulations require maintaining predevelopment time of concentration by strategically routing flows to maintain travel time, improve water quality, and to control the stormwater discharge. Flow calculations will also be conducted

during preparations of the erosion and sedimentation control plan to ensure concentrated stormwater runoff flows from peak rain events will not impact nearby water bodies. The proposed project footprint will be filled during construction activities; therefore, adverse impacts to groundwater are not anticipated. Fort Stewart is in consultation with the Georgia Environmental Protection Division regarding a water quality certification pursuant to Section 401 of the Clean Water Act. The USACE would include a copy of the 401 water quality certification with any permit issued. In addition, the special condition of any permit issued would require the permittee to adhere to the conditions of the 401 water quality certification. (RGCEIS Section 4.3 Water Quality and Resources)

12. Air Quality – Adverse impacts to air quality is not anticipated. Only minor and temporary amounts of dust generation during timber harvesting and construction are expected; however, no regulatory air quality thresholds would be exceeded. (RGCEIS Section 4.2 Air Quality)

13. Noise Levels – The projected operating environment would generate a Noise Zone II contour that extends slightly beyond the northern boundary into an undeveloped area. The projected operating environment under the proposed location would not generate a Noise Zone II contour that extends into the Fort Stewart housing area. The projected operating environment would not generate a Noise Zone III contour that extends beyond the boundary or into the Fort Stewart housing area. (RGCEIS Section 4.6 Noise)

14. Public Safety – During the timber harvest, prescribed industrial safety standards would be followed. No specific aspects of the proposed project would create any unique or extraordinary safety issues. The project location is outside of current explosive safety quantity distance clear zones and the inhabited building distance clear zones. An unexploded ordnance survey will be conducted prior to timber harvesting and construction activities. If necessary, an unexploded ordnance avoidance plan will be prepared. (RGCEIS Section 4.9 Safety)

15. Energy Needs - Within the area of potential effect, there are existing utilities into which new lines from the range can tie in, minimizing the potential ground disturbing activities associated with the establishment of all-new utility systems. This proposed project would also not result in a substantial increase in utility usage. Executive Order 13423 sets as a goal for all federal agencies the improvement of energy efficiency and the "reduc[tion] of greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal

year 2015, relative to the baseline to the agency's energy use in fiscal year 2003." The U.S. Army Energy Strategy for Installations (U.S. Army Energy Strategy for Installations, 8 July 2005, available at http://army-energy.hqda.pentagon.mil/docs/strategy.pdf), also contains strategies to reduce energy waste and improve efficiency. Taking these policies into account, this action does not represent a net incrementally addition to the global climate change problem. (RGCEIS Section 4.8 Infrastructure)

16. National Security – The proposed project will have no effect to national security. The requirement for this range has been validated by the Range and Training Land Program Development Plan prepared for Fort Stewart and the Forces Command Live Fire Training Investment Strategy. This project has been coordinated with the Installation physical security plan, and all physical security measures are included in the project. All required antiterrorism protection measures are included in the project, per DA PAM 190-51 (*Risk Analysis for Army Property*) and Training Manual 5-853-1 (*Security Engineering Project Development*). (RGCEIS Section 4.9 Safety)

17. Navigation – Navigable waters will not be impacted by this project. (RGCEIS Section 4.3 Water Quality and Resources)

18. Shoreline Erosion Accretion - The site is many miles from the coast and the project will not add to shoreline erosion accretion. (RGCEIS Section 4.1 Geology and Soils)

19. Flood Hazards – The site does not present an unusual flood hazard for this area (see below.) (RGCEIS Section 4.3 Water Quality and Resources)

20. Flood Plain – The site is not in a Federal Emergency Management Administration (FEMA) flood zone. (RGCEIS Section 4.3.1 Surface Water and Floodplains)

21. Wetlands – The project, as currently proposed, would impact 43.6 acres of bottomland hardwood wetlands, either through direct filling or by mechanized land clearing. However, the applicant has not completed final site design for the proposed project. The standard site layout for this type of range would require the filling and/or mechanized clearing of all 43.6 acres of bottomland hardwood wetlands on the 981-acre project site. The applicant will likely be able to avoid some of the wetlands on the project site as final site design is

completed for the project. However, for the purposes of this permit evaluation, the US Army Corps of Engineers (USACE) will assume that all 43.6 acres of wetlands on the proposed project site would be impacted. As an additional avoidance measure, the USACE would include the following special condition in any draft permit issued for this project: The site design for this project has not been finalized. Authorized wetland impacts are based on a standard range design. Prior to conducting any work in wetlands on this project site, the permittee shall submit final site development plans to the USACE for review and approval. It is anticipated that once final design is completed, there will be a minor reduction in the amount of wetland area that will be impacted by the project. This anticipated change in the footprint of authorized wetland impact is authorized under this permit and modification of the permit will not be required for this change in site design.

The present total proposed wetland impact for the four proposed ranges is 179.03 acres. As discussed by the applicant above, not all of these proposed impacts are for fill, but a certain percentage would involve mechanized land clearing impacts. Clearing wetlands of vegetation and maintaining them in scrub/shrub vegetation results in a change in function, but not a total loss in function. The mitigation credits proposed by Fort Stewart are assuming a total loss in function. The proposed mitigation plan is to purchase 1,391credits to compensate for a total of 179 acres of wetland impact for all four ranges. This is a credit to impact ratio of 7.8:1. On average, three credits are generated for each acre of wetland restoration at the Wilkinson/Oconee Mitigation Bank, where credits will be purchased for the FY11 ranges. Therefore, the effective mitigation ratio for the FY11 Multipurpose Machine Gun Range and FY11 Infantry Platoon Battle Course projects would be approximately 2.6:1 of wetland restoration. The Applicant has not ruled out other acceptable compensatory mitigation alternatives to mitigate wetlands impact (provided through mitigation banks or in-lieu fee programs) for the FY13 Digital Multipurpose Training Range and the FY13 Qualification Training Range. Therefore, it is the position of the USACE that the mitigation proposed for this DPMTR project would meet the requirements of the new mitigation rule.

22. Refuges - The site will not impact any areas specifically devoted to wildlife refuge. (RGCEIS Section 4.4 Biological Resources)

23. Fish – The site will not impact any fish species. The Canoochee and Ogeechee rivers are approximately 20 miles from the proposed project site. (RGCEIS Section 4.4 Biological Resources)

24. Wildlife – The site will impact RCW foraging habitat. The entire action area lies within Eastern Indigo snake habitat. There have been seven sightings within the proposed project area. A portion of this action area (267.8 acres) lies within Gopher Tortoise habitat. Prior to construction, area will be surveyed for Gopher Tortoises and relocated to appropriate habitat. This action is likely to affect but not adversely affect the Eastern Indigo snake. A portion of the proposed action area lies within frosted flatwoods salamander (FFS) habitat (56 acres). This proposed action will not affect any known FFS breeding ponds or their buffers. Formal consultation with the USFWS has been completed for these impacts. (RGCEIS Section 4.4 Biological Resources)

25. Food Chain Organisms – No specific or unique food chain organisms are known or suspected to exist on the site. (RGCEIS Section 4.4 Biological Resources)

26. Shellfish Production – The site is many miles from the coast and the project will not affect local shellfish production. (RGCEIS Section 4.4 Biological Resources)

27. Endangered Species – The US Army, Fort Stewart is the lead federal agency for this proposed action. The site will impact RCW foraging habitat. The entire action area lies within Eastern Indigo snake habitat. There have been seven sightings within the proposed project area. A portion of this action area (267.8 acres) lies within Gopher Tortoise habitat. Prior to construction, area will be surveyed for Gopher Tortoises and relocated to appropriate habitat. This action is likely to affect but not adversely affect the Eastern Indigo snake. A portion of the proposed action area lies within frosted FFS habitat (56 acres). This proposed action will not affect any known FFS breeding ponds or their buffers. Formal consultation with the USFWS has been completed for these impacts. Fort Stewart has completed required consultation and the USFWS has made necessary Section 7 of the Endangered Species Act determinations.

28. General Environmental Concerns – The project is expected to incur only the most minimal adverse impact to the local ecosystem. Sites are chosen to include the goal of avoiding and/or minimizing such impacts. Where possible and appropriate, impacts will be mitigated. Fort Stewart is generating an Environmental Impact Statement detailing these impacts.

29. Property Ownership – The property is owned by the United States Army for the primary purpose of military training. (RGCEIS Section 4.7 Land Use)

30. Mineral Needs – No particularly valuable or unique minerals are known or suspected to exist at the site. (RGCEIS Section 4.1 Geology and Soils)

31. Other – No notable environmental aspects not covered by the preceding will be impacted by this project.

D. US ARMY CORPS OF ENGINEERS' WETLAND POLICY: The proposed wetland alteration is necessary to realize the project's purpose and should result in minimal adverse environmental impacts. The benefits of the project would outweigh the minimal detrimental impacts. Therefore, the project is in accordance with US Army Corps of Engineers' Wetland Policy (33 CFR 320.4(b)).

E. TITLE III OF THE CIVIL RIGHTS ACT OF 1964 AND EXECUTIVE ORDER 12898: The proposed action would not directly, or through contractual or other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin, nor would it have a disproportionate effect on minority or low-income communities.

F. CUMULATIVE IMPACTS: The Council on Environmental Quality (CEQ) defines cumulative impacts as the "impact on the environment which results from the incremental impact of the action(s) when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

Geographic Scope/Region of Influence (ROI): the National Environmental Policy Act (NEPA) requires that the impacts of each proposed project be considered within the appropriate geographical area/region of influence. The geographic area/ROI for purposes of consideration of proposed projects within the boundaries of Fort Stewart are: the Altamaha watershed and United States Geological Service, Georgia Hydrologic Unit Code (HUC) 03070106 encompassing portions of Appling, Evans, Glynn, Jeff Davis, Long, McIntosh, Montgomery, Tattnall, Toombs, and Wayne County; the Lower Ogeechee River watershed HUC 03060202, encompassing portions of Bryan, Bulloch, Chatham, Effingham, Emanuel, Jenkins, and Screven Counties; the Little Ogeechee watershed HUC 03060204, encompassing portions of Bryan, Chatham, Effingham, Liberty, Long and McIntosh Counties; and the Canoochee Creek watershed HUC 03060203, encompassing portions of Bryan, Liberty, Evans, Tattnall, Candler, Emanuel, and Bulloch Counties. The Corps determined that actions taken in the "Fort Stewart Watersheds"

would be sufficiently similar in location, topography, watershed impacts, habitat types, etc., to be considered in a cumulative impacts assessment. To properly scope this analysis the Corps has identified target resources for evaluation based on public and agency comments. Target resources are important resources that could be cumulatively affected by activities in the identified scoping area.

The USACE identified the following target resources because of their scarcity and regional importance: (1) wetlands; (2) water quality; (3) aquatic species, and (4) mitigation. Below we have assessed the cumulative impacts of the proposed project on these target resources. In doing this, we considered the impacts of this project, past projects, as well as all reasonably foreseeable impacts in the above identified watersheds.

The proposed action, in addition to other projects in the geographic areas of consideration (i.e., HUC's 03070106, 03060202, 03060204, and 03060203), have the possibility to result in either negative or positive impacts in a cumulative manner. Cumulative impacts are most likely to occur when a relationship exists between a proposed action, or alternative, and other actions expected to occur in a similar location, time period, and/or involving similar actions, i.e. past, present, and reasonably foreseeable future actions.

There are numerous projects in the watersheds associated with Fort Stewart, which are part of typical urban activities/development. These projects can be categorized generally as construction, maintenance, or demolition. This analysis takes into account the proposed project/action along with the larger projects in the ROI.

1. Wetlands: The following table provides information on all wetland impacts permitted by the Savannah District between January 1, 1990, and July 6, 2005, and the acres of wetland mitigation required for these impacts. This information was generated by the Savannah District Regulatory Analysis and Management System (RAMS) database. There has undoubtedly been some additional loss of wetland during this time period from activities not regulated by the Corps, but no data exist on these losses.

Table 4. Wetland Impacts from January 1, 1990, through July 6, 2005, in the Counties Included in the Fort Stewart Watersheds

Wetland Acres Requested	Wetland Acres Permitted	Wetland Acres Mitigated

County	Acres			
Bryan	111509	38.15	41.81	236.29
Bulloch	81797	114.67	119.28	205.28
Chatham	162459	701.13	666.91	4298.24
Effingham	127318	175.13	205.08	633.59
Emanuel	42158	67.78	67.78	269.26
Jenkins	35292	55.74	55.74	230.22
Screven	85270	47.99	57.19	92.08
Liberty	139558	55.74	55.74	230.22
Long	93629	117.9	117.9	1343.68
McIntosh	149942	16.86	16.85	69.64
Appling	39963	34.02	34.02	70.39
Evans	12493	21.28	21.28	34.81
Glynn	134011	210.8	210.13	1496.65
Jeff Davis	23394	2.68	2.68	3.75
Montgomery	14426	8.78	8.78	6.96
Tattnall	33959	31.49	31.49	73.08
Toombs	21718	3.45	3.45	2.43
Wayne	99669	189.6	188.5	1499.45
Candler	17051	4.98	10.48	4.78
Emanuel	42158	67.78	67.78	269.26
TOTALS	1467774	1965.95	1982.87	11070.06

In summary, the Corps can document that in 1990 there were approximately 1,467,774 acres of wetlands in HUC's 03070106, 03060202, 03060204, and 03060203 within Bryan, Bulloch, Chatham, Effingham, Emanuel, Jenkins, Screven, Liberty, Long, McIntosh, Appling, Evans, Glynn, Jeff Davis, Montgomery, Tattnall, Toombs, Wayne, Candler and Emanuel Counties. By deducting 1,982.87acres of wetland impacts since 1990 (RAMS database), there are at least 1,465,792 acres of wetlands remaining in this area. This amounts to a loss of 0.2 percent of the wetlands in HUC's 03070106, 03060202, 03060204, and 03060203 since 1990. The largest percent loss by county would be Chatham County, where 0.4 % of the wetlands have been impacted since 1990. The Corps can also document that 11,070.06 acres of wetland mitigation were provided to offset the post 1990 wetland impacts in this area.

In addition to the impacts described above, Fort Stewart itself has experienced some wetland impacts associated with various projects since the close of the review period in 2005. Some major restoration projects, employed to mitigate wetland impacts, have also occurred within and after the review period, but have not been integrated into the data described above. The effects of

these projects are outlined in the table below.

Table 5. Fort Stewart Wetland Impacts Post-2005

	Wetland	Wetland	Wetland
	Acres	Acres	Acres
County	Requested	Permitted	Mitigated
Bryan	4.23	4.23	0
Liberty	214.77	214.77	3230
Long	0	0	0
Evans	0	0	0
Tattnall	0	0	0
TOTALS	219	219	3230

The following is a list of Fort Stewart projects authorized by the Corps within Fort Stewart watersheds outside the review period.

a. Department of the Army Permit 940000880 (modification), issued June 29, 1995, authorized the enhancement of approximately 1,300 acres of wetlands in the A11 training area of Fort Stewart, to mitigate for 2.1 acres of wetlands impacted by the earlier construction (under the same Permit number) of rail pass tracks in an adjacent training area.

b. Department of the Army File Number 200007600 refers to the restoration and enhancement of approximately 1,200 acres of wetlands to create For Stewart's Canoochee Creek Reservoir (or "Pond 4") Mitigation Bank.

c. Department of the Army Permit 200601665, issued December 6, 2006, authorized impacts to 4.23 acres of wetlands in Bryan County for improvements to the road in Fort Stewart's existing Convoy Live Fire Range. Mitigation consisted of a debit of 12.7 credits from the Installation's on-post wetland mitigation bank.

d. Department of the Army Permit 200501852, issued March 12, 2007, authorized impacts to 206.9 acres of wetlands in Liberty County for the construction of the Digital Multipurpose Range Complex. 4.0 acres of jurisdictional wetland were impacted through direct filling; the remaining 202.9 acres were impacted though cutting of vegetation to meet line-of-sight requirements.

Mitigation was accomplished through the Strum Bay Restoration, which (under the same Permit) restored and enhanced approximately 730 acres of wetlands adjacent to the project area by correcting previously impacted hydrology.

e. One project for which a DA permit is pending, vehicle maintenance facilities in support of 2nd BCT operations, will impact a total of 7.87 acres of wetlands. Although no DA Permit number has yet been assigned to these projects as they are still in the planning stages, the Fort Stewart Wetland Mitigation Bank has been debited in anticipation of them, so the impacts have been included in this analysis.

Fort Stewart has implemented an aggressive mitigation program in order to offset wetland impacts on the Installation. These projects include wetland enhancement and wetland restoration projects on large scale areas that provide higher quality mitigation than smaller patchwork single permit mitigation products. The following are current wetland mitigation projects located within the boundaries of Fort Stewart:

Pond 4 Mitigation Bank (USACE File Number 200007600): This single user bank was permitted for projects located within the boundaries of the Fort Stewart Installation. Approximately 1200 acres of wetlands were restored within the Canoochee Creek and Strum Bay wetland systems. This project is mostly comprised of deepwater and hardwood swamp habitat. Additional areas upstream of Pond 4 are currently being studied that would increase the total amount of wetland enhancement and restoration (see Strum Bay Mitigation Area below).

A-11 Mitigation Area (USACE File Number 940000880): This project specific mitigation area is comprised of approximately 1300 acres of wetland enhancement/restoration. Hydrologic enhancement/restoration was competed through the reintroduction of hydrology that had been previously diverted around the project area. It is comprised mostly of pine/cypress flatwoods and hardwood drainages.

Strum Bay Mitigation Area (USACE File Number 200501852): This project specific mitigation was originally developed to mitigate impacted associated with the DMPRC. Subsequent studies realized a much larger restoration/enhancement was obtained by re-directing hydrology back into the Strum Bay wetland system. This project has now identified enhancement and restoration of wetland hydrology to approximately 730 acres. This portion of the Strum Bay wetland system is located upstream from the Pond 4 Mitigation Bank, thus creating additional benefits to water quality and habitat to the entire Strum Bay wetland system and Pond 4 Mitigation Bank.

Summary: These effects, when combined with other projects in the ROI, do have the potential to result in adverse cumulative impacts; however, it is expected that other projects in the ROI will be implemented as follows: projects will use erosion control measures, silt fencing, and other Best Management Practices; sufficient storm water management structures will be constructed as part of new construction; erosion and sedimentation control plans will be filed in accordance with Georgia's Sedimentation Pollution Control Act; and all projects will be conducted in accordance/in compliance with federal, state, and local laws. This includes obtaining and adhering to appropriate wetland permits, including compliance with compensatory wetland mitigation requirements outlined in the wetland permit(s).

2. Water Quality: Water quality is affected by changes to the environment (referred to as stressors) that adversely affect aquatic life or impair human uses of a water body. Point sources are municipal and industrial wastewater discharge. Non-point sources consist of sediment, litter, bacteria, pesticides, fertilizers, metals, oils, grease, and a variety of other pollutants that are washed from rural and urban lands by storm water. Expected growth in population and employment in the basin will mean more potential stress from storm water runoff as well as non-point source loading.

Wetland Loss: The impacts to wetlands discussed above would be expected to have an adverse impact on water quality due to the loss of associated aquatic functions (flood water retention, filtration, contaminate removal, sediment retention, etc.). The mitigation for these impacts would help to offset these impacts to water quality.

Point Source Discharges: Impacts from municipal wastewater, agricultural, and industrial discharges were greater prior to the 1970's. Due to increased regulation, these discharges have been reduced but continue to introduce pollutants into the system, which lower water quality when considered cumulatively. Georgia's "2004 303(d) List" for Bryan, Evans, Liberty, Long, and Tattnall counties have 3 waterways listed as impaired or partially impaired; they are listed in the table below with the causes of impairment.

Table 6.

Waterway	Cause of Impairment
Canoochee River	Trophic-weighted residue value (mercury in fish tissue)

Peacock Creek	Low dissolved oxygen and fecal coliform bacteria
Taylor's Creek	Low dissolved oxygen

Non-point Source Discharges: Residential, commercial and industrial development results in an increase in impervious surfaces (roof tops, paved roads, parking lots, etc.), which affects storm water discharges. Development results in an increase in non-point source contaminant loading through associated increases in urban landscaping (pesticides and fertilizers), increased traffic (oil, grease and metals), and other associated activities. There would be an anticipated incremental increase in adverse impacts to water quality as impervious surfaces increase. The following table is a summary of anticipated population growth-induced increases in impervious surfaces in the Altamaha watershed. The amount of impervious surface coverage is increasingly recognized as a valuable predictor of overall water quality within a watershed. In general, as population increases, so does impervious surface. As impervious surface area increases, water quality decreases. Table 4.1 shows population and impervious surface area growth over time for the Lower Ogeechee watershed; Table 4.2 shows population and impervious surface area growth over time for the Canoochee watershed; Table 4.3 shows population and impervious surface area growth over time for the Little Ogeechee watershed; Table 4.4 shows population and impervious surface area growth over time for the Altamaha watershed.

The impervious surface data was generated by the USEPA and provided to the Corps via a table titled "Total Impervious Area Calculations by 12-Digit HUC Watershed (based upon National Land Cover Data, 1993). Using simple linear regression analysis, the Corps utilized county population projection data to estimate percent increase in impervious surface, by county. The data contained in Tables 4.1 thru 4.4 indicates that as the population of each county continues to increase, there will be an associated increase in impervious surfaces. All counties in the study area would be anticipated to experience an increase of less than one percent impervious surface by the year 2050. However, each county is responsible for regulating non-point source storm water discharges pursuant to Section 402 of the CWA. These county storm water management programs should help to minimize the anticipated adverse impacts to water quality.

Table 7 Projected Population Growths and Associated Approximate Impervious Surface Increases Lower Ogeechee - HUC 03060202

County		**Year**						
		2007	2008	2010	2020	2030	2040	2050
Bryan	Population / square mile	66	69	70	88	106	124	142
	% impervious Surface Coverage	2.33	2.37	2.39	2.68	2.97	3.26	3.55
Bulloch	Population / square mile	96	98	101	120	139	157	176
	% impervious Surface Coverage	2.81	2.84	2.89	3.20	3.50	3.79	4.09
Chatham	Population / square mile	385	389	386	410	434	457	481
	% impervious Surface Coverage	7.33	7.39	7.35	7.71	8.07	8.42	8.78
Effingham	Population / square mile	105	108	111	142	173	204	234
	% impervious Surface Coverage	2.95	3.00	3.05	3.55	4.04	4.53	5.00
Emanuel	Population / square mile	32	33	33	34	36	37	38
	% impervious Surface Coverage	1.77	1.79	1.79	1.81	1.84	1.85	1.87
Jenkins	Population / square mile	24	24	25	25	25	25	26
	% impervious Surface Coverage	1.64	1.64	1.66	1.66	1.66	1.66	1.68
Screven	Population / square mile	23	23	24	25	26	27	28
	% impervious Surface Coverage	1.63	1.63	1.64	1.66	1.68	1.69	1.71
Watershed Average								
Lower Ogeechee	Population / square mile	104	106	107	121	134	147	161
	% impervious Surface Coverage	2.92	2.95	2.97	3.18	3.39	3.60	3.81

Table 8 Projected Population Growths and Associated Approximate Impervious Surface Increases Canoochee - HUC 03060203

County		Year						
		2007	2008	2010	2020	2030	2040	2050
Bryan	Population / square mile	66	69	70	88	106	124	142
	% impervious Surface Coverage	2.33	2.37	2.39	2.68	2.97	3.26	3.55
Bulloch	Population / square mile	96	98	101	120	139	157	176
	% impervious Surface Coverage	2.81	2.84	2.89	3.20	3.50	3.79	4.09
Candler	Population / square mile	42	43	44	50	56	62	67
	% impervious Surface Coverage	1.94	1.95	1.97	2.07	2.16	2.26	2.34
Emanuel	Population / square mile	32	33	33	34	36	37	38
	% impervious Surface Coverage	1.77	1.79	1.79	1.81	1.84	1.85	1.87
Evans	Population / square mile	61	62	65	74	84	93	102
	% impervious Surface Coverage	2.24	2.26	2.31	2.46	2.62	2.76	2.91
Jenkins	Population / square mile	24	24	25	25	25	25	26
	% impervious Surface Coverage	1.64	1.64	1.66	1.66	1.66	1.66	1.68
Liberty	Population / square mile	100	97	105	109	114	119	124
	% impervious Surface Coverage	2.87	2.83	2.95	3.02	3.10	3.18	3.26
Long	Population / square mile	28	28	31	38	46	53	60
	% impervious Surface Coverage	1.71	1.71	1.76	1.87	2.00	2.11	2.23
Tattnall	Population / square mile	47	48	50	57	63	70	76
	% impervious Surface Coverage	2.02	2.03	2.07	2.18	2.28	2.39	2.49
Watershed Average								
Canoochee	Population / square mile	55	56	58	66	74	82	90
	% impervious Surface Coverage	2.15	2.16	2.20	2.33	2.46	2.58	2.71

Table 9 Projected Population Growths and Associated Approximate Impervious Surface Increases Little Ogeechee - HUC 03060204

County		**Year**						
		2007	2008	2010	2020	2030	2040	2050
Bryan	Population / square mile	66	69	70	88	106	124	142
	% impervious Surface Coverage	2.33	2.37	2.39	2.68	2.97	3.26	3.55
Chatham	Population / square mile	385	389	386	410	434	457	481
	% impervious Surface Coverage	7.33	7.39	7.35	7.71	8.07	8.42	8.78
Effingham	Population / square mile	105	108	111	142	173	204	234
	% impervious Surface Coverage	2.95	3.00	3.05	3.55	4.04	4.53	5.00
Liberty	Population / square mile	100	97	105	109	114	119	124
	% impervious Surface Coverage	2.87	2.83	2.95	3.02	3.10	3.18	3.26
Long	Population / square mile	28	28	31	38	46	53	60
	% impervious Surface Coverage	1.71	1.71	1.76	1.87	2.00	2.11	2.23
McIntosh	Population / square mile	20	20	21	24	26	29	32
	% impervious Surface Coverage	1.58	1.58	1.59	1.64	1.68	1.72	1.77
Watershed Average								
Ogeechee Coastal	Population / square mile	117	119	121	135	150	164	179
	% impervious Surface Coverage	3.13	3.15	3.18	3.41	3.64	3.87	4.10

Table 10 Projected Population Growths and Associated Approximate Impervious Surface Increases Altamaha - HUC 03070106

Appling	Population / square mile	35	35	36	38	41	43	46
	% impervious Surface Coverage	1.82	1.82	1.84	1.87	1.92	1.95	2.00
Evans	Population / square mile	61	62	65	74	84	93	102
	% impervious Surface Coverage	2.24	2.26	2.31	2.46	2.62	2.76	2.91
Glynn	Population / square mile	128	130	129	141	152	164	175
	% impervious Surface Coverage	3.32	3.36	3.34	3.53	3.71	3.90	4.07
Jeff Davis	Population / square mile	40	40	40	42	44	47	49
	% impervious Surface Coverage	1.90	1.90	1.90	1.94	1.97	2.02	2.05
Long	Population / square mile	28	28	31	38	46	53	60
	% impervious Surface Coverage	1.71	1.71	1.76	1.87	2.00	2.11	2.23
McIntosh	Population / square mile	20	20	21	24	26	29	32
	% impervious Surface Coverage	1.58	1.58	1.59	1.64	1.68	1.72	1.77
Montgomery	Population / square mile	36	36	38	42	45	49	53
	% impervious Surface Coverage	1.84	1.84	1.87	1.94	1.98	2.05	2.11
Tattnall	Population / square mile	47	48	50	57	63	70	76
	% impervious Surface Coverage	2.02	2.03	2.07	2.18	2.28	2.39	2.49
Toombs	Population / square mile	75	76	76	81	87	92	97
	% impervious Surface Coverage	2.47	2.49	2.49	2.57	2.67	2.75	2.83
Wayne	Population / square mile	45	45	46	52	58	63	69
	% impervious Surface Coverage	1.98	1.98	2.00	2.10	2.20	2.28	2.37
Watershed Averages								
Altamaha	Population / square mile	52	52	53	59	65	70	76
	% impervious Surface Coverage	2.09	2.10	2.12	2.21	2.30	2.39	2.48

Summary: This effect, when combined with other projects in the geographical area of influence, does have the potential to result in adverse cumulative impacts; however, it is expected that future projects would be implemented as follows: projects will use erosion control measures, silt fencing, and other BMPs; sufficient storm water management structures will be constructed as part of new construction; erosion and sedimentation control plans will be filed in accordance with Georgia's Sedimentation Pollution Control Act; and all projects will be undertaken in accordance with federal, state, and local laws.

Fort Stewart's role in general and project-specific oversight to ensure compliance with environmental legislation and the overall health of the local ecosystem have certainly played a role in mitigating adverse impacts to water quality. Also, the use of this large (~ 280,000 acres) area of land for military training has and will continue to ensure that the vast majority of the Installation remains managed wilderness. This allows natural processes to operate in support of water quality to a degree not seen in many surrounding areas which have experienced a great deal of development, and is the primary contributor to good water quality relative to those areas. Also, it must be noted that many projects related to military training (ex: firing ranges) do not feature impervious surfaces to the same degree as many civilian and private projects, and will not experience human activity and traffic of the same frequency and intensity, which might otherwise worsen local water quality. Furthermore, through the oversight of Environmental Compliance Officers, Army units self-monitor their training activities to avoid and minimize potentially harmful activities. A 1999 water quality survey performed by Fort Stewart determined that the quality of water leaving Fort Stewart's geographic boundaries was of equal or better quality than that which entered the Installation.

In view of the above, the Corps determined that the proposed project, with proposed special permit conditions, would have minimal impacts on water quality when considered alone or in concert with the other past, present and reasonably foreseeable future projects in the basin.

3. Aquatic Species: Permitted impacts to wetlands and water quality as discussed above have affected fish and other aquatic species such as mussels and aquatic insects.

The proposed projects would not result in a direct adverse impact to any stream or river, or to aquatic species in the waterways. Rather, the project would result in an unavoidable impact to 43.6 acres of wetland, and a loss of the aquatic habitat function provided by these wetlands. However, this project-related wetland loss would be minor when considered cumulatively with

all other past and planned wetland losses discussed above. In addition, the applicant's proposed wetland mitigation plan would help to offset the aquatic habitat function loss that would result from this project. Furthermore, Fort Stewart Fish & Wildlife monitors and maintains the quality of Fort Stewart aquatic habitats as part of their fisheries program.

Overall, the proposed projects will not have a significant impact on Fort Stewart aquatic habitats and species.

4. Compensatory Mitigation: As defined in the NEPA regulations, compensatory mitigation is "*compensation for the impact by replacing or providing substitute resources or environments*" (40 CFR Part 1508.20). The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 Multipurpose Machine Gun Range, FY11 Infantry Platoon Battle Course, FY13 Qualification Training Range, and the FY13 Digital Multipurpose Training Range. For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs). Similar to the process outlined in the Compensatory Mitigation Rule, the Installation's standard procurement processes conducts market research in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary and secondary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11.

Proposed project: The proposed project supporting military training will adversely impact 43.6 acres of Jurisdictional Wetland. To mitigate for these impacts the applicant would purchase 336.79 mitigation credits from a Corps approved mitigation bank that services the project area. Additionally, some small projects will be mitigated through debits from the Installation's on-post wetland mitigation bank. As such, any adverse impacts to wetlands and other waters of the U.S. caused by this project would be offset by the proposed mitigation.

Summary: The main public detriment that would result from this project would be the loss of 43.6 acres of jurisdictional wetlands. Many of the wetland functions and values important to the public, such as flood attenuation, sediment retention, fish and wildlife habitat, and others, would be replaced by the applicant's mitigation plan. Additionally, Fort Stewart's past mitigation efforts (approximately 3,230 acres) have adequately offset impacts within the boundaries Fort Stewart. Mitigation for the current projects will be offset through additional mitigation efforts, including the use of off-site Corps approved wetland mitigation banks. The mitigation plan

would also provide adequate compensation for the impacted wetlands through the implementation of wetland creation, enhancement and preservation. The proposed projects would not impact federal or state protected species or critical habitat. Cultural resources have been considered and it has been determined that they would not be impacted. Overall, the public benefits of the proposed project would outweigh the public detriments.

In view of the above, the Corps has determined that the proposed project, with proposed special permit conditions, would not have a significant impact on wetlands and/or other waters of the U.S. when considered alone or in concert with the other past, present and reasonably foreseeable future projects in the Fort Stewart watersheds.

F. SECONDARY/INDIRECT IMPACTS: See Section E above and the RGCEIS, prepared by Fort Stewart.

G. IRREVERSIBLE AND IRRETRIEVABLE RESOURCE COMMITMENTS: Authorization of the applicant's preferred alternative, or any other build alternative, could result in an irreversible and irretrievable commitment of a range of natural, physical, human and fiscal resources. The fossil fuels, labor and construction materials that would be expended, if the project is constructed, are generally not considered irretrievable resources. In addition, these resources are not in short supply and their use would not have an adverse effect upon their continued availability.

H. EFFECT ON FEDERAL PROJECTS: We have determined the proposed activity would not have an adverse effect on any Federal Project (33 CFR 320.4(g)).

PART V - PERMIT ACTION ALTERNATIVES

A. TO ISSUE THE PERMIT IN ACCORDANCE WITH THE PLANS SUBMITTED BY THE APPLICANT: This course of action by itself would be inappropriate because it does not include provision for special conditions (See D. below).

B. TO DENY THE REQUEST FOR A PERMIT: Denial of the permit would not be an appropriate course of action. The proposed activity would not have significant adverse effects on navigation, the environment or other public interest factors.

C. TO ISSUE THE PERMIT AFTER SUBMITTAL OF MODIFIED PLANS BY THE

APPLICANT WITH SPECIAL CONDITIONS: This course of action would not be warranted. Our review of the applicant's plans and alternatives showed the applicant's proposed activity to be the most practicable way to accomplish the applicant's overall purpose.

D. TO ISSUE THE PERMIT IN ACCORDANCE WITH THE PLANS SUBMITTED BY THE APPLICANT WITH SPECIAL CONDITIONS: This would be the appropriate course of action to follow. In order to protect the public interest the following special conditions would be placed on any permit issued:

1. All dredged or borrowed material used as fill on this project will be from clean, uncontaminated sources and free from cultural resources.

2. That no construction activity or stockpiling will occur in waters of the United States, including wetland areas, outside of the areas authorized for filling under this permit.

3. Prior to the commencement of construction activities for this project, the limits of the proposed fill areas in jurisdictional waters shall be clearly flagged and staked by you and/or your contractors. All construction personnel shall be shown the location(s) of all wetland and/or stream areas outside of the construction area to prevent encroachment from heavy equipment into these areas.

4. Borrow site or sites for stockpiling fill dirt shall be prohibited within 200 feet of streambanks, 50 feet of wetlands and open waters or elsewhere runoff from the site would increase sedimentation in waters of the United States unless specifically authorized by this permit. Normal grading activities such as cutting and filling within 200 feet of streams or 50 feet of wetlands/open waters are authorized.

5. Construction debris, liquid concrete, old riprap, old support materials, or other litter shall not be placed in streams or in areas where migration into streams and/or wetlands could reasonably be expected.

6. Staging areas and equipment maintenance areas will be located at least 200 feet from streambanks to minimize the potential for wash water, petroleum products, or other contaminants from construction equipment entering the streams.

7. The permittee shall ensure that the project's master drainage plan is designed and

implemented to avoid inadvertent drainage of wetlands and inadvertent water diversion resulting in a reduction of hydrology in wetlands. The permittee shall also ensure that secondary road ditches and/or small after-project drainage ditches do not inadvertently impact wetlands or waters of the US.

8. The permittee shall minimize bank erosion and sedimentation in construction areas by utilizing Best Management Practices for stream corridors, installing and maintaining significant erosion and sediment control measures, and providing daily reviews of construction and stream protection methods. Check dams and riprap placed in streams and wetlands as erosion control measures are considered a fill and not authorized under this permit unless they were specifically authorized by this permit.

9. All work conducted under this permit shall be located, outlined, designed, constructed and operated in accordance with the minimal requirements as contained in the Georgia Erosion and Sedimentation Control Act of 1975, as amended. Utilization of plans and specifications as contained in "Manual for Erosion and Sediment Control, (Latest Edition)," published by the Georgia Soil and Water Conservation Commission or their equivalent will aid in achieving compliance with the aforementioned minimal requirements.

10. You shall obtain and comply with all appropriate Federal, state, and local authorizations required for this type of activity. A stream buffer variance may be required. Variances are issued by the Director of the Georgia Environmental Protection Division (EPD), as defined in the Georgia Erosion and Sedimentation Control Act of 1975, as amended. It is our understanding that you may obtain information concerning variances at the Georgia EPD's web site at www.gaepd.org or by contacting the Watershed Protection Branch at (404) 675-6240.

11. If you or your contractors discover any federally listed threatened or endangered species and/or their habitat while accomplishing the activities authorized by this permit, you must immediately STOP work in the area and notify the issuing office of what you have found. We will initiate the Federal and state coordination required to determine if the species and/or habitat warrant further consultation with the USFWS.

12. Prior to the commencement of construction activities for this activity, the permittee shall insure that this project complies with all applicable rules, requirements, and/or regulations of the FEMA and/or the Georgia Floodplain Management Office with regard to construction activities in designated floodplains and/or floodways prior to commencement of work activity, to

include revisions to the National Flood Insurance Program maps if required.

13. Prior to the commencement of any work in jurisdictional waters of the United States for this activity, you will purchase wetland mitigation credits from an approved wetland mitigation bank. You or the mitigation bank sponsor must provide this office with documentation of this purchase before any work may commence. The notice should reference the USACE file number assigned to this project.

14. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the NRHP.

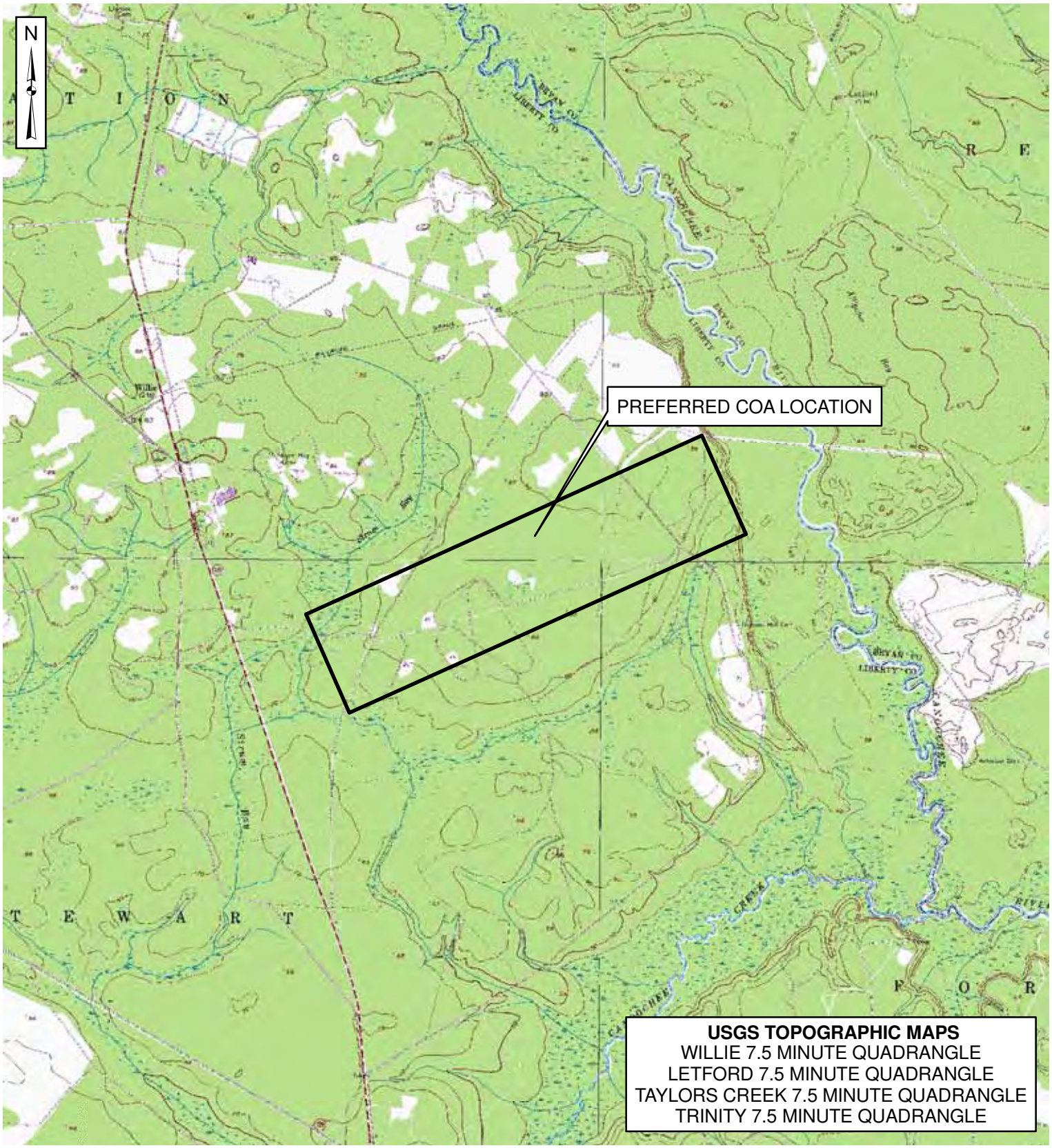
15. The permittee, US Army Fort Stewart, is the lead federal agency for this proposed action. The permittee shall meet all lead federal agency responsibilities pursuant to Section 7 of the Endangered Species Act, prior to any work occurring in waters of the US subject to the jurisdiction of the USACE.

16. The permittee, US Army Fort Stewart, is the lead federal agency for this proposed action. Fort Stewart shall meet all lead federal agency responsibilities pursuant to Section 106 of the National Historic Preservation Act, prior to any work occurring in waters of the US subject to the jurisdiction of the USACE.

17. The site design for this project has not been finalized. Authorized wetland impacts are based on a standard range design. Prior to conducting any work in wetlands on this project site, the permittee shall submit final site development plans to the USACE for review and approval. No work in wetlands can occur until the USACE has reviewed and approved the final plan in writing; this concurrence letter needs to document that the 404(b)(1) process has been adequately demonstrated. It is anticipated that once final design is completed, there will be a minor reduction in the amount of wetland area that will be impacted by the project. This anticipated change in the footprint of authorized wetland impact is authorized under this permit and modification of the permit will not be required for this change in site design.

18. If a conditioned Water Quality Certification has been issued for your project, you must comply with conditions specified in the certification as Special Conditions to this permit.

PART VI – COURSE OF ACTION FIGURES



VICINITY MAP - PREFERRED COA

1" = 4,000'

0 2,000 4,000 8,000 Feet

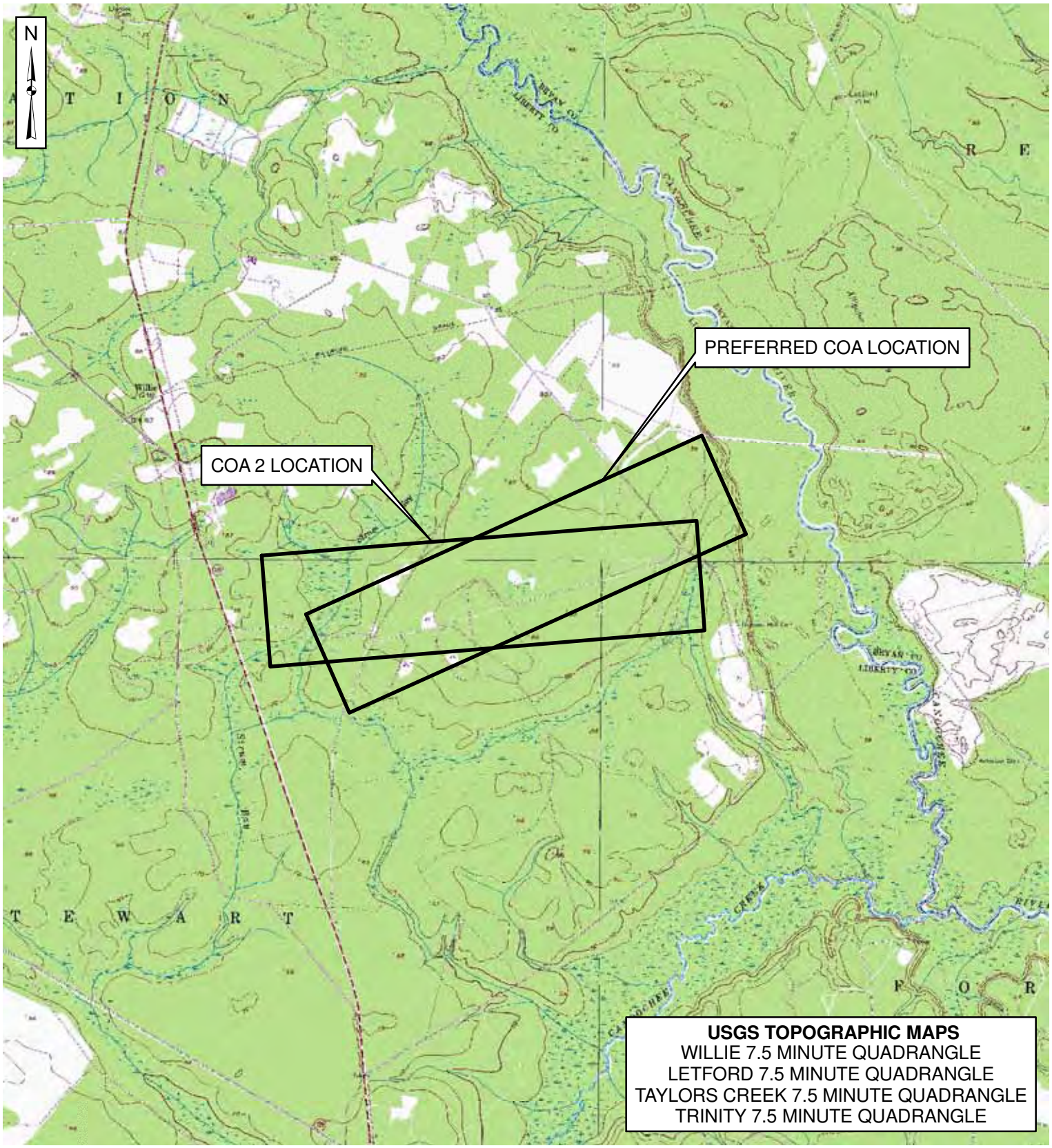
PROJECT: DMPTR - DIGITAL MULTIPURPOSE TRAINING RANGE

COUNTY: LIBERTY

SURVEY DATUM: UTM

FIGURE: 1 OF 4

DATE: NOVEMBER 2009



VICINITY MAP - CONSIDERED COAS

1" = 4,000'

0 2,000 4,000 8,000 Feet

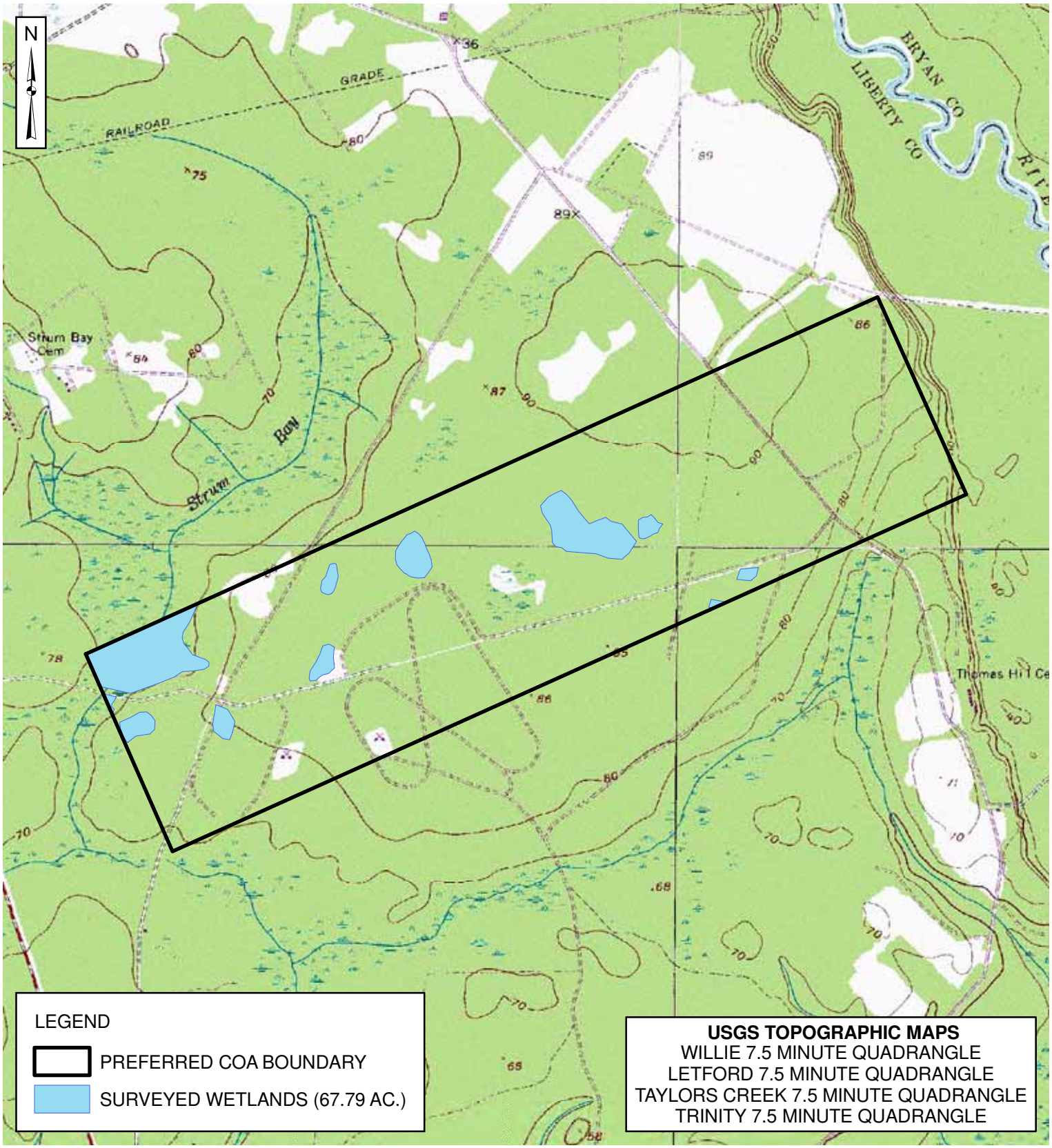
PROJECT: DMPTR - DIGITAL MULTIPURPOSE TRAINING RANGE

COUNTY: LIBERTY

SURVEY DATUM: UTM

FIGURE: 2 OF 4

DATE: NOVEMBER 2009



LOCATION MAP - PREFERRED COA

1" = 2,000'

0 1,000 2,000 4,000 Feet

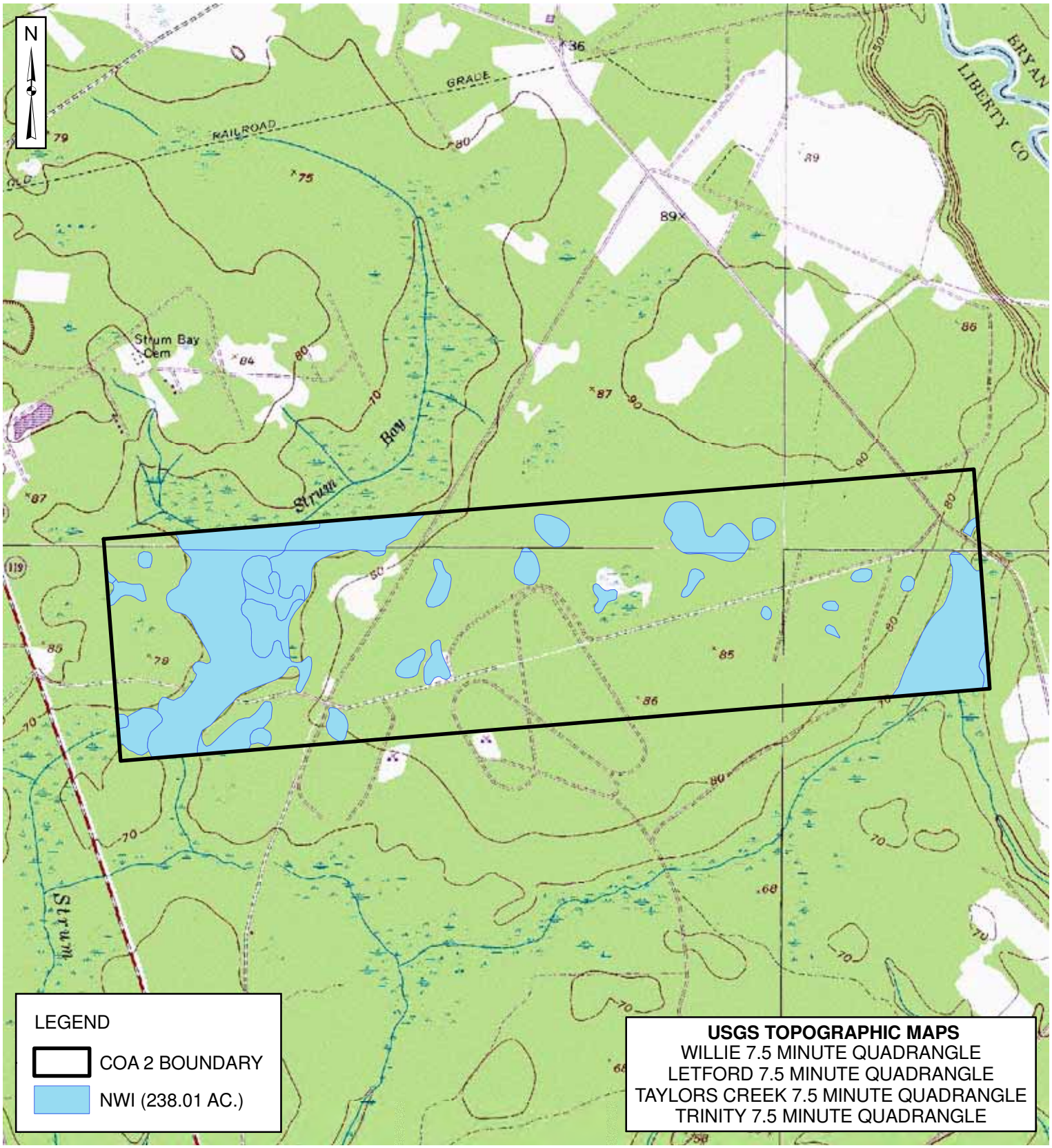
PROJECT: DMPTR - DIGITAL MULTIPURPOSE TRAINING RANGE

COUNTY: LIBERTY

SURVEY DATUM: UTM

FIGURE: 3 OF 4

DATE: NOVEMBER 2009



LOCATION MAP - COA 2

1" = 2,000'

0 1,000 2,000 4,000 Feet

PROJECT: DMPTR - DIGITAL MULTIPURPOSE TRAINING RANGE

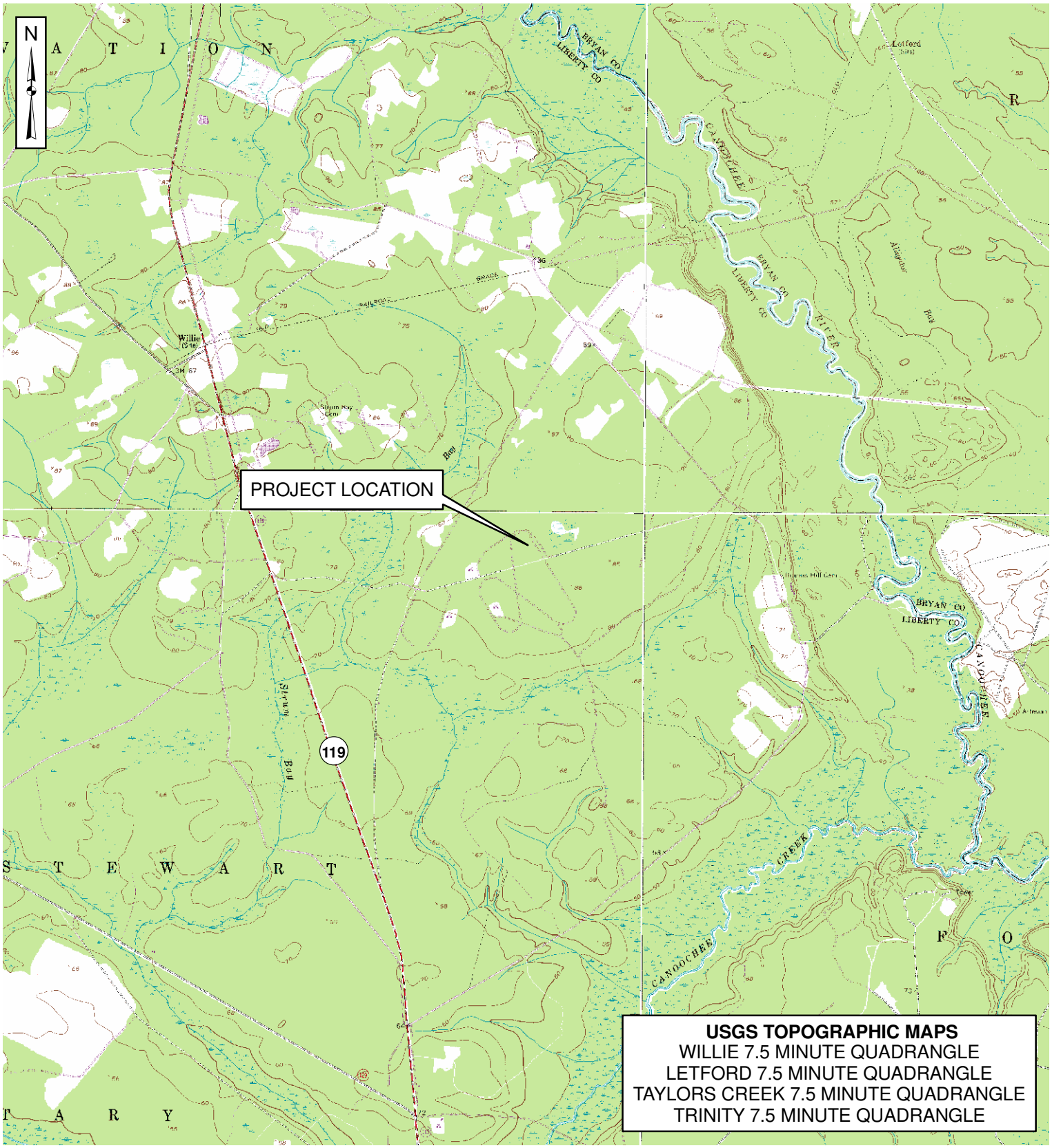
COUNTY: LIBERTY

SURVEY DATUM: UTM

FIGURE: 4 OF 4

DATE: NOVEMBER 2009

PART VII – PERMIT FIGURES



USGS TOPOGRAPHIC MAPS
WILLIE 7.5 MINUTE QUADRANGLE
LETFORD 7.5 MINUTE QUADRANGLE
TAYLORS CREEK 7.5 MINUTE QUADRANGLE
TRINITY 7.5 MINUTE QUADRANGLE

PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN A STANDARD DIGITAL MULTIPURPOSE TRANING RANGE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

PROJECT VICINITY MAP

1" = 4,000'

0 2,000 4,000 8,000 Feet

APPLICANT:
FORT STEWART DPW

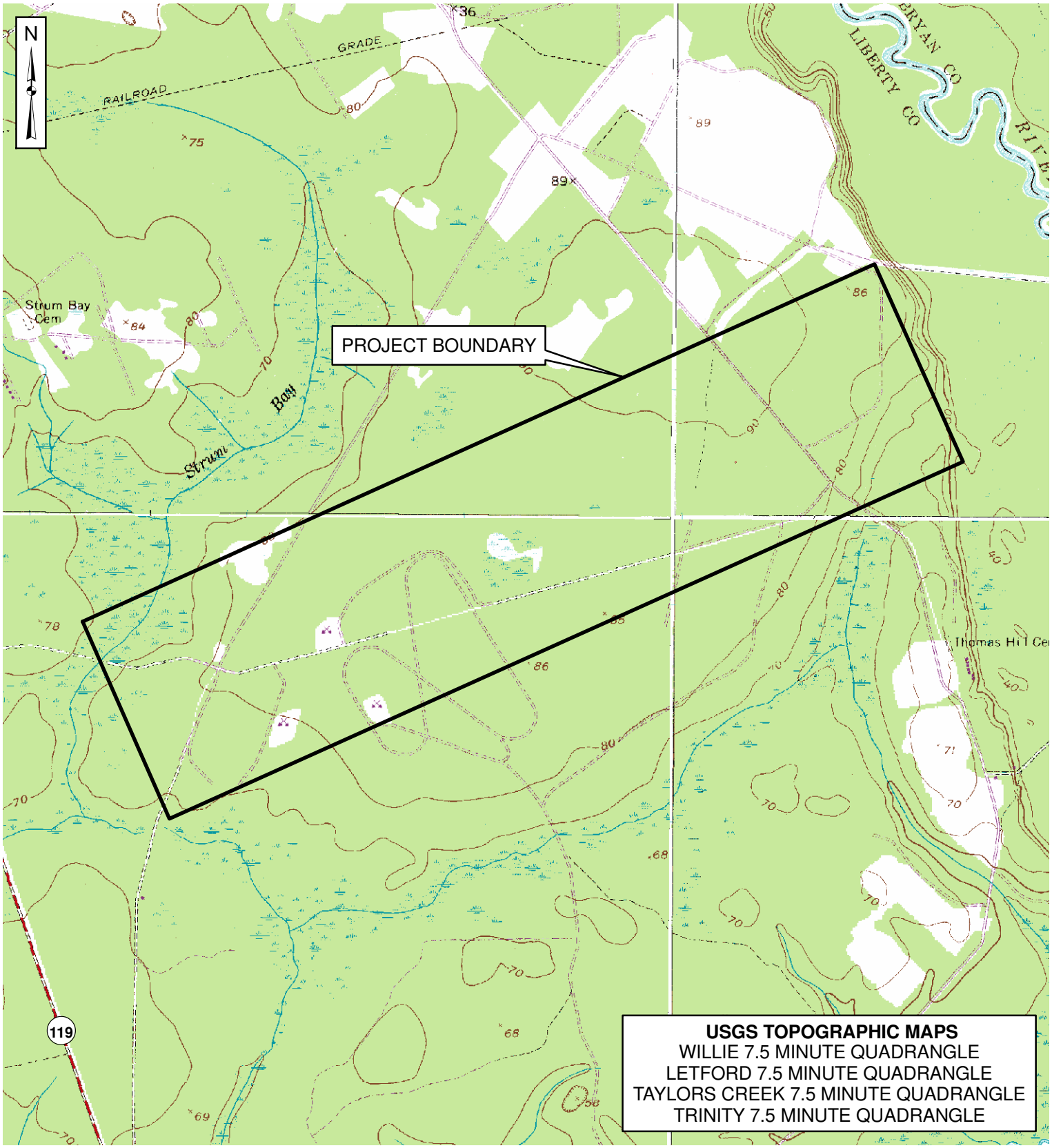
PROPOSED: WETLAND FILL

NEAREST WATERBODY: STRUM BAY

COUNTY: LIBERTY

FIGURE: 1 OF 6

DATE: NOVEMBER 2009



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN A STANDARD DIGITAL MULTIPURPOSE TRANING RANGE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

PROJECT LOCATION MAP

1" = 2,000'

0 1,000 2,000 4,000 Feet

APPLICANT:
FORT STEWART DPW

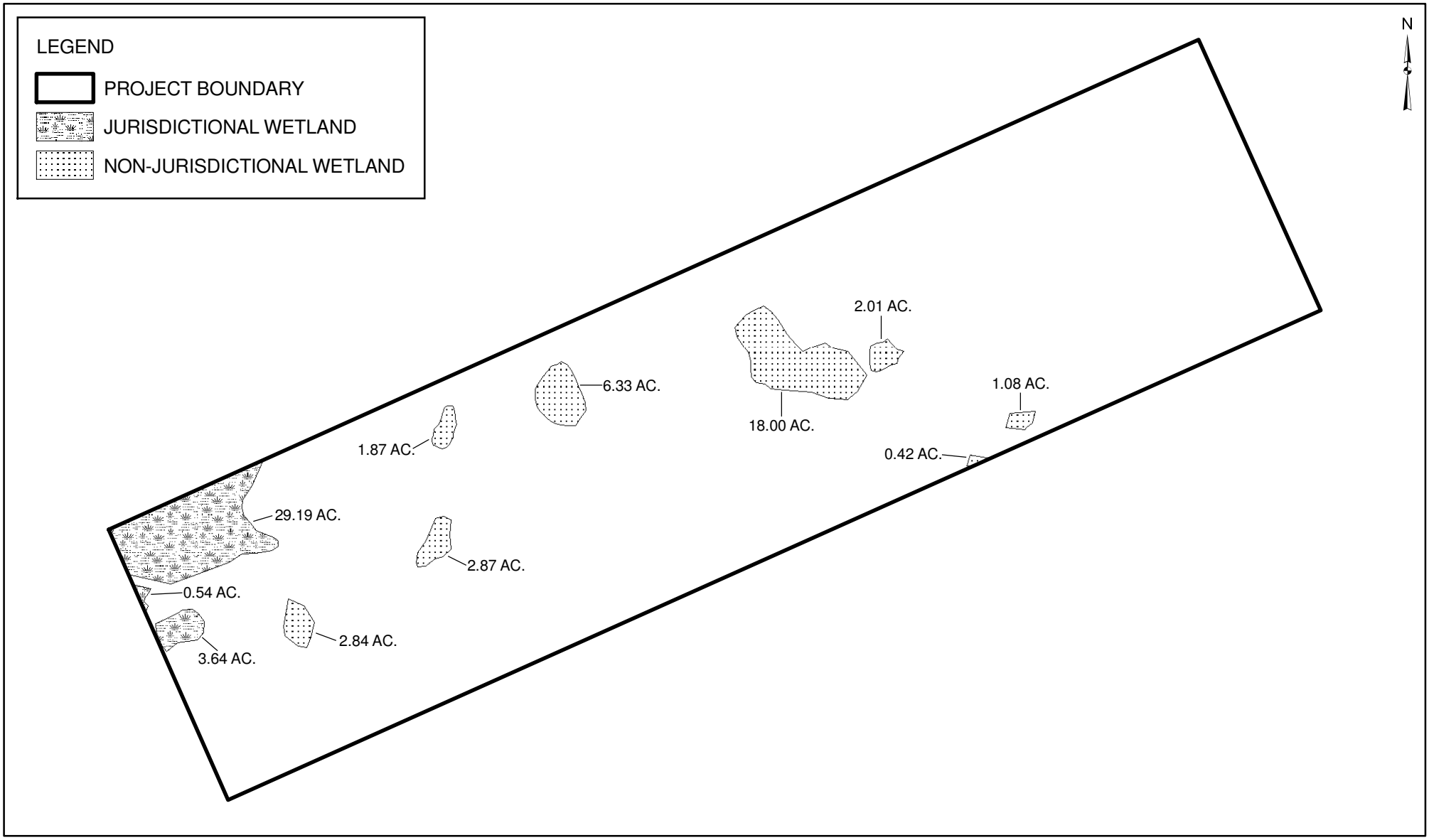
PROPOSED: WETLAND FILL

NEAREST WATERBODY: STRUM BAY

COUNTY: LIBERTY

FIGURE: 2 OF 6

DATE: NOVEMBER 2009



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN A STANDARD DIGITAL MULTIPURPOSE TRANING RANGE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

EXISTING CONDITIONS

SCALE: 1" = 1,500'

0 750 1,500 3,000 Feet

APPLICANT:
FORT STEWART DPW

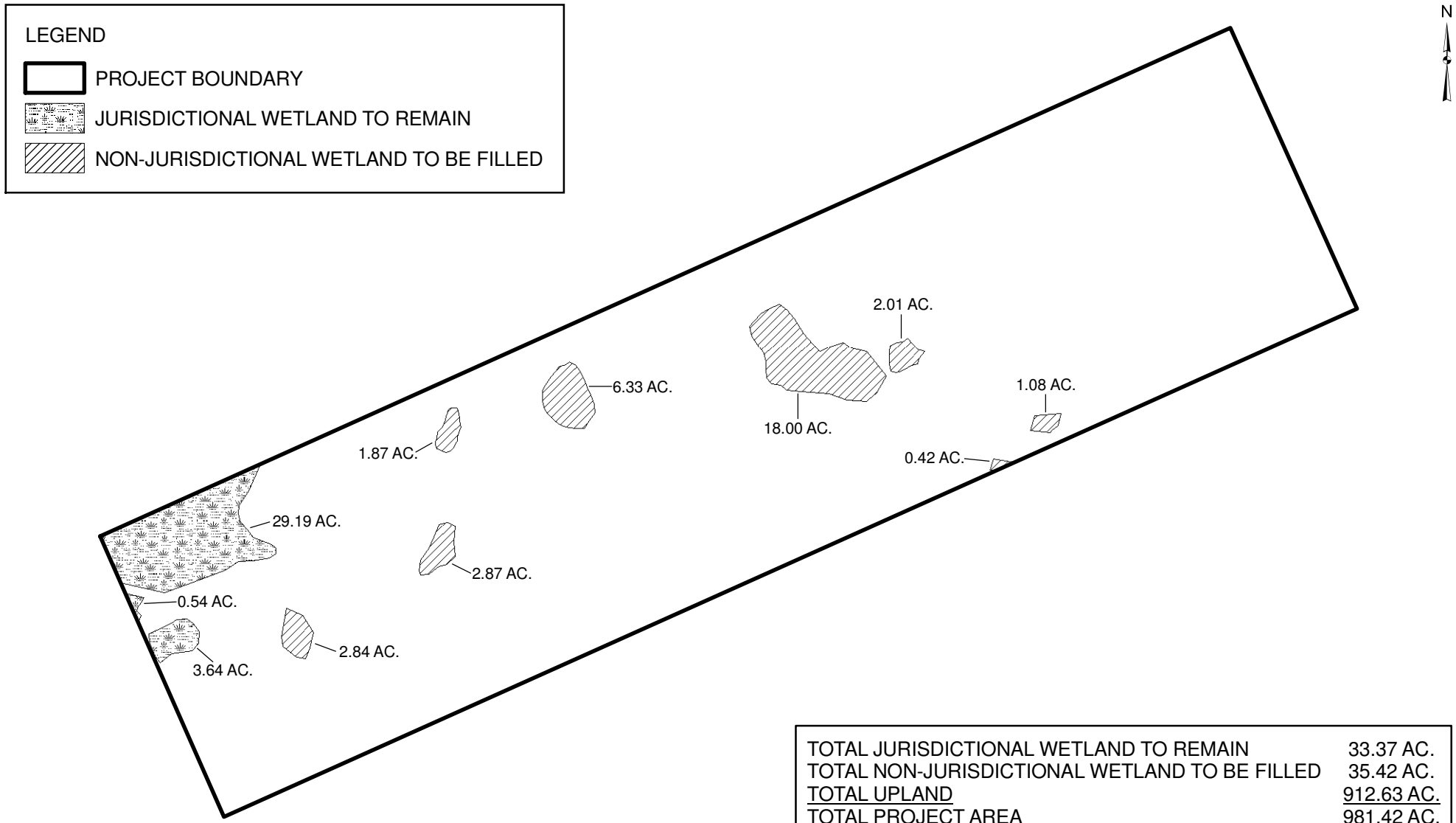
PROPOSED: WETLAND FILL

NEAREST WATERBODY: STRUM BAY

COUNTY: LIBERTY

FIGURE: 3 OF 6

DATE: NOVEMBER 2009



TOTAL JURISDICTIONAL WETLAND TO REMAIN	33.37 AC.
TOTAL NON-JURISDICTIONAL WETLAND TO BE FILLED	35.42 AC.
TOTAL UPLAND	912.63 AC.
TOTAL PROJECT AREA	981.42 AC.

PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN A STANDARD DIGITAL MULTIPURPOSE TRANING RANGE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

PROPOSED CONDITIONS

SCALE: 1" = 1,500'

0 750 1,500 3,000 Feet

APPLICANT:
FORT STEWART DPW

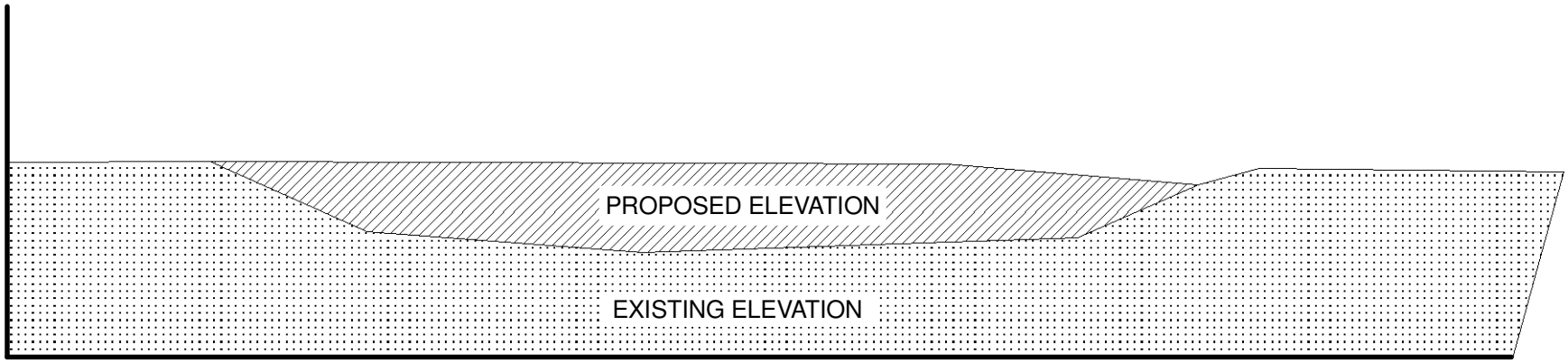
PROPOSED: WETLAND FILL

NEAREST WATERBODY: STRUM BAY

COUNTY: LIBERTY

FIGURE: 4 OF 6

DATE: NOVEMBER 2009



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN A STANDARD DIGITAL MULTIPURPOSE TRANING RANGE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

CROSS-SECTION

NOT TO SCALE

APPLICANT:
FORT STEWART DPW

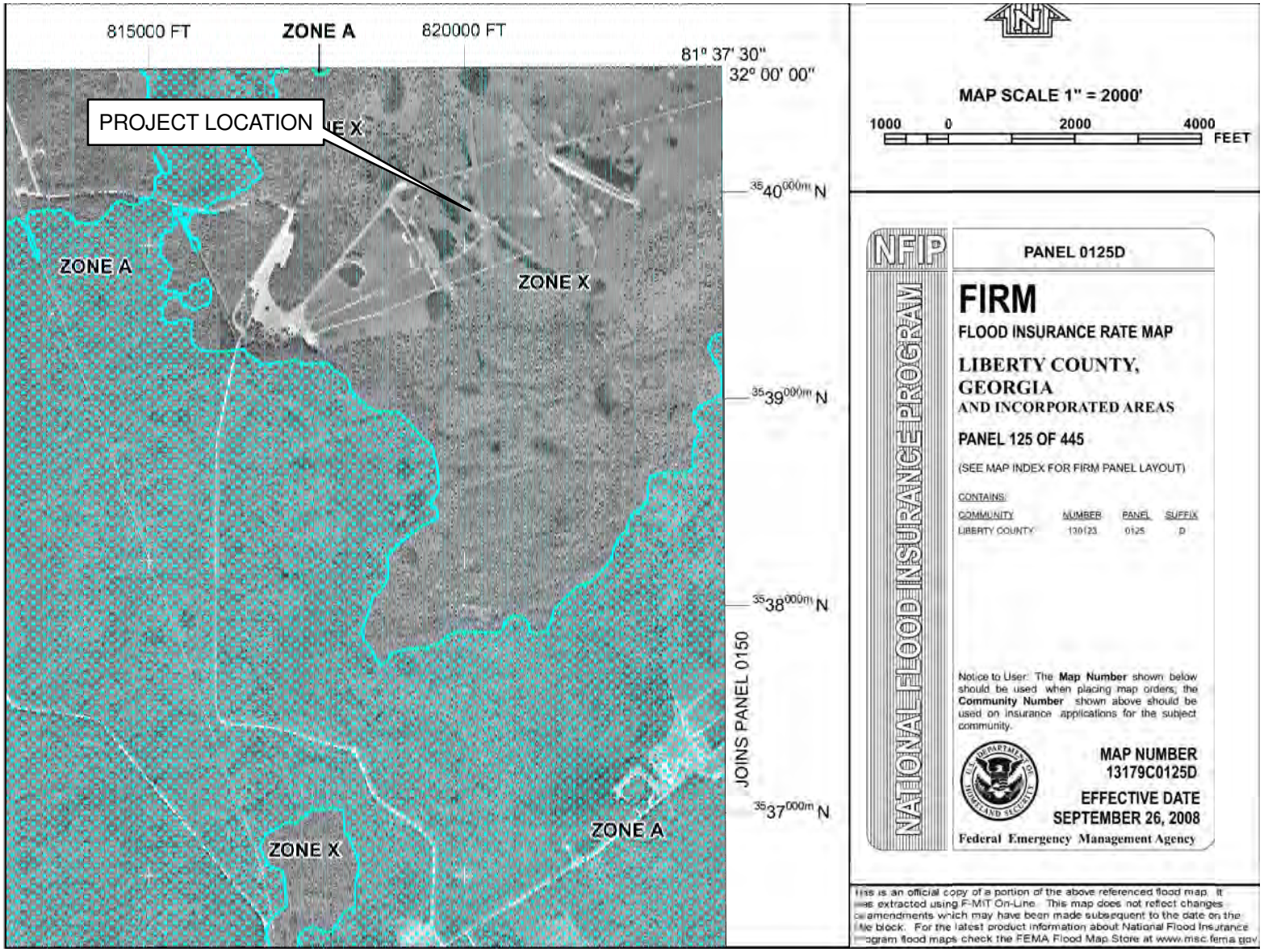
PROPOSED: WETLAND FILL

NEAREST WATERBODY: STRUM BAY

COUNTY: LIBERTY

FIGURE: 5 OF 6

DATE: NOVEMBER 2009



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN A STANDARD DIGITAL MULTIPURPOSE TRANING RANGE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

FLOOD INSURANCE RATE MAP

NOT TO SCALE

APPLICANT:
FORT STEWART DPW

PROPOSED: WETLAND FILL

NEAREST WATERBODY: STRUM BAY

COUNTY: LIBERTY

FIGURE: 6 OF 6

DATE: NOVEMBER 2009

CASE DOCUMENT FOR: INFANTRY PLATOON BATTLE COURSE
APPLICATION NUMBER 200900884
FOR A DEPARTMENT OF THE ARMY PERMIT
BY
FORT STEWART ARMY INSTALLATION, SAVANNAH, GEORGIA

PART I - INTRODUCTION

A. NAME AND ADDRESS OF APPLICANT:

U.S. Army, Fort Stewart Army Installation
Directorate of Public Works
1550 Frank Cochran Drive, Bldg. 1137
Fort Stewart, Georgia 31414

B. APPLICATION NUMBER: 200900884

C. LOCATION OF PROPOSED ACTIVITY: The site is located at Fort Stewart, in Bryan County, Georgia. The site is located within the C-1 Training Area (in the vicinity of latitude 32º 4' 35" north and longitude 81º 33' 20" west). A location map is provided in Appendix A to this document.

D. PROJECT DESCRIPTION: The Infantry Platoon Battle Course (IPBC) is a small caliber range used to support infantry platoon live-fire collective training to test infantry platoons (mounted or dismounted) on the skills necessary to conduct tactical movement techniques, and detect, identify, engage, and defeat stationary and moving infantry and armor targets in a tactical array. In addition to live fire, this range is used to train on sub-caliber and/or laser devices and can support the live-fire collective training needs of active and reserve component infantry platoons.

The IPBC includes eight mortar simulation device emplacements, six stationary armor targets (SATs), one moving armor target (MAT), 43 stationary infantry targets (SITs), 14 moving infantry targets (MITs), one trench obstacle, nine machine-gun bunkers (with sound effects simulator), two landing zones, one assault/defend house, two 800-square-foot buildings, an air-vault latrine facility, ammo breakdown area, range tower, enclosed bleachers, and a covered mess facility. The IPBC footprint totals 1000 acres and would undergo selective tree removal (no clear-cut) to enhance training realism and for target placement. Landing and drop zone areas

would be completely cleared.

The applicant has completed the 90% site design for the above described range project. The standard site layout for this type of range would require the filling and/or mechanized clearing of all 5.39 acres of bottomland hardwood wetlands on the 71-acre project site. The applicant will likely be able to avoid some of the wetlands on the project site as final site design is completed for the project. However, for the purposes of this permit evaluation, the US Army Corps of Engineers (USACE) will assume that all 5.39 acres of wetlands on the proposed project site would be impacted. In addition, the applicant's proposed wetland mitigation plan is to purchase 40.35 mitigation credits to offset unavoidable impact to 5.39 acres of wetlands.

E. BASIC PURPOSE AND NEED: The basic purpose of the proposed project is to provide the Soldiers of Fort Stewart, Reserve and National Guard units with critical training needs for both active and reserve component units that train on the Installation. This range is an essential element of infantry platoon training and readiness requirements prior to deployment into a theater of operations. There is not an IPBC at Fort Stewart to support the live-fire training of infantry platoons assigned to active component units stationed there or those units that habitually train on the Installation.

F. APPLICANT'S SUPPLEMENTAL INFORMATION: The following information is part of the administrative record for the project.

1. Project Narrative

2. Project Purpose and Need

3. Description of Resources Occurring within the Project Area, Potential Impacts, and Mitigation

4. Vicinity Map

5. Additional Studies and Response to Comments:

G. PROPOSED WORK SUBJECT TO THE JURISDICTION OF THE US ARMY CORPS OF ENGINEERS: The applicant proposes to perform work in, or affecting waters of the United States.

H APPLICABLE STATUTORY AUTHORITY: The applicant is making application pursuant to Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344).

PART II - COORDINATION

A. JOINT PUBLIC NOTICE (JPN): On April 21, 2010, the United States Army Corps of Engineers Savannah District (USACE) issued a JPN on the proposed work. Copies of the notice were provided to federal, state, and local agencies and the public. The notice was also posted on USACE public web page.

B. RESPONSE TO JOINT PUBLIC NOTICE: A summary of the comments received in response to the Joint Public Notice is presented in Table 1 below.

Table 1. Summary of Comments

COMMENTOR	OBJECT	3(b) Y/N	NO OBJECT	NO OBJECT W/CONDITION	DATE
Federal Agencies					
1. National Marine Fisheries Services			X		05-24-10
2. US Environmental Protection Agency (EIS comments)				X	04-21-10
3. US Fish and Wildlife Service					*
State of Georgia					
4. State Clearing House					*
5. Coastal Resources Division, Federal Consistency					*
6. Environmental Protection Division					*
Other					
7. Southern Environmental Law Center - Ogeechee River Keeper				X	05-21-10

* No date indicates no comment received.

C. DISCUSSION OF RESPONSES:

1. National Marine Fisheries Service (NMFS): By letter dated May 24, 2010, the NMFS stated "Based on the information in the public notice, the proposed project would not occur in the vicinity of essential fish habitat designated by the South Atlantic Fishery Management Council or NMFS. Present staffing levels preclude further analysis of the proposed activities and no further action is planned. This position is neither supportive of nor in opposition to your authorization of the proposed work."

2. Georgia State Clearinghouse: By memorandum dated June 8, 2010, the Georgia State Clearinghouse stated that the request has been found to be consistent with state goals, policies, plans, objectives, and programs, with which the state is concerned.

3. Environmental Protection Agency (EPA): There were no comments received pursuant the USACE Joint Public Notice dated April 21, 2010, from the EPA. However, Fort Stewart did receive comments and questions from the EPA Region 4, pursuant to the Draft Environmental Impact Statement (EIS) for Training Range and Garrison Support Facilities Construction and Operation at Fort Stewart, Georgia. The following are EPA comments relevant to the Section 404 permit notifications:

a. Issue 1: EPA is currently reviewing a joint public notice dated April 21, 2010, for four individual permits for four projects (DMPTR, IPBC, MPMGR and QTR) with a total of 185.9 acres of wetland impacts. This is a substantial level of wetland impacts, particularly in relation to recently permitted impacts throughout Georgia.

(1) Applicants Response: Fort Stewart avoids and minimizes wetlands impacts when possible. The implementation of the actions proposed in the preferred alternative (Alternative B Sitings) has the potential to negatively impact up to 0.2% of the Installation's nearly 91,000 acres of wetlands. More importantly, of the "up to 0.2% of the Installation's wetlands being impacted," most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement. As stated earlier in this reply, the Installation anticipates wetland impacts will be much less than projected through further avoidance and minimization incorporated during the design phases of each project after the site is selected. It is important to note, that despite the large amount of military training activity that occurs on Fort Stewart, because of the Installation's proactive efforts to avoid,

enhance, and mitigate wetlands, its wetlands remain of a high quality, retaining and transmitting large amounts of fresh water and providing habitat for countless local species. Proactive environmental stewardship programs also help to keep our wetlands pristine. As discussed in opening paragraphs in Chapter 3 of the DEIS, Fort Stewart's Integrated Training Area Management (ITAM) program conducts land rehabilitation through the construction of low water crossings and Soldier training related to sustainability of Fort Stewart lands.

Much of the avoidance and minimization takes place before actual site selection. Training ranges of this kind have fairly specific requirements and it is not always possible to build them without impacting every wetland in the footprint. Site designers may alter certain aspects of a proposed range in response to environmental concerns during various stages of the design process, typically reviewed at the 10%, 35%, 60%, 90%, and 100% stages of completion, if they can do so while still meeting the operational and training requirements of the range. For example, the currently on-going design process reduced the wetland impacts from the IPBC to a third of what they were at the time of writing the DEIS. Impacts from the MPMGR have also been slightly reduced. Several proposed range projects were sited without wetland impacts of any kind. It is hoped that impacts from the QTR and DMPTR may be reduced, but as they are not yet in the design process this cannot be precisely determined.

It is also important to note that not all of the 185.9 acres (now 179.03) of wetlands will actually be cleared, grubbed, and/or filled. Rather, that is a maximum projected "up to" amount. The actual number of acres impacted will likely be reduced further at each design level for target placement, etc.). Therefore, although the "permitted impacts" of this project may seem large in relation to other recently permitted impacts in Georgia, they do not represent substantial impacts to Fort Stewart wetlands resources.

(2) <u>USACE Position</u>: The combined wetland impact associated with the four proposed range projects has been reduced from 185.9 acres to 179.03 acres. In addition, as these projects approach final design, combined wetland impacts are expected to be reduced further. With regard to the amount of proposed wetland impact for these four projects relative to projects recently permitted by the Savannah District, there have been residential, commercial and reservoir projects authorized within the past five years with impacts in excess of 100 acres.

Based on the extensive experience of the USACE in review of permit applications for project located in the lower coastal plain of Georgia, most sites are typically comprised by approximately thirty permit wetlands. Fort Stewart is typical of site in the lower coastal plain and is also approximately thirty percent wetlands. Fort Stewart is the only military base with large range construction in Coastal Georgia. Proposed wetland impacts associated with the size of this proposed range are comparable to the wetland impacts associated with past range development on Fort Stewart.

a. Issue 2: EPA is particularly concerned that all impacts have been characterized as wetland impacts when two of the four projects show the potential for streams impacts on the 7.5-minute USGS topo quad maps. EPA notes that while the Fort has had a significant cumulative impact to streams from past projects, these impacts have not been mitigated.

(1) Applicants Response: The footprints of the MPMGR and IPBC on the 7.5-minute USGS topographic quads show "blue line" streams in the areas, however, a site visit by Fort Stewart and the Georgia Environmental Protection Division (GA EPD) on January 20, 2010, found no streams. The Savannah District also did not identify any streams within the range footprints. This information was added to Section 4.3.1, of the FEIS.

Over the years, Fort Stewart has worked diligently to mitigate impacts – direct and indirect, as well as cumulative – to the Installation's streams, as well as wetlands. During the development of the Installation's wetland bank, for example, thousands of feet of Canoochee Creek and Strum Bay were restored without being credited to the Installation's mitigation bank. The Installation takes pride in that fact and welcomes working with ORK and other local environmental stakeholders on future projects.

(2) USACE Position: The USACE has completed an expanded preliminary jurisdictional determination for the project site. This determination verified there are no jurisdictional streams located on the project site.

a. Issue 3: The FEIS should provide more discussion regarding the quality of the wetlands impacted. The DEIS mentions they're freshwater wetlands and that the Army has acquired mitigation credits to restore a historically but degraded hardwood wetland system. It is unclear what type of wetlands ecosystems are being impacted by the ranges and garrison proposed projects.

(1) Applicants Response: Surveys of the proposed range and garrison sites by Fort Stewart determined these ecosystems were predominantly broadleaf hardwood palustrine wetlands consisting of vegetative communities typical of wetlands in the Coastal Plain: pond pine (Pinus serotina), pond cypress (*Taxodium ascendens*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), American hornbeam (*Carpinus caroliniana*), Highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occur with varying frequency depending on the landform and hydrology of particular areas. Animal communities are also supported by these areas – wading birds such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea herodias*), amphibians such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*), and mammals such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites. Soil types are hydric sand-loam mixtures of the Ellabelle, Bibb, Pelham, and Leefield types. Text reflecting this information was incorporated into Section 6.4.1 of the FEIS..

(2) USACE Position: The description of the wetlands proposed to be impacted, which was submitted by the applicant and summarized above, is sufficient for the USACE to base an assessment of the wetland quality. In addition, the USACE has made multiple visits to Fort Stewart and is very familiar with the quality of wetlands located within the proposed project site(s). The USACE used this information and its knowledge of wetland habitats on Fort Stewart in its assessment of proposed wetland impacts and the adequacy of the applicant's proposed mitigation plan.

a. Issue 4: EPA is unable to fully evaluate wetlands impacts, which is an area of CWA-designated responsibility for the Agency, in the DEIS because expanded CWA 404(b)(l) analyses have not been prepared for three ranges: FY 13 Modified Record Fire Range, FY 13 10/25 Meter Zero Range, and FY 14 Convoy Live Fire Range. This is a concern. EPA would like to review and comment on these analyses before they appear in the FEIS. Please coordinate with Bob Lord, Region 4's Wetlands Program to discuss further.

(1) Applicants Response: As we mentioned in Section 4.3.2.2. of the DEIS, the

Installation has not prepared §404(b)(1) analyses for the FY13 MRFR, FY13 10/25 Meter Zero Range, and FY14 CLFR because some or all impacts to wetlands will likely be avoided during the design phase of these projects. The wetlands located on these sites are less than 5 acres each. If, however, wetlands cannot be avoided, the Installation will prepare §404(b)(1) analyses for these projects and request a §404(b) permit at that time.

(2) USACE Position: Wetland impacts pursuant to the construction of the FY 13 Modified Record Fire Range, FY 13 10/25 Meter Zero Range, and FY 14 Convoy Live Fire Range have not been determined by Fort Stewart. When these proposed projects are sited and designs are complete, and if there are any proposed wetland impacts associated with them, Fort Stewart will apply for a Section 404 permit with the USACE. Any proposed wetland impacts will be evaluated at that time and coordinated through the USACE permit process. The USACE is preparing an analysis of the proposed IPBC, MPMGR, DMPTR and QTR pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for the IPBC, MPMGR, DMPTR and QTR projects.

a. Issue 5: The DEIS states that the Fort has a regional permit for low water crossings, issued in 2001 and renewed in 2006 for 5 years, which allows for a maximum of 15 acres of cumulative wetlands impacts from low-water crossings. Approximately 5 acres of wetlands have been impacted using this permit. The FEIS should discuss the application of the Fort's regional permit for low water crossings, which allows for a maximum of 15 acres of cumulative wetlands impacts from low-water crossings, how the cumulative wetlands impacts are defined, and the water quality impacts and other aquatic resources impacts associated with this permit.

(1) Applicants Response: Low water crossings are not a part of the proposed action and there are no new low water crossings anticipated in the foreseeable future. As discussed in Section 3.4.4.2, only routine maintenance and repair of existing low water crossings in the range and training areas will be conducted.

(2) USACE Position: As part of this document, the USACE has prepared a cumulative impact assessment of all known past, presently proposed, and reasonably foreseeable future impacts to aquatic resources. This assessment takes into consideration

impacts associated with low water crossings.

a. Issue 6: EPA is concerned that the credit calculations using the Savannah District Standard Operating Procedure (SOP) do not fully compensate for the impacts. The Savannah District has frequently indicated to EPA that the SOP is not applicable to large impacts, such as those over 10 acres. EPA agrees and has proposed a scaling factor to address the cumulative impacts of large projects such as the factor used in the Charleston District SOP. This is the approach used by the Georgia Department of Transportation for its projects that exceed the 10 acre threshold. For very large projects this scaling factor could be capped at an appropriate level. EPA has suggested 3.0 acres, which is equal to the next largest factor used in the SOP. Application of the SOP without a scaling factor for large impacts, particularly the 108.1 acres for the MPMGR is not appropriate, even according to past finding from the Savannah District.

(1) Applicants Response: While a scaling factor may be appropriate to use in many large scale projects where a great deal of fill is being introduced into the wetland system and where the projects require large amounts of impermeable surfaces, neither of these considerations constitute significant components of any of the projects under consideration in the DEIS. Of this filled acreage only a small amount will include the introduction of impermeable surfaces. The only impermeable surfaces will consist of the range operations area and cover only 2% of each project footprint. As noted in Answer #1 above, while maximum projected "up to" amounts have been provided, most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement.

As a result, it is the Installation's position that use of any scaling factor is not necessary to compensate for the cumulative impacts associated with these types of projects and applying a scaling factor, as called for in the Charleston District's SOP, to these types of projects would appear to be arbitrary and capricious as it would not appear to be based on any sound engineering or hydrologic rational but would appear to be more punitive than compensatory in nature.

Moreover, the Installation always takes into account secondary wetland impacts. In reference to the MPMGR, which is the project that contains the majority of the 179.03 acres of wetlands to be potentially impacted, the Installation has evaluated potential secondary cumulative impacts. In our planning process, as noted above, the Installation

took a “worst case scenario” approach when determining how to compensate for the quantity of wetlands loss. The Installation is planning to off-set secondary cumulative wetland effects from this range and has obtained an additional 287 mitigation credits from the Wilkinson-Oconee Bank. The Installation did account for the lost functions and values impacted by the project with respect to direct and indirect impacts.

As noted in Sections 3.4.5 and 4.3.2, the Savannah District is a cooperating agency to this EIS, and was consulted with regard to the factors noted above. Additionally, Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Having reviewed these documents and the associated 404(b)(1), the Savannah District did not suggest a need to utilize a scaling factor.

(2) USACE Position: The present total proposed wetland impact for the four proposed ranges is 179.03 acres. As discussed by the applicant above, not all of these proposed impacts are for fill, but a certain percentage would involve mechanized land clearing impacts. Clearing wetlands of vegetation and maintaining them in scrub/shrub vegetation results in a change in function, but not a total loss in function. The mitigation credits proposed by Fort Stewart are assuming a total loss in function. The proposed mitigation plan is to purchase 1,391 credits to compensate for a total of 179 acres of wetland impact. This is credit to impact ratio of 7.8:1. On average, three credits are generated for each acre of wetland restoration at the Wilkinson/Oconee Mitigation Bank, where credits will be purchased for the FY11 ranges. Therefore, the effective mitigation ratio for the FY11 Multipurpose Machine Gun Range and FY11 Infantry Platoon Battle Course projects would be approximately 2.6:1 of wetland restoration. The Applicant has not ruled out other acceptable compensatory mitigation alternatives to mitigate wetlands impact (provided through mitigation banks or in-lieu fee programs) for the FY13 Digital Multipurpose Training Range and the FY13 Qualification Training Range. Therefore, it is the position of the USACE that the mitigation proposed for this IPBC project would meet the requirements of the new mitigation rule.

a. Issue 7: The DEIS indicates that approximately one-third of the Fort's lands are wetlands. It also states some of the remaining 160 credits contained in the Fort's on-site mitigation bank will be used for the Garrison construction projects. Additionally, the Army has previously purchased credits from an established off-Fort wetland mitigation bank in accordance with the Compensatory Mitigation Rule (33 CFR Part 332) to cover

the proposed range projects. The Fort canvassed the available mitigation banks nearly one year ago, which may not reflect the current banks and credit availability. Given the opportunity, EPA would have discouraged the use of the Wilkinson - Oconee Mitigation Bank since it is out of the watershed, out of the ecoregion, and likely does not fully compensate for the functions lost at the project sites. EPA is also concerned, despite the rationale provided in the DEIS, that the Fort is not fully debiting its own mitigation bank before going to off-site alternatives. The Fort's mitigation bank is within the same watershed and ecoregion and thus more likely to replace the lost wetland functions. There appears to be ample time to expand this bank to accommodate the future needs presented as a reason for not fully using it for these projects. Typically, EPA discourages applicants from purchasing mitigation credits until the Section 404 permit has been issued, because this precludes other, possibly preferable, mitigation actions.

(1) Applicants Response: Although the Fort Stewart mitigation bank has sufficient credits to offset impacts from the two Garrison support construction projects, the Army has determined it is not sufficient to cover the unavoidable negative impacts to wetlands from the FY11-14 training range construction projects, for which the Installation must purchase credits from an off-site wetlands mitigation bank. The remaining acres within the Installation wetland bank allows Commanders to respond to emergency range training requirements, which surface from “In Theater” conditions and scenarios, or award Congressional Garrison or training additions that must be executed by Fort Stewart within one year or less. If Commanders did not have this flexibility, Installation projects with unavoidable wetland impacts would be cancelled or held up in significant delays awaiting Congressional funding to purchase “off-Post” wetland credits.

As discussed in Chapter 6 of the DEIS, despite the physical distance between the Wilkinson - Oconee Bank (WOB) restoration area and Fort Stewart, looking at the choice from a more holistic watershed perspective shows that the two locations are rooted in an interconnected complex of wetlands and open water bodies. The WOB wetlands were determined to be an ecologically acceptable replacement for the small portion of Fort Stewart wetlands impacts due to the proposed action. Hydrologic and habitat wetland functions will remain unimpaired.

At the time the credits were purchased, there were no other readily available mitigation banks open in the primary service area with the quantity and quality of credits needed to cover the Installation’s projected needs. The Federal appropriations process did not

provide the Installation with the flexibility to wait until Section 404 permits were issued to initiate the required solicitation process to purchase the credits without putting the funding for the specific FY 2011 range projects in jeopardy. As part of the Installation's standard procurement processes, market research is conducted in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11.

For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs). For instance, the Installation is actively seeking opportunities to incorporate off-site compensatory mitigation projects into its private lands conservation initiatives in partnership with the Georgia Land Trust and will continue to do so to further provide compensatory mitigation within the primary service area and watershed. Under the Savannah District's SOP, the Wilkinson-Oconee Bank (WOB) is grandfathered as a pre-existing bank created prior to the Compensatory Mitigation Final Rule (please refer to Answer 9 below). As such, the WOB is an acceptable mitigation alternative that is in full compliance with the policy and purpose of mitigation required by the CWA, the Savannah District SOP, and the Compensatory Mitigation Final Rule. The information contained in this answer has been added to Section 6.4.1.1 of the FEIS.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. At the time of the pre-application meeting, the USACE agreed to allow the applicant to purchase credits from the secondary mitigation zone of the Wilkinson-Oconee Bank, which was the only bank with available credits. The agreement was made with the applicant in order to allow them time to procure funds necessary to provide mitigation when needed. The on-base Pond Four Mitigation Bank will be used to mitigate smaller on-post projects in the future that would likely be on a short time-line for planning, permitting and construction. The Army procurement process takes too long to allow for the purchase of mitigation credits for these small, short, time-line projects. Therefore, the USACE agrees with the applicant to save Pond Four credits for these future small projects.

a. Issue 8: EPA disagrees with the statement that applying for a CWA Section 404

permit is a minimization of wetlands impacts. The DEIS states "While the Army strives to avoid negative impacts to wetlands when it sites new range and training facilities on Fort Stewart, if impacts to regulated wetlands cannot be avoided, the Army minimizes those impacts by applying for a Section 404 permit as required by the Clean Water Act. CWA 404 requires a permit for any dredge and fill impacts to jurisdictional waters, including wetlands. The CWA is a regulatory requirement, not a mitigation option. The FEIS should clarify this misrepresentation of CWA Section 404 permit program as a form of mitigation.

(1) Applicants Response: The information in the text and tables, located in Section 6.4.3, of the FEIS has been edited to identify more accurately and clearly the differences between what is a required measure, such as a regulatory permit, and what is a mitigation option.

(2) USACE Position: The applicant made the suggested correction.

a. Issue 9: The DEIS discusses wetlands compensatory mitigation in context of NEPA-required mitigation when it should also discuss how the proposed mitigation meets the requirements of the Compensatory Mitigation for Losses of Aquatic Resources Final Rule. NEPA requires that to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analyses and related surveys and studies required by the Fish and Wildlife Coordination Act, the National Historic Preservation Act of 1966, the Endangered Species Act of 1973, and other environmental review laws and executive orders. The Compensatory Mitigation for Losses of Aquatic Resources Final Rule is considered to be a relevant "other environmental review law" as it is one of the CWA Section 404 implementing regulations. The FEIS should discuss and apply the Final Rule in its wetlands mitigation discussion.

(1) Applicants Response: The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR. Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Section 6.4.1.1 of the FEIS has been revised to clearly explain that a mitigation decision has not yet been made for the FY13 QTR and the FY13 DMPTR. For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable

compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs). Similar to the process outlined in the Compensatory Mitigation Rule, the Installation's standard procurement processes conducts market research in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary and secondary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11.

According to 33 CFR 332, *Compensatory Mitigation for Losses of Aquatic Resources*, mitigation bank credits may be used if the project is in the service area of a mitigation bank. Section 332.3 (b)(2) has a description of why mitigation bank credits are acceptable in compensating for wetland impacts:

"Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable." Fort Stewart followed these requirements during the development of its mitigation plan.

(2) <u>USACE Position</u>: See USACE Position on USEPA issue 7 above.

a. <u>Issue 10</u>: While EPA does not expect the precise replication of all wetlands adversely impacted by the proposed action, the FEIS should explain how the proposed mitigation will adequately compensate for lost wetland functions and values such that it results in no net loss of wetland functions and values. This discussion is absent from the DEIS. Furthermore, since the U.S. Army Corp of Engineers (USACOE) cannot issue a

CWA 404 permit if there is a less damaging practicable alternative, the FEIS should discuss compliance with this provision.

(1) Applicants Response: The wetlands in the Wilkinson-Oconee Bank (WOB) are "in-kind" to the wetlands on Fort Stewart. Consistent with the fact that both areas are on Georgia's Coastal Plain, wetlands within the WOB are very similar to those slated for impact by the proposed Fort Stewart range projects. Surveys of the proposed range sites by Fort Stewart determined that dominant vegetation communities consist of plants typical of wetlands in the Coastal Plain: mixtures of pond and bald cypress (*Taxodium ascendensand distichum, respectively*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), privet (*Ligustrum sinense*), American hornbeam/ironwood (*Carpinus caroliniana*), highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occur with varying frequency depending on the landform and hydrology of particular areas, and essentially identical communities with similar distribution are found in the Wilkinson-Oconee's Mitigation Bank. Animal communities also supported by these areas are: wading birds, such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea Herodias*); amphibians, such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*); and mammals, such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites, and have been similarly reported in the Wilkinson-Oconee area. The American alligator (*Alligator mississippiensis*) is common throughout Fort Stewart and has also been observed at Wilkinson-Oconee. The locally endangered Wood Stork *Mycteria Americana* can also be found at both locations (though they are not expected to be impacted by the proposed projects).

Soil types were also consistent between the two areas. The Ellabelle, Bibb, Pelham, and Leefield types predominated in the proposed project areas. Analyses of the Natural Resources Conservation Service profiles show these to be comparable to the Chewacla, Chastain and Congaree soils which cover the Wilkinson-Oconee area. All are characterized by loamy surface layers and clayey or loamy subsoils, and all soils are on the National Hydric Soils list.

Although the area of the Coastal Plain in which the Wilkinson-Oconee area is situated

features more relief than that of Fort Stewart, the specific area of the restoration situated as it is in the Oconee River floodplain, is flatter than the surrounding general topography, resulting in a similar hydrologic profile to Fort Stewart. The bottomland hardwood wetland systems found at both locations share the typical functions of holding temporary storage surface water, maintenance of characteristic subsurface hydrology, removal and sequestration of elements, retention of particulates, export of organic carbon, maintenance of characteristic plant community, and habitat for wildlife. Based on this comparison, despite the distance between the two areas, wetlands on Fort Stewart and at the Wilkinson-Oconee restoration area are very similar and, therefore, their use for mitigation fully supports the requirement for "no net loss". Text reflecting this information was incorporated into Section 6.4.1.1 of the FEIS.

(2) USACE Position: As discussed above, the mitigation proposed by the applicant would comply with the new mitigation rule. The USACE is preparing an analysis of the proposed project pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for this proposed project. This analysis would also confirm that the final proposed site development plan for this range, as well as the other three ranges being reviewed, was the least environmentally damaging practicable alternative that would meet the basic project purpose.

a. Issue 11: The DEIS states that the USACOE documents approximately 1,467,774 acres of wetlands impacted within 20 Georgia counties and by deducting 1,982.87 acres of wetlands impacts since 1990 there are at least 1,465,791.13 acres of wetlands remaining. According to the DEIS, this amounts to a loss of 0.14% of wetlands since 1990 - an insignificant amount." It is unclear if the USACOE document referenced in the DEIS is referring to the 1,467,774 acres of wetlands as being impacted in the 20 Georgia counties or existing (un-impacted) wetlands in these counties. This paragraph needs to be clarified in the FEIS.

(1) Applicants Response: There are 1,467,774 existing acres of existing wetlands within the 20 Georgia counties referenced, of which 1,465,791.13 acres of wetlands are un-impacted. This is how the Installation calculated a loss of 0.14% of wetlands since 1990 and the determination of "insignificant" derived. Text clarifying this information was incorporated into Section 5.3.3.2 of the FEIS.

(2) USACE Position: Fort Stewart corrected the FEIS, and clarified the information that EPA questioned.

3. US Fish and Wildlife Service (USFWS): No comments received. The US Army, Fort Stewart is the lead federal agency for this proposed action and has completed consultation with the USFWS. The Final Biological Opinion can be found in Appendix B of the FEIS.

4. Georgia State Clearinghouse: By memorandum dated June 8, 2010, the Georgia State Clearinghouse stated that the request has been found to be consistent with state goals, policies, plans, objectives, and programs, with which the state is concerned.

5. Georgia Department of Natural Resources, Coastal Resource Division (Georgia CRD): No comments were received from Georgia CRD. However, this office must certify that the project is consistent with the Georgia Coastal Management Program prior to the USACE completing its review of the subject application.

6. Georgia Department of Natural Resources, Environmental Protection Division (Georgia EPD):

7. Southern Environmental Law Center (SELC): By letter dated May 21, 2010, the SELC provided the following comments on behalf of the Ogeechee Riverkeeper, Inc. (ORK):

a. Issue 1: The applicant's alternatives analysis in the DEIS includes alternative COA 3 which is a "heavily utilized" existing multipurpose range complex (MPRC) (*Fort Stewart note: the range proposed for construction is actually a Digital Multi-Purpose Training Range, or DMPTR*). DEIS, Appendix D at 10. This, of course, begs the question as to why the Applicant is including as an alternative a site that could never be used even if it determined that the site would have fewer environmental impacts. Alternative COA 3 is not a practicable alternative at all.

(1) Applicants Response: Transforming the existing MPRC was an option legitimately considered as a practical alternative but rejected due to current and expected military operations and training demands. Transforming the existing MPRC and other operational ranges will remain a consideration on future range projects as the types of

military training and weapon systems evolve over time and possibly render older ranges obsolete. An example of this is the COA 1 for the DMPTR, which involves the transformation of another existing range, Red Cloud Foxtrot. In siting the DPMTR over top of an existing range, we are attempting to minimize and avoid the wetland impacts that would be associated with constructing the DPMTR elsewhere on Fort Stewart.

(2) USACE Position: Given the amount of development on the base as a whole, the re-use of an existing range should be considered as a potential alternative. The elimination of alternatives as not being practicable is a standard part of the Section 404(b)(1) Guidelines.

b. Issue 2: The other alternative which the Applicant examined yielded wetlands impacts of 240 acres. It is difficult to accept that there were no other practicable alternatives at Fort Stewart for this proposed range. Two-hundred forty acres is more than the combined wetlands impacts of all four of the proposed ranges.

(1) Applicants Response: Based on the Installation's location in a relatively flat coastal plain and the location of pre-existing military training ranges and facilities on high ground, impacts to 240 acres of wetlands to build a new 995 acre range is not beyond the realm of reasonable consideration as a viable alternative. The fact that wetland impacts in the preferred alternative are less than five percent of the overall range size demonstrates the Installation's efforts to avoid and minimize wetland impacts associated with the siting of new military ranges and training facilities. Army Installations, including Fort Stewart, must maintain their training lands to fully sustain mission requirements for national security. The way the Army does this is through its master planning process. It is important to note that the Installation's planning efforts to minimize wetland impacts begins with attempts to select a site with the least amount of wetlands. At this point in the planning process, the range design is limited to placement on site of a footprint of the proposed range. This footprint shows the maximum number of wetland impacts and that is why we state "up to" so many acres; however, once a final site is selected, further attempts are made to avoid and minimize negative impacts to wetlands inside the range footprint through the range design process.

The final range design cannot be prepared prior to a site being selected. Also, despite Fort Stewart's large size, much of its lands are already committed to other training, recreational, and environmental activities. Maneuver and dismounted maneuver training

areas occupy large portions of the Installation, where the integration of large firing ranges is not suitable. The west side of the Installation is devoted to maneuver training and, in its entirety, is necessary to meet Brigade mission training requirements. Maneuver training is necessary in upland areas to reduce wetland impacts resulting from heavy wheeled and tracked military vehicles, as well as to avoid vehicles from getting stuck in wet areas. The southeast side of the Installation is devoted to dismounted maneuver training (i.e. training on foot) and also contains a wooded recreational area for campers. More than 100,000 acres are devoted to the restoration and management of environmentally sensitive areas, such as habitat for threatened and endangered species (including the red-cockaded woodpecker (RCW) and gopher tortoise) and wetlands.

During the planning process for the FY13 DMPTR, which Fort Stewart initiated in 2006, the Installation developed a total of eight siting alternatives. This process allowed both operational and environmental aspects, including impacts to wetlands, to be thoroughly analyzed in a collective manner by members of the Installation's Environmental Division, Range Control Division, and Master Planning Division. As the analysis progressed, these siting alternatives were ranked using screening criteria, as discussed in Chapter 2, *Description of the Proposed Action and Alternatives*, of the FEIS. Minimization of environmental impacts, including wetlands, was a factor in which alternatives were considered viable and which were not. One DMPTR discounted alternative, not discussed in the FEIS, contained 673 acres of wetlands impact. Another site, also not considered any further, contained 313 acres of wetland impact and would have resulted in the elimination of 683 acres of RCW habitat (compared to an RCW habitat loss of 22.4 acres and 31 acres as a result of Alternatives B and C, respectively). Even though these eliminated sites were operationally viable, they were removed from consideration after environmental impacts were determined to be significant.

(2) <u>USACE Position</u>: There are variety of safety, noise, and other constraints that limit where a live fire range could be located on Fort Stewart. The Army is the "expert" for siting ranges and conducted an intensive alternatives analysis for locating this, and the other three range projects; to avoid wetland impacts, while meeting other site constraints. The Section 404(b)(1) analysis to be prepared for this action will fully address this issue.

c. <u>Issue 3</u>: Multi Purpose Machine Gun Range (MPMGR). As an alternative for this range, the Applicant proposed course of action (COA) 5 which would have yielded wetlands impacts of less than 9 acres had it been chosen as the preferred alternative.

However, the Applicant eliminated this alternative because it emerged as the preferred alternative for DMPTR. As such, COA 5 should not be discussed as a viable alternative for the MPMGR.

(1) Applicants Response: As a large military training and deployment complex, Fort Stewart must examine and analyze the cumulative effects of all its proposed ranges within its training platform as constrained by the Installation borders, adjacent and associated training facilities, and surface danger zones relative to one another. This analysis is in addition to examining other resources, such as wetlands, to optimize training while minimizing the overall impact to our environment. The decisions made on the siting of each range and what are practical alternatives are inherently intertwined and interdependent. This may not have been reflected well in Section 404 permit applications, but is more fully explained in Section 6.4.1.1 of the FEIS. The possibility remains that the MPMGR could be selected to occupy that site currently under consideration for the DMPTR if the DMPTR is ultimately selected to occupy another site.

Also, many other impacts, in addition to wetland impacts, are examined and analyzed in the siting of new ranges and training facilities, including other environmental factors (such as threatened and endangered species) and non-environmental factors (such as the impact the site has on the ability to conduct timely and realistic military training based on current threats to our nation's armed forces when engaged in combat or peace keeping operations overseas). Both the MPMGR and DMPTR were approved for funding, and as has been noted, COA 2 for the DMPTR would have carried a level of wetland impact even greater than the current impacts from both the MPMGR and the DMPTR. Given the many constraints (see Appendix D for siting criteria) at play in siting both ranges, the preferred COAs for the two ranges were seen as a necessary compromise for ensuring all needed ranges are built and military training requirements met.

(2) USACE Position: See discussion for SELC issue 2 above.

d. Issue 4: Notwithstanding the above, the Applicant needs to more adequately explain why it did not select COA 5 as the preferred alternative for MPMGR considering it would have reduced the wetlands impacts from 116.7 acres down to 9 acres.

(1) Applicants Response: Unfortunately, it would not be possible to ignore the fact that the site was already selected as the preferred site for the DMPTR, as suggested. Two

independently proposed ranges cannot have the same preferred site. The Installation agrees that nine acres of impact for a 250-acre range is far more desirable than 116.7 acres of wetland impacts (which we now have down to 103.3 acres); however, wetlands impacts for this specific range were only one factor examined and analyzed in selecting this site as the preferred alternative. Selection of this site as the preferred alternative helps the Installation's ability to avoid and minimize the overall and cumulative impacts to all wetlands associated with planned or reasonably anticipated range construction, as reflected in Sections 4.3.2, 5.3.3.2, and 6.4.1 of the FEIS.

(2) USACE Position: See discussion for SELC issue 2 above.

e. Issue 5: Qualification Training Range (QTR). For this proposed range, the Applicant discusses but then rules out COA 3, which would have less wetlands impacts than the Preferred Alternative B. The Applicant rules out this alternative site because it is the proposed location for a future Modified Record Fire (MRF) range, which is not before the Corps at this time. Again, given the significant size of Fort Stewart, alternatives for one range should not be eliminated for future potential ranges, or, such a site should never be discussed as an alternative. The Applicant is required under the Section 404(b)(1) guidelines to indentify "practicable alternatives," not alternatives that could never be chosen regardless of how favorable they might be from an environmental standpoint.

(1) Applicants Response: Again, as a large military training and deployment complex, Fort Stewart must examine and analyze the cumulative effects of all its proposed ranges within its training platform as constrained by the Installation borders, adjacent and associated training facilities, and surface danger zones relative to one another. This analysis is in addition to examining other resources, such as wetlands, to optimize training while minimizing the overall impact to our environment. The decisions made on the siting of each range and what are practical alternatives are inherently intertwined and interdependent. This may not have been reflected well in Section 404 permit applications; but is more fully explained in the FEIS. One reason the COA 3 was deemed unsuitable was the fact the site is currently an operational range that is projected for reuse or transformation as a future MRF range. While Fort Stewart has a large land mass, much of its land mass is not environmentally or operationally suitable for range construction or for a number of considerations. Although significant, wetland impacts are only one of several significant factors considered when examining the suitability for

siting of a range. The remaining lands that are suitable for future range construction are limited because the best locations are currently being used to capacity as military ranges or training areas. The Installation contains many sensitive resources, such as wetlands and protected species habitat, which limit the locations suitable for constructing new military training ranges that are capable of maximizing military training while minimizing environmental impacts. Because of the operational impacts examined and analyzed when siting ranges, and because the Installation was able to minimize impacts and mitigate those that did occur, the decision was made to retain the COA 3 site for a future project. The alternative was practicable but was not chosen in this instance.

(2) USACE Position: See discussion for SELC issue 2 above.

f. Issue 6: Inadequate Mitigation. Ogeechee Riverkeeper (ORK) is concerned with several flaws in the Application's proposed mitigation measures. Considering the Project's significant destruction and alteration of wetlands, it is imperative that the value and functions of wetlands on Fort Stewart are mitigated. ORK shares the concerns expressed by the Environmental Protection Agency (EPA) in its comments on the Draft Environmental Impact Statement dated May 14, 2010. First, the Applicant's usage of the Savannah District's Standard Operating Procedure (SOP) for calculation of mitigation credits is inconsistent with the district's position that the SOP should not be applied to projects with large wetlands impacts. Given the Project's substantial wetlands impact of 190 acres, we urge the Corps to apply the SOP, but do so with a scaling factor to address the cumulative impact of the Project, an approach that is followed by the Charleston District. The Applicant's use of the SOP without a scaling factor will not successfully and adequately replace the lost functions and values of wetlands impacted by the Project.

(1) Applicants Response: The implementation of the actions proposed in the preferred alternative (Alternative B Sitings) has the potential to negatively impact up to 0.2% of the Installation’s nearly 91,000 acres of wetlands. More importantly, of the up to 0.2% of the Installation’s wetlands being impacted, most of those impacts are not the result of adding fill to the wetlands, and as stated earlier, the Installation anticipates wetland impacts will be much less than projected through further avoidance and minimization incorporated during the design phases of each project after the site is selected. It is important to note, that despite the large amount of military training activity that occurs on Fort Stewart, because of the Installation’s proactive efforts to avoid, enhance and mitigate wetlands, its wetlands remain of a high quality, retaining and

transmitting large amounts of fresh water and providing habitat for countless local species.

While a scaling factor may be appropriate to use in many large scale projects where a great deal of fill is being introduced into the wetland system and where the projects require large amounts of impermeable surfaces, neither of these considerations constitute significant components of any of the projects under consideration in the FEIS. Of this filled acreage only a small amount will include the introduction of impermeable surfaces. The only impermeable surfaces will consist of the range operations area and cover only 2% of each project footprint. As noted above, while maximum projected "up to" amounts have been provided, most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement. This information is located in Section 4.3.2.2.

As a result, it is the Installation's position that use of any scaling factor is not necessary to compensate for the cumulative impacts associated with these types of projects and applying a scaling factor, as called for in the Charleston District's SOP, to these types of projects would appear to be arbitrary and capricious as it would not appear to be based on any sound engineering or hydrologic rational but would appear to be more punitive than compensatory in nature.

Moreover, the Installation always takes into account secondary wetland impacts. In reference to the MPMGR, which is the project that contains the majority of the 190 acres (now 179.03 acres) of wetlands to be potentially impacted, the Installation has evaluated potential secondary / cumulative impacts. In our planning process, as noted above, the Installation took a "worst case scenario" approach when determining how to compensate for the quantity of wetlands loss. The Installation is planning to off-set secondary / cumulative wetland effects from this range and has obtained an additional 287 mitigation credits from the Wilkinson-Oconee Bank. The Installation did account for the lost functions and values impacted by the project with respect to direct and indirect impacts.

As noted in Sections 3.4.5 and 4.3.2 of the FEIS, the Savannah District is a cooperating agency to this EIS, and was consulted with regard to the factors noted above. Additionally, Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Having reviewed these documents and the associated 404(b)(1), the Savannah District did not suggest a need to

utilize a scaling factor.

(2) USACE Position: The USACE does not require the usage of the Savannah District's Standard Operating Procedure (SOP) for calculation of mitigation credits for projects of this size. The USACE does not use any scaling factor in association with the USACE SOP. The present total proposed wetland impact for the four proposed ranges is 179.03 acres. As discussed by the applicant above, not all of these proposed impacts are for fill, but a certain percentage would involve mechanized land clearing impacts. Clearing wetlands of vegetation and maintaining them in scrub/shrub vegetation results in a change in function, but not a total loss in function. The mitigation credits proposed by Fort Stewart are assuming a total loss in function. The proposed mitigation plan is to purchase 1,391credits to compensate for a total of 179 acres of wetland impact for all four ranges. This is a credit to impact ratio of 7.8:1. On average, three credits are generated for each acre of wetland restoration at the Wilkinson/Oconee Mitigation Bank, where credits will be purchased for the FY11 ranges. Therefore, the effective mitigation ratio for the FY11 Multipurpose Machine Gun Range and FY11 Infantry Platoon Battle Course projects would be approximately 2.6:1 of wetland restoration. The Applicant has not ruled out other acceptable compensatory mitigation alternatives to mitigate wetlands impact (provided through mitigation banks or in-lieu fee programs) for the FY13 Digital Multipurpose Training Range and the FY13 Qualification Training Range. Therefore, it is the position of the USACE that the mitigation proposed for this IPBC project would meet the requirements of the new mitigation rule.

g. Issue 7: Second, the Applicant's choice of the Wilkinson-Oconee Mitigation Bank conflicts with the policy and purpose of mitigation required by the CWA. Under the Corp’s regulation, the Applicant's "compensatory mitigation should be located within the same watershed as the impact site ...." 33 C.F.R. § 332.3. The purpose of this rule is to preserve and maintain water resources within a watershed, and ensure that wetlands lost are compensated by wetlands with similar characteristics, values, and functions. The Application, however, proposes mitigation outside of Fort Stewart and in another watershed at the Wilkinson-Oconee Mitigation Bank. This choice not only conflicts with the Corps' policy but also ignores the available 160 credits contained in Fort Stewart's on-site mitigation bank. ORK believes that the Corps should require the Applicant's use of the on-site mitigation.

(1) Applicants Response: Mitigation credits generated from the on-Post compensatory mitigation bank are not being used because there are insufficient credits available to satisfy requirements associated with the projects and the Installation needs to retain the few credits remaining for potential use to compensate for last minute and unanticipated Congressional add-on projects that occur on the Installation on a not-infrequent basis. Regarding use of mitigation banks, the Compensatory Mitigation for Losses of Aquatic Resources Final Rule states, "In many cases, the environmentally preferable compensatory mitigation may be provided through mitigation banks or in-lieu fee programs because they usually involve consolidating compensatory mitigation projects where ecologically appropriate, consolidating resources, providing financial planning and scientific expertise (which often is not practical for permittee-responsible compensatory mitigation projects), reducing temporal losses of functions, and reducing uncertainty over project success." The rule then lists types of compensatory mitigation measures in order of preference. The rule states that "[in] general, the required compensatory mitigation should be located within the same watershed as the impact site." But mitigation bank credits may be used if the project is in the service area of the bank. Section 332.3 (b)(2) has a description of why mitigation bank credits are given in the regulation:

"Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable." Fort Stewart followed these requirements during the development of its mitigation plan.

Under the Savannah District's SOP, the Wilkinson-Oconee Bank is "grandfathered" as a pre-existing bank created prior to the Compensatory Mitigation Final Rule. As such, the Wilkinson-Oconee Bank is an acceptable mitigation alternative that is in full compliance with the policy and purpose of mitigation required by the CWA, the Savannah District SOP, and the Compensatory Mitigation Final Rule. Fort Stewart's use of the Wilkinson-Oconee Bank as mitigation for the proposed FY11 range projects was fully coordinated with the Savannah District, which was a cooperating agency on the EIS.

The wetlands in the Wilkinson-Oconee Bank are "in-kind" to the wetlands on Fort Stewart. Consistent with the fact that both areas are on Georgia's Coastal Plain, wetlands within the Wilkinson-Oconee are essentially identical to those slated for impact by the proposed Fort Stewart range projects. Surveys of the proposed range sites by Fort Stewart determined that dominant vegetation communities consist of plants typical of wetlands in the Coastal Plain: mixtures of pond pine (Pinus serotina), pond cypress (*Taxodium ascendens*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), American hornbeam (*Carpinus caroliniana*), Highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occurr with varying frequency depending on the landform and hydrology of particular areas, and essentially identical communities with similar distribution are found in the Wilkinson-Oconee's Mitigaiton Bank. Animal communities also supported by these areas are: wading birds, such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea Herodias*); amphibians, such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*); and mammals, such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites, and have been similarly reported in the Wilkinson-Oconee area.

Soil types were also consistent between the two areas. Hydric sand-loam mixtures of the Ellabelle, Bibb, Pelham, and Leefield types predominated in the proposed project areas. Analyses of Natural Resources Conservation Service profiles show these to be comparable to the Chastain and Congaree soils which cover the Wilkinson-Oconee area. All soils are on the National Hydric Soils list. Although the area of the Coastal Plain in which the Wilkinson-Oconee area is situated features more relief than that of Fort Stewart, the specific area of the restoration is flatter than the surrounding general topography, resulting in a similar hydrologic profile to Fort Stewart. The bottomland

hardwood wetland systems found at both locations share the typical functions of holding temporary storage surface water, maintenance of characteristic subsurface hydrology, removal and sequestration of elements, retention of particulates, export of organic carbon, maintenance of characteristic plant community, and habitat for wildlife. Based on this comparison, despite the distance between the two areas, wetlands on Fort Stewart and at the Wilkinson-Oconee restoration area are very similar and, therefore, their use for mitigation fully supports the requirement for "no net loss". Text reflecting this information was incorporated into Section 6.4.1.1 of the FEIS.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. At the time of the pre-application meeting, the USACE agreed to allow the applicant to purchase credits from the secondary mitigation zone of the Wilkinson-Oconee Bank, which was the only bank with available credits. The agreement was made with the applicant in order to allow them time to procure funds necessary to provide mitigation when needed. The on-base Pond Four Mitigation Bank will be used to mitigate smaller on-post projects in the future that would likely be on a short time line for planning, permitting and construction. The Army procurement process takes too long to allow for the purchase of mitigation credits for these small, short-time-line projects. Therefore, the USACE agrees with the applicant to save Pond Four credits for these future small projects.

h. Issue 8: Before seeking compensatory mitigation in a different watershed, the Applicant should explore the use of existing and new mitigation banks in Ogeechee River Watershed. According to the DEIS's evaluation of mitigation banks in 2009, the Ogeechee River/Margin Bay and Black Creek Banks may now have available credits. DEIS at 6-8. Also, given the significant amount of wetlands within the boundaries of Fort Stewart as well as Fort Stewart's experience in the creation of mitigation banks, the Corps should require the Applicant to take a hard look at a potential onsite mitigation bank that would ensure the compensation of the wetlands' lost values and functions.

(1) Applicants Response: Existing and new mitigation banks within this watershed were not available at the time Fort Stewart was required to begin planning for the required wetlands credit acquisition for its FY 2011 range projects with known and/or anticipated wetlands impacts (see answer to Issue #9, below, for additional details). On-

site wetlands mitigation was not a viable option because, as discussed in Section 5.3.3.2 of the FEIS, although Fort Stewart has an existing mitigation bank and an on-site wetlands restoration project, it is running out of new places where additional on-site mitigation can be conducted. If credits are available in the primary service area in the future, however, then Fort Stewart will work to try and obtain these credits, in accordance with the Compensatory Mitigation Rule For Losses of Aquatic Resources (33 CFR 332) and the Federal Acquisition Regulation. For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs).

After exploring and selecting reasonable site alternatives for the proposed FY11-FY14 range projects, the Installation determined that the last remaining on-site mitigation bank (Pond 4) could not support the wetland mitigation requirements for these facilities and sustain itself for mitigation of proposed and future garrison construction, and other unplanned projects that arise out of mission changes. The remaining acres within the Installation Wetland Bank allows Command to respond to emergency range training requirements which surface from “In Theater” conditions and scenarios, or award Congressional garrison or training additions that must be executed by Fort Stewart within one year or less. If Commanders did not have this flexibility, Installation projects with unavoidable wetland impacts would be cancelled or held up in significant delays awaiting Congressional funding to purchase “off-Post” wetland credits.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. The credits purchased were in the secondary service area of the Wilkinson-Oconee Bank which was the only bank with available credits. The on base Pond Four Mitigation Bank would not have enough acreage needed for these projects. Fort Stewart has conducted an in-depth review of potential wetland mitigation sites on the base and is in the process of developing additional areas connected to the existing Pond Four Mitigation Bank; however, no additional mitigation is available at this time.

h. Issue 9: The Applicant's proposed mitigation plan is based on mitigation credits purchased a year ago from the Wilkinson-Oconee Bank which was the "only bank that provided an offer to the solicitation...." DEIS at 6-8. It is our understanding that Section 404 permit applicants are discouraged from procuring mitigation credits in advance of

receiving a permit so that the Applicant is not limited in its mitigation options, such as the use of new mitigation banks. This reasoning is at play here. It has been a year since the Applicant solicited a mitigation contract and, according to the Applicant's DEIS mitigation bank table 6.1, at least two Ogeechee River Watershed banks may now have credits available.

(1) Applicants Response: The timeline associated with Congressional Budget approval and Federal Appropriation process for military construction requires advance planning to enable construction to be implemented in the timeframe appropriation was made. The timeline for planning and construction of these projects is quite early (two years out or more) and did not allow for a later solicitation. To secure the funds necessary to build a proposed range, Headquarters-Department of the Army (HQDA) requires the Installation to budget for wetland impacts that will be unavoidable at least two years prior to the proposed project's anticipated contract award date. If an Installation fails to provide this to HQDA within the given timeline, the project is not funded. In the past, Fort Stewart has been able to mitigate using its on-Post wetland mitigation bank; however, as mentioned above, the on-Post bank no longer has an adequate amount of credits available to support these ranges while also meeting the requirements of the Installation's "In-Theater" mission requirements. The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR. Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Section 6.4.1.1 of the FEIS has been revised to clearly explain that a mitigation decision has not yet been made for the FY13 QTR and the FY13 DMPTR.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. The USACE recognized the time restraints associated with the proposed projects and the military's appropriation and allocation of funds needed for potential wetland impacts and agreed to the use of the Wilkinson-Oconee Bank for these projects. Any future projects mitigation requirements would fall within the guidelines and mitigation availability in place at that time.

i. Issue 10: Furthermore, we share EPA's concerns that the Applicant is not

sufficiently mitigating impacts on streams. It is our understanding that Fort Stewart's projects in the past have significantly affected streams that were not mitigated. ORK urges the Corps to ensure that stream impacts are assessed separately from wetlands impacts and that the loss of streams is compensated appropriately. Overall, ORK is concerned that the Applicant's proposed mitigation plan simply does not include adequate compensation for Fort Stewart's wetlands and streams that will be significantly impacted by the Project.

(1) Applicants Response: No streams will be lost as a result of the proposed project. The footprints of the MPMGR and IPBC on the 7.5-minute USGS topographic quads show "blue line" streams in the areas; however, a site visit by Fort Stewart and the Georgia Environmental Protection Division (GA EPD) on January 20, 2010, found no streams. The Savannah District also did not identify any streams within the range footprints. This information was added to Section 4.3.1, of the FEIS.

Over the years, Fort Stewart has worked diligently to mitigate impacts – direct and indirect, as well as cumulative – to the Installation's streams, as well as wetlands. During the development of the Installation's wetland bank, for example, thousands of feet of Canoochee Creek and Strum Bay were restored without being credited to the Installation's mitigation bank. The Installation takes pride in that fact and welcomes working with ORK and other local environmental stakeholders on future projects.

(2) USACE Position: The USACE has completed an expanded preliminary jurisdictional determination for the project site. This determination verified there are no jurisdictional streams located on the project site.

j. Issue 11: Failure to Minimize Impacts to Marine Resources. Section 404(b)(1) guidelines prohibit issuance of a permit where "[t]he proposed discharge does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem." 40 C.F.R. § 230.12(a)(3)(iii) (emphasis added). None of the information that we have reviewed demonstrates that the Applicant has tried to adequately minimize the impacts of the Project. The Applicant repeatedly contends that because it is utilizing existing range footprints the Project will "avoid and minimize impacts to more pristine and un-fragmented wetlands systems" on Fort Stewart. See e.g. Public Notice at 3. While ORK appreciates the Applicant's utilization of existing ranges for the Project, this reuse

of range areas does not ensure minimization of harm to aquatic ecosystems or satisfy the regulation's mandate that the Project includes "all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem." 40 C.F.R. § 230. 12(a)(3)(iii).

(1) Applicants Response: In addition to avoiding and minimizing impacts to more pristine and un-fragmented wetlands systems, as noted in the comment, Fort Stewart consistently seeks to minimize and avoid wetland impacts at each stage of the design process. It is also important to note that the proposed ranges would be constructed on existing ranges that are operational and already cleared of vegetation. First, much of the avoidance and minimization process takes place before actual site selection. (See response to Issue #2.) Training ranges of this kind have fairly specific requirements and it is not always possible to build them without impacting every wetland in the footprint; however, site designers may alter certain aspects in response to environmental concerns during various stages of the design process (10%, 35%, 60%, 90%, and 100% stages of design completion). This is easiest if they can do so while still meeting the operational and training requirements of the range. For example, the currently on-going design process reduced the wetland impacts from the IPBC to a third of what they were at the time of writing the DEIS. Impacts from the MPMGR were also slightly reduced during that time and several proposed range projects were sited without wetland impacts of any kind. It is hoped that impacts from the QTR and DMPTR may be reduced, but as they are not yet in the design process, this cannot be precisely determined.

To ensure compliance with the Georgia (GA) Erosion and Sedimentation Control Act (ESCA) and the CWA on existing and future training ranges, Fort Stewart mandates full utilization of Timber Harvest best management practices (BMPs), National Pollutant Discharge Elimination System (NPDES) permit requirements, site-specific Erosion and Sedimentation Pollution Control Plans (ESPCPs), and pre- and post-construction BMPs to reduce the potential adverse impacts to water bodies, such as streams. The projects discussed in the JPN and FEIS have not undergone complete design. During this process, however, Fort Stewart stormwater specialists review ESPCPs for compliance with the GA ESCA and the CWA. The Installation also utilizes the Natural Resources Conservation Service (NRCS) to provide technical expertise during preparation of ESPCPs prior to Fort Stewart providing construction approval. Fort Stewart stormwater compliance assessors and NRCS consistently inspect and monitor on-going construction actions. They will also do this during the construction of these proposed projects to ensure adherence to associated ESPCPs. Fort Stewart inspectors also routinely inspect

tank trails, range access roads, range course roads, and dirt roads/trails to see if any damage is occurring (such as hardened tank trails or water crossings need repairs, to prevent sedimentation of adjacent streams).

(2) USACE Position: The USACE is preparing an analysis of the proposed project pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for this proposed project. This analysis will document that all requirements of the Guidelines have been met.

k. Issue 12: The Applicant-specifically, in Appendix D to the DEIS, fails to adequately describe measures intended to minimize impacts besides asserting that the ranges will be placed in existing disturbed areas. The proposed plans for MPMGR and QTR consist of wetlands impacts of 116.7 acres and 26.7 acres, respectively. Contrary to the Applicant's assertion that these proposed impacts are not extensive, the two ranges impact all wetlands within MPMGR and QTR areas. Thus, when all wetlands in each project area are destroyed or altered, the Applicant has failed to demonstrate that it has adequately minimized impacts to the aquatic ecosystem. The Applicant's failure to offer measures to minimize impacts to wetlands and streams violates the Section 404(b)(1) guidelines and the CWA. ORK urges the Corps to require the Applicant to set forth specific measures intended to minimize wetlands impacts on each of the four proposed ranges.

(1) Applicants Response: As noted in previous response, Fort Stewart attempts to avoid and minimize wetland impacts throughout the siting and design process. The most substantial avoidance and minimization occurs during the siting process as part of the site alternatives to carry forward for detailed analysis. Please note that, at the initial siting phase, the amount of wetland acres impacted attributed to each range is simply a total of all wetland acres that *would be located within the range footprint that could potentially be impacted*, and it is likely not *all of the wetlands within the footprint will be impacted by the project because avoiding and minimizing negative impacts wetland are carried forward as a consideration into the actual range design process after the site is selected*. Efforts are made to reduce these impacts as the design progresses and, it is anticipated that, as design proceeds, additional wetlands avoidance and minimization of effect will be achieved. Again as an example, the currently on-going design process for the IPBC

range has reduced the wetland impacts to a third of what they were at the time of writing the DEIS. Design efforts for the MPMGR have produced similar results, as well. Furthermore, little-to-no impervious surfaces will exist on these ranges, so runoff will not increase appreciably. The primary areas of "hardened surfaces" will consist of concrete turning pads, hardened stream crossings, etc., but not hardened roads and/or completely paved areas. The range surfaces will still be permeable, and, after construction, will acquire a covering of grasses and light herbaceous vegetation. Furthermore, wildlife may still traverse the ranges and graze during periods (sometimes weeks or more) the ranges are not in use.

In regard to the general issues of siting ranges and orienting them to avoid wetlands, further mention must be made of the Surface Danger Zone, or SDZ. Every range has an SDZ, an area within which people, property, and wildlife are in danger of being struck by projectiles during live fire exercises. Because of this danger, safety of Fort Stewart personnel, the public, and wildlife is a primary consideration in range siting. As previously noted, an SDZ may cover hundreds or even thousands of acres, and ranges must be sited to ensure areas of habitation, daily operations, traffic, and environmental sensitivity do not fall within them. A further limitation to siting is the fact that Fort Stewart is essentially cut into quarters by two major Georgia highways conveying regular civilian traffic. Injury or loss of human life during live fire exercises due to an improperly placed SDZ would be unacceptable to any party. Therefore, all organizations involved in siting ranges are forced to site ranges and their attendant SDZs very carefully. Efforts are made to ensure SDZs overlap. This maximizes land use and minimizes areas impacted by live fire; in part this is itself an environmental consideration as vegetation and animal populations may suffer losses from carelessly directed live fire.

(2) <u>USACE Position</u>: The USACE is preparing an analysis of the proposed project pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for this proposed project. This analysis will document that all requirements of the Guidelines have been met.

l. <u>Issue 13</u>: Deposition of Munitions. Finally, to our knowledge the Applicant fails to discuss the impact to water quality of any munitions landing in any waters of the United States on the proposed ranges. Under the Section 404(b)(1) guidelines, the Corps

has an independent duty to evaluate water quality impacts before it issues a permit. The deposition of the munitions in such waters will be an indirect impact of the proposed Project.

(1) Applicants Response: The Military Munitions Rule states that used or fired munitions are considered a solid waste only when they are removed from their original landing spot (www.epa.gov/epaoswer/hazwaste/military/index.htm). Therefore, since the proposed ranges will utilize existing impact areas and the munitions will be used for their intended purposes and will be left where they land, the munitions are not considered solid waste. The best practices to minimize the impact of lead on the environment are stormwater and erosion controls, vegetation management, soil amendments, bullet traps, and soil pH modifiers which are utilized.

(2) USACE Position: A certain percentage of the munitions that are used or fired on this range, and the other three ranges under review, would likely land in waters of the United States. The USACE would assume that most of this exploded ordinance would be comprised of lead, copper, zinc and other inert metals. Fragments of inert metal would not dissolve in water or otherwise become bio-available. Therefore, there would be a very low probability of munitions resulting in a more than minimal impact on water quality. The Georgia Environmental Protection Agency is reviewing the proposed project under Section 402 of the Clean Water Act, for compliance with the state's Water Quality Certification program. Prior to the USACE issuing a final permit for this proposal, the Georgia EPD must first issue Water Quality Certification. With issuance of Water Quality Certification, Georgia EPD would confirm that the proposed project would meet all applicable state standards.

PART III - ALTERNATIVES/SECTION 404(b)(1) ANALYSIS

A. ALTERNATIVES:

1. No Action: Under this alternative, Fort Stewart would not construct an IPBC range on the Installation. Without this range complex, the infantry units that are stationed on or habitually train on the Installation would not be able to train critical, collective infantry platoon live-fire tasks. There is no other range on the Installation designed to support the live-fire training of infantry platoon collective tasks. Without the IPBC range, infantry

platoons would not be trained in the unit collective live-fire skills needed prior to moving into platoon and company level collective live-fire training. Without this range infantry platoons would not be able to train to Army collective live-fire tasks standards and would not be considered combat ready.

2. Off-Post Locations: Consideration was given to siting the IPBC in an Off-Post location. Duplicating the infrastructure at a location Off-Post would incur considerable costs beyond the capability of the applicant's budget constraints. The IPBC would at a minimum require a large tract of land in an appropriate shape to co-locate the surface danger zones (SDZ) and associated facilities (see further discussion below). Estimates and surveys have shown to acquire such a track of land would require an Environmental Impact Statement. An Off-Post facility would be difficult to locate and still meet the Proximity requirements, especially given the logistics, cost, and scheduling required. Additionally, there are no other Public Lands available nearby that would be compatible with the IPBC training requirements.

3. On-Post Location: As previously stated, the proposed project is for the construction of an IPBC that does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make Unexploded Ordnance (UXO) clearance operations difficult. The IPBC is a small caliber range used to support infantry platoon live-fire collective training to test infantry platoons (mounted or dismounted) on the skills necessary to conduct tactical movement techniques, and detect, identify, engage, and defeat stationary and moving infantry and armor targets in a tactical array. In addition to live fire, this range is used to train on sub-caliber and/or laser devices and can support the live-fire collective training needs of active and reserve component infantry platoons.

   The IPBC includes eight mortar simulation device emplacements, six SATs, one MAT, 43 SITs, 14 MITs, one trench obstacle, nine machine-gun bunkers (with sound effects simulator), two landing zones, one assault/defend house, two 800-square-foot buildings, an air-vault latrine facility, ammo breakdown area, range tower, enclosed bleachers, and a covered mess facility. The IPBC footprint totals 1000 acres and would undergo selective tree removal (no clear-cut) to enhance training realism and for target placement. Landing and drop zone areas would be completely cleared.

The applicant identified three potential IPBC sites located within the Fort Stewart reservation. Each of these sites contains the area needed to support the range and accompanying SDZ. The

three sites, which are discussed in more detail below, were identified and evaluated using the following criteria:

1. Allow Anti-Terrorism and Force Protection. The site must be able to accommodate appropriate anti-terrorism measures and standoff distances.

2. Compatibility with Wildfire and Control (Prescribed) Burning Programs. The risk of wildfires is taken into consideration when siting projects. Areas to be avoided are those that are infrequently burned, because of safety concerns and for adherence to protected species habitat management plans include parcels near major highways (State and Interstate) and adjacent communities. Constructing facilities in locations that hinder Fort Stewart's prescribed burn program must be avoided.

3. Minimization of Environmental Impacts. Consideration of environmental impacts when siting projects include the following: avoid or minimize impacts to cultural and natural resources (such as wetlands and protected species); avoid direct impacts to creeks and streams; limit expansion of noise cones into existing residential areas and off-post communities; minimize adverse air quality impacts; and limit new metal contamination in standing timber (ranges).

4. Further Sustainability Goals. The Army incorporates sustainability principals into the planning, development, and upgrade of its facilities. From the outset, site selection and design follow sustainability principals, starting with design "charrettes" to ensure stakeholder collaboration toward optimal design, fiscal constraints, local characteristics and constraints, environmental issues, and consideration of functional adjacencies/relationships and land use compatibility. Site selection is based on functional adjacencies/relationships and land use compatibility. Ensure development near Fort Stewart's Garrison/cantonment (living and working) areas flow well with existing infrastructure, protecting green fields and preserving habitat and natural resources. Minimize negative impacts on the site and on neighboring properties and structures; avoid or mitigate excessive noise, shading on green spaces, additional traffic, obscuring significant views, etc.

The Army Range Requirements Model (ARRM) is an Army-wide planning tool used by Army Headquarters to determine range requirements at each Army Installation. The ARRM provides an automated capability to take doctrinal requirements and accurately

calculate live training throughput capacities and throughput requirements for each Installation. Ranges must be identified in the Installation's ARRM for it to receive Department of the Army (DA) funding. In addition to the four siting criteria listed above, which are applicable to all facilities at Fort Stewart, the MPMGR has been identified in the ARRM and was sited based the following Range-specific criteria:

1. Ability to Meet Training Requirements. There should be sufficient range capacity to ensure each unit meets its training requirements as set forth in the following: Army regulation (AR) 350-1, *Army Training and Leader Development*; Training Circular (TC) 7-9, *Infantry Live-Fire Training*; DA Pamphlet (PAM) 350-38, *Standards in Weapons Training*; TC 25-8, *Training Ranges*; the 3rd Infantry Division's Live Fire Guidance; and the unit's related Mission Essential Task List.

2. Range Design. Based on each proposed range's training purpose, each range must be of sufficient acreage to accommodate the SDZs for use of the specified munitions, as required by DA PAM 385-64, *Ammunition and Explosive Safety Standards*. The SDZ is a temporary safety boundary that surrounds the firing range and associated impact area that provides a buffer to protect personnel from the non-dud producing rounds that may be ricocheted during operation of the range. It includes an ordnance dispersion area, ricochet area, and an added safety buffer zone. This area is closed to all unauthorized personnel during each training exercise on the range. In addition, each range must have an existing impact area sufficient to support live-fire munitions used at Fort Stewart and be configured (e.g., course and targets) in a manner lending itself to achieving offensive and defensive training objectives.

3. Proximity. Range assets must be available for access by all Fort Stewart-stationed units to meet their reoccurring training requirements and to achieve combat readiness status before they deploy. This means sufficient ranges must be available within a geographic distance that allows each unit to get equipment to and from range locations to complete essential tasks in a timely manner. The time and cost of transporting units to a training area must not interfere with the overall training levels for a unit. Each unit has a limited amount of time and cost resources to achieve training requirements. The time and cost of transport cannot be so excessive that it compromises the unit's ability to meet all mission essential tasks and readiness requirements. Quality of life may be affected if troops have to travel too far for training.

The USACE has performed an analysis of the three identified Courses of Action (COAs) and determined that COA 1 is the preferred alternative. The range design in COA 1 results in fewer wetland impact than COA 2 while minimizing operational constraints. A table is shown below for each proposed range, comparing each COA against the operational feasibility criteria is shown below. The overall screening criteria discussed in more detail below.

Summary of Screening Analysis for FY11 IPBC				
Criteria	**No-Action**	**COA 1**	**COA 2**	**COA Eliminated**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	●	●	⊘
Has the range been sited to maximize use of the Installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	●	●	✗
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	⊘
Does this course of action avoid and minimize adverse environmental impacts?	✔	●	⊘	⊘
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	●	●	●
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	⊘
Does this course of action minimize construction costs for the range? [1]	✔	⊘	⊘	⊘
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Course of Action Feasibility	✗	⊘	⊘	✗

[1] For *this criterion, that may arise for mitigating potential environmental impacts. It represents only the relative cost of construction for each particular location.*

LEGEND:

✖ = Not Feasible – Unacceptable limitations
⊘ = Feasible – Moderate limitations and challenges
● = Feasible – Minor limitations and challenges
✔ = Feasible – No limitations or challenges
n/a = Not Applicable

The Directorate of Public Works (DPW) Environmental Division, working in conjunction with the Directorate of Plans, Training, Mobilization, and Security (DPTMS) Training Division, the DPW Fish & Wildlife Branch, the DPW Forestry Branch, and the DPW Master Planning Division were able to identify three separate locations on Fort Stewart for the placement of this IPBC. Each of the three sites is discussed in more detail below:

a. **COA 1 is located in the C-1 Training Area (Within Alternative B) and is the preferred site.**

Allow Anti-Terrorism and Force Protection. Appropriate anti-terrorism measures and standoff distances are met by siting IPBC at COA 1.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the IPBC at COA 1 would not create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities.

Minimization of Environmental Impacts. Siting the IPBC on top of an inactive aerial gunnery range reduces new adverse impacts to the environment; approximately 5.39 acres of impact are proposed with COA 1. The target boxes in the proposed footprint were site adapted to reduce wetland and threatened and endangered species impacts. Also, the IPBC footprint will not require site clearing for the entire footprint. Selective tree thinning will add to training realism while leaving a portion of the Red-cockaded woodpecker (RCW) habitat in place. It is probable that the RCW clusters located outside of the battle course's footprint would be impacted within the SDZ. The IPBC footprint will utilize selective tree thinning, not a clear-cut, which will add to training realism while leaving some RCW habitat in place. Impacts may occur to the RCW clusters located outside of the course's footprint within the SDZ, though not to a degree that would restrict the Installation from meeting its RCW recovery goals. RCW habitat protection

berms will be constructed to help reduce adverse impacts. Therefore, consultation with the US Fish and Wildlife Service (USFWS) is underway for this course of action. It is not anticipated that these impacts will restrict the Installation from meeting its RCW recovery goals. Noise contours would not extend beyond the Installation's boundary at this IPBC location. There are no cultural resources known to exist on the site. Environmental impacts were minimized, while meeting operational requirements when siting. Therefore, this site is carried forward as a viable COA, as the Installation's preferred IPBC site.

Further Sustainability Goals. As discussed above, COA 1 was sited to on top of an inactive aerial gunnery to avoid development of an inappropriate site and reduce environmental impacts. COA 1 was selected based on compatibility with the adjacent land use.

Ability to Meet Training Requirements. Fort Stewart considered the location of this proposed range in relation to the rest of the Installation and has determined this site to be the most viable course of action. The site does not isolate useful maneuver terrain, cut off impact areas, or make clearance operations difficult. COA 1 for the IPBC would not result in live fire rounds crossing major roads nor would it result in the SDZ extending beyond the Installation's boundary.

Range Design. The IPBC is a 1,000-acre facility with two helicopter landing zones and several target boxes located throughout the footprint. Weapon firing could occur in a 360 degree radius. The northern training area, particularly C-1, was the best location that could accommodate the tactical array of an IPBC. COA 1 was configured to achieve offensive and defensive objectives. COA 1 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use at Fort Stewart. The course would support mounted and dismounted training. The impact area associated with this battle course is already duded. Since the location of COA 1 is on top of an old aerial gunner range, the possibility of unexploded ordnance exists. However, unexploded ordnance will be characterized and removed prior to range construction.

The preferred IPBC location does not impact existing maneuver areas, nor does it create a new contaminated impact area. The proposed range does not impact existing flight routes and is in close proximity to existing utilities. There are also existing power lines in the area.

Proximity. This location would constrain training within Fort Stewart due to the distance from the garrison to the C-1 TA. Transportation to the range is the largest design constraint of this location. COA 1 would require lengthy transportation to meet annual training requirements and

to achieve combat readiness status before they deploy. The time and cost of transporting units to COA 1 would have a minor impact on the overall training levels for a unit.

Advantages/Disadvantages: Advantages of this site are that it does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult. UXO presence is assumed (due to its historical use as a range) and it will be characterized and removed prior to new range construction. Construction at this site would not result in live fire rounds crossing State Highways or Interstates, the SDZ extending beyond Fort Stewart's boundary, and it is also within 10,000 feet of existing power lines. Impacts to wetlands would be avoided and minimized as discussed further in Section B of this document.

b. COA 2 is located C-1 TAs within Alternative C.

Allow Anti-Terrorism and Force Protection. Appropriate anti-terrorism measures and standoff distances are met by siting IPBC at COA 2.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the IPBC at COA 2 would not create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities.

Minimization of Environmental Impacts. The difference between COA 1 and COA 2 is the orientation of the IPBC footprint. The orientation of COA 1 better supports movement of the target boxes to minimize wetland and threatened and endangered species habitat impacts. Similar to the environmental impacts discussed with respect to COA 1, siting the IPBC COA 2 on top of an existing range reduces adverse impacts to the environment. The target boxes in the proposed footprint could also be site adapted to reduce wetland and threatened and endangered species impacts. However, there would be much larger wetland impacts with COA 2 (approximately 31.5 acres). While COA 2 would result in greater wetland impacts, the site would avoid impacts to protected species habitat. The COA 2 IPBC site would extend Noise Zone II (87 dB PK15) approximately 375 meters beyond the Installation boundary, creating a new noise receptor area. There are no cultural resources known to exist on the site. In summary, there is a low potential for indirect impacts to nearby cultural resources and can be avoided or minimized. Environmental constraints were minimized where possible while meeting operational requirements when siting COA 2. Therefore, this site is carried forward as a viable COA, as the Installation's second IPBC site.

Further Sustainability Goals. As discussed above, COA 2 was sited to on top of an inactive aerial gunnery to avoid development of an inappropriate site and reduce environmental impacts. COA 2 was selected based on compatibility with the adjacent land use.

Ability to Meet Training Requirements. COA 2 also provides sufficient capacity to support an IPBC. Fort Stewart considered the location of this proposed range in relation to the rest of the Installation and has determined this site to be the most viable course of action. The site does not isolate useful maneuver terrain, cut off impact areas, or make clearance operations difficult.

Range Design. As with COA 1, COA 2 was configured to achieve offensive and defensive objectives. COA 2 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use on Fort Stewart. The course would support mounted and dismounted training. The impact area associated with this battle course is already duded. Since the location of COA 2 is on top of an old aerial gunner range, the possibility of unexploded ordnance exists. However, unexploded ordnance will be characterized and removed prior to range construction. COA 2 does not impact existing maneuver areas, nor does it create a new contaminated impact area. The proposed range does not impact existing flight routes and is in close proximity to existing utilities. There are also existing power lines in the area. COA 2 for the IPBC would not result in live fire rounds crossing major roads nor would it result in the SDZ extending beyond the Installation's boundary.

Proximity. As with COA 1, the COA 2 would constrain training within Fort Stewart due to the distance from the garrison to the C-1 TA. Transportation to the range is the largest design constraint of this location. COA 2 would require lengthy transportation to meet annual training requirements and to achieve combat readiness status before they deploy. Transporting units to COA 2 would have a minor impact on the overall training levels for a unit.

<u>Advantages/Disadvantages</u>: The primary difference between COA 1 and COA2 is the orientation of the IPBC footprint itself. Disadvantages of COA 2 include increased environmental impacts.

c. COA 3 is located in TAs B-14/15 within Alternative C.

Allow Anti-Terrorism and Force Protection. Appropriate anti-terrorism measures and standoff distances are met by siting IPBC at COA 3.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the IPBC at COA 3 would not create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities.

Minimization of Environmental Impacts. Environmental impacts associated with COA 3 are unknown since this alternative was eliminated from further review due to the operational constraints.

Further Sustainability Goals. As discussed above, COA 3 was sited to on top of an inactive aerial gunnery to avoid development of an inappropriate site and reduce environmental impacts. COA 3 was selected based on compatibility with the adjacent land use.

Ability to Meet Training Requirements. COA 3 in TAs B-14/15 would require the closure of a heavily utilized tank trail (FS 42). The SDZ of Red Cloud Hotel Range, when firing, would also interfere with and reduce the full use of the IPBC, which could remove or interfere with this range's use in the training rotation. This alternative was determined unfeasible.

Range Design. COA 3 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use at Fort Stewart. However, COA 3 would require the closure of a heavily utilized tank trail (FS 42) and was determined unfeasible.

Proximity. Transporting units to COA 3 would have a minor impact on the overall training levels for a unit.

Advantages/Disadvantages: COA 3 in TAs B-14/15 would require the closure of a heavily utilized tank trail (FS 42). The SDZ of Red Cloud Hotel Range, when firing, would also interfere with and reduce the full use of the IPBC, which could remove or interfere with this range's use in the training rotation. This alternative was determined unfeasible.

B. AVOIDANCE:

1. Total wetland avoidance on-site is not possible based on the layout and size of range complexes. Also, the layout of adjacent wetland areas made total avoidance impossible. Any further reduction in proposed impacts would not meet the applicant's purpose and

would not be practicable.

2. The applicant has completed the 90% site design for the proposed project. The standard site layout for this type of range would require the filling and/or mechanized clearing of all 5.39 acres of bottomland hardwood wetlands on the 71-acre project site. The applicant will likely be able to avoid some of the wetlands on the project site as final site design is completed for the project. However, for the purposes of this permit evaluation, the USACE will assume that all 5.39 acres of wetlands on the proposed project site would be impacted. As an additional avoidance measure, the USACE would include the following special condition in any draft permit issued for this project:

> The site design for this project has not been finalized. Authorized wetland impacts are based on a standard range design. Prior to conducting any work in wetlands on this project site, the permittee shall submit final site development plans to the USACE for review and approval. No work in wetlands can occur until the USACE has reviewed and approved the final plan in writing; this concurrence letter needs to document that the 404(b)(1) process has been adequately demonstrated. It is anticipated that once final design is completed, there will be a minor reduction in the amount of wetland area that will be impacted by the project. This anticipated change in the footprint of authorized wetland impact is authorized under this permit and modification of the permit will not be required for this change in site design.

C. MINIMIZATION ALTERNATIVES:

1. Reducing wetland foot print: As required by Section 404(b) 1 of the CWA, minimization of wetlands was documented within the footprint the project site. The range floor was re-sited in several locations to document avoidance and to minimize the wetland impact. Overall, the wetland impacts in COA 1 were reduced from 15.9 acres to 5.39 acres, pursuant to the 90 percent design review. All other significant environmental issues (Threatened and Endangered Species [T&ES], CRM, Tribal Issues...etc) will not experience adverse impacts or require environmental mitigation. Again; the preferred COA 1, only impacts wetlands. Even though these wetland impacts will be extensive, they are not significant compared to the potential adverse impacts from habitat loss of the RCW or CRM resources associated with the other COAs. As with other ranges that are currently being planned and sited at Fort Stewart, the IPBC is utilizing an existing

training footprint and SDZ, which will avoid and minimize impacts to more pristine and un-fragmented wetland systems that exist in other low impact training areas. The IPBC is considered a maneuver range which allows the range planners more flexibility to move objective boxes and targets to avoid wetland impacts and other sensitive environmental resources. Efforts to minimize wetland impacts are also referenced in the Range and Garrison Construction Environmental Impact Statement (RGCEIS), Section 2.3.2 FY11 IPBC through the graphical presentation of the standard range design for the IPBC versus the preferred COA.

2. Erosion Control Techniques: The applicant has indicated that best management practices (BMPs) would be utilized while performing any construction activities on the subject property. In addition, the applicant has indicated that activities would be performed in a manner to minimize turbidity and/or erosion. Any permit that would be issued by the USACE would also include the following special condition, "All work conducted under this permit shall be located, outlined, designed, constructed and operated in accordance with the minimal requirements as contained in the Georgia Erosion and Sedimentation Control Act of 1975, as amended. Utilization of plans and specifications as contained in "Manual for Erosion and Sediment Control, (Latest Edition)," published by the Georgia Soil and Water Conservation Commission or their equivalent will aid in achieving compliance with the aforementioned minimal requirements."

D. COMPENSATORY MITIGATION: Using Savannah District's Standard Operating Procedure (SOP), for calculating compensatory mitigation requirements, Fort Stewart determined that at least 40.35 credits are required to compensate for the proposed impacts. In June 2009, Fort Stewart contacted eight off-post mitigation banks. Fort Stewart solicited a contract for the purchase of in-kind mitigation credits for a period of 16 days, starting 28 May 2009, to all mitigation banks that could service Fort Stewart with wetland mitigation credits acceptable by the USACE. The only bank that provided an offer to the solicitation was Wilkinson-Oconee Bank. As described on its website, the Bank consisted of ditched, drained and clear-cut bottomland hardwoods, marginal forested scrub-shrub and herbaceous wetland systems, impaired streams and degraded riparian buffers and is being restored to vast bottomland hardwood wetland system that historically existing. Therefore, aquatic impacts associated with the proposed ranges are commensurate with the secondary service area of Wilkinson-Oconee Bank, which is a USACE approved mitigation bank.

At the time of the required solicitation, other banks within Fort Stewart's primary service area

did not have the appropriate number of credits available to support the Installation's needs to meet Congressional funding timelines for the proposed ranges. The Wilkinson-Oconee Bank has the appropriate number and resource type of credits available for Fort Stewart to completely mitigate unavoidable wetland impacts associated with proposed range construction.

E. CONCLUSIONS: Based on the above, an off-post facility would be difficult to locate and still meet the proximity requirements, especially given the logistics, cost, and scheduling required. Also, duplicating the infrastructure at a location off-post would incur considerable costs beyond the capability of the applicant's budget constraints. The applicant provided an adequate analysis of on-post locations for sighting this range and mitigation, as well as three other proposed new ranges.

F. SECTION 404(b)(1) ANALYSIS: This project must be evaluated for compliance with the Section 404(b)(1) Guidelines (40 CFR Section 230). The goal of the 404(b)(1) Guidelines is "to restore and maintain the chemical, physical, and biological integrity of waters of the United States through the control of discharges of dredges or fill material." An expanded 404(b)(1) analysis will be conducted prior to making any permit decision.

PART IV - PUBLIC INTEREST REVIEW

A. ENVIRONMENTAL SETTING/EXISTING CONDITIONS: The Department of the Army owns and manages the area in which the proposed IPBC is located. The preferred COA is located with C-1 Training Area.

B. ENVIRONMENTAL IMPACTS: The USACE Regulatory Program considers the full public interest, reflecting the protection and utilization of important resources. Table 3 is a summary of our public interest review for the proposed activity, which assesses the impacts of the proposed permit action on environmental and other public interest factors
(33 CFR 320.1(a)(1), 320.4 and 325.3(c)).

Table 3. Summary of Project Impacts

FACTORS	No Effect	Negligible	Undetermined	Beneficial Major/ Minor		Adverse Major/ Minor	
1. Economics/Social	X						
2. Education/Scientific	X						
3. Aesthetics	X						
4. Food-Fiber Production	X						
5. Historical/Architectural/ Archaeological	X						
6. Recreation	X						
7. Land Use	X						
8. Mineral Resources	X						
9. Soil Conservation							X
10. Water Supply Conservation	X						
11. Water Quality		X					
12. Air Quality		X					
13. Noise Levels							X
14. Public Safety		X					
15. Energy Needs							X
16. National Security	X						
17. Navigation	X						
18. Shoreline Erosion Accretion	X						
19. Flood Hazards	X						
20. Flood Plain							X
21. Wetlands							X
22. Refuges	X						
23. Fish	X						
24. Wildlife			X				
25. Food Chain Organisms	X						
26. Shellfish Production	X						
27. Threatened and Endangered Species			X				
28. General Environmental Concerns							X
29. Property Ownership	X						
30. Mineral Needs	X						
31. Other	X						

C. DISCUSSION: We have evaluated the permit application regarding the need for the proposed activities, the practicability of project alternatives, and the beneficial and detrimental effects, including cumulative impacts. Complete descriptions of the 31 public interest factors can be found in the RGCEIS for Fort Stewart. Each public interest factor is referenced to specific sections within the EIS.

1. Economics/Social – The proposed project will have no effect to the local economy or local social environment. (RGCEIS Section 4.11 Social and Economics)

2. Education/Scientific – The proposed project will have no effect to educational or scientific resources. The project footprint is within an Army Installation small arms impact area. (RGCEIS Section 4.11 Social and Economics)

3. Aesthetics – The proposed project will have no effect to aesthetics. The project footprint is within an Army Installation small arms impact area and is off-limits to unauthorized personnel. (RGCEIS Section 4.7 Land Use)

4. Food-Fiber Production – The proposed project will have no effect to food or fiber production. The project site is within an existing small arms impact area. (RGCEIS Section 4.4.3 Forestry Management)

5. Historical/Architectural/Archaeological – The US Army, Fort Stewart is the lead federal agency for this proposed action. Impact analysis for historic properties follow guidelines set forth in Section 106 of the National Historic Preservation Act (NHPA) implementing regulations (36 CFR 800), Fort Stewart's Programmatic Agreement with the Georgia SHPO. Fort Stewart would complete required consultation and make any necessary Section 106 of the NHPA determination, if required, prior to any work occurring in waters of the US subject to the jurisdiction of the USACE on a project site where cultural resources have been identified. (RGCEIS Section 4.5 Cultural Resources)

6. Recreation – The proposed project will have no effect to recreational areas. The footprint is located with a land use designated for range and training lands. (RGCEIS Section 4.7 Land Use)

7. Land Use – The proposed project is compatible to the existing land use category of range and training lands. Therefore, there will be no effect to land use. (RGCEIS Section 4.7 Land

Use)

8. Mineral Resources – The proposed project is located within the confines of an Army Installation that is designated for Soldier training. There are no minerals mined at Fort Stewart. Therefore, there will be no effect to mineral resources at the project site. (RGCEIS Section 4.1 Geology and Soils)

9. Soil Conservation – The project will undergo selective tree removal and grubbing and grading within the target objective boxes and landing zones. However, standard erosion and sedimentation control measures will be implemented to prevent sedimentation from leaving the confines of the project site. Erosion and sedimentation control best management practices (BMPs) will also be implemented throughout the duration of the project and after construction to ensure stormwater leaving the range has been filtered before reaching nearby wetland areas. Furthermore, an erosion and sedimentation control plan will be prepared for this project. A National Pollution Discharge Elimination System (NPDES) permit will be obtained for this project. At a minimum, a Level 1A Erosion and Sedimentation (E&S) Control Certified or Subcontractor Awareness E&S trained individual is required to be on site during any land disturbance activity. Adverse impacts to soil are expected to be minor and temporary in nature until construction is completed. (RGCEIS Section 4.1 Geology and Soils)

10. Water Supply Conservation – The proposed project will not require use of the Installation's water supply. Therefore, water supply will have no effect. (RGCEIS Section 4.3 Water Quality and Resources)

11. Water Quality – During the construction phase of the proposed project, wetland areas will be filled within the range footprint. All necessary permitting and mitigation will be conducted. See number 21, Wetlands, for additional information regarding impacts to wetland areas. Impacts to nearby surface water would likely not be impacted since necessary E&S control measures, as required by the Georgia Environmental Protection Division, will be implemented to prevent sedimentation from leaving the site. Turbidity samples will be taken during and after construction to ensure sedimentation in outfall areas do not increase from what the area currently experiences. Total Maximum Daily Load (TMDL) regulations require maintaining predevelopment time of concentration by strategically routing flows to maintain travel time, improve water quality, and to control the stormwater discharge. Flow calculations will also be conducted during preparations of the E&S control plan to ensure

concentrated stormwater runoff flows from peak rain events will not impact nearby water bodies. The proposed project footprint will be filled during construction activities; therefore, adverse impacts to groundwater are not anticipated.

Fort Stewart is in consultation with the Georgia Environmental Protection Division regarding a water quality certification pursuant to Section 401 of the Clean Water Act. The USACE would include a copy of the 401 water quality certification with any permit issued. In addition, the special condition of any permit issued would require the permittee to adhere to the conditions of the 401 water quality certification. (RGCEIS Section 4.3 Water Quality and Resources)

12. Air Quality – Adverse impacts to air quality is not anticipated. Only minor and temporary amounts of dust generation during timber harvesting and construction are expected; however, no regulatory air quality thresholds would be exceeded. (RGCEIS Section 4.2 Air Quality)

13. Noise Levels – The projected operating environment would generate a Noise Zone II contour that extends less than 1,000 meters beyond the northern boundary. There are small clusters of residential areas within these Noise Zone II contours. The projected operating environment would not generate a Noise Zone III contour that extends beyond the boundary or into the Fort Stewart housing area. (RGCEIS Section 4.6 Noise)

14. Public Safety – During the timber harvest, prescribed industrial safety standards would be followed. No specific aspects of the proposed project would create any unique or extraordinary safety issues. The project location is outside of current explosive safety quantity distance clear zones and the inhabited building distance clear zones. An unexploded ordnance survey will be conducted prior to timber harvesting and construction activities. If necessary, an unexploded ordnance avoidance plan will be prepared. (RGCEIS Section 4.9 Safety)

15. Energy Needs - Within the area of potential effect, there are existing utilities into which new lines from the range can tie in, minimizing the potential ground disturbing activities associated with the establishment of all-new utility systems. This proposed project would also not result in a substantial increase in utility usage. Executive Order 13423 sets as a goal for all federal agencies the improvement of energy efficiency and the "reduc[tion] of greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal

year 2015, relative to the baseline to the agency's energy use in fiscal year 2003." The U.S. Army Energy Strategy for Installations (U.S. Army Energy Strategy for Installations, 8 July 2005, available at http://army-energy.hqda.pentagon.mil/docs/strategy.pdf), also contains strategies to reduce energy waste and improve efficiency. Taking these policies into account, this action does not represent a net incrementally addition to the global climate change problem. (RGCEIS Section 4.8 Infrastructure)

16. National Security – The proposed project will have no effect to national security. The requirement for this range has been validated by the Range and Training Land Program Development Plan prepared for Fort Stewart and the Forces Command Live Fire Training Investment Strategy. This project has been coordinated with the Installation physical security plan, and all physical security measures are included in the project. All required antiterrorism protection measures are included in the project, per DA Pamphlet 190-51 (*Risk Analysis for Army Property*) and Training Manual 5-853-1 (*Security Engineering Project Development*). (RGCEIS Section 4.9 Safety)

17. Navigation – Navigable waters will not be impacted by this project. (RGCEIS Section 4.3 Water Quality and Resources)

18. Shoreline Erosion Accretion - The site is many miles from the coast and the project will not add to shoreline erosion accretion. (RGCEIS Section 4.1 Geology and Soils)

19. Flood Hazards – The site does not present an unusual flood hazard for this area (see below.) (RGCEIS Section 4.3 Water Quality and Resources)

20. Flood Plain – Small portions of the site (roughly conforming to those areas where wetlands intersect the site) are located in the Federal Emergency Management Administration (FEMA) 100 year flood zone, meaning that the flood elevation in those areas has a 1- percent chance of being equaled or exceeded each year. This does not present an unusual flooding hazard for this area, and as the site will be used only for military training, does not present an appreciable hazard to property or human safety. (RGCEIS Section 4.3.1 Surface Water and Floodplains)

21. Wetlands – The project, as currently proposed, would impact 5.39 acres of bottomland hardwood wetlands, either through direct filling or by mechanized landclering. The applicant has completed the 90% site design for the proposed project. The standard site layout for this type of range would require the filling and/or mechanized clearing of all 5.39

acres of bottomland hardwood wetlands on the 71-acre project site. The applicant will likely be able to avoid some of the wetlands on the project site as final site design is completed for the project. However, for the purposes of this permit evaluation, the US Army Corps of Engineers (USACE) will assume that all 5.39 acres of wetlands on the proposed project site would be impacted. As an additional avoidance measure, the USACE would include the following special condition in any draft permit issued for this project: The site design for this project has not been finalized. Authorized wetland impacts are based on a standard range design. Prior to conducting any work in wetlands on this project site, the permittee shall submit final site development plans to the USACE for review and approval. It is anticipated that once final design is completed, there will be a minor reduction in the amount of wetland area that will be impacted by the project. This anticipated change in the footprint of authorized wetland impact is authorized under this permit and modification of the permit will not be required for this change in site design.

The present total proposed wetland impact for the four proposed ranges is 179.03 acres. As discussed by the applicant above, not all of these proposed impacts are for fill, but a certain percentage would involve mechanized land clearing impacts. Clearing wetlands of vegetation and maintaining them in scrub/shrub vegetation results in a change in function, but not a total loss in function. The mitigation credits proposed by Fort Stewart are assuming a total loss in function. The proposed mitigation plan is to purchase 1,391 credits to compensate for a total of 179 acres of wetland impact. This is credit to impact ratio of 7.8:1. On average, three credits are generated for each acre of wetland restoration at the Wilkinson/Oconee Mitigation Bank, where credits will be purchased. Therefore, the effective mitigation ratio for this project would be approximately 2.6:1 of wetland restoration. Therefore, it is the position of the USACE that the mitigation proposed for this project, as well as the other three proposed range projects, would meet the requirements of the new mitigation rule.

Even with implementation of the applicant's proposed compensatory wetland mitigation plan, the project would result in an overall loss in aquatic function within the watershed and on Fort Stewart. Therefore, the USACE has determined that the project would result in a minor adverse impact to wetlands. (RGCEIS Section 4.3.2 Wetlands)

22. Refuges - The site will not impact any areas specifically devoted to wildlife refuge. (RGCEIS Section 4.4 Biological Resources)

23. Fish – The site will not impact any fish species. The Canoochee and Ogeechee rivers are approximately 15 miles from the proposed project site. (RGCEIS Section 4.4 Biological Resources)

24. Wildlife –The site will impact RCW foraging habitat. Impacts to RCW clusters and foraging habitat will be minimized by constructing protection berms behind the target lines. During the design process, Installation Wildlife Management personnel will work with engineers to incorporate RCW protection berms where possible into the layout of the proposed project. Formal consultation with the USFWS has been conducted for these impacts. (RGCEIS Section 4.4 Biological Resources)

25. Food Chain Organisms – No specific or unique food chain organisms are known or suspected to exist on the site. (RGCEIS Section 4.4 Biological Resources)

26. Shellfish Production – The site is many miles from the coast and the project will not affect local shellfish production. RGCEIS Section 4.4 Biological Resources)

27. Endangered Species – The US Army, Fort Stewart is the lead federal agency for this proposed action. The site will impact RCW foraging habitat. Impacts to RCW clusters and foraging habitat will be minimized by constructing protection berms behind the target lines. During the design process, Installation Wildlife Management personnel will work with engineers to incorporate RCW protection berms where possible into the layout of the proposed project. Formal consultation with the USFWS has been completed for these impacts. Fort Stewart has completed required consultation and the USFWS has made necessary Section 7 of the Endangered Species Act determinations.

28. General Environmental Concerns – The project is expected to incur only the most minimal adverse impact to the local ecosystem. Sites are chosen to include the goal of avoiding and/or minimizing such impacts. Where possible and appropriate, impacts will be mitigated. Fort Stewart is generating an Environmental Impact Statement detailing these impacts.

29. Property Ownership – The property is owned by the United States Army for the primary purpose of military training. (RGCEIS Section 4.7 Land Use)

30. Mineral Needs – No particularly valuable or unique minerals are known or suspected to exist at the site. (RGCEIS Section 4.1 Geology and Soils)

31. Other – No notable environmental aspects not covered by the preceding will be impacted by this project.

D. US ARMY CORPS OF ENGINEERS' WETLAND POLICY: The proposed wetland alteration is necessary to realize the project's purpose and should result in minimal adverse environmental impacts. The benefits of the project would outweigh the minimal detrimental impacts. Therefore, the project is in accordance with USACE Wetland Policy (33 CFR 320.4(b)).

E. TITLE III OF THE CIVIL RIGHTS ACT OF 1964 AND EXECUTIVE ORDER 12898: The proposed action would not directly, or through contractual or other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin, nor would it have a disproportionate effect on minority or low-income communities.

F. CUMULATIVE IMPACTS: The Council on Environmental Quality (CEQ) defines cumulative impacts as the "impact on the environment which results from the incremental impact of the action(s) when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

Geographic Scope/Region of Influence (ROI): the National Environmental Policy Act (NEPA) requires that the impacts of each proposed project be considered within the appropriate geographical area/region of influence. The geographic area/ROI for purposes of consideration of proposed projects within the boundaries of Fort Stewart are: the Altamaha watershed and United States Geological Service, Georgia Hydrologic Unit Code (HUC) 03070106 encompassing portions of Appling, Evans, Glynn, Jeff Davis, Long, McIntosh, Montgomery, Tattnall, Toombs, and Wayne County; the Lower Ogeechee River watershed HUC 03060202, encompassing portions of Bryan, Bulloch, Chatham, Effingham, Emanuel, Jenkins, and Screven Counties; the Little Ogeechee watershed HUC 03060204, encompassing portions of Bryan, Chatham, Effingham, Liberty, Long and McIntosh Counties; and the Canoochee Creek watershed HUC 03060203, encompassing portions of Bryan, Liberty, Evans, Tattnall, Candler, Emanuel, and Bulloch Counties. The USACE determined that actions taken in the "Fort Stewart Watersheds" would be sufficiently similar in location, topography, watershed impacts, habitat types, etc., to be considered in a cumulative impacts assessment. To properly scope this analysis the USACE has identified target resources for evaluation based on public and agency comments. Target

resources are important resources that could be cumulatively affected by activities in the identified scoping area.

The USACE identified the following target resources because of their scarcity and regional importance: (1) wetlands; (2) water quality; (3) aquatic species, and (4) mitigation. Below we have assessed the cumulative impacts of the proposed project on these target resources. In doing this, we considered the impacts of this project, past projects, as well as all reasonably foreseeable impacts in the Fort Stewart Watersheds consisting of HUC's 03070106, 03060202, 03060204, and 03060203.

The proposed action, in addition to other projects in the geographic areas of consideration (i.e., HUC's 03070106, 03060202, 03060204, and 03060203), have the possibility to result in either negative or positive impacts in a cumulative manner. Cumulative impacts are most likely to occur when a relationship exists between a proposed action, or alternative, and other actions expected to occur in a similar location, time period, and/or involving similar actions, i.e. past, present, and reasonably foreseeable future actions.

There are numerous projects in the watersheds associated with Fort Stewart, which are part of typical urban activities/development. These projects can be categorized generally as construction, maintenance, or demolition. This analysis takes into account the proposed project/action along with the larger projects in the ROI.

1. Wetlands: The following table provides information on all wetland impacts permitted by the Savannah District between January 1, 1990, and July 6, 2005, and the acres of wetland mitigation required for these impacts. This information was generated by the Savannah District Regulatory Analysis and Management System (RAMS) database. There has undoubtedly been some additional loss of wetland during this time period from activities not regulated by the USACE, but no data exist on these losses.

Table 4. Wetland Impacts from January 1, 1990, through July 6, 2005, in the Counties Included in the Fort Stewart Watersheds

County	Acres	Wetland Acres Requested	Wetland Acres Permitted	Wetland Acres Mitigated
Bryan	111509	38.15	41.81	236.29

Bulloch	81797	114.67	119.28	205.28
Chatham	162459	701.13	666.91	4298.24
Effingham	127318	175.13	205.08	633.59
Emanuel	42158	67.78	67.78	269.26
Jenkins	35292	55.74	55.74	230.22
Screven	85270	47.99	57.19	92.08
Liberty	139558	55.74	55.74	230.22
Long	93629	117.9	117.9	1343.68
McIntosh	149942	16.86	16.85	69.64
Appling	39963	34.02	34.02	70.39
Evans	12493	21.28	21.28	34.81
Glynn	134011	210.8	210.13	1496.65
Jeff Davis	23394	2.68	2.68	3.75
Montgomery	14426	8.78	8.78	6.96
Tattnall	33959	31.49	31.49	73.08
Toombs	21718	3.45	3.45	2.43
Wayne	99669	189.6	188.5	1499.45
Candler	17051	4.98	10.48	4.78
Emanuel	42158	67.78	67.78	269.26
TOTALS	1467774	1965.95	1982.87	11070.06

In summary, the USACE can document that in 1990 there were approximately 1,467,774 acres of wetlands in HUC's 03070106, 03060202, 03060204, and 03060203 within Bryan, Bulloch, Chatham, Effingham, Emanuel, Jenkins, Screven, Liberty, Long, McIntosh, Appling, Evans, Glynn, Jeff Davis, Montgomery, Tattnall, Toombs, Wayne, Candler and Emanuel Counties. By deducting 1,982.87acres of wetland impacts since 1990 (RAMS database), there are at least 1,465,792 acres of wetlands remaining in this area. This amounts to a loss of 0.2 percent of the wetlands in HUC's 03070106, 03060202, 03060204, and 03060203 since 1990. The largest percent loss by county would be Chatham County, where 0.4 % of the wetlands have been impacted since 1990. The USACE can also document that 11,070.06 acres of wetland mitigation were provided to offset the post 1990 wetland impacts in this area.

In addition to the impacts described above, Fort Stewart itself has experienced some wetland impacts associated with various projects since the close of the review period in 2005. Some major restoration projects, employed to mitigate wetland impacts, have also occurred within and after the review period, but have not been integrated into the data described above. The effects of these projects are outlined in the table below.

Table 5. Fort Stewart Wetland Impacts Post-2005

County	Wetland Acres Requested	Wetland Acres Permitted	Wetland Acres Mitigated
Bryan	4.23	4.23	0
Liberty	214.77	214.77	3230
Long	0	0	0
Evans	0	0	0
Tattnall	0	0	0
TOTALS	219	219	3230

The following is a list of Fort Stewart projects authorized by the USACE within Fort Stewart watersheds outside the review period.

a. Department of the Army Permit 940000880 (modification), issued June 29, 1995, authorized the enhancement of approximately 1,300 acres of wetlands in the A11 training area of Fort Stewart, to mitigate for 2.1 acres of wetlands impacted by the earlier construction (under the same Permit number) of rail pass tracks in an adjacent training area.

b. Department of the Army File Number 200007600 refers to the restoration and enhancement of approximately 1200 acres of wetlands to create For Stewart's Canoochee Creek Reservoir (or "Pond 4") Mitigation Bank.

c. Department of the Army Permit 200601665, issued December 6, 2006, authorized impacts to 4.23 acres of wetlands in Bryan County for improvements to the road in Fort Stewart's existing Convoy Live Fire Range. Mitigation consisted of a debit of 12.7 credits from the Installation's on-post wetland mitigation bank.

d. Department of the Army Permit 200501852, issued March 12, 2007, authorized impacts to 206.9 acres of wetlands in Liberty County for the construction of the Digital Multipurpose Range Complex (DMRC). 4.0 acres of jurisdictional wetland were impacted through direct filling; the remaining 202.9 acres were impacted though cutting of vegetation to meet line-of-sight requirements. Mitigation was accomplished through the Strum Bay Restoration, which (under the same Permit) restored and enhanced approximately 730 acres of wetlands adjacent to the

project area by correcting previously impacted hydrology.

e. One project for which a DA Permit is pending, vehicle maintenance facilities in support of 2nd BCT operations, will impact a total of 7.87 acres of wetlands. Although no DA Permit number has yet been assigned to these projects as they are still in the planning stages, the Fort Stewart Wetland Mitigation Bank has been debited in anticipation of them, so the impacts have been included in this analysis.

Fort Stewart has implemented an aggressive mitigation program in order to offset wetland impacts on the Installation. These projects include wetland enhancement and wetland restoration projects on large scale areas that provide higher quality mitigation than smaller patchwork single permit mitigation products. The following are current wetland mitigation projects located within the boundaries of Fort Stewart:

Pond 4 Mitigation Bank (USACE File Number 200007600): This single user bank was permitted for projects located within the boundaries of the Fort Stewart Installation. Approximately 1200 acres of wetlands were restored within the Canoochee Creek and Strum Bay wetland systems. This project is mostly comprised of deepwater and hardwood swamp habitat. Additional areas upstream of Pond 4 are currently being studied that would increase the total amount of wetland enhancement and restoration (see Strum Bay Mitigation Area below).

A-11 Mitigation Area (USACE File Number 940000880): This project specific mitigation area is comprised of approximately 1300 acres of wetland enhancement/restoration. Hydrologic enhancement/restoration was competed through the reintroduction of hydrology that had been previously diverted around the project area. It is comprised mostly of pine/cypress flatwoods and hardwood drainages.

Strum Bay Mitigation Area (USACE File Number 200501852): This project specific mitigation was originally developed to mitigate impacted associated with the DMPRC. Subsequent studies realized a much larger restoration/enhancement was obtained by re-directing hydrology back into the Strum Bay wetland system. This project has now identified enhancement and restoration of wetland hydrology to approximately 730 acres. This portion of the Strum Bay wetland system is located upstream from the Pond 4 Mitigation Bank, thus creating additional benefits to water quality and habitat to the entire Strum Bay wetland system and Pond 4 Mitigation Bank.

Summary: These effects, when combined with other projects in the ROI, do have the potential to

result in adverse cumulative impacts; however, it is expected that other projects in the ROI will be implemented as follows: projects will use erosion control measures, silt fencing, and other Best Management Practices; sufficient storm water management structures will be constructed as part of new construction; erosion and sedimentation control plans will be filed in accordance with Georgia's Sedimentation Pollution Control Act; and all projects will be conducted in accordance/in compliance with federal, state, and local laws. This includes obtaining and adhering to appropriate wetland permits, including compliance with compensatory wetland mitigation requirements outlined in the wetland permit(s).

2. Water Quality: Water quality is affected by changes to the environment (referred to as stressors) that adversely affect aquatic life or impair human uses of a water body. Point sources are municipal and industrial wastewater discharge. Non-point sources consist of sediment, litter, bacteria, pesticides, fertilizers, metals, oils, grease, and a variety of other pollutants that are washed from rural and urban lands by storm water. Expected growth in population and employment in the basin will mean more potential stress from storm water runoff as well as non-point source loading.

Wetland Loss: The impacts to wetlands discussed above would be expected to have an adverse impact on water quality due to the loss of associated aquatic functions (flood water retention, filtration, contaminate removal, sediment retention, etc.). The mitigation for these impacts would help to offset these impacts to water quality.

Point Source Discharges: Impacts from municipal wastewater, agricultural, and industrial discharges were greater prior to the 1970's. Due to increased regulation, these discharges have been reduced but continue to introduce pollutants into the system, which lower water quality when considered cumulatively. Georgia's "2004 303(d) List" for Bryan, Evans, Liberty, Long, and Tattnall counties have 3 waterways listed as impaired or partially impaired; they are listed in the table below with the causes of impairment.

Table 6.

Waterway	Cause of Impairment
Canoochee River	Trophic-weighted residue value (mercury in fish tissue)
Peacock Creek	Low dissolved oxygen and fecal coliform bacteria
Taylor's Creek	Low dissolved oxygen

Non-point Source Discharges: Residential, commercial and industrial development results in an increase in impervious surfaces (roof tops, paved roads, parking lots, etc.), which affects storm water discharges. Development results in an increase in non-point source contaminant loading through associated increases in urban landscaping (pesticides and fertilizers), increased traffic (oil, grease and metals), and other associated activities. There would be an anticipated incremental increase in adverse impacts to water quality as impervious surfaces increase. The following table is a summary of anticipated population growth-induced increases in impervious surfaces in the Altamaha watershed. The amount of impervious surface coverage is increasingly recognized as a valuable predictor of overall water quality within a watershed. In general, as population increases, so does impervious surface. As impervious surface area increases, water quality decreases. Table 4.1 shows population and impervious surface area growth over time for the Lower Ogeechee watershed; Table 4.2 shows population and impervious surface area growth over time for the Canoochee watershed; Table 4.3 shows population and impervious surface area growth over time for the Little Ogeechee watershed; Table 4.4 shows population and impervious surface area growth over time for the Altamaha watershed.

The impervious surface data was generated by the USEPA and provided to the USACE via a table titled "Total Impervious Area Calculations by 12-Digit HUC Watershed (based upon National Land Cover Data, 1993). Using simple linear regression analysis, the USACE utilized county population projection data to estimate percent increase in impervious surface, by county. The data contained in Tables 4.1 thru 4.4 indicates that as the population of each county continues to increase, there will be an associated increase in impervious surfaces. All counties in the study area would be anticipated to experience an increase of less than one percent impervious surface by the year 2050. However, each county is responsible for regulating non-point source storm water discharges pursuant to Section 402 of the CWA. These county storm water management programs should help to minimize the anticipated adverse impacts to water quality.

Table 7. Projected Population Growths and Associated Approximate Impervious Surface Increases
Lower Ogeechee - HUC 03060202

County		**Year**						
		2007	2008	2010	2020	2030	2040	2050
Bryan	Population / square mile	66	69	70	88	106	124	142
	% impervious Surface Coverage	2.33	2.37	2.39	2.68	2.97	3.26	3.55
Bulloch	Population / square mile	96	98	101	120	139	157	176
	% impervious Surface Coverage	2.81	2.84	2.89	3.20	3.50	3.79	4.09
Chatham	Population / square mile	385	389	386	410	434	457	481
	% impervious Surface Coverage	7.33	7.39	7.35	7.71	8.07	8.42	8.78
Effingham	Population / square mile	105	108	111	142	173	204	234
	% impervious Surface Coverage	2.95	3.00	3.05	3.55	4.04	4.53	5.00
Emanuel	Population / square mile	32	33	33	34	36	37	38
	% impervious Surface Coverage	1.77	1.79	1.79	1.81	1.84	1.85	1.87
Jenkins	Population / square mile	24	24	25	25	25	25	26
	% impervious Surface Coverage	1.64	1.64	1.66	1.66	1.66	1.66	1.68
Screven	Population / square mile	23	23	24	25	26	27	28
	% impervious Surface Coverage	1.63	1.63	1.64	1.66	1.68	1.69	1.71
Watershed Average								
Lower Ogeechee	Population / square mile	104	106	107	121	134	147	161
	% impervious Surface Coverage	2.92	2.95	2.97	3.18	3.39	3.60	3.81

Table 8. Projected Population Growths and Associated Approximate Impervious Surface Increases Canoochee - HUC 03060203

County		Year						
		2007	2008	2010	2020	2030	2040	2050
Bryan	Population / square mile	66	69	70	88	106	124	142
	% impervious Surface Coverage	2.33	2.37	2.39	2.68	2.97	3.26	3.55
Bulloch	Population / square mile	96	98	101	120	139	157	176
	% impervious Surface Coverage	2.81	2.84	2.89	3.20	3.50	3.79	4.09
Candler	Population / square mile	42	43	44	50	56	62	67
	% impervious Surface Coverage	1.94	1.95	1.97	2.07	2.16	2.26	2.34
Emanuel	Population / square mile	32	33	33	34	36	37	38
	% impervious Surface Coverage	1.77	1.79	1.79	1.81	1.84	1.85	1.87
Evans	Population / square mile	61	62	65	74	84	93	102
	% impervious Surface Coverage	2.24	2.26	2.31	2.46	2.62	2.76	2.91
Jenkins	Population / square mile	24	24	25	25	25	25	26
	% impervious Surface Coverage	1.64	1.64	1.66	1.66	1.66	1.66	1.68
Liberty	Population / square mile	100	97	105	109	114	119	124
	% impervious Surface Coverage	2.87	2.83	2.95	3.02	3.10	3.18	3.26
Long	Population / square mile	28	28	31	38	46	53	60
	% impervious Surface Coverage	1.71	1.71	1.76	1.87	2.00	2.11	2.23
Tattnall	Population / square mile	47	48	50	57	63	70	76
	% impervious Surface Coverage	2.02	2.03	2.07	2.18	2.28	2.39	2.49
Watershed Average								
Canoochee	Population / square mile	55	56	58	66	74	82	90
	% impervious Surface Coverage	2.15	2.16	2.20	2.33	2.46	2.58	2.71

Table 9. Projected Population Growths and Associated Approximate Impervious Surface Increases Little Ogeechee - HUC 03060204

County		**Year**						
		2007	2008	2010	2020	2030	2040	2050
Bryan	Population / square mile	66	69	70	88	106	124	142
	% impervious Surface Coverage	2.33	2.37	2.39	2.68	2.97	3.26	3.55
Chatham	Population / square mile	385	389	386	410	434	457	481
	% impervious Surface Coverage	7.33	7.39	7.35	7.71	8.07	8.42	8.78
Effingham	Population / square mile	105	108	111	142	173	204	234
	% impervious Surface Coverage	2.95	3.00	3.05	3.55	4.04	4.53	5.00
Liberty	Population / square mile	100	97	105	109	114	119	124
	% impervious Surface Coverage	2.87	2.83	2.95	3.02	3.10	3.18	3.26
Long	Population / square mile	28	28	31	38	46	53	60
	% impervious Surface Coverage	1.71	1.71	1.76	1.87	2.00	2.11	2.23
McIntosh	Population / square mile	20	20	21	24	26	29	32
	% impervious Surface Coverage	1.58	1.58	1.59	1.64	1.68	1.72	1.77
Watershed Average								
Ogeechee Coastal	Population / square mile	117	119	121	135	150	164	179
	% impervious Surface Coverage	3.13	3.15	3.18	3.41	3.64	3.87	4.10

Table 10. Projected Population Growths and Associated Approximate Impervious Surface Increases Altamaha - HUC 03070106

Appling	Population / square mile	35	35	36	38	41	43	46
	% impervious Surface Coverage	1.82	1.82	1.84	1.87	1.92	1.95	2.00
Evans	Population / square mile	61	62	65	74	84	93	102
	% impervious Surface Coverage	2.24	2.26	2.31	2.46	2.62	2.76	2.91
Glynn	Population / square mile	128	130	129	141	152	164	175
	% impervious Surface Coverage	3.32	3.36	3.34	3.53	3.71	3.90	4.07
Jeff Davis	Population / square mile	40	40	40	42	44	47	49
	% impervious Surface Coverage	1.90	1.90	1.90	1.94	1.97	2.02	2.05
Long	Population / square mile	28	28	31	38	46	53	60
	% impervious Surface Coverage	1.71	1.71	1.76	1.87	2.00	2.11	2.23
McIntosh	Population / square mile	20	20	21	24	26	29	32
	% impervious Surface Coverage	1.58	1.58	1.59	1.64	1.68	1.72	1.77
Montgomery	Population / square mile	36	36	38	42	45	49	53
	% impervious Surface Coverage	1.84	1.84	1.87	1.94	1.98	2.05	2.11
Tattnall	Population / square mile	47	48	50	57	63	70	76
	% impervious Surface Coverage	2.02	2.03	2.07	2.18	2.28	2.39	2.49
Toombs	Population / square mile	75	76	76	81	87	92	97
	% impervious Surface Coverage	2.47	2.49	2.49	2.57	2.67	2.75	2.83
Wayne	Population / square mile	45	45	46	52	58	63	69
	% impervious Surface Coverage	1.98	1.98	2.00	2.10	2.20	2.28	2.37
Watershed Averages								
Altamaha	Population / square mile	52	52	53	59	65	70	76
	% impervious Surface Coverage	2.09	2.10	2.12	2.21	2.30	2.39	2.48

Summary: This effect, when combined with other projects in the geographical area of influence, does have the potential to result in adverse cumulative impacts; however, it is expected that future projects would be implemented as follows: projects will use erosion control measures, silt fencing, and other BMPs; sufficient storm water management structures will be constructed as part of new construction; erosion and sedimentation control plans will be filed in accordance with Georgia's Sedimentation Pollution Control Act; and all projects will be undertaken in accordance with federal, state, and local laws.

Fort Stewart's role in general and project-specific oversight to ensure compliance with environmental legislation and the overall health of the local ecosystem have certainly played a role in mitigating adverse impacts to water quality. Also, the use of this large (~ 280,000 acres) area of land for military training has and will continue to ensure that the vast majority of the Installation remains managed wilderness. This allows natural processes to operate in support of water quality to a degree not seen in many surrounding areas which have experienced a great deal of development, and is the primary contributor to good water quality relative to those areas. Also, it must be noted that many projects related to military training (ex: firing ranges) do not feature impervious surfaces to the same degree as many civilian and private projects, and will not experience human activity and traffic of the same frequency and intensity, which might otherwise worsen local water quality. Furthermore, through the oversight of Environmental Compliance Officers, Army units self-monitor their training activities to avoid and minimize potentially harmful activities. A 1999 water quality survey performed by Fort Stewart determined that the quality of water leaving Fort Stewart's geographic boundaries was of equal or better quality than that which entered the Installation.

In view of the above, the USACE determined that the proposed project, with proposed special permit conditions, would have minimal impacts on water quality when considered alone or in concert with the other past, present and reasonably foreseeable future projects in the basin.

3. Aquatic Species: Permitted impacts to wetlands and water quality as discussed above have affected fish and other aquatic species such as mussels and aquatic insects.

The proposed projects would not result in a direct adverse impact to any stream or river, or to aquatic species in the waterways. Rather, the project would result in unavoidable impacts to 5.39 acres of wetland, and a loss of the aquatic habitat function provided by these wetlands. However, this project-related wetland loss would be minor when considered cumulatively with

all other past and planned wetland losses discussed above. In addition, the applicant's proposed wetland mitigation plan would help to offset the aquatic habitat function loss that would result from this project. Furthermore, Fort Stewart Fish & Wildlife monitors and maintains the quality of Fort Stewart aquatic habitats as part of their fisheries program.

Overall, the proposed projects will not have a significant impact on Fort Stewart aquatic habitats and species.

4. Compensatory Mitigation: As defined in the NEPA regulations, compensatory mitigation is "*compensation for the impact by replacing or providing substitute resources or environments*" (40 CFR Part 1508.20). The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed Infantry Platoon Battle Course. The compensatory wetland mitigation ratios proposed for this project are 3:1 for those projects utilizing the on-post mitigation bank, and approximately 8:1 for projects utilizing off-post credits. The applicant's proposed compensatory wetland mitigation plan would provide more than would be needed to offset lost aquatic functions, and greater than required by 404 mitigation guidance as stated in the SOPs for determining compensatory mitigation.

Fort Stewart has elected to mitigate impacts from the proposed IPBC by purchasing credits from the Wilkinson-Oconee Mitigation Bank. The Wilkinson-Oconee Bank consists of 6,735 acres of restored, enhanced, and preserved bottomland hardwood and cypress-tupelo wetlands – the same types predominating on Fort Stewart. The placement of Fort Stewart within the service area of this Bank, the similarity of wetland types, and the quantity of available credits, made the Wilkinson-Oconee the ideal off-post mitigation option compared to other mitigation banks in Georgia.

Proposed projects: The proposed project supporting military training will adversely impact 5.39 acres of Jurisdictional Wetland. To mitigate for these impacts the applicant would purchase 40.35 mitigation credits from a USACE-approved mitigation bank that services the project area. Additionally, some small projects will be mitigated through debits from the Installation’s on-post wetland mitigation bank. As such, any adverse impacts to wetlands and other waters of the U.S. caused by this project would be offset by the proposed mitigation.

Summary: The main public detriment that would result from this project would be the loss of 5.39 acres of jurisdictional wetlands. Many of the wetland functions and values important to the public, such as flood attenuation, sediment retention, fish and wildlife habitat, and others, would

be replaced by the applicant's mitigation plan. Additionally, Fort Stewart's past mitigation efforts (approximately 3,230 acres) have adequately offset impacts within the boundaries Fort Stewart. Mitigation for the current projects will be offset through additional mitigation efforts, including the use of off-site USACE approved wetland mitigation banks. The mitigation plan would also provide adequate compensation for the impacted wetlands through the implementation of wetland creation, enhancement and preservation. The proposed projects would not impact federal or state protected species or critical habitat. Cultural resources have been considered and it has been determined that they would not be impacted. Overall, the public benefits of the proposed project would outweigh the public detriments.

In view of the above, the USACE has determined that the proposed project, with proposed special permit conditions, would not have a significant impact on wetlands and/or other waters of the U.S. when considered alone or in concert with the other past, present and reasonably foreseeable future projects in the Fort Stewart watersheds.

F. SECONDARY/INDIRECT IMPACTS: See Section E above and the RGCEIS, prepared by Fort Stewart.

G. IRREVERSIBLE AND IRRETRIEVABLE RESOURCE COMMITMENTS: Authorization of the applicant's preferred alternative, or any other build alternative, could result in an irreversible and irretrievable commitment of a range of natural, physical, human and fiscal resources. The fossil fuels, labor and construction materials that would be expended, if the project is constructed, are generally not considered irretrievable resources. In addition, these resources are not in short supply and their use would not have an adverse effect upon their continued availability.

H. EFFECT ON FEDERAL PROJECTS: We have determined the proposed activity would not have an adverse effect on any Federal Project (33 CFR 320.4(g)).

PART V - PERMIT ACTION ALTERNATIVES

A. TO ISSUE THE PERMIT IN ACCORDANCE WITH THE PLANS SUBMITTED BY THE APPLICANT: This course of action by itself would be inappropriate because it does not include provision for special conditions (See D. below).

B. TO DENY THE REQUEST FOR A PERMIT: Denial of the permit would not be an

appropriate course of action. The proposed activity would not have significant adverse effects on navigation, the environment or other public interest factors.

C. TO ISSUE THE PERMIT AFTER SUBMITTAL OF MODIFIED PLANS BY THE APPLICANT WITH SPECIAL CONDITIONS: This course of action would not be warranted. Our review of the applicant's plans and alternatives showed the applicant's proposed activity to be the most practicable way to accomplish the applicant's overall purpose.

D. TO ISSUE THE PERMIT IN ACCORDANCE WITH THE PLANS SUBMITTED BY THE APPLICANT WITH SPECIAL CONDITIONS: This would be the appropriate course of action to follow. In order to protect the public interest the following special conditions would be placed on any permit issued:

1. All dredged or borrowed material used as fill on this project will be from clean, uncontaminated sources and free from cultural resources.

2. That no construction activity or stockpiling will occur in waters of the United States, including wetland areas, outside of the areas authorized for filling under this permit.

3. Prior to the commencement of construction activities for this project, the limits of the proposed fill areas in jurisdictional waters shall be clearly flagged and staked by you and/or your contractors. All construction personnel shall be shown the location(s) of all wetland and/or stream areas outside of the construction area to prevent encroachment from heavy equipment into these areas.

4. Borrow site or sites for stockpiling fill dirt shall be prohibited within 200 feet of streambanks, 50 feet of wetlands and open waters or elsewhere runoff from the site would increase sedimentation in waters of the United States unless specifically authorized by this permit. Normal grading activities such as cutting and filling within 200 feet of streams or 50 feet of wetlands/open waters are authorized.

5. Construction debris, liquid concrete, old riprap, old support materials, or other litter shall not be placed in streams or in areas where migration into streams and/or wetlands could reasonably be expected.

6. Staging areas and equipment maintenance areas will be located at least 200 feet from

streambanks to minimize the potential for wash water, petroleum products, or other contaminants from construction equipment entering the streams.

7. The permittee shall ensure that the project's master drainage plan is designed and implemented to avoid inadvertent drainage of wetlands and inadvertent water diversion resulting in a reduction of hydrology in wetlands. The permittee shall also ensure that secondary road ditches and/or small after-project drainage ditches do not inadvertently impact wetlands or waters of the US.

8. The permittee shall minimize bank erosion and sedimentation in construction areas by utilizing BMPs for stream corridors, installing and maintaining significant erosion and sediment control measures, and providing daily reviews of construction and stream protection methods. Check dams and riprap placed in streams and wetlands as erosion control measures are considered a fill and not authorized under this permit unless they were specifically authorized by this permit.

9. All work conducted under this permit shall be located, outlined, designed, constructed and operated in accordance with the minimal requirements as contained in the Georgia Erosion and Sedimentation Control Act of 1975, as amended. Utilization of plans and specifications as contained in "Manual for Erosion and Sediment Control, (Latest Edition)," published by the Georgia Soil and Water Conservation Commission or their equivalent will aid in achieving compliance with the aforementioned minimal requirements.

10. You shall obtain and comply with all appropriate Federal, state, and local authorizations required for this type of activity. A stream buffer variance may be required. Variances are issued by the Director of the Georgia Environmental Protection Division (EPD), as defined in the Georgia Erosion and Sedimentation Control Act of 1975, as amended. It is our understanding that you may obtain information concerning variances at the Georgia EPD's web site at www.gaepd.org or by contacting the Watershed Protection Branch at (404) 675-6240.

11. If you or your contractors discover any federally listed threatened or endangered species and/or their habitat while accomplishing the activities authorized by this permit, you must immediately STOP work in the area and notify the issuing office of what you have found. We will initiate the Federal and state coordination required to determine if the species and/or habitat warrant further consultation with the USFWS.

12. Prior to the commencement of construction activities for this activity, the permittee shall insure that this project complies with all applicable rules, requirements, and/or regulations of the Federal Emergency Management Agency and/or the Georgia Floodplain Management Office with regard to construction activities in designated floodplains and/or floodways prior to commencement of work activity, to include revisions to the National Flood Insurance Program maps if required.

13. Prior to the commencement of any work in jurisdictional waters of the United States for this activity, you will purchase wetland mitigation credits from an approved wetland mitigation bank. You or the mitigation bank sponsor must provide this office with documentation of this purchase before any work may commence. The notice should reference the USACE file number assigned to this project.

14. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

15. The permittee, US Army Fort Stewart, is the lead federal agency for this proposed action. The permittee shall meet all lead federal agency responsibilities pursuant to Section 7 of the Endangered Species Act, prior to any work occurring in waters of the US subject to the jurisdiction of the USACE.

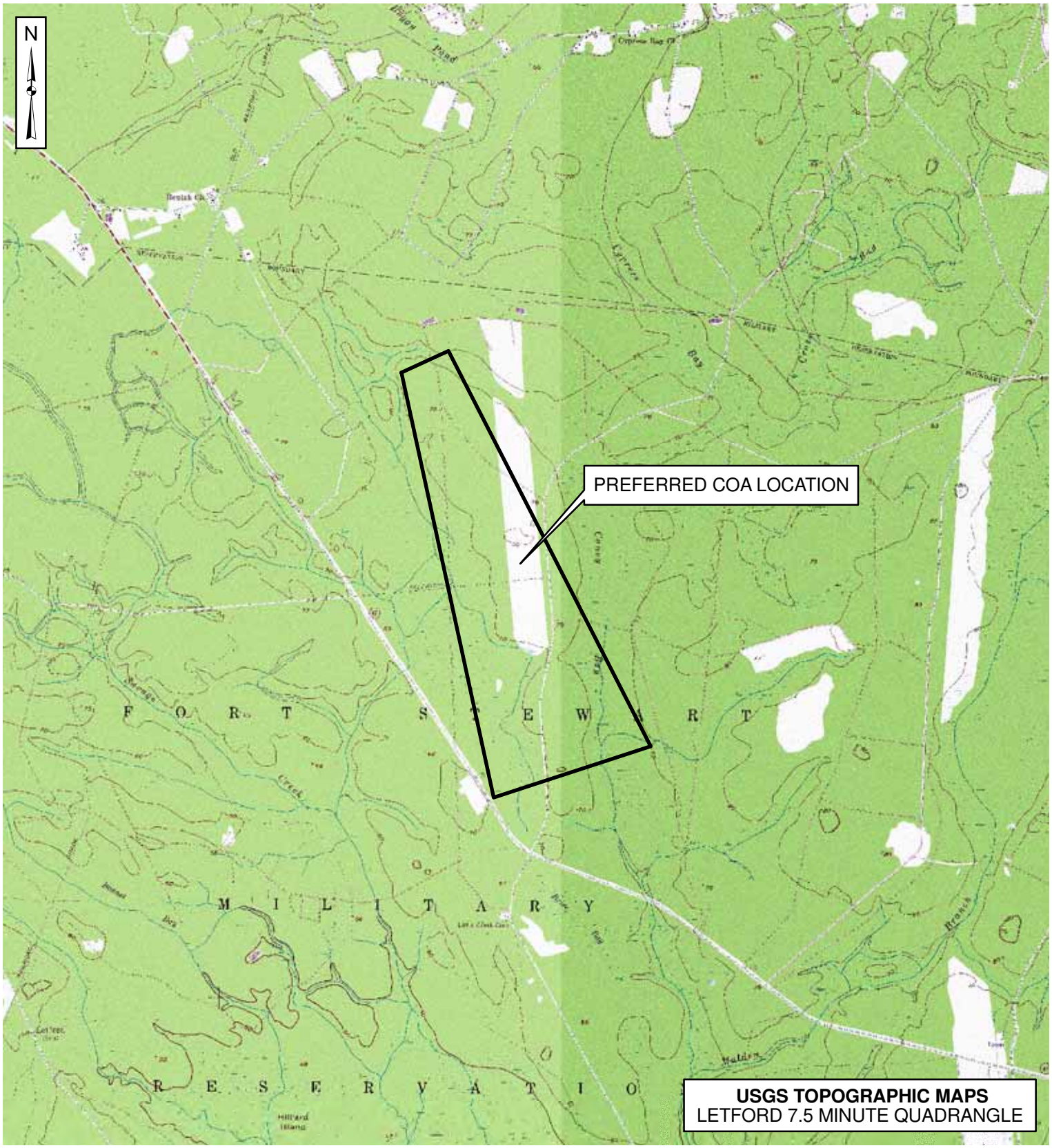
16. The permittee, US Army Fort Stewart, is the lead federal agency for this proposed action. Fort Stewart shall meet all lead federal agency responsibilities pursuant to Section 106 of the National Historic Preservation Act, prior to any work occurring in waters of the US subject to the jurisdiction of the USACE.

17. The site design for this project was based on the 90% design. Authorized wetland impacts are based on a standard range design. Prior to conducting any work in wetlands on this project site, the permittee shall submit final site development plans to the USACE for review and approval. No work in wetlands can occur until the USACE has reviewed and approved the final plan in writing; this concurrence letter needs to document that the 404(b)(1) process has been adequately demonstrated. It is anticipated that once final design is completed, there will be a minor reduction in the amount of wetland area that will be impacted by the project. This

anticipated change in the footprint of authorized wetland impact is authorized under this permit and modification of the permit will not be required for this change in site design.

18. If a conditioned Water Quality Certification has been issued for your project, you must comply with conditions specified in the certification as Special Conditions to this permit.

PART VI – COURSE OF ACTION FIGURES



VICINITY MAP - PREFERRED COA

1" = 4,000'

0 2,000 4,000 8,000 Feet

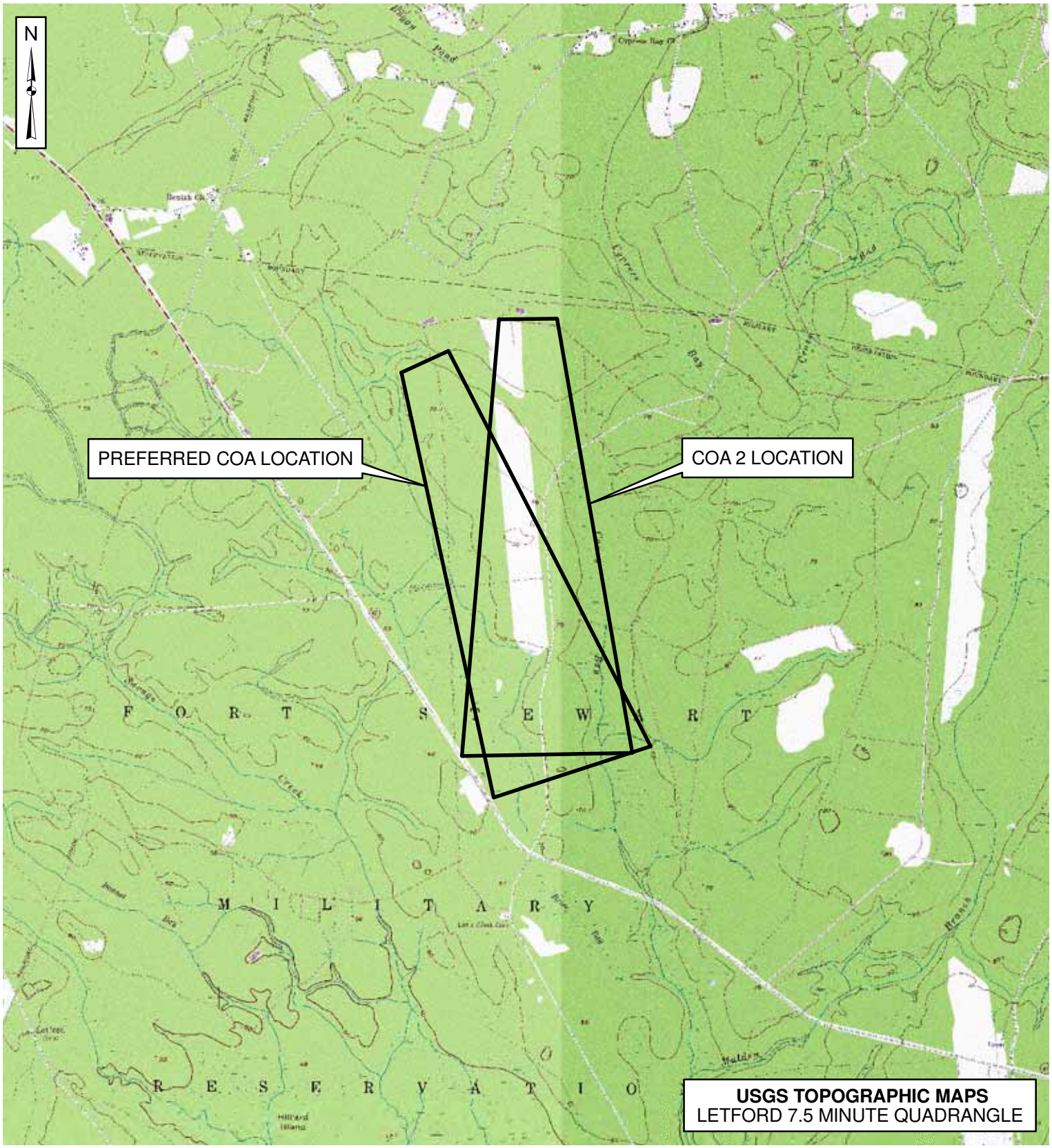
PROJECT: IPBC - INFANTRY PLATOON BATTLE COURSE

COUNTY: BRYAN

SURVEY DATUM: UTM

FIGURE: 1 OF 4

DATE: NOVEMBER 2009



VICINITY MAP - CONSIDERED COAS

1" = 4,000'

0 2,000 4,000 8,000 Feet

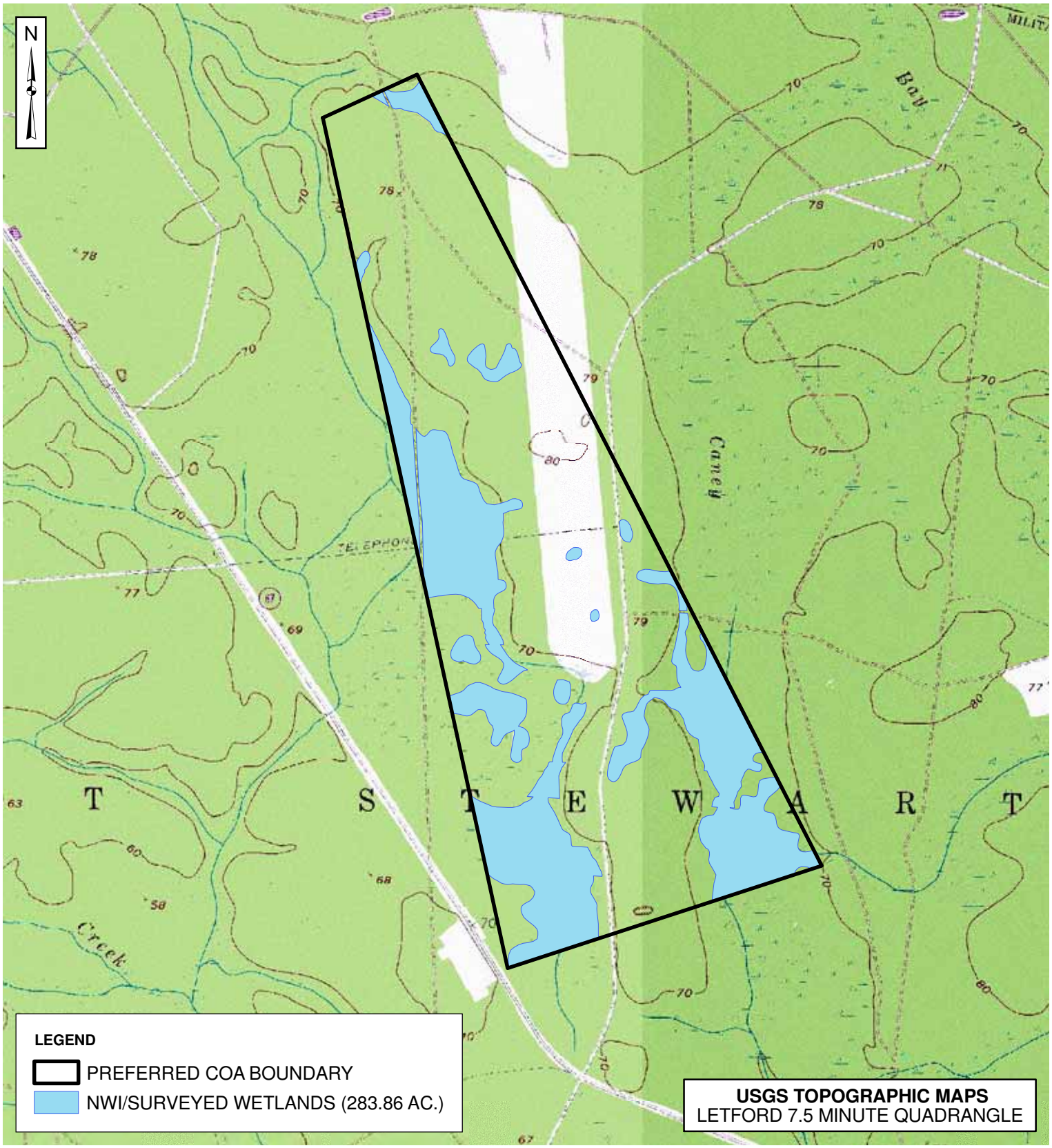
PROJECT: IPBC - INFANTRY PLATOON BATTLE COURSE

COUNTY: BRYAN

SURVEY DATUM: UTM

FIGURE: 2 OF 4

DATE: NOVEMBER 2009



LOCATION MAP - PREFERRED COA

1" = 2,000'

0 1,000 2,000 4,000 Feet

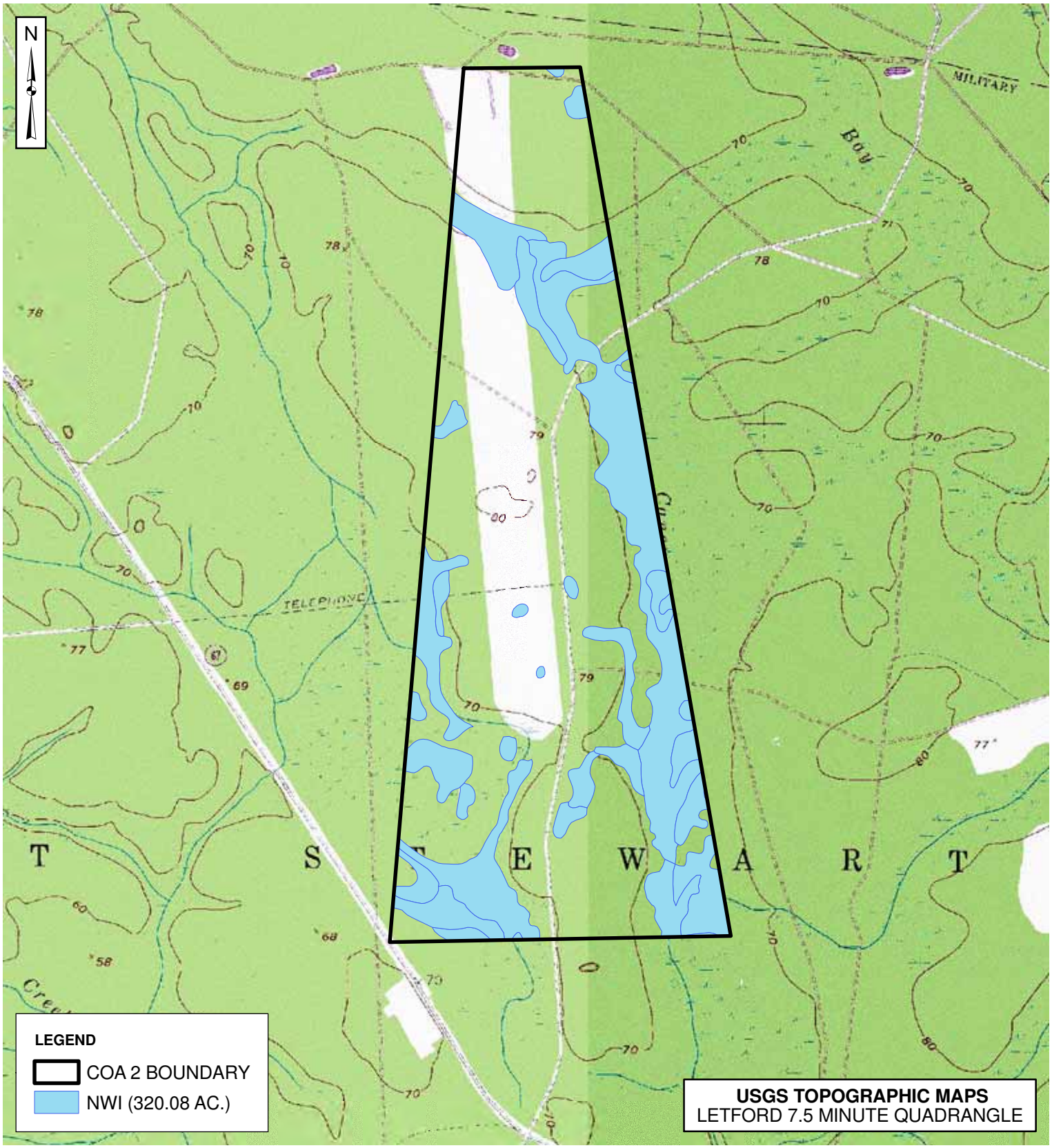
PROJECT: IPBC - INFANTRY PLATOON BATTLE COURSE

COUNTY: BRYAN

SURVEY DATUM: UTM

FIGURE: 3 OF 4

DATE: NOVEMBER 2009



LOCATION MAP - COA 2

1" = 2,000'

0 1,000 2,000 4,000 Feet

PROJECT: IPBC - INFANTRY PLATOON BATTLE COURSE

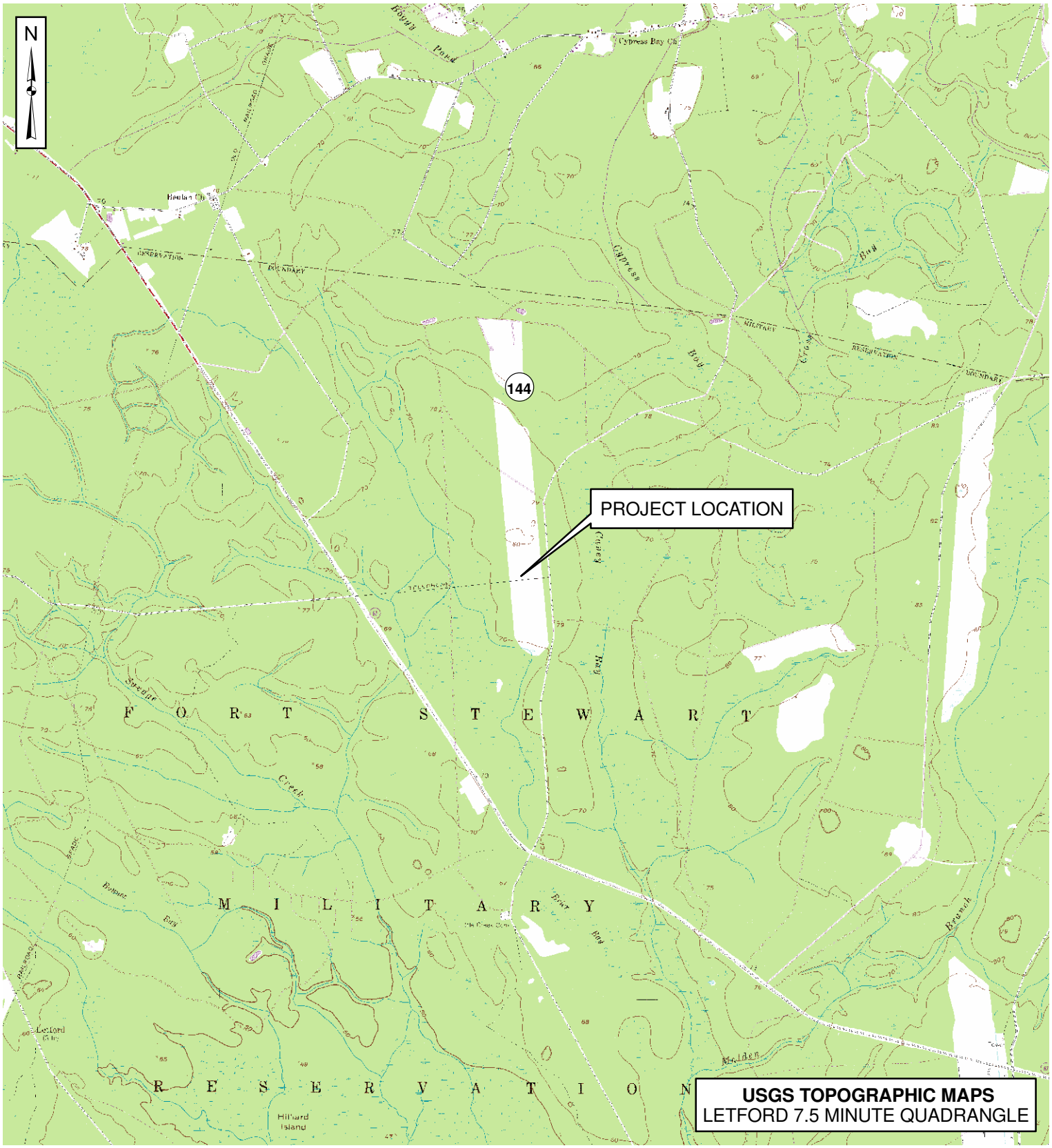
COUNTY: BRYAN

SURVEY DATUM: UTM

FIGURE: 4 OF 4

DATE: NOVEMBER 2009

PART VII – PERMIT FIGURES



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN AN INFANTRY PLATOON BATTLE COURSE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

PROJECT VICINITY MAP

1" = 4,000'

0 2,000 4,000 8,000 Feet

APPLICANT:
FORT STEWART DPW

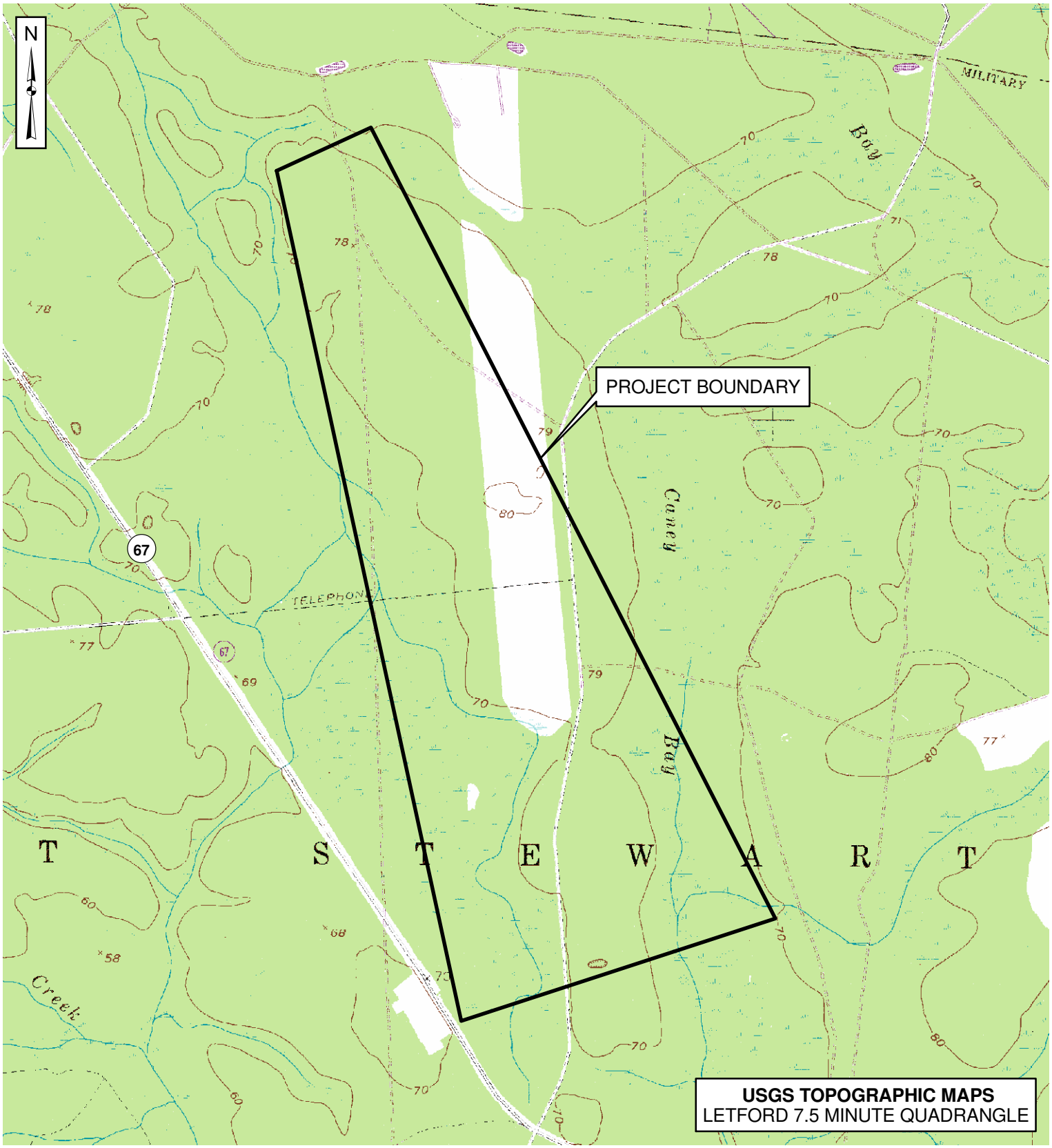
PROPOSED: WETLAND FILL

NEAREST WATERBODY: TRIBUTARY OF MALDEN BRANCH

COUNTY: BRYAN

FIGURE: 1 OF 6

DATE: NOVEMBER 2009



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN AN INFANTRY PLATOON BATTLE COURSE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

PROJECT LOCATION MAP

1" = 2,000'

0 1,000 2,000 4,000 Feet

APPLICANT:
FORT STEWART DPW

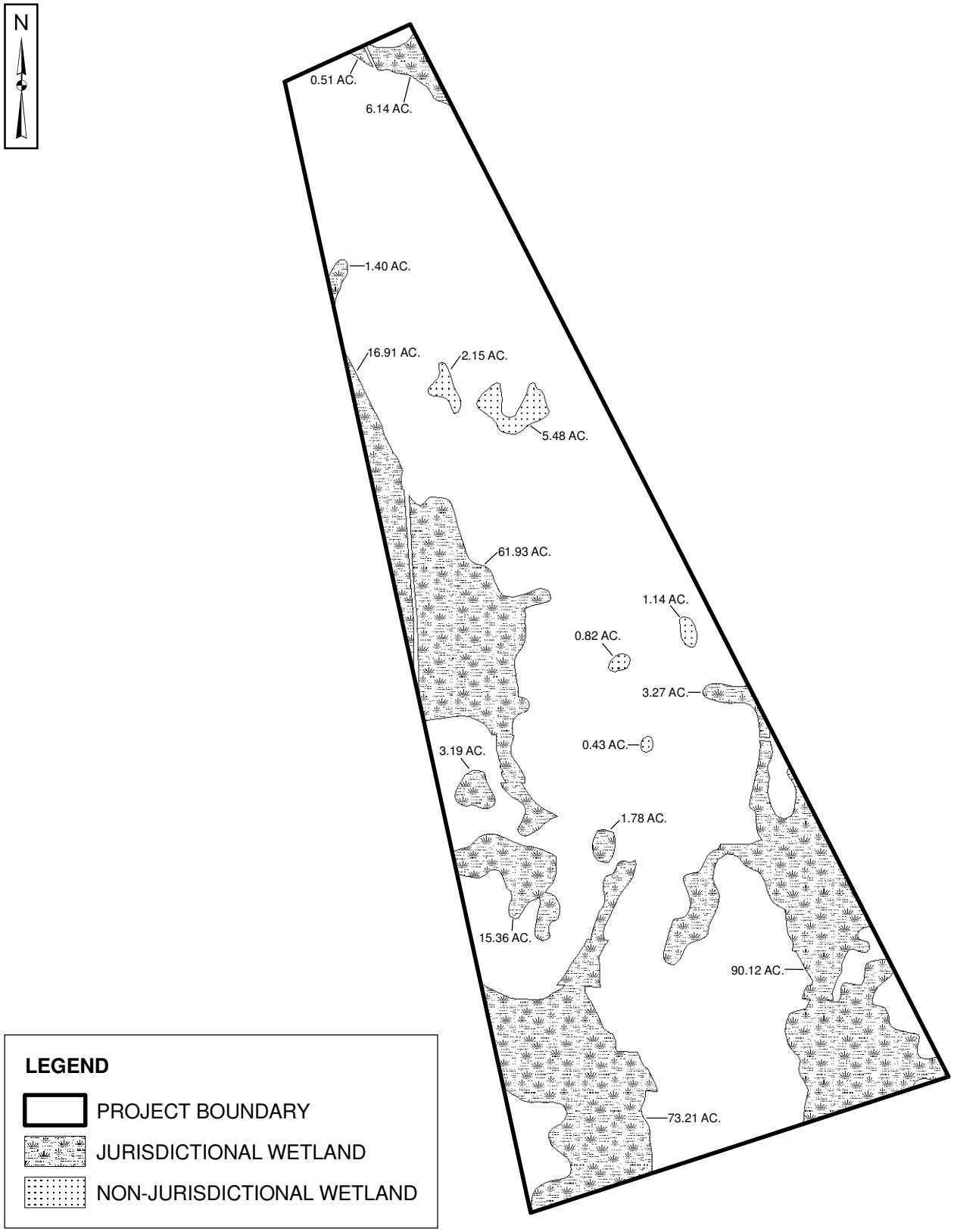
PROPOSED: WETLAND FILL

NEAREST WATERBODY: TRIBUTARY OF MALDEN BRANCH

COUNTY: BRYAN

FIGURE: 2 OF 6

DATE: NOVEMBER 2009



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN AN INFANTRY PLATOON BATTLE COURSE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

EXISTING CONDITIONS

1" = 1,650'

0 825 1,650 3,300 Feet

APPLICANT:
FORT STEWART DPW

PROPOSED: WETLAND FILL

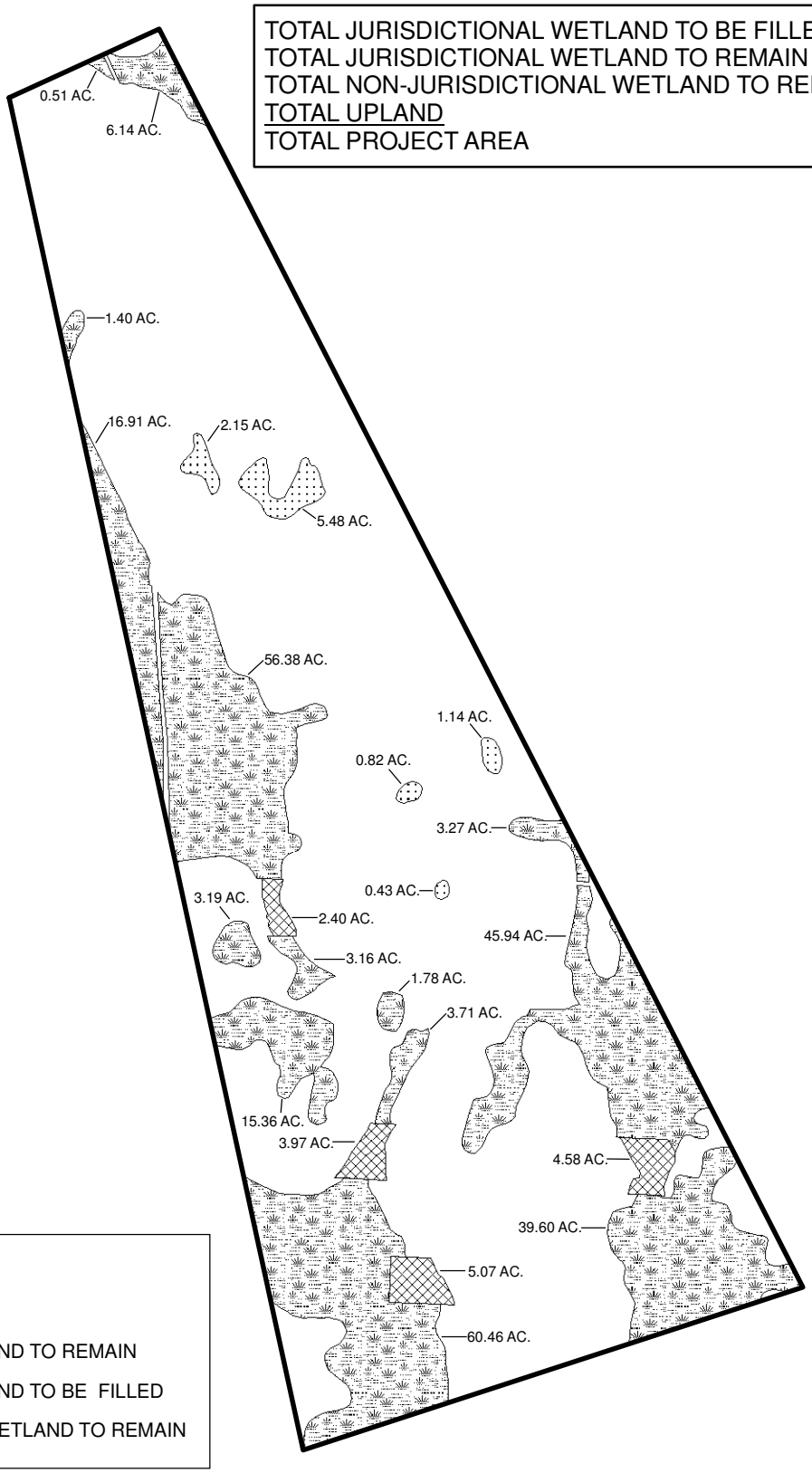
NEAREST WATERBODY: TRIBUTARY OF MALDEN BRANCH

COUNTY: BRYAN

FIGURE: 3 OF 6

DATE: NOVEMBER 2009

TOTAL JURISDICTIONAL WETLAND TO BE FILLED	16.02 AC.
TOTAL JURISDICTIONAL WETLAND TO REMAIN	257.82 AC.
TOTAL NON-JURISDICTIONAL WETLAND TO REMAIN	10.02 AC.
TOTAL UPLAND	704.77 AC.
TOTAL PROJECT AREA	988.63 AC.



LEGEND

- PROJECT BOUNDARY
- JURISDICTIONAL WETLAND TO REMAIN
- JURISDICTIONAL WETLAND TO BE FILLED
- NON-JURISDICTIONAL WETLAND TO REMAIN

PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN AN INFANTRY PLATOON BATTLE COURSE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

PROPOSED CONDITIONS

1" = 1,650'

0 825 1,650 3,300 Feet

APPLICANT:
FORT STEWART DPW

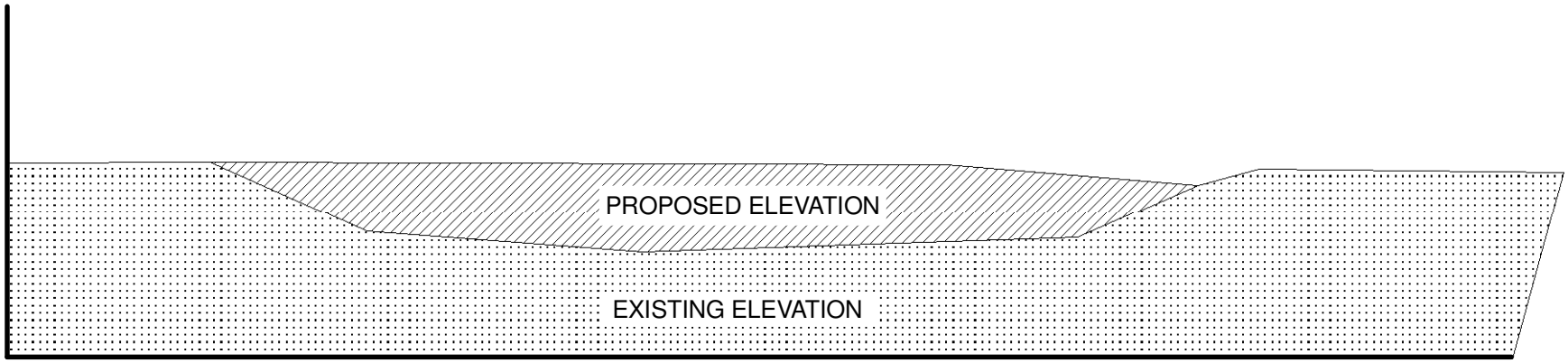
PROPOSED: WETLAND FILL

NEAREST WATERBODY: TRIBUTARY OF MALDEN BRANCH

COUNTY: BRYAN

FIGURE: 4 OF 6

DATE: NOVEMBER 2009



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN AN INFANTRY PLATOON BATTLE COURSE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

CROSS-SECTION

NOT TO SCALE

APPLICANT:
FORT STEWART DPW

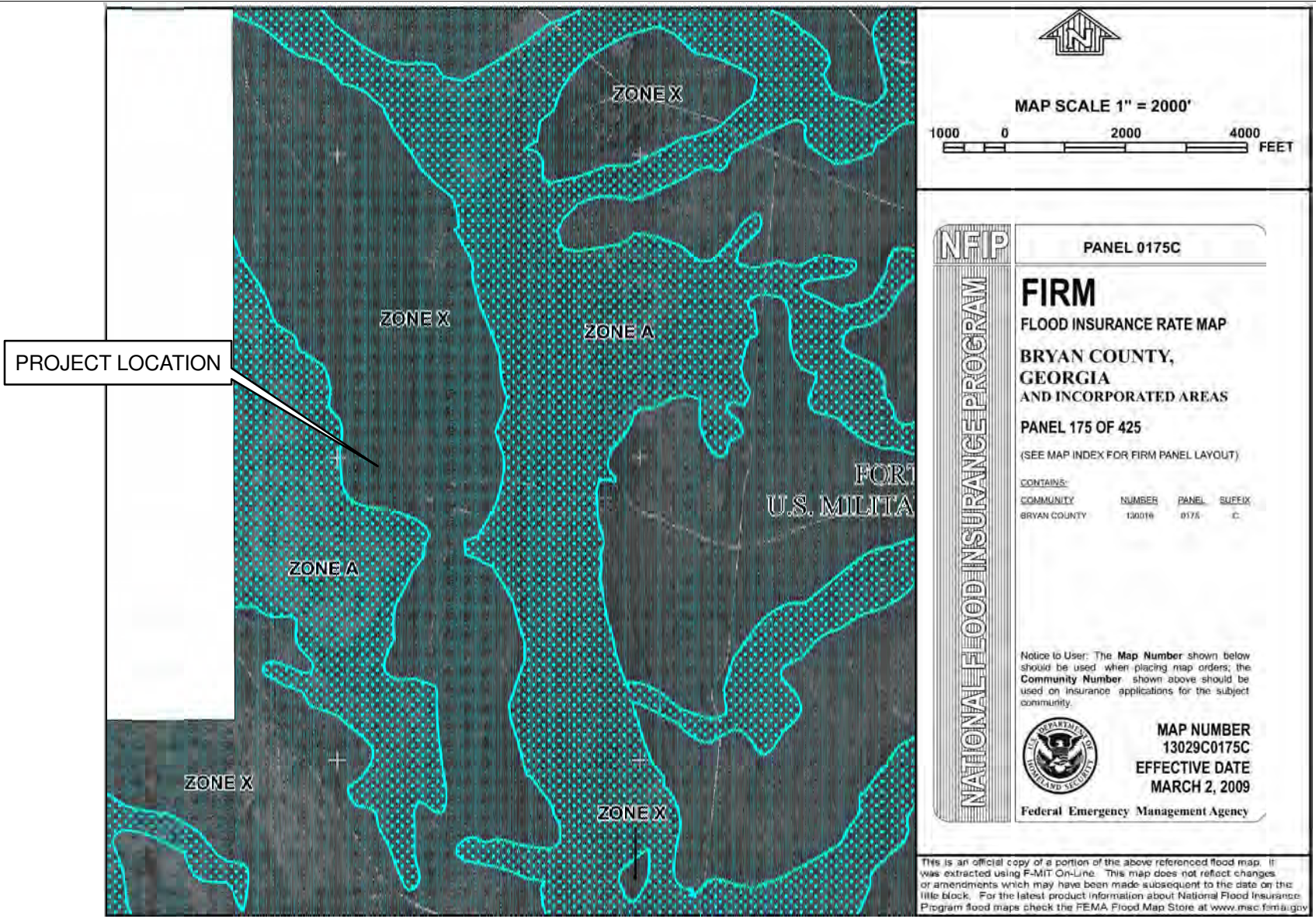
PROPOSED: WETLAND FILL

NEAREST WATERBODY: TRIBUTARY OF MALDEN BRANCH

COUNTY: BRYAN

FIGURE: 5 OF 6

DATE: NOVEMBER 2009



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN AN INFANTRY PLATOON BATTLE COURSE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

FLOOD INSURANCE RATE MAP

NOT TO SCALE

APPLICANT:
FORT STEWART DPW

PROPOSED: WETLAND FILL

NEAREST WATERBODY: TRIBUTARY OF MALDEN BRANCH

COUNTY: BRYAN

FIGURE: 6 OF 6

DATE: NOVEMBER 2009

CASE DOCUMENT FOR: MULTIPURPOSE MACHINE GUN RANGE
APPLICATION NUMBER 200900786
FOR A DEPARTMENT OF THE ARMY PERMIT
BY
FORT STEWART ARMY INSTALLATION, SAVANNAH, GEORGIA

PART I - INTRODUCTION

A. NAME AND ADDRESS OF APPLICANT:

U.S. Army, Fort Stewart Army Installation
Directorate of Public Works
1550 Frank Cochran Drive, Bldg. 1137
Fort Stewart, Georgia 31414

B. APPLICATION NUMBER: 200900786

C. LOCATION OF PROPOSED ACTIVITY: The site is located at Fort Stewart, in Liberty County, Georgia. The site is located in the Delta Small Arms Range (in the vicinity of latitude 31º 54' 55" north and longitude 81º 44' 18" west). A location map is provided in Appendix A to this document.

D. PROJECT DESCRIPTION: The Multi Purpose Machine Gun Range (MPMGR) is a small caliber range used to train tenant and reserve Soldiers in basic machine gun live-fire training tasks required to sustain combat proficiency; specifically, to identify and engage stationary infantry targets with a machine gun. Weapons used on this range include the M249 squad automatic weapon (SAW) (5.56mm), the M60 machine gun (7.62mm), the M240B machine gun, the MK19 automatic grenade launcher, the M42 sniper weapon, and the M2 machine gun (0.50 caliber).

Primary features of this range include 180 stationary infantry targets (SITs), 20 moving infantry targets (MITs), 20 stationary armor targets (SATs), 10 firing lanes, two 800-square-foot buildings, one ammunition breakdown building, one air-vault latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with an enclosure. The actual range will be 320 meters in width by 300 meters in depth and require approximately 250 acres of clear-cutting. All targets would be fully automated, allowing numerous event and specific target

training scenarios, all of which will be computer driven and scored from the range operations center. The associated Range Operations and Control facilities will consist of the standard Small Arms Facilities. These facilities consist of an After Action Facility, Staging Facility, bleacher enclosure, range control tower, range operations and storage building, latrine, covered mess and building information systems. Supporting facilities include electric service, paving with parking for Military and Personally Operated Vehicles (POVs), site improvements, storm drainage and information systems.

The applicant completed a 90% site design for the above described range project. The standard site layout for this type of range would require the filling and/or mechanized clearing of all 103.34 acres of bottomland hardwood wetlands on the 236-acre project site. The applicant will likely be able to avoid some of the wetlands on the project site as final site design is completed for the project. However, for the purposes of this permit evaluation, the US Army Corps of Engineers (USACE) will assume that all 103.34 acres of wetlands on the proposed project site would be impacted. In addition, the applicant's proposed wetland mitigation plan is to purchase 797.77 mitigation credits to offset unavoidable impact to 103.34 acres of wetlands.

E. BASIC PURPOSE AND NEED: The basic purpose of the proposed project is to provide the Soldiers of Fort Stewart, Reserve and National Guard units with efficiency with live fire training for machine gun engagements by meeting training requirements and maintaining maneuver terrain, while utilizing existing surface danger zones (SDZs) and avoiding impacts to wetlands.

F. APPLICANT'S SUPPLEMENTAL INFORMATION: The following information is part of the administrative record for the project.

1. Project Narrative

2. Project Purpose and Need

3. Description of Resources Occurring within the Project Area, Potential Impacts, and Mitigation

4. Vicinity Map

5. Additional Studies and Response to Comments:

G. PROPOSED WORK SUBJECT TO THE JURISDICTION OF THE US ARMY CORPS OF ENGINEERS: The applicant proposes to perform work in, or affecting waters of the United States.

H. APPLICABLE STATUTORY AUTHORITY: The applicant is making application pursuant to Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344).

PART II - COORDINATION

A. JOINT PUBLIC NOTICE (JPN): On April 21, 2010, the United States Army Corps of Engineers Savannah District (USACE) issued a JPN on the proposed work. Copies of the notice were provided to federal, state, and local agencies and the public. The notice was also posted on USACE public web page.

B. RESPONSE TO JOINT PUBLIC NOTICE: A summary of the comments received in response to the Joint Public Notice is presented in Table 1 below.

Table 1. Summary of Comments

COMMENTOR	OBJECT	3(b) Y/N	NO OBJECT	NO OBJECT W/CONDITION	DATE
Federal Agencies					
1. National Marine Fisheries Services			X		05-24-10
2. US Environmental Protection Agency (EIS comments)				X	04-21-10
3. US Fish and Wildlife Service					*
State of Georgia					
4. State Clearing House					*
5. Coastal Resources Division, Federal Consistency					*
6. Environmental Protection Division					*
Other					
7. Southern Environmental Law Center - Ogeechee River Keeper				X	05-21-10

* No date indicates no comment received.

C. DISCUSSION OF RESPONSES:

1. National Marine Fisheries Service (NMFS): By letter dated May 24, 2010, the NMFS stated "Based on the information in the public notice, the proposed project would not occur in the vicinity of essential fish habitat designated by the South Atlantic Fishery Management Council or NMFS. Present staffing levels preclude further analysis of the proposed activities and no further action is planned. This position is neither supportive of nor in opposition to your authorization of the proposed work."

2. Environmental Protection Agency (EPA): There were no comments received pursuant the USACE Joint Public Notice dated April 21, 2010, from the EPA. However, Fort Stewart did receive comments and questions from the EPA Region 4, pursuant to the Draft Environmental Impact Statement (EIS) for Training Range and Garrison Support Facilities Construction and Operation at Fort Stewart, Georgia. The following are EPA comments relevant to the Section 404 permit notifications:

a. Issue 1: EPA is currently reviewing a joint public notice dated April 21, 2010, for four individual permits for four projects (DMPTR, IPBC, MPMGR and QTR) with a total of 185.9 acres of wetland impacts. This is a substantial level of wetland impacts, particularly in relation to recently permitted impacts throughout Georgia.

(1) Applicants Response: Fort Stewart avoids and minimizes wetlands impacts when possible. The implementation of the actions proposed in the preferred alternative (Alternative B Sitings) has the potential to negatively impact up to 0.2% of the Installation's nearly 91,000 acres of wetlands. More importantly, of the "up to 0.2% of the Installation's wetlands being impacted," most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement. As stated earlier in this reply, the Installation anticipates wetland impacts will be much less than projected through further avoidance and minimization incorporated during the design phases of each project after the site is selected. It is important to note, that despite the large amount of military training activity that occurs on Fort Stewart, because of the Installation's proactive efforts to avoid, enhance, and mitigate wetlands, its wetlands remain of a high quality, retaining and transmitting large amounts of fresh water and providing habitat for countless local species. Proactive environmental stewardship programs also help to keep our wetlands

pristine. As discussed in opening paragraphs in Chapter 3 of the DEIS, Fort Stewart's Integrated Training Area Management (ITAM) program conducts land rehabilitation through the construction of low water crossings and Soldier training related to sustainability of Fort Stewart lands.

Much of the avoidance and minimization takes place before actual site selection. Training ranges of this kind have fairly specific requirements and it is not always possible to build them without impacting every wetland in the footprint. Site designers may alter certain aspects of a proposed range in response to environmental concerns during various stages of the design process, typically reviewed at the 10%, 35%, 60%, 90%, and 100% stages of completion, if they can do so while still meeting the operational and training requirements of the range. For example, the currently on-going design process reduced the wetland impacts from the IPBC to a third of what they were at the time of writing the DEIS. Impacts from the MPMGR have also been slightly reduced. Several proposed range projects were sited without wetland impacts of any kind. It is hoped that impacts from the QTR and DMPTR may be reduced, but as they are not yet in the design process this cannot be precisely determined.

It is also important to note that not all of the 185.9 acres (now 179.03 acres) of wetlands will actually be cleared, grubbed, and/or filled. Rather, that is a maximum projected "up to" amount. The actual number of acres impacted will likely be reduced further at each design level for target placement, etc.). Therefore, although the "permitted impacts" of this project may seem large in relation to other recently permitted impacts in Georgia, they do not represent substantial impacts to Fort Stewart wetlands resources. This text has been added to Section 4.3.2.2 of the FEIS.

(2) <u>USACE Position</u>: The combined wetland impact associated with the four proposed range projects has been reduced from 185.9 acres to 179.03 acres. In addition, as these projects approach final design, combined wetland impacts are expected to be reduced further. With regard to the amount of proposed wetland impact for these four projects relative to projects recently permitted by the Savannah District, there have been residential, commercial and reservoir projects authorized within the past five years with impacts in excess of 100 acres.

Based on the extensive experience of the USACE in review of permit applications for project located in the lower coastal plain of Georgia, most sites are typically comprised

by approximately thirty permit wetlands. Fort Stewart is typical of site in the lower coastal plain and is also approximately thirty percent wetlands. Fort Stewart is the only military base with large range construction in Coastal Georgia. Proposed wetland impacts associated with the size of this proposed range are comparable to the wetland impacts associated with past range development on Fort Stewart.

a. Issue 2: EPA is particularly concerned that all impacts have been characterized as wetland impacts when two of the four projects show the potential for streams impacts on the 7.5-minute USGS topo quad maps. EPA notes that while the Fort has had a significant cumulative impact to streams from past projects, these impacts have not been mitigated.

(1) Applicants Response: The footprints of the MPMGR and IPBC on the 7.5-minute USGS topographic quads show "blue line" streams in the areas, however, a site visit by Fort Stewart and the Georgia Environmental Protection Division (GA EPD) on January 20, 2010, found no streams. The Savannah District also did not identify any streams within the range footprints. This information was added to Section 4.3.1, of the FEIS.

Over the years, Fort Stewart has worked diligently to mitigate impacts – direct and indirect, as well as cumulative – to the Installation's streams, as well as wetlands. During the development of the Installation's wetland bank, for example, thousands of feet of Canoochee Creek and Strum Bay were restored without being credited to the Installation's mitigation bank. The Installation takes pride in that fact and welcomes working with ORK and other local environmental stakeholders on future projects.

(2) USACE Position: The USACE has completed an expanded preliminary jurisdictional determination for the project site. This determination verified there are no jurisdictional streams located on the project site.

a. Issue 3: The FEIS should provide more discussion regarding the quality of the wetlands impacted. The DEIS mentions they're freshwater wetlands and that the Army has acquired mitigation credits to restore a historically but degraded hardwood wetland system. It is unclear what type of wetlands ecosystems are being impacted by the ranges and garrison proposed projects.

(1) Applicants Response: Surveys of the proposed range and garrison sites by Fort Stewart determined these ecosystems were predominantly broadleaf hardwood palustrine wetlands consisting of vegetative communities typical of wetlands in the Coastal Plain: pond pine (Pinus serotina), pond cypress (*Taxodium ascendens*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), American hornbeam (*Carpinus caroliniana*), Highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occur with varying frequency depending on the landform and hydrology of particular areas. Animal communities are also supported by these areas – wading birds such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea herodias*), amphibians such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*), and mammals such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites. Soil types are hydric sand-loam mixtures of the Ellabelle, Bibb, Pelham, and Leefield types. Text reflecting this information was incorporated into Section 6.4.1 of the FEIS.

(2) USACE Position: The description of the wetlands proposed to be impacted, which was submitted by the applicant and summarized above, is sufficient for the USACE to base an assessment of the wetland quality. In addition, the USACE has made multiple visits to Fort Stewart and is very familiar with the quality of wetlands located within the proposed project site(s). The USACE used this information and its knowledge of wetland habitats on Fort Stewart in its assessment

a. Issue 4: EPA is unable to fully evaluate wetlands impacts, which is an area of CWA-designated responsibility for the Agency, in the DEIS because expanded CWA 404(b)(l) analyses have not been prepared for three ranges: FY 13 Modified Record Fire Range, FY 13 10/25 Meter Zero Range, and FY 14 Convoy Live Fire Range. This is a concern. EPA would like to review and comment on these analyses before they appear in the FEIS. Please coordinate with Bob Lord, Region 4's Wetlands Program to discuss further (note, that no comments were received from Bob Lord, Region 4's Wetland Program).

(1) Applicants Response: As we mentioned in Section 4.3.2.2. of the DEIS, the Installation has not prepared §404(b)(1) analyses for the FY13 MRFR, FY13 10/25

Meter Zero Range, and FY14 CLFR because some or all impacts to wetlands will likely be avoided during the design phase of these projects. The wetlands located on these sites are less than 5 acres each. If, however, wetlands cannot be avoided, the Installation will prepare §404(b)(1) analyses for these projects and request a §404(b) permit at that time.

(2) USACE Position: Wetland impacts pursuant to the construction of the FY 13 Modified Record Fire Range, FY 13 10/25 Meter Zero Range, and FY 14 Convoy Live Fire Range have not been determined by Fort Stewart. When these proposed projects are sited and designs are complete, and if there are any proposed wetland impacts associated with them, Fort Stewart will apply for a Section 404 permit with the USACE. Any proposed wetland impacts will be evaluated at that time and coordinated through the USACE permit process. The USACE is preparing an analysis of the proposed IPBC, MPMGR, DMPTR and QTR pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for the IPBC, MPMGR, DMPTR and QTR projects.

a. Issue 5: The DEIS states that the Fort has a regional permit for low water crossings, issued in 2001 and renewed in 2006 for 5 years, which allows for a maximum of 15 acres of cumulative wetlands impacts from low-water crossings. Approximately 5 acres of wetlands have been impacted using this permit. The FEIS should discuss the application of the Fort's regional permit for low water crossings, which allows for a maximum of 15 acres of cumulative wetlands impacts from low-water crossings, how the cumulative wetlands impacts are defined, and the water quality impacts and other aquatic resources impacts associated with this permit.

(1) Applicants Response: Low water crossings are not a part of the proposed action and there are no new low water crossings anticipated in the foreseeable future. As discussed in Section 3.4.4.2, only routine maintenance and repair of existing low water crossings in the range and training areas will be conducted.

(2) USACE Position: As part of this document, the USACE has prepared a cumulative impact assessment of all known past, presently proposed, and reasonably foreseeable future impacts to aquatic resources. This assessment takes into consideration impacts associated with low water crossings.

a. Issue 6: EPA is concerned that the credit calculations using the Savannah District Standard Operating Procedure (SOP) do not fully compensate for the impacts. The Savannah District has frequently indicated to EPA that the SOP is not applicable to large impacts, such as those over 10 acres. EPA agrees and has proposed a scaling factor to address the cumulative impacts of large projects such as the factor used in the Charleston District SOP. This is the approach used by the Georgia Department of Transportation for its projects that exceed the 10 acre threshold. For very large projects this scaling factor could be capped at an appropriate level. EPA has suggested 3.0 acres, which is equal to the next largest factor used in the SOP. Application of the SOP without a scaling factor for large impacts, particularly the 108.1 acres for the MPMGR is not appropriate, even according to past finding from the Savannah District.

(1) Applicants Response: While a scaling factor may be appropriate to use in many large scale projects where a great deal of fill is being introduced into the wetland system and where the projects require large amounts of impermeable surfaces, neither of these considerations constitute significant components of any of the projects under consideration in the DEIS. Of this filled acreage only a small amount will include the introduction of impermeable surfaces. The only impermeable surfaces will consist of the range operations area and cover only 2% of each project footprint. As noted in Answer #1 above, while maximum projected "up to" amounts have been provided, most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement. This information is located in Section 4.3.2.2.

As a result, it is the Installation's position that use of any scaling factor is not necessary to compensate for the cumulative impacts associated with these types of projects and applying a scaling factor, as called for in the Charleston District's SOP, to these types of projects would appear to be arbitrary and capricious as it would not appear to be based on any sound engineering or hydrologic rational but would appear to be more punitive than compensatory in nature.

Moreover, the Installation always takes into account secondary wetland impacts. In reference to the MPMGR, which is the project that contains the majority of the 179.03 acres of wetlands to be potentially impacted, the Installation has evaluated potential secondary cumulative impacts. In our planning process, as noted above, the Installation

took a “worst case scenario” approach when determining how to compensate for the quantity of wetlands loss. The Installation is planning to off-set secondary cumulative wetland effects from this range and has obtained an additional 287 mitigation credits from the Wilkinson-Oconee Bank. The Installation did account for the lost functions and values impacted by the project with respect to direct and indirect impacts.

As a cooperating agency to this EIS, the Savannah District was consulted with regard to the factors noted above. Additionally, Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Having reviewed these documents and the associated 404(b)(1), the Savannah District did not suggest a need to utilize a scaling factor.

(2) USACE Position: The present total proposed wetland impact for the four proposed ranges is 179.03 acres. As discussed by the applicant above, not all of these proposed impacts are for fill, but a certain percentage would involve mechanized land clearing impacts. Clearing wetlands of vegetation and maintaining them in scrub/shrub vegetation results in a change in function, but not a total loss in function. The mitigation credits proposed by Fort Stewart are assuming a total loss in function. The proposed mitigation plan is to purchase 1,391 credits to compensate for a total of 179 acres of wetland impact for all four ranges. This is a credit to impact ratio of 7.8:1. On average, three credits are generated for each acre of wetland restoration at the Wilkinson/Oconee Mitigation Bank, where credits will be purchased for the FY11 ranges. Therefore, the effective mitigation ratio for the FY11 Multipurpose Machine Gun Range and FY11 Infantry Platoon Battle Course projects would be approximately 2.6:1 of wetland restoration. The Applicant has not ruled out other acceptable compensatory mitigation alternatives to mitigate wetlands impact (provided through mitigation banks or in-lieu fee programs) for the FY13 Digital Multipurpose Training Range and the FY13 Qualification Training Range. It is the position of the USACE that the mitigation proposed for this MPMGR project would meet the requirements of the new mitigation rule.

a. Issue 7: The DEIS indicates that approximately one-third of the Fort's lands are wetlands. It also states some of the remaining 160 credits contained in the Fort's on-site mitigation bank will be used for the Garrison construction projects. Additionally, the Army has previously purchased credits from an established off-Fort wetland mitigation bank in accordance with the Compensatory Mitigation Rule (33 CFR Part 332) to cover the proposed range projects. The Fort canvassed the available mitigation banks nearly

one year ago, which may not reflect the current banks and credit availability. Given the opportunity, EPA would have discouraged the use of the Wilkinson - Oconee Mitigation Bank since it is out of the watershed, out of the ecoregion, and likely does not fully compensate for the functions lost at the project sites. EPA is also concerned, despite the rationale provided in the DEIS, that the Fort is not fully debiting its own mitigation bank before going to off-site alternatives. The Fort's mitigation bank is within the same watershed and ecoregion and thus more likely to replace the lost wetland functions. There appears to be ample time to expand this bank to accommodate the future needs presented as a reason for not fully using it for these projects. Typically, EPA discourages applicants from purchasing mitigation credits until the Section 404 permit has been issued, because this precludes other, possibly preferable, mitigation actions.

(1) Applicants Response: Although the Fort Stewart mitigation bank has sufficient credits to offset impacts from the two Garrison support construction projects, the Army has determined it is not sufficient to cover the unavoidable negative impacts to wetlands from the FY11-14 training range construction projects, for which the Installation must purchase credits from an off-site wetlands mitigation bank. The remaining acres within the Installation wetland bank allows Commanders to respond to emergency range training requirements, which surface from "In Theater" conditions and scenarios, or award Congressional Garrison or training additions that must be executed by Fort Stewart within one year or less. If Commanders did not have this flexibility, Installation projects with unavoidable wetland impacts would be cancelled or held up in significant delays awaiting Congressional funding to purchase "off-Post" wetland credits.

As discussed in Chapter 6 of the DEIS, despite the physical distance between the Wilkinson - Oconee Bank (WOB) restoration area and Fort Stewart, looking at the choice from a more holistic watershed perspective shows that the two locations are rooted in an interconnected complex of wetlands and open water bodies. The WOB wetlands were determined to be an ecologically acceptable replacement for the small portion of Fort Stewart wetlands impacts due to the proposed action. Hydrologic and habitat wetland functions will remain unimpaired.

At the time the credits were purchased, there were no other readily available mitigation banks open in the primary service area with the quantity and quality of credits needed to cover the Installation's projected needs. The Federal appropriations process did not provide the Installation with the flexibility to wait until Section 404 permits were issued

to initiate the required solicitation process to purchase the credits without putting the funding for the specific FY 2011 range projects in jeopardy. As part of the Installation's standard procurement processes, market research is conducted in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11.

For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs). For instance, the Installation is actively seeking opportunities to incorporate off-site compensatory mitigation projects into its private lands conservation initiatives in partnership with the Georgia Land Trust and will continue to do so to further provide compensatory mitigation within the primary service area and watershed. Under the Savannah District's SOP, the Wilkinson-Oconee Bank (WOB) is grandfathered as a pre-existing bank created prior to the Compensatory Mitigation Final Rule (please refer to Answer 9 below). As such, the WOB is an acceptable mitigation alternative that is in full compliance with the policy and purpose of mitigation required by the CWA, the Savannah District SOP, and the Compensatory Mitigation Final Rule. This information contained in this answer has been added to Section 6.4.1.1 of the FEIS.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. At the time of the pre-application meeting, the USACE agreed to allow the applicant to purchase credits from the secondary mitigation zone of the Wilkinson-Oconee Bank, which was the only bank with available credits. The agreement was made with the applicant in order to allow them time to procure funds necessary to provide mitigation when needed. The on-base Pond Four Mitigation Bank will be used to mitigate smaller on-post projects in the future that would likely be on a short time-line for planning, permitting and construction. The Army procurement process takes too long to allow for the purchase of mitigation credits for these small, short, time-line projects. Therefore, the USACE agrees with the applicant to save Pond Four credits for these future small projects.

a. Issue 8: EPA disagrees with the statement that applying for a CWA Section 404 permit is a minimization of wetlands impacts. The DEIS states "While the Army strives

to avoid negative impacts to wetlands when it sites new range and training facilities on Fort Stewart, if impacts to regulated wetlands cannot be avoided, the Army minimizes those impacts by applying for a Section 404 permit as required by the Clean Water Act. CWA 404 requires a permit for any dredge and fill impacts to jurisdictional waters, including wetlands. The CWA is a regulatory requirement, not a mitigation option. The FEIS should clarify this misrepresentation of CWA Section 404 permit program as a form of mitigation.

(1) Applicants Response: The information in the text and tables, located in Section 6.4.3 of the FEIS, has been edited to identify more accurately and clearly the differences between what is a required measure, such as a regulatory permit, and what is a mitigation option.

(2) USACE Position: The applicant made the suggested correction.

a. Issue 9: The DEIS discusses wetlands compensatory mitigation in context of NEPA-required mitigation when it should also discuss how the proposed mitigation meets the requirements of the Compensatory Mitigation for Losses of Aquatic Resources Final Rule. NEPA requires that to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analyses and related surveys and studies required by the Fish and Wildlife Coordination Act, the National Historic Preservation Act of 1966, the Endangered Species Act of 1973, and other environmental review laws and executive orders. The Compensatory Mitigation for Losses of Aquatic Resources Final Rule is considered to be a relevant "other environmental review law" as it is one of the CWA Section 404 implementing regulations. The FEIS should discuss and apply the Final Rule in its wetlands mitigation discussion.

(1) Applicants Response: The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR. Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Section 6.4.1.1 of the FEIS has been revised to clearly explain that a mitigation decision has not yet been made for the FY13 QTR and the FY13 DMPTR. For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee

programs). Similar to the process outlined in the Compensatory Mitigation Rule, the Installation's standard procurement processes conducts market research in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary and secondary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11.

According to 33 CFR 332, *Compensatory Mitigation for Losses of Aquatic Resources*, mitigation bank credits may be used if the project is in the service area of a mitigation bank. Section 332.3 (b)(2) has a description of why mitigation bank credits are acceptable in compensating for wetland impacts:

"Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable." Fort Stewart followed these requirements during the development of its mitigation plan.

(2) <u>USACE Position</u>: See USACE Position on USEPA issue 7 above.

a. <u>Issue 10</u>: While EPA does not expect the precise replication of all wetlands adversely impacted by the proposed action, the FEIS should explain how the proposed mitigation will adequately compensate for lost wetland functions and values such that it results in no net loss of wetland functions and values. This discussion is absent from the DEIS. Furthermore, since the U.S. Army Corp of Engineers (USACOE) cannot issue a CWA 404 permit if there is a less damaging practicable alternative, the FEIS should

discuss compliance with this provision.

(1) Applicants Response: The wetlands in the Wilkinson-Oconee Bank (WOB) are "in-kind" to the wetlands on Fort Stewart. Consistent with the fact that both areas are on Georgia's Coastal Plain, wetlands within the WOB are very similar to those slated for impact by the proposed Fort Stewart range projects. Surveys of the proposed range sites by Fort Stewart determined that dominant vegetation communities consist of plants typical of wetlands in the Coastal Plain: mixtures of pond and bald cypress (*Taxodium ascendensand distichum, respectively*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), privet (*Ligustrum sinense*), American hornbeam/ironwood (*Carpinus caroliniana*), highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occur with varying frequency depending on the landform and hydrology of particular areas, and essentially identical communities with similar distribution are found in the Wilkinson-Oconee's Mitigation Bank. Animal communities also supported by these areas are: wading birds, such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea Herodias*); amphibians, such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*); and mammals, such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites, and have been similarly reported in the Wilkinson-Oconee area. The American alligator (*Alligator mississippiensis*) is common throughout Fort Stewart and has also been observed at Wilkinson-Oconee. The locally endangered Wood Stork *Mycteria Americana* can also be found at both locations (though they are not expected to be impacted by the proposed projects).

Soil types were also consistent between the two areas. The Ellabelle, Bibb, Pelham, and Leefield types predominated in the proposed project areas. Analyses of the Natural Resources Conservation Service profiles show these to be comparable to the Chewacla, Chastain and Congaree soils which cover the Wilkinson-Oconee area. All are characterized by loamy surface layers and clayey or loamy subsoils, and all soils are on the National Hydric Soils list.

Although the area of the Coastal Plain in which the Wilkinson-Oconee area is situated features more relief than that of Fort Stewart, the specific area of the restoration situated

as it is in the Oconee River floodplain, is flatter than the surrounding general topography, resulting in a similar hydrologic profile to Fort Stewart. The bottomland hardwood wetland systems found at both locations share the typical functions of holding temporary storage surface water, maintenance of characteristic subsurface hydrology, removal and sequestration of elements, retention of particulates, export of organic carbon, maintenance of characteristic plant community, and habitat for wildlife. Based on this comparison, despite the distance between the two areas, wetlands on Fort Stewart and at the Wilkinson-Oconee restoration area are very similar and, therefore, their use for mitigation fully supports the requirement for "no net loss". Text reflecting this information was incorporated into Section 6.4.1.1 of the FEIS.

(2) USACE Position: As discussed above, the mitigation proposed by the applicant would comply with the new mitigation rule. The USACE is preparing an analysis of the proposed project pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for this proposed project. This analysis would also confirm that the final proposed site development plan for this range, as well as the other three ranges being reviewed, was the least environmentally damaging practicable alternative that would meet the basic project purpose.

a. Issue 11: The DEIS states that the USACOE documents approximately 1,467,774 acres of wetlands impacted within 20 Georgia counties and by deducting 1,982.87 acres of wetlands impacts since 1990 there are at least 1,465,791.13 acres of wetlands remaining. According to the DEIS, this amounts to a loss of 0.14% of wetlands since 1990 - an insignificant amount." It is unclear if the USACOE document referenced in the DEIS is referring to the 1,467,774 acres of wetlands as being impacted in the 20 Georgia counties or existing (un-impacted) wetlands in these counties. This paragraph needs to be clarified in the FEIS.

(1) Applicants Response: There are 1,467,774 existing acres of existing wetlands within the 20 Georgia counties referenced, of which 1,465,791.13 acres of wetlands are un-impacted. This is how the Installation calculated a loss of 0.14% of wetlands since 1990 and the determination of "insignificant" derived. Text clarifying this information was incorporated into Section 5.3.3.2 of the FEIS.

(2) USACE Position: Fort Stewart corrected the FEIS, and clarified the information that EPA questioned.

3. US Fish and Wildlife Service (USFWS): No comments received. The US Army, Fort Stewart is the lead federal agency for this proposed action and has completed consultation with the USFWS. The Final Biological Opinion can be found in Appendix B of the FEIS.

4. Georgia State Clearinghouse: By memorandum dated June 8, 2010, the Georgia State Clearinghouse stated that the request has been found to be consistent with state goals, policies, plans, objectives, and programs, with which the state is concerned.

5. Georgia Department of Natural Resources, Coastal Resource Division (Georgia CRD): No comments were received from Georgia CRD. However, this office must certify that the project is consistent with the Georgia Coastal Management Program prior to the USACE completing its review of the subject application.

6. Georgia Department of Natural Resources, Environmental Protection Division (Georgia EPD): No comments were received from Georgia EPD. Fort Stewart is in consultation with the Georgia Environmental Protection Division regarding a water quality certification pursuant to Section 401 of the Clean Water Act. The USACE would include a copy of the 401 water quality certification with any permit issued. In addition, the special condition of any permit issued would require the permittee to adhere to the conditions of the 401 water quality certification.

7. Southern Environmental Law Center (SELC): By letter dated May 21, 2010, the SELC provided the following comments on behalf of the Ogeechee Riverkeeper, Inc. (ORK):

a. Issue 1: The applicant's alternatives analysis in the DEIS includes alternative COA 3 which is a "heavily utilized" existing multipurpose range complex (MPRC) (*Fort Stewart note: the range proposed for construction is actually a Digital Multi-Purpose Training Range, or DMPTR*). DEIS, Appendix D at 10. This, of course, begs the question as to why the Applicant is including as an alternative a site that could never be used even if it determined that the site would have fewer environmental impacts. Alternative COA 3 is not a practicable alternative at all.

(1) Applicants Response: Transforming the existing MPRC was an option

legitimately considered as a practical alternative but rejected due to current and expected military operations and training demands. Transforming the existing MPRC and other operational ranges will remain a consideration on future range projects as the types of military training and weapon systems evolve over time and possibly render older ranges obsolete. An example of this is the COA 1 for the DMPTR, which involves the transformation of another existing range, Red Cloud Foxtrot. In siting the DPMTR over top of an existing range, we are attempting to minimize and avoid the wetland impacts that would be associated with constructing the DPMTR elsewhere on Fort Stewart.

(2) USACE Position: Given the amount of development on the base as a whole, the re-use of an existing range should be considered as a potential alternative. The elimination of alternatives as not being practicable is a standard part of the Section 404(b)(1) Guidelines.

b. Issue 2: The other alternative which the Applicant examined yielded wetlands impacts of 240 acres. It is difficult to accept that there were no other practicable alternatives at Fort Stewart for this proposed range. Two-hundred forty acres is more than the combined wetlands impacts of all four of the proposed ranges.

(1) Applicants Response: Based on the Installation's location in a relatively flat coastal plain and the location of pre-existing military training ranges and facilities on high ground, impacts to 240 acres of wetlands to build a new 995 acre range is not beyond the realm of reasonable consideration as a viable alternative. The fact that wetland impacts in the preferred alternative are less than five percent of the overall range size demonstrates the Installation's efforts to avoid and minimize wetland impacts associated with the siting of new military ranges and training facilities. Army Installations, including Fort Stewart, must maintain their training lands to fully sustain mission requirements for national security. The way the Army does this is through its master planning process. It is important to note that the Installation's planning efforts to minimize wetland impacts begins with attempts to select a site with the least amount of wetlands. At this point in the planning process, the range design is limited to placement on site of a footprint of the proposed range. This footprint shows the maximum number of wetland impacts and that is why we state "up to" so many acres; however, once a final site is selected, further attempts are made to avoid and minimize negative impacts to wetlands inside the range footprint through the range design process.

The final range design cannot be prepared prior to a site being selected. Also, despite Fort Stewart's large size, much of its lands are already committed to other training, recreational, and environmental activities. Maneuver and dismounted maneuver training areas occupy large portions of the Installation, where the integration of large firing ranges is not suitable. The west side of the Installation is devoted to maneuver training and, in its entirety, is necessary to meet Brigade mission training requirements. Maneuver training is necessary in upland areas to reduce wetland impacts resulting from heavy wheeled and tracked military vehicles, as well as to avoid vehicles from getting stuck in wet areas. The southeast side of the Installation is devoted to dismounted maneuver training (i.e. training on foot) and also contains a wooded recreational area for campers. More than 100,000 acres are devoted to the restoration and management of environmentally sensitive areas, such as habitat for threatened and endangered species (including the red-cockaded woodpecker (RCW) and gopher tortoise) and wetlands.

During the planning process for the FY13 DMPTR, which Fort Stewart initiated in 2006, the Installation developed a total of eight siting alternatives. This process allowed both operational and environmental aspects, including impacts to wetlands, to be thoroughly analyzed in a collective manner by members of the Installation's Environmental Division, Range Control Division, and Master Planning Division. As the analysis progressed, these siting alternatives were ranked using screening criteria, as discussed in Chapter 2, *Description of the Proposed Action and Alternatives*, of the FEIS. Minimization of environmental impacts, including wetlands, was a factor in which alternatives were considered viable and which were not. One DMPTR discounted alternative, not discussed in the FEIS, contained 673 acres of wetlands impact. Another site, also not considered any further, contained 313 acres of wetland impact and would have resulted in the elimination of 683 acres of RCW habitat (compared to an RCW habitat loss of 22.4 acres and 31 acres as a result of Alternatives B and C, respectively). Even though these eliminated sites were operationally viable, they were removed from consideration after environmental impacts were determined to be significant.

(2) <u>USACE Position</u>: There are variety of safety, noise, and other constraints that limit where a live fire range could be located on Fort Stewart. The Army is the "expert" for siting ranges and conducted an intensive alternatives analysis for locating this, and the other three range projects; to avoid wetland impacts, while meeting other site constraints. The Section 404(b)(1) analysis to be prepared for this action will fully address this issue.

c. Issue 3: Multi Purpose Machine Gun Range (MPMGR). As an alternative for this range, the Applicant proposed course of action (COA) 5 which would have yielded wetlands impacts of less than 9 acres had it been chosen as the preferred alternative. However, the Applicant eliminated this alternative because it emerged as the preferred alternative for DMPTR. As such, COA 5 should not be discussed as a viable alternative for the MPMGR.

(1) Applicants Response: As a large military training and deployment complex, Fort Stewart must examine and analyze the cumulative effects of all its proposed ranges within its training platform as constrained by the Installation borders, adjacent and associated training facilities, and surface danger zones relative to one another. This analysis is in addition to examining other resources, such as wetlands, to optimize training while minimizing the overall impact to our environment. The decisions made on the siting of each range and what are practical alternatives are inherently intertwined and interdependent. This may not have been reflected well in Section 404 permit applications, but is more fully explained in Section 6.4.1.1 of the FEIS. The possibility remains that the MPMGR could be selected to occupy that site currently under consideration for the DMPTR if the DMPTR is ultimately selected to occupy another site.

Also, many other impacts, in addition to wetland impacts, are examined and analyzed in the siting of new ranges and training facilities, including other environmental factors (such as threatened and endangered species) and non-environmental factors (such as the impact the site has on the ability to conduct timely and realistic military training based on current threats to our nation's armed forces when engaged in combat or peace keeping operations overseas). Both the MPMGR and DMPTR were approved for funding, and as has been noted, COA 2 for the DMPTR would have carried a level of wetland impact even greater than the current impacts from both the MPMGR and the DMPTR. Given the many constraints (see Appendix D for siting criteria) at play in siting both ranges, the preferred COAs for the two ranges were seen as a necessary compromise for ensuring all needed ranges are built and military training requirements met.

(2) USACE Position: See discussion for SELC issue 2 above.

d. Issue 4: Notwithstanding the above, the Applicant needs to more adequately explain why it did not select COA 5 as the preferred alternative for MPMGR considering it would have reduced the wetlands impacts from 116.7 acres down to 9 acres.

(1) Applicants Response: Unfortunately, it would not be possible to ignore the fact that the site was already selected as the preferred site for the DMPTR, as suggested. Two independently proposed ranges cannot have the same preferred site. The Installation agrees that nine acres of impact for a 250-acre range is far more desirable than 116.7 acres of wetland impacts (which we now have down to 103.3 acres); however, wetlands impacts for this specific range were only one factor examined and analyzed in selecting this site as the preferred alternative. Selection of this site as the preferred alternative helps the Installation's ability to avoid and minimize the overall and cumulative impacts to all wetlands associated with planned or reasonably anticipated range construction, as reflected in Sections 4.3.2, 5.3.3.2, and 6.4.1 of the FEIS.

(2) USACE Position: See discussion for SELC issue 2 above.

e. Issue 5: Qualification Training Range (QTR). For this proposed range, the Applicant discusses but then rules out COA 3, which would have less wetlands impacts than the Preferred Alternative B. The Applicant rules out this alternative site because it is the proposed location for a future Modified Record Fire (MRF) range, which is not before the Corps at this time. Again, given the significant size of Fort Stewart, alternatives for one range should not be eliminated for future potential ranges, or, such a site should never be discussed as an alternative. The Applicant is required under the Section 404(b)(1) guidelines to indentify "practicable alternatives," not alternatives that could never be chosen regardless of how favorable they might be from an environmental standpoint.

(1) Applicants Response: Again, as a large military training and deployment complex, Fort Stewart must examine and analyze the cumulative effects of all its proposed ranges within its training platform as constrained by the Installation borders, adjacent and associated training facilities, and surface danger zones relative to one another. This analysis is in addition to examining other resources, such as wetlands, to optimize training while minimizing the overall impact to our environment. The decisions made on the siting of each range and what are practical alternatives are inherently intertwined and interdependent. This may not have been reflected well in Section 404 permit applications; but is more fully explained in the FEIS. One reason the COA 3 was deemed unsuitable was the fact the site is currently an operational range that is projected for reuse or transformation as a future MRF range. While Fort Stewart has a large land

mass, much of its land mass is not environmentally or operationally suitable for range construction or for a number of considerations. Although significant, wetland impacts are only one of several significant factors considered when examining the suitability for siting of a range. The remaining lands that are suitable for future range construction are limited because the best locations are currently being used to capacity as military ranges or training areas. The Installation contains many sensitive resources, such as wetlands and protected species habitat, which limit the locations suitable for constructing new military training ranges that are capable of maximizing military training while minimizing environmental impacts. Because of the operational impacts examined and analyzed when siting ranges, and because the Installation was able to minimize impacts and mitigate those that did occur, the decision was made to retain the COA 3 site for a future project. The alternative was practicable but was not chosen in this instance.

(2) USACE Position: See discussion for SELC issue 2 above.

f. Issue 6: Inadequate Mitigation. Ogeechee Riverkeeper (ORK) is concerned with several flaws in the Application's proposed mitigation measures. Considering the Project's significant destruction and alteration of wetlands, it is imperative that the value and functions of wetlands on Fort Stewart are mitigated. ORK shares the concerns expressed by the Environmental Protection Agency (EPA) in its comments on the Draft Environmental Impact Statement dated May 14, 2010. First, the Applicant's usage of the Savannah District's Standard Operating Procedure (SOP) for calculation of mitigation credits is inconsistent with the district's position that the SOP should not be applied to projects with large wetlands impacts. Given the Project's substantial wetlands impact of 190 acres, we urge the Corps to apply the SOP, but do so with a scaling factor to address the cumulative impact of the Project, an approach that is followed by the Charleston District. The Applicant's use of the SOP without a scaling factor will not successfully and adequately replace the lost functions and values of wetlands impacted by the Project.

(1) Applicants Response: The implementation of the actions proposed in the preferred alternative (Alternative B Sitings) has the potential to negatively impact up to 0.2% of the Installation’s nearly 91,000 acres of wetlands. More importantly, of the up to 0.2% of the Installation’s wetlands being impacted, most of those impacts are not the result of adding fill to the wetlands, and as stated earlier, the Installation anticipates wetland impacts will be much less than projected through further avoidance and

minimization incorporated during the design phases of each project after the site is selected. It is important to note, that despite the large amount of military training activity that occurs on Fort Stewart, because of the Installation's proactive efforts to avoid, enhance and mitigate wetlands, its wetlands remain of a high quality, retaining and transmitting large amounts of fresh water and providing habitat for countless local species.

While a scaling factor may be appropriate to use in many large scale projects where a great deal of fill is being introduced into the wetland system and where the projects require large amounts of impermeable surfaces, neither of these considerations constitute significant components of any of the projects under consideration in the FEIS. Of this filled acreage only a small amount will include the introduction of impermeable surfaces. The only impermeable surfaces will consist of the range operations area and cover only 2% of each project footprint. As noted above, while maximum projected "up to" amounts have been provided, most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement. This information is located in Section 4.3.2.2.

As a result, it is the Installation's position that use of any scaling factor is not necessary to compensate for the cumulative impacts associated with these types of projects and applying a scaling factor, as called for in the Charleston District's SOP, to these types of projects would appear to be arbitrary and capricious as it would not appear to be based on any sound engineering or hydrologic rational but would appear to be more punitive than compensatory in nature.

Moreover, the Installation always takes into account secondary wetland impacts. In reference to the MPMGR, which is the project that contains the majority of the 190 acres (now 179.03 acres) of wetlands to be potentially impacted, the Installation has evaluated potential secondary / cumulative impacts. In our planning process, as noted above, the Installation took a "worst case scenario" approach when determining how to compensate for the quantity of wetlands loss. The Installation is planning to off-set secondary / cumulative wetland effects from this range and has obtained an additional 287 mitigation credits from the Wilkinson-Oconee Bank. The Installation did account for the lost functions and values impacted by the project with respect to direct and indirect impacts.

As noted in Sections 3.4.5 and 4.3.2 of the FEIS, the Savannah District is a cooperating

agency to this EIS, and was consulted with regard to the factors noted above. Additionally, Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Having reviewed these documents and the associated 404(b)(1), the Savannah District did not suggest a need to utilize a scaling factor.

(2) USACE Position: The USACE does not require the usage of the Savannah District's Standard Operating Procedure (SOP) for calculation of mitigation credits for projects of this size. The USACE does not use any scaling factor in association with the USACE SOP. The present total proposed wetland impact for the four proposed ranges is 179.03 acres. As discussed by the applicant above, not all of these proposed impacts are for fill, but a certain percentage would involve mechanized land clearing impacts. Clearing wetlands of vegetation and maintaining them in scrub/shrub vegetation results in a change in function, but not a total loss in function. The mitigation credits proposed by Fort Stewart are assuming a total loss in function. The proposed mitigation plan is to purchase 1,391credits to compensate for a total of 179 acres of wetland impact for all four ranges. This is a credit to impact ratio of 7.8:1. On average, three credits are generated for each acre of wetland restoration at the Wilkinson/Oconee Mitigation Bank, where credits will be purchased for the FY11 ranges. Therefore, the effective mitigation ratio for the FY11 Multipurpose Machine Gun Range and FY11 Infantry Platoon Battle Course projects would be approximately 2.6:1 of wetland restoration. The Applicant has not ruled out other acceptable compensatory mitigation alternatives to mitigate wetlands impact (provided through mitigation banks or in-lieu fee programs) for the FY13 Digital Multipurpose Training Range and the FY13 Qualification Training Range. It is the position of the USACE that the mitigation proposed for this MPMGR project would meet the requirements of the new mitigation rule.

g. Issue 7: Second, the Applicant's choice of the Wilkinson-Oconee Mitigation Bank conflicts with the policy and purpose of mitigation required by the CWA. Under the Corp’s regulation, the Applicant's "compensatory mitigation should be located within the same watershed as the impact site ...." 33 C.F.R. § 332.3. The purpose of this rule is to preserve and maintain water resources within a watershed, and ensure that wetlands lost are compensated by wetlands with similar characteristics, values, and functions. The Application, however, proposes mitigation outside of Fort Stewart and in another

watershed at the Wilkinson-Oconee Mitigation Bank. This choice not only conflicts with the Corps' policy but also ignores the available 160 credits contained in Fort Stewart's on-site mitigation bank. ORK believes that the Corps should require the Applicant's use of the on-site mitigation.

(1) Applicants Response: Mitigation credits generated from the on-Post compensatory mitigation bank are not being used because there are insufficient credits available to satisfy requirements associated with the projects and the Installation needs to retain the few credits remaining for potential use to compensate for last minute and unanticipated Congressional add-on projects that occur on the Installation on a not-infrequent basis. Regarding use of mitigation banks, the Compensatory Mitigation for Losses of Aquatic Resources Final Rule states, "In many cases, the environmentally preferable compensatory mitigation may be provided through mitigation banks or in-lieu fee programs because they usually involve consolidating compensatory mitigation projects where ecologically appropriate, consolidating resources, providing financial planning and scientific expertise (which often is not practical for permittee-responsible compensatory mitigation projects), reducing temporal losses of functions, and reducing uncertainty over project success." The rule then lists types of compensatory mitigation measures in order of preference. The rule states that "[in] general, the required compensatory mitigation should be located within the same watershed as the impact site." But mitigation bank credits may be used if the project is in the service area of the bank. Section 332.3 (b)(2) has a description of why mitigation bank credits are given in the regulation:

"Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee

programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable." Fort Stewart followed these requirements during the development of its mitigation plan.

Under the Savannah District's SOP, the Wilkinson-Oconee Bank is "grandfathered" as a pre-existing bank created prior to the Compensatory Mitigation Final Rule. As such, the Wilkinson-Oconee Bank is an acceptable mitigation alternative that is in full compliance with the policy and purpose of mitigation required by the CWA, the Savannah District SOP, and the Compensatory Mitigation Final Rule. Fort Stewart's use of the Wilkinson-Oconee Bank as mitigation for the proposed FY11 range projects was fully coordinated with the Savannah District, which was a cooperating agency on the EIS.

The wetlands in the Wilkinson-Oconee Bank are "in-kind" to the wetlands on Fort Stewart. Consistent with the fact that both areas are on Georgia's Coastal Plain, wetlands within the Wilkinson-Oconee are essentially identical to those slated for impact by the proposed Fort Stewart range projects. Surveys of the proposed range sites by Fort Stewart determined that dominant vegetation communities consist of plants typical of wetlands in the Coastal Plain: mixtures of pond pine (Pinus serotina), pond cypress (*Taxodium ascendens*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), American hornbeam (*Carpinus caroliniana*), Highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occurr with varying frequency depending on the landform and hydrology of particular areas, and essentially identical communities with similar distribution are found in the Wilkinson-Oconee's Mitigaiton Bank. Animal communities also supported by these areas are: wading birds, such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea Herodias*); amphibians, such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*); and mammals, such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites, and have been similarly reported in the Wilkinson-Oconee area.

Soil types were also consistent between the two areas. Hydric sand-loam mixtures of the Ellabelle, Bibb, Pelham, and Leefield types predominated in the proposed project areas. Analyses of Natural Resources Conservation Service profiles show these to be comparable to the Chastain and Congaree soils which cover the Wilkinson-Oconee area.

All soils are on the National Hydric Soils list. Although the area of the Coastal Plain in which the Wilkinson-Oconee area is situated features more relief than that of Fort Stewart, the specific area of the restoration is flatter than the surrounding general topography, resulting in a similar hydrologic profile to Fort Stewart. The bottomland hardwood wetland systems found at both locations share the typical functions of holding temporary storage surface water, maintenance of characteristic subsurface hydrology, removal and sequestration of elements, retention of particulates, export of organic carbon, maintenance of characteristic plant community, and habitat for wildlife. Based on this comparison, despite the distance between the two areas, wetlands on Fort Stewart and at the Wilkinson-Oconee restoration area are very similar and, therefore, their use for mitigation fully supports the requirement for "no net loss". Text reflecting this information was incorporated into Section 6.4.1.1 of the FEIS.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. At the time of the pre-application meeting, the USACE agreed to allow the applicant to purchase credits from the secondary mitigation zone of the Wilkinson-Oconee Bank, which was the only bank with available credits. The agreement was made with the applicant in order to allow them time to procure funds necessary to provide mitigation when needed. The on-base Pond Four Mitigation Bank will be used to mitigate smaller on-post projects in the future that would likely be on a short time line for planning, permitting and construction. The Army procurement process takes too long to allow for the purchase of mitigation credits for these small, short-time-line projects. Therefore, the USACE agrees with the applicant to save Pond Four credits for these future small projects.

h. Issue 8: Before seeking compensatory mitigation in a different watershed, the Applicant should explore the use of existing and new mitigation banks in Ogeechee River Watershed. According to the DEIS's evaluation of mitigation banks in 2009, the Ogeechee River/Margin Bay and Black Creek Banks may now have available credits. DEIS at 6-8. Also, given the significant amount of wetlands within the boundaries of Fort Stewart as well as Fort Stewart's experience in the creation of mitigation banks, the Corps should require the Applicant to take a hard look at a potential onsite mitigation bank that would ensure the compensation of the wetlands' lost values and functions.

(1) Applicants Response: Existing and new mitigation banks within this watershed

were not available at the time Fort Stewart was required to begin planning for the required wetlands credit acquisition for its FY 2011 range projects with known and/or anticipated wetlands impacts (see answer to Issue #9, below, for additional details). On-site wetlands mitigation was not a viable option because, as discussed in Section 5.3.3.2 of the FEIS, although Fort Stewart has an existing mitigation bank and an on-site wetlands restoration project, it is running out of new places where additional on-site mitigation can be conducted. If credits are available in the primary service area in the future, however, then Fort Stewart will work to try and obtain these credits, in accordance with the Compensatory Mitigation Rule For Losses of Aquatic Resources (33 CFR 332) and the Federal Acquisition Regulation. For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs).

After exploring and selecting reasonable site alternatives for the proposed FY11-FY14 range projects, the Installation determined that the last remaining on-site mitigation bank (Pond 4) could not support the wetland mitigation requirements for these facilities and sustain itself for mitigation of proposed and future garrison construction, and other unplanned projects that arise out of mission changes. The remaining acres within the Installation Wetland Bank allows Command to respond to emergency range training requirements which surface from "In Theater" conditions and scenarios, or award Congressional garrison or training additions that must be executed by Fort Stewart within one year or less. If Commanders did not have this flexibility, Installation projects with unavoidable wetland impacts would be cancelled or held up in significant delays awaiting Congressional funding to purchase "off-Post" wetland credits.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. The credits purchased were in the secondary service area of the Wilkinson-Oconee Bank which was the only bank with available credits. The on base Pond Four Mitigation Bank would not have enough acreage needed for these projects. Fort Stewart has conducted an in-depth review of potential wetland mitigation sites on the base and is in the process of developing additional areas connected to the existing Pond Four Mitigation Bank; however, no additional mitigation is available at this time.

h. Issue 9: The Applicant's proposed mitigation plan is based on mitigation credits

purchased a year ago from the Wilkinson-Oconee Bank which was the "only bank that provided an offer to the solicitation...." DEIS at 6-8. It is our understanding that Section 404 permit applicants are discouraged from procuring mitigation credits in advance of receiving a permit so that the Applicant is not limited in its mitigation options, such as the use of new mitigation banks. This reasoning is at play here. It has been a year since the Applicant solicited a mitigation contract and, according to the Applicant's DEIS mitigation bank table 6.1, at least two Ogeechee River Watershed banks may now have credits available.

(1) Applicants Response: The timeline associated with Congressional Budget approval and Federal Appropriation process for military construction requires advance planning to enable construction to be implemented in the timeframe appropriation was made. The timeline for planning and construction of these projects is quite early (two years out or more) and did not allow for a later solicitation. To secure the funds necessary to build a proposed range, Headquarters-Department of the Army (HQDA) requires the Installation to budget for wetland impacts that will be unavoidable at least two years prior to the proposed project's anticipated contract award date. If an Installation fails to provide this to HQDA within the given timeline, the project is not funded. In the past, Fort Stewart has been able to mitigate using its on-Post wetland mitigation bank; however, as mentioned above, the on-Post bank no longer has an adequate amount of credits available to support these ranges while also meeting the requirements of the Installation's "In-Theater" mission requirements. The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR. Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Section 6.4.1.1 of the FEIS has been revised to clearly explain that a mitigation decision has not yet been made for the FY13 QTR and the FY13 DMPTR.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. The USACE recognized the time restraints associated with the proposed projects and the military's appropriation and allocation of funds needed for potential wetland impacts and agreed to the use of the Wilkinson-Oconee Bank for these projects. Any future projects mitigation requirements would fall within the guidelines and mitigation availability in place at that

time.

i. Issue 10: Furthermore, we share EPA's concerns that the Applicant is not sufficiently mitigating impacts on streams. It is our understanding that Fort Stewart's projects in the past have significantly affected streams that were not mitigated. ORK urges the Corps to ensure that stream impacts are assessed separately from wetlands impacts and that the loss of streams is compensated appropriately. Overall, ORK is concerned that the Applicant's proposed mitigation plan simply does not include adequate compensation for Fort Stewart's wetlands and streams that will be significantly impacted by the Project.

(1) Applicants Response: No streams will be lost as a result of the proposed project. The footprints of the MPMGR and IPBC on the 7.5-minute USGS topographic quads show "blue line" streams in the areas; however, a site visit by Fort Stewart and the Georgia Environmental Protection Division (GA EPD) on January 20, 2010, found no streams. The Savannah District also did not identify any streams within the range footprints. This information was added to Section 4.3.1, of the FEIS.

Over the years, Fort Stewart has worked diligently to mitigate impacts – direct and indirect, as well as cumulative – to the Installation's streams, as well as wetlands. During the development of the Installation's wetland bank, for example, thousands of feet of Canoochee Creek and Strum Bay were restored without being credited to the Installation's mitigation bank. The Installation takes pride in that fact and welcomes working with ORK and other local environmental stakeholders on future projects.

(2) USACE Position: The USACE has completed an expanded preliminary jurisdictional determination for the project site. This determination verified there are no jurisdictional streams located on the project site.

j. Issue 11: Failure to Minimize Impacts to Marine Resources. Section 404(b)(1) guidelines prohibit issuance of a permit where "[t]he proposed discharge does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem." 40 C.F.R. § 230.12(a)(3)(iii) (emphasis added). None of the information that we have reviewed demonstrates that the Applicant has tried to adequately minimize the impacts of the Project. The Applicant repeatedly contends that because it is utilizing

existing range footprints the Project will "avoid and minimize impacts to more pristine and un-fragmented wetlands systems" on Fort Stewart. See e.g. Public Notice at 3. While ORK appreciates the Applicant's utilization of existing ranges for the Project, this reuse of range areas does not ensure minimization of harm to aquatic ecosystems or satisfy the regulation's mandate that the Project includes "all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem." 40 C.F.R. § 230. 12(a)(3)(iii).

(1) Applicants Response: In addition to avoiding and minimizing impacts to more pristine and un-fragmented wetlands systems, as noted in the comment, Fort Stewart consistently seeks to minimize and avoid wetland impacts at each stage of the design process. It is also important to note that the proposed ranges would be constructed on existing ranges that are operational and already cleared of vegetation. First, much of the avoidance and minimization process takes place before actual site selection. (See response to Issue #2.) Training ranges of this kind have fairly specific requirements and it is not always possible to build them without impacting every wetland in the footprint; however, site designers may alter certain aspects in response to environmental concerns during various stages of the design process (10%, 35%, 60%, 90%, and 100% stages of design completion). This is easiest if they can do so while still meeting the operational and training requirements of the range. For example, the currently on-going design process reduced the wetland impacts from the IPBC to a third of what they were at the time of writing the DEIS. Impacts from the MPMGR were also slightly reduced during that time and several proposed range projects were sited without wetland impacts of any kind. It is hoped that impacts from the QTR and DMPTR may be reduced, but as they are not yet in the design process, this cannot be precisely determined.

To ensure compliance with the Georgia (GA) Erosion and Sedimentation Control Act (ESCA) and the CWA on existing and future training ranges, Fort Stewart mandates full utilization of Timber Harvest best management practices (BMPs), National Pollutant Discharge Elimination System (NPDES) permit requirements, site-specific Erosion and Sedimentation Pollution Control Plans (ESPCPs), and pre- and post-construction BMPs to reduce the potential adverse impacts to water bodies, such as streams. The projects discussed in the JPN and FEIS have not undergone complete design. During this process, however, Fort Stewart stormwater specialists review ESPCPs for compliance with the GA ESCA and the CWA. The Installation also utilizes the Natural Resources Conservation Service (NRCS) to provide technical expertise during preparation of ESPCPs prior to Fort Stewart providing construction approval. Fort Stewart stormwater

compliance assessors and NRCS consistently inspect and monitor on-going construction actions. They will also do this during the construction of these proposed projects to ensure adherence to associated ESPCPs. Fort Stewart inspectors also routinely inspect tank trails, range access roads, range course roads, and dirt roads/trails to see if any damage is occurring (such as hardened tank trails or water crossings need repairs, to prevent sedimentation of adjacent streams).

(2) USACE Position: The USACE is preparing an analysis of the proposed project pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for this proposed project. This analysis will document that all requirements of the Guidelines have been met.

k. Issue 12: The Applicant-specifically, in Appendix D to the DEIS, fails to adequately describe measures intended to minimize impacts besides asserting that the ranges will be placed in existing disturbed areas. The proposed plans for MPMGR and QTR consist of wetlands impacts of 116.7 acres and 26.7 acres, respectively. Contrary to the Applicant's assertion that these proposed impacts are not extensive, the two ranges impact all wetlands within MPMGR and QTR areas. Thus, when all wetlands in each project area are destroyed or altered, the Applicant has failed to demonstrate that it has adequately minimized impacts to the aquatic ecosystem. The Applicant's failure to offer measures to minimize impacts to wetlands and streams violates the Section 404(b)(1) guidelines and the CWA. ORK urges the Corps to require the Applicant to set forth specific measures intended to minimize wetlands impacts on each of the four proposed ranges.

(1) Applicants Response: As noted in previous response, Fort Stewart attempts to avoid and minimize wetland impacts throughout the siting and design process. The most substantial avoidance and minimization occurs during the siting process as part of the site alternatives to carry forward for detailed analysis. Please note that, at the initial siting phase, the amount of wetland acres impacted attributed to each range is simply a total of all wetland acres that *would be located within the range footprint that could potentially be impacted*, and it is likely not *all of the wetlands within the footprint will be impacted by the project because avoiding and minimizing negative impacts wetland are carried forward as a consideration into the actual range design process after the site is selected*.

Efforts are made to reduce these impacts as the design progresses and, it is anticipated that, as design proceeds, additional wetlands avoidance and minimization of effect will be achieved. Again as an example, the currently on-going design process for the IPBC range has reduced the wetland impacts to a third of what they were at the time of writing the DEIS. Design efforts for the MPMGR have produced similar results, as well. Furthermore, little-to-no impervious surfaces will exist on these ranges, so runoff will not increase appreciably. The primary areas of "hardened surfaces" will consist of concrete turning pads, hardened stream crossings, etc., but not hardened roads and/or completely paved areas. The range surfaces will still be permeable, and, after construction, will acquire a covering of grasses and light herbaceous vegetation. Furthermore, wildlife may still traverse the ranges and graze during periods (sometimes weeks or more) the ranges are not in use.

In regard to the general issues of siting ranges and orienting them to avoid wetlands, further mention must be made of the Surface Danger Zone, or SDZ. Every range has an SDZ, an area within which people, property, and wildlife are in danger of being struck by projectiles during live fire exercises. Because of this danger, safety of Fort Stewart personnel, the public, and wildlife is a primary consideration in range siting. As previously noted, an SDZ may cover hundreds or even thousands of acres, and ranges must be sited to ensure areas of habitation, daily operations, traffic, and environmental sensitivity do not fall within them. A further limitation to siting is the fact that Fort Stewart is essentially cut into quarters by two major Georgia highways conveying regular civilian traffic. Injury or loss of human life during live fire exercises due to an improperly placed SDZ would be unacceptable to any party. Therefore, all organizations involved in siting ranges are forced to site ranges and their attendant SDZs very carefully. Efforts are made to ensure SDZs overlap. This maximizes land use and minimizes areas impacted by live fire; in part this is itself an environmental consideration as vegetation and animal populations may suffer losses from carelessly directed live fire.

(2) USACE Position: The USACE is preparing an analysis of the proposed project pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for this proposed project. This analysis will document that all requirements of the Guidelines have been met.

l. Issue 13: Deposition of Munitions. Finally, to our knowledge the Applicant fails to discuss the impact to water quality of any munitions landing in any waters of the United States on the proposed ranges. Under the Section 404(b)(1) guidelines, the Corps has an independent duty to evaluate water quality impacts before it issues a permit. The deposition of the munitions in such waters will be an indirect impact of the proposed Project.

(1) Applicants Response: The Military Munitions Rule states that used or fired munitions are considered a solid waste only when they are removed from their original landing spot (www.epa.gov/epaoswer/hazwaste/military/index.htm). Therefore, since the proposed ranges will utilize existing impact areas and the munitions will be used for their intended purposes and will be left where they land, the munitions are not considered solid waste. The best practices to minimize the impact of lead on the environment are stormwater and erosion controls, vegetation management, soil amendments, bullet traps, and soil pH modifiers which are utilized.

(2) USACE Position: A certain percentage of the munitions that are used or fired on this range, and the other three ranges under review, would likely land in waters of the United States. The USACE would assume that most of this exploded ordinance would be comprised of lead, copper, zinc and other inert metals. Fragments of inert metal would not dissolve in water or otherwise become bio-available. Therefore, there would be a very low probability of munitions resulting in a more than minimal impact on water quality. The Georgia Environmental Protection Agency is reviewing the proposed project under Section 402 of the Clean Water Act, for compliance with the state's Water Quality Certification program. Prior to the USACE issuing a final permit for this proposal, the Georgia EPD must first issue Water Quality Certification. With issuance of Water Quality Certification, Georgia EPD would confirm that the proposed project would meet all applicable state standards.

PART III - ALTERNATIVES/SECTION 404(b)(1) ANALYSIS

A. ALTERNATIVES:

1. No Action: The no action alternative is one in which the proposed MPMGR facility would not be built. If this facility is not provided, the Soldiers of Fort Stewart, Reserve and

National Guard units that train here will not be able to obtain and maintain efficiency for live fire training for machine gun engagements. Units will not train to standard, and the gap between equipment fielding and training will widen. The ranges that do exist on the Installation for machine gun marksmanship training cannot accommodate the annual marksmanship throughput needed to test Soldiers in their live-fire marksmanship skills. Ultimately, Soldiers may enter future combat, less than fully prepared to employ the full capabilities of their weapons and equipment.

2. Off-Post Locations: Consideration was given to siting the MPMGR in an Off-Post location. Duplicating the infrastructure at a location Off-Post would incur considerable costs beyond the capability of the applicant's budget constraints. The MPMGR would at a minimum require approximately 6,500 acres of land in an appropriate shape to co-locate the SDZ and associated facilities (see further discussion below). For comparison, the 3rd Infantry's Satellite Post, Hunter Army Air Field, is only 5,100 acres total. Estimates and surveys have shown to acquire such a track of land would require an Environmental Impact Statement. An Off-Post facility would be difficult to locate and still meet the Proximity requirements, especially given the logistics, cost, and scheduling required. Additionally, there are no other Public Lands available nearby that would be compatible with the MPMGR training requirements.

3. On-Post Location: The proposed project is for the construction of a MPMGR that utilizes existing SDZs, does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make Unexploded Ordnance (UXO) clearance operations difficult, while avoiding impacts to wetlands. The MPMGR will be used to train tenant and reserve Soldiers in basic machine gun live-fire training tasks required to sustain combat proficiency; specifically, to identify and engage stationary infantry targets with a machine gun. The actual range will be 320 meters in width by 300 meters in depth and require approximately 250 acres of clear-cutting. All targets would be fully automated, allowing numerous event and specific target training scenarios, all of which will be computer driven and scored from the range operations center. The associated Range Operations and Control facilities will consist of the standard Small Arms Facilities. These facilities consist of an After Action Facility, Staging Facility, bleacher enclosure, range control tower, range operations and storage building, latrine, covered mess and building information systems. Supporting facilities include electric service, paving with parking for Military and POVs, site improvements, storm drainage and information systems.

The applicant identified five potential MPMGR sites located within the Fort Stewart reservation. Each of these sites contains the area needed to support the range and accompanying SDZ. The five sites, discussed in more detail below, were identified and evaluated using the following criteria, which apply to all facilities at Fort Stewart:

1. Allow Anti-Terrorism and Force Protection. The site must be able to accommodate appropriate anti-terrorism measures and standoff distances.

2. Compatibility with Wildfire and Control (Prescribed) Burning Programs. The risk of wildfires is taken into consideration when siting projects. Areas to be avoided are those that are infrequently burned, because of safety concerns and for adherence to protected species habitat management plans include parcels near major highways (State and Interstate) and adjacent communities. Constructing facilities in locations that hinder Fort Stewart's prescribed burn program must be avoided.

3. Minimization of Environmental Impacts. Consideration of environmental impacts when siting projects include the following: avoid or minimize impacts to cultural and natural resources (such as wetlands and protected species); avoid direct impacts to creeks and streams; limit expansion of noise cones into existing residential areas and off-post communities; minimize adverse air quality impacts; and limit new metal contamination in standing timber (ranges).

4. Further Sustainability Goals. The Army incorporates sustainability principals into the planning, development, and upgrade of its facilities. From the outset, site selection and design follow sustainability principals, starting with design "charrettes" to ensure stakeholder collaboration toward optimal design, fiscal constraints, local characteristics and constraints, environmental issues, and consideration of functional adjacencies/relationships and land use compatibility. Site selection is based on functional adjacencies/relationships and land use compatibility. Ensure development near Fort Stewart's Garrison/cantonment (living and working) areas flow well with existing infrastructure, protecting green fields and preserving habitat and natural resources. Minimize negative impacts on the site and on neighboring properties and structures; avoid or mitigate excessive noise, shading on green spaces, additional traffic, obscuring significant views, etc.

The Army Range Requirements Model (ARRM) is an Army-wide planning tool used by

Army Headquarters to determine range requirements at each Army Installation. The ARRM provides an automated capability to take doctrinal requirements and accurately calculate live training throughput capacities and throughput requirements for each Installation. Ranges must be identified in the Installation's ARRM for it to receive Department of the Army (DA) funding. In addition to the four siting criteria listed above, which are applicable to all facilities at Fort Stewart, the MPMGR has been identified in the ARRM and was sited based the following Range-specific criteria:

1. Ability to Meet Training Requirements. There should be sufficient range capacity to ensure each unit meets its training requirements as set forth in the following: Army regulation (AR) 350-1, *Army Training and Leader Development*; Training Circular (TC) 7-9, *Infantry Live-Fire Training*; DA Pamphlet (PAM) 350-38, *Standards in Weapons Training*; TC 25-8, *Training Ranges*; the 3rd Infantry Division's Live Fire Guidance; and the unit's related Mission Essential Task List.

2. Range Design. Based on each proposed range's training purpose, each range must be of sufficient acreage to accommodate the SDZs for use of the specified munitions, as required by DA PAM 385-64, *Ammunition and Explosive Safety Standards*. The SDZ is a temporary safety boundary that surrounds the firing range and associated impact area that provides a buffer to protect personnel from the non-dud producing rounds that may be ricocheted during operation of the range. It includes an ordnance dispersion area, ricochet area, and an added safety buffer zone. This area is closed to all unauthorized personnel during each training exercise on the range. In addition, each range must have an existing impact area sufficient to support live-fire munitions used at Fort Stewart and be configured (e.g., course and targets) in a manner lending itself to achieving offensive and defensive training objectives.

3. Proximity. Range assets must be available for access by all Fort Stewart-stationed units to meet their reoccurring training requirements and to achieve combat readiness status before they deploy. This means sufficient ranges must be available within a geographic distance that allows each unit to get equipment to and from range locations to complete essential tasks in a timely manner. The time and cost of transporting units to a training area must not interfere with the overall training levels for a unit. Each unit has a limited amount of time and cost resources to achieve training requirements. The time and cost of transport cannot be so excessive that it compromises the unit's ability to meet all mission essential tasks and readiness requirements. Quality of life may be affected if troops have

to travel too far for training.

The USACE has performed an analysis of the five identified Courses of Action (COAs) and determined that COA 1 is the preferred alternative due to the minimal operational constraints of the range design. A table is shown below for each proposed range, comparing each COA against the operational feasibility criteria is shown below. The overall screening criteria discussed in more detail below.

Summary of Screening Analysis for FY11 MPMGR				
Criteria	**No-Action**	**COA 1**	**COA 2**	**COA 3, 4, and 5 Eliminated**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✖	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	●	●	✔
Has the range been sited to maximize use of the Installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	✔	✖
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	✖
Does this course of action avoid and minimize adverse environmental impacts?	✔	⊘	⊘	●
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔	✖
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	⊘

Does this course of action minimize construction costs for the range? [1]	✔	●	⊘	⊘
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Course of Action Feasibility	✖	⊘	⊘	✖

[1] *For this criterion, that may arise for mitigating potential environmental impacts. It represents only the relative cost of construction for each particular location.*

LEGEND:

✖ = Not Feasible – Unacceptable limitations
⊘ = Feasible – Moderate limitations and challenges
● = Feasible – Minor limitations and challenges
✔ = Feasible – No limitations or challenges
n/a = Not Applicable

The Directorate of Public Works (DPW) Environmental Division, working in conjunction with the Directorate of Plans, Training, Mobilization, and Security (DPTMS) Training Division, the DPW Fish & Wildlife Branch, the DPW Forestry Branch, and the DPW Master Planning Division were able to identify five separate locations on Fort Stewart for the placement of this MPMGR. Each of the five sites is discussed in more detail below:

a. COA 1 is located in the Delta – 8 (D-8) Training Area (TA) and is the preferred site.

Allow Anti-Terrorism and Force Protection. COA 1 accommodates appropriate anti-terrorism measures and standoff distances.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the MPMGR at COA 1 would not create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities. During site early siting efforts, targets were moved closer together to reduce the SDZ, which kept it within Fort Stewart's boundary and avoided it crossing Georgia Highway 144 West.

Minimization of Environmental Impacts. COA 1 is located in Delta TA on top of an existing MPMGR; therefore, this alternative requires less timber removal (compared to COA 2, which consists of undisturbed terrain). The siting on top of an existing range avoids the majority of wetland areas; however, approximately 103.34 acres of jurisdictional wetlands will still be impacted and require mitigation and CWA Section 404 permitting. Avoidance and minimization

of jurisdictional wetlands during the design and construction of this range will be explored. Complete leveling for contour consistency on the site may not be necessary, as well, because rolling terrain is a training benefit as long as the line of sight (LOS) (from shooter to target) is maintained. Maintenance to keep vegetation at an acceptable height will be necessary for the continued operation of this range.

COA 1 would impact red-cockaded woodpecker (RCW) clusters, their associated habitat, and a frosted flatwoods salamander (FFS) pond. These impacts will not impede recovery of the Fort Stewart RCW population and is not likely to jeopardize the continued existence of FFS. Locating COA 1 adjacent to the small arms ranges currently in the D-8 TA, as well as ranges proposed in future fiscal year Range Plans adjacent to the existing ranges, would significantly reduce impacts to critical RCW habitat. If the MPMGR was placed in another location and not overlaid on existing SDZs, the project footprint would utilize additional 5,500 or more acres of critical habitat, which would have a significant adverse impact to the environmental concerns stated above. COA 1 prevents adverse impacts to an additional RCW habitat & recovery efforts, preventing Formal Section 7 Consultation with the US Fish and Wildlife Service (USFWS).

Further Sustainability Goals. Site selection for the MPMGR was based on functional adjacencies/relationships and land use compatibility. As discussed above, COA 1 was sited to include significant overlaps of multiple SDZs to avoid development of an inappropriate site and reduce environmental impacts. COA 1 was selected based on compatibility with the adjacent land use.

Ability to Meet Training Requirements. During initial sitings, COA 1 was the Trainer & War Fighters (T&WF) preferred site since this location would be accessible to meet annual training requirements and to achieve combat readiness status before they deploy. The time and cost of transporting units to COA 1 would not have a major impact on the overall training levels for a unit. The proposed siting for the MPMGR in the D-8 TA would generate training value and merit from the T&WF by supplementing the other small arms ranges currently on site and the ranges coming in the future fiscal years' Range Plan. This COA creates a range complex consisting of a sniper range, 2-MPMGRs, a Qualification Training Range, and a Known Distance Range, thus greatly enhancing the proximity of these facilities.

Range Design. COA 1 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use on Fort Stewart. COA 1 was configured to achieve offensive and defensive training objectives. It is located adjacent to an existing tank trail [Fort

Stewart (FS) 36] and within 10,000 feet of existing power sources. Construction at the preferred location does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult. It is located adjacent to an existing tank trail (FS 36) and within 10,000 feet of existing power sources.

Proximity. COA 1 is in close proximity to the cantonment area, allowing Soldiers to travel on foot to the range and minimizing operational constraints. COA 1 was sited within a geographic distance that allows each unit to get equipment to and from range locations to complete essential tasks in a timely manner. COA 1 would support the training units' ability to march to the Delta Small Arms Range Complex. Fort Stewart has undergone a Heavy Brigade Combat Team (BCT) to Infantry BCT conversion, which has placed an extensive utilization requirement on Infantry qualification with training ranges. The Infantry BCTs do not have the transportation assets of the Armor BCTs, resulting in a shortfall of transportation assets. In combination with visiting, but deploying, BCTs training to Mission Essential Task List, it is required for Infantry training facilities to be within walking or route marching distances. Close-In Range Facilities for Infantry training are a priority to meet timelines for deploying Infantry BCTs.

Advantages/Disadvantages: COA 1 is the preferred location because the site does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult, while avoiding impacts to previously-undisturbed wetlands. Impacts to the environment would be avoided and minimized where possible.

a. **COA 2 is located in the Delta – 9 (D-9) TA** (This site is just South of the preferred COA 1)

Allow Anti-Terrorism and Force Protection. COA 2 accommodates appropriate anti-terrorism measures and standoff distances.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the MPMGR at COA 2 would not create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities.

Minimization of Environmental Impacts. COA 2 site is not sited on top of an existing cleared area and would require approximately 250 acres of clear-cutting for LOS. Although COA 2 would impact fewer acres of wetlands (96.2 acres), the impacts would occur on previously-undisturbed wetlands. These impacts would be more environmentally intensive compared to

impacts at COA 1 because portions of COA 1 include the existing range and some areas which have already been cleared. The Range Floor is affixed in a certain location to the SDZ of the MPMGR, impacting jurisdictional wetlands, requiring wetland mitigation and permitting. As with COA 1, if designing the MPMGR at this location, avoidance and minimization efforts would be essential. Hard-wiring for targets, depending on the availability of funds, would reduce the wetland areas needing de-mucking and filling. RCW clusters and habitat, as well as a FFS pond would be adversely impacted at this site. The COA 2 site would also extend the Noise Zone II contour beyond its existing limits.

Further Sustainability Goals. Site selection for the MPMGR was based on functional adjacencies/relationships and land use compatibility. COA 2 is not located on top of an existing range and would require 250 acres of clearing for LOS.

Ability to Meet Training Requirements. Like COA 1, siting the MPMGR at COA 2 would meet training requirements.

Range Design. COA 2 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use at Fort Stewart. COA 2 was configured to achieve offensive and defensive objectives. Like the preferred location, the construction of the MPMGR at COA 2 does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult.

Proximity. COA 2 is in close proximity to the cantonment area, allowing Soldiers to travel on foot to the range and minimizing operational constraints. COA 2 was sited within a geographic distance that allows each unit to get equipment to and from range locations to complete essential tasks in a timely manner.

Advantages/Disadvantages: Based upon the information gathered, COA 2 would be more environmentally intensive compared to impacts at COA 1 because portions of COA 1 include the existing range and some areas which have already been cleared. COA 2 would also extend the Noise Zone II contour beyond its existing limits.

a. COA 3 is located in the Charlie - 12 (C-17) TA

Allow Anti-Terrorism and Force Protection. COA 3 accommodates appropriate anti-terrorism measures and standoff distances.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the MPMGR at COA 3 would create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities. Construction would occur within the dismounted maneuver TA C-17, which would reduce available maneuver terrain. This alternative is farther from the cantonment area than the other alternatives, is not within 10,000 feet of existing power lines, and is adjacent to the City of Richmond Hill and Interstate 95 (I-95). The latter is problematic because vehicles traveling on I-95 and local roads are so numerous, with as many as 73,900 vehicles per day crossing near TA C-17. This training area is therefore rarely prescribed-burned by Fort Stewart because of safety risks (smoke and/or fire near the road) to these travelers on nearby roadways. In addition, live weapons firing within the proposed MPMG at this location and its SDZ may cause frequent brush and forest fires. Therefore, construction and operation of a range at this site would be problematic from an operational and safety perspective and it was deemed not feasible.

Minimization of Environmental Impacts. As discussed above, Training area C-17 is bordered on three sides by the Ogeechee and Canoochee Rivers with extensive swamp systems. COA 3 would result in impacts to approximately 22.8 acres of jurisdictional wetlands. Impacts to critical RCW habitat and cultural resources are not anticipated within COA 3.

Further Sustainability Goals. Site selection for the MPMGR was based on functional adjacencies/relationships and land use compatibility. COA 3 would create new artillery impact areas and would not overlap existing SDZs. COA 3 would not be compatible with the adjacent land use, which includes major highways.

Ability to Meet Training Requirements. COA 3 places a large SDZ over a currently unimpeded training area, has the potential to affect transportation, and create road closure scenarios.

Range Design. COA 3 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use at Fort Stewart. However, COA 3 would create new artillery impact areas, is located within existing flight routes, and is in close proximity to major roads (Georgia Highway 144 and Interstate 95).

Proximity. COA 3 is located farther from the cantonment than COA 1 and COA 2, which creates operational constraints.

Advantages/Disadvantages: Based upon the information gathered, COA 3 minimizes adverse environmental impacts to wetlands and waters and RCW habitat. However, site design would cause operational constraints and would create adverse wildfire or control burning issues for nearby highways and communities.

b. COA 4 is located in the Delta - 5 (D-5) TA

Allow Anti-Terrorism and Force Protection. Appropriate anti-terrorism measures and standoff distances are met by siting MPMGR at COA 4.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the MPMGR at COA 4 would not create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities.

Minimization of Environmental Impacts. COA 4 was also sited to include significant overlaps of multiple SDZs; however, the required 242-acre Range Floor would impact 106.8 acres of wetlands. The Range Floor is affixed in a certain location to the SDZ of the MPMGR.

Further Sustainability Goals. As discussed above, COA 4 was sited to include significant overlaps of multiple SDZs to avoid development of an inappropriate site and reduce environmental impacts. COA 4 was selected based on compatibility with the adjacent land use.

Ability to Meet Training Requirements. COA 4 is also located within the Delta Small Arms Range and would be accessible to meet annual training requirements and to achieve combat readiness status before they deploy. COA 4 would not result in 50 caliber fire crossing other ranges or State highways or result in the SDZ extending beyond the Installation's boundaries.

Range Design. COA 4 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use at Fort Stewart. COA 4 was configured to achieve offensive and defensive objectives; however, the site would constrain training within Fort Stewart. The proposed range does not create new impact areas through placement within existing SDZ and

does not impact existing flight routes. However, COA 4 would require SDZ coordination by Range Control to ensure ranges in the Delta Training Area do not cross fire. In addition, when the proposed range requires maintenance, the site would require a new access road that would need to connect to an existing tank trail in the area (FS 91 or FS 20). COA 4 is in close proximity to existing utilities.

Proximity. Transporting units to COA 4 would not have a major impact on the overall training levels for a unit. COA 4 was sited within a geographic distance that allows each unit to deploy its Soldiers logistically and equipment to and from the MPMGR to complete essential life-fire tasks within established timeframes.

Advantages/Disadvantages: Based upon the information gathered, COA 4 would have less wetland impacts than the preferred alternative, but operational constraints due to the range design prevent the alternative from being considered further.

c. COA 5: The Bravo – 4 (B-4) TA

Allow Anti-Terrorism and Force Protection. Appropriate anti-terrorism measures and standoff distances are met by siting MPMGR at COA 5.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the MPMGR at COA 5 would not create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities.

Minimization of Environmental Impacts. The COA 5 location of the MPMGR over the RC-Foxtrot (RC-F) would result in a nominal wetland impact (approximately 8.9 acres). COA 5 would have no adverse impacts to Cultural Resources and result in only nominal impacts to threatened and endangered species critical habitat.

Further Sustainability Goals. As discussed above, COA 5 was sited to include significant overlaps of multiple SDZs to avoid development of an inappropriate site and reduce environmental impacts. COA 5 was selected based on compatibility with the adjacent land use.

Ability to Meet Training Requirements. COA 5 provides sufficient capacity to support a MPMGR. The location of the COA 5 SDZ would allow live-fire training without the closure of training areas needed for maneuver of units. However, COA 5 would not be available and would

interfere with the training requirements of other military units as discussed below in Range Design.

Range Design. COA 5 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use at Fort Stewart. However, this proposed siting of MPMGR at COA 5 is directly on top of a currently existing Red Cloud (RC) Range, called RC-F. At the time of this study it was found the RC-F that was currently no longer utilized to its fullest potential due to the immediately adjacent construction of the new Digital Multi Purpose Range Complex (DMPRC). The footprint of the DMPRC is approximately twice the size of the RC-F range, resulting in the SDZ of the DMPRC overlapping the RC-F range. The overlap in SDZs prevented the armor and track vehicles from maneuvering down the full length of the range course roads. Range Control decided to utilize RC-F for the qualification training for the .50 cal machine gun. The machine gun qualification range does not require down range occupation of troops or vehicles. Since this range was being utilized for machine gun training and qualification, COA 5 would meet the criteria for locating the new MPMGR.

Proximity. COA 5 would be accessible to meet annual training requirements and to achieve combat readiness status before they deploy. Transporting units to COA 5 would not have a major impact on the overall training levels for a unit. COA 5 was sited within a geographic distance that allows each unit to deploy its Soldiers logistically and equipment to and from the MPMGR to complete essential life-fire tasks within established timeframes.

Advantages/Disadvantages:

During this study, the RC-F range was proposed as the future site of the new DMPTR currently scheduled for construction in Fiscal Year 2013. The RC-F range was considered a more appropriate size and met the selection criteria for the DMPTR. The DMPTR has since been "officially" sited thru the Master Planning Office and signed off on by the Garrison Commander. Therefore, COA 5 was no longer considered feasible for the MPMGR.

B. AVOIDANCE:

1. Total wetland avoidance on-site is not possible based on the layout and size of range complexes. Also, the layout of adjacent wetland areas made total avoidance impossible. Any further reduction in proposed impacts would not meet the applicant's purpose and would not be practicable.

2. The range floor was re-sited in several locations to document avoidance. Overall, the wetland impacts in COA 1 were reduced from 142 acres to 103.34 acres, pursuant to the 90 percent design review. In addition, approximately 36 acres of the 103.34 acres of wetland fill have been reduced to secondary impacts for clear cutting for LOS requirements. Cost will factor regarding how the range's targets will be hard-wired. It is required to have the targets from 0m-800m wired. De-mucking and wetland filling is necessary within this portion of the range. From 800m-1100m there are no targets; therefore, de-mucking and filling wetlands within this area of the range is not necessary. If funding is available, the targets 1100m-1500m will be hard-wired, which would require de-mucking and filling of wetlands within this area. The Installation will not know if funding will be available for this option until the engineering firm makes their determination. Complete leveling for contour consistency on the site may not be necessary. For realistic training, having some rolling terrain is a training benefit as long as the LOS is not affected. As an additional avoidance measure, the USACE would include the following special condition in any draft permit issued for this project:

> The site design for this project has not been finalized. Authorized wetland impacts are based on a standard range design. Prior to conducting any work in wetlands on this project site, the permittee shall submit final site development plans to the USACE for review and approval. No work in wetlands can occur until the USACE has reviewed and approved the final plan in writing; this concurrence letter needs to document that the 404(b)(1) process has been adequately demonstrated. It is anticipated that once final design is completed, there will be a minor reduction in the amount of wetland area that will be impacted by the project. This anticipated change in the footprint of authorized wetland impact is authorized under this permit and modification of the permit will not be required for this change in site design."

C. <u>MINIMIZATION ALTERNATIVES</u>:

1. <u>Minimizing Wetland Footprint</u>: As required by Section 404(b) 1 of the CWA, minimization of adverse impact to wetlands was documented within the footprint the project site, based on the current ninety percent design configuration of the proposed project. As the project continues through the design process, to the point of final design, it is anticipated that there will be the potential for avoiding impacts to some wetland areas. Side slopes of wetland fills will be at a 3:1 minimum, to avoid unnecessary

impacts. Wetland boundaries and project limits will be clearly marked to prevent inadvertent impacts to adjacent wetland areas.

2. Erosion Control Techniques: The applicant has indicated that best management practices (BMPs) would be utilized while performing any construction activities on the subject property. In addition, the applicant has indicated that activities would be performed in a manner to minimize turbidity and/or erosion. Any permit that would be issued by the USACE would also include the following special condition, "All work conducted under this permit shall be located, outlined, designed, constructed and operated in accordance with the minimal requirements as contained in the Georgia Erosion and Sedimentation Control Act of 1975, as amended. Utilization of plans and specifications as contained in "Manual for Erosion and Sediment Control, (Latest Edition)," published by the Georgia Soil and Water Conservation Commission or their equivalent will aid in achieving compliance with the aforementioned minimal requirements."

D. COMPENSATORY MITIGATION: Fort Stewart determined that at least 797.77 credits are required to compensate for the proposed impacts. In June 2009, Fort Stewart contacted eight off-post mitigation banks. Fort Stewart solicited a contract for the purchase of in-kind mitigation credits for a period of 16 days, starting 28 May 2009, to all mitigation banks that could service Fort Stewart with wetland mitigation credits acceptable by the USACE. The only bank that provided an offer to the solicitation was Wilkinson-Oconee Bank. As described on its website, the Bank consisted of ditched, drained and clear-cut bottomland hardwoods, marginal forested scrub-shrub and herbaceous wetland systems, impaired streams and degraded riparian buffers and is being restored to vast bottomland hardwood wetland system that historically existing. Therefore, aquatic impacts associated with the proposed ranges are commensurate with the secondary service area of Wilkinson-Oconee Bank, which is an USACE approved mitigation bank.

At the time of the required solicitation, other banks within Fort Stewart's primary service area did not have the appropriate number of credits available to support the Installation's needs to meet Congressional funding timelines for the proposed ranges. The Wilkinson-Oconee Bank has the appropriate number and resource type of credits available for Fort Stewart to completely mitigate unavoidable wetland impacts associated with proposed range construction.

E. CONCLUSIONS: Based on the above, an off-post facility would be difficult to locate and still meet the proximity requirements, especially given the logistics, cost, and scheduling

required. Also, duplicating the infrastructure at a location off-post would incur considerable costs beyond the capability of the applicant's budget constraints. The applicant provided an adequate analysis of on-post locations for sighting this range and mitigation, as well as three other proposed new ranges. .

F. SECTION 404(b)(1) ANALYSIS: This project must be evaluated for compliance with the Section 404(b)(1) Guidelines (40 CFR Section 230). The goal of the 404(b)(1) Guidelines is "to restore and maintain the chemical, physical, and biological integrity of waters of the United States through the control of discharges of dredges or fill material." An expanded 404(b)(1) analysis will be conducted prior to making any permit decision.

PART IV - PUBLIC INTEREST REVIEW

A. ENVIRONMENTAL SETTING/EXISTING CONDITIONS: The DA owns and manages the area in which the proposed MPMGR is located. The preferred COA is located with Delta Small Arms Impact Area, specifically located to the west of the existing Garrison at Fort Stewart.

B. ENVIRONMENTAL IMPACTS: The USACE Regulatory Program considers the full public interest, reflecting the protection and utilization of important resources. Table 3 is a summary of our public interest review for the proposed activity, which assesses the impacts of the proposed permit action on environmental and other public interest factors (33 CFR 320.1(a)(1), 320.4 and 325.3(c)).

Table 3. Summary of Project Impacts

FACTORS	No Effect	Negligible	Undetermined	Beneficial Major/ Minor		Adverse Major/ Minor	
1. Economics/Social	X						
2. Education/Scientific	X						
3. Aesthetics	X						
4. Food-Fiber Production	X						
5. Historical/Architectural/ Archaeological	X						
6. Recreation	X						
7. Land Use	X						
8. Mineral Resources	X						
9. Soil Conservation							X
10. Water Supply Conservation	X						
11. Water Quality		X					
12. Air Quality		X					
13. Noise Levels							X
14. Public Safety		X					
15. Energy Needs							X
16. National Security	X						
17. Navigation	X						
18. Shoreline Erosion Accretion	X						
19. Flood Hazards	X						
20. Flood Plain							X
21. Wetlands							X
22. Refuges	X						
23. Fish	X						
24. Wildlife			X				
25. Food Chain Organisms	X						
26. Shellfish Production	X						
27. Threatened and Endangered Species			X				
28. General Environmental Concerns							X
29. Property Ownership	X						
30. Mineral Needs	X						
31. Other	X						

C. DISCUSSION: We have evaluated the permit application regarding the need for the proposed activities, the practicability of project alternatives, and the beneficial and detrimental effects, including cumulative impacts. Complete descriptions of the 31 public interest factors can be found in the Range and Garrison Construction Environmental Impact Statement (RGCEIS) for Fort Stewart. Each public interest factor is referenced to specific sections within the EIS.

1. Economics/Social – The proposed project will have no effect to the local economy or local social environment. (RGCEIS Section 4.11 Social and Economics)

2. Education/Scientific – The proposed project will have no effect to educational or scientific resources. The project footprint is within an Army Installation small arms impact area. (RGCEIS Section 4.11 Social and Economics)

3. Aesthetics – The proposed project will have no effect to aesthetics. The project footprint is within an Army Installation small arms impact area and is off-limits to unauthorized personnel. (RGCEIS Section 4.7 Land Use)

4. Food-Fiber Production – The proposed project will have no effect to food or fiber production. The project site is within an existing small arms impact area. (RGCEIS Section 4.4.3 Forestry Management)

5. Historical/Architectural/Archaeological – The US Army, Fort Stewart is the lead federal agency for this proposed action. Impact analysis for historic properties follow guidelines set forth in Section 106 of the National Historic Preservation Act (NHPA) implementing regulations (36 CFR 800), Fort Stewart's Programmatic Agreement with the Georgia SHPO. Fort Stewart would complete required consultation and make any necessary Section 106 of the NHPA determination, if required, prior to any work occurring in waters of the US subject to the jurisdiction of the USACE on a project site where cultural resources have been identified. (RGCEIS Section 4.5 Cultural Resources)

6. Recreation – The proposed project will have no effect to recreational areas. The footprint is located with a land use designated for range and training lands. (RGCEIS Section 4.7 Land Use)

7. Land Use – The proposed project is compatible to the existing land use category of range and

training lands. Therefore, there will be no effect to land use. (RGCEIS Section 4.7 Land Use)

8. Mineral Resources – The proposed project is located within the confines of an Army Installation that is designated for Soldier training. There are no minerals mined at Fort Stewart. Therefore, there will be no effect to mineral resources at the project site. (RGCEIS Section 4.1 Geology and Soils)

9. Soil Conservation – The project will undergo tree removal and grubbing and grading during construction of the proposed range. However, standard erosion and sedimentation control measures will be implemented to prevent sedimentation from leaving the confines of the project site. Erosion and sedimentation control best management practices (BMPs) will also be implemented throughout the duration of the project and after construction to ensure stormwater leaving the range has been filtered before reaching nearby wetland areas. Furthermore, an erosion and sedimentation control plan will be prepared for this project. A National Pollution Discharge Elimination System (NPDES) permit will be obtained for this project. At a minimum, a Level 1A Erosion and Sedimentation (E&S) Control Certified or Subcontractor Awareness E&S trained individual is required to be on site during any land disturbance activity. Adverse impacts to soil are expected to be minor and temporary in nature until construction is completed. (RGCEIS Section 4.1 Geology and Soils)

10. Water Supply Conservation – The proposed project will not require use of the Installation's water supply. Therefore, water supply will have no effect. (RGCEIS Section 4.3 Water Quality and Resources)

11. Water Quality – During the construction phase of the proposed project, wetland areas will be filled within the range footprint. All necessary permitting and mitigation will be conducted. See number 21, Wetlands, for additional information regarding impacts to wetland areas. Impacts to nearby surface water would likely not be impacted since necessary E&S control measures, as required by the Georgia Environmental Protection Division, will be implemented to prevent sedimentation from leaving the site. Turbidity samples will be taken during and after construction to ensure sedimentation in outfall areas do not increase from what the area currently experiences. Total Maximum Daily Load (TMDL) regulations require maintaining predevelopment time of concentration by strategically routing flows to maintain travel time, improve water quality, and to control the stormwater discharge. Flow calculations will also be conducted during preparations of the E&S control plan to ensure

concentrated stormwater runoff flows from peak rain events will not impact nearby water bodies. The proposed project footprint will be filled during construction activities; therefore, adverse impacts to groundwater are not anticipated. Fort Stewart is in consultation with the Georgia Environmental Protection Division regarding a water quality certification pursuant to Section 401 of the Clean Water Act. The USACE would include a copy of the 401 water quality certification with any permit issued. In addition, the special condition of any permit issued would require the permittee to adhere to the conditions of the 401 water quality certification. (RGCEIS Section 4.3 Water Quality and Resources)

12. Air Quality – Adverse impacts to air quality is not anticipated. Only minor and temporary amounts of dust generation during timber harvesting and construction are expected; however, no regulatory air quality thresholds would be exceeded. (RGCEIS Section 4.2 Air Quality)

13. Noise Levels – The proposed project and its location will not change the total distance of Noise Zone II (87 dB PK15) that currently extends beyond the southwestern portion of the Installation boundary (1400 meters). However, the shape of the contour will change as a result of this project and a new receiver area for small arms noise will be generated. Noise Zone III (104 dB PK15) will not extend beyond the Installation boundary. (RGCEIS Section 4.6 Noise)

14. Public Safety – During the timber harvest, prescribed industrial safety standards would be followed. No specific aspects of the proposed project would create any unique or extraordinary safety issues. The project location is outside of current explosive safety quantity distance clear zones and the inhabited building distance clear zones. An unexploded ordnance survey will be conducted prior to timber harvesting and construction activities. If necessary, an unexploded ordnance avoidance plan will be prepared. (RGCEIS Section 4.9 Safety)

15. Energy Needs - Within the area of potential effect, there are existing utilities into which new lines from the range can tie in, minimizing the potential ground disturbing activities associated with the establishment of all-new utility systems. This proposed project would also not result in a substantial increase in utility usage. Executive Order 13423 sets as a goal for all federal agencies the improvement of energy efficiency and the "reduc[tion] of greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal year 2015, relative to the baseline to the agency's energy use in fiscal year 2003." The U.S.

Army Energy Strategy for Installations (U.S. Army Energy Strategy for Installations, 8 July 2005, available at http://army-energy.hqda.pentagon.mil/docs/strategy.pdf), also contains strategies to reduce energy waste and improve efficiency. Taking these policies into account, this action does not represent a net incrementally addition to the global climate change problem. (RGCEIS Section 4.8 Infrastructure)

16. National Security – The proposed project will have no effect to national security. The requirement for this range has been validated by the Range and Training Land Program Development Plan prepared for Fort Stewart and the Forces Command Live Fire Training Investment Strategy. This project has been coordinated with the Installation physical security plan, and all physical security measures are included in the project. All required antiterrorism protection measures are included in the project, per DA PAM 190-51 (*Risk Analysis for Army Property*) and Training Manual 5-853-1 (*Security Engineering Project Development*). (RGCEIS Section 4.9 Safety)

17. Navigation – Navigable waters will not be impacted by this project. (RGCEIS Section 4.3 Water Quality and Resources)

18. Shoreline Erosion Accretion - The site is many miles from the coast and the project will not add to shoreline erosion accretion. (RGCEIS Section 4.1 Geology and Soils)

19. Flood Hazards – The site does not present an unusual flood hazard for this area (see below.) (RGCEIS Section 4.3 Water Quality and Resources)

20. Flood Plain – The southeast portion of the site is located in the Federal Emergency Management Administration (FEMA) 100 year flood zone, meaning that the flood elevation in that area has a 1- percent chance of being equaled or exceeded each year. This does not present an unusual flooding hazard for this area, and as the site will be used only for military training, does not present an appreciable hazard to property or human safety. (RGCEIS Section 4.3.1 Surface Water and Floodplains)

21. Wetlands – The project, as currently proposed, would impact 103.34 acres of bottomland hardwood wetlands, either through direct filling or by mechanized landclering. The applicant has completed the 90% site design for the proposed project. The standard site layout for this type of range would require the filling and/or mechanized clearing of all 103.34 acres of bottomland hardwood wetlands on the 236-acre project site. The applicant will likely be able to avoid some of the wetlands on the project site as final site design is

completed for the project. However, for the purposes of this permit evaluation, the US Army Corps of Engineers (USACE) will assume that all 103.34 acres of wetlands on the proposed project site would be impacted. As an additional avoidance measure, the USACE would include the following special condition in any draft permit issued for this project: The site design for this project has not been finalized. Authorized wetland impacts are based on a standard range design. Prior to conducting any work in wetlands on this project site, the permittee shall submit final site development plans to the USACE for review and approval. It is anticipated that once final design is completed, there will be a minor reduction in the amount of wetland area that will be impacted by the project. This anticipated change in the footprint of authorized wetland impact is authorized under this permit and modification of the permit will not be required for this change in site design.

The present total proposed wetland impact for the four proposed ranges is 179.03 acres. As discussed by the applicant above, not all of these proposed impacts are for fill, but a certain percentage would involve mechanized land clearing impacts. Clearing wetlands of vegetation and maintaining them in scrub/shrub vegetation results in a change in function, but not a total loss in function. The mitigation credits proposed by Fort Stewart are assuming a total loss in function. The proposed mitigation plan is to purchase 1,391credits to compensate for a total of 179 acres of wetland impact for all four ranges. This is a credit to impact ratio of 7.8:1. On average, three credits are generated for each acre of wetland restoration at the Wilkinson/Oconee Mitigation Bank, where credits will be purchased for the FY11 ranges. Therefore, the effective mitigation ratio for the FY11 Multipurpose Machine Gun Range and FY11 Infantry Platoon Battle Course projects would be approximately 2.6:1 of wetland restoration.

Even with implementation of the applicant's proposed compensatory wetland mitigation plan, the project would result in an overall loss in aquatic function within the watershed and on Fort Stewart. Therefore, the USACE has determined that the project would result in a minor adverse impact to wetlands. (RGCEIS Section 4.3.2 Wetlands)

22. Refuges - The site will not impact any areas specifically devoted to wildlife refuge. (RGCEIS Section 4.4 Biological Resources)

23. Fish – The site will not impact any fish species. The Canoochee and Ogeechee rivers are approximately 20 miles from the proposed project site. (RGCEIS Section 4.4 Biological Resources)

24. Wildlife – The site will impact the RCW foraging habitat. This site will also impact a potential breed pond for the flatwoods salamander. However, there has never been a salamander found in this pond. Formal consultation with the USFWS has been completed for these impacts. (RGCEIS Section 4.4 Biological Resources)

25. Food Chain Organisms – No specific or unique food chain organisms are known or suspected to exist on the site. (RGCEIS Section 4.4 Biological Resources)

26. Shellfish Production – The site is many miles from the coast and the project will not affect local shellfish production. (RGCEIS Section 4.4 Biological Resources)

27. The US Army, Fort Stewart is the lead federal agency for this proposed action. The site will impact RCW foraging habitat. This site will also impact a potential breed pond for the flatwoods salamander. However, there has never been a salamander found in this pond. Formal consultation with the USFWS has been completed for these impacts. Fort Stewart has completed required consultation and the USFWS has made necessary Section 7 of the Endangered Species Act determinations.

28. General Environmental Concerns – The project is expected to incur only the most minimal adverse impact to the local ecosystem. Sites are chosen to include the goal of avoiding and/or minimizing such impacts. Where it is possible and appropriate, impacts to environmental resources would be mitigated. Fort Stewart is generating an Environmental Impact Statement detailing these impacts.

29. Property Ownership – The property is owned by the United States Army for the primary purpose of military training. (RGCEIS Section 4.7 Land Use)

30. Mineral Needs – No particularly valuable or unique minerals are known or suspected to exist at the site. (RGCEIS Section 4.1 Geology and Soils)

31. Other – No notable environmental aspects not covered by the preceding will be impacted by this project.

D. <u>US ARMY CORPS OF ENGINEERS' WETLAND POLICY</u>: The proposed wetland alteration is necessary to realize the project's purpose and should result in minimal adverse

environmental impacts. The benefits of the project would outweigh the minimal detrimental impacts. Therefore, the project is in accordance with USACE Wetland Policy (33 CFR 320.4(b)).

E. TITLE III OF THE CIVIL RIGHTS ACT OF 1964 AND EXECUTIVE ORDER 12898: The proposed action would not directly, or through contractual or other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin, nor would it have a disproportionate effect on minority or low-income communities.

F. CUMULATIVE IMPACTS: The Council on Environmental Quality (CEQ) defines cumulative impacts as the "impact on the environment which results from the incremental impact of the action(s) when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

Geographic Scope/Region of Influence (ROI): the National Environmental Policy Act (NEPA) requires that the impacts of each proposed project be considered within the appropriate geographical area/region of influence. The geographic area/ROI for purposes of consideration of proposed projects within the boundaries of Fort Stewart are: the Altamaha watershed and United States Geological Service, Georgia Hydrologic Unit Code (HUC) 03070106 encompassing portions of Appling, Evans, Glynn, Jeff Davis, Long, McIntosh, Montgomery, Tattnall, Toombs, and Wayne County; the Lower Ogeechee River watershed HUC 03060202, encompassing portions of Bryan, Bulloch, Chatham, Effingham, Emanuel, Jenkins, and Screven Counties; the Little Ogeechee watershed HUC 03060204, encompassing portions of Bryan, Chatham, Effingham, Liberty, Long and McIntosh Counties; and the Canoochee Creek watershed HUC 03060203, encompassing portions of Bryan, Liberty, Evans, Tattnall, Candler, Emanuel, and Bulloch Counties. The USACE determined that actions taken in the "Fort Stewart Watersheds" would be sufficiently similar in location, topography, watershed impacts, habitat types, etc., to be considered in a cumulative impacts assessment. To properly scope this analysis the USACE has identified target resources for evaluation based on public and agency comments. Target resources are important resources that could be cumulatively affected by activities in the identified scoping area.

The USACE identified the following target resources because of their scarcity and regional importance: (1) wetlands; (2) water quality; (3) aquatic species, and (4) mitigation. Below we have assessed the cumulative impacts of the proposed project on these target resources. In doing

this, we considered the impacts of this project, past projects, as well as all reasonably foreseeable impacts in the Fort Stewart Watersheds consisting of HUC's 03070106, 03060202, 03060204, and 03060203.

The proposed action, in addition to other projects in the geographic areas of consideration (i.e., HUC's 03070106, 03060202, 03060204, and 03060203), have the possibility to result in either negative or positive impacts in a cumulative manner. Cumulative impacts are most likely to occur when a relationship exists between a proposed action, or alternative, and other actions expected to occur in a similar location, time period, and/or involving similar actions, i.e. past, present, and reasonably foreseeable future actions.

There are numerous projects in the watersheds associated with Fort Stewart, which are part of typical urban activities/development. These projects can be categorized generally as construction, maintenance, or demolition. This analysis takes into account the proposed project/action along with the larger projects in the ROI.

1. Wetlands: The following table provides information on all wetland impacts permitted by the Savannah District between January 1, 1990, and July 6, 2005, and the acres of wetland mitigation required for these impacts. This information was generated by the Savannah District Regulatory Analysis and Management System (RAMS) database. There has undoubtedly been some additional loss of wetland during this time period from activities not regulated by the USACE, but no data exist on these losses.

Table 4. Wetland Impacts from January 1, 1990, through July 6, 2005, in the Counties Included in the Fort Stewart Watersheds

County	Acres	Wetland Acres Requested	Wetland Acres Permitted	Wetland Acres Mitigated
Bryan	111509	38.15	41.81	236.29
Bulloch	81797	114.67	119.28	205.28
Chatham	162459	701.13	666.91	4298.24
Effingham	127318	175.13	205.08	633.59
Emanuel	42158	67.78	67.78	269.26
Jenkins	35292	55.74	55.74	230.22
Screven	85270	47.99	57.19	92.08
Liberty	139558	55.74	55.74	230.22

Long	93629	117.9	117.9	1343.68
McIntosh	149942	16.86	16.85	69.64
Appling	39963	34.02	34.02	70.39
Evans	12493	21.28	21.28	34.81
Glynn	134011	210.8	210.13	1496.65
Jeff Davis	23394	2.68	2.68	3.75
Montgomery	14426	8.78	8.78	6.96
Tattnall	33959	31.49	31.49	73.08
Toombs	21718	3.45	3.45	2.43
Wayne	99669	189.6	188.5	1499.45
Candler	17051	4.98	10.48	4.78
Emanuel	42158	67.78	67.78	269.26
TOTALS	1467774	1965.95	1982.87	11070.06

In summary, the USACE can document that in 1990 there were approximately 1,467,774 acres of wetlands in HUC's 03070106, 03060202, 03060204, and 03060203 within Bryan, Bulloch, Chatham, Effingham, Emanuel, Jenkins, Screven, Liberty, Long, McIntosh, Appling, Evans, Glynn, Jeff Davis, Montgomery, Tattnall, Toombs, Wayne, Candler and Emanuel Counties. By deducting 1,982.87acres of wetland impacts since 1990 (RAMS database), there are at least 1,465,792 acres of wetlands remaining in this area. This amounts to a loss of 0.2 percent of the wetlands in HUC's 03070106, 03060202, 03060204, and 03060203 since 1990. The largest percent loss by county would be Chatham County, where 0.4 % of the wetlands have been impacted since 1990. The USACE can also document that 11,070.06 acres of wetland mitigation were provided to offset the post 1990 wetland impacts in this area.

In addition to the impacts described above, Fort Stewart itself has experienced some wetland impacts associated with various projects since the close of the review period in 2005. Some major restoration projects, employed to mitigate wetland impacts, have also occurred within and after the review period, but have not been integrated into the data described above. The effects of these projects are outlined in the table below.

Table 5. Fort Stewart Wetland Impacts Post-2005

	Wetland Acres	Wetland Acres	Wetland Acres
County	Requested	Permitted	Mitigated
Bryan	4.23	4.23	0

Liberty	214.77	214.77	3230
Long	0	0	0
Evans	0	0	0
Tattnall	0	0	0
TOTALS	219	219	3230

The following is a list of Fort Stewart projects authorized by the USACE within Fort Stewart watersheds outside the review period.

a. Department of the Army Permit 940000880 (modification), issued June 29, 1995, authorized the enhancement of approximately 1,300 acres of wetlands in the A11 training area of Fort Stewart, to mitigate for 2.1 acres of wetlands impacted by the earlier construction (under the same Permit number) of rail pass tracks in an adjacent training area.

b. Department of the Army File Number 200007600 refers to the restoration and enhancement of approximately 1,200 acres of wetlands to create For Stewart's Canoochee Creek Reservoir (or "Pond 4") Mitigation Bank.

c. Department of the Army Permit 200601665, issued December 6, 2006, authorized impacts to 4.23 acres of wetlands in Bryan County for improvements to the road in Fort Stewart's existing Convoy Live Fire Range. Mitigation consisted of a debit of 12.7 credits from the Installation's on-post wetland mitigation bank.

d. Department of the Army Permit 200501852, issued March 12, 2007, authorized impacts to 206.9 acres of wetlands in Liberty County for the construction of the Digital Multipurpose Range Complex. 4.0 acres of jurisdictional wetland were impacted through direct filling; the remaining 202.9 acres were impacted though cutting of vegetation to meet line-of-sight requirements. Mitigation was accomplished through the Strum Bay Restoration, which (under the same Permit) restored and enhanced approximately 730 acres of wetlands adjacent to the project area by correcting previously impacted hydrology.

e. One project for which a DA Permit is pending, vehicle maintenance facilities in support of 2nd BCT operations, will impact a total of 7.87 acres of wetlands. Although no DA Permit number has yet been assigned to these projects as they are still in the planning stages, the Fort Stewart Wetland Mitigation Bank has been debited in anticipation of them, so the impacts have

been included in this analysis.

Fort Stewart has implemented an aggressive mitigation program in order to offset wetland impacts on the Installation. These projects include wetland enhancement and wetland restoration projects on large scale areas that provide higher quality mitigation than smaller patchwork single permit mitigation products. The following are current wetland mitigation projects located within the boundaries of Fort Stewart:

Pond 4 Mitigation Bank (USACE File Number 200007600): This single user bank was permitted for projects located within the boundaries of the Fort Stewart Installation. Approximately 1200 acres of wetlands were restored within the Canoochee Creek and Strum Bay wetland systems. This project is mostly comprised of deepwater and hardwood swamp habitat. Additional areas upstream of Pond 4 are currently being studied that would increase the total amount of wetland enhancement and restoration (see Strum Bay Mitigation Area below).

A-11 Mitigation Area (USACE File Number 940000880): This project specific mitigation area is comprised of approximately 1300 acres of wetland enhancement/restoration. Hydrologic enhancement/restoration was competed through the reintroduction of hydrology that had been previously diverted around the project area. It is comprised mostly of pine/cypress flatwoods and hardwood drainages.

Strum Bay Mitigation Area (USACE File Number 200501852): This project specific mitigation was originally developed to mitigate impacted associated with the DMPRC. Subsequent studies realized a much larger restoration/enhancement was obtained by re-directing hydrology back into the Strum Bay wetland system. This project has now identified enhancement and restoration of wetland hydrology to approximately 730 acres. This portion of the Strum Bay wetland system is located upstream from the Pond 4 Mitigation Bank, thus creating additional benefits to water quality and habitat to the entire Strum Bay wetland system and Pond 4 Mitigation Bank.

Summary: These effects, when combined with other projects in the ROI, do have the potential to result in adverse cumulative impacts; however, it is expected that other projects in the ROI will be implemented as follows: projects will use erosion control measures, silt fencing, and other Best Management Practices (BMPs); sufficient storm water management structures will be constructed as part of new construction; erosion and sedimentation control plans will be filed in accordance with Georgia's Sedimentation Pollution Control Act; and all projects will be conducted in accordance/in compliance with federal, state, and local laws. This includes

obtaining and adhering to appropriate wetland permits, including compliance with compensatory wetland mitigation requirements outlined in the wetland permit(s).

2. Water Quality: Water quality is affected by changes to the environment (referred to as stressors) that adversely affect aquatic life or impair human uses of a water body. Point sources are municipal and industrial wastewater discharge. Non-point sources consist of sediment, litter, bacteria, pesticides, fertilizers, metals, oils, grease, and a variety of other pollutants that are washed from rural and urban lands by storm water. Expected growth in population and employment in the basin will mean more potential stress from storm water runoff as well as non-point source loading.

Wetland Loss: The impacts to wetlands discussed above would be expected to have an adverse impact on water quality due to the loss of associated aquatic functions (flood water retention, filtration, contaminate removal, sediment retention, etc.). The mitigation for these impacts would help to offset these impacts to water quality.

Point Source Discharges: Impacts from municipal wastewater, agricultural, and industrial discharges were greater prior to the 1970's. Due to increased regulation, these discharges have been reduced but continue to introduce pollutants into the system, which lower water quality when considered cumulatively. Georgia's "2004 303(d) List" for Bryan, Evans, Liberty, Long, and Tattnall counties have 3 waterways listed as impaired or partially impaired; they are listed in the table below with the causes of impairment.

Table 6.

Waterway	Cause of Impairment
Canoochee River	Trophic-weighted residue value (mercury in fish tissue)
Peacock Creek	Low dissolved oxygen and fecal coliform bacteria
Taylor's Creek	Low dissolved oxygen

Non-point Source Discharges: Residential, commercial and industrial development results in an increase in impervious surfaces (roof tops, paved roads, parking lots, etc.), which affects storm water discharges. Development results in an increase in non-point source contaminant loading through associated increases in urban landscaping (pesticides and fertilizers), increased traffic

(oil, grease and metals), and other associated activities. There would be an anticipated incremental increase in adverse impacts to water quality as impervious surfaces increase. The following table is a summary of anticipated population growth-induced increases in impervious surfaces in the Altamaha watershed. The amount of impervious surface coverage is increasingly recognized as a valuable predictor of overall water quality within a watershed. In general, as population increases, so does impervious surface. As impervious surface area increases, water quality decreases. Table 4.1 shows population and impervious surface area growth over time for the Lower Ogeechee watershed; Table 4.2 shows population and impervious surface area growth over time for the Canoochee watershed; Table 4.3 shows population and impervious surface area growth over time for the Little Ogeechee watershed; Table 4.4 shows population and impervious surface area growth over time for the Altamaha watershed.

The impervious surface data was generated by the USEPA and provided to the USACE via a table titled "Total Impervious Area Calculations by 12-Digit HUC Watershed (based upon National Land Cover Data, 1993). Using simple linear regression analysis, the USACE utilized county population projection data to estimate percent increase in impervious surface, by county. The data contained in Tables 4.1 thru 4.4 indicates that as the population of each county continues to increase, there will be an associated increase in impervious surfaces. All counties in the study area would be anticipated to experience an increase of less than one percent impervious surface by the year 2050. However, each county is responsible for regulating non-point source storm water discharges pursuant to Section 402 of the CWA. These county storm water management programs should help to minimize the anticipated adverse impacts to water quality.

Table 7. Projected Population Growths and Associated Approximate Impervious Surface Increases
Lower Ogeechee - HUC 03060202

County		**Year**						
		2007	2008	2010	2020	2030	2040	2050
Bryan	Population / square mile	66	69	70	88	106	124	142
	% impervious Surface Coverage	2.33	2.37	2.39	2.68	2.97	3.26	3.55
Bulloch	Population / square mile	96	98	101	120	139	157	176
	% impervious Surface Coverage	2.81	2.84	2.89	3.20	3.50	3.79	4.09
Chatham	Population / square mile	385	389	386	410	434	457	481
	% impervious Surface Coverage	7.33	7.39	7.35	7.71	8.07	8.42	8.78
Effingham	Population / square mile	105	108	111	142	173	204	234
	% impervious Surface Coverage	2.95	3.00	3.05	3.55	4.04	4.53	5.00
Emanuel	Population / square mile	32	33	33	34	36	37	38
	% impervious Surface Coverage	1.77	1.79	1.79	1.81	1.84	1.85	1.87
Jenkins	Population / square mile	24	24	25	25	25	25	26
	% impervious Surface Coverage	1.64	1.64	1.66	1.66	1.66	1.66	1.68
Screven	Population / square mile	23	23	24	25	26	27	28
	% impervious Surface Coverage	1.63	1.63	1.64	1.66	1.68	1.69	1.71
Watershed Average								
Lower Ogeechee	Population / square mile	104	106	107	121	134	147	161
	% impervious Surface Coverage	2.92	2.95	2.97	3.18	3.39	3.60	3.81

Table 8. Projected Population Growths and Associated Approximate Impervious Surface Increases Canoochee - HUC 03060203

County		Year						
		2007	2008	2010	2020	2030	2040	2050
Bryan	Population / square mile	66	69	70	88	106	124	142
	% impervious Surface Coverage	2.33	2.37	2.39	2.68	2.97	3.26	3.55
Bulloch	Population / square mile	96	98	101	120	139	157	176
	% impervious Surface Coverage	2.81	2.84	2.89	3.20	3.50	3.79	4.09
Candler	Population / square mile	42	43	44	50	56	62	67
	% impervious Surface Coverage	1.94	1.95	1.97	2.07	2.16	2.26	2.34
Emanuel	Population / square mile	32	33	33	34	36	37	38
	% impervious Surface Coverage	1.77	1.79	1.79	1.81	1.84	1.85	1.87
Evans	Population / square mile	61	62	65	74	84	93	102
	% impervious Surface Coverage	2.24	2.26	2.31	2.46	2.62	2.76	2.91
Jenkins	Population / square mile	24	24	25	25	25	25	26
	% impervious Surface Coverage	1.64	1.64	1.66	1.66	1.66	1.66	1.68
Liberty	Population / square mile	100	97	105	109	114	119	124
	% impervious Surface Coverage	2.87	2.83	2.95	3.02	3.10	3.18	3.26
Long	Population / square mile	28	28	31	38	46	53	60
	% impervious Surface Coverage	1.71	1.71	1.76	1.87	2.00	2.11	2.23
Tattnall	Population / square mile	47	48	50	57	63	70	76
	% impervious Surface Coverage	2.02	2.03	2.07	2.18	2.28	2.39	2.49
Watershed Average								
Canoochee	Population / square mile	55	56	58	66	74	82	90
	% impervious Surface Coverage	2.15	2.16	2.20	2.33	2.46	2.58	2.71

Table 9. Projected Population Growths and Associated Approximate Impervious Surface Increases Little Ogeechee - HUC 03060204

County		**Year**						
		2007	2008	2010	2020	2030	2040	2050
Bryan	Population / square mile	66	69	70	88	106	124	142
	% impervious Surface Coverage	2.33	2.37	2.39	2.68	2.97	3.26	3.55
Chatham	Population / square mile	385	389	386	410	434	457	481
	% impervious Surface Coverage	7.33	7.39	7.35	7.71	8.07	8.42	8.78
Effingham	Population / square mile	105	108	111	142	173	204	234
	% impervious Surface Coverage	2.95	3.00	3.05	3.55	4.04	4.53	5.00
Liberty	Population / square mile	100	97	105	109	114	119	124
	% impervious Surface Coverage	2.87	2.83	2.95	3.02	3.10	3.18	3.26
Long	Population / square mile	28	28	31	38	46	53	60
	% impervious Surface Coverage	1.71	1.71	1.76	1.87	2.00	2.11	2.23
McIntosh	Population / square mile	20	20	21	24	26	29	32
	% impervious Surface Coverage	1.58	1.58	1.59	1.64	1.68	1.72	1.77
Watershed Average								
Ogeechee Coastal	Population / square mile	117	119	121	135	150	164	179
	% impervious Surface Coverage	3.13	3.15	3.18	3.41	3.64	3.87	4.10

Table 10. Projected Population Growths and Associated Approximate Impervious Surface Increases
Altamaha - HUC 03070106

Appling	Population / square mile	35	35	36	38	41	43	46
	% impervious Surface Coverage	1.82	1.82	1.84	1.87	1.92	1.95	2.00
Evans	Population / square mile	61	62	65	74	84	93	102
	% impervious Surface Coverage	2.24	2.26	2.31	2.46	2.62	2.76	2.91
Glynn	Population / square mile	128	130	129	141	152	164	175
	% impervious Surface Coverage	3.32	3.36	3.34	3.53	3.71	3.90	4.07
Jeff Davis	Population / square mile	40	40	40	42	44	47	49
	% impervious Surface Coverage	1.90	1.90	1.90	1.94	1.97	2.02	2.05
Long	Population / square mile	28	28	31	38	46	53	60
	% impervious Surface Coverage	1.71	1.71	1.76	1.87	2.00	2.11	2.23
McIntosh	Population / square mile	20	20	21	24	26	29	32
	% impervious Surface Coverage	1.58	1.58	1.59	1.64	1.68	1.72	1.77
Montgomery	Population / square mile	36	36	38	42	45	49	53
	% impervious Surface Coverage	1.84	1.84	1.87	1.94	1.98	2.05	2.11
Tattnall	Population / square mile	47	48	50	57	63	70	76
	% impervious Surface Coverage	2.02	2.03	2.07	2.18	2.28	2.39	2.49
Toombs	Population / square mile	75	76	76	81	87	92	97
	% impervious Surface Coverage	2.47	2.49	2.49	2.57	2.67	2.75	2.83
Wayne	Population / square mile	45	45	46	52	58	63	69
	% impervious Surface Coverage	1.98	1.98	2.00	2.10	2.20	2.28	2.37
Watershed Averages								
Altamaha	Population / square mile	52	52	53	59	65	70	76
	% impervious Surface Coverage	2.09	2.10	2.12	2.21	2.30	2.39	2.48

Summary: This effect, when combined with other projects in the geographical area of influence, does have the potential to result in adverse cumulative impacts; however, it is expected that future projects would be implemented as follows: projects will use erosion control measures, silt fencing, and other BMPs; sufficient storm water management structures will be constructed as part of new construction; erosion and sedimentation control plans will be filed in accordance with Georgia's Sedimentation Pollution Control Act; and all projects will be undertaken in accordance with federal, state, and local laws.

Fort Stewart's role in general and project-specific oversight to ensure compliance with environmental legislation and the overall health of the local ecosystem have certainly played a role in mitigating adverse impacts to water quality. Also, the use of this large (~ 280,000 acres) area of land for military training has and will continue to ensure that the vast majority of the Installation remains managed wilderness. This allows natural processes to operate in support of water quality to a degree not seen in many surrounding areas which have experienced a great deal of development, and is the primary contributor to good water quality relative to those areas. Also, it must be noted that many projects related to military training (ex: firing ranges) do not feature impervious surfaces to the same degree as many civilian and private projects, and will not experience human activity and traffic of the same frequency and intensity, which might otherwise worsen local water quality. Furthermore, through the oversight of Environmental Compliance Officers, Army units self-monitor their training activities to avoid and minimize potentially harmful activities. A 1999 water quality survey performed by Fort Stewart determined that the quality of water leaving Fort Stewart's geographic boundaries was of equal or better quality than that which entered the Installation.

In view of the above, the USACE determined that the proposed project, with proposed special permit conditions, would have minimal impacts on water quality when considered alone or in concert with the other past, present and reasonably foreseeable future projects in the basin.

3. Aquatic Species: Permitted impacts to wetlands and water quality as discussed above have affected fish and other aquatic species such as mussels and aquatic insects.

The proposed projects would not result in a direct adverse impact to any stream or river, or to aquatic species in the waterways. Rather, the project would result in an unavoidable impact to 103.34 acres of wetland, and a loss of the aquatic habitat function provided by these wetlands. However, this project-related wetland loss would be minor when considered cumulatively with

all other past and planned wetland losses discussed above. In addition, the applicant's proposed wetland mitigation plan would help to offset the aquatic habitat function loss that would result from this project. Furthermore, Fort Stewart Fish & Wildlife monitors and maintains the quality of Fort Stewart aquatic habitats as part of their fisheries program.

Overall, the proposed projects will not have a significant impact on Fort Stewart aquatic habitats and species.

4. Compensatory Mitigation: As defined in the NEPA regulations, compensatory mitigation is "*compensation for the impact by replacing or providing substitute resources or environments*" (40 CFR Part 1508.20). The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 Multipurpose Machine Gun Range. The compensatory wetland mitigation ratios proposed for this project are 3:1 for those projects utilizing the on-post mitigation bank, and approximately 8:1 for projects utilizing off-post credits. The applicant's proposed compensatory wetland mitigation plan would provide more than would be needed to offset lost aquatic functions, and greater than required by 404 mitigation guidance as stated in the SOP for determining compensatory mitigation.

In addition to on-post mitigation areas, Fort Stewart has elected to mitigate impacts from its proposed ranges by purchasing credits from the Wilkinson-Oconee Mitigation Bank. The size and importance of this range project drove this decision, which will allow the on-post Bank to be reserved for numerous other smaller projects, which would not be likely to receive the funding which makes off-post mitigation an option. The Wilkinson-Oconee Bank consists of 6,735 acres of restored, enhanced, and preserved bottomland hardwood and cypress-tupelo wetlands – the same types predominating on Fort Stewart. The placement of Fort Stewart within the service area of this Bank, the similarity of wetland types, and the quantity of available credits, made the Wilkinson-Oconee the ideal off-post mitigation option compared to other mitigation banks in Georgia.

Proposed project: The proposed project supporting military training will adversely impact 103.34 acres of Jurisdictional Wetland. To mitigate for these impacts the applicant would purchase 336.76 mitigation credits from a USACE approved mitigation bank that services the project area. Additionally, some small projects will be mitigated through debits from the Installation’s on-post wetland mitigation bank. As such, any adverse impacts to wetlands and other waters of the U.S. caused by this project would be offset by the proposed mitigation.

Summary: The main public detriment that would result from this project would be the loss of 103.34 acres of jurisdictional wetlands. Many of the wetland functions and values important to the public, such as flood attenuation, sediment retention, fish and wildlife habitat, and others, would be replaced by the applicant's mitigation plan. Additionally, Fort Stewart's past mitigation efforts (approximately 3,230 acres) have adequately offset impacts within the boundaries Fort Stewart. Mitigation for the current projects will be offset through additional mitigation efforts, including the use of off-site USACE approved wetland mitigation banks. The mitigation plan would also provide adequate compensation for the impacted wetlands through the implementation of wetland creation, enhancement and preservation. The proposed projects would not impact federal or state protected species or critical habitat. Cultural resources have been considered and it has been determined that they would not be impacted. Overall, the public benefits of the proposed project would outweigh the public detriments.

In view of the above, the USACE has determined that the proposed project, with proposed special permit conditions, would not have a significant impact on wetlands and/or other waters of the U.S. when considered alone or in concert with the other past, present and reasonably foreseeable future projects in the Fort Stewart watersheds.

F. SECONDARY/INDIRECT IMPACTS: See Section E above and the Range and Garrison Construction Environmental Impact Statement, prepared by Fort Stewart.

G. IRREVERSIBLE AND IRRETRIEVABLE RESOURCE COMMITMENTS: Authorization of the applicant's preferred alternative, or any other build alternative, could result in an irreversible and irretrievable commitment of a range of natural, physical, human and fiscal resources. The fossil fuels, labor and construction materials that would be expended, if the project is constructed, are generally not considered irretrievable resources. In addition, these resources are not in short supply and their use would not have an adverse effect upon their continued availability.

H. EFFECT ON FEDERAL PROJECTS: We have determined the proposed activity would not have an adverse effect on any Federal Project (33 CFR 320.4(g)).

PART V - PERMIT ACTION ALTERNATIVES

A. TO ISSUE THE PERMIT IN ACCORDANCE WITH THE PLANS SUBMITTED BY THE APPLICANT: This course of action by itself would be inappropriate because it does not include

provision for special conditions (See D. below).

B. TO DENY THE REQUEST FOR A PERMIT: Denial of the permit would not be an appropriate course of action. The proposed activity would not have significant adverse effects on navigation, the environment or other public interest factors.

C. TO ISSUE THE PERMIT AFTER SUBMITTAL OF MODIFIED PLANS BY THE APPLICANT WITH SPECIAL CONDITIONS: This course of action would not be warranted. Our review of the applicant's plans and alternatives showed the applicant's proposed activity to be the most practicable way to accomplish the applicant's overall purpose.

D. TO ISSUE THE PERMIT IN ACCORDANCE WITH THE PLANS SUBMITTED BY THE APPLICANT WITH SPECIAL CONDITIONS: This would be the appropriate course of action to follow. In order to protect the public interest the following special conditions would be placed on any permit issued:

1. All dredged or borrowed material used as fill on this project will be from clean, uncontaminated sources and free from cultural resources.

2. That no construction activity or stockpiling will occur in waters of the United States, including wetland areas, outside of the areas authorized for filling under this permit.

3. Prior to the commencement of construction activities for this project, the limits of the proposed fill areas in jurisdictional waters shall be clearly flagged and staked by you and/or your contractors. All construction personnel shall be shown the location(s) of all wetland and/or stream areas outside of the construction area to prevent encroachment from heavy equipment into these areas.

4. Borrow site or sites for stockpiling fill dirt shall be prohibited within 200 feet of streambanks, 50 feet of wetlands and open waters or elsewhere runoff from the site would increase sedimentation in waters of the United States unless specifically authorized by this permit. Normal grading activities such as cutting and filling within 200 feet of streams or 50 feet of wetlands/open waters are authorized.

5. Construction debris, liquid concrete, old riprap, old support materials, or other litter shall not be placed in streams or in areas where migration into streams and/or wetlands could

reasonably be expected.

6. Staging areas and equipment maintenance areas will be located at least 200 feet from streambanks to minimize the potential for wash water, petroleum products, or other contaminants from construction equipment entering the streams.

7. The permittee shall ensure that the project's master drainage plan is designed and implemented to avoid inadvertent drainage of wetlands and inadvertent water diversion resulting in a reduction of hydrology in wetlands. The permittee shall also ensure that secondary road ditches and/or small after-project drainage ditches do not inadvertently impact wetlands or waters of the US.

8. The permittee shall minimize bank erosion and sedimentation in construction areas by utilizing BMPs for stream corridors, installing and maintaining significant erosion and sediment control measures, and providing daily reviews of construction and stream protection methods. Check dams and riprap placed in streams and wetlands as erosion control measures are considered a fill and not authorized under this permit unless they were specifically authorized by this permit.

9. All work conducted under this permit shall be located, outlined, designed, constructed and operated in accordance with the minimal requirements as contained in the Georgia Erosion and Sedimentation Control Act of 1975, as amended. Utilization of plans and specifications as contained in "Manual for Erosion and Sediment Control, (Latest Edition)," published by the Georgia Soil and Water Conservation Commission or their equivalent will aid in achieving compliance with the aforementioned minimal requirements.

10. You shall obtain and comply with all appropriate Federal, state, and local authorizations required for this type of activity. A stream buffer variance may be required. Variances are issued by the Director of the Georgia Environmental Protection Division (EPD), as defined in the Georgia Erosion and Sedimentation Control Act of 1975, as amended. It is our understanding that you may obtain information concerning variances at the Georgia EPD's web site at www.gaepd.org or by contacting the Watershed Protection Branch at (404) 675-6240.

11. If you or your contractors discover any federally listed threatened or endangered species and/or their habitat while accomplishing the activities authorized by this permit, you must immediately STOP work in the area and notify the issuing office of what you have found.

We will initiate the Federal and state coordination required to determine if the species and/or habitat warrant further consultation with the USFWS.

12. Prior to the commencement of construction activities for this activity, the permittee shall insure that this project complies with all applicable rules, requirements, and/or regulations of the FEMA and/or the Georgia Floodplain Management Office with regard to construction activities in designated floodplains and/or floodways prior to commencement of work activity, to include revisions to the National Flood Insurance Program maps if required.

13. Prior to the commencement of any work in jurisdictional waters of the United States for this activity, you will purchase wetland mitigation credits from an approved wetland mitigation bank. You or the mitigation bank sponsor must provide this office with documentation of this purchase before any work may commence. The notice should reference the USACE file number assigned to this project.

14. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the NRHP.

15. The permittee, US Army Fort Stewart, is the lead federal agency for this proposed action. The permittee shall meet all lead federal agency responsibilities pursuant to Section 7 of the Endangered Species Act, prior to any work occurring in waters of the US subject to the jurisdiction of the USACE.

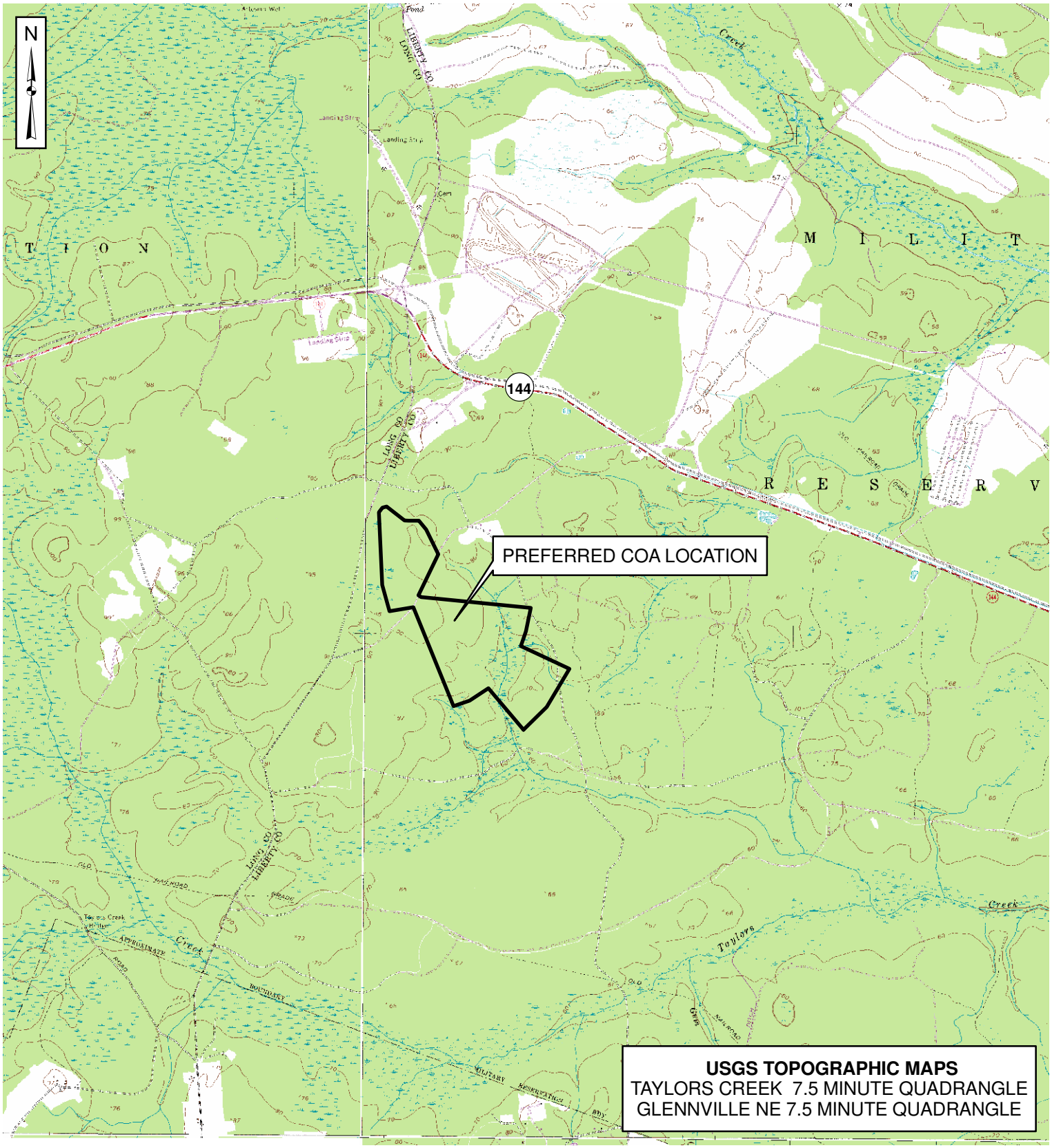
16. The permittee, US Army Fort Stewart, is the lead federal agency for this proposed action. Fort Stewart shall meet all lead federal agency responsibilities pursuant to Section 106 of the National Historic Preservation Act, prior to any work occurring in waters of the US subject to the jurisdiction of the USACE.

17. The site design for this project was based on the 90% design. Authorized wetland impacts are based on a standard range design. Prior to conducting any work in wetlands on this project site, the permittee shall submit final site development plans to the USACE for review and approval. No work in wetlands can occur until the USACE has reviewed and approved the final plan in writing; this concurrence letter needs to document that the 404(b)(1) process has been adequately demonstrated. It is anticipated that once final design is completed, there will be a

minor reduction in the amount of wetland area that will be impacted by the project. This anticipated change in the footprint of authorized wetland impact is authorized under this permit and modification of the permit will not be required for this change in site design.

18. If a conditioned Water Quality Certification has been issued for your project, you must comply with conditions specified in the certification as Special Conditions to this permit.

PART VI – COURSE OF ACTION FIGURES



VICINITY MAP - PREFERRED COA

1" = 4,000'

0 2,000 4,000 8,000 Feet

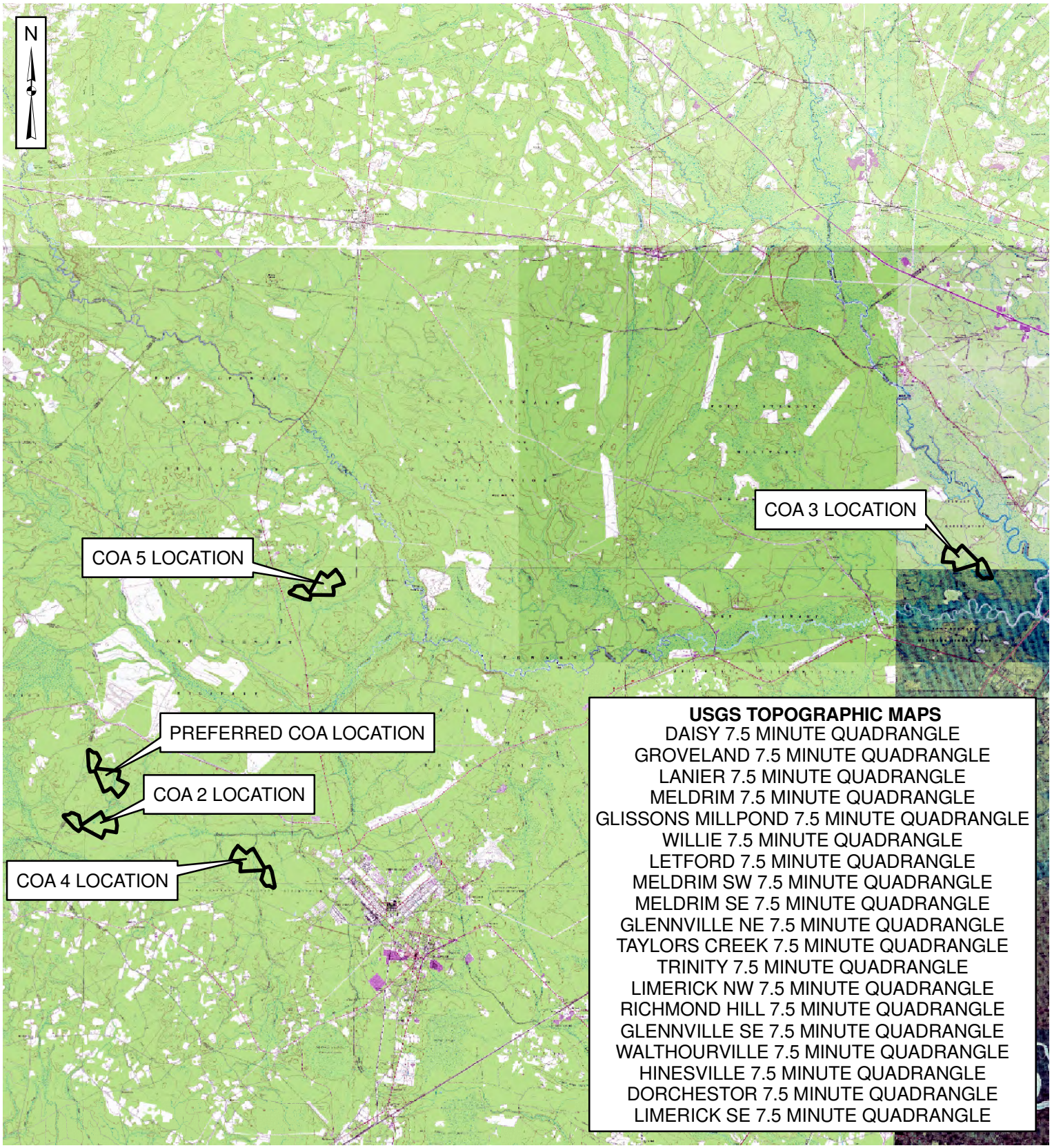
PROJECT: MPMG - MULTIPURPOSE MACHINE GUN RANGE

COUNTY: LIBERTY

SURVEY DATUM: UTM

FIGURE: 1 OF 7

DATE: FEBRUARY 2010



VICINITY MAP - CONSIDERED COAS

1" = 19,000'

0 9,500 19,000 38,000 Feet

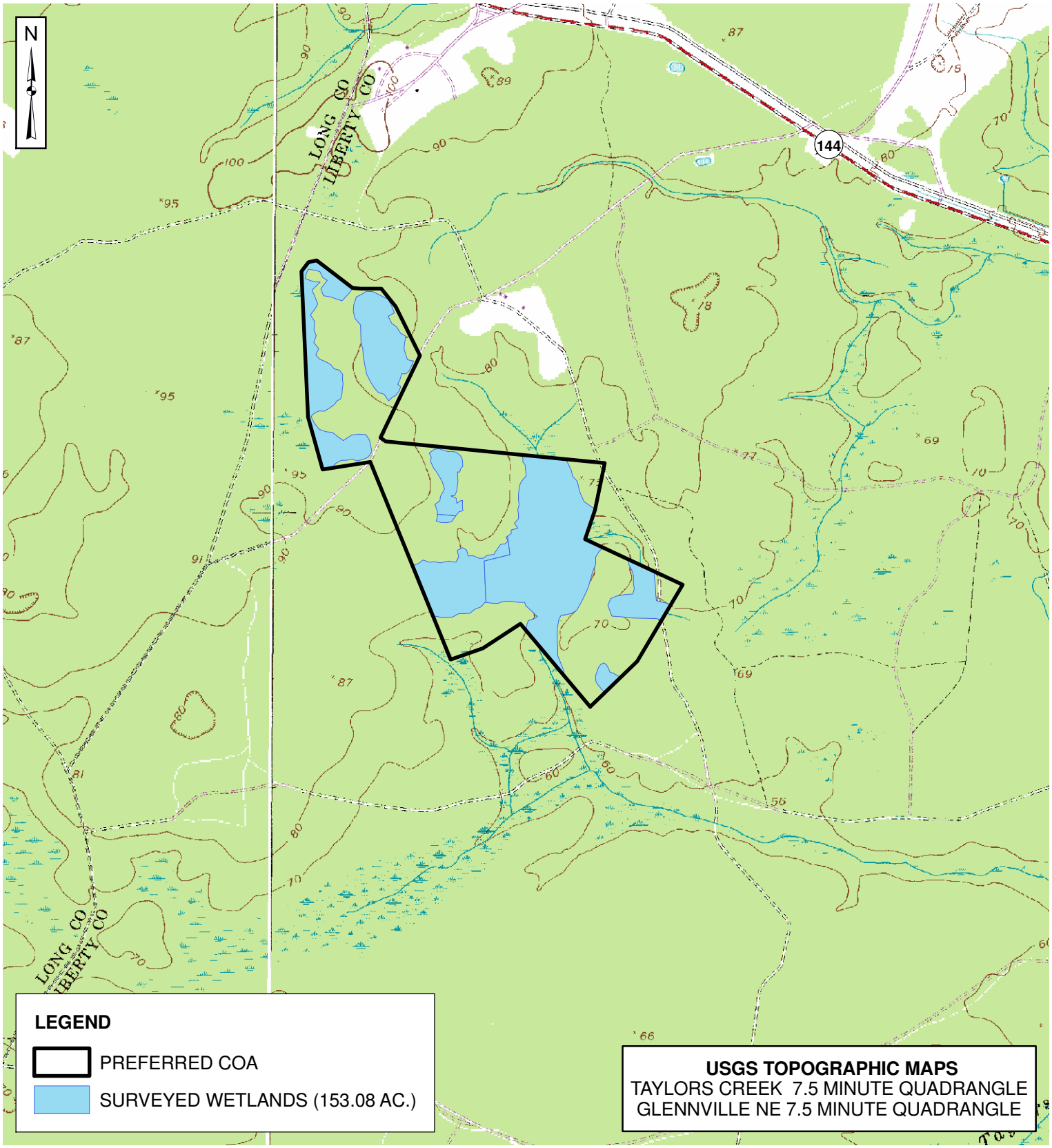
PROJECT: MPMG - MULTIPURPOSE MACHINE GUN RANGE

COUNTY: LIBERTY/BRYAN

SURVEY DATUM: UTM

FIGURE: 2 OF 7

DATE: FEBRUARY 2010



LOCATION MAP - PREFERRED COA

1" = 2,000'

0 1,000 2,000 4,000 Feet

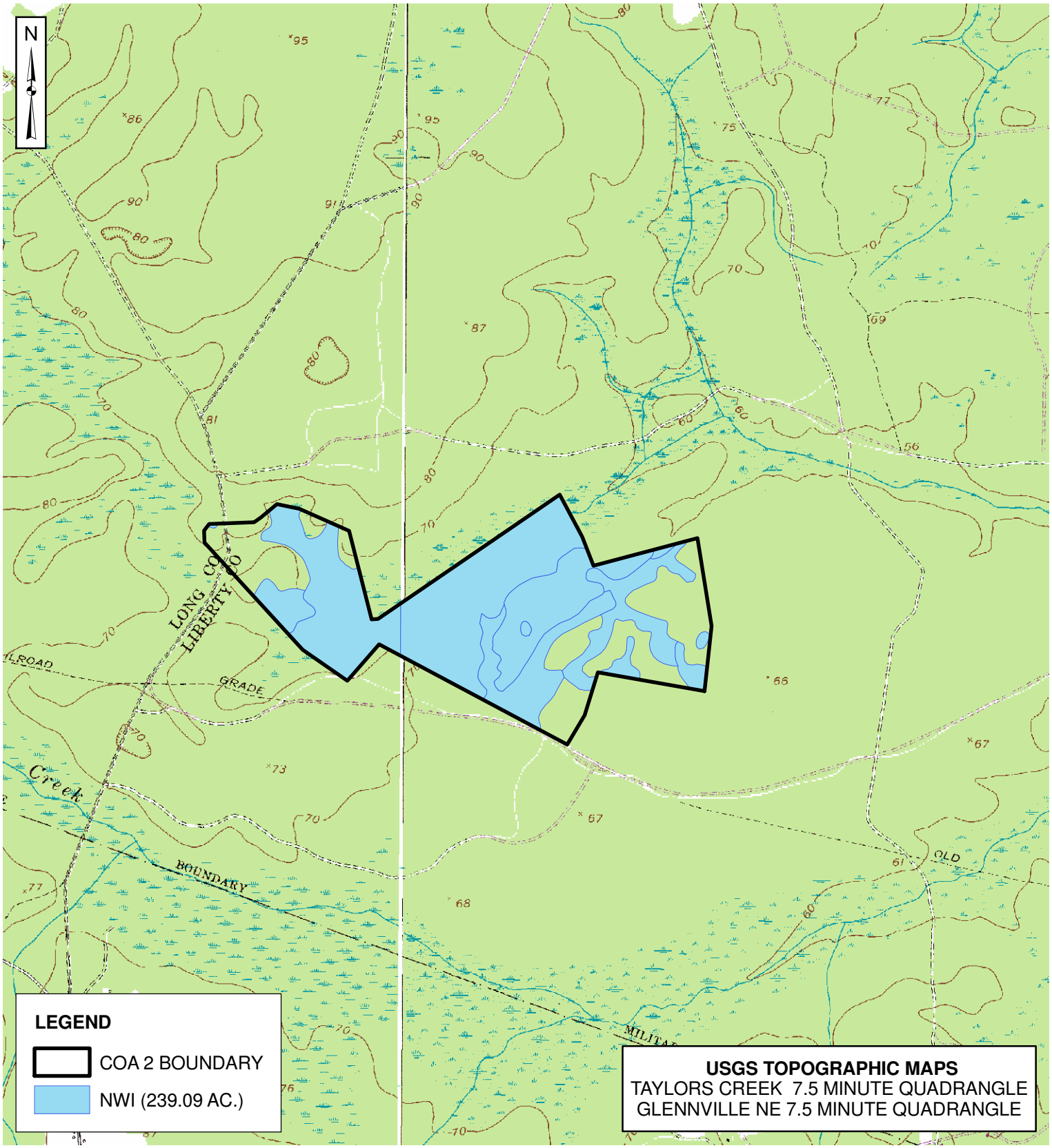
PROJECT: MPMG - MULTIPURPOSE MACHINE GUN RANGE

COUNTY: LIBERTY

SURVEY DATUM: UTM

FIGURE: 3 OF 7

DATE: FEBRUARY 2010



LOCATION MAP - COA 2

1" = 2,000'

0 1,000 2,000 4,000 Feet

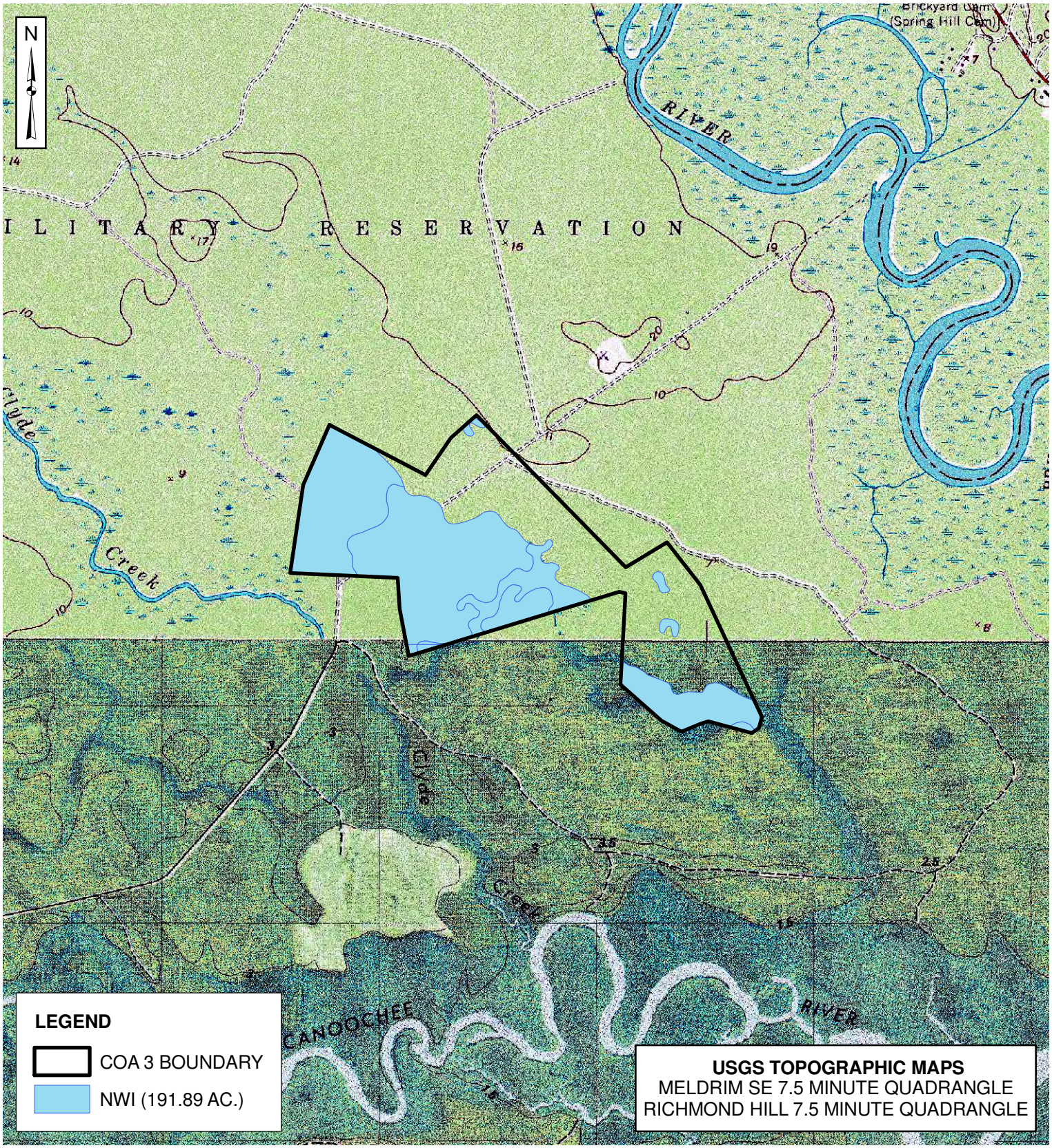
PROJECT: MPMG - MULTIPURPOSE MACHINE GUN RANGE

COUNTY: LIBERTY

SURVEY DATUM: UTM

FIGURE: 4 OF 7

DATE: FEBRUARY 2010



LOCATION MAP - COA 3

1" = 2,000'

0 1,000 2,000 4,000 Feet

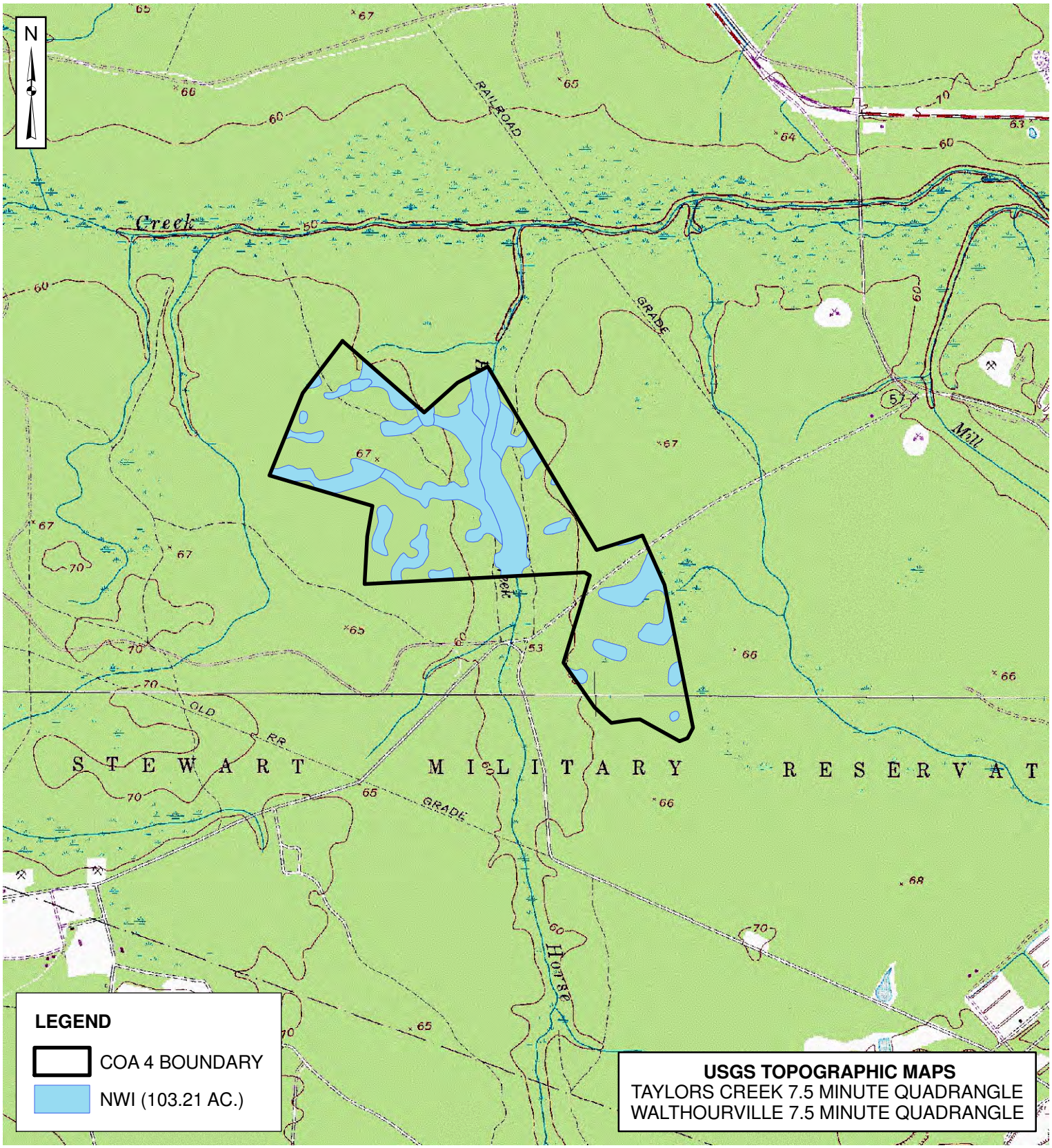
PROJECT: MPMG - MULTIPURPOSE MACHINE GUN RANGE

COUNTY: BRYAN

SURVEY DATUM: UTM

FIGURE: 5 OF 7

DATE: FEBRUARY 2010



LOCATION MAP - COA 4

1" = 2,000'

0 1,000 2,000 4,000 Feet

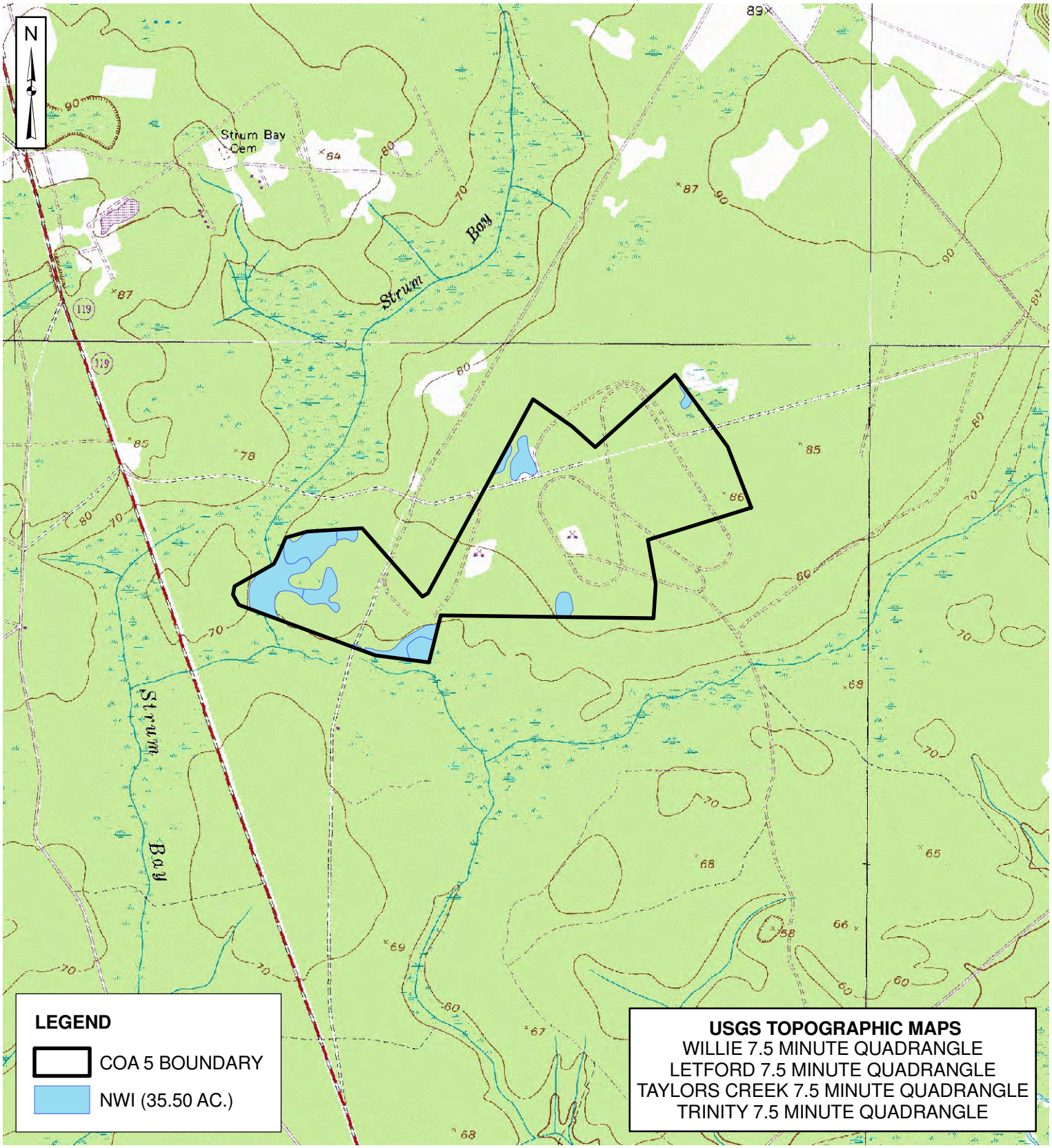
PROJECT: MPMG - MULTIPURPOSE MACHINE GUN RANGE

COUNTY: LIBERTY/BRYAN

SURVEY DATUM: UTM

FIGURE: 6 OF 7

DATE: FEBRUARY 2010



LOCATION MAP - COA 5

1" = 2,000'

0 1,000 2,000 4,000 Feet

PROJECT: MPMG - MULTIPURPOSE MACHINE GUN RANGE

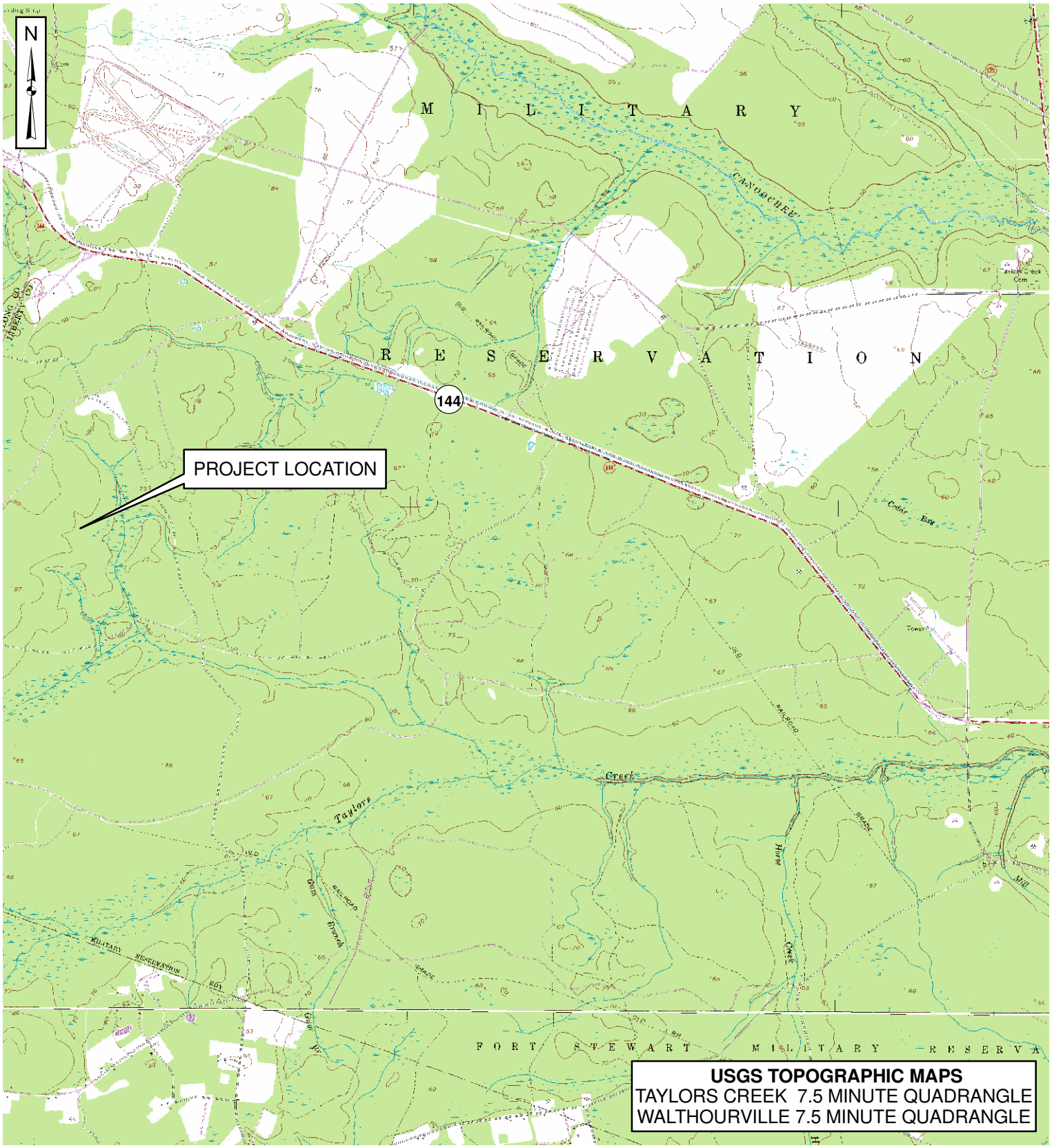
COUNTY: LIBERTY

SURVEY DATUM: UTM

FIGURE: 7 OF 7

DATE: FEBRUARY 2010

PART VII – PERMIT FIGURES



PURPOSE: FACILITATE THE CONSTRUCTION OF FACILITIES AND INFRASTRUCTURE THAT WILL SUPPORT A MULTIPURPOSE MACHINE GUN RANGE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

PROJECT VICINITY MAP

1" = 4,000'

0 2,000 4,000 8,000 Feet

APPLICANT:
FORT STEWART DPW

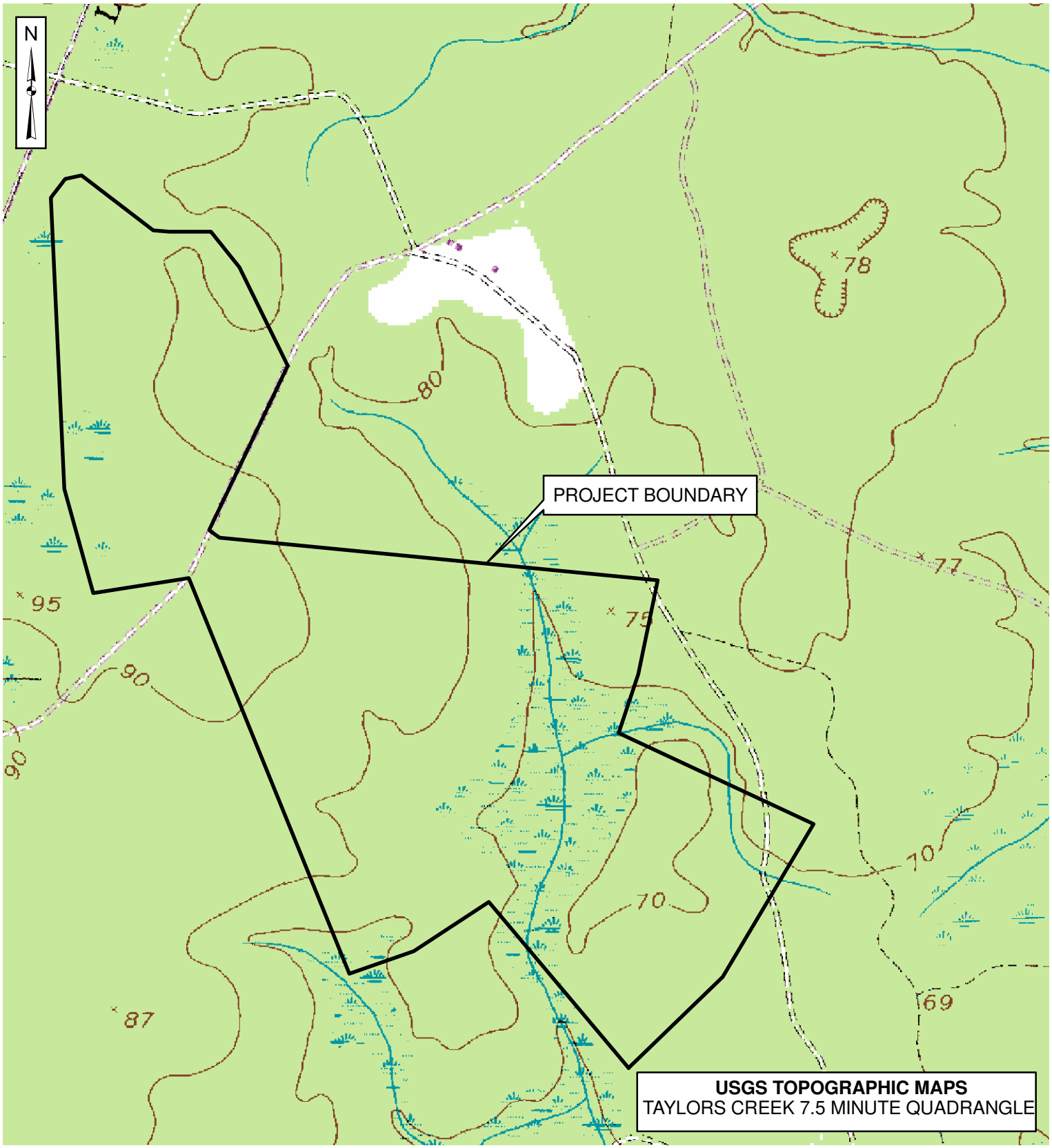
PROPOSED: WETLAND FILL

NEAREST WATERBODY: TAYLORS CREEK

COUNTY: LIBERTY

FIGURE: 1 OF 6

DATE: FEBRUARY 2010



PURPOSE: FACILITATE THE CONSTRUCTION OF FACILITIES AND INFRASTRUCTURE THAT WILL SUPPORT A MULTIPURPOSE MACHINE GUN RANGE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

PROJECT LOCATION MAP

1" = 1,000'

0 500 1,000 2,000 Feet

APPLICANT:
FORT STEWART DPW

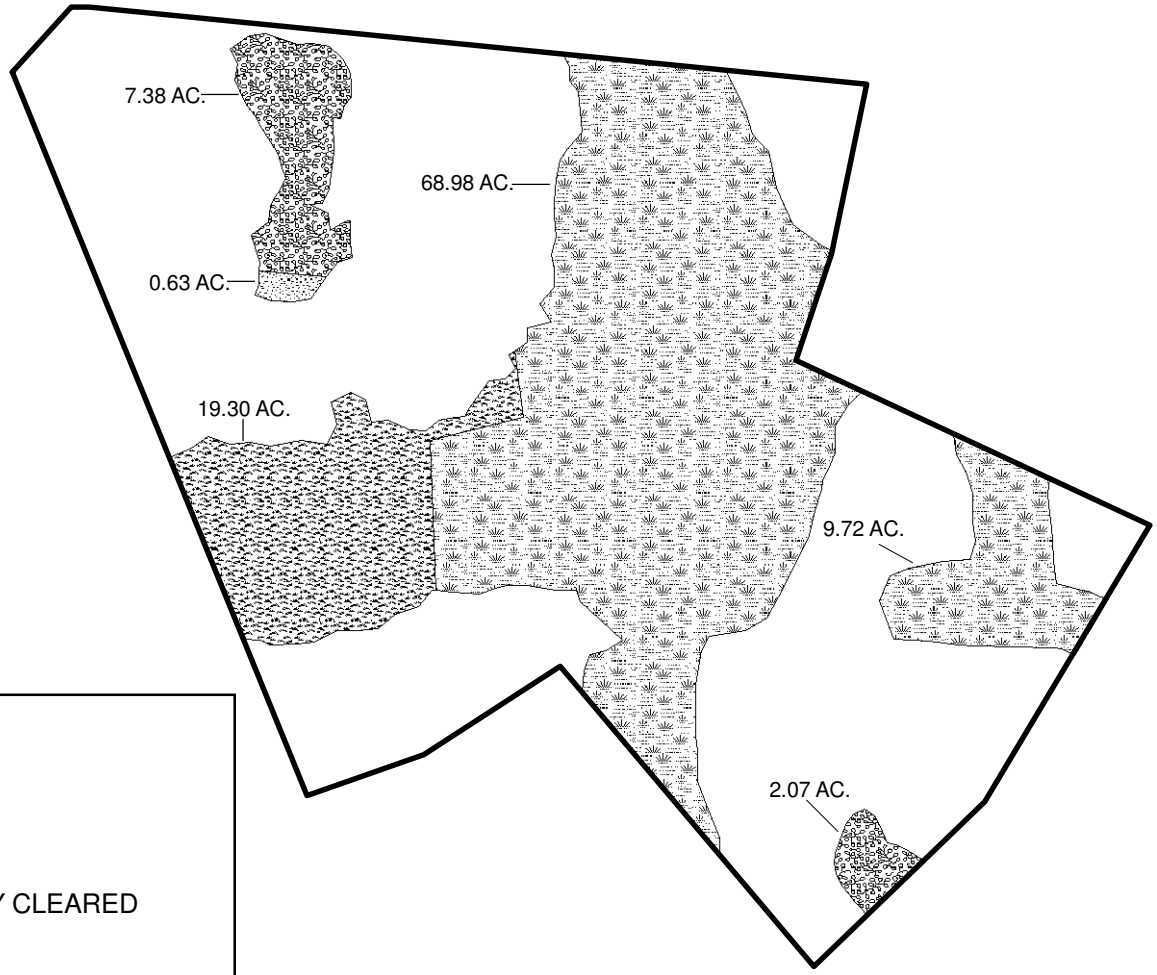
PROPOSED: WETLAND FILL

NEAREST WATERBODY: TAYLORS CREEK

COUNTY: LIBERTY

FIGURE: 2 OF 6

DATE: FEBRUARY 2010



LEGEND

- PROJECT BOUNDARY
- JURISDICTIONAL WETLAND
- JURISDICTIONAL WETLAND PREVIOUSLY CLEARED
- NON-JURISDICTIONAL WETLAND
- NON-JURISDICTIONAL WETLAND PREVIOUSLY CLEARED

PURPOSE: FACILITATE THE CONSTRUCTION OF FACILITIES AND INFRASTRUCTURE THAT WILL SUPPORT A MULTIPURPOSE MACHINE GUN RANGE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

EXISTING CONDITIONS

SCALE: 1" = 800'

0 400 800 1,600 Feet

APPLICANT:
FORT STEWART DPW

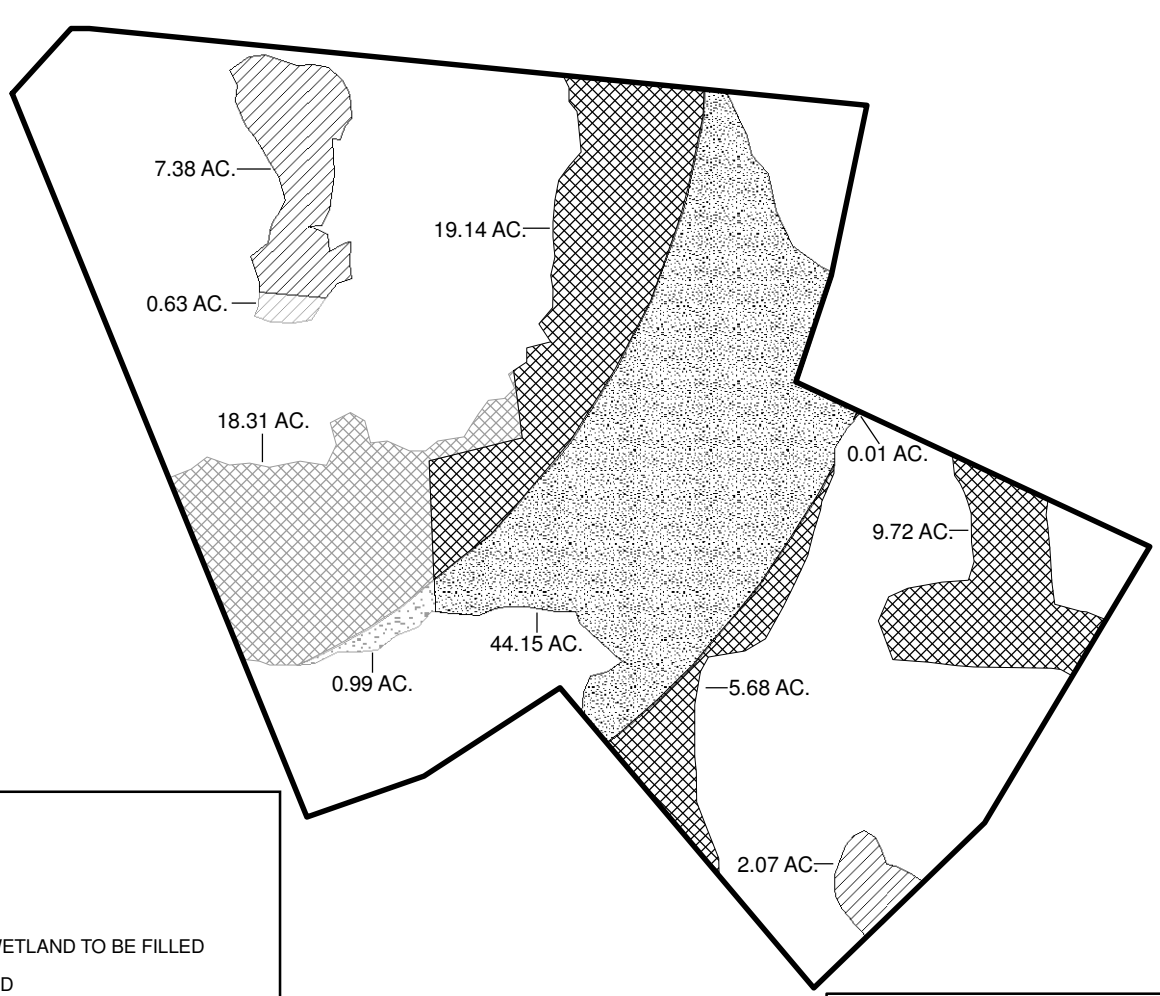
PROPOSED: WETLAND FILL

NEAREST WATERBODY: TAYLORS CREEK

COUNTY: LIBERTY

FIGURE: 3 OF 6

DATE: DECEMBER 2009



LEGEND

- PROJECT BOUNDARY
- JURISDICTIONAL WETLAND TO BE FILLED
- PREVIOUSLY CLEARED JURISDICTIONAL WETLAND TO BE FILLED
- JURISDICTIONAL WETLAND TO BE CLEARED
- PREVIOUSLY CLEARED JURISDICTIONAL WETLAND
- NON-JURISDICTIONAL WETLAND TO BE FILLED
- PREVIOUSLY CLEARED NON-JURISDICTIONAL WETLAND TO BE FILLED

TOTAL JURISDICTIONAL WETLAND TO BE FILLED	52.86 AC.
TOTAL JURISDICTIONAL WETLAND TO BE CLEARED	44.15 AC.
TOTAL JURISDICTIONAL WETLAND PREVIOUSLY CLEARED	0.99 AC.
TOTAL NON-JURISDICTIONAL WETLAND TO BE FILLED	10.08 AC.
TOTAL UPLAND	132.90 AC.
TOTAL PROJECT AREA	240.98 AC.

PURPOSE: FACILITATE THE CONSTRUCTION OF FACILITIES AND INFRASTRUCTURE THAT WILL SUPPORT A MULTIPURPOSE MACHINE GUN RANGE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

PROPOSED CONDITIONS

SCALE: 1" = 800'

0 400 800 1,600 Feet

APPLICANT:
FORT STEWART DPW

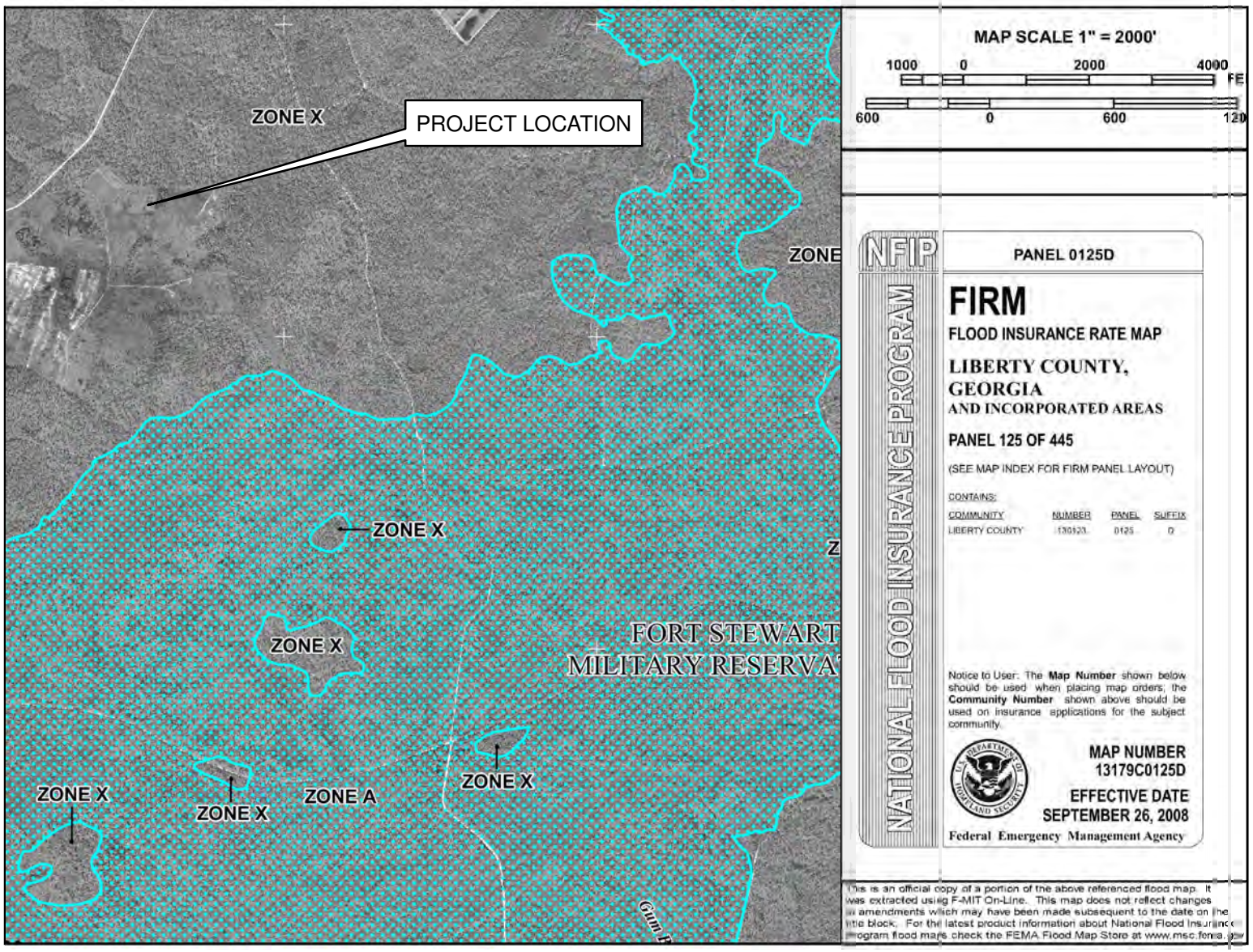
PROPOSED: WETLAND FILL

NEAREST WATERBODY: TAYLORS CREEK

COUNTY: LIBERTY

FIGURE: 4 OF 6

DATE: DECEMBER 2009



PURPOSE: FACILITATE THE CONSTRUCTION OF FACILITIES AND INFRASTRUCTURE THAT WILL SUPPORT A MULTIPURPOSE MACHINE GUN RANGE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

FLOOD INSURANCE RATE MAP

NOT TO SCALE

APPLICANT:
FORT STEWART DPW

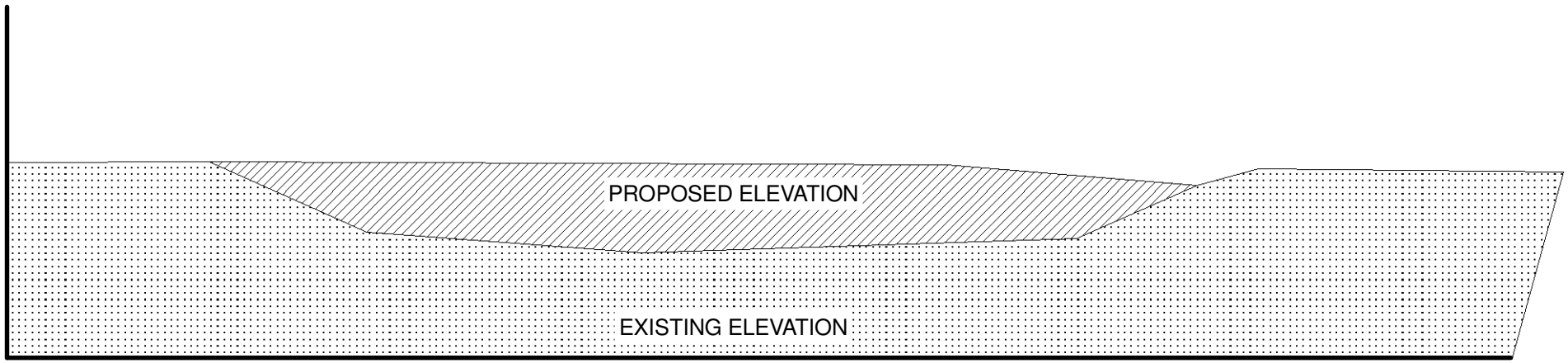
PROPOSED: WETLAND FILL

NEAREST WATERBODY: TAYLORS CREEK

COUNTY: LIBERTY

FIGURE: 6 OF 6

DATE: FEBRUARY 2010



PURPOSE: FACILITATE THE CONSTRUCTION OF FACILITIES AND INFRASTRUCTURE THAT WILL SUPPORT A MULTIPURPOSE MACHINE GUN RANGE

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

TYPICAL CROSS SECTION

NOT TO SCALE

APPLICANT:
FORT STEWART DPW

PROPOSED: WETLAND FILL

NEAREST WATERBODY: TAYLORS CREEK

COUNTY: LIBERTY

FIGURE: 5 OF 6

DATE: FEBRUARY 2010

CASE DOCUMENT FOR: QUALIFICATION TRAINING RANGE
APPLICATION NUMBER 200900886
FOR A DEPARTMENT OF THE ARMY PERMIT
BY
FORT STEWART ARMY INSTALLATION, SAVANNAH, GEORGIA

PART I - INTRODUCTION

A. NAME AND ADDRESS OF APPLICANT:

U.S. Army, Fort Stewart Army Installation
Directorate of Public Works
1550 Frank Cochran Drive, Bldg. 1137
Fort Stewart, Georgia 31414

B. APPLICATION NUMBER: 200900886

C. LOCATION OF PROPOSED ACTIVITY: The site is located at Fort Stewart, in Liberty County, Georgia. The site is located in the Delta Small Arms Range (in the vicinity of latitude 31º 55' 21" north and longitude 81º 43' 56" west). A location map is provided in Part VII of this document.

D. PROJECT DESCRIPTION: The Qualification Training Range (QTR) is a small caliber range used to train individual Soldiers on the skills necessary to detect, identify, and engage stationary and moving infantry targets in a tactical array. This range enhances throughput capability for units by consolidating their efforts to operating one live-fire training facility. Primary features of this range include 429 stationary infantry targets (SITs), 20 stationary armor targets (SAT)s, 20 moving infantry targets (MITs), 10 SIT emplacements with multiple targets, two 800-square-foot buildings, one ammunition breakdown building, one air-vault latrine, one covered mess facility, one 248-square-foot range operations tower, and covered bleachers with enclosure.

The applicant has not completed final site design for the above described range project. The standard site layout for this type of range would require the filling and/or mechanized clearing of all 26.7 acres of bottomland hardwood wetlands on the 223-acre project site. The applicant will likely be able to avoid some of the wetlands on the project site as final site design is completed for the project. However, for the purposes of this permit evaluation, the US Army Corps of

Engineers (USACE) will assume that all 26.7 acres of wetlands on the proposed project site would be impacted. In addition, the applicant's proposed wetland mitigation plan is to purchase 216.27 mitigation credits to offset unavoidable impact to 26.7 acres of wetlands.

E. BASIC PURPOSE AND NEED: The basic purpose of the proposed project is to provide active duty and reserve component units and Soldiers, who use the Installation as a training platform, with new facilities that are critical in the training of individual Soldiers in the basic live-fire tasks required to sustain combat readiness and proficiency. The Army Range Requirements Model (ARRM) substantiates that Fort Stewart has a requirement for a QTR to meet training requirements. Fort Stewart's existing ranges do not have the capacity required to sustain the level of throughput necessary to adequately train Soldiers and maintain readiness standards.

F. APPLICANT'S SUPPLEMENTAL INFORMATION: The following information is part of the administrative record for the project.

1. Project Narrative

2. Project Purpose and Need

3. Description of Resources Occurring within the Project Area, Potential Impacts, and Mitigation

4. Vicinity Map

5. Additional Studies and Response to Comments:

G. PROPOSED WORK SUBJECT TO THE JURISDICTION OF THE US ARMY CORPS OF ENGINEERS: The applicant proposes to perform work in, or affecting waters of the United States.

H. APPLICABLE STATUTORY AUTHORITY: The applicant is making application pursuant to Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344).

PART II - COORDINATION

A. JOINT PUBLIC NOTICE (JPN): On April 21, 2010, the United States Army Corps of Engineers Savannah District (USACE) issued a JPN on the proposed work. Copies of the notice were provided to federal, state, and local agencies and the public. The notice was also posted on USACE public web page.

B. RESPONSE TO JOINT PUBLIC NOTICE: A summary of the comments received in response to the Joint Public Notice is presented in Table 1 below.

Table 1. Summary of Comments

COMMENTOR	OBJECT	3(b) Y/N	NO OBJECT	NO OBJECT W/CONDITION	DATE
Federal Agencies					
1. National Marine Fisheries Services			X		05-24-10
2. US Environmental Protection Agency (EIS comments)				X	04-21-10
3. US Fish and Wildlife Service					*
State of Georgia					
4. State Clearing House					*
5. Coastal Resources Division, Federal Consistency					*
6. Environmental Protection Division					*
Other					
7. Southern Environmental Law Center - Ogeechee River Keeper				X	05-21-10

* No date indicates no comment received.

C. DISCUSSION OF RESPONSES:

1. National Marine Fisheries Service (NMFS): By letter dated May 24, 2010, the NMFS stated "Based on the information in the public notice, the proposed project would not occur in the vicinity of essential fish habitat designated by the South Atlantic Fishery Management Council or NMFS. Present staffing levels preclude further analysis of the proposed activities and no further action is planned. This position is neither supportive of nor in opposition to your authorization of the proposed work."

2. Environmental Protection Agency (EPA): There were no comments received pursuant the USACE Joint Public Notice dated April 21, 2010, from the EPA. However, Fort Stewart did receive comments and questions from the EPA Region 4, pursuant to the Draft Environmental Impact Statement (EIS) for Training Range and Garrison Support Facilities Construction and Operation at Fort Stewart, Georgia. The following are EPA comments relevant to the Section 404 permit notifications:

a. Issue 1: EPA is currently reviewing a joint public notice dated April 21, 2010, for four individual permits for four projects (DMPTR, IPBC, MPMGR and QTR) with a total of 185.9 acres of wetland impacts. This is a substantial level of wetland impacts, particularly in relation to recently permitted impacts throughout Georgia.

(1) Applicants Response: Fort Stewart avoids and minimizes wetlands impacts when possible. The implementation of the actions proposed in the preferred alternative (Alternative B Sitings) has the potential to negatively impact up to 0.2% of the Installation's nearly 91,000 acres of wetlands. More importantly, of the "up to 0.2% of the Installation's wetlands being impacted," most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement. As stated earlier in this reply, the Installation anticipates wetland impacts will be much less than projected through further avoidance and minimization incorporated during the design phases of each project after the site is selected. It is important to note, that despite the large amount of military training activity that occurs on Fort Stewart, because of the Installation's proactive efforts to avoid, enhance, and mitigate wetlands, its wetlands remain of a high quality, retaining and transmitting large amounts of fresh water and providing habitat for countless local species. Proactive environmental stewardship programs also help to keep our wetlands pristine. As discussed in opening paragraphs in Chapter 3 of the DEIS, Fort Stewart's

Integrated Training Area Management (ITAM) program conducts land rehabilitation through the construction of low water crossings and Soldier training related to sustainability of Fort Stewart lands.

Much of the avoidance and minimization takes place before actual site selection. Training ranges of this kind have fairly specific requirements and it is not always possible to build them without impacting every wetland in the footprint. Site designers may alter certain aspects of a proposed range in response to environmental concerns during various stages of the design process, typically reviewed at the 10%, 35%, 60%, 90%, and 100% stages of completion, if they can do so while still meeting the operational and training requirements of the range. For example, the currently on-going design process reduced the wetland impacts from the IPBC to a third of what they were at the time of writing the DEIS. Impacts from the MPMGR have also been slightly reduced. Several proposed range projects were sited without wetland impacts of any kind. It is hoped that impacts from the QTR and DMPTR may be reduced, but as they are not yet in the design process this cannot be precisely determined.

It is also important to note that not all of the 185.9 acres (now 179.03 acres) of wetlands will actually be cleared, grubbed, and/or filled. Rather, that is a maximum projected "up to" amount. The actual number of acres impacted will likely be reduced further at each design level for target placement, etc.). Therefore, although the "permitted impacts" of this project may seem large in relation to other recently permitted impacts in Georgia, they do not represent substantial impacts to Fort Stewart wetlands resources. This text has been added to Section 4.3.2.2 of the FEIS.

(2) <u>USACE Position</u>: The combined wetland impact associated with the four proposed range projects has been reduced from 185.9 acres to 179.03 acres. In addition, as these projects approach final design, combined wetland impacts are expected to be reduced further. With regard to the amount of proposed wetland impact for these four projects relative to projects recently permitted by the Savannah District, there have been residential, commercial and reservoir projects authorized within the past five years with impacts in excess of 100 acres.

Based on the extensive experience of the USACE in review of permit applications for project located in the lower coastal plain of Georgia, most sites are typically comprised by approximately thirty permit wetlands. Fort Stewart is typical of site in the lower

coastal plain and is also approximately thirty percent wetlands. Fort Stewart is the only military base with large range construction in Coastal Georgia. Proposed wetland impacts associated with the size of this proposed range are comparable to the wetland impacts associated with past range development on Fort Stewart.

a. Issue 2: EPA is particularly concerned that all impacts have been characterized as wetland impacts when two of the four projects show the potential for streams impacts on the 7.5-minute USGS topo quad maps. EPA notes that while the Fort has had a significant cumulative impact to streams from past projects, these impacts have not been mitigated.

(1) Applicants Response: The footprints of the MPMGR and IPBC on the 7.5-minute USGS topographic quads show "blue line" streams in the areas, however, a site visit by Fort Stewart and the Georgia Environmental Protection Division (GA EPD) on January 20, 2010, found no streams. The Savannah District also did not identify any streams within the range footprints. This information was added to Section 4.3.1, of the FEIS.

Over the years, Fort Stewart has worked diligently to mitigate impacts – direct and indirect, as well as cumulative – to the Installation's streams, as well as wetlands. During the development of the Installation's wetland bank, for example, thousands of feet of Canoochee Creek and Strum Bay were restored without being credited to the Installation's mitigation bank. The Installation takes pride in that fact and welcomes working with ORK and other local environmental stakeholders on future projects.

(2) USACE Position: The USACE has completed an expanded preliminary jurisdictional determination for the project site. This determination verified there are no jurisdictional streams located on the project site.

a. Issue 3: The FEIS should provide more discussion regarding the quality of the wetlands impacted. The DEIS mentions they're freshwater wetlands and that the Army has acquired mitigation credits to restore a historically but degraded hardwood wetland system. It is unclear what type of wetlands ecosystems are being impacted by the ranges and garrison proposed projects.

(1) Applicants Response: Surveys of the proposed range and garrison sites by Fort Stewart determined these ecosystems were predominantly broadleaf hardwood palustrine

wetlands consisting of vegetative communities typical of wetlands in the Coastal Plain: pond pine (Pinus serotina), pond cypress (*Taxodium ascendens*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), American hornbeam (*Carpinus caroliniana*), Highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occur with varying frequency depending on the landform and hydrology of particular areas. Animal communities are also supported by these areas – wading birds such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea herodias*), amphibians such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*), and mammals such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites. Soil types are hydric sand-loam mixtures of the Ellabelle, Bibb, Pelham, and Leefield types. Text reflecting this information was incorporated into Section 6.4.1 of the FEIS.

(2) USACE Position: The description of the wetlands proposed to be impacted, which was submitted by the applicant and summarized above, is sufficient for the USACE to base an assessment of the wetland quality. In addition, the USACE has made multiple visits to Fort Stewart and is very familiar with the quality of wetlands located within the proposed project site(s). The USACE used this information and its knowledge of wetland habitats on Fort Stewart in its assessment of proposed wetland impacts and the adequacy of the applicant's proposed mitigation plan.

a. Issue 4: EPA is unable to fully evaluate wetlands impacts, which is an area of CWA-designated responsibility for the Agency, in the DEIS because expanded CWA 404(b)(l) analyses have not been prepared for three ranges: FY 13 Modified Record Fire Range, FY 13 10/25 Meter Zero Range, and FY 14 Convoy Live Fire Range. This is a concern. EPA would like to review and comment on these analyses before they appear in the FEIS. Please coordinate with Bob Lord, Region 4's Wetlands Program to discuss further (note, that no comments were received from Bob Lord, Region 4's Wetland Program).

(1) Applicants Response: As we mentioned in Section 4.3.2.2. of the DEIS, the Installation has not prepared §404(b)(1) analyses for the FY13 MRFR, FY13 10/25 Meter Zero Range, and FY14 CLFR because some or all impacts to wetlands will likely

be avoided during the design phase of these projects. The wetlands located on these sites are less than 5 acres each. If, however, wetlands cannot be avoided, the Installation will prepare §404(b)(1) analyses for these projects and request a §404(b) permit at that time.

(2) USACE Position: Wetland impacts pursuant to the construction of the FY 13 Modified Record Fire Range, FY 13 10/25 Meter Zero Range, and FY 14 Convoy Live Fire Range have not been determined by Fort Stewart. When these proposed projects are sited and designs are complete, and if there are any proposed wetland impacts associated with them, Fort Stewart will apply for a Section 404 permit with the USACE. Any proposed wetland impacts will be evaluated at that time and coordinated through the USACE permit process. The USACE is preparing an analysis of the proposed IPBC, MPMGR, DMPTR and QTR pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for the IPBC, MPMGR, DMPTR and QTR projects.

a. Issue 5: The DEIS states that the Fort has a regional permit for low water crossings, issued in 2001 and renewed in 2006 for 5 years, which allows for a maximum of 15 acres of cumulative wetlands impacts from low-water crossings. Approximately 5 acres of wetlands have been impacted using this permit. The FEIS should discuss the application of the Fort's regional permit for low water crossings, which allows for a maximum of 15 acres of cumulative wetlands impacts from low-water crossings, how the cumulative wetlands impacts are defined, and the water quality impacts and other aquatic resources impacts associated with this permit.

(1) Applicants Response: Low water crossings are not a part of the proposed action and there are no new low water crossings anticipated in the foreseeable future. As discussed in Section 3.4.4.2, only routine maintenance and repair of existing low water crossings in the range and training areas will be conducted.

(2) USACE Position: As part of this document, the USACE has prepared a cumulative impact assessment of all known past, presently proposed, and reasonably foreseeable future impacts to aquatic resources. This assessment takes into consideration impacts associated with low water crossings.

a. Issue 6: EPA is concerned that the credit calculations using the Savannah District Standard Operating Procedure (SOP) do not fully compensate for the impacts. The Savannah District has frequently indicated to EPA that the SOP is not applicable to large impacts, such as those over 10 acres. EPA agrees and has proposed a scaling factor to address the cumulative impacts of large projects such as the factor used in the Charleston District SOP. This is the approach used by the Georgia Department of Transportation for its projects that exceed the 10 acre threshold. For very large projects this scaling factor could be capped at an appropriate level. EPA has suggested 3.0 acres, which is equal to the next largest factor used in the SOP. Application of the SOP without a scaling factor for large impacts, particularly the 108.1 acres for the MPMGR is not appropriate, even according to past finding from the Savannah District.

(1) Applicants Response: While a scaling factor may be appropriate to use in many large scale projects where a great deal of fill is being introduced into the wetland system and where the projects require large amounts of impermeable surfaces, neither of these considerations constitute significant components of any of the projects under consideration in the DEIS. Of this filled acreage only a small amount will include the introduction of impermeable surfaces. The only impermeable surfaces will consist of the range operations area and cover only 2% of each project footprint. As noted in Answer #1 above, while maximum projected "up to" amounts have been provided, most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement.

As a result, it is the Installation's position that use of any scaling factor is not necessary to compensate for the cumulative impacts associated with these types of projects and applying a scaling factor, as called for in the Charleston District's SOP, to these types of projects would appear to be arbitrary and capricious as it would not appear to be based on any sound engineering or hydrologic rational but would appear to be more punitive than compensatory in nature.

Moreover, the Installation always takes into account secondary wetland impacts. In reference to the MPMGR, which is the project that contains the majority of the 179.03 acres of wetlands to be potentially impacted, the Installation has evaluated potential secondary cumulative impacts. In our planning process, as noted above, the Installation took a "worst case scenario" approach when determining how to compensate for the quantity of wetlands loss. The Installation is planning to off-set secondary cumulative

wetland effects from this range and has obtained an additional 287 mitigation credits from the Wilkinson-Oconee Bank. The Installation did account for the lost functions and values impacted by the project with respect to direct and indirect impacts.

As noted in Sections 3.4.5 and 4.3.2, the Savannah District is a cooperating agency to this EIS, and was consulted with regard to the factors noted above. Additionally, Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Having reviewed these documents and the associated 404(b)(1), the Savannah District did not suggest a need to utilize a scaling factor.

(2) USACE Position: The present total proposed wetland impact for the four proposed ranges is 179.03 acres. As discussed by the applicant above, not all of these proposed impacts are for fill, but a certain percentage would involve mechanized land clearing impacts. Clearing wetlands of vegetation and maintaining them in scrub/shrub vegetation results in a change in function, but not a total loss in function. The mitigation credits proposed by Fort Stewart are assuming a total loss in function. The proposed mitigation plan is to purchase 1,391credits to compensate for a total of 179 acres of wetland impact for all four ranges. This is a credit to impact ratio of 7.8:1. On average, three credits are generated for each acre of wetland restoration at the Wilkinson/Oconee Mitigation Bank, where credits will be purchased for the FY11 ranges. Therefore, the effective mitigation ratio for the FY11 Multipurpose Machine Gun Range and FY11 Infantry Platoon Battle Course projects would be approximately 2.6:1 of wetland restoration. The Applicant has not ruled out other acceptable compensatory mitigation alternatives to mitigate wetlands impact (provided through mitigation banks or in-lieu fee programs) for the FY13 Digital Multipurpose Training Range and the FY13 Qualification Training Range. Therefore, it is the position of the USACE that the mitigation proposed for this QTR project would meet the requirements of the new mitigation rule.

a. Issue 7: The DEIS indicates that approximately one-third of the Fort's lands are wetlands. It also states some of the remaining 160 credits contained in the Fort's on-site mitigation bank will be used for the Garrison construction projects. Additionally, the Army has previously purchased credits from an established off-Fort wetland mitigation bank in accordance with the Compensatory Mitigation Rule (33 CFR Part 332) to cover the proposed range projects. The Fort canvassed the available mitigation banks nearly one year ago, which may not reflect the current banks and credit availability. Given the

opportunity, EPA would have discouraged the use of the Wilkinson - Oconee Mitigation Bank since it is out of the watershed, out of the ecoregion, and likely does not fully compensate for the functions lost at the project sites. EPA is also concerned, despite the rationale provided in the DEIS, that the Fort is not fully debiting its own mitigation bank before going to off-site alternatives. The Fort's mitigation bank is within the same watershed and ecoregion and thus more likely to replace the lost wetland functions. There appears to be ample time to expand this bank to accommodate the future needs presented as a reason for not fully using it for these projects. Typically, EPA discourages applicants from purchasing mitigation credits until the Section 404 permit has been issued, because this precludes other, possibly preferable, mitigation actions.

(1) Applicants Response: Although the Fort Stewart mitigation bank has sufficient credits to offset impacts from the two Garrison support construction projects, the Army has determined it is not sufficient to cover the unavoidable negative impacts to wetlands from the FY11-14 training range construction projects, for which the Installation must purchase credits from an off-site wetlands mitigation bank. The remaining acres within the Installation wetland bank allows Commanders to respond to emergency range training requirements, which surface from "In Theater" conditions and scenarios, or award Congressional Garrison or training additions that must be executed by Fort Stewart within one year or less. If Commanders did not have this flexibility, Installation projects with unavoidable wetland impacts would be cancelled or held up in significant delays awaiting Congressional funding to purchase "off-Post" wetland credits.

As discussed in Chapter 6 of the DEIS, despite the physical distance between the Wilkinson - Oconee Bank (WOB) restoration area and Fort Stewart, looking at the choice from a more holistic watershed perspective shows that the two locations are rooted in an interconnected complex of wetlands and open water bodies. The WOB wetlands were determined to be an ecologically acceptable replacement for the small portion of Fort Stewart wetlands impacts due to the proposed action. Hydrologic and habitat wetland functions will remain unimpaired.

At the time the credits were purchased, there were no other readily available mitigation banks open in the primary service area with the quantity and quality of credits needed to cover the Installation's projected needs. The Federal appropriations process did not provide the Installation with the flexibility to wait until Section 404 permits were issued to initiate the required solicitation process to purchase the credits without putting the

funding for the specific FY 2011 range projects in jeopardy. As part of the Installation's standard procurement processes, market research is conducted in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11.

For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs). For instance, the Installation is actively seeking opportunities to incorporate off-site compensatory mitigation projects into its private lands conservation initiatives in partnership with the Georgia Land Trust and will continue to do so to further provide compensatory mitigation within the primary service area and watershed. Under the Savannah District's SOP, the Wilkinson-Oconee Bank (WOB) is grandfathered as a pre-existing bank created prior to the Compensatory Mitigation Final Rule (please refer to Answer 9 below). As such, the WOB is an acceptable mitigation alternative that is in full compliance with the policy and purpose of mitigation required by the CWA, the Savannah District SOP, and the Compensatory Mitigation Final Rule. The information contained in this answer has been added to Section 6.4.1.1 of the FEIS.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. At the time of the pre-application meeting, the USACE agreed to allow the applicant to purchase credits from the secondary mitigation zone of the Wilkinson-Oconee Bank, which was the only bank with available credits. The agreement was made with the applicant in order to allow them time to procure funds necessary to provide mitigation when needed. The on-base Pond Four Mitigation Bank will be used to mitigate smaller on-post projects in the future that would likely be on a short time-line for planning, permitting and construction. The Army procurement process takes too long to allow for the purchase of mitigation credits for these small, short, time-line projects. Therefore, the USACE agrees with the applicant to save Pond Four credits for these future small projects.

a. Issue 8: EPA disagrees with the statement that applying for a CWA Section 404 permit is a minimization of wetlands impacts. The DEIS states "While the Army strives to avoid negative impacts to wetlands when it sites new range and training facilities on

Fort Stewart, if impacts to regulated wetlands cannot be avoided, the Army minimizes those impacts by applying for a Section 404 permit as required by the Clean Water Act. CWA 404 requires a permit for any dredge and fill impacts to jurisdictional waters, including wetlands. The CWA is a regulatory requirement, not a mitigation option. The FEIS should clarify this misrepresentation of CWA Section 404 permit program as a form of mitigation.

(1) Applicants Response: The information in the text and tables, located in Section 6.4.3 of the FEIS, has been edited to identify more accurately and clearly the differences between what is a required measure, such as a regulatory permit, and what is a mitigation option.

(2) USACE Position: The applicant made the suggested correction.

a. Issue 9: The DEIS discusses wetlands compensatory mitigation in context of NEPA-required mitigation when it should also discuss how the proposed mitigation meets the requirements of the Compensatory Mitigation for Losses of Aquatic Resources Final Rule. NEPA requires that to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analyses and related surveys and studies required by the Fish and Wildlife Coordination Act, the National Historic Preservation Act of 1966, the Endangered Species Act of 1973, and other environmental review laws and executive orders. The Compensatory Mitigation for Losses of Aquatic Resources Final Rule is considered to be a relevant "other environmental review law" as it is one of the CWA Section 404 implementing regulations. The FEIS should discuss and apply the Final Rule in its wetlands mitigation discussion.

(1) Applicants Response: The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR. Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Section 6.4.1.1 of the FEIS has been revised to clearly explain that a mitigation decision has not yet been made for the FY13 QTR and the FY13 DMPTR. For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs). Similar to the process outlined in the Compensatory Mitigation Rule, the

Installation's standard procurement processes conducts market research in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary and secondary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11.

According to 33 CFR 332, *Compensatory Mitigation for Losses of Aquatic Resources*, mitigation bank credits may be used if the project is in the service area of a mitigation bank. Section 332.3 (b)(2) has a description of why mitigation bank credits are acceptable in compensating for wetland impacts:

"Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable." Fort Stewart followed these requirements during the development of its mitigation plan.

(2) <u>USACE Position</u>: See USACE Position on USEPA issue 7 above.

a. <u>Issue 10</u>: While EPA does not expect the precise replication of all wetlands adversely impacted by the proposed action, the FEIS should explain how the proposed mitigation will adequately compensate for lost wetland functions and values such that it results in no net loss of wetland functions and values. This discussion is absent from the DEIS. Furthermore, since the U.S. Army Corp of Engineers (USACOE) cannot issue a CWA 404 permit if there is a less damaging practicable alternative, the FEIS should discuss compliance with this provision.

(1) Applicants Response: The wetlands in the Wilkinson-Oconee Bank (WOB) are "in-kind" to the wetlands on Fort Stewart. Consistent with the fact that both areas are on Georgia's Coastal Plain, wetlands within the WOB are very similar to those slated for impact by the proposed Fort Stewart range projects. Surveys of the proposed range sites by Fort Stewart determined that dominant vegetation communities consist of plants typical of wetlands in the Coastal Plain: mixtures of pond and bald cypress (*Taxodium ascendensand distichum, respectively*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), privet (*Ligustrum sinense*), American hornbeam/ironwood (*Carpinus caroliniana*), highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occur with varying frequency depending on the landform and hydrology of particular areas, and essentially identical communities with similar distribution are found in the Wilkinson-Oconee's Mitigation Bank. Animal communities also supported by these areas are: wading birds, such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea Herodias*); amphibians, such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*); and mammals, such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites, and have been similarly reported in the Wilkinson-Oconee area. The American alligator (*Alligator mississippiensis*) is common throughout Fort Stewart and has also been observed at Wilkinson-Oconee. The locally endangered Wood Stork *Mycteria Americana* can also be found at both locations (though they are not expected to be impacted by the proposed projects).

Soil types were also consistent between the two areas. The Ellabelle, Bibb, Pelham, and Leefield types predominated in the proposed project areas. Analyses of the Natural Resources Conservation Service profiles show these to be comparable to the Chewacla, Chastain and Congaree soils which cover the Wilkinson-Oconee area. All are characterized by loamy surface layers and clayey or loamy subsoils, and all soils are on the National Hydric Soils list.

Although the area of the Coastal Plain in which the Wilkinson-Oconee area is situated features more relief than that of Fort Stewart, the specific area of the restoration situated as it is in the Oconee River floodplain, is flatter than the surrounding general topography,

resulting in a similar hydrologic profile to Fort Stewart. The bottomland hardwood wetland systems found at both locations share the typical functions of holding temporary storage surface water, maintenance of characteristic subsurface hydrology, removal and sequestration of elements, retention of particulates, export of organic carbon, maintenance of characteristic plant community, and habitat for wildlife. Based on this comparison, despite the distance between the two areas, wetlands on Fort Stewart and at the Wilkinson-Oconee restoration area are very similar and, therefore, their use for mitigation fully supports the requirement for "no net loss". Text reflecting this information was incorporated into Section 6.4.1.1 of the FEIS.

(2) USACE Position: As discussed above, the mitigation proposed by the applicant would comply with the new mitigation rule. The USACE is preparing an analysis of the proposed project pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for this proposed project. This analysis would also confirm that the final proposed site development plan for this range, as well as the other three ranges being reviewed, was the least environmentally damaging practicable alternative that would meet the basic project purpose.

a. Issue 11: The DEIS states that the USACOE documents approximately 1,467,774 acres of wetlands impacted within 20 Georgia counties and by deducting 1,982.87 acres of wetlands impacts since 1990 there are at least 1,465,791.13 acres of wetlands remaining. According to the DEIS, this amounts to a loss of 0.14% of wetlands since 1990 - an insignificant amount." It is unclear if the USACOE document referenced in the DEIS is referring to the 1,467,774 acres of wetlands as being impacted in the 20 Georgia counties or existing (un-impacted) wetlands in these counties. This paragraph needs to be clarified in the FEIS.

(1) Applicants Response: There are 1,467,774 existing acres of existing wetlands within the 20 Georgia counties referenced, of which 1,465,791.13 acres of wetlands are un-impacted. This is how the Installation calculated a loss of 0.14% of wetlands since 1990 and the determination of "insignificant" derived. Text clarifying this information was incorporated into Section 5.3.3.2 of the FEIS.

(2) USACE Position: Fort Stewart corrected the FEIS, and clarified the information

that EPA questioned.

3. US Fish and Wildlife Service (USFWS): No comments received. The US Army, Fort Stewart is the lead federal agency for this proposed action and has completed consultation with the USFWS. The Final Biological Opinion can be found in Appendix B of the FEIS.

4. Georgia State Clearinghouse: By memorandum dated June 8, 2010, the Georgia State Clearinghouse stated that the request has been found to be consistent with state goals, policies, plans, objectives, and programs, with which the state is concerned.

5. Georgia Department of Natural Resources, Coastal Resource Division (Georgia CRD): No comments were received from Georgia CRD. However, this office must certify that the project is consistent with the Georgia Coastal Management Program prior to the USACE completing its review of the subject application.

6. Georgia Department of Natural Resources, Environmental Protection Division (Georgia EPD): No comments were received from Georgia EPD. Fort Stewart is in consultation with the Georgia Environmental Protection Division regarding a water quality certification pursuant to Section 401 of the Clean Water Act. The USACE would include a copy of the 401 water quality certification with any permit issued. In addition, the special condition of any permit issued would require the permittee to adhere to the conditions of the 401 water quality certification.

7. Southern Environmental Law Center (SELC): By letter dated May 21, 2010, the SELC provided the following comments on behalf of the Ogeechee Riverkeeper, Inc. (ORK):

a. Issue 1: The applicant's alternatives analysis in the DEIS includes alternative COA 3 which is a "heavily utilized" existing multipurpose range complex (MPRC) (*Fort Stewart note: the range proposed for construction is actually a Digital Multi-Purpose Training Range, or DMPTR*). DEIS, Appendix D at 10. This, of course, begs the question as to why the Applicant is including as an alternative a site that could never be used even if it determined that the site would have fewer environmental impacts. Alternative COA 3 is not a practicable alternative at all.

(1) Applicants Response: Transforming the existing MPRC was an option legitimately considered as a practical alternative but rejected due to current and expected

military operations and training demands. Transforming the existing MPRC and other operational ranges will remain a consideration on future range projects as the types of military training and weapon systems evolve over time and possibly render older ranges obsolete. An example of this is the COA 1 for the DMPTR, which involves the transformation of another existing range, Red Cloud Foxtrot. In siting the DPMTR over top of an existing range, we are attempting to minimize and avoid the wetland impacts that would be associated with constructing the DPMTR elsewhere on Fort Stewart.

(2) USACE Position: Given the amount of development on the base as a whole, the re-use of an existing range should be considered as a potential alternative. The elimination of alternatives as not being practicable is a standard part of the Section 404(b)(1) Guidelines.

b. Issue 2: The other alternative which the Applicant examined yielded wetlands impacts of 240 acres. It is difficult to accept that there were no other practicable alternatives at Fort Stewart for this proposed range. Two-hundred forty acres is more than the combined wetlands impacts of all four of the proposed ranges.

(1) Applicants Response: Based on the Installation's location in a relatively flat coastal plain and the location of pre-existing military training ranges and facilities on high ground, impacts to 240 acres of wetlands to build a new 995 acre range is not beyond the realm of reasonable consideration as a viable alternative. The fact that wetland impacts in the preferred alternative are less than five percent of the overall range size demonstrates the Installation's efforts to avoid and minimize wetland impacts associated with the siting of new military ranges and training facilities. Army Installations, including Fort Stewart, must maintain their training lands to fully sustain mission requirements for national security. The way the Army does this is through its master planning process. It is important to note that the Installation's planning efforts to minimize wetland impacts begins with attempts to select a site with the least amount of wetlands. At this point in the planning process, the range design is limited to placement on site of a footprint of the proposed range. This footprint shows the maximum number of wetland impacts and that is why we state "up to" so many acres; however, once a final site is selected, further attempts are made to avoid and minimize negative impacts to wetlands inside the range footprint through the range design process.

The final range design cannot be prepared prior to a site being selected. Also, despite

Fort Stewart's large size, much of its lands are already committed to other training, recreational, and environmental activities. Maneuver and dismounted maneuver training areas occupy large portions of the Installation, where the integration of large firing ranges is not suitable. The west side of the Installation is devoted to maneuver training and, in its entirety, is necessary to meet Brigade mission training requirements. Maneuver training is necessary in upland areas to reduce wetland impacts resulting from heavy wheeled and tracked military vehicles, as well as to avoid vehicles from getting stuck in wet areas. The southeast side of the Installation is devoted to dismounted maneuver training (i.e. training on foot) and also contains a wooded recreational area for campers. More than 100,000 acres are devoted to the restoration and management of environmentally sensitive areas, such as habitat for threatened and endangered species (including the red-cockaded woodpecker (RCW) and gopher tortoise) and wetlands.

During the planning process for the FY13 DMPTR, which Fort Stewart initiated in 2006, the Installation developed a total of eight siting alternatives. This process allowed both operational and environmental aspects, including impacts to wetlands, to be thoroughly analyzed in a collective manner by members of the Installation's Environmental Division, Range Control Division, and Master Planning Division. As the analysis progressed, these siting alternatives were ranked using screening criteria, as discussed in Chapter 2, *Description of the Proposed Action and Alternatives*, of the FEIS. Minimization of environmental impacts, including wetlands, was a factor in which alternatives were considered viable and which were not. One DMPTR discounted alternative, not discussed in the FEIS, contained 673 acres of wetlands impact. Another site, also not considered any further, contained 313 acres of wetland impact and would have resulted in the elimination of 683 acres of RCW habitat (compared to an RCW habitat loss of 22.4 acres and 31 acres as a result of Alternatives B and C, respectively). Even though these eliminated sites were operationally viable, they were removed from consideration after environmental impacts were determined to be significant.

(2) <u>USACE Position</u>: There are variety of safety, noise, and other constraints that limit where a live fire range could be located on Fort Stewart. The Army is the "expert" for siting ranges and conducted an intensive alternatives analysis for locating this, and the other three range projects; to avoid wetland impacts, while meeting other site constraints. The Section 404(b)(1) analysis to be prepared for this action will fully address this issue.

c. <u>Issue 3</u>: Multi Purpose Machine Gun Range (MPMGR). As an alternative for

this range, the Applicant proposed course of action (COA) 5 which would have yielded wetlands impacts of less than 9 acres had it been chosen as the preferred alternative. However, the Applicant eliminated this alternative because it emerged as the preferred alternative for DMPTR. As such, COA 5 should not be discussed as a viable alternative for the MPMGR.

(1) Applicants Response: As a large military training and deployment complex, Fort Stewart must examine and analyze the cumulative effects of all its proposed ranges within its training platform as constrained by the Installation borders, adjacent and associated training facilities, and surface danger zones relative to one another. This analysis is in addition to examining other resources, such as wetlands, to optimize training while minimizing the overall impact to our environment. The decisions made on the siting of each range and what are practical alternatives are inherently intertwined and interdependent. This may not have been reflected well in Section 404 permit applications, but is more fully explained in Section 6.4.1.1 of the FEIS. The possibility remains that the MPMGR could be selected to occupy that site currently under consideration for the DMPTR if the DMPTR is ultimately selected to occupy another site.

Also, many other impacts, in addition to wetland impacts, are examined and analyzed in the siting of new ranges and training facilities, including other environmental factors (such as threatened and endangered species) and non-environmental factors (such as the impact the site has on the ability to conduct timely and realistic military training based on current threats to our nation's armed forces when engaged in combat or peace keeping operations overseas). Both the MPMGR and DMPTR were approved for funding, and as has been noted, COA 2 for the DMPTR would have carried a level of wetland impact even greater than the current impacts from both the MPMGR and the DMPTR. Given the many constraints (see Appendix D for siting criteria) at play in siting both ranges, the preferred COAs for the two ranges were seen as a necessary compromise for ensuring all needed ranges are built and military training requirements met.

(2) USACE Position: See discussion for SELC issue 2 above.

d. Issue 4: Notwithstanding the above, the Applicant needs to more adequately explain why it did not select COA 5 as the preferred alternative for MPMGR considering it would have reduced the wetlands impacts from 116.7 acres down to 9 acres.

(1) Applicants Response: Unfortunately, it would not be possible to ignore the fact that the site was already selected as the preferred site for the DMPTR, as suggested. Two independently proposed ranges cannot have the same preferred site. The Installation agrees that nine acres of impact for a 250-acre range is far more desirable than 116.7 acres of wetland impacts (which we now have down to 103.3 acres); however, wetlands impacts for this specific range were only one factor examined and analyzed in selecting this site as the preferred alternative. Selection of this site as the preferred alternative helps the Installation's ability to avoid and minimize the overall and cumulative impacts to all wetlands associated with planned or reasonably anticipated range construction, as reflected in Sections 4.3.2, 5.3.3.2, and 6.4.1 of the FEIS.

(2) USACE Position: See discussion for SELC issue 2 above.

e. Issue 5: Qualification Training Range (QTR). For this proposed range, the Applicant discusses but then rules out COA 3, which would have less wetlands impacts than the Preferred Alternative B. The Applicant rules out this alternative site because it is the proposed location for a future Modified Record Fire (MRF) range, which is not before the Corps at this time. Again, given the significant size of Fort Stewart, alternatives for one range should not be eliminated for future potential ranges, or, such a site should never be discussed as an alternative. The Applicant is required under the Section 404(b)(1) guidelines to indentify "practicable alternatives," not alternatives that could never be chosen regardless of how favorable they might be from an environmental standpoint.

(1) Applicants Response: Again, as a large military training and deployment complex, Fort Stewart must examine and analyze the cumulative effects of all its proposed ranges within its training platform as constrained by the Installation borders, adjacent and associated training facilities, and surface danger zones relative to one another. This analysis is in addition to examining other resources, such as wetlands, to optimize training while minimizing the overall impact to our environment. The decisions made on the siting of each range and what are practical alternatives are inherently intertwined and interdependent. This may not have been reflected well in Section 404 permit applications; but is more fully explained in the FEIS. One reason the COA 3 was deemed unsuitable was the fact the site is currently an operational range that is projected for reuse or transformation as a future MRF range. While Fort Stewart has a large land

mass, much of its land mass is not environmentally or operationally suitable for range construction or for a number of considerations. Although significant, wetland impacts are only one of several significant factors considered when examining the suitability for siting of a range. The remaining lands that are suitable for future range construction are limited because the best locations are currently being used to capacity as military ranges or training areas. The Installation contains many sensitive resources, such as wetlands and protected species habitat, which limit the locations suitable for constructing new military training ranges that are capable of maximizing military training while minimizing environmental impacts. Because of the operational impacts examined and analyzed when siting ranges, and because the Installation was able to minimize impacts and mitigate those that did occur, the decision was made to retain the COA 3 site for a future project. The alternative was practicable but was not chosen in this instance.

(2) USACE Position: See discussion for SELC issue 2 above.

f. Issue 6: Inadequate Mitigation. Ogeechee Riverkeeper (ORK) is concerned with several flaws in the Application's proposed mitigation measures. Considering the Project's significant destruction and alteration of wetlands, it is imperative that the value and functions of wetlands on Fort Stewart are mitigated. ORK shares the concerns expressed by the Environmental Protection Agency (EPA) in its comments on the Draft Environmental Impact Statement dated May 14, 2010. First, the Applicant's usage of the Savannah District's Standard Operating Procedure (SOP) for calculation of mitigation credits is inconsistent with the district's position that the SOP should not be applied to projects with large wetlands impacts. Given the Project's substantial wetlands impact of 190 acres, we urge the Corps to apply the SOP, but do so with a scaling factor to address the cumulative impact of the Project, an approach that is followed by the Charleston District. The Applicant's use of the SOP without a scaling factor will not successfully and adequately replace the lost functions and values of wetlands impacted by the Project.

(1) Applicants Response: The implementation of the actions proposed in the preferred alternative (Alternative B Sitings) has the potential to negatively impact up to 0.2% of the Installation’s nearly 91,000 acres of wetlands. More importantly, of the up to 0.2% of the Installation’s wetlands being impacted, most of those impacts are not the result of adding fill to the wetlands, and as stated earlier, the Installation anticipates wetland impacts will be much less than projected through further avoidance and minimization incorporated during the design phases of each project after the site is

selected. It is important to note, that despite the large amount of military training activity that occurs on Fort Stewart, because of the Installation's proactive efforts to avoid, enhance and mitigate wetlands, its wetlands remain of a high quality, retaining and transmitting large amounts of fresh water and providing habitat for countless local species.

While a scaling factor may be appropriate to use in many large scale projects where a great deal of fill is being introduced into the wetland system and where the projects require large amounts of impermeable surfaces, neither of these considerations constitute significant components of any of the projects under consideration in the FEIS. Of this filled acreage only a small amount will include the introduction of impermeable surfaces. The only impermeable surfaces will consist of the range operations area and cover only 2% of each project footprint. As noted above, while maximum projected "up to" amounts have been provided, most of those impacts are not the result of adding fill to the wetlands, but rather vegetative maintenance for line-of-sight and grubbing/grading for target placement. This information is located in Section 4.3.2.2.

As a result, it is the Installation's position that use of any scaling factor is not necessary to compensate for the cumulative impacts associated with these types of projects and applying a scaling factor, as called for in the Charleston District's SOP, to these types of projects would appear to be arbitrary and capricious as it would not appear to be based on any sound engineering or hydrologic rational but would appear to be more punitive than compensatory in nature.

Moreover, the Installation always takes into account secondary wetland impacts. In reference to the MPMGR, which is the project that contains the majority of the 190 acres (now 179.03 acres) of wetlands to be potentially impacted, the Installation has evaluated potential secondary / cumulative impacts. In our planning process, as noted above, the Installation took a "worst case scenario" approach when determining how to compensate for the quantity of wetlands loss. The Installation is planning to off-set secondary / cumulative wetland effects from this range and has obtained an additional 287 mitigation credits from the Wilkinson-Oconee Bank. The Installation did account for the lost functions and values impacted by the project with respect to direct and indirect impacts.

As noted in Sections 3.4.5 and 4.3.2 of the FEIS, the Savannah District is a cooperating agency to this EIS, and was consulted with regard to the factors noted above.

Additionally, Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Having reviewed these documents and the associated 404(b)(1), the Savannah District did not suggest a need to utilize a scaling factor.

(2) USACE Position: The USACE does not require the usage of the Savannah District's Standard Operating Procedure (SOP) for calculation of mitigation credits for projects of this size. The USACE does not use any scaling factor in association with the USACE SOP. The present total proposed wetland impact for the four proposed ranges is 179.03 acres. As discussed by the applicant above, not all of these proposed impacts are for fill, but a certain percentage would involve mechanized land clearing impacts. Clearing wetlands of vegetation and maintaining them in scrub/shrub vegetation results in a change in function, but not a total loss in function. The mitigation credits proposed by Fort Stewart are assuming a total loss in function. The proposed mitigation plan is to purchase 1,391credits to compensate for a total of 179 acres of wetland impact for all four ranges. This is a credit to impact ratio of 7.8:1. On average, three credits are generated for each acre of wetland restoration at the Wilkinson/Oconee Mitigation Bank, where credits will be purchased for the FY11 ranges. Therefore, the effective mitigation ratio for the FY11 Multipurpose Machine Gun Range and FY11 Infantry Platoon Battle Course projects would be approximately 2.6:1 of wetland restoration. The Applicant has not ruled out other acceptable compensatory mitigation alternatives to mitigate wetlands impact (provided through mitigation banks or in-lieu fee programs) for the FY13 Digital Multipurpose Training Range and the FY13 Qualification Training Range. Therefore, it is the position of the USACE that the mitigation proposed for this QTR project would meet the requirements of the new mitigation rule.

g. Issue 7: Second, the Applicant's choice of the Wilkinson-Oconee Mitigation Bank conflicts with the policy and purpose of mitigation required by the CWA. Under the Corp’s regulation, the Applicant's "compensatory mitigation should be located within the same watershed as the impact site ...." 33 C.F.R. § 332.3. The purpose of this rule is to preserve and maintain water resources within a watershed, and ensure that wetlands lost are compensated by wetlands with similar characteristics, values, and functions. The Application, however, proposes mitigation outside of Fort Stewart and in another

watershed at the Wilkinson-Oconee Mitigation Bank. This choice not only conflicts with the Corps' policy but also ignores the available 160 credits contained in Fort Stewart's on-site mitigation bank. ORK believes that the Corps should require the Applicant's use of the on-site mitigation.

(1) Applicants Response: Mitigation credits generated from the on-Post compensatory mitigation bank are not being used because there are insufficient credits available to satisfy requirements associated with the projects and the Installation needs to retain the few credits remaining for potential use to compensate for last minute and unanticipated Congressional add-on projects that occur on the Installation on a not-infrequent basis. Regarding use of mitigation banks, the Compensatory Mitigation for Losses of Aquatic Resources Final Rule states, "In many cases, the environmentally preferable compensatory mitigation may be provided through mitigation banks or in-lieu fee programs because they usually involve consolidating compensatory mitigation projects where ecologically appropriate, consolidating resources, providing financial planning and scientific expertise (which often is not practical for permittee-responsible compensatory mitigation projects), reducing temporal losses of functions, and reducing uncertainty over project success." The rule then lists types of compensatory mitigation measures in order of preference. The rule states that "[in] general, the required compensatory mitigation should be located within the same watershed as the impact site." But mitigation bank credits may be used if the project is in the service area of the bank. Section 332.3 (b)(2) has a description of why mitigation bank credits are given in the regulation:

"Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee

programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable." Fort Stewart followed these requirements during the development of its mitigation plan.

Under the Savannah District's SOP, the Wilkinson-Oconee Bank is "grandfathered" as a pre-existing bank created prior to the Compensatory Mitigation Final Rule. As such, the Wilkinson-Oconee Bank is an acceptable mitigation alternative that is in full compliance with the policy and purpose of mitigation required by the CWA, the Savannah District SOP, and the Compensatory Mitigation Final Rule. Fort Stewart's use of the Wilkinson-Oconee Bank as mitigation for the proposed FY11 range projects was fully coordinated with the Savannah District, which was a cooperating agency on the EIS.

The wetlands in the Wilkinson-Oconee Bank are "in-kind" to the wetlands on Fort Stewart. Consistent with the fact that both areas are on Georgia's Coastal Plain, wetlands within the Wilkinson-Oconee are essentially identical to those slated for impact by the proposed Fort Stewart range projects. Surveys of the proposed range sites by Fort Stewart determined that dominant vegetation communities consist of plants typical of wetlands in the Coastal Plain: mixtures of pond pine (Pinus serotina), pond cypress (*Taxodium ascendens*), water oak (*Quercus nigra*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), loblolly bay (*Gordonia lasianthus*), green ash (*Fraxinus pennsylvanica*), American hornbeam (*Carpinus caroliniana*), Highbush blueberry (*Vaccinium corymbosum*), fetterbush lyonia (*Lyonia lucida*), and sweetbay (*Magnolia virginiana*) among many others including varied herbs and grasses. These plants occurr with varying frequency depending on the landform and hydrology of particular areas, and essentially identical communities with similar distribution are found in the Wilkinson-Oconee's Mitigaiton Bank. Animal communities also supported by these areas are: wading birds, such as the Great Egret (*Casmerodius albus*), the Snowy Egret (*Egretta thula*), and the Great Blue Heron (*Ardea Herodias*); amphibians, such as the Bullfrog (*Rana catesbeiana*) and Wood Frog (*Rana sylvatica*); and mammals, such as the Whitetail Deer (*Odocoileus virginiana*) were all observed during the surveys of the range project sites, and have been similarly reported in the Wilkinson-Oconee area.

Soil types were also consistent between the two areas. Hydric sand-loam mixtures of the Ellabelle, Bibb, Pelham, and Leefield types predominated in the proposed project areas. Analyses of Natural Resources Conservation Service profiles show these to be comparable to the Chastain and Congaree soils which cover the Wilkinson-Oconee area.

All soils are on the National Hydric Soils list. Although the area of the Coastal Plain in which the Wilkinson-Oconee area is situated features more relief than that of Fort Stewart, the specific area of the restoration is flatter than the surrounding general topography, resulting in a similar hydrologic profile to Fort Stewart. The bottomland hardwood wetland systems found at both locations share the typical functions of holding temporary storage surface water, maintenance of characteristic subsurface hydrology, removal and sequestration of elements, retention of particulates, export of organic carbon, maintenance of characteristic plant community, and habitat for wildlife. Based on this comparison, despite the distance between the two areas, wetlands on Fort Stewart and at the Wilkinson-Oconee restoration area are very similar and, therefore, their use for mitigation fully supports the requirement for "no net loss". Text reflecting this information was incorporated into Section 6.4.1.1 of the FEIS.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. At the time of the pre-application meeting, the USACE agreed to allow the applicant to purchase credits from the secondary mitigation zone of the Wilkinson-Oconee Bank, which was the only bank with available credits. The agreement was made with the applicant in order to allow them time to procure funds necessary to provide mitigation when needed. The on-base Pond Four Mitigation Bank will be used to mitigate smaller on-post projects in the future that would likely be on a short time line for planning, permitting and construction. The Army procurement process takes too long to allow for the purchase of mitigation credits for these small, short-time-line projects. Therefore, the USACE agrees with the applicant to save Pond Four credits for these future small projects.

h. Issue 8: Before seeking compensatory mitigation in a different watershed, the Applicant should explore the use of existing and new mitigation banks in Ogeechee River Watershed. According to the DEIS's evaluation of mitigation banks in 2009, the Ogeechee River/Margin Bay and Black Creek Banks may now have available credits. DEIS at 6-8. Also, given the significant amount of wetlands within the boundaries of Fort Stewart as well as Fort Stewart's experience in the creation of mitigation banks, the Corps should require the Applicant to take a hard look at a potential onsite mitigation bank that would ensure the compensation of the wetlands' lost values and functions.

(1) Applicants Response: Existing and new mitigation banks within this watershed

were not available at the time Fort Stewart was required to begin planning for the required wetlands credit acquisition for its FY 2011 range projects with known and/or anticipated wetlands impacts (see answer to Issue #9, below, for additional details). On-site wetlands mitigation was not a viable option because, as discussed in Section 5.3.3.2 of the FEIS, although Fort Stewart has an existing mitigation bank and an on-site wetlands restoration project, it is running out of new places where additional on-site mitigation can be conducted. If credits are available in the primary service area in the future, however, then Fort Stewart will work to try and obtain these credits, in accordance with the Compensatory Mitigation Rule For Losses of Aquatic Resources (33 CFR 332) and the Federal Acquisition Regulation. For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs).

After exploring and selecting reasonable site alternatives for the proposed FY11-FY14 range projects, the Installation determined that the last remaining on-site mitigation bank (Pond 4) could not support the wetland mitigation requirements for these facilities and sustain itself for mitigation of proposed and future garrison construction, and other unplanned projects that arise out of mission changes. The remaining acres within the Installation Wetland Bank allows Command to respond to emergency range training requirements which surface from "In Theater" conditions and scenarios, or award Congressional garrison or training additions that must be executed by Fort Stewart within one year or less. If Commanders did not have this flexibility, Installation projects with unavoidable wetland impacts would be cancelled or held up in significant delays awaiting Congressional funding to purchase "off-Post" wetland credits.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. The credits purchased were in the secondary service area of the Wilkinson-Oconee Bank which was the only bank with available credits. The on base Pond Four Mitigation Bank would not have enough acreage needed for these projects. Fort Stewart has conducted an in-depth review of potential wetland mitigation sites on the base and is in the process of developing additional areas connected to the existing Pond Four Mitigation Bank; however, no additional mitigation is available at this time.

h. Issue 9: The Applicant's proposed mitigation plan is based on mitigation credits

purchased a year ago from the Wilkinson-Oconee Bank which was the "only bank that provided an offer to the solicitation...." DEIS at 6-8. It is our understanding that Section 404 permit applicants are discouraged from procuring mitigation credits in advance of receiving a permit so that the Applicant is not limited in its mitigation options, such as the use of new mitigation banks. This reasoning is at play here. It has been a year since the Applicant solicited a mitigation contract and, according to the Applicant's DEIS mitigation bank table 6.1, at least two Ogeechee River Watershed banks may now have credits available.

(1) Applicants Response: The timeline associated with Congressional Budget approval and Federal Appropriation process for military construction requires advance planning to enable construction to be implemented in the timeframe appropriation was made. The timeline for planning and construction of these projects is quite early (two years out or more) and did not allow for a later solicitation. To secure the funds necessary to build a proposed range, Headquarters-Department of the Army (HQDA) requires the Installation to budget for wetland impacts that will be unavoidable at least two years prior to the proposed project's anticipated contract award date. If an Installation fails to provide this to HQDA within the given timeline, the project is not funded. In the past, Fort Stewart has been able to mitigate using its on-Post wetland mitigation bank; however, as mentioned above, the on-Post bank no longer has an adequate amount of credits available to support these ranges while also meeting the requirements of the Installation's "In-Theater" mission requirements. The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 MPMGR, FY11 IPBC, FY13 QTR, and the FY13 DMPTR. Fort Stewart participated in pre-application meetings with the Corps to discuss potential mitigation requirements and information needs. Section 6.4.1.1 of the FEIS has been revised to clearly explain that a mitigation decision has not yet been made for the FY13 QTR and the FY13 DMPTR.

(2) USACE Position: The USACE met with the applicant in preapplication during which the use of existing banks was discussed and the USACE determined that the Wilkinson-Oconee Bank was an acceptable mitigation alternative. The USACE recognized the time restraints associated with the proposed projects and the military's appropriation and allocation of funds needed for potential wetland impacts and agreed to the use of the Wilkinson-Oconee Bank for these projects. Any future projects mitigation requirements would fall within the guidelines and mitigation availability in place at that

time.

i. Issue 10: Furthermore, we share EPA's concerns that the Applicant is not sufficiently mitigating impacts on streams. It is our understanding that Fort Stewart's projects in the past have significantly affected streams that were not mitigated. ORK urges the Corps to ensure that stream impacts are assessed separately from wetlands impacts and that the loss of streams is compensated appropriately. Overall, ORK is concerned that the Applicant's proposed mitigation plan simply does not include adequate compensation for Fort Stewart's wetlands and streams that will be significantly impacted by the Project.

(1) Applicants Response: No streams will be lost as a result of the proposed project. The footprints of the MPMGR and IPBC on the 7.5-minute USGS topographic quads show “blue line” streams in the areas; however, a site visit by Fort Stewart and the Georgia Environmental Protection Division (GA EPD) on January 20, 2010, found no streams. The Savannah District also did not identify any streams within the range footprints. This information was added to Section 4.3.1, of the FEIS.

Over the years, Fort Stewart has worked diligently to mitigate impacts – direct and indirect, as well as cumulative – to the Installation’s streams, as well as wetlands. During the development of the Installation’s wetland bank, for example, thousands of feet of Canoochee Creek and Strum Bay were restored without being credited to the Installation’s mitigation bank. The Installation takes pride in that fact and welcomes working with ORK and other local environmental stakeholders on future projects.

(2) USACE Position: The USACE has completed an expanded preliminary jurisdictional determination for the project site. This determination verified there are no jurisdictional streams located on the project site.

j. Issue 11: Failure to Minimize Impacts to Marine Resources. Section 404(b)(1) guidelines prohibit issuance of a permit where "[t]he proposed discharge does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem." 40 C.F.R. § 230.12(a)(3)(iii) (emphasis added). None of the information that we have reviewed demonstrates that the Applicant has tried to adequately minimize the impacts of the Project. The Applicant repeatedly contends that because it is utilizing existing range footprints the Project will "avoid and minimize impacts to more pristine

and un-fragmented wetlands systems" on Fort Stewart. See e.g. Public Notice at 3. While ORK appreciates the Applicant's utilization of existing ranges for the Project, this reuse of range areas does not ensure minimization of harm to aquatic ecosystems or satisfy the regulation's mandate that the Project includes "all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem." 40 C.F.R. § 230. 12(a)(3)(iii).

(1) Applicants Response: In addition to avoiding and minimizing impacts to more pristine and un-fragmented wetlands systems, as noted in the comment, Fort Stewart consistently seeks to minimize and avoid wetland impacts at each stage of the design process. It is also important to note that the proposed ranges would be constructed on existing ranges that are operational and already cleared of vegetation. First, much of the avoidance and minimization process takes place before actual site selection. (See response to Issue #2.) Training ranges of this kind have fairly specific requirements and it is not always possible to build them without impacting every wetland in the footprint; however, site designers may alter certain aspects in response to environmental concerns during various stages of the design process (10%, 35%, 60%, 90%, and 100% stages of design completion). This is easiest if they can do so while still meeting the operational and training requirements of the range. For example, the currently on-going design process reduced the wetland impacts from the IPBC to a third of what they were at the time of writing the DEIS. Impacts from the MPMGR were also slightly reduced during that time and several proposed range projects were sited without wetland impacts of any kind. It is hoped that impacts from the QTR and DMPTR may be reduced, but as they are not yet in the design process, this cannot be precisely determined.

To ensure compliance with the Georgia (GA) Erosion and Sedimentation Control Act (ESCA) and the CWA on existing and future training ranges, Fort Stewart mandates full utilization of Timber Harvest best management practices (BMPs), National Pollutant Discharge Elimination System (NPDES) permit requirements, site-specific Erosion and Sedimentation Pollution Control Plans (ESPCPs), and pre- and post-construction BMPs to reduce the potential adverse impacts to water bodies, such as streams. The projects discussed in the JPN and FEIS have not undergone complete design. During this process, however, Fort Stewart stormwater specialists review ESPCPs for compliance with the GA ESCA and the CWA. The Installation also utilizes the Natural Resources Conservation Service (NRCS) to provide technical expertise during preparation of ESPCPs prior to Fort Stewart providing construction approval. Fort Stewart stormwater compliance assessors and NRCS consistently inspect and monitor on-going construction

actions. They will also do this during the construction of these proposed projects to ensure adherence to associated ESPCPs. Fort Stewart inspectors also routinely inspect tank trails, range access roads, range course roads, and dirt roads/trails to see if any damage is occurring (such as hardened tank trails or water crossings need repairs, to prevent sedimentation of adjacent streams).

(2) USACE Position: The USACE is preparing an analysis of the proposed project pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for this proposed project. This analysis will document that all requirements of the Guidelines have been met.

k. Issue 12: The Applicant-specifically, in Appendix D to the DEIS, fails to adequately describe measures intended to minimize impacts besides asserting that the ranges will be placed in existing disturbed areas. The proposed plans for MPMGR and QTR consist of wetlands impacts of 116.7 acres and 26.7 acres, respectively. Contrary to the Applicant's assertion that these proposed impacts are not extensive, the two ranges impact all wetlands within MPMGR and QTR areas. Thus, when all wetlands in each project area are destroyed or altered, the Applicant has failed to demonstrate that it has adequately minimized impacts to the aquatic ecosystem. The Applicant's failure to offer measures to minimize impacts to wetlands and streams violates the Section 404(b)(1) guidelines and the CWA. ORK urges the Corps to require the Applicant to set forth specific measures intended to minimize wetlands impacts on each of the four proposed ranges.

(1) Applicants Response: As noted in previous response, Fort Stewart attempts to avoid and minimize wetland impacts throughout the siting and design process. The most substantial avoidance and minimization occurs during the siting process as part of the site alternatives to carry forward for detailed analysis. Please note that, at the initial siting phase, the amount of wetland acres impacted attributed to each range is simply a total of all wetland acres that *would be located within the range footprint that could potentially be impacted*, and it is likely not *all of the wetlands within the footprint will be impacted by the project because avoiding and minimizing negative impacts wetland are carried forward as a consideration into the actual range design process after the site is selected*. Efforts are made to reduce these impacts as the design progresses and, it is anticipated

that, as design proceeds, additional wetlands avoidance and minimization of effect will be achieved. Again as an example, the currently on-going design process for the IPBC range has reduced the wetland impacts to a third of what they were at the time of writing the DEIS. Design efforts for the MPMGR have produced similar results, as well. Furthermore, little-to-no impervious surfaces will exist on these ranges, so runoff will not increase appreciably. The primary areas of "hardened surfaces" will consist of concrete turning pads, hardened stream crossings, etc., but not hardened roads and/or completely paved areas. The range surfaces will still be permeable, and, after construction, will acquire a covering of grasses and light herbaceous vegetation. Furthermore, wildlife may still traverse the ranges and graze during periods (sometimes weeks or more) the ranges are not in use.

In regard to the general issues of siting ranges and orienting them to avoid wetlands, further mention must be made of the Surface Danger Zone, or SDZ. Every range has an SDZ, an area within which people, property, and wildlife are in danger of being struck by projectiles during live fire exercises. Because of this danger, safety of Fort Stewart personnel, the public, and wildlife is a primary consideration in range siting. As previously noted, an SDZ may cover hundreds or even thousands of acres, and ranges must be sited to ensure areas of habitation, daily operations, traffic, and environmental sensitivity do not fall within them. A further limitation to siting is the fact that Fort Stewart is essentially cut into quarters by two major Georgia highways conveying regular civilian traffic. Injury or loss of human life during live fire exercises due to an improperly placed SDZ would be unacceptable to any party. Therefore, all organizations involved in siting ranges are forced to site ranges and their attendant SDZs very carefully. Efforts are made to ensure SDZs overlap. This maximizes land use and minimizes areas impacted by live fire; in part this is itself an environmental consideration as vegetation and animal populations may suffer losses from carelessly directed live fire.

(2) USACE Position: The USACE is preparing an analysis of the proposed project pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act. This analysis will not be completed prior to finalization of the EIS. However, this analysis will be completed prior to the USACE signing a Record of Decision for the EIS; which would be the final permit decision for this proposed project. This analysis will document that all requirements of the Guidelines have been met.

l. Issue 13: Deposition of Munitions. Finally, to our knowledge the Applicant fails

to discuss the impact to water quality of any munitions landing in any waters of the United States on the proposed ranges. Under the Section 404(b)(1) guidelines, the Corps has an independent duty to evaluate water quality impacts before it issues a permit. The deposition of the munitions in such waters will be an indirect impact of the proposed Project.

(1) Applicants Response: The Military Munitions Rule states that used or fired munitions are considered a solid waste only when they are removed from their original landing spot (www.epa.gov/epaoswer/hazwaste/military/index.htm). Therefore, since the proposed ranges will utilize existing impact areas and the munitions will be used for their intended purposes and will be left where they land, the munitions are not considered solid waste. The best practices to minimize the impact of lead on the environment are stormwater and erosion controls, vegetation management, soil amendments, bullet traps, and soil pH modifiers which are utilized.

(2) USACE Position: A certain percentage of the munitions that are used or fired on this range, and the other three ranges under review, would likely land in waters of the United States. The USACE would assume that most of this exploded ordinance would be comprised of lead, copper, zinc and other inert metals. Fragments of inert metal would not dissolve in water or otherwise become bio-available. Therefore, there would be a very low probability of munitions resulting in a more than minimal impact on water quality. The Georgia Environmental Protection Agency is reviewing the proposed project under Section 402 of the Clean Water Act, for compliance with the state's Water Quality Certification program. Prior to the USACE issuing a final permit for this proposal, the Georgia EPD must first issue Water Quality Certification. With issuance of Water Quality Certification, Georgia EPD would confirm that the proposed project would meet all applicable state standards.

PART III - ALTERNATIVES/SECTION 404(b)(1) ANALYSIS

A. ALTERNATIVES:

1. No Action: Under this course of action the Army would not construct a QTR. Current ranges are not adequate enough to provide the throughput required for modernized M4 and M16, machine guns, sniper weapons and standard issue pistol training. Consequently,

some Soldiers may not be able to obtain the required small arms marksmanship training resulting in a decrease in the readiness posture and overall deployability of a unit.

2. Off-Post Locations: Consideration was given to siting the QTR in an Off-Post location. Duplicating the infrastructure at a location Off-Post would incur considerable costs beyond the capability of the applicant's budget constraints. The QTR would at a minimum require a large tract of land in an appropriate shape to co-locate the surface danger zones (SDZs) and associated facilities (see further discussion below). Estimates and surveys have shown to acquire such a track of land would require an Environmental Impact Statement. An Off-Post facility would be difficult to locate and still meet the Proximity requirements, especially given the logistics, cost, and scheduling required. Additionally, there are no other Public Lands available nearby that would be compatible with the QTR training requirements.

3. On-Post Locations: The proposed project would not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make Unexploded Ordnance (UXO) clearance operations difficult.

The applicant identified three potential QTR sites on Fort Stewart. Each of these sites contains the area needed to support the range and accompanying SDZ. The three sites, which are discussed in more detail below, were identified and evaluated using the following criteria:

1. Allow Anti-Terrorism and Force Protection. The site must be able to accommodate appropriate anti-terrorism measures and standoff distances.

2. Compatibility with Wildfire and Control (Prescribed) Burning Programs. The risk of wildfires is taken into consideration when siting projects. Areas to be avoided are those that are infrequently burned, because of safety concerns and for adherence to protected species habitat management plans include parcels near major highways (State and Interstate) and adjacent communities. Constructing facilities in locations that hinder Fort Stewart's prescribed burn program must be avoided.

3. Minimization of Environmental Impacts. Consideration of environmental impacts when siting projects include the following: avoid or minimize impacts to cultural and natural resources (such as wetlands and protected species); avoid direct impacts to creeks and streams; limit expansion of noise cones into existing residential areas and off-post

communities; minimize adverse air quality impacts; and limit new metal contamination in standing timber (ranges).

4. Further Sustainability Goals. The Army incorporates sustainability principals into the planning, development, and upgrade of its facilities. From the outset, site selection and design follow sustainability principals, starting with design "charrettes" to ensure stakeholder collaboration toward optimal design, fiscal constraints, local characteristics and constraints, environmental issues, and consideration of functional adjacencies/relationships and land use compatibility. Site selection is based on functional adjacencies/relationships and land use compatibility. Ensure development near Fort Stewart's Garrison/cantonment (living and working) areas flow well with existing infrastructure, protecting green fields and preserving habitat and natural resources. Minimize negative impacts on the site and on neighboring properties and structures; avoid or mitigate excessive noise, shading on green spaces, additional traffic, obscuring significant views, etc.

The Army Range Requirements Model (ARRM) is an Army-wide planning tool used by Army Headquarters to determine range requirements at each Army Installation. The ARRM provides an automated capability to take doctrinal requirements and accurately calculate live training throughput capacities and throughput requirements for each Installation. Ranges must be identified in the Installation's ARRM for it to receive Department of the Army (DA) funding. In addition to the four siting criteria listed above, which are applicable to all facilities at Fort Stewart, the QTR has been identified in the ARRM and was sited based the following Range-specific criteria:

1. Ability to Meet Training Requirements. There should be sufficient range capacity to ensure each unit meets its training requirements as set forth in the following: Army regulation (AR) 350-1, *Army Training and Leader Development*; Training Circular (TC) 7-9, *Infantry Live-Fire Training*; DA Pamphlet (PAM) 350-38, *Standards in Weapons Training*; TC 25-8, *Training Ranges*; the 3rd Infantry Division's Live Fire Guidance; and the unit's related Mission Essential Task List.

2. Range Design. Based on each proposed range's training purpose, each range must be of sufficient acreage to accommodate the SDZs for use of the specified munitions, as required by DA PAM 385-64, *Ammunition and Explosive Safety Standards*. The SDZ is a temporary safety boundary that surrounds the firing range and associated impact area

that provides a buffer to protect personnel from the non-dud producing rounds that may be ricocheted during operation of the range. It includes an ordnance dispersion area, ricochet area, and an added safety buffer zone. This area is closed to all unauthorized personnel during each training exercise on the range. In addition, each range must have an existing impact area sufficient to support live-fire munitions used at Fort Stewart and be configured (e.g., course and targets) in a manner lending itself to achieving offensive and defensive training objectives.

3. Proximity. Range assets must be available for access by all Fort Stewart-stationed units to meet their reoccurring training requirements and to achieve combat readiness status before they deploy. This means sufficient ranges must be available within a geographic distance that allows each unit to get equipment to and from range locations to complete essential tasks in a timely manner. The time and cost of transporting units to a training area must not interfere with the overall training levels for a unit. Each unit has a limited amount of time and cost resources to achieve training requirements. The time and cost of transport cannot be so excessive that it compromises the unit's ability to meet all mission essential tasks and readiness requirements. Quality of life may be affected if troops have to travel too far for training.

The USACE has performed an analysis of the three identified Courses of Action (COAs) and determined that COA 1 is the preferred alternative because it minimizes operational constraints. Impacts to wetlands would be avoided and minimized as discussed in Section B of this document. A table is shown below, for each proposed range, comparing each COA against the operational feasibility criteria is shown below. The overall screening criteria discussed in more detail below.

Table 2. Summary of Screening Analysis for FY1 QTR

Criteria	**No-Action**	**COA 1**	**COA 2**	**COA 3 Eliminated**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	✔	✔	✗

Has the range been sited to maximize use of the Installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	✔	✖
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	✔
Does this course of action avoid and minimize adverse environmental impacts?	✔	●	⊘	●
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔	✔
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	✔
Does this course of action minimize construction costs for the range? [1]	✔	●	●	●
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Course of Action Feasibility	✖	●	⊘	✖

[1] *For this criterion, that may arise for mitigating potential environmental impacts. It represents only the relative cost of construction for each particular location.*

LEGEND:

✖ = Not Feasible – Unacceptable limitations
⊘ = Feasible – Moderate limitations and challenges
● = Feasible – Minor limitations and challenges
✔ = Feasible – No limitations or challenges
n/a = Not Applicable

The Directorate of Public Works (DPW) Environmental Division, working in conjunction with the Directorate of Plans, Training, Mobilization, and Security (DPTMS) Training Division, the DPW Fish & Wildlife Branch, the DPW Forestry Branch, and the DPW Master Planning Division were able to identify 3 separate locations on Fort Stewart for the placement of this QTR. Each of the three sites is discussed in more detail below:

a. **COA 1 is located in the D-7 Training Area (Within Alternative B) and is the preferred site.**

Allow Anti-Terrorism and Force Protection. Appropriate anti-terrorism measures and standoff distances are met by siting QTR at COA 1.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the QTR at COA 1 would not create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities.

Minimization of Environmental Impacts. COA 1 would have an SDZ that overlaps 75 to 85 percent of the SDZs associated with existing and proposed adjacent ranges, which reduces new adverse environmental impacts. The COA 1 site would impact 26.7 acres of jurisdictional wetlands and would require wetland mitigation and 404 permitting, but impacts were avoided as much as possible during placement of the QTR. COA 1 may affect, but is not likely to adversely affect, the following protected species: Red-Cockaded Woodpecker (RCW), Frosted Flatwoods Salamander, Eastern Indigo Snake, and Wood Stork. No RCW cavity or start trees have been detected in COA 1, but a portion of the existing RCW habitat unit would be impacted. No Frosted Flatwoods Salamanders, Eastern Indigo Snakes, or Wood Storks have ever been identified in the action area. A portion of COA 1 intersects buffers of potential breeding ponds, but project design will incorporate protection measures to prevent significant erosion, run-off, or other off-site impacts that may affect habitat. In addition, COA 1 would not impact any gopher tortoise burrows that eastern indigo snakes might use as winter refugia, nor will it impact wetlands that may be used as summer foraging habitat. Fort Stewart is currently preparing a Biological Evaluation (BE) for consultation with the United States Fish and Wildlife Service (USFWS) for this QTR COA and all other COA 1 facilities. The QTR sited in the existing Delta Small Arms Impact Area would keep metal contamination in this general location. Cultural resources would not be impacted.

The preferred QTR COA does not change the total distance of existing noise zones extending off the Installation. The Noise Zone II contour would remain extended beyond the boundary, but with a different shape and location resulting in a new receiver area for small arms noise. Environmental impacts were minimized while meeting operational requirements when siting.

Further Sustainability Goals. As discussed above, COA 1 was sited to include significant overlaps of multiple SDZs to avoid development of an inappropriate site and reduce environmental impacts. COA 1 was selected based on compatibility with the adjacent land use.

Ability to Meet Training Requirements. COA 1 would be accessible to meet annual training requirements and to achieve combat readiness status before they deploy. The location of the COA 1 SDZ would allow live-fire training without the closure of training areas needed for maneuver of units. COA 1 would be available and would not interfere with the training requirements of other military units. COA 1 would not result in live fire rounds crossing other ranges or State highways or result in the SDZ extending beyond the Installation's boundaries.

Range Design. The QTR at this location is within an existing small arms impact area, within the Delta Training Area. COA 1 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use on Fort Stewart. COA 1 was configured to achieve offensive and defensive training objectives. This location does not constrain training within Fort Stewart. The proposed range does not create new impact areas through placement within existing SDZ and does not impact existing flight routes. Additionally, the range is in close proximity to existing utilities. When the proposed range requires maintenance, the site should provide easy access when adjacent ranges are active since it is sited off of an existing tank trail (FS 36), similar to existing and proposed ranges in the Delta Small Arms Impact Area. The SDZs of the existing Sniper Range and FY11 MPMG may interfere with the maintenance of the QTR beyond 1500 meters; however, this is not a substantial problem as it would not remove the range from the training rotation.

Proximity. Transporting units to COA 1 would not have a major impact on the overall training levels for a unit. COA 1 was sited within a geographic distance that allows each unit to deploy its Soldiers logistically and equipment to and from the QTR to complete essential life-fire tasks within established timeframes.

Advantages/Disadvantages: Based upon the information gathered, advantages of this site are that it does not isolate useful maneuver terrain, cut off impact areas, create a new impact area, or make UXO clearance operations difficult. Although greater environmental impacts would occur under COA 1, this site is the preferred alternative.

b. COA 2 is located in the Small Arms Impact Area in D-9 TA (Within Alternative C)

Allow Anti-Terrorism and Force Protection. Appropriate anti-terrorism measures and standoff distances are met by siting QTR at COA 2.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the QTR at COA 2 would not create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities.

Minimization of Environmental Impacts. The QTR COA 2 location would also have an SDZ that overlaps 75 to 85 percent of the SDZs associated with existing and proposed adjacent ranges, which reduces new adverse environmental impacts. The COA 2 site would impact 24.7 acres of jurisdictional wetlands and would require wetland mitigation and permitting. The BE is pending for COA 2; however, the siting is expected to have similar impacts to protected species as COA 1. Based on draft data collection, no RCW cavity or start trees have been detected in COA 2. The project would remove 124.6 acres of existing RCW habitat. No Frosted Flatwoods Salamanders or Eastern Indigo Snakes habitat units have ever been identified in COA 2. The QTR sited in the existing Delta Small Arms Impact Area would keep metal contamination in this general location. One cultural resource was identified within the proposed footprint, but was determined ineligible for the National Register of Historic Place (NRHP). Therefore, no direct impacts to historic properties will occur under COA 2. The QTR COA 2 site would extend Noise Zone II further outside of the Installation's boundary than COA 1. Environmental impacts were minimized while meeting operational requirements when siting. However, this COA has greater adverse environmental impacts than the preferred QTR COA 1.

Further Sustainability Goals. As discussed above, COA 2 was sited to include significant overlaps of multiple SDZs to avoid development of an inappropriate site and reduce environmental impacts. COA 2 was selected based on compatibility with the adjacent land use.

Ability to Meet Training Requirements. COA 2 would be accessible to meet annual training requirements and to achieve combat readiness status before they deploy. Similar to COA 1, the QTR at this location is within the Delta Small Arms Impact Area. COA 2 for the QTR would not result in live fire rounds crossing major roads nor would it result in the SDZ extending beyond the Installation's boundary. COA 2 provides sufficient capacity to support a QTR. COA 2 would be available and would not interfere with the training requirements of other military units.

Range Design. The QTR at this location is within an existing small arms impact area, within the Delta Training Area. COA 2 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use at Fort Stewart. COA 2 was configured to achieve

offensive and defensive objectives. This location does not constrain training within Fort Stewart. The proposed range does not create new impact areas through placement within existing SDZ and does not impact existing flight routes. Additionally, the range is in close proximity to existing utilities. When the proposed range requires maintenance, the site should provide easy access when adjacent ranges are active since it is sited off of an existing tank trail (FS 36), similar to existing and proposed ranges in the Delta Small Arms Impact Area. However, during live fire of adjacent ranges, maintenance beyond 1000 meters could not be conducted. In addition, the proposed FY11 MPMG would interfere with the maintenance of the QTR beyond 1000 meters at this location.

Proximity. Transporting units to COA 2 would not have a major impact on the overall training levels for a unit. COA 2 was sited within a geographic distance that allows each unit to deploy its Soldiers logistically and equipment to and from the QTR to complete essential life-fire tasks within established timeframes.

Advantages/Disadvantages: Construction at COA 2 would result in more environmentally adverse impacts than COA 1, resulting in extensive mitigation costs and requirements.

c. COA 3 is located at the D-9 TA

Allow Anti-Terrorism and Force Protection. Appropriate anti-terrorism measures and standoff distances are met by siting QTR at COA 3.

Compatibility with Wildfire and Control (Prescribed) Burning Programs. Locating the QTR at COA 3 would not create additional wildfire or control burning issues since the site is not in close proximity to highways or residential communities.

Minimization of Environmental Impacts. COA 3 would have similar environmental impacts as compared to COA 2. The QTR COA 3 location would also have an SDZ that overlaps 75 to 85 percent of the SDZs associated with existing and proposed adjacent ranges, which reduces new adverse environmental impacts.

Further Sustainability Goals. As discussed above, COA 3 was sited to include significant overlaps of multiple SDZs to avoid development of an inappropriate site and reduce environmental impacts. COA 3 was selected based on compatibility with the adjacent land use.

Ability to Meet Training Requirements. COA 3 would be accessible to meet annual training requirements and to achieve combat readiness status before they deploy. Similar to COA 1, the QTR at this location is within the Delta Small Arms Impact Area. COA 3 for the QTR would not result in live fire rounds crossing major roads nor would it result in the SDZ extending beyond the Installation's boundary. COA 3 provides sufficient capacity to support a QTR. COA 3 would be available and would not interfere with the training requirements of other military units.

Range Design. This QTR siting option is similar to the COA 2 site except that it is oriented northeast to prevent the associated SDZ from leaving the Installation boundary. The QTR at this location is within an existing small arms impact area, within the Delta Training Area. COA 3 was sited to provide sufficient acreage to accommodate the SDZs for use of the specified munitions and would have an existing impact area sufficient to support the live-fire munitions contemplated for use at Fort Stewart. The design of COA 3 would cause operational constraints, not meeting outlined screening criteria. COA 3 would impact the preferred COA location for the FY13 Modified Record Fire (MRF) range. Essentially, if the QTR were sited here, the FY13 MRF range's preferred site would not be a viable option for the Installation.

Proximity. Transporting units to COA 3 would not have a major impact on the overall training levels for a unit. COA 3 was sited within a geographic distance that allows each unit to deploy its Soldiers logistically and equipment to and from the QTR to complete essential life-fire tasks within established timeframes.

Advantages/Disadvantages: This QTR siting option is similar to the Alternative C site except that it is oriented northeast to prevent the associated SDZ from leaving Fort Stewart's boundary. Because of this, the QTR SDZ would affect the preferred alternative location for the FY13 MRF range. Essentially, if the QTR were sited here, the FY13 MRF range's preferred site would not be a viable option for Fort Stewart. Therefore, the QTR at this location was determined unfeasible and is not carried forward for detail review.

B. AVOIDANCE:

1. Total wetland avoidance on-site is not possible based on the layout and size of range complexes. Also, the layout of adjacent wetland areas made total avoidance impossible. Any further reduction in proposed impacts would not meet the applicant's purpose and would not be practicable.

2. The applicant has not completed final site design for the proposed project. The standard site layout for this type of range would require the filling and/or mechanized clearing of all 26.7 acres of bottomland hardwood wetlands on the 223-acre project site. The applicant will likely be able to avoid some of the wetlands on the project site as final site design is completed for the project. However, for the purposes of this permit evaluation, the US Army Corps of Engineers (USACE) will assume that all 26.7 acres of wetlands on the proposed project site would be impacted. As an additional avoidance measure, the USACE would include the following special condition in any draft permit issued for this project:

> The site design for this project has not been finalized. Authorized wetland impacts are based on a standard range design. Prior to conducting any work in wetlands on this project site, the permittee shall submit final site development plans to the USACE for review and approval. No work in wetlands can occur until the USACE has reviewed and approved the final plan in writing; this concurrence letter needs to document that the 404(b)(1) process has been adequately demonstrated. It is anticipated that once final design is completed, there will be a minor reduction in the amount of wetland area that will be impacted by the project. This anticipated change in the footprint of authorized wetland impact is authorized under this permit and modification of the permit will not be required for this change in site design.

C. MINIMIZATION ALTERNATIVES:

1. Minimizing Wetland Footprint: As required by Section 404(b) 1 of the CWA, minimization of adverse impact to wetlands was documented within the footprint the project site, based on the current design configuration of the proposed project. As the project continues through the design process, to the point of final design, it is anticipated that there will be the potential for avoiding impacts to some wetland areas. Side slopes of wetland fills will be at a 3:1 minimum, to avoid unnecessary impacts. Wetland boundaries and project limits will be clearly marked to prevent inadvertent impacts to adjacent wetland areas.

2. Erosion Control Techniques: The applicant has indicated that best management practices (BMPs) would be utilized while performing any construction activities on the subject

property. In addition, the applicant has indicated that activities would be performed in a manner to minimize turbidity and/or erosion. Any permit that would be issued by the USACE would also include the following special condition, “All work conducted under this permit shall be located, outlined, designed, constructed and operated in accordance with the minimal requirements as contained in the Georgia Erosion and Sedimentation Control Act of 1975, as amended. Utilization of plans and specifications as contained in "Manual for Erosion and Sediment Control, (Latest Edition)," published by the Georgia Soil and Water Conservation Commission or their equivalent will aid in achieving compliance with the aforementioned minimal requirements.”

D. COMPENSATORY MITIGATION: Using Savannah District's Standard Operating Procedure (SOP), for calculating compensatory mitigation requirements, Fort Stewart determined that at least 216.27 credits would be required to compensate for the proposed impacts. Fort Stewart will evaluate acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs) for the FY13 QTR. Similar to the process outlined in the Compensatory Mitigation Rule, the Installation’s standard procurement processes conducts market research in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary and secondary service area mitigation credits. This process will be implemented when seeking mitigation options for ranges beyond FY11.

E. CONCLUSIONS: Based on the above, an off-post facility would be difficult to locate and still meet the proximity requirements, especially given the logistics, cost, and scheduling required. Also, duplicating the infrastructure at a location off-post would incur considerable costs beyond the capability of the applicant’s budget constraints. The applicant provided an adequate analysis of on-post locations for sighting this range and mitigation, as well as three other proposed new ranges.

F. SECTION 404(b)(1) ANALYSIS: This project must be evaluated for compliance with the Section 404(b)(1) Guidelines (40 CFR Section 230). The goal of the 404(b)(1) Guidelines is “to restore and maintain the chemical, physical, and biological integrity of waters of the United States through the control of discharges of dredges or fill material.” An expanded 404(b)(1) analysis will be conducted prior to making any permit decision.

PART IV - PUBLIC INTEREST REVIEW

A. ENVIRONMENTAL SETTING/EXISTING CONDITIONS: The DA owns and manages the area in which the proposed QTR is located. The preferred COA is located with Delta Small Arms Impact Area, specifically located to the west of the existing Garrison at Fort Stewart.

B. ENVIRONMENTAL IMPACTS: The USACE's Regulatory Program considers the full public interest, reflecting the protection and utilization of important resources. Table 3 is a summary of our public interest review for the proposed activity, which assesses the impacts of the proposed permit action on environmental and other public interest factors
(33 CFR 320.1(a)(1), 320.4 and 325.3(c)).

Table 3. Summary of Project Impacts

FACTORS	No Effect	Negligible	Undetermined	Beneficial Major/ Minor		Adverse Major/ Minor	
1. Economics/Social	X						
2. Education/Scientific	X						
3. Aesthetics	X						
4. Food-Fiber Production	X						
5. Historical/Architectural/ Archaeological	X						
6. Recreation	X						
7. Land Use	X						
8. Mineral Resources	X						
9. Soil Conservation							X
10. Water Supply Conservation	X						
11. Water Quality		X					
12. Air Quality		X					
13. Noise Levels							X
14. Public Safety		X					
15. Energy Needs							X
16. National Security	X						
17. Navigation	X						
18. Shoreline Erosion Accretion	X						
19. Flood Hazards	X						
20. Flood Plain							X
21. Wetlands							X
22. Refuges	X						
23. Fish	X						
24. Wildlife			X				
25. Food Chain Organisms	X						
26. Shellfish Production	X						
27. Threatened and Endangered Species			X				
28. General Environmental Concerns							X
29. Property Ownership	X						
30. Mineral Needs	X						
31. Other	X						

C. DISCUSSION: We have evaluated the permit application regarding the need for the proposed activities, the practicability of project alternatives, and the beneficial and detrimental effects, including cumulative impacts. Complete descriptions of the 31 public interest factors can be found in the Range and Garrison Construction EIS (RGCEIS) for Fort Stewart. Each public interest factor is referenced to specific sections within the EIS.

1. Economics/Social – The proposed project will have no effect to the local economy or local social environment. (RGCEIS Section 4.11 Social and Economics)

2. Education/Scientific – The proposed project will have no effect to educational or scientific resources. The project footprint is within an Army Installation small arms impact area. (RGCEIS Section 4.11 Social and Economics)

3. Aesthetics – The proposed project will have no effect to aesthetics. The project footprint is within an Army Installation small arms impact area and is off-limits to unauthorized personnel. (RGCEIS Section 4.7 Land Use)

4. Food-Fiber Production – The proposed project will have no effect to food or fiber production. The project site is within an existing small arms impact area. (RGCEIS Section 4.4.3 Forestry Management)

5. Historical/Architectural/Archaeological – The US Army, Fort Stewart is the lead federal agency for this proposed action. Impact analysis for historic properties follow guidelines set forth in Section 106 of the National Historic Preservation Act (NHPA) implementing regulations (36 CFR 800), Fort Stewart's Programmatic Agreement with the Georgia SHPO. Fort Stewart would complete required consultation and make any necessary Section 106 of the NHPA determination, if required, prior to any work occurring in waters of the US subject to the jurisdiction of the USACE on a project site where cultural resources have been identified. (RGCEIS Section 4.5 Cultural Resources).

6. Recreation – The proposed project will have no effect to recreational areas. The footprint is located with a land use designated for range and training lands. (RGCEIS Section 4.7 Land Use)

7. Land Use – The proposed project is compatible to the existing land use category of range and training lands. Therefore, there will be no effect to land use. (RGCEIS Section 4.7 Land

Use)

8. Mineral Resources – The proposed project is located within the confines of an Army Installation that is designated for Soldier training. There are no minerals mined at Fort Stewart. Therefore, there will be no effect to mineral resources at the project site. (RGCEIS Section 4.1 Geology and Soils)

9. Soil Conservation – The project will undergo tree removal and grubbing and grading during construction of the proposed range. However, standard erosion and sedimentation (E&S) control measures will be implemented to prevent sedimentation from leaving the confines of the project site. E&S control best management practices (BMPs) will also be implemented throughout the duration of the project and after construction to ensure stormwater leaving the range has been filtered before reaching nearby wetland areas. Furthermore, an E&S control plan will be prepared for this project. A National Pollution Discharge Elimination System (NPDES) permit will be obtained for this project. At a minimum, a Level 1A E&S Control Certified or Subcontractor Awareness E&S trained individual is required to be on site during any land disturbance activity. Adverse impacts to soil are expected to be minor and temporary in nature until construction is completed. (RGCEIS Section 4.1 Geology and Soils)

10. Water Supply Conservation – The proposed project will not require use of the Installation's water supply. Therefore, water supply will have no effect. (RGCEIS Section 4.3 Water Quality and Resources)

11. Water Quality – During the construction phase of the proposed project, wetland areas will be filled within the range footprint. All necessary permitting and mitigation will be conducted. See number 21, Wetlands, for additional information regarding impacts to wetland areas. Impacts to nearby surface water would likely not be impacted since necessary E&S control measures, as required by the Georgia Environmental Protection Division, will be implemented to prevent sedimentation from leaving the site. Turbidity samples will be taken during and after construction to ensure sedimentation in outfall areas do not increase from what the area currently experiences. Total Maximum Daily Load (TMDL) regulations require maintaining predevelopment time of concentration by strategically routing flows to maintain travel time, improve water quality, and to control the stormwater discharge. Flow calculations will also be conducted during preparations of the E&S control plan to ensure

concentrated stormwater runoff flows from peak rain events will not impact nearby water bodies. The proposed project footprint will be filled during construction activities; therefore, adverse impacts to groundwater are not anticipated.

Fort Stewart is in consultation with the Georgia Environmental Protection Division regarding a water quality certification pursuant to Section 401 of the Clean Water Act. The USACE would include a copy of the 401 water quality certification with any permit issued. In addition, the special condition of any permit issued would require the permittee to adhere to the conditions of the 401 water quality certification. (RGCEIS Section 4.3 Water Quality and Resources)

12. Air Quality – Adverse impacts to air quality is not anticipated. Only minor and temporary amounts of dust generation during timber harvesting and construction are expected; however, no regulatory air quality thresholds would be exceeded. (RGCEIS Section 4.2 Air Quality)

13. Noise Levels – The proposed project and its location will not change the total distance of Noise Zone II (87 dB PK15) that currently extends beyond the southwestern portion of the Installation boundary (1400 meters). However, the shape of the contour will change as a result of this project and a new receiver area for small arms noise will be generated. Noise Zone III (104 dB PK15) will not extend beyond the Installation boundary. (RGCEIS Section 4.6 Noise)

14. Public Safety – During the timber harvest, prescribed industrial safety standards would be followed. No specific aspects of the proposed project would create any unique or extraordinary safety issues. The project location is outside of current explosive safety quantity distance clear zones and the inhabited building distance clear zones. An unexploded ordnance survey will be conducted prior to timber harvesting and construction activities. If necessary, an unexploded ordnance avoidance plan will be prepared. (RGCEIS Section 4.9 Safety)

15. Energy Needs – Within the area of potential effect, there are existing utilities into which new lines from the range can tie in, minimizing the potential ground disturbing activities associated with the establishment of all-new utility systems. This proposed project would also not result in a substantial increase in utility usage. Executive Order 13423 sets as a goal for all federal agencies the improvement of energy efficiency and the "reduc[tion] of

greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal year 2015, relative to the baseline to the agency's energy use in fiscal year 2003." The U.S. Army Energy Strategy for Installations (U.S. Army Energy Strategy for Installations, 8 July 2005, available at http://army-energy.hqda.pentagon.mil/docs/strategy.pdf), also contains strategies to reduce energy waste and improve efficiency. Taking these policies into account, this action does not represent a net incrementally addition to the global climate change problem. (RGCEIS Section 4.8 Infrastructure)

16. National Security – The proposed project will have no effect to national security. The requirement for this range has been validated by the Range and Training Land Program Development Plan prepared for Fort Stewart and the Forces Command Live Fire Training Investment Strategy. This project has been coordinated with the Installation physical security plan, and all physical security measures are included in the project. All required antiterrorism protection measures are included in the project, per DA PAM 190-51 (*Risk Analysis for Army Property*) and Training Manual 5-853-1 (*Security Engineering Project Development*). (RGCEIS Section 4.9 Safety)

17. Navigation – Navigable waters will not be impacted by this project. (RGCEIS Section 4.3 Water Quality and Resources)

18. Shoreline Erosion Accretion - The site is many miles from the coast and the project will not add to shoreline erosion accretion. (RGCEIS Section 4.1 Geology and Soils)

19. Flood Hazards – The site does not present an unusual flood hazard for this area (see below.) (RGCEIS Section 4.3 Water Quality and Resources)

20. Flood Plain – The site is located in the Federal Emergency Management Administration (FEMA) 100 year flood zone, meaning that the flood elevation in that area has a 1- percent chance of being equaled or exceeded each year. This does not present an unusual flooding hazard for this area, and as the site will be used only for military training, does not present an appreciable hazard to property or human safety. (RGCEIS Section 4.3.1 Surface Water and Floodplains)

21. Wetlands – The project, as currently proposed, would impact 26.7 acres of bottomland hardwood wetlands, either through direct filling or by mechanized land clearing. However,

the applicant has not completed final site design for the proposed project. The standard site layout for this type of range would require the filling and/or mechanized clearing of all 26.7 acres of bottomland hardwood wetlands on the 223-acre project site. The applicant will likely be able to avoid some of the wetlands on the project site as final site design is completed for the project. However, for the purposes of this permit evaluation, the US Army Corps of Engineers (USACE) will assume that all 26.7 acres of wetlands on the proposed project site would be impacted. As an additional avoidance measure, the USACE would include the following special condition in any draft permit issued for this project: The site design for this project has not been finalized. Authorized wetland impacts are based on a standard range design. Prior to conducting any work in wetlands on this project site, the permittee shall submit final site development plans to the USACE for review and approval. It is anticipated that once final design is completed, there will be a minor reduction in the amount of wetland area that will be impacted by the project. This anticipated change in the footprint of authorized wetland impact is authorized under this permit and modification of the permit will not be required for this change in site design.

The present total proposed wetland impact for the four proposed ranges is 179.03 acres. As discussed by the applicant above, not all of these proposed impacts are for fill, but a certain percentage would involve mechanized land clearing impacts. Clearing wetlands of vegetation and maintaining them in scrub/shrub vegetation results in a change in function, but not a total loss in function. The mitigation credits proposed by Fort Stewart are assuming a total loss in function. The proposed mitigation plan is to purchase 1,391credits to compensate for a total of 179 acres of wetland impact for all four ranges. This is a credit to impact ratio of 7.8:1. On average, three credits are generated for each acre of wetland restoration at the Wilkinson/Oconee Mitigation Bank, where credits will be purchased for the FY11 ranges. Therefore, the effective mitigation ratio for the FY11 Multipurpose Machine Gun Range and FY11 Infantry Platoon Battle Course projects would be approximately 2.6:1 of wetland restoration. The Applicant has not ruled out other acceptable compensatory mitigation alternatives to mitigate wetlands impact (provided through mitigation banks or in-lieu fee programs) for the FY13 Digital Multipurpose Training Range and the FY13 Qualification Training Range. Therefore, it is the position of the USACE that the mitigation proposed for this QTR project would meet the requirements of the new mitigation rule.

Even with implementation of the applicant’s proposed compensatory wetland mitigation plan, the project would result in an overall loss in aquatic function within the watershed and

on Fort Stewart. Therefore, the USACE has determined that the project would result in a minor adverse impact to wetlands. (RGCEIS Section 4.3.2 Wetlands)

22. Refuges - The site will not impact any areas specifically devoted to wildlife refuge. (RGCEIS Section 4.4 Biological Resources)

23. Fish – The site will not impact any fish species. The Canoochee and Ogeechee rivers are approximately 20 miles from the proposed project site. (RGCEIS Section 4.4 Biological Resources)

24. Wildlife – There were no RCW cavity or start trees detected in the footprint. The site will impact RCW foraging habitat. This site will also impact a potential breed pond for the flatwoods salamander. However, there has never been a salamander found in this pond. Formal consultation with the USFWS has been conducted for these impacts. (RGCEIS Section 4.4 Biological Resources)

25. Food Chain Organisms – No specific or unique food chain organisms are known or suspected to exist on the site. (RGCEIS Section 4.4 Biological Resources)

26. Shellfish Production – The site is many miles from the coast and the project will not affect local shellfish production. (RGCEIS Section 4.4 Biological Resources)

27. Endangered Species – The US Army, Fort Stewart is the lead federal agency for this proposed action. The site will impact RCW foraging habitat. This site will also impact a potential breed pond for the flatwoods salamander. However, there has never been a salamander found in this pond. Fort Stewart has completed formal consultation with the USFWS. The USFWS has made the necessary Section 7 of the Endangered Species Act determinations for the proposed project.

28. General Environmental Concerns – The project is expected to incur only the most minimal adverse impact to the local ecosystem. Sites are chosen to include the goal of avoiding and/or minimizing such impacts. Where possible and appropriate, impacts will be mitigated. Fort Stewart is generating an Environmental Impact Statement detailing these impacts.

29. Property Ownership – The property is owned by the United States Army for the primary purpose of military training. RGCEIS Section 4.7 Land Use)

30. Mineral Needs – No particularly valuable or unique minerals are known or suspected to exist at the site. (RGCEIS Section 4.1 Geology and Soils)

31. Other – No notable environmental aspects not covered by the preceding will be impacted by this project.

D. US ARMY CORPS OF ENGINEERS' WETLAND POLICY: The proposed wetland alteration is necessary to realize the project's purpose and should result in minimal adverse environmental impacts. The benefits of the project would outweigh the minimal detrimental impacts. Therefore, the project is in accordance with USACE's Wetland Policy (33 CFR 320.4(b)).

E. TITLE III OF THE CIVIL RIGHTS ACT OF 1964 AND EXECUTIVE ORDER 12898: The proposed action would not directly, or through contractual or other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin, nor would it have a disproportionate effect on minority or low-income communities.

F. CUMULATIVE IMPACTS: The Council on Environmental Quality (CEQ) defines cumulative impacts as the "impact on the environment which results from the incremental impact of the action(s) when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

Geographic Scope/Region of Influence (ROI): the National Environmental Policy Act (NEPA) requires that the impacts of each proposed project be considered within the appropriate geographical area/region of influence. The geographic area/ROI for purposes of consideration of proposed projects within the boundaries of Fort Stewart are: the Altamaha watershed and United States Geological Service, Georgia Hydrologic Unit Code (HUC) 03070106 encompassing portions of Appling, Evans, Glynn, Jeff Davis, Long, McIntosh, Montgomery, Tattnall, Toombs, and Wayne County; the Lower Ogeechee River watershed HUC 03060202, encompassing portions of Bryan, Bulloch, Chatham, Effingham, Emanuel, Jenkins, and Screven Counties; the Little Ogeechee watershed HUC 03060204, encompassing portions of Bryan, Chatham, Effingham, Liberty, Long and McIntosh Counties; and the Canoochee Creek watershed HUC 03060203, encompassing portions of Bryan, Liberty, Evans, Tattnall, Candler, Emanuel, and Bulloch Counties. The USACE determined that actions taken in the "Fort Stewart Watersheds"

would be sufficiently similar in location, topography, watershed impacts, habitat types, etc., to be considered in a cumulative impacts assessment. To properly scope this analysis the USACE has identified target resources for evaluation based on public and agency comments. Target resources are important resources that could be cumulatively affected by activities in the identified scoping area.

The USACE identified the following target resources because of their scarcity and regional importance: (1) wetlands; (2) water quality; (3) aquatic species, and (4) mitigation. Below we have assessed the cumulative impacts of the proposed project on these target resources. In doing this, we considered the impacts of this project, past projects, as well as all reasonably foreseeable impacts in the above identified watersheds.

The proposed action, in addition to other projects in the geographic areas of consideration (i.e., HUC's 03070106, 03060202, 03060204, and 03060203), have the possibility to result in either negative or positive impacts in a cumulative manner. Cumulative impacts are most likely to occur when a relationship exists between a proposed action, or alternative, and other actions expected to occur in a similar location, time period, and/or involving similar actions, i.e. past, present, and reasonably foreseeable future actions.

There are numerous projects in the watersheds associated with Fort Stewart, which are part of typical urban activities/development. These projects can be categorized generally as construction, maintenance, or demolition. This analysis takes into account the proposed project/action along with the larger projects in the ROI.

1. Wetlands: The following table provides information on all wetland impacts permitted by the Savannah District between January 1, 1990, and July 6, 2005, and the acres of wetland mitigation required for these impacts. This information was generated by the Savannah District Regulatory Analysis and Management System (RAMS) database. There has undoubtedly been some additional loss of wetland during this time period from activities not regulated by the USACE, but no data exist on these losses.

Table 4. Wetland Impacts from January 1, 1990, through July 6, 2005, in the Counties Included in the Fort Stewart Watersheds

Wetland Acres Requested	Wetland Acres Permitted	Wetland Acres Mitigated

County	Acres			
Bryan	111509	38.15	41.81	236.29
Bulloch	81797	114.67	119.28	205.28
Chatham	162459	701.13	666.91	4298.24
Effingham	127318	175.13	205.08	633.59
Emanuel	42158	67.78	67.78	269.26
Jenkins	35292	55.74	55.74	230.22
Screven	85270	47.99	57.19	92.08
Liberty	139558	55.74	55.74	230.22
Long	93629	117.9	117.9	1343.68
McIntosh	149942	16.86	16.85	69.64
Appling	39963	34.02	34.02	70.39
Evans	12493	21.28	21.28	34.81
Glynn	134011	210.8	210.13	1496.65
Jeff Davis	23394	2.68	2.68	3.75
Montgomery	14426	8.78	8.78	6.96
Tattnall	33959	31.49	31.49	73.08
Toombs	21718	3.45	3.45	2.43
Wayne	99669	189.6	188.5	1499.45
Candler	17051	4.98	10.48	4.78
Emanuel	42158	67.78	67.78	269.26
TOTALS	1467774	1965.95	1982.87	11070.06

In summary, the USACE can document that in 1990 there were approximately 1,467,774 acres of wetlands in HUC's 03070106, 03060202, 03060204, and 03060203 within Bryan, Bulloch, Chatham, Effingham, Emanuel, Jenkins, Screven, Liberty, Long, McIntosh, Appling, Evans, Glynn, Jeff Davis, Montgomery, Tattnall, Toombs, Wayne, Candler and Emanuel Counties. By deducting 1,982.87acres of wetland impacts since 1990 (RAMS database), there are at least 1,465,792 acres of wetlands remaining in this area. This amounts to a loss of 0.2 percent of the wetlands in HUC's 03070106, 03060202, 03060204, and 03060203 since 1990. The largest percent loss by county would be Chatham County, where 0.4 % of the wetlands have been impacted since 1990. The USACE can also document that 11,070.06 acres of wetland mitigation were provided to offset the post 1990 wetland impacts in this area.

In addition to the impacts described above, Fort Stewart itself has experienced some wetland impacts associated with various projects since the close of the review period in 2005. Some major restoration projects, employed to mitigate wetland impacts, have also occurred within and after the review period, but have not been integrated into the data described above. The effects of

these projects are outlined in the table below.

Table 5. Fort Stewart Wetland Impacts Post-2005

	Wetland	Wetland	Wetland
	Acres	Acres	Acres
County	Requested	Permitted	Mitigated
Bryan	4.23	4.23	0
Liberty	214.77	214.77	3230
Long	0	0	0
Evans	0	0	0
Tattnall	0	0	0
TOTALS	219	219	3230

The following is a list of Fort Stewart projects authorized by the USACE within Fort Stewart watersheds outside the review period.

a. Department of the Army Permit 940000880 (modification), issued June 29, 1995, authorized the enhancement of approximately 1,300 acres of wetlands in the A11 training area of Fort Stewart, to mitigate for 2.1 acres of wetlands impacted by the earlier construction (under the same Permit number) of rail pass tracks in an adjacent training area.

b. Department of the Army File Number 200007600 refers to the restoration and enhancement of approximately 1,200 acres of wetlands to create For Stewart's Canoochee Creek Reservoir (or "Pond 4") Mitigation Bank.

c. Department of the Army Permit 200601665, issued December 6, 2006, authorized impacts to 4.23 acres of wetlands in Bryan County for improvements to the road in Fort Stewart's existing Convoy Live Fire Range. Mitigation consisted of a debit of 12.7 credits from the Installation's on-post wetland mitigation bank.

d. Department of the Army Permit 200501852, issued March 12, 2007, authorized impacts to 206.9 acres of wetlands in Liberty County for the construction of the Digital Multipurpose Range Complex (DMPRC). 4.0 acres of jurisdictional wetland were impacted through direct filling; the remaining 202.9 acres were impacted though cutting of vegetation to meet line-of-sight

requirements. Mitigation was accomplished through the Strum Bay Restoration, which (under the same Permit) restored and enhanced approximately 730 acres of wetlands adjacent to the project area by correcting previously impacted hydrology.

e. One project for which a DA Permit is pending, vehicle maintenance facilities in support of 2nd BCT operations, will impact a total of 7.87 acres of wetlands. Although no DA Permit number has yet been assigned to these projects as they are still in the planning stages, the Fort Stewart Wetland Mitigation Bank has been debited in anticipation of them, so the impacts have been included in this analysis.

Fort Stewart has implemented an aggressive mitigation program in order to offset wetland impacts on the Installation. These projects include wetland enhancement and wetland restoration projects on large scale areas that provide higher quality mitigation than smaller patchwork single permit mitigation products. The following are current wetland mitigation projects located within the boundaries of Fort Stewart:

Pond 4 Mitigation Bank (USACE File Number 200007600): This single user bank was permitted for projects located within the boundaries of the Fort Stewart Installation. Approximately 1200 acres of wetlands were restored within the Canoochee Creek and Strum Bay wetland systems. This project is mostly comprised of deepwater and hardwood swamp habitat. Additional areas upstream of Pond 4 are currently being studied that would increase the total amount of wetland enhancement and restoration (see Strum Bay Mitigation Area below).

A-11 Mitigation Area (USACE File Number 940000880): This project specific mitigation area is comprised of approximately 1300 acres of wetland enhancement/restoration. Hydrologic enhancement/restoration was competed through the reintroduction of hydrology that had been previously diverted around the project area. It is comprised mostly of pine/cypress flatwoods and hardwood drainages.

Strum Bay Mitigation Area (USACE File Number 200501852): This project specific mitigation was originally developed to mitigate impacted associated with the DMPRC. Subsequent studies realized a much larger restoration/enhancement was obtained by re-directing hydrology back into the Strum Bay wetland system. This project has now identified enhancement and restoration of wetland hydrology to approximately 730 acres. This portion of the Strum Bay wetland system is located upstream from the Pond 4 Mitigation Bank, thus creating additional benefits to water quality and habitat to the entire Strum Bay wetland system and Pond 4 Mitigation Bank.

Summary: These effects, when combined with other projects in the ROI, do have the potential to result in adverse cumulative impacts; however, it is expected that other projects in the ROI will be implemented as follows: projects will use erosion control measures, silt fencing, and other Best Management Practices (BMPs); sufficient storm water management structures will be constructed as part of new construction; erosion and sedimentation control plans will be filed in accordance with Georgia's Sedimentation Pollution Control Act; and all projects will be conducted in accordance/in compliance with federal, state, and local laws. This includes obtaining and adhering to appropriate wetland permits, including compliance with compensatory wetland mitigation requirements outlined in the wetland permit(s).

2. Water Quality: Water quality is affected by changes to the environment (referred to as stressors) that adversely affect aquatic life or impair human uses of a water body. Point sources are municipal and industrial wastewater discharge. Non-point sources consist of sediment, litter, bacteria, pesticides, fertilizers, metals, oils, grease, and a variety of other pollutants that are washed from rural and urban lands by storm water. Expected growth in population and employment in the basin will mean more potential stress from storm water runoff as well as non-point source loading.

Wetland Loss: The impacts to wetlands discussed above would be expected to have an adverse impact on water quality due to the loss of associated aquatic functions (flood water retention, filtration, contaminate removal, sediment retention, etc.). The mitigation for these impacts would help to offset these impacts to water quality.

Point Source Discharges: Impacts from municipal wastewater, agricultural, and industrial discharges were greater prior to the 1970's. Due to increased regulation, these discharges have been reduced but continue to introduce pollutants into the system, which lower water quality when considered cumulatively. Georgia's "2004 303(d) List" for Bryan, Evans, Liberty, Long, and Tattnall counties have 3 waterways listed as impaired or partially impaired; they are listed in the table below with the causes of impairment.

Table 6.

Waterway	Cause of Impairment
Canoochee River	Trophic-weighted residue value (mercury in fish tissue)
Peacock Creek	Low dissolved oxygen and fecal coliform bacteria

Taylor's Creek	Low dissolved oxygen

Non-point Source Discharges: Residential, commercial and industrial development results in an increase in impervious surfaces (roof tops, paved roads, parking lots, etc.), which affects storm water discharges. Development results in an increase in non-point source contaminant loading through associated increases in urban landscaping (pesticides and fertilizers), increased traffic (oil, grease and metals), and other associated activities. There would be an anticipated incremental increase in adverse impacts to water quality as impervious surfaces increase. The following table is a summary of anticipated population growth-induced increases in impervious surfaces in the Altamaha watershed. The amount of impervious surface coverage is increasingly recognized as a valuable predictor of overall water quality within a watershed. In general, as population increases, so does impervious surface. As impervious surface area increases, water quality decreases. Table 4.1 shows population and impervious surface area growth over time for the Lower Ogeechee watershed; Table 4.2 shows population and impervious surface area growth over time for the Canoochee watershed; Table 4.3 shows population and impervious surface area growth over time for the Little Ogeechee watershed; Table 4.4 shows population and impervious surface area growth over time for the Altamaha watershed.

The impervious surface data was generated by the USEPA and provided to the USACE via a table titled "Total Impervious Area Calculations by 12-Digit HUC Watershed (based upon National Land Cover Data, 1993). Using simple linear regression analysis, the USACE utilized county population projection data to estimate percent increase in impervious surface, by county. The data contained in Tables 4.1 thru 4.4 indicates that as the population of each county continues to increase, there will be an associated increase in impervious surfaces. All counties in the study area would be anticipated to experience an increase of less than one percent impervious surface by the year 2050. However, each county is responsible for regulating non-point source storm water discharges pursuant to Section 402 of the CWA. These county storm water management programs should help to minimize the anticipated adverse impacts to water quality.

Table 7. Projected Population Growths and Associated Approximate Impervious Surface Increases
Lower Ogeechee - HUC 03060202

County		**Year**						
		2007	2008	2010	2020	2030	2040	2050
Bryan	Population / square mile	66	69	70	88	106	124	142
	% impervious Surface Coverage	2.33	2.37	2.39	2.68	2.97	3.26	3.55
Bulloch	Population / square mile	96	98	101	120	139	157	176
	% impervious Surface Coverage	2.81	2.84	2.89	3.20	3.50	3.79	4.09
Chatham	Population / square mile	385	389	386	410	434	457	481
	% impervious Surface Coverage	7.33	7.39	7.35	7.71	8.07	8.42	8.78
Effingham	Population / square mile	105	108	111	142	173	204	234
	% impervious Surface Coverage	2.95	3.00	3.05	3.55	4.04	4.53	5.00
Emanuel	Population / square mile	32	33	33	34	36	37	38
	% impervious Surface Coverage	1.77	1.79	1.79	1.81	1.84	1.85	1.87
Jenkins	Population / square mile	24	24	25	25	25	25	26
	% impervious Surface Coverage	1.64	1.64	1.66	1.66	1.66	1.66	1.68
Screven	Population / square mile	23	23	24	25	26	27	28
	% impervious Surface Coverage	1.63	1.63	1.64	1.66	1.68	1.69	1.71
Watershed Average								
Lower Ogeechee	Population / square mile	104	106	107	121	134	147	161
	% impervious Surface Coverage	2.92	2.95	2.97	3.18	3.39	3.60	3.81

Table 8. Projected Population Growths and Associated Approximate Impervious Surface Increases Canoochee - HUC 03060203

County		Year						
		2007	2008	2010	2020	2030	2040	2050
Bryan	Population / square mile	66	69	70	88	106	124	142
	% impervious Surface Coverage	2.33	2.37	2.39	2.68	2.97	3.26	3.55
Bulloch	Population / square mile	96	98	101	120	139	157	176
	% impervious Surface Coverage	2.81	2.84	2.89	3.20	3.50	3.79	4.09
Candler	Population / square mile	42	43	44	50	56	62	67
	% impervious Surface Coverage	1.94	1.95	1.97	2.07	2.16	2.26	2.34
Emanuel	Population / square mile	32	33	33	34	36	37	38
	% impervious Surface Coverage	1.77	1.79	1.79	1.81	1.84	1.85	1.87
Evans	Population / square mile	61	62	65	74	84	93	102
	% impervious Surface Coverage	2.24	2.26	2.31	2.46	2.62	2.76	2.91
Jenkins	Population / square mile	24	24	25	25	25	25	26
	% impervious Surface Coverage	1.64	1.64	1.66	1.66	1.66	1.66	1.68
Liberty	Population / square mile	100	97	105	109	114	119	124
	% impervious Surface Coverage	2.87	2.83	2.95	3.02	3.10	3.18	3.26
Long	Population / square mile	28	28	31	38	46	53	60
	% impervious Surface Coverage	1.71	1.71	1.76	1.87	2.00	2.11	2.23
Tattnall	Population / square mile	47	48	50	57	63	70	76
	% impervious Surface Coverage	2.02	2.03	2.07	2.18	2.28	2.39	2.49
Watershed Average								
Canoochee	Population / square mile	55	56	58	66	74	82	90
	% impervious Surface Coverage	2.15	2.16	2.20	2.33	2.46	2.58	2.71

Table 9. Projected Population Growths and Associated Approximate Impervious Surface Increases Little Ogeechee - HUC 03060204

County		**Year**						
		2007	2008	2010	2020	2030	2040	2050
Bryan	Population / square mile	66	69	70	88	106	124	142
	% impervious Surface Coverage	2.33	2.37	2.39	2.68	2.97	3.26	3.55
Chatham	Population / square mile	385	389	386	410	434	457	481
	% impervious Surface Coverage	7.33	7.39	7.35	7.71	8.07	8.42	8.78
Effingham	Population / square mile	105	108	111	142	173	204	234
	% impervious Surface Coverage	2.95	3.00	3.05	3.55	4.04	4.53	5.00
Liberty	Population / square mile	100	97	105	109	114	119	124
	% impervious Surface Coverage	2.87	2.83	2.95	3.02	3.10	3.18	3.26
Long	Population / square mile	28	28	31	38	46	53	60
	% impervious Surface Coverage	1.71	1.71	1.76	1.87	2.00	2.11	2.23
McIntosh	Population / square mile	20	20	21	24	26	29	32
	% impervious Surface Coverage	1.58	1.58	1.59	1.64	1.68	1.72	1.77
Watershed Average								
Ogeechee Coastal	Population / square mile	117	119	121	135	150	164	179
	% impervious Surface Coverage	3.13	3.15	3.18	3.41	3.64	3.87	4.10

Table 10. Projected Population Growths and Associated Approximate Impervious Surface Increases Altamaha - HUC 03070106

Appling	Population / square mile	35	35	36	38	41	43	46
	% impervious Surface Coverage	1.82	1.82	1.84	1.87	1.92	1.95	2.00
Evans	Population / square mile	61	62	65	74	84	93	102
	% impervious Surface Coverage	2.24	2.26	2.31	2.46	2.62	2.76	2.91
Glynn	Population / square mile	128	130	129	141	152	164	175
	% impervious Surface Coverage	3.32	3.36	3.34	3.53	3.71	3.90	4.07
Jeff Davis	Population / square mile	40	40	40	42	44	47	49
	% impervious Surface Coverage	1.90	1.90	1.90	1.94	1.97	2.02	2.05
Long	Population / square mile	28	28	31	38	46	53	60
	% impervious Surface Coverage	1.71	1.71	1.76	1.87	2.00	2.11	2.23
McIntosh	Population / square mile	20	20	21	24	26	29	32
	% impervious Surface Coverage	1.58	1.58	1.59	1.64	1.68	1.72	1.77
Montgomery	Population / square mile	36	36	38	42	45	49	53
	% impervious Surface Coverage	1.84	1.84	1.87	1.94	1.98	2.05	2.11
Tattnall	Population / square mile	47	48	50	57	63	70	76
	% impervious Surface Coverage	2.02	2.03	2.07	2.18	2.28	2.39	2.49
Toombs	Population / square mile	75	76	76	81	87	92	97
	% impervious Surface Coverage	2.47	2.49	2.49	2.57	2.67	2.75	2.83
Wayne	Population / square mile	45	45	46	52	58	63	69
	% impervious Surface Coverage	1.98	1.98	2.00	2.10	2.20	2.28	2.37
Watershed Averages								
Altamaha	Population / square mile	52	52	53	59	65	70	76
	% impervious Surface Coverage	2.09	2.10	2.12	2.21	2.30	2.39	2.48

Summary: This effect, when combined with other projects in the geographical area of influence, does have the potential to result in adverse cumulative impacts; however, it is expected that future projects would be implemented as follows: projects will use erosion control measures, silt fencing, and other BMPs; sufficient storm water management structures will be constructed as part of new construction; erosion and sedimentation control plans will be filed in accordance with Georgia's Sedimentation Pollution Control Act; and all projects will be undertaken in accordance with federal, state, and local laws.

Fort Stewart's role in general and project-specific oversight to ensure compliance with environmental legislation and the overall health of the local ecosystem have certainly played a role in mitigating adverse impacts to water quality. Also, the use of this large (~ 280,000 acres) area of land for military training has and will continue to ensure that the vast majority of the Installation remains managed wilderness. This allows natural processes to operate in support of water quality to a degree not seen in many surrounding areas which have experienced a great deal of development, and is the primary contributor to good water quality relative to those areas. Also, it must be noted that many projects related to military training (ex: firing ranges) do not feature impervious surfaces to the same degree as many civilian and private projects, and will not experience human activity and traffic of the same frequency and intensity, which might otherwise worsen local water quality. Furthermore, through the oversight of Environmental Compliance Officers, Army units self-monitor their training activities to avoid and minimize potentially harmful activities. A 1999 water quality survey performed by Fort Stewart determined that the quality of water leaving Fort Stewart's geographic boundaries was of equal or better quality than that which entered the Installation.

In view of the above, the USACE determined that the proposed project, with proposed special permit conditions, would have minimal impacts on water quality when considered alone or in concert with the other past, present and reasonably foreseeable future projects in the basin.

3. Aquatic Species: Permitted impacts to wetlands and water quality as discussed above have affected fish and other aquatic species such as mussels and aquatic insects.

The proposed project would not result in a direct adverse impact to any stream or river, or to aquatic species in the waterways. Rather, the project would result in an unavoidable impact to 26.9 acres of wetland, and a loss of the aquatic habitat function provided by these wetlands. However, this project-related wetland loss would be minor when considered cumulatively with

all other past and planned wetland losses discussed above. In addition, the applicant's proposed wetland mitigation plan would help to offset the aquatic habitat function loss that would result from this project. Furthermore, Fort Stewart Fish & Wildlife monitors and maintains the quality of Fort Stewart aquatic habitats as part of their fisheries program.

Overall, the proposed projects will not have a significant impact on Fort Stewart aquatic habitats and species.

4. Compensatory Mitigation: As defined in the NEPA regulations, compensatory mitigation is "*compensation for the impact by replacing or providing substitute resources or environments*" (40 C.F.R. Part 1508.20). The Installation utilized the Compensatory Mitigation Rule (33 CFR Part 332) when developing its mitigation plan for the proposed FY11 Multipurpose Machine Gun Range, FY11 Infantry Platoon Battle Course, FY13 Qualification Training Range, and the FY13 Digital Multipurpose Training Range. For projects beyond FY 2011, Fort Stewart has not precluded the use of other acceptable compensatory mitigation alternatives (provided through mitigation banks or in-lieu fee programs). Similar to the process outlined in the Compensatory Mitigation Rule, the Installation's standard procurement processes conducts market research in accordance with the Federal Acquisition Regulation. This research requirement as it relates to contracting of off-post wetland credit purchases includes evaluating the current market and availability of primary and secondary service area mitigation credits. This process will also be implemented when seeking mitigation options for ranges beyond FY11.

Proposed project: The proposed project supporting military training will adversely impact 26.7 acres of jurisdictional wetland. To mitigate for these impacts the applicant would purchase 216.27 mitigation credits from a USACE approved mitigation bank that services the project area. Additionally, some small projects will be mitigated through debits from the Installation's on-post wetland mitigation bank. As such, any adverse impacts to wetlands and other waters of the U.S. caused by this project would be offset by the proposed mitigation.

Summary: The main public detriment that would result from this project would be the loss of 26.7 acres of jurisdictional wetlands. Many of the wetland functions and values important to the public, such as flood attenuation, sediment retention, fish and wildlife habitat, and others, would be replaced by the applicant's mitigation plan. Additionally, Fort Stewart's past mitigation efforts (approximately 3,230 acres) have adequately offset impacts within the boundaries Fort Stewart. Mitigation for the current projects will be offset through additional mitigation efforts,

including the use of off-site USACE approved wetland mitigation banks. The mitigation plan would also provide adequate compensation for the impacted wetlands through the implementation of wetland restoration, creation, enhancement and preservation. The proposed projects would not impact federal or state protected species or critical habitat. Cultural resources have been considered and it has been determined that they would not be impacted. Overall, the public benefits of the proposed project would outweigh the public detriments.

In view of the above, the USACE has determined that the proposed project, with proposed special permit conditions, would not have a significant impact on wetlands and/or other waters of the U.S. when considered alone or in concert with the other past, present and reasonably foreseeable future projects in the Fort Stewart watersheds.

F. SECONDARY/INDIRECT IMPACTS: See Section E above and the Range and Garrison Construction Environmental Impact Statement, prepared by Fort Stewart.

G. IRREVERSIBLE AND IRRETRIEVABLE RESOURCE COMMITMENTS: Authorization of the applicant's preferred alternative, or any other build alternative, could result in an irreversible and irretrievable commitment of a range of natural, physical, human and fiscal resources. The fossil fuels, labor and construction materials that would be expended, if the project is constructed, are generally not considered irretrievable resources. In addition, these resources are not in short supply and their use would not have an adverse effect upon their continued availability.

H. EFFECT ON FEDERAL PROJECTS: We have determined the proposed activity would not have an adverse effect on any Federal Project (33 CFR 320.4(g)).

PART V - PERMIT ACTION ALTERNATIVES

A. TO ISSUE THE PERMIT IN ACCORDANCE WITH THE PLANS SUBMITTED BY THE APPLICANT: This course of action by itself would be inappropriate because it does not include provision for special conditions (See D. below).

B. TO DENY THE REQUEST FOR A PERMIT: Denial of the permit would not be an appropriate course of action. The proposed activity would not have significant adverse effects

on navigation, the environment or other public interest factors.

C. TO ISSUE THE PERMIT AFTER SUBMITTAL OF MODIFIED PLANS BY THE APPLICANT WITH SPECIAL CONDITIONS: This course of action would not be warranted. Our review of the applicant's plans and alternatives showed the applicant's proposed activity to be the most practicable way to accomplish the applicant's overall purpose.

D. TO ISSUE THE PERMIT IN ACCORDANCE WITH THE PLANS SUBMITTED BY THE APPLICANT WITH SPECIAL CONDITIONS: This would be the appropriate course of action to follow. In order to protect the public interest the following special conditions would be placed on any permit issued:

1. All dredged or borrowed material used as fill on this project will be from clean, uncontaminated sources and free from cultural resources.

2. That no construction activity or stockpiling will occur in waters of the United States, including wetland areas, outside of the areas authorized for filling under this permit.

3. Prior to the commencement of construction activities for this project, the limits of the proposed fill areas in jurisdictional waters shall be clearly flagged and staked by you and/or your contractors. All construction personnel shall be shown the location(s) of all wetland and/or stream areas outside of the construction area to prevent encroachment from heavy equipment into these areas.

4. Borrow site or sites for stockpiling fill dirt shall be prohibited within 200 feet of streambanks, 50 feet of wetlands and open waters or elsewhere runoff from the site would increase sedimentation in waters of the United States unless specifically authorized by this permit. Normal grading activities such as cutting and filling within 200 feet of streams or 50 feet of wetlands/open waters are authorized.

5. Construction debris, liquid concrete, old riprap, old support materials, or other litter shall not be placed in streams or in areas where migration into streams and/or wetlands could reasonably be expected.

6. Staging areas and equipment maintenance areas will be located at least 200 feet from streambanks to minimize the potential for wash water, petroleum products, or other contaminants

from construction equipment entering the streams.

7. The permittee shall ensure that the project's master drainage plan is designed and implemented to avoid inadvertent drainage of wetlands and inadvertent water diversion resulting in a reduction of hydrology in wetlands. The permittee shall also ensure that secondary road ditches and/or small after-project drainage ditches do not inadvertently impact wetlands or waters of the US.

8. The permittee shall minimize bank erosion and sedimentation in construction areas by utilizing BMPs for stream corridors, installing and maintaining significant erosion and sediment control measures, and providing daily reviews of construction and stream protection methods. Check dams and riprap placed in streams and wetlands as erosion control measures are considered a fill and not authorized under this permit unless they were specifically authorized by this permit.

9. All work conducted under this permit shall be located, outlined, designed, constructed and operated in accordance with the minimal requirements as contained in the Georgia Erosion and Sedimentation Control Act of 1975, as amended. Utilization of plans and specifications as contained in "Manual for Erosion and Sediment Control, (Latest Edition)," published by the Georgia Soil and Water Conservation Commission or their equivalent will aid in achieving compliance with the aforementioned minimal requirements.

10. You shall obtain and comply with all appropriate Federal, state, and local authorizations required for this type of activity. A stream buffer variance may be required. Variances are issued by the Director of the Georgia Environmental Protection Division (EPD), as defined in the Georgia Erosion and Sedimentation Control Act of 1975, as amended. It is our understanding that you may obtain information concerning variances at the Georgia EPD's web site at www.gaepd.org or by contacting the Watershed Protection Branch at (404) 675-6240.

11. If you or your contractors discover any federally listed threatened or endangered species and/or their habitat while accomplishing the activities authorized by this permit, you must immediately STOP work in the area and notify the issuing office of what you have found. We will initiate the Federal and state coordination required to determine if the species and/or habitat warrant further consultation with the USFWS.

12. Prior to the commencement of construction activities for this activity, the permittee

shall insure that this project complies with all applicable rules, requirements, and/or regulations of the FEMA and/or the Georgia Floodplain Management Office with regard to construction activities in designated floodplains and/or floodways prior to commencement of work activity, to include revisions to the National Flood Insurance Program maps if required.

13. Prior to the commencement of any work in jurisdictional waters of the United States for this activity, you will purchase wetland mitigation credits from an approved wetland mitigation bank. You or the mitigation bank sponsor must provide this office with documentation of this purchase before any work may commence. The notice should reference the USACE file number assigned to this project.

14. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the NRHP.

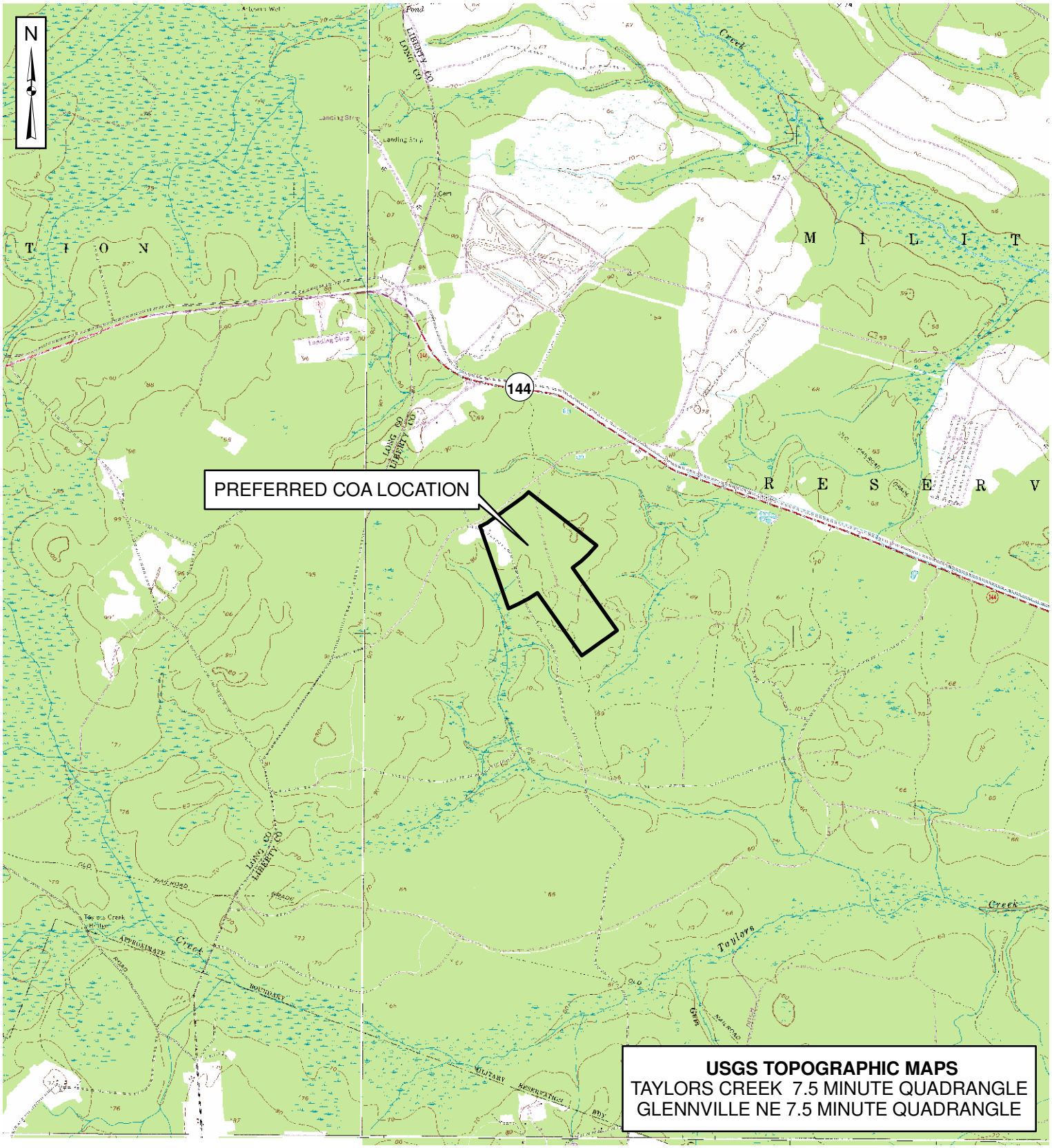
15. The permittee, US Army Fort Stewart, is the lead federal agency for this proposed action. The permittee shall meet all lead federal agency responsibilities pursuant to Section 7 of the Endangered Species Act, prior to any work occurring in waters of the US subject to the jurisdiction of the USACE.

16. The permittee, US Army Fort Stewart, is the lead federal agency for this proposed action. Fort Stewart shall meet all lead federal agency responsibilities pursuant to Section 106 of the National Historic Preservation Act, prior to any work occurring in waters of the US subject to the jurisdiction of the USACE.

17. The site design for this project has not been finalized. Authorized wetland impacts are based on a standard range design. Prior to conducting any work in wetlands on this project site, the permittee shall submit final site development plans to the USACE for review and approval. No work in wetlands can occur until the USACE has reviewed and approved the final plan in writing; this concurrence letter needs to document that the 404(b)(1) process has been adequately demonstrated. It is anticipated that once final design is completed, there will be a minor reduction in the amount of wetland area that will be impacted by the project. This anticipated change in the footprint of authorized wetland impact is authorized under this permit and modification of the permit will not be required for this change in site design.

18. If a conditioned Water Quality Certification has been issued for your project, you must comply with conditions specified in the certification as Special Conditions to this permit.

PART VI – COURSE OF ACTION FIGURES



VICINITY MAP - PREFERRED COA

1" = 4,000'

0 2,000 4,000 8,000 Feet

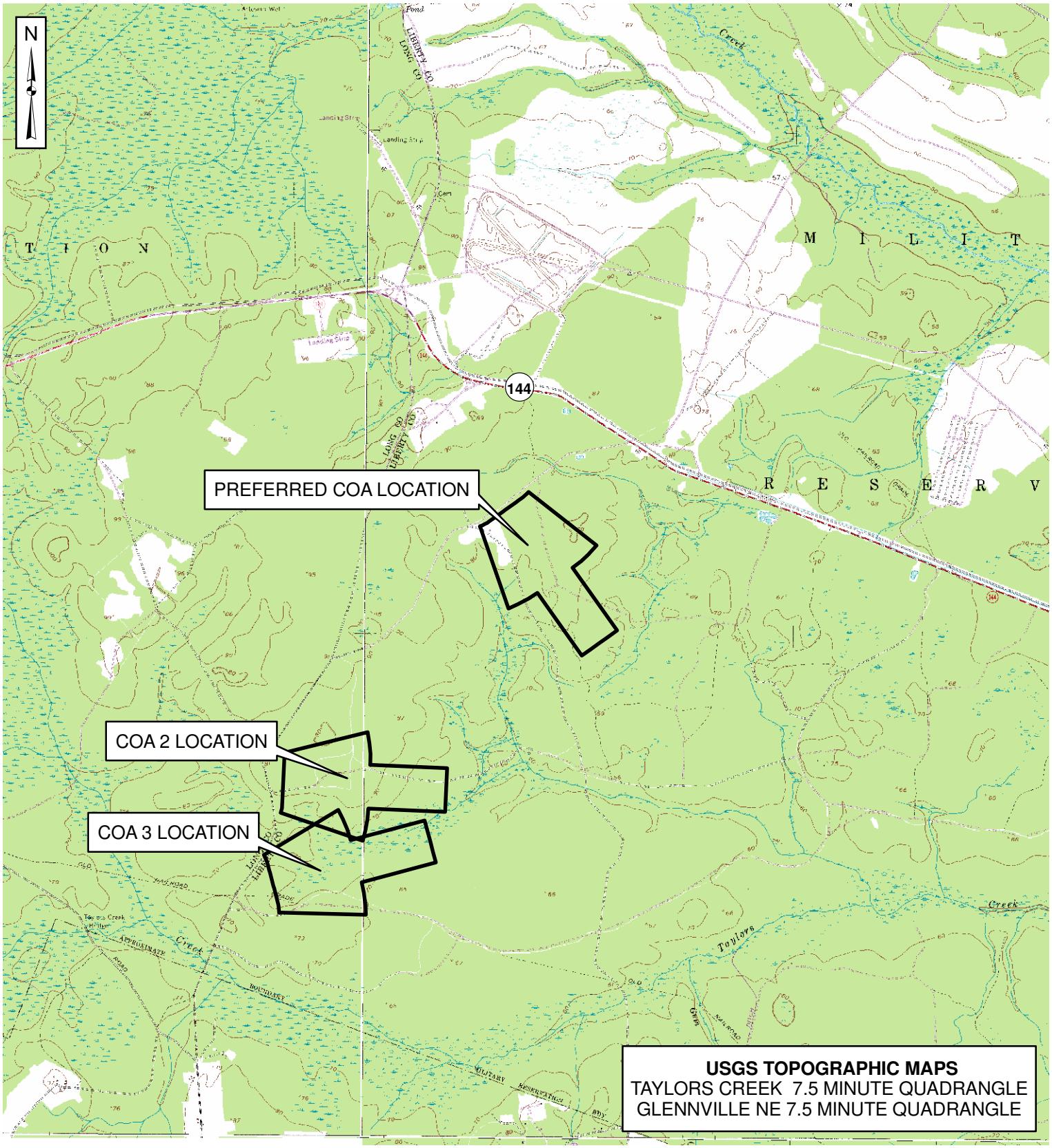
PROJECT: QTR - QUALIFICATION TRAINING RANGE

COUNTY: LIBERTY

SURVEY DATUM: UTM

FIGURE: 1 OF 5

DATE: NOVEMBER 2009



VICINITY MAP - CONSIDERED COAS

1" = 4,000'

0 2,000 4,000 8,000 Feet

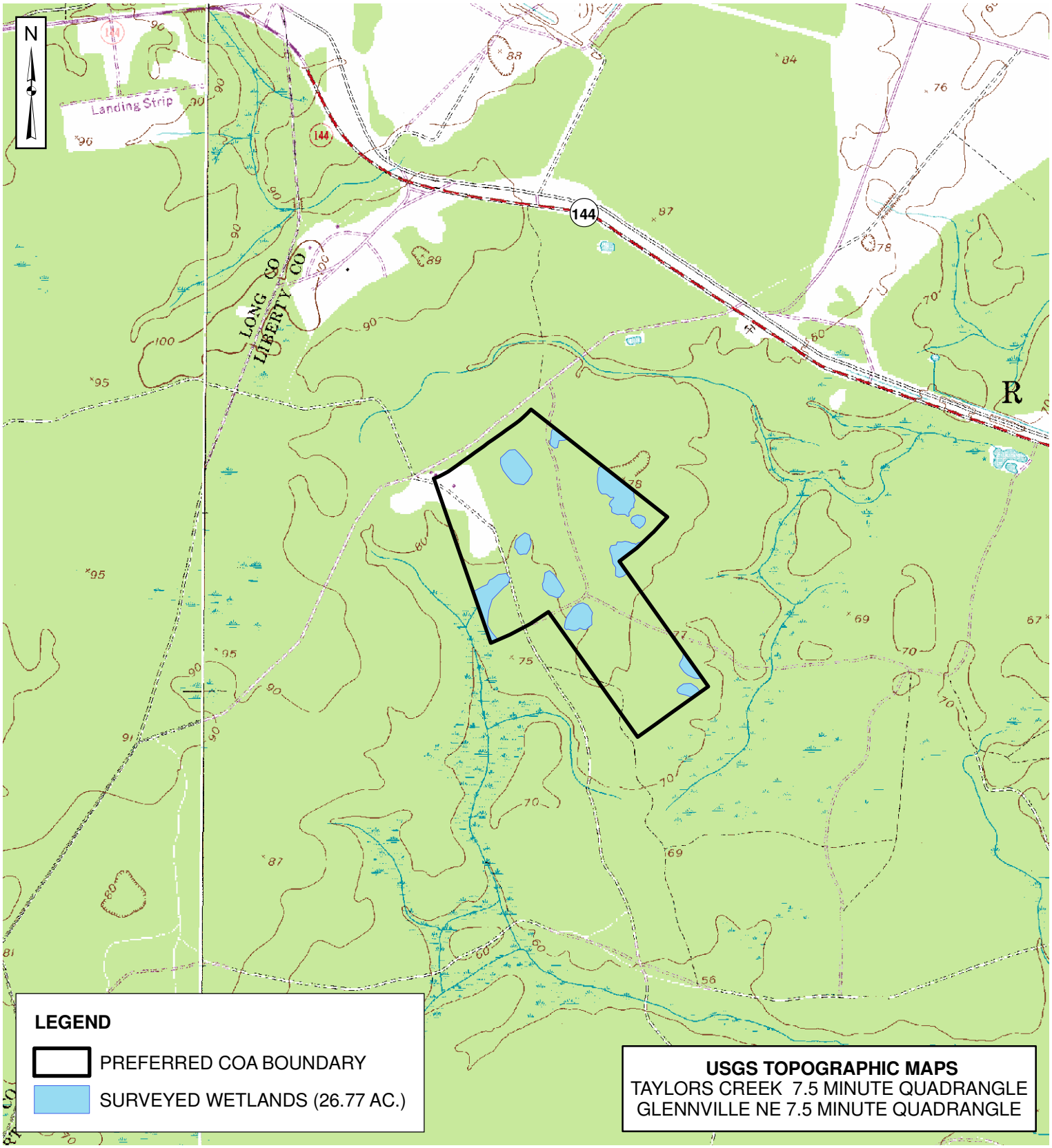
PROJECT: QTR - QUALIFICATION TRAINING RANGE

COUNTY: LIBERTY

SURVEY DATUM: UTM

FIGURE: 2 OF 5

DATE: NOVEMBER 2009



LOCATION MAP - PREFERRED COA

1" = 2,000'

0 1,000 2,000 4,000 Feet

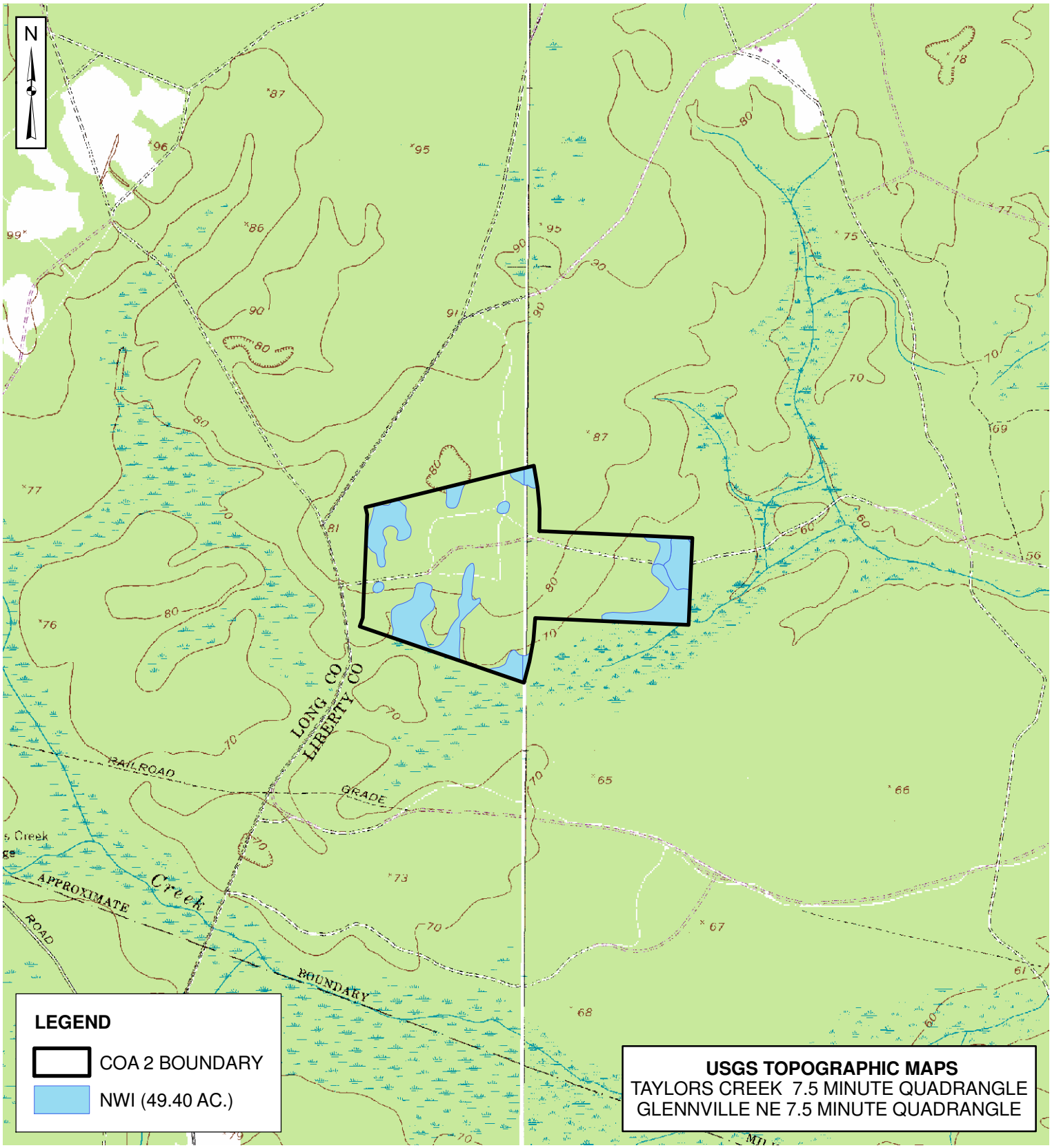
PROJECT: QTR - QUALIFICATION TRAINING RANGE

COUNTY: LIBERTY

SURVEY DATUM: UTM

FIGURE: 3 OF 5

DATE: NOVEMBER 2009



LOCATION MAP - COA 2

1" = 2,000'

0 1,000 2,000 4,000 Feet

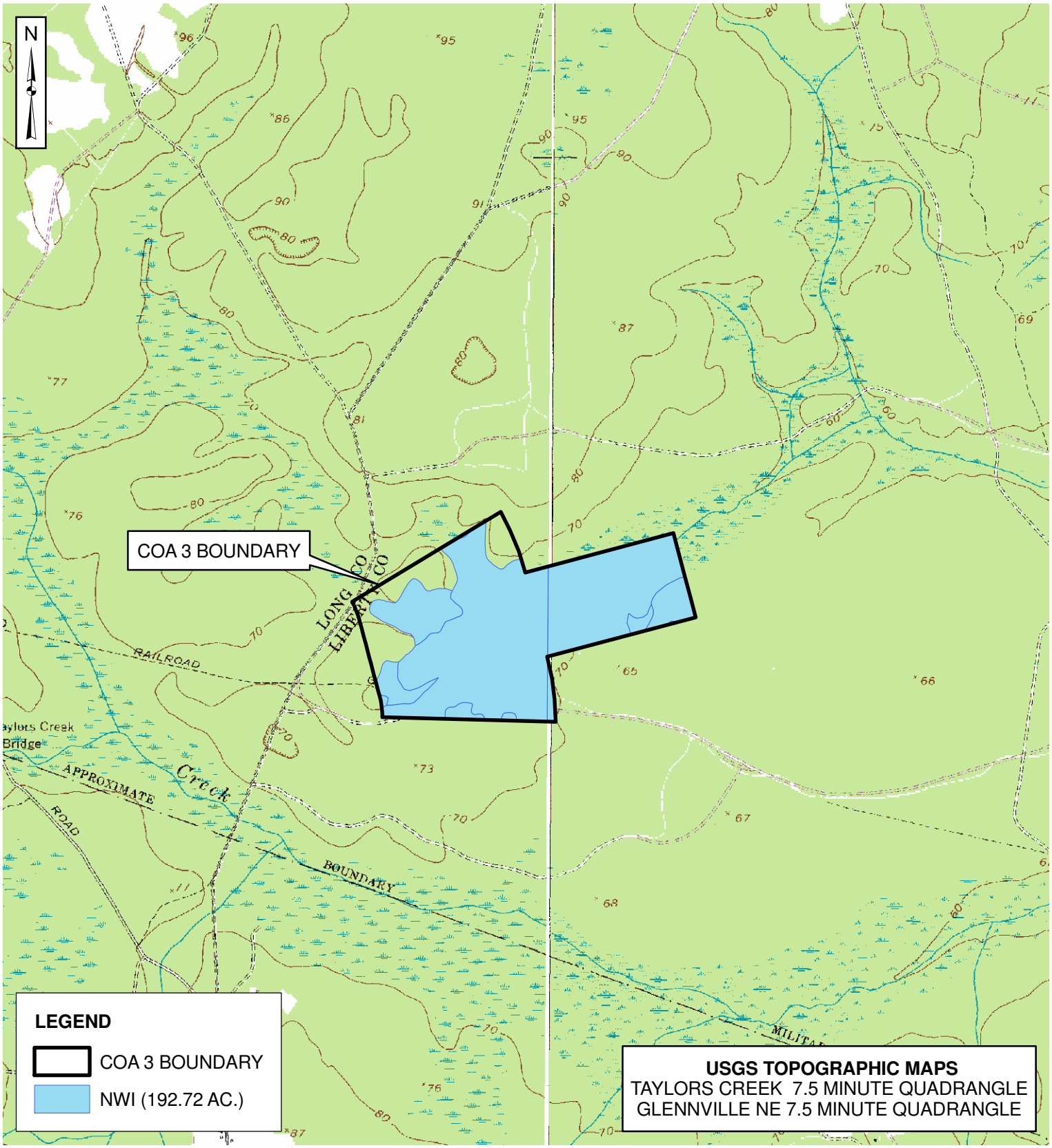
PROJECT: QTR - QUALIFICATION TRAINING RANGE

COUNTY: LIBERTY

SURVEY DATUM: UTM

FIGURE: 4 OF 5

DATE: NOVEMBER 2009



LOCATION MAP - COA 3

1" = 2,000'

0 1,000 2,000 4,000 Feet

PROJECT: QTR - QUALIFICATION TRAINING RANGE

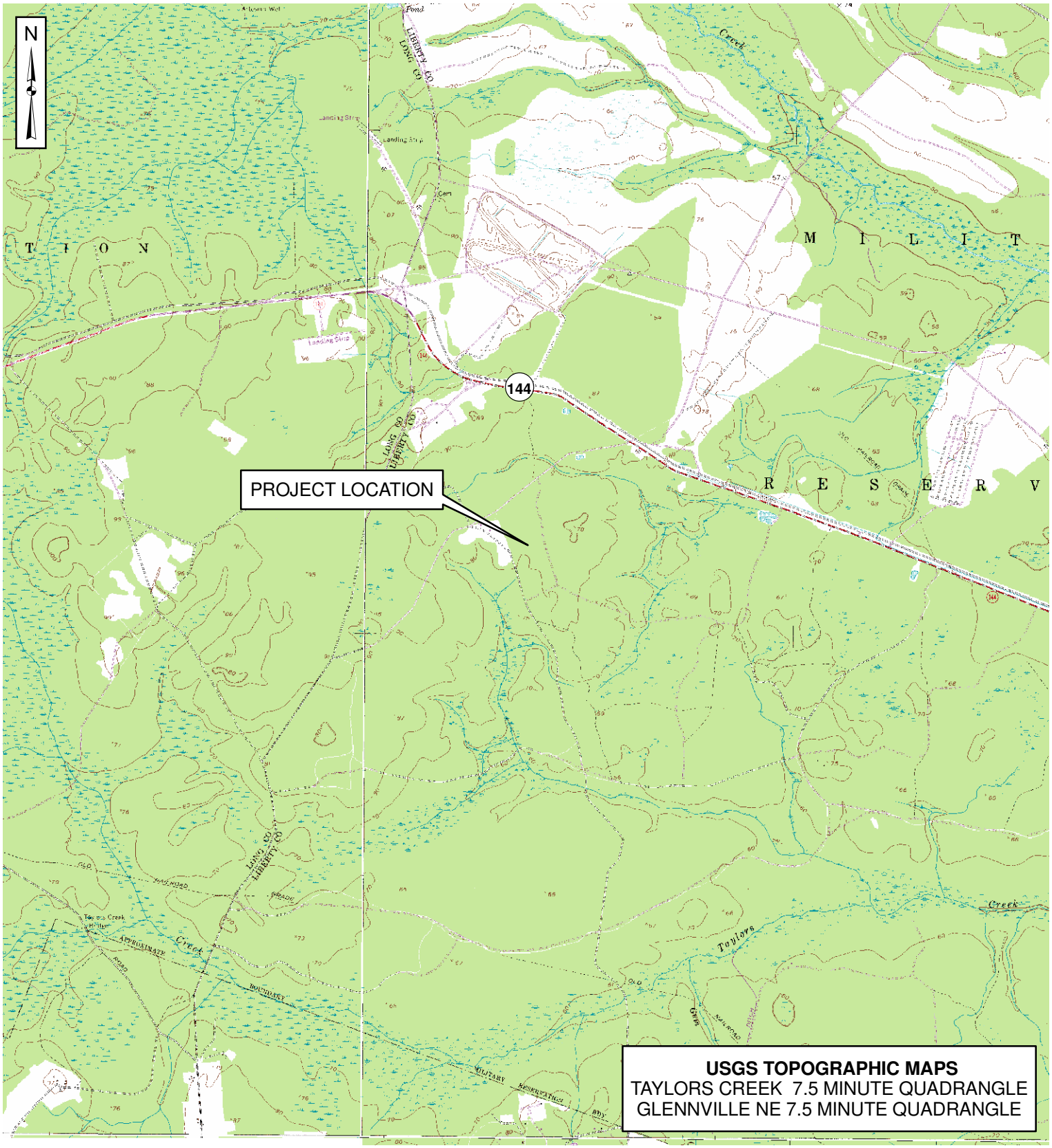
COUNTY: LIBERTY

SURVEY DATUM: UTM

FIGURE: 5 OF 5

DATE: NOVEMBER 2009

PART VII – PERMIT FIGURES



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN A QUALIFICATION TRAINING RANGE TO TRAIN SOLDIERS IN COMBAT PROFICIENCY

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

PROJECT VICINITY MAP

1" = 4,000'

0 2,000 4,000 8,000 Feet

APPLICANT:
FORT STEWART DPW

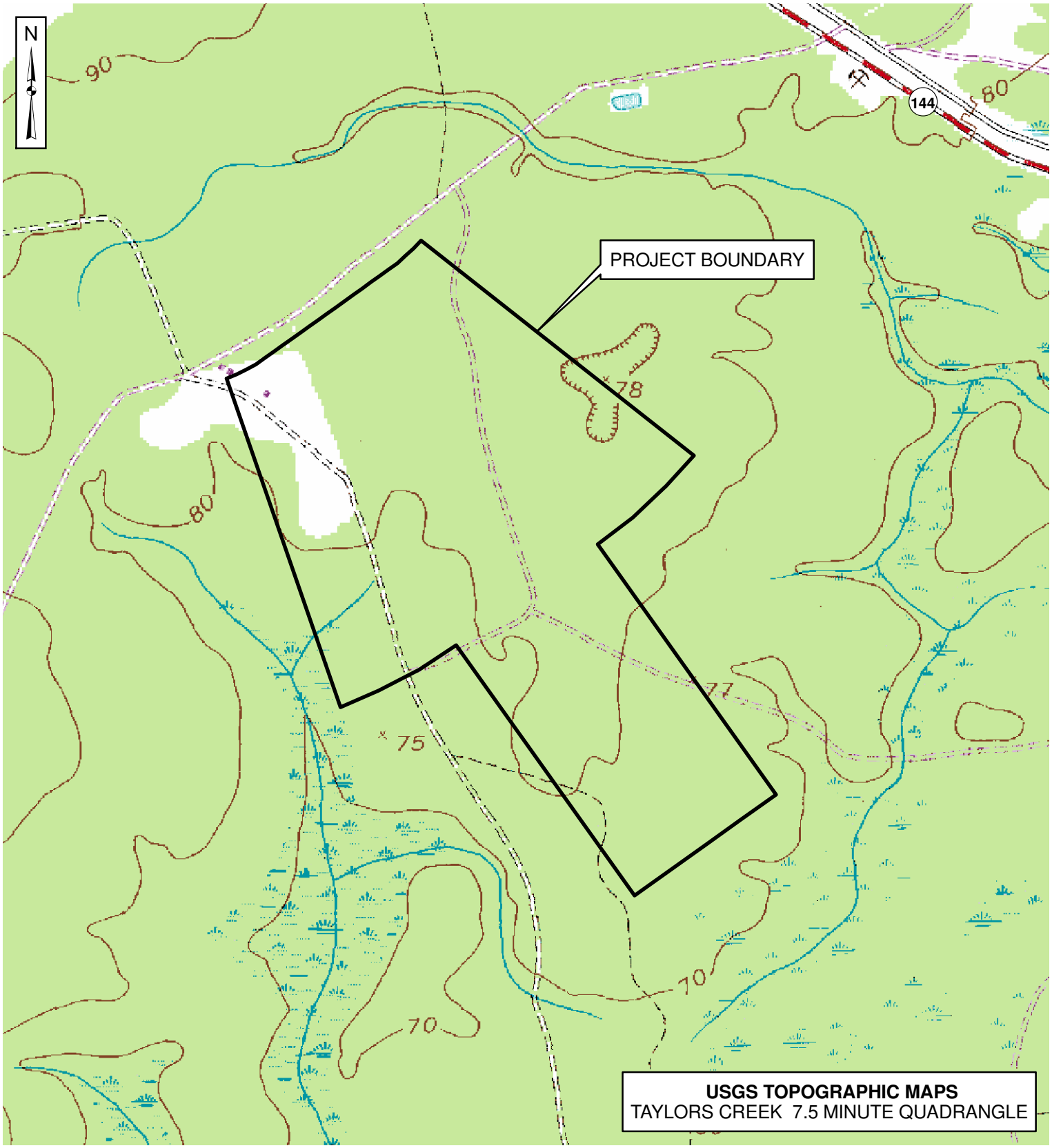
PROPOSED: WETLAND FILL

NEAREST WATERBODY: TRIBUTARY OF TAYLORS CREEK

COUNTY: LIBERTY

FIGURE: 1 OF 6

DATE: NOVEMBER 2009



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN A QUALIFICATION TRAINING RANGE TO TRAIN SOLDIERS IN COMBAT PROFICIENCY

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

PROJECT LOCATION MAP

1" = 1,000'

0 500 1,000 2,000 Feet

APPLICANT:
FORT STEWART DPW

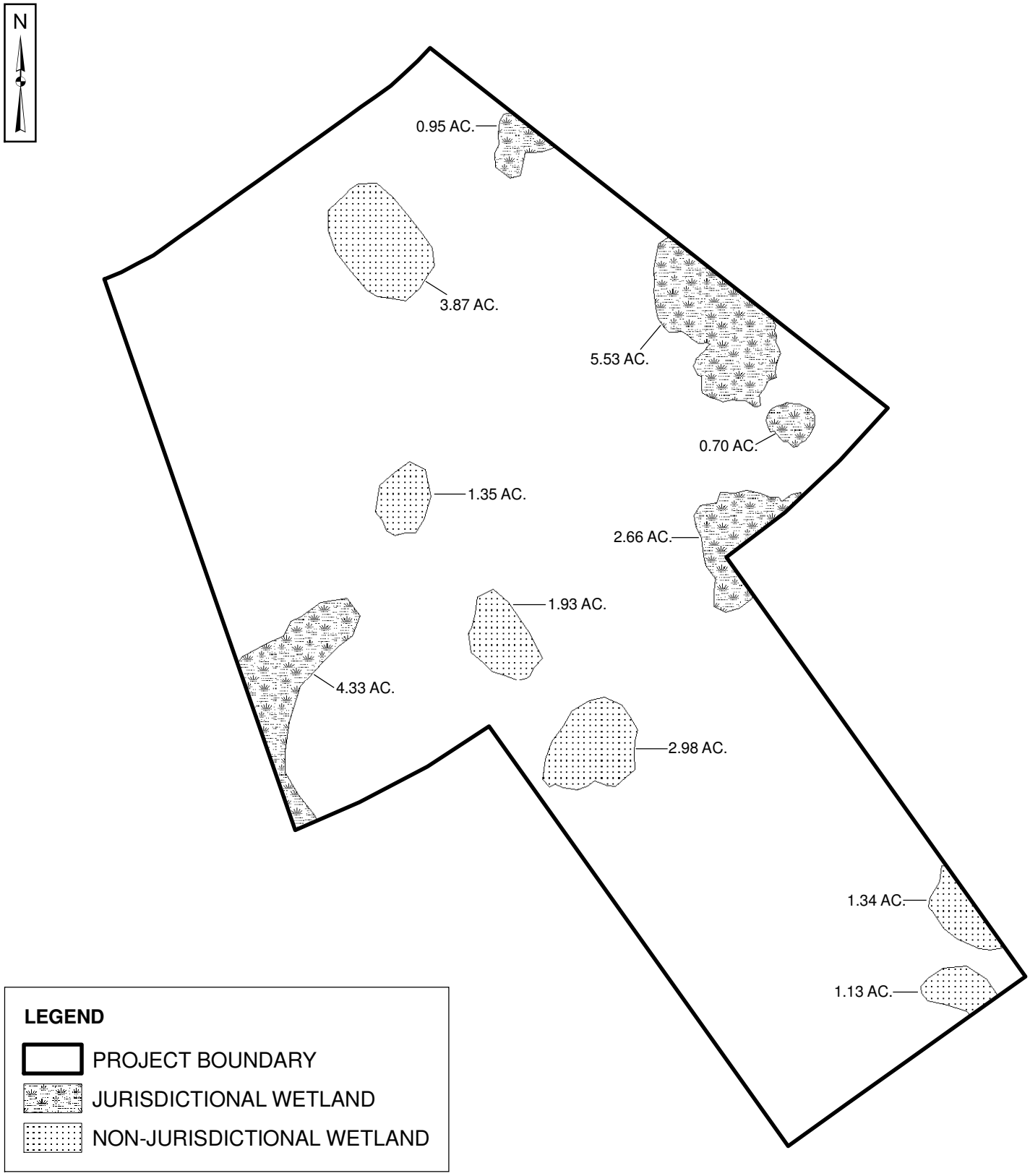
PROPOSED: WETLAND FILL

NEAREST WATERBODY: TRIBUTARY OF TAYLORS CREEK

COUNTY: LIBERTY

FIGURE: 2 OF 6

DATE: NOVEMBER 2009



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN A QUALIFICATION TRAINING RANGE TO TRAIN SOLDIERS IN COMBAT PROFICIENCY

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

EXISTING CONDITIONS

1" = 625'

0 312.5 625 1,250 Feet

APPLICANT:
FORT STEWART DPW

PROPOSED: WETLAND FILL

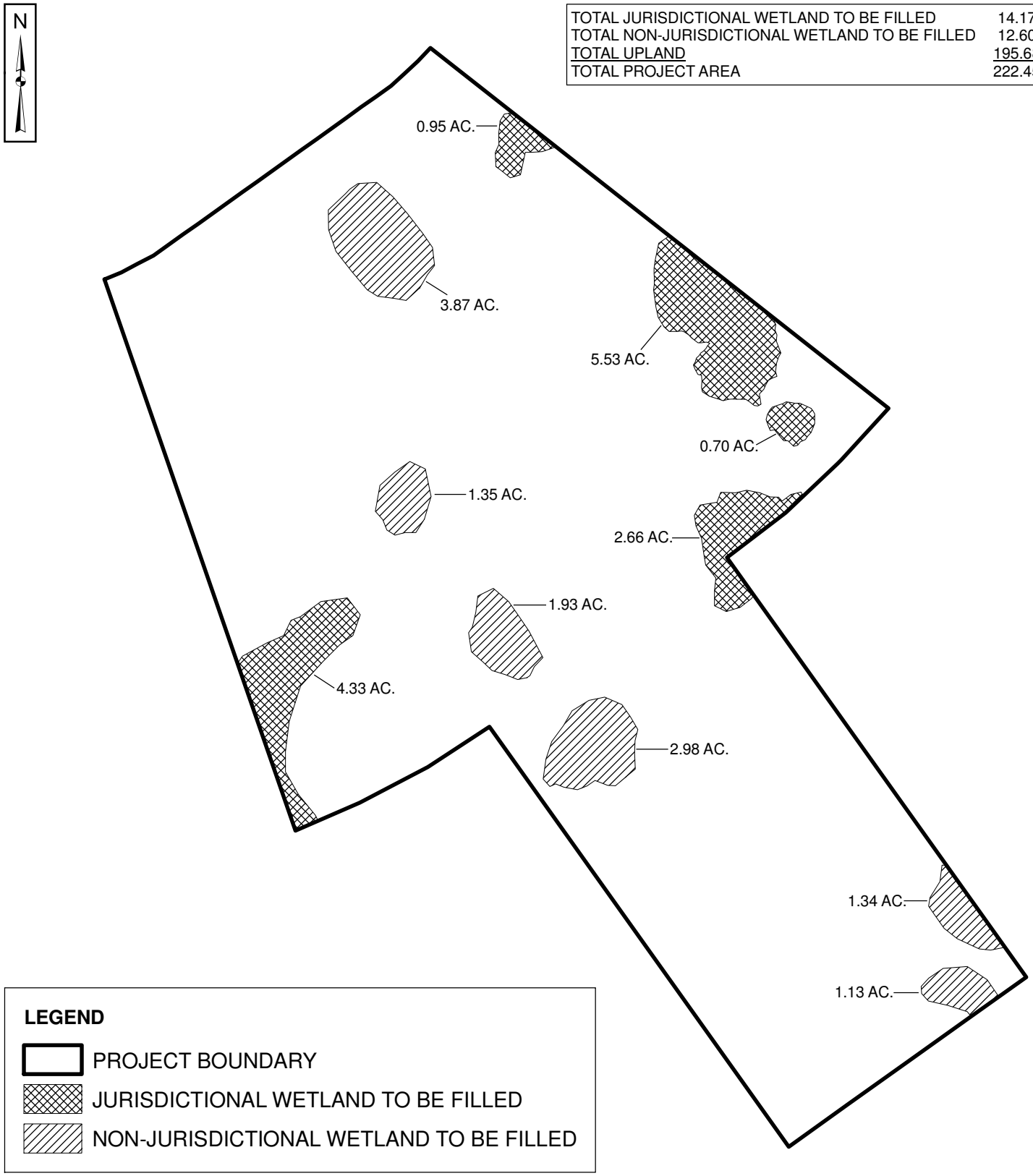
NEAREST WATERBODY: TRIBUTARY OF TAYLORS CREEK

COUNTY: LIBERTY

FIGURE: 3 OF 6

DATE: NOVEMBER 2009

TOTAL JURISDICTIONAL WETLAND TO BE FILLED	14.17 AC.
TOTAL NON-JURISDICTIONAL WETLAND TO BE FILLED	12.60 AC.
TOTAL UPLAND	195.68 AC.
TOTAL PROJECT AREA	222.45 AC.



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN A QUALIFICATION TRAINING RANGE TO TRAIN SOLDIERS IN COMBAT PROFICIENCY

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

PROPOSED CONDITIONS

1" = 625'

0 312.5 625 1,250 Feet

APPLICANT:
FORT STEWART DPW

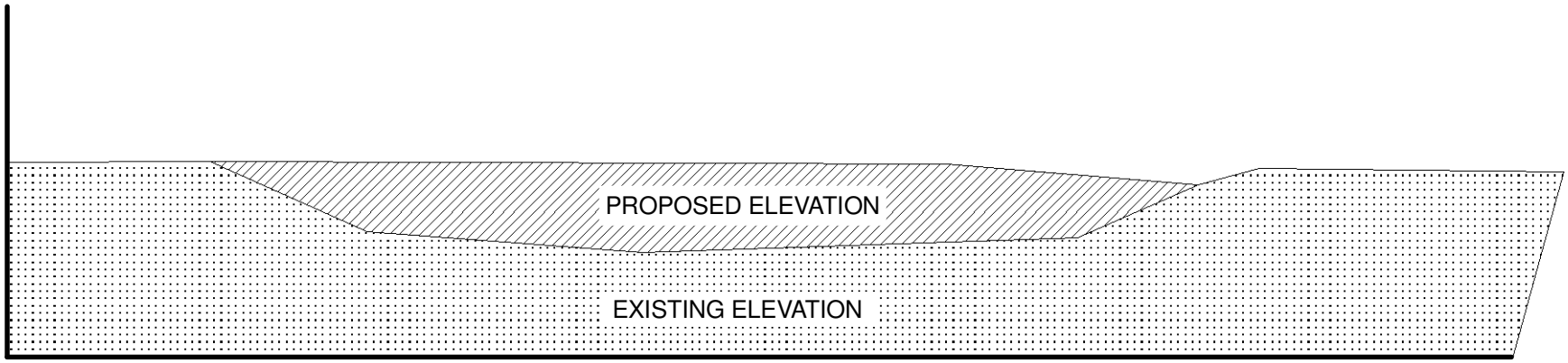
PROPOSED: WETLAND FILL

NEAREST WATERBODY: TRIBUTARY OF TAYLORS CREEK

COUNTY: LIBERTY

FIGURE: 4 OF 6

DATE: NOVEMBER 2009



PURPOSE: CONSTRUCT, OPERATE, AND MAINTAIN A QUALIFICATION TRAINING RANGE TO TRAIN SOLDIERS IN COMBAT PROFICIENCY

ADJACENT PROPERTY OWNERS:
1. SEE ATTACHED

SURVEY DATUM: UTM

CROSS-SECTION

NOT TO SCALE

APPLICANT:
FORT STEWART DPW

PROPOSED: WETLAND FILL

NEAREST WATERBODY: TRIBUTARY OF TAYLORS CREEK

COUNTY: LIBERTY

FIGURE: 5 OF 6

DATE: NOVEMBER 2009

PART VII – PERMIT FIGURES

Master List of Past, Present, and Future Actions

Project or Activity	Time Frame	Spatial Extent (if known)
FSGA (then known as Camp Stewart) established as an anti-aircraft training base, and a number of small arms and artillery ranges were constructed.	1940-1941	
Camp Stewart reopens as the Third Army Antiaircraft Artillery Training Camp at the onset of the Korean War.	1950	
The Army authorized construction of tank firing ranges and maneuver areas and the following year the base was renamed Camp Stewart Antiaircraft Artillery and Tank Training Center.	1953	
Army designated base as Fort Stewart, a permanent Installation.	1956	280,000 acres
Fort Stewart became the Advanced Flight Training Center (AFTC), part of the Army's Aviation School, based out of Fort Rucker, Alabama. In conjunction with HAAF, acquired by the Army in 1967, the AFTC trained both fixed and rotary wing pilots in advanced flight, gunnery, and tactical courses. Many of the smaller cantonment areas originate from this time, including Evans Field and the NCO Academy (originally TAC X). Liberty Field was also completely redeveloped in support of fixed wing training, and renamed Wright Army Airfield.	1966	
Training areas and ranges greatly expanded, along with massive building programs constructing permanent barracks, motorpools, family housing, community, and recreation facilities. In 1974 base became home to the 24th Infantry Division [reflagged in 1996 as the Third Infantry Division (Mechanized)].	1970s – 1980s	
Brigade Marshalling Area and Tank Trail	1993	
Tank Commanders Proficiency Course, FS 40 Road bridge, and Railroad pass tracks	1994	
Training Area A-11 Wetlands Restoration	1996	
Canoochee Creek Reservoir ("Pond 4") Mitigation bank established.	2000	
Multipurpose Training Range	2000	
15th Street Access Control Point	2001	
Convoy Live Fire Ranges	2004	
4th Unit of Action (now 2nd BCT) Facilities	2004	
Bridge 30/E12	2005	

Convoy Live Fire Road Widening	2006	
Digital Multipurpose Range Complex	2007	
Strum Bay Restoration	2008	
Fort Stewart WWII Wood Buildings Demolition	1992-2008	958,156 SF
Fort Stewart WWII Wood Buildings Demolition	2009-2014	45,928 SF
Fort Stewart WWII Wood Buildings Demolition	Beyond 2014	122,683 SF
Cantonment construction and expansion	Past-present	7,567 acres
Construction activities to support garrison and training functions (including tenant unit mobilizations) and projects that have already been analyzed by NEPA (see Table 5-X).	2008-present	
New and ongoing construction associated with the Installation Priority Board (IPB) (see Table 5-X for FY10 IPB projects list):	2010	
FY11-FY14 Range, Cantonment, and Traffic Improvement construction.	Proposed Action	
New and continuous training and major construction (see Table 5-X for complete project list). Training would continue to support Third Infantry Division training as required by Command to include live-fire, mounted, and dismounted training; Tenant Unit Mobilizations, and UAS training.	Future	FSGA Range and Maneuver Areas
Arrival of the EN BN (see Table 5-X for population totals)	2010	Up to 50-acre expansion of FSGA cantonment area; 417 Soldiers
Arrival of the Warrior UAS Unit (see Table 5-X for population totals)	2012	Up to 130-acre expansion of WAAF; 17 Soldiers
ITAM Projects, including low water crossings	Ongoing	
Range and Training Land Assessment Monitoring	Ongoing	
FSGA ICRMP and PA	2001-future	
FSGA INRMP and ESMP	1997-future	FSGA Range and Maneuver Areas for the purposes of timber harvesting, mowing, prescribed burning, data collection, etc.

2008-Present Projects and Projects with NEPA completion

Fiscal Year	Project	NEPA Type
2008	Stockton Circle upgrades near existing PX.	REC, project was categorically excluded using C-1.
2008	Modular Child Development Centers (CDCs) near Fort Stewart housing areas.	REC, projects were categorically excluded using C-1.
2008	Holbrook recreation area RV storage expansion and pet boarding facility.	REC, project were categorically excluded using C-1.
2008	Unaccompanied Personnel Housing near Fort Stewart's housing area.	EA that covered construction and operation of the facility.
2008	Echelons Above Brigade (EAB) Barracks to support QM and EOD units.	REC, project was categorically excluded using C-1. Project was sited to avoid impacts to sensitive environmental resources.
2008	Warrior Transition Complex in Fort Stewart's cantonment area.	REC, project was categorically excluded using C-1 and C-2
2009	Reuse Water Pipeline (Purple Pipe) from City of Hinesville to Fort Stewart's Central Energy Plant and Golf Course.	REC, project was categorically excluded using C-1.
2009	QM and HR Tactical Equipment Maintenance Facilities located near Fort Stewart's existing motorpool complex.	EA that covered construction, operation, and wetland mitigation and permitting.
2009	4IBCT Complex in B-5.	EA that covered construction, operation, wetland mitigation and permitting, and impacts to RCW clusters and habitat.
2009	Recycling Center near existing processing station.	REC, project was categorically excluded using C-1.
2009	Fort Stewart Fire Station off 15th Street.	REC, project was categorically excluded using C-1.
2009	WAAF Fire Station.	REC, project was categorically excluded using C-1.
2009	Replace Chilled Water Distribution System at Fort Stewart's Central Energy Plant.	REC, project was categorically excluded using C-2.

2009	Renovation of Army Lodging building 4950.	REC completed to cover asbestos abatement requirements.
2009	Renovation of Stewart Lanes Bowling Alley.	REC completed to cover asbestos abatement requirements.
2009	Improvised Explosive Device (IED) Course at Fort Stewart.	REC, project was categorically excluded using C-1. Facades and overpasses were constructed to avoid sensitive resources.
2009	56th Infantry Brigade Combat Team Mobilization at Fort Stewart	REC, project was categorically excluded using I-3, Training and Testing.
2009	Army Community Services building.	REC, project was categorically excluded using C-1.
2010	NCO Academy Tank Trail in Training Area F-20.	EA that covered construction, operation, wetland permitting, and impacts to RCW habitat.
2010	Liberty County Middle School on 15th Street.	EA that covered construction, operation, wetland mitigation and permitting, and impacts to RCW habitat.
2010	DoD Elementary School near existing housing area in Fort Stewart's cantonment area.	EA that covered construction of greater than 5 acres of new disturbance.
2010	Winn Army Community Hospital addition and alterations.	REC, project was categorically excluded using C-1.
2010	Sniper Field Fire Range in Delta Small Arms Impact Area.	EA that covered construction, operation, wetland mitigation and permitting, and impacts to RCW habitat.
2010	Mobile Vehicle and Cargo Inspection System relocation to HWY 119. Project is also on FY10 IPB list.	EA that covered construction, operation, and impacts to RCW habitat.
2010	Range Control Operations Complex located near Holbrook Pond. Project is also on FY10 IPB list.	EA that covered construction, operation, and impacts to RCW habitat. Wetland impacts will likely be avoided during design.
2010	Name Brand Casual Dining Facilities for Fort Stewart.	REC, project was categorically excluded using C-1. ECP and ROA-C completed for lease.

2011	Training Support Center near existing Range Control facilities.	REC, project was categorically excluded using C-1 and will not have cumulative impacts. Project was sited to avoid sensitive environmental resources.
2012	Battle Command Training Center (BCTC) at Evans Army Airfield. Project was originally an FY10 project.	EA that covered construction, operation, potential wetland impacts and impacts to RCW habitat.
2012	2nd BCT Physical Fitness Facility near existing 2nd BCT complex.	REC, project was categorically excluded using C-1 and will not have cumulative impacts. Project was sited to avoid sensitive environmental resources.
2013	Soldier Service Center Addition in Fort Stewart's cantonment area.	REC, project was categorically excluded using C-1. Project will not impact any sensitive resources.
2013	Kennel Complex at WAAF	REC, project was categorically excluded using C-1. Project will not impact any sensitive resources.
2014	Hero Road Expansion in Fort Stewart's cantonment area.	REC, project was categorically excluded using C-1.

FY10 Installation Priority Board (IPB) Projects

FY10 IPB PRI	QMB PRI	QMB ACTION	Project Description	Status	OMNI	STRATEGIC FOCUS
1	1	PP&R 2.3.1.1.13	Motor Pool Enhancement Project	Motorpools (priorities 1-5), VMF renovation requirements (SRM) at FS - **Bldg 1201** 4th BCT 3/7 IN BN, PN 56284 LR, **Bldg 1220** 4th BCT 3/7 IN BN, PN 56271 LR, **Bldg 1259** 4th BCT 3/7 IN BN, PN 56284 LR, **Bldg 1840** 3rd SUST 135 QM CO PETRO, **Bldg 1245** 1st BCT 6/9 AR BN FY 09 VMF renovations: Bldg 1205 awarded 11 Aug. Bldg 1208 awarded 19 Aug. Bldg 1209, 1211, 1215 in DOC	120	Life, Health, and Safety; Impacts Facility ISR ratings, Support ARFORGEN.
2	1	S&S 5.1.3.16.2	Repair of Fire Hydrants	YB-00153-9J, DPW to submit action to hire A-76 contractor personnel to complete non-critical hydrant repairs.	114	Life/Health/Safety
3	1	TS 1.1.1.6.18	Construct Range Branch Operations and Training Facility.	IJO YG9-09-9J. Facility to be located in Training Area A-17.	105	A key facility in providing operational and training support capabilities for our customers. Safety issue.
4	1	WB 3.2.6.15.9	Construct Marne Admin Law and Tax Center.	DD-015-9J.	105	Swing space. Customer Service.
5	3	S&S 5.1.4.2.11	Relocate Access Control Point to HWY 119 (Middle School)	YB-001549-J	105	Life/Health/Safety. Relocation of the MVACIS Facility
6	1	OR 4.5.1.1.13	Construct facility to house Residential Community Initiative (RCI) personnel.	RCI personnel were displaced when their WWII wood facility was taken down. They currently occupy space in a Balfour Beatty facility that is scheduled to be taken down.	51	Reduce WWII Wood Facilities.
7	2	PP&R 2.4.3.5.6	Correct QAE Taxiway Sign findings	IJO# JA-17-8J, JA-15-8J, JA-16-8J	36	Deployment readiness, Regulatory, Safety Management.
8	2	TS 1.3.3.4.2	Renovate Evans Dining Facility.	IJO YGB 5-5J.	171	Impact on Military Training and Safety. ARFORGEN.
9	4	S&S 5.1.3.12.8	Renovation/expansion of the Fire Station in WAAF	IJO Y.B. -001529J	105	Renovation to house personnel expansion. Life/Health/Safety

10	5	PP&R 2.3.4.2.25	Construct Army Combat Uniform ACU / Rapid Fielding Initiative RFI facility	IJO# YG-0011-8J Construct a facility for RFI mission to replace facility at WAAF	75	Division Readiness, ARFORGEN.
11	2	S&S 5.1.3.17.2	Upgrade of the transceiver radio to narrowband		126	Army Mandated
12	2	OR 4.4.5.1.5	Construct New Multimedia Visual Information Center (MVIC).	Leave DAPS in Building 136. Eliminates Temp Facilities Building 136 and 137 (doublewide trailer), two storage shed sitting in the shadow of the Main Post Chapel.	105	Grow the Army, Quality of Life, Customer Service.
13	2	WB 3.4.1.4.47	Construct Outdoor Rec Bldg – HAAF	FA-01-8J, In design at COE.	66	Army Family Covenant
14	3	PP&R 2.3.4.2.28	Security Cage in DOL Bldg 2916	IJO# S6S-16-9J Storage Issue of Securing Equipment	132	Sensitive Storage Accountability Issues, ARFORGEN.
15	3	TS 1.2.3.4.22	Construct Urban Compound.	YG9-70-7J, vicinity Obstacle course, PAT recommendation.	78	CLOSE-IN Training. Impact on Military Training and Readiness. ARFORGEN.
16	3	WB 3.4.1.4.54	Renovate Caro Fitness Center & turn Basketball Court into Combative Room	SF-70-8J Expecting stimulus dollars for renovation but not for combative room	66	Army Family Covenant / Improves Appearance
17	4	PP&R 2.3.1.2.11	DOL Small Arms Repair Facility, Hunter AAF. Actions were dropped from original contract	IJO# DB-002-9J,DB-003-9J Install security fence and pour crush and run. Actions were dropped from original contract	102	Impact RESET and Readiness. ARFORGEN
18	4	TS 1.2.3.5.6	Construct Urban Town #1 (St Lo).	YGB 5-5J. **Design complete.**	78	Impact on Military Training and Readiness. ARFORGEN.
19	4	WB 3.4.6.10.1	Rebuild Vale Chapel (Replaces the action to renovate Vale Chapel Youth Ministry)	SC-14-7J, 5,000 sq ft. In design at COE.	45	Army Family Covenant
20	5	S&S 5.2.1.1.49	Construct Running Path - HAAF	C3-0029-9J	117	Life/Health/Safety. Running path along North Lightning Road.
21	5	TS 1.3.2.4.11	Construct CFFT and EST Facility Complex, HAAF.	JD-2-6J, **Design complete.**	105	Impact on Military Training and Readiness. ARFORGEN.
22	6	TS 1.1.1.9.1	Purchase Wetland Mitigation Credits in support of FY11 Machinegun Range construction.	Estimated costs for wetland credits is needed to mitigate the impact of no credits for future range development.	183	131 funds. ARFORGEN. Increase Wetland bank to accommodate ranges in the FYDP. Will run out of credits in FY12 when the 50 CAL Range is completed.

23	6	PP&R 2.4.1.1.10	Reader Boards for the Truscott Air Terminal	IJO# JA-06-8J Mass notification system for DAACG	93	Mission Readiness
24	6	WB 3.4.1.4.43	Renovate Adult Sports Complex Fields	SF-33-8J	45	Army Family Covenant
25	6	S&S 5.1.2.14.1	Expansion of detention cells FS/HAAF	YB-00031-9J	114	Expansion of detention cells to add more square footage to existing capabilities.
26	7	TS 1.2.7.7.9	Construct Tactical UAS Hanger at Evans AAF.	YG9-16-9J.	132	PAT Team recommendation. Eliminates transportation mishaps and provides shelter for storage and maintenance. ARFORGEN.
27	7	PP&R 2.4.1.1.11	Connect HVAC to additional generator at Truscott Air Terminal	IJO# JA-11-6J (backup power)	69	Crisis Support (backup power) Life/Health/Safety
28	7	WB 3.4.1.15.15	Expansion of Rocky's Parking Lot by 50 spaces	SF 100-7, Expansion of lot for patrons. Ready by Year End for funding	48	Army Family Covenant/ Increases access
29	7	S&S 5.1.1.1.19	Relocate non decal vehicle access at FS Gate 1	IJO# YB-00149-9J	33	Quality of Life. Improves access for vehicles with decals.
30	8	TS 1.1.3.6.6	Construct tower, run utilities, make improvements to SA-N	YG9-61-8J	75	CLOSE-IN Training opportunity. Impact on Readiness. ARFORGEN
31	8	PP&R 2.2.3.5.4	Recoat and install security lights at the TMP Hunter AAF	IJO# DC-043-8J Action initiated to satisfy Safety infraction.	72	Safety/Security
32	8	WB 3.4.1.4.72	Replace Wooden Floor at Newman Gym	SF-00202	60	Customer Satisfaction

33	8	S&S 5.1.2.12.5	Construct additional Law Enforcement admin facility vic bldg 280	IJO# YB-00031-7J **Design complete ???**	96	Life/Health/Safety
34	9	S&S 5.2.1.1.25	Construct new Safety Center Building	IJO# SQ-6-7J	102	Operational readiness, safety. Renovate safety office with classrooms.
35	9	TS 1.2.3.5.10	Construct Urban Town #6 (Moody)	YG9-27-8J Design Funded	78	Impact on Military Training and Readiness. ARFORGEN.
36	9	PP&R 2.2.3.5.5	Expand TMP parking area at Fort Stewart	IJO# S3S-044-8J This action will satisfy a security issue addressed by DES, Physical Security.	72	Grow the Army, ARFORGEN
37	9	WB 3.7.1.10	Construct an FRC Center adjacent to ACS	SF 00309 9J	42	Army Family Covenant
38	10	S&S 5.2.1.1.48	Construct new safety training facility - HAAF	IJO # FM-002--9J	156	Operational readiness, safety. Dedicated Facility will address ASTC training availability shortfalls at HAAF.
39	10	TS 1.1.3.6.4	Construct tower, run utilities, make improvements to SA-O	YG9-62-8J	75	Impact on Readiness. ARFORGEN
40	10	PP&R 2.3.4.3.1 & 2.3.4.3.7	Renovate Bldg 1036 @ HAAF to accommodate Laundry Pick-Up Point, Sew Shop, renovate CIF and add 50 parking spaces	IJO# DB-66-4J Renovate Bldg 1036, to relocate laundry pickup point, Sew Shop and update CIF IJO# DD-034-8J Increase parking spaces at Bldg 1036	57	Grow the Army, Customer Service.
41	10	WB 3.1.3.3	Repave Area parking around Ft. Stewart Logdging #4950	S3 00005	21	Army Family Covenant
42	11	WB 3.4.1.4.77	Replace Bleachers at Newman	SF-00219	99	Customer Satisfaction

43	11	PP&R 2.3.4.3.9	AVN BDE Open Shed Storage Facility (Pole Barn)	IJO# LB-08-8J	48	Mission Readiness.
44	11	S&S 5.1.2.12.17	Construct DES Motor park.	IJO# YB-00013-9J, Patrol Vehicles & Dispatching Office between Bldg 283 and Gate 1.	27	Operational Readiness, maintenance of a Safe/Secure environment.
45	12	PP&R 2.3.4.2.29	Repair ASP road leading up to the Warehouse	IJO# S6S-71-7J, $30K design cost funded	99	Training and Deployment Readiness, ARFORGEN.
46	12	WB 3.4.1.4.71	Add an additional sports field at Sports Complex (HAAF)	TBD	21	Increases efficiency and meet demand
47	13	PP&R 2.3.4.2.30	Concrete Slab between Bldg 1146 & Bldg 1150 (Hazmart / Bulk Class III)	IJO# DD-15-9J	54	Grow the Army, Support ARFORGEN.
48	13	WB 3.4.1.4	Repave RV parking at Lott's Island	IJO# FA 00126 8J	21	Army Family Covenant
49	14	PP&R 2.2.3.5.6	Construct TMP office / drivers testing facility	IJO# S3S-045-8J	117	Grow the Army, Division Readiness.
50	14	WB 3.4.1.4.59	Repave Circle/Road leading into Lott's Island	IJO# FA 0012 78 J	21	Army Family Covenant
51	15	PP&R 2.3.1.1.16	Scrape and Paint Bldg 1170, DOL Maintenance Facility	IJO# S6S-38-5J Design status 100% complete	87	Life/Health/Safety.
52	15	WB 3.5.1.7.12	Construct Permanent Latrine Facilities at Marne Gardens & Cottrell Field	Design and Build	60	Quality of Life, Army Family Covenant
53	16	PP&R 2.3.4.3.10	Crush and Run DOL Storage yard Bldg 1036 – Hunter AAF	IJO# DD-118-8J	99	Grow the Army, ARFORGEN, Customer Service
54	16	WB 3.5.1.7.5	Renovate Bldg #623	WG-33-8J, In design at COE.	89	Increases availability of Admin Space
55	17	WB 3.5.1.7.6	Renovate Bldg #620	WG-34-8J, Scheduled after bldg #623, Will not be funded until late FY09	81	Increases Availability Of Admin Space

56	17	PP&R 2.1.2.1.21	Construct a Container Handling Facility office	IJO# S3S-039-8J	75	Division Readiness
57	18	PP&R 2.3.4.2.19	Construct a roof over the Residue Yard, Ammunition Supply Point (ASP), DOL	IJO# S6S-018-8J	84	Environmental Management
58	18	WB 3.4.6.1.7	Construct Chapel Annex for Admin Support	SC-1-6J, Site approved at Mar 06 Planning Board. In Design complete/ ready to be executed	54	Army Family Covenant
59	19	PP&R 2.5.2.1.2	Pave the Donovan Field Parking Lot	IJO# S6S-033-8J	114	Life/Health/Safety, Installation event support, improves mobility for handicap
60	20	PP&R 2.4.1.1.14	Install Backup Generator for Saber Hall	IJO# JA-05-9J	54	Deployment Readiness (backup power)
61	21	PP&R 2.4.1.1.13	Renovate Airfield Operations Facility, Bldg 1252, Hunter AAF	IJO# JA-0002-09	66	Life/Health/Safety, Deployment Readiness.
62	22	PP&R 2.3.4.2.22	Crush N Run Class VII Yard	IJO# S5S-35-8J	114	Grow the Army, ARFORGEN.
63	23	PP&R 2.3.1.1.22	Add rest room, break room, and office to Bldg 1065, DOL Maintenance	IJO# S6S-63-7J Union issue	72	Life/Health/Safety. Union Issues.
64	24	PP&R 2.4.3.5.10	Correct ERDC findings East side of POL Island	IJO# JA-20-8J T17B cost $3.5m, A14B cost $1.7m, T13B cost $2.5m replace portion of T14B $308K.	99	Regulatory, Safety Management.
65	25	PP&R 2.3.1.1.21	Build a Commo / NVD Repair Facility, DOL Maintenance Division	IJO# S5S-026-8J	72	Grow the Army, ARFORGEN.

66	26	PP&R 2.3.1.1.23	Construct Open Shed Storage Facility, DOL Maintenance Div	IJO# S5S-046-8J	66	Environmental Management.
67	27	PP&R 2.1.1.1.17	Deployment Assembly Area DAA	IJO# S3S-20-9J	126	Deployment Readiness, ARFORGEN
68	28	PP&R 2.3.1.1.24	Construct engine / transmission storage facility, DOL Maintenance Division	IJO# S6S-049-8J	48	Environmental Management
69	29	PP&R 2.2.2.4.11	Construct Parts Storage Facility for DOL Maintenance Division	IJO# S5S-040-8J Replace 2 sprung shelters	69	Grow the Army, ARFORGEN
70	30	PP&R 2.3.1.1.28	DOL Maintenance Generator / Small End Items Repair Facility	IJO# S5S-07-9J	54	ARFORGEN.
71	31	PP&R 2.3.4.3.3	Construct a Chemical Defense Equipment (CDE) Storage Facility, Hunter AAF	IJO# DD-032-8J	93	Division Readiness, ARFORGEN.
72	32	PP&R 2.3.1.1.12	Replace Paint Prep Booth (sprung shelter) with pre-engineered metal building, DOL Maintenance Division	IJO# S6S-04-6JRequirement identified and coordinating with AMC to fund	78	ARFORGEN.

Future Major Construction Projects

Fiscal Year	Project
2016	Multipurpose Machine Gun Range (#2)
2016	Infantry Squad Battle Course (#2)
2017	Light Demo Range
Long Range	Known Distance Range (#2)
Long Range	Digital Multipurpose Training Range (#2)

APPENDIX F

TRANSPORTATION

FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

December 2004

Fort Stewart Comprehensive Traffic Engineering Study

Prepared for

Fort Stewart

Directorate of Public Works

Prepared by

Nakata Planning Group, LLC

DWA
Day Wilburn Associates, Inc.

In association with

US Army Corps of Engineers
Savannah District

December 2004

FINAL SUBMITTAL

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SECTION 1 – INTRODUCTION

Fort Stewart Comprehensive Traffic Engineering Study is an examination of the existing transportation system for the installation. This study evaluates existing and future traffic conditions on and adjacent to the installation and identifies necessary transportation improvements required to meet the needs of the installation.

Study Purpose

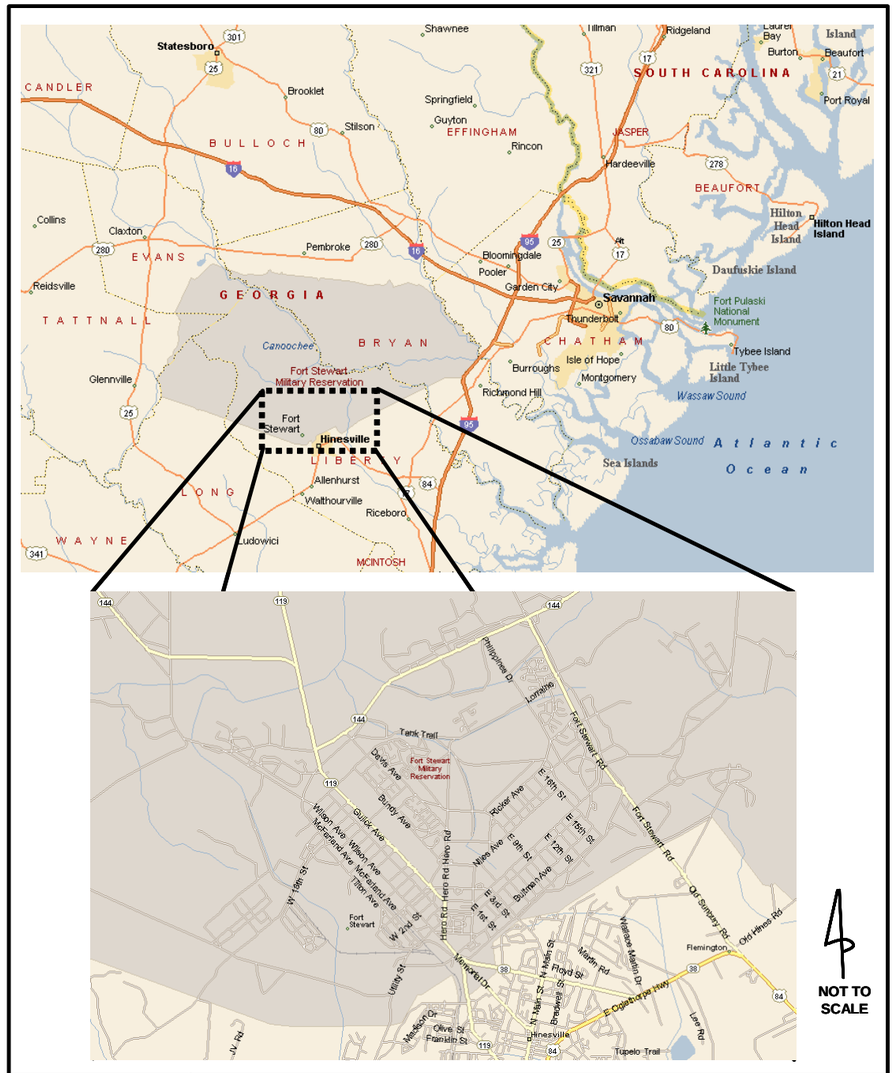
In order to accommodate and support the divisional units stationed at Fort Stewart, the Directorate of Public Works (DPW) requested a comprehensive traffic engineering study be conducted at the installation to evaluate the existing transportation infrastructure based on the existing and future needs of the installation. The comprehensive traffic engineering study is divided into three elements:

Assessment of Existing Conditions;
Assessment of Future Conditions, and
Implementation of Recommended Improvements.

The *Assessment of Existing Conditions* is the first element of this comprehensive engineering study. The purpose of this element is to assess the existing transportation infrastructure supporting the installation, determine its transportation needs and develop a list of potential recommendations for improving the existing infrastructure to meet the current needs of the installation. The purpose of the second element, *Assessment of Future Conditions,* is to evaluate future development and operations for the installation and identify what transportation requirements are needed to meet future traffic and parking demands within and adjacent to the installation. This assessment consists of identifying future developments and shifts in military personnel, forecasting future traffic demand, and identifying needed improvements to accommodate future expansion. The third element, *Implementation of Recommended Improvements,* identifies improvement projects based on the deficiencies identified in the first two elements, construction costs to implement the projects and prioritizes the implementation of the projects.

Installation Background

Fort Stewart is located in Hinesville, Georgia. Figure 1 depicts the location of the installation relative to downtown Savannah and southeastern Georgia.



Currently, Fort Stewart is home to the 3rd Infantry Division (Mechanized) - the "Rock of the Marne" and numerous other supporting active duty and reserve component military organizations. There are approximately 20,000 personnel officially assigned to Fort Stewart (15,000 military and 5,000 civilians) and the post is currently experiencing an increase in the assigned strength due to both Army Modularity and the fact that many existing organization are at 100% (or greater) of their authorized strength.

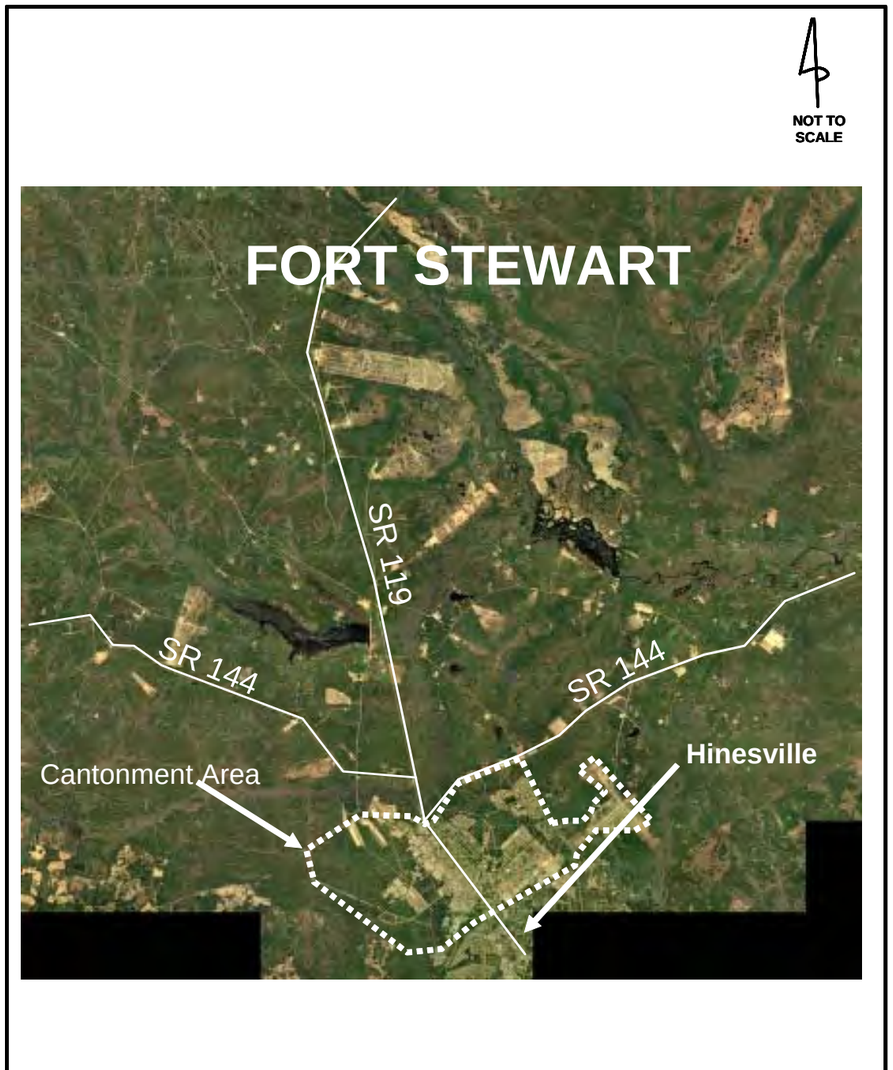
The main entrances to Fort Stewart are located on General Screven Way to the south and SR 119 to the north of the installation. Additionally, there are five secondary access points to the Fort located at 4th Street, Harmon Avenue, 18th Street, 15th Street, and Frank Cochran Drive. The area surrounding the installation to the south is heavily developed with commercial land uses mixed with residential neighborhoods. The area to the south is the only area that is heavily developed. The surrounding areas north, east and west of Fort Stewart are comprised predominantly by woodlands and training facilities. Figure 2 shows an aerial photograph of the installation and the surrounding area.

Study Methodology

The methodology used in conducting the Comprehensive Traffic Engineering Study is broken into three elements. The first element consists of an inventory of the existing transportation network and traffic conditions. The second element examines future development plans and shifts in military and civilian personnel and evaluates future transportation needs. The third element of the study includes the development of conceptual improvement projects and implementation plan.

Assessment of Existing Conditions

The first element of the study is divided into three tasks. The first task provides an inventory of the existing transportation infrastructure including the internal roadway network, access points, traffic flow characteristics, and parking facilities. The second task assesses how the existing infrastructure is operating relative to the existing needs of the installation. The third task summarizes existing roadway and traffic deficiencies and identifies potential improvement projects for improving traffic circulation and parking access and supply. The methodology used in conducting this element of the study consists of three phases; traffic data collection and field observations, assessment of existing transportation facilities, and identifying needed improvements based on current needs of the installation.



Inventory of Existing Conditions

A field inventory of the existing transportation infrastructure was conducted for the installation. The inventory included roadway lane geometries, traffic control devices, presence of pedestrian facilities, speed limits, and parking supply.

Twenty-four hour and peak hour traffic counts were collected on the internal roadway network at select locations throughout the installation. Queuing and delay studies were conducted on the inbound lanes to the installation at the two main gates. Accident data was obtained and analyzed for Fort Stewart for the latest 12-month period. An origin-destination (O-D) survey was conducted at the installation by means of a survey.

Assessment of Existing Conditions

An assessment of the existing lane geometry and traffic control devices was conducted for the internal roadway network and the adjacent off post intersections just outside the main access points. The operations of the main access points to the installation were also evaluated. Field observations were conducted at the access points and internal roadway system during the peak traffic periods. Specific areas on the installation identified by DPW as experiencing parking problems were evaluated. Recent accident data was analyzed to identify areas with potential safety concerns.

Summary of Findings

Based on the data collection efforts and the assessment of the current transportation infrastructure existing deficiencies were identified. Once deficiencies were identified potential projects were developed.

Assessment of Future Conditions

The methodology used in conducting the second element of the study consists of evaluating future development plans and shifts in military personnel to forecast future traffic projections. These planned projects and shifts in military personnel were evaluated based on their potential impacts to the existing traffic conditions. Future increases in traffic were then forecasted based on these development plans and personnel reassignments. The second element assesses the existing transportation infrastructure based on future traffic conditions on Fort Stewart and identifies existing roadway, parking and traffic deficiencies based on the future needs of the installation.

Future Development Plans and Personnel Strength

The Fort Stewart Master Plan was reviewed to identify future projects that may impact traffic conditions on the installation. In addition to the Master Plan, DWA took into consideration future reassignments of military personnel to the installation. These planned projects and shifts in military personnel were evaluated based on their potential impacts to the existing traffic conditions. Future increases in traffic were then forecasted based on these development plans and personnel reassignments.

Assessment of Future Traffic Conditions

Based on future traffic projections, the existing roadway network was analyzed to identify potential transportation deficiencies associated with planned development included in Fort Stewart's Master Plan. Growth rates were applied to existing traffic counts based on the forecasted increases in traffic. Future daily and peak hour traffic counts were then estimated to reflect the potential traffic impacts associated with the planned developments for Fort Stewart. Operational analyses were performed at the major intersections within and adjacent to the installation to assess the operations of the existing infrastructure.

Assessment of Future Transportation Deficiencies and Recommendations

Based on the planned development, future traffic projections and operational analyses, future transportation deficiencies were identified. These future deficiencies included impacts to the internal roadway system, parking supply, traffic control devices, and pedestrian facilities. Based on these future deficiencies, potential improvement projects were developed to mitigate impacts associated with future traffic demand.

Implementation of Recommended Improvements

The third element of the study identifies potential improvement projects, estimates preliminary construction costs for implementing the improvements and prioritizes projects according to need.

Development of Recommended Improvements

This section of the study summarizes recommended improvement projects for mitigating the deficiencies identified in the first two elements of the study; *Assessment of Existing Conditions* and *Assessment of Future Conditions*. Detailed conceptual drawings are presented for each of the recommendations.

Priority of Implementation

Recommended improvement projects are prioritized into three categories; short-range, mid-range and long-range projects. The priority of the projects is based on the following criteria:

- Safety
- Operational deficiencies
- Substandard design
- Cost
- Future need

Preliminary Construction Cost Estimates

Estimated construction costs were developed for each of the recommended improvement projects. The cost estimates were based on actual itemized costs obtained from the Georgia Department of Transportation (GDOT).

SECTION 2 – ASSESSMENT OF EXISTING CONDITIONS

Assessment of Existing Conditions is the first element of the comprehensive traffic engineering study being conducted for the installation. This element evaluates existing traffic conditions on and adjacent to the installation.

The purpose of this element is to assess the existing transportation infrastructure supporting the installation, determine its transportation needs and develop a list of potential recommendations for improving the existing infrastructure to meet the current needs of the installation.

Inventory of Existing Roadway Network

An inventory of the existing internal roadway network at Fort Stewart was conducted to evaluate the existing infrastructure and traffic conditions on the installation. The inventory consisted of road geometry, traffic control devices, pedestrian facilities, and signing and markings.

Access Points

Main Gate
(Temporarily closed to traffic)

Fort Stewart is bounded by SR 144 to the northwest, Fort Stewart Road to the northeast, and the City of Hinesville to the south. The main cantonment area to Fort Stewart has seven access points to the installation. The two primary access points are on General Screven Way (Main Gate), located to the south of the installation, and SR 119/Gulick Avenue (Gulick Gate) on the north side. Main Gate has recently been reconstructed based on current access control point (ACP) guidelines and is open to traffic. Gulick Gate, however, is currently under construction and traffic is being rerouted to the adjacent William Wilson Avenue Gate. Both Main Gate and Gulick Gate are open twenty-four hours, seven days a week. The five secondary access points are Troupe Gate (ACP 2), Harmon Gate (ACP 3), Austin Road Gate (ACP 4), William Wilson Avenue Gate (ACP 6), 15th Street Gate (ACP 7), and Frank Cochran Gate (ACP 8). 15th Street Gate has recently been reconstructed using the new ACP guidelines. The construction phasing of the remaining secondary gates to comply with the ACP guidelines will be staggered. Austin Road Gate has been permanently closed due to new post residential development in the northeast quadrant of the cantonment area.

Gulick Gate
(Temporarily closed to traffic)

The gates provide access to the installation for military personnel, civilian employees and visitors. Civilian truck traffic entering Fort Stewart is directed to use 15th Street Gate for inspection. Passes for visitors without military IDs can be issued at all gates. Figure 2-1 depicts the location of the existing access points.

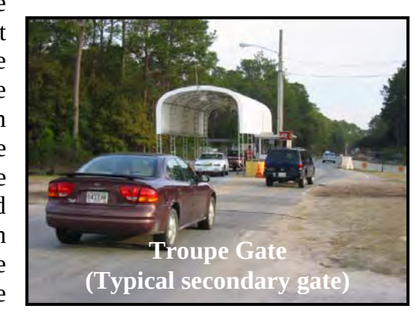
Main Gate's (ACP 1) hours of operation are 00:00 to 24:00, seven days a week. Main Gate has three inbound lanes approaching the fort with visitor's passes being issued only in the right outside inbound lane. There are two outbound lanes exiting the installation at the gate.

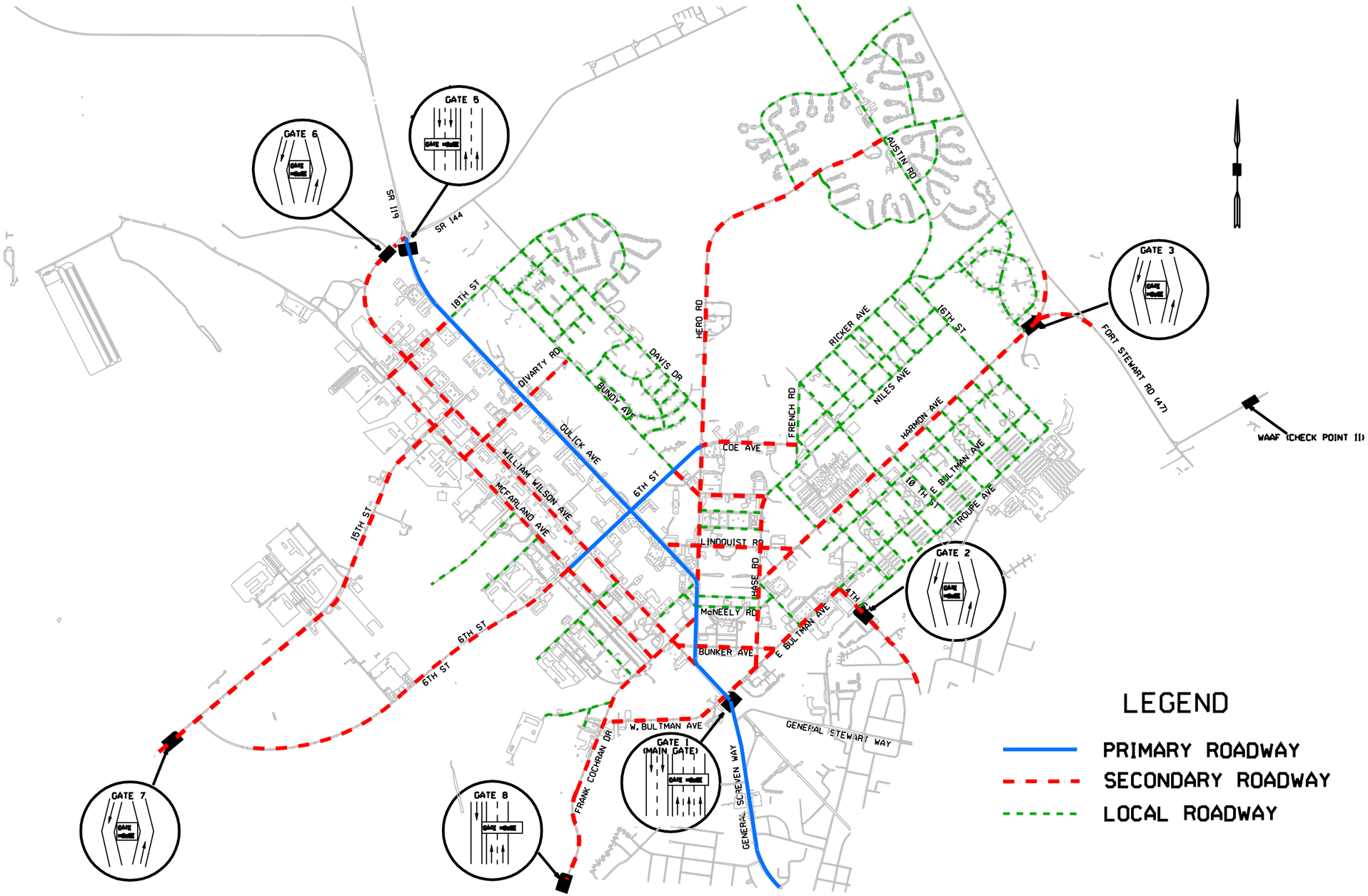
Gulick Gate's (ACP 5) hours of operation are 00:00 to 24:00, seven days a week. Gulick Gate is located approximately 500-feet south of the intersection of SR 119 and SR 144 on SR 119.

15th Street Gate

During the time this study was being conducted Gulick Gate was under construction and traffic was being diverted to 18th Street Gate. Gulick Gate has two inbound and two outbound travel lanes.

Troupe Gate (ACP 2) is located at the intersection of 4th Street and Troupe Avenue and open 05:00 to 21:00, seven days a week. The access point operates with one inbound and one outbound lane throughout the day, with one tandem checkpoint, with the exception of the PT peak. During the PT peak, from approximately 05:00 to 06:45, the outbound lane is converted to an inbound lane and restricted to vehicles traveling northeast to East Bultman Avenue. The existing inbound lane is restricted to the right turn movement traveling northwest on Troupe Avenue.


Troupe Gate
(Typical secondary gate)



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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

EXISTING ROADWAY NETWORK AND ACCESS POINTS

DESIGNED:	CHECKED:	DATE: AUGUST 2004
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Figure 2-1

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The conversion of the outbound lane increases the capacity of the gate and its ability to handle the large influx of vehicles with a minimum of four MPs on duty checking credentials, two inbound lanes with tandem checkpoints. Secondary gates typically have a small, prefabricated guardhouse with a covering over the inbound lane, as shown in the adjacent photo.

Harmon Gate (ACP 3) operates from 05:00 to 24:00, seven days a week. The access point has one inbound and one outbound lane. During the peak periods a minimum of three MPs are on duty checking credentials, one inbound lane with tandem checkpoints.

William Wilson Avenue Gate (ACP 6) is currently open 24 hours a day, seven days a week during the period Gulick Gate is under construction. Previous to the current construction effort to Gulick Gate, William Wilson Avenue Gate was closed to vehicle traffic. The access point has one inbound and one outbound lane. During the peak periods a minimum of three MPs are on duty checking credentials, one inbound lane with tandem checkpoints.

15th Street Gate's (ACP 7) hours of operation are 05:00 to 21:00, seven days a week, with the exception of PT, where the gate is closed. The access points operate with one inbound and one outbound lane with two tandem checkpoints. 15th Street Gate has recently completed construction to comply with ACP guidelines. The checkpoint also has the capability of inspecting civilian trucks.

Frank Cochran Gate (ACP 8) operates from 05:00 to 21:00, seven days a week. The access point has two inbound and one outbound lanes. The second inbound lane is used during the peak periods. During the peak periods a minimum of four MPs are on duty checking credentials, two inbound lanes with tandem checkpoints.

Wright Army Airfield Gate (WAAF Check Point 11) is currently open 24 hours a day, seven days a week. The access point has one inbound and one outbound lane. WAAF Gate only provides access to the airfield and experiences low vehicle traffic. During the peak periods a minimum of two MPs are on duty checking credentials, one inbound lane with tandem checkpoints.

Internal Roadway Network

The installation's roadway network is composed of a system of primary and secondary roadways. Figure 2-1 illustrates the location of the primary, secondary, and local roadway network. Primary roadways provide the main access to the installation and provide the main circulation to the major destinations on post. The primary roadway network supporting the installation consists of Gulick Avenue and 6th Street.

Gulick Avenue/SR 119 provides the primary access to Fort Stewart and is orientated in the north-south direction. Gulick Avenue becomes General Screven Way/SR 119, south of Main Gate and SR 119 north of Gulick Gate. Gulick Avenue is a four-lane divided roadway with 11 and one-half foot travel lanes with a raised concrete median and overhead street lighting. Gulick Avenue provides access between the barracks and offices in the northern Gulick Gate area and the southern Main Gate, towards the central business district of Hinesville.

Gulick Avenue

6th Street provides the main access in the east-west orientation. 6th Street is a four-lane facility extending west from Hero Road to McFarland Avenue, with 11 and one-half-foot travel lanes with curb and gutter and overhead street lighting. 6th Street transitions to a two-lane roadway between McFarland Avenue and 15th Street with curb and gutter and overhead lighting. 6th Street provides the primary access between 15th Street Gate to the west and the parade grounds, gymnasium, and the Commissary to the east.

6th Street

The secondary roadway network provides an important connection between primary roadways and direct access to the different land uses within the installation. The secondary roadway system consists of the following facilities:

- William Wilson Avenue (11-foot travel lanes)
- McFarland Avenue (11-foot travel lanes)
- 6th Street (11-foot travel lanes)
- 15th Street (11-foot travel lanes)
- 18th Street (11-foot travel lanes)
- Divarty Road (11-foot travel lanes)
- Frank Cochran Drive (11-foot travel lanes)
- Bultman Avenue (11-foot travel lanes)
- Bucker Road (11-foot travel lanes)
- McNeely Road (11-foot travel lanes)
- Lindquist Road (11-foot travel lanes)
- Coe Avenue (11-foot travel lanes)
- Hero Road (11-foot travel lanes)
- Hase Road (11-foot travel lanes)
- Harmon Avenue (11-foot travel lanes)

Hase Road
(Typical secondary road geometry)

The secondary roadway network consists of undivided two-lane roadways with 11-foot lanes. The secondary roadways have limited sidewalk facilities and do not have curb and gutter.

Hero Road and Hase Road provide the access to the main activity center area within the installation consisting of the PX, Commissary, theatre, library gymnasium, and bowling lanes as well as many other land uses. Lindquist Avenue, McNeely Road, Bunker Avenue, Coe Avenue, and Bundy Avenue provide a vital connection for circulation between Hero Road, Hase Road and the adjacent land uses.

Harmon Avenue provides access to the installation from Fort Stewart Road and direct access to many destinations within the installation including the Winn Army Community Hospital, National Guard facilities, and parade grounds. Harmon Avenue has a three-lane typical section with dedicated left turn lanes at the intersections between Lindquist Avenue and 10th Street. Harmon Avenue transitions to a two-lane roadway east of 10th Street with no dedicated left turn lanes

William Wilson Avenue and McFarland Avenue are two-lane parallel facilities extending northwest from Frank Cochran Drive to 18th Street. These facilities provide direct access to the motor pools and industrial type land uses on the installation. Sixth Street, 15th Street, Divarty Road and 18th Street provide an important connection for circulation between William Wilson Avenue and McFarland Avenue. William Wilson Avenue also provides access (Wilson Gate) to the installation at SR-119/SR-144. Wilson Gate is temporarily open to traffic while Gulick Gate is under construction.

In addition to the primary and secondary roadway networks, a system of local roadways provide direct access to individual land uses within the installation including the residential communities, barracks, and motor pools.

The posted speed limit for the primary and secondary roadway system is 30 mph post wide with the exception of the roadways illustrated in Figure 2-2, Existing Traffic Control Devices. Existing pavement markings and signage are consistent with design guidelines contained in the Manual on Uniform Traffic Control Devices (MUTCD).

Existing Lane Geometry and Traffic Control Devices

An inventory of the existing lane geometry at key intersections was conducted throughout the installation. Figure 2-3 shows the existing lane geometry at the primary and secondary road intersections located on post. The majority of the intersections on post consist of single-lane approaches with stop signs on the side street approaches. At the majority of the intersections stop signs are supplemented with 24-inch white stop bars on the minor street approach. Figure 2-2 shows an inventory of the existing traffic control devices located on the primary and secondary roadway system. There are a total of twelve signalized intersection maintained by Fort Stewart located along the Gulick Avenue, Hero Road, William Wilson Avenue, Divarty Road, and 6th Street corridors.

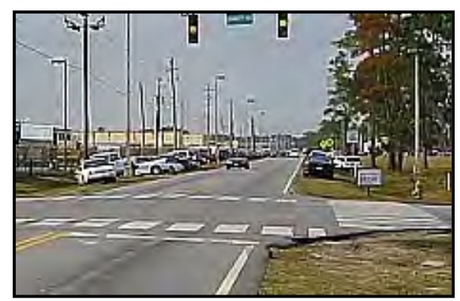
Existing Pedestrian Facilities

Limited pedestrian facilities are located throughout the installation. Figure 2-4 shows the location of existing sidewalks and pedestrian crossings along the primary and secondary roadway system. Pedestrian facilities consist of concrete sidewalk and at-grade pedestrian crosswalks. Mid-block crosswalks typically consist of pavement markings and advanced warning signs and are consistent with design criteria contained in the MUTCD. The high frequency of mid-block crosswalks and the advanced warning signs along William Wilson Avenue adjacent to the motor pool produces visual clutter; where the location of one mid-block crossing bleeds together with the next location, making it difficult to identify.

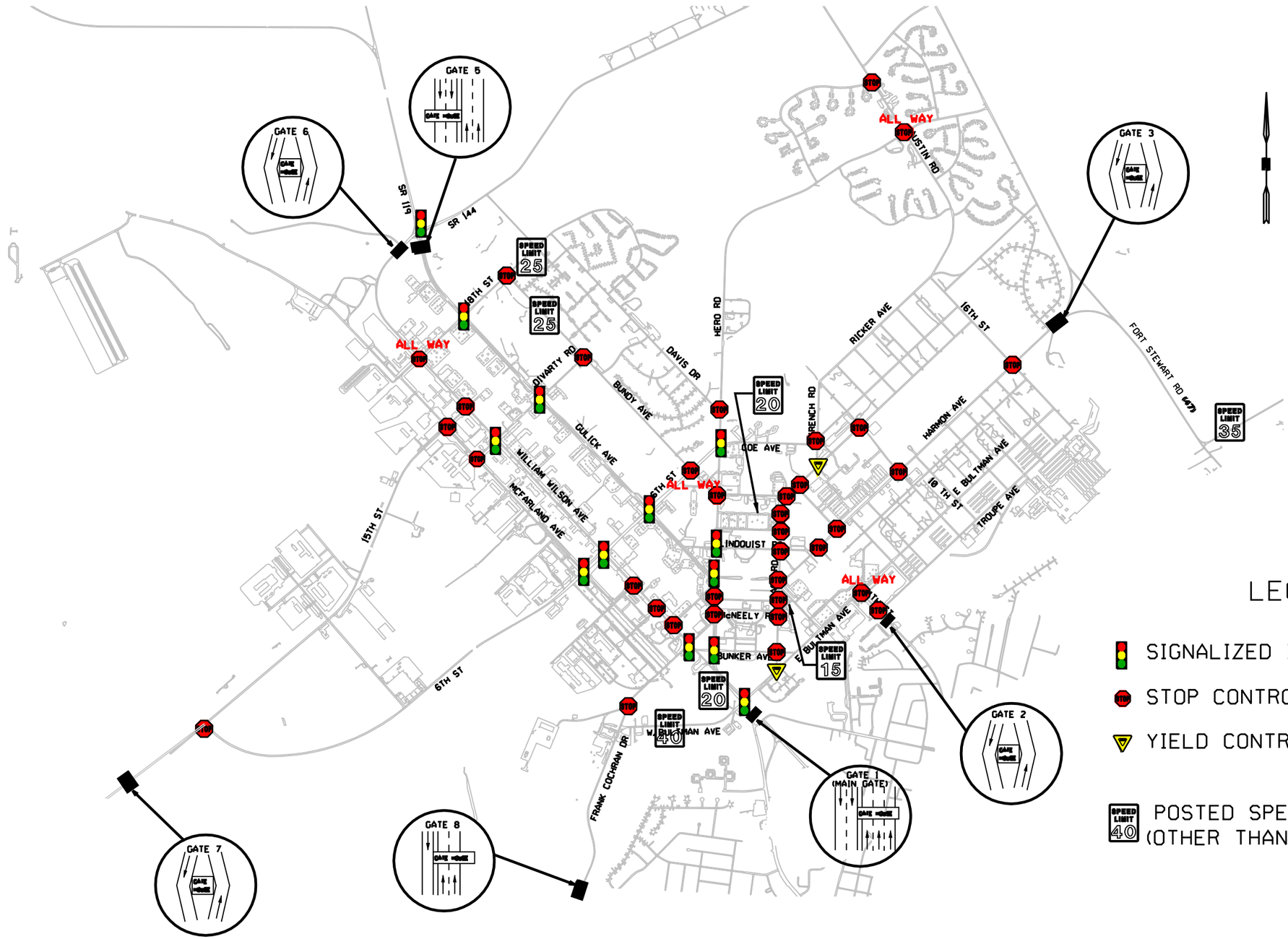
Signing and Pavement Markings

MUTCD signage and pavement markings are used throughout the installation. Typical signs include stop signs, no parking, pedestrian crossing, yield, street name, railroad crossing, and speed limit signs. In addition to the standard MUTCD signs there special signs located on the installation related to the operations of the military base.

Existing Parking Supply and Demand



Based on field observations and discussion with post staff several areas on the installation were identified as having parking issues. The two main areas of concern are the Winn Army Community Hospital and the area adjacent to the motor pool on William Wilson Ave. and McFarland Avenue.



LEGEND

- SIGNALIZED INTERSECTION
- STOP CONTROLLED INTERSECTION
- YIELD CONTROLLED INTERSECTION
- SPEED LIMIT 40 — POSTED SPEED LIMIT (OTHER THAN 30 MPH)

GRAPHIC SCALE (IN FEET)
100 0 50 100 200
1" = 100' HORIZONTAL

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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

EXISTING TRAFFIC CONTROL DEVICES

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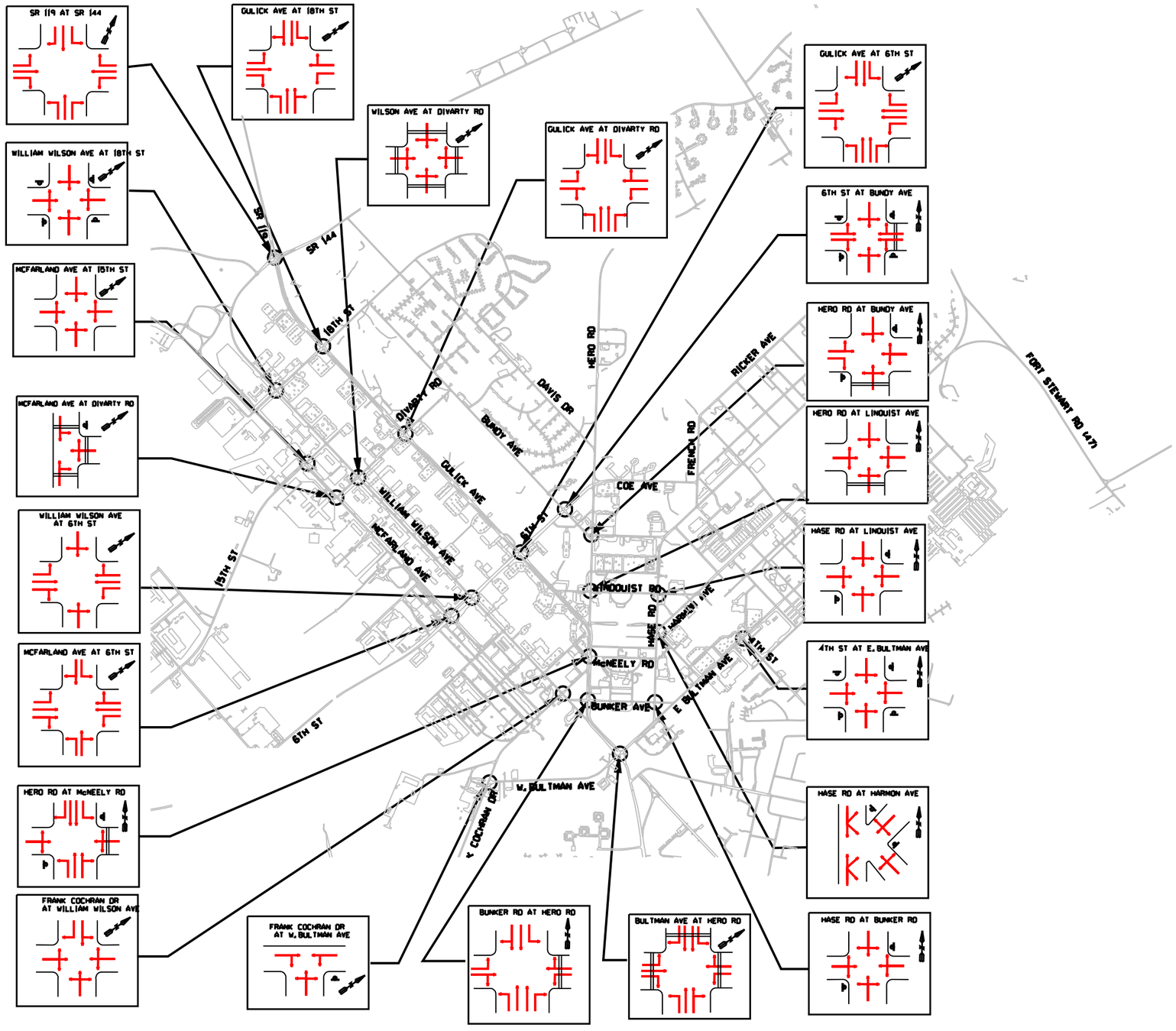

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INTERSECTION LANE GEOMETRY

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Figure 2-3

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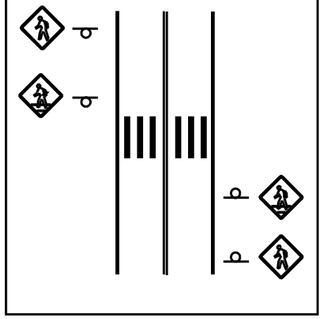
TYPICAL CROSSWALK DETAIL



LEGEND

SIDEWALK LOCATION

CROSSWALK LOCATIONS

BIKE PATH

NO.	DATE	DESCRIPTION OF REVISION

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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

EXISTING PEDESTRIAN FACILITIES

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Figure 2-4

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Winn Army Community Hospital parking lots are experiencing demand that is greater than their capacity which is forcing personnel to park along the internal parking lot roadway system. The four-lane access road from the 6th Street extension becomes lined with vehicles restricting the entryway to one lane in each direction. The grass lot adjacent to 9th Street and the hospital appears to have become an expansion parking lot for the overflow of vehicles that cannot find parking in the surface lots.

William Wilson Avenue and McFarland Avenue are two-lane secondary roads providing access to the motor pools and the company offices. The roadways have two 11-foot lanes with grass shoulders and, in many areas, ditches adjacent to the roadways. The roadways are signed for no parking along the facility. However, personnel park their vehicles along the roadway wherever there is sufficient shoulder width to accommodate their vehicles. The area has a high concentration of personnel performing PT in the morning when available parking becomes grossly insufficient prompting personnel to find parking wherever possible, including raised islands in parking lots. Many vehicles remain in these locations throughout the day when more suitable parking has become available.

Existing Parking Supply

Figure 2-5 shows the existing parking supply and demand along William Wilson Avenue and McFarland Avenue. Figure 2-6 shows existing parking conditions at Winn Army Community Hospital.

Winn Army Community Hospital

A parking inventory of Winn Army Community Hospital parking lot was conducted. Based on the inventory of the surface parking lot there are a total of 795 spaces with an additional 150 spaces located on the corner of 6th Street and Niles Avenue.

William Wilson Avenue

An inventory of the existing parking was conducted along William Wilson Avenue between 18th Street and Frank Cochran Avenue. Based on the inventory there are twelve surface parking lots along William Wilson Avenue providing a total of 3,550 spaces.

McFarland Avenue

An inventory of the existing parking was conducted along McFarland Avenue between 18th Street and 6th Street. Based on the inventory there are five surface parking lots along McFarland Avenue providing a total of 625 spaces.

Existing Parking Demand

Winn Army Community Hospital

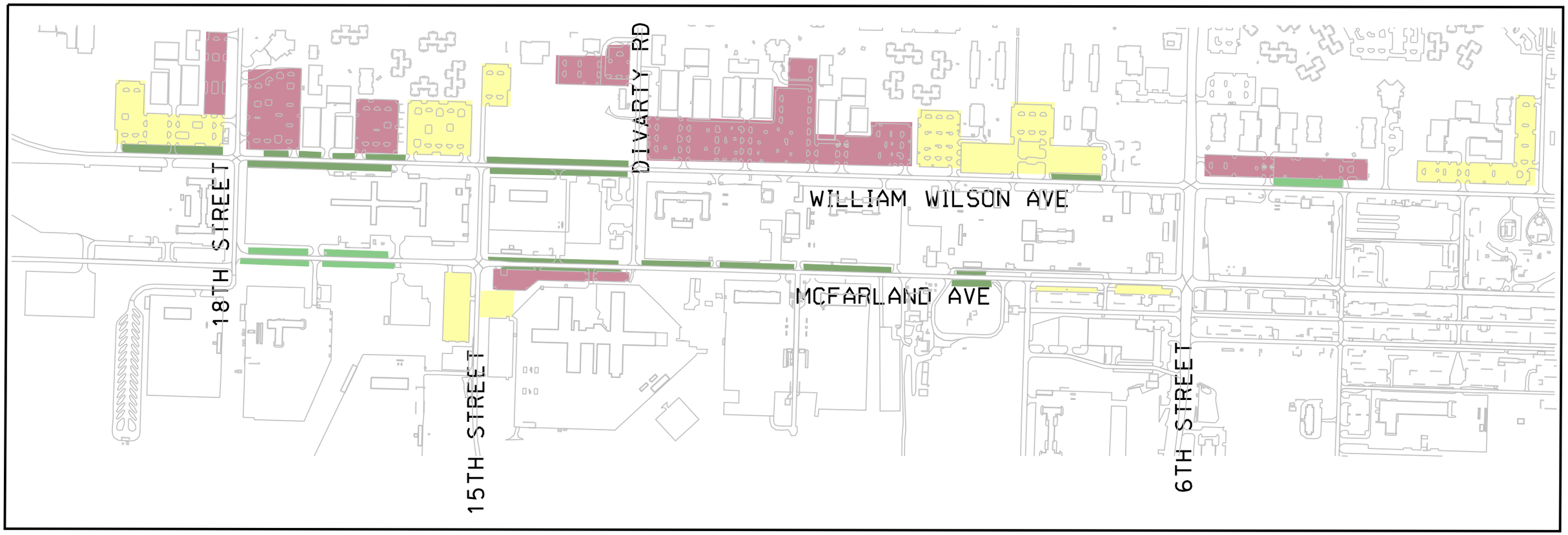
Based on the field inventory all of the existing parking facilities, with the exception of the most western lot, were operating at 95 to 100 percent capacity throughout the day, with over 175 vehicles parking in non-designated areas along the edge of the roadway at any given time. The overflow of parking creates congestion along the roadway and on the grass lot to the east of the hospital.

William Wilson Avenue

Based on the field inventory many of the existing parking facilities were operating at 95 to 100 percent capacity throughout the day, with over 215 vehicles parking in non-designated areas along the edge of the roadway at any given time. The overflow of parking creates congestion along the roadway and creates potential site distance problems for traffic on William Wilson Avenue, as well as pedestrians attempting to cross the roadway between vehicles.

McFarland Avenue

Based on the field inventory many of the existing parking facilities were operating at 95 to 100 percent capacity throughout the day, with over 205 vehicles parking in non-designated areas along the edge of the roadway at any given time. The overflow of parking creates congestion along the roadway and creates potential site distance problems for traffic on McFarland Avenue, as well as pedestrians attempting to cross the roadway between vehicles.



LEGEND

PARKING LOT WITH AVAILABLE PARKING CAPACITY

PARKING LOT EXCEEDING 95% OF CAPACITY

NON-DESIGNATED OFF-STREET PARKING

APPROXIMATE PARKING LOT CAPACITY ALONG WILSON AVENUE CORRIDOR = 3550 SPACES
APPROXIMATE PARKING LOT CAPACITY ALONG MCFARLAND AVENUE CORRIDOR = 625 SPACES

APPROXIMATE OFF-STREET PARKING IN NON-DESIGNATED AREAS ALONG WILSON AVENUE CORRIDOR = 215 VEHICLES
APPROXIMATE OFF-STREET PARKING IN DESIGNATED AREAS ALONG MCFARLAND AVENUE CORRIDOR = 205 VEHICLES

(IN FEET)
300 0 150 300 600
1" = 300' HORIZONTAL

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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

WILLIAM WILSON AVE AND McFARLAND AVE
PARKING SUPPLY AND DEMAND

DESIGNED:	CHECKED:	DATE: AUGUST 2004
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Figure 2-5

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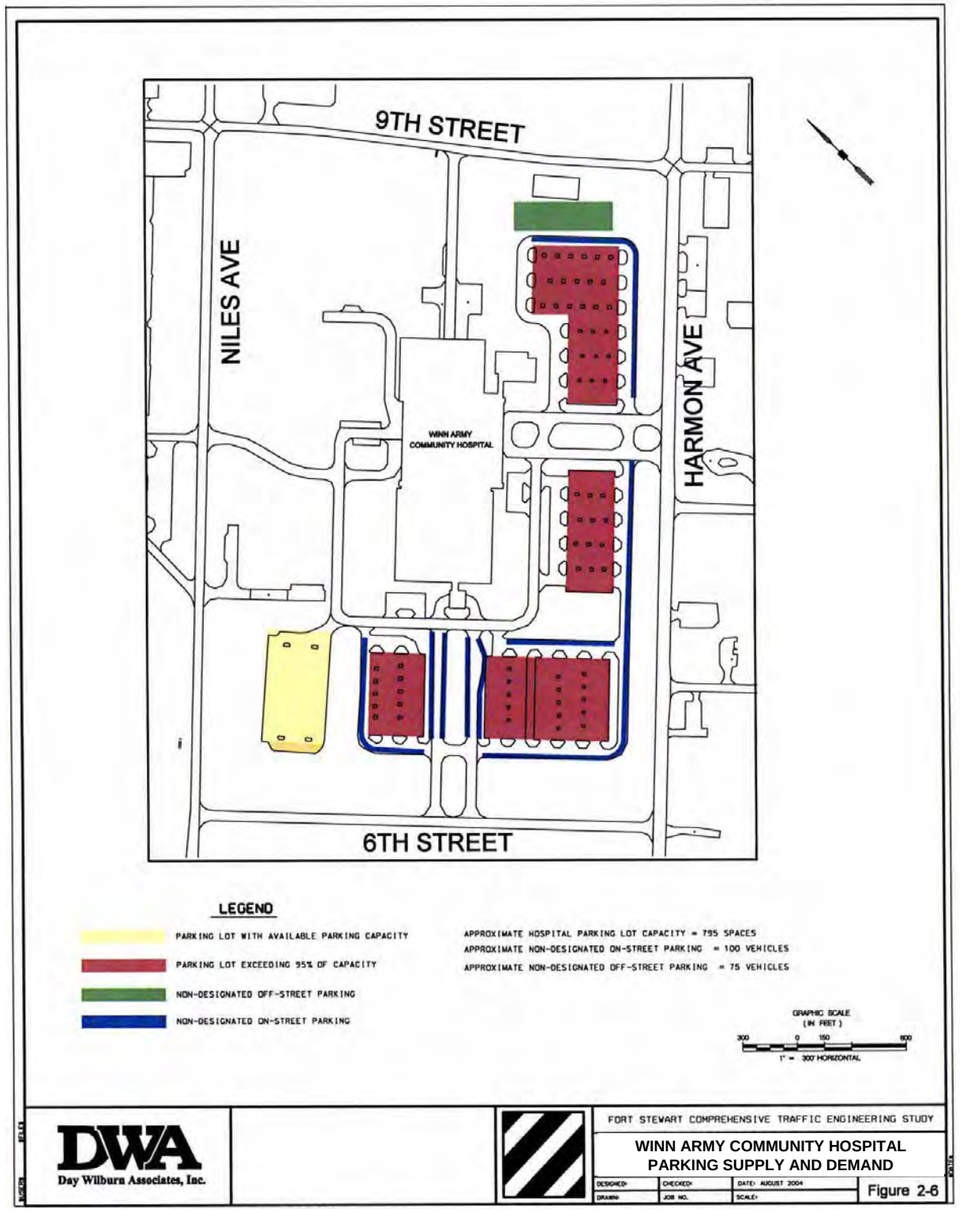


Traffic Flow Characteristics

Traffic data collection was performed between 01 and 12 December 2003 on Fort Stewart's primary and secondary roadway system. The traffic data collected at the installation includes the following:

- Twenty-four hour bi-directional traffic counts each access point;
- Twenty-four hour bi-directional traffic counts on primary and secondary internal roadways;
- Six hour turning movement counts at major on-post intersections, and
- Morning and noon peak hour delay/queue studies at access points.

The purpose of the traffic data collection is to obtain an understanding of existing travel patterns, peaking characteristics and magnitude of the traffic on the existing internal roadway system to evaluate traffic conditions on post.

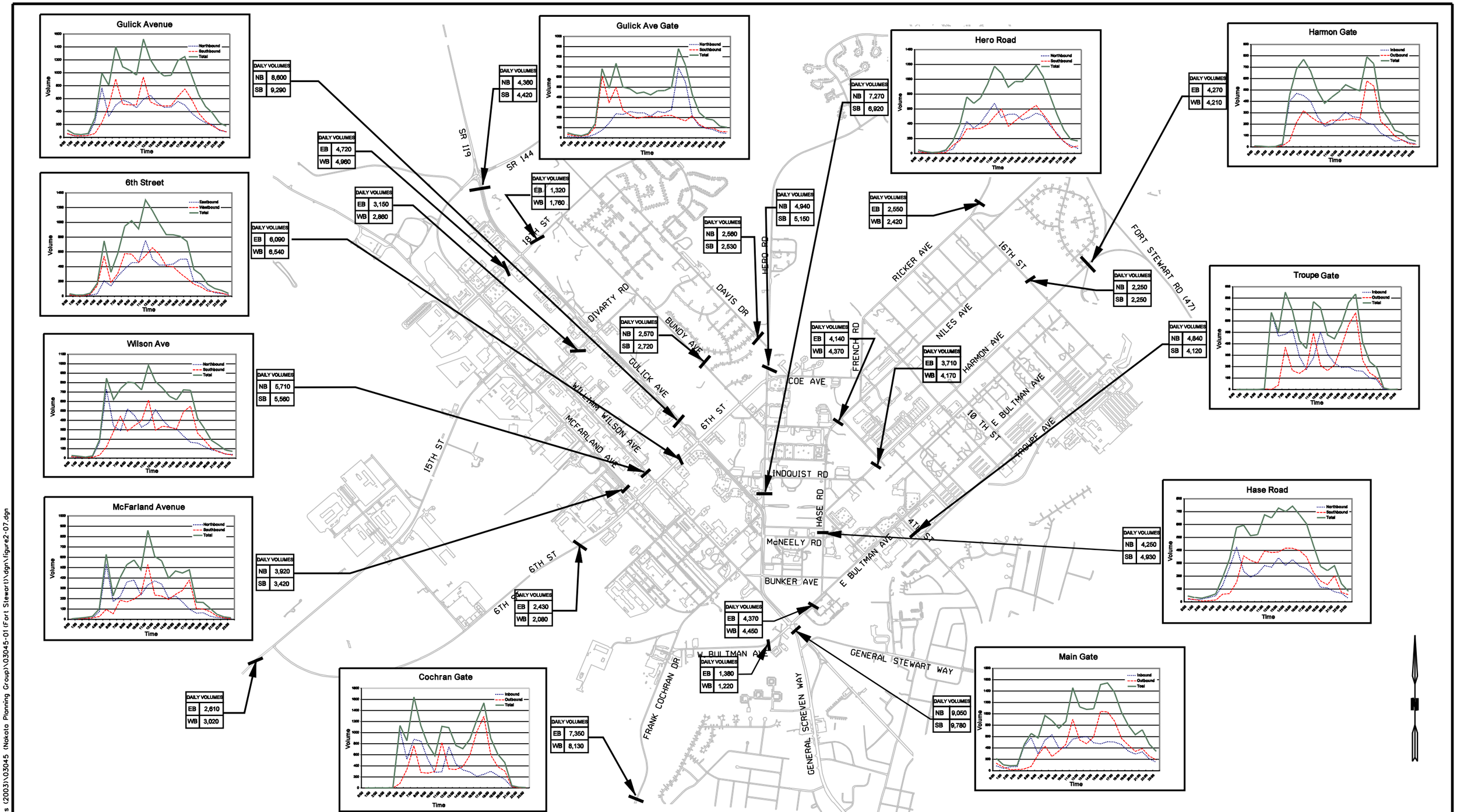
Daily Traffic Volumes

Twenty-four hour traffic counts (ADT) were collected on a typical weekday during the week of 01 December 2003. The ADT counts are used to identify how much traffic is on each roadway on a typical day and when the peak traffic periods are during the day. In addition, they are used to identify the amount of traffic on each roadway for any particular hour of the day. Figure 2-7 summarizes the daily traffic volumes on the major internal roadways of the installation.

Table 2-1 summarizes the results of the 24-hour traffic counts entering and exiting the installation at each of the access points.

Table 2- 1
Access Points Twenty-Four Hour Traffic Volumes

Access Point	Inbound	Outbound	Total
Gate 1 (Main)	9,050	8,130	17,180
Gate 2 (Troupe Avenue)	4,840	4,120	8,960
Gate 3 (Harmon Avenue)	4,210	4,270	8,480
Gate 4 (Austin Road) **Closed**	N/A	N/A	N/A
Gate 5 (Gulick Avenue)	4,420	4,360	8,780
Gate 6 (Wilson) **Closed**	N/A	N/A	N/A
Gate 7 (15th Street)	2,610	3,020	5,630
Gate 8 (Frank Cochran Drive)	7,350	8,130	15,480
Check Point 11 (WAAF)	1,010	740	1,750
Total Traffic	**33,490**	**32,770**	**66,260**



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DAILY TRAFFIC VOLUMES

DESIGNED:	CHECKED:	DATE: AUGUST 2004
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Figure 2-7

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Fort Stewart has 67,910 vehicles entering and exiting the installation on a daily basis. The main access points to the installation are the main gate at General Screven Way with a daily traffic volume of over 18,800 vehicles per day, Frank Cochran Drive with 15,480 vpd, Troupe Gate with 8,960 vpd, and Harmon Gate with 8,480 vpd. The majority of the traffic (28%) enters and exits through the main gate on General Screven Way. The main gate is adjacent to the downtown Hinesville area with numerous commercial land uses (retail, restaurants, etc.) located just outside the main gate. Theses land uses attract a significant amount of traffic during the noon peak period. The main gate serves the majority of the visitors to the installation. Frank Cochran Drive Gate services approximately 23 percent of the total traffic accessing the Fort. Frank Cochran Drive Gate provides access to local businesses and residential neighborhoods outside the installation. Troupe Gate serves approximately 13 percent of the traffic entering and exiting the installation on a typical weekday. Troupe Gate is located close to several residential neighborhoods and is heavily used by military and civilian personnel who live off post.

15th Street Gate provides access for all commercial vehicles as well as military/civilian personnel and has a daily traffic volume of 5,630 vehicles per day. Gate 11 (WAAF) provides access to Wright Army Airfield with 1,750 vehicles per day.

Gates 4 (Austin Road) and Gate 6 (Wilson Gate) were closed to traffic during the traffic data collection the week of 01 December 2003.

Passes to the installation are issued at each of the gates to the installation. On average, MPs at the gates typically write 80 passes per day. Passes are issued to visitors, contractors, and military/civilian personnel stationed at the Fort who have not obtained a registration decal for their vehicle.

The access points to the installation feed the primary internal roadway network of the Fort. Traffic is dispersed onto secondary and local roadways to reach the different destinations on post. Gulick Avenue carries 17,880 vehicles per day with 8,595 traveling northbound and 9,285 in the southbound direction. Hero Road north of Gulick Avenue has 14,190 vehicles per day. 6th Street carries 12,620 vpd with over 6,000 vehicles per day eastbound and 6,535 westbound. Hase Road carries 4,250 northbound and 4,930 southbound vehicles per day. East Bultman Avenue has a total traffic volume of 8,820 vehicles per day with 4,370 traveling eastbound and 4,450 westbound. Harmon Avenue has 7,880 vehicles per day with 3,710 eastbound and 4,170 westbound. Austin Road serving mainly residential land uses carries 4,970 vehicles per day with eastbound 2,550 and 2,420 westbound vehicles per day.

Peak Hour Traffic Volumes

Peak traffic flow is influenced by the standard operating characteristics of the installation. On a typical weekday military personnel begin arriving at Fort Stewart between 0530 and 0630 for physical training (PT). After PT large populations of the military staff who reside off post leave the installation to shower and dress before returning for duty. Between 0700 and 0800 civilian employees arrive for work and between 0800 and 0900 military personnel return to the installation for work. Between 1100 and 1300 a large percentage of the military and civilian population leave the post during their lunch hour. In the afternoon between 1600 and 1800 military and civilian personnel leave the installation. As can be seen from the hourly traffic profiles shown in Figure 9 inbound traffic at the gates peaks at 0600, 0900, and then again at 1300. The outbound traffic has a minor peak at 0800 and then peaks again at 1200 and at 1700.

Peak hour turning movement counts were collected at the major intersections during the morning noon and afternoon peak periods. Figures 2-8, 2-9 and 2-10 summarize the intersection counts for the peak periods.

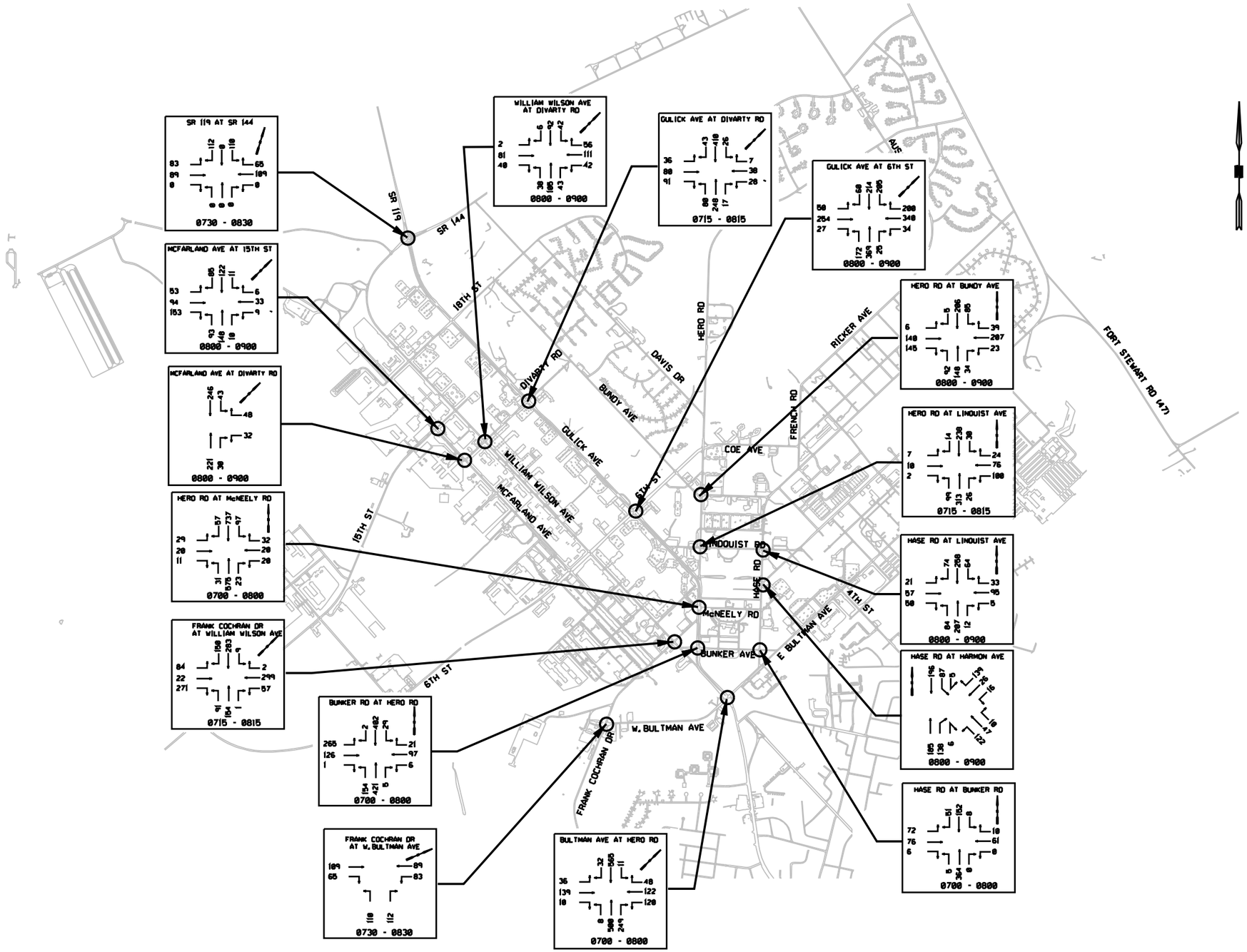
Queuing and Delay Studies

Queuing and delay studies were conducted for the inbound lanes at the major access points during the morning and noon peak inbound periods. The times of the study were from 0530 to 0900 and from 1200 to 1300. Based on existing traffic counts the amount of traffic entering 15th Street Gate did not warrant a queue/delay study. The studies were conducted through field observations recording the number of vehicles in stopped line at the checkpoints and the amount of time it took for them to clear the access point. At access points experiencing extremely long queues and delay, travel time studies were performed to determine how long it took to pass through the access point and how far back the vehicle queues extended outside the installation. Table 2-2 summarizes the results of the queue/delay study during the morning peak period.

Table 2-2
Morning Peak Inbound Period

Access Point	Average Delay per Vehicle (sec/veh)	Maximum Delay per Vehicle (sec/veh)	Average Queue Length (feet)	Maximum Queue Length (feet)
Gate 1 (Main Gate)	170	290	1900	2100
Gate 2 (Troupe Avenue)	85	540	260	2380
Gate 3 (Harmon Avenue)	140	555	610	1500
Gate 5 (Gulick Avenue)	54	97	210	780
Gate 8 (Cochran Drive)		485		2640

Traffic entering Main Gate experienced an average delay of 170 seconds per vehicle during the morning peak period. During the heaviest morning peak period vehicles entering the installation experienced maximum delays of 290 seconds per vehicle with vehicle queues extending 2,100 feet back from the main gate with three inbound lanes through the gate.



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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

AM PEAK HOUR TURNING MOVEMENTS

DESIGNED:	CHECKED:	DATE: AUGUST 2004
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Figure 2-8

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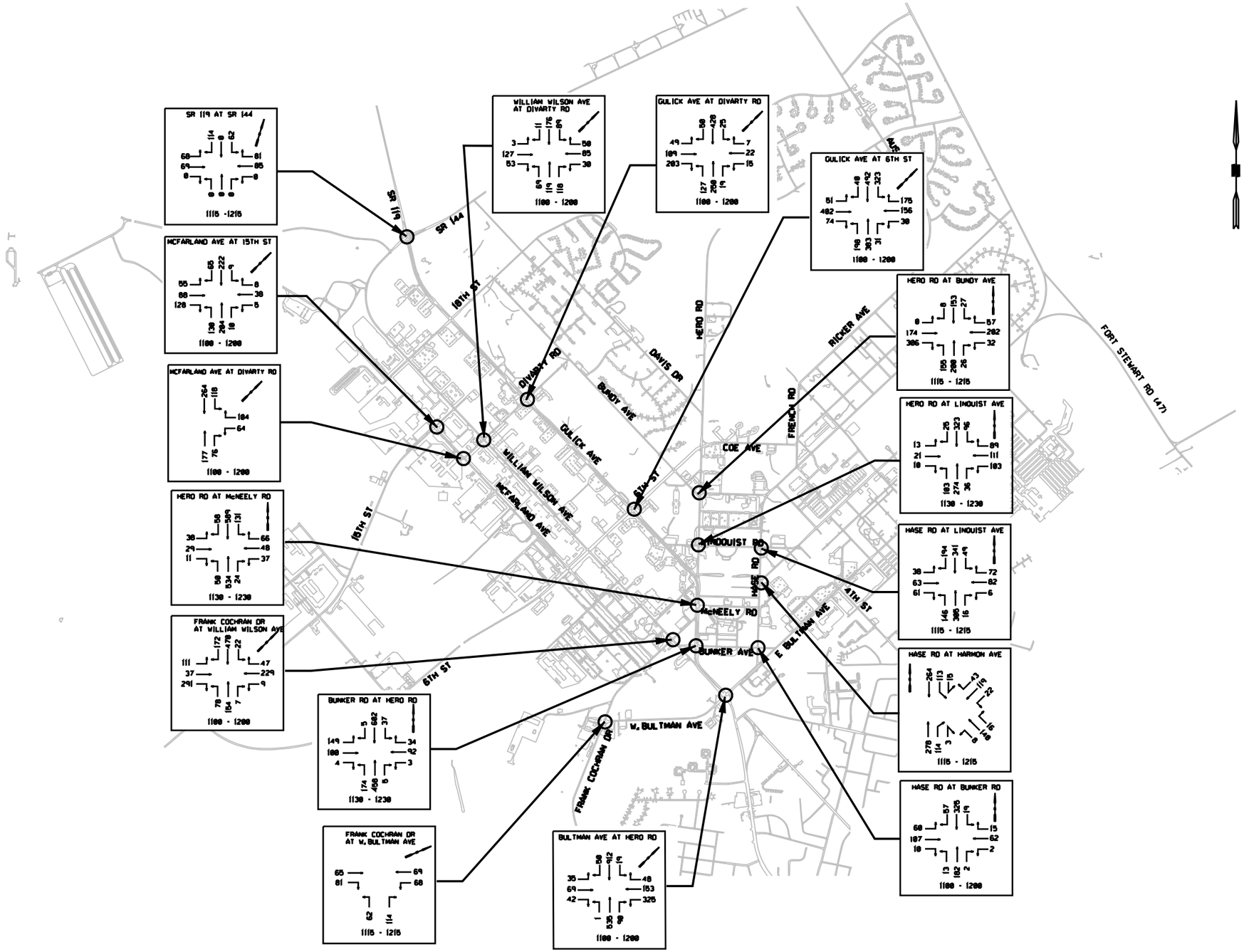

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MIDDAY PEAK HOUR TURNING MOVEMENTS

DESIGNED:	CHECKED:	DATE: AUGUST 2004	Figure 2-9
DRAWN:	JOB NO.	SCALE:	

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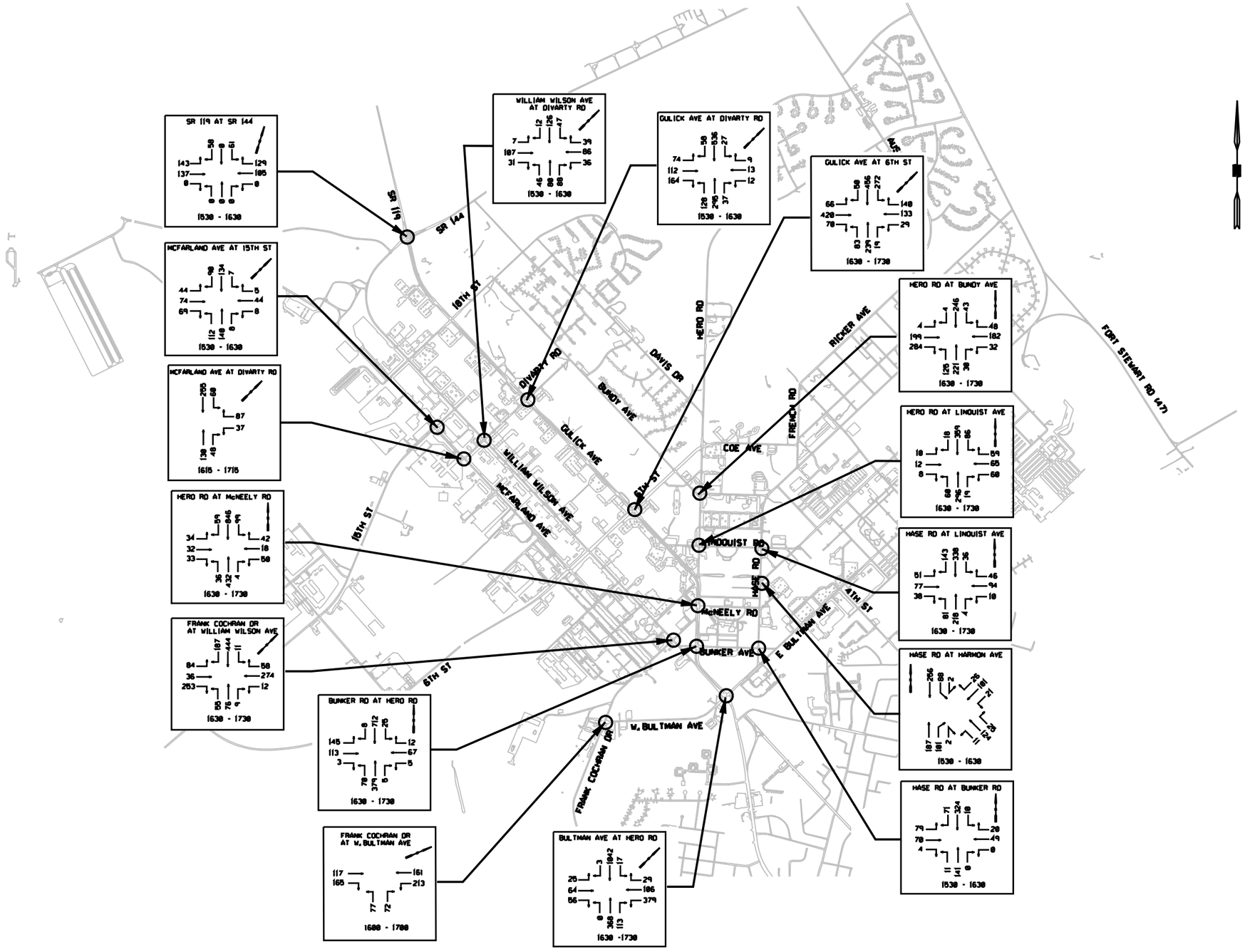

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PM PEAK HOUR TURNING MOVEMENTS

DESIGNED:	CHECKED:	DATE: AUGUST 2004
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Figure 2-10

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Troupe Gate experienced an average morning delay of 85 seconds per vehicle with an average vehicle queue of 260 feet outside the access point. During the peak morning period traffic entering through Troupe Gate experienced a maximum delay of 540 seconds per vehicle with a queue length of 2,380 feet back from the access point. Harmon Gate also experienced long delays and queuing during the morning peak inbound periods. The maximum delay was 555 seconds per vehicle with a maximum back of queue of over 1,500 feet. During the peak morning period traffic would back up from the access point to Fort Stewart Road. Gulick Avenue Gate experienced moderate delay between 54 and 97 seconds per vehicle during the morning peak period with a maximum back of queue of 780 feet from the access point. Due to the heavy demand at Frank Cochran Drive Gate vehicles entering the installation a delay study could not be conducted. Sample travel runs were performed to indicate conditions experienced by drivers entering at this location. Drivers experienced a maximum observed delay of 485 seconds per vehicle and a maximum queue of 2,640 feet from the access point during the morning period.

Queue/delay studies were performed for the noon peak inbound period for each of the main access points to the Fort. Table 2-3 summarizes the results of the noon peak.

Table 2-3
Noon Peak Inbound Period

Access Point	Average Delay per Vehicle (sec/veh)	Maximum Delay per Vehicle (sec/veh)	Average Queue Length (feet)	Maximum Queue Length (feet)
Gate 1 (Main)	325	495	2100	2100
Gate 2 (Troupe)	128	330	960	2600
Gate 3 (Harmon Avenue)	31	75	65	690
Gate 5 (Gulick Avenue)	24	38	30	180
Gate 8 (Cochran Drive)		880		2900

During the noon peak inbound period traffic entering through Main Gate experienced delay of 325 to 495 seconds per vehicle with a maximum queue of 2,100 feet outside the post on General Screven Way. Troupe Gate had a maximum delay of 330 seconds per vehicle with a vehicle queue of 2,600 vehicles back from the access point to the installation. Sample travel runs were performed to indicate conditions experienced by drivers entering at the Frank Cochran Drive Gate. Drivers experienced a maximum observed delay of 880 seconds per vehicle and a maximum queue of 2,900 feet from the access point during the midday period. Main Gate, Troupe Gate and Frank Cochran Drive Gate all experience heavy delay and long delays during the noon peak period due to the close proximity to commercial businesses and restaurants.

Inbound traffic at both Harmon and Gulick Gates experienced only minor delay and minimal queuing entering the installation during the noon peak period. These gates are fairly remote and are not used as much during the noon peak period.

Capacity Analysis

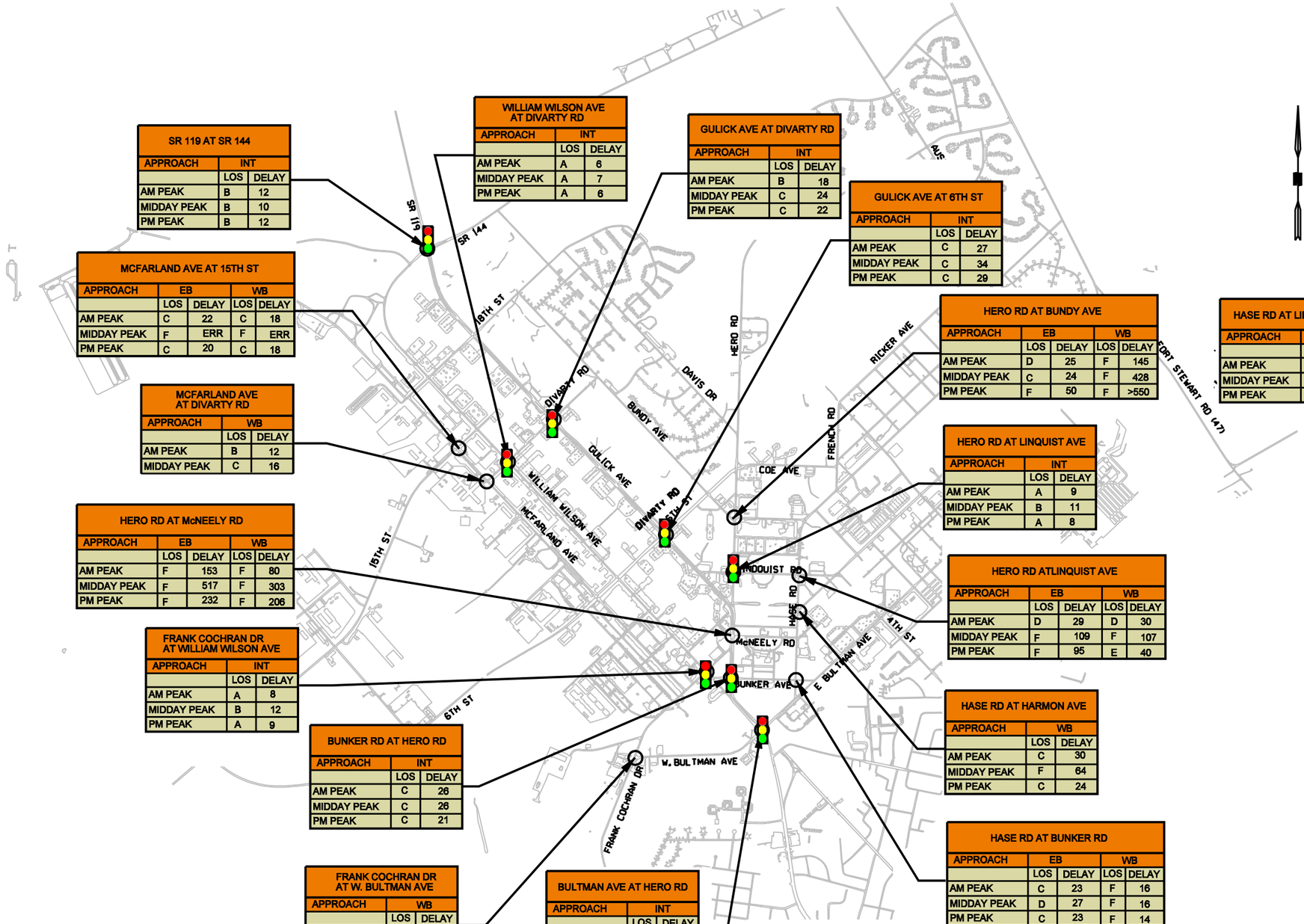
Intersections located along corridors currently experiencing traffic congestion and poor operating conditions were analyzed to determine if improvements to the intersections were warranted. Operational capacity analyses were performed at specific intersections along major corridors during the morning, noon and afternoon peak hours. The capacity analyses were performed to determine the operating level of service (LOS) at the study intersections. LOS for an intersection is based on the vehicular delay at the intersection and is a typical measure of effectiveness used to evaluate intersection operations. The Highway Capacity Manual provides ranges of delay for each LOS definition, spanning from very minimal delays (LOS A) to high delays (LOS F). LOS F is considered unacceptable for most drivers.

For unsignalized intersections where side streets or minor streets are controlled by a stop sign, the criterion for evaluating traffic operations is the LOS for the controlled turning movements at the intersection. Synchro was used to apply the methodology from the Highway Capacity Manual to determine the delay and LOS for these turning movements. Synchro software was used to determine the LOS based on the following input data:

- Intersection geometry
- Lane configuration
- Turning movement volumes

Figure 2-11 summarizes the results of the operational analysis for both signalized and unsignalized intersections. Major intersections with existing traffic signals were analyzed for the morning, noon and afternoon peak period using the current signal phasing and timings and each intersection. The intersections are currently operating fully actuated with right-of-way given to the side streets when demand is present. The following on-post signalized intersections were analyzed:

- Gulick Avenue at Divarty Road
- Gulick Avenue at 6th Street
- Hero Road at Bunker Road
- Hero Road at Bultman Avenue
- Hero Road at Lindquist Avenue
- Frank Cochran Drive at Wilson Avenue
- Wilson Avenue at Divarty Road



SR 119 AT SR 144		
APPROACH	INT	
	LOS	DELAY
AM PEAK	B	12
MIDDAY PEAK	B	10
PM PEAK	B	12

WILLIAM WILSON AVE AT DIVARTY RD		
APPROACH	INT	
	LOS	DELAY
AM PEAK	A	6
MIDDAY PEAK	A	7
PM PEAK	A	6

GULICK AVE AT DIVARTY RD		
APPROACH	INT	
	LOS	DELAY
AM PEAK	B	18
MIDDAY PEAK	C	24
PM PEAK	C	22

GULICK AVE AT 6TH ST		
APPROACH	INT	
	LOS	DELAY
AM PEAK	C	27
MIDDAY PEAK	C	34
PM PEAK	C	29

MCFARLAND AVE AT 15TH ST				
APPROACH	EB		WB	
	LOS	DELAY	LOS	DELAY
AM PEAK	C	22	C	18
MIDDAY PEAK	F	ERR	F	ERR
PM PEAK	C	20	C	18

MCFARLAND AVE AT DIVARTY RD		
APPROACH	WB	
	LOS	DELAY
AM PEAK	B	12
MIDDAY PEAK	C	16

HERO RD AT BUNDY AVE				
APPROACH	EB		WB	
	LOS	DELAY	LOS	DELAY
AM PEAK	D	25	F	145
MIDDAY PEAK	C	24	F	428
PM PEAK	F	50	F	>550

HASE RD AT LINQUIST AVE		
APPROACH	INT	
	LOS	DELAY
AM PEAK	A	9
MIDDAY PEAK	B	14
PM PEAK	B	12

HERO RD AT LINQUIST AVE		
APPROACH	INT	
	LOS	DELAY
AM PEAK	A	9
MIDDAY PEAK	B	11
PM PEAK	A	8

HERO RD AT McNEELY RD				
APPROACH	EB		WB	
	LOS	DELAY	LOS	DELAY
AM PEAK	F	153	F	80
MIDDAY PEAK	F	517	F	303
PM PEAK	F	232	F	206

HERO RD ATLINQUIST AVE				
APPROACH	EB		WB	
	LOS	DELAY	LOS	DELAY
AM PEAK	D	29	D	30
MIDDAY PEAK	F	109	F	107
PM PEAK	F	95	E	40

FRANK COCHRAN DR AT WILLIAM WILSON AVE		
APPROACH	INT	
	LOS	DELAY
AM PEAK	A	8
MIDDAY PEAK	B	12
PM PEAK	A	9

HASE RD AT HARMON AVE		
APPROACH	WB	
	LOS	DELAY
AM PEAK	C	30
MIDDAY PEAK	F	64
PM PEAK	C	24

BUNKER RD AT HERO RD		
APPROACH	INT	
	LOS	DELAY
AM PEAK	C	26
MIDDAY PEAK	C	26
PM PEAK	C	21

HASE RD AT BUNKER RD				
APPROACH	EB		WB	
	LOS	DELAY	LOS	DELAY
AM PEAK	C	23	F	16
MIDDAY PEAK	D	27	F	16
PM PEAK	C	23	F	14

FRANK COCHRAN DR AT W. BULTMAN AVE		
APPROACH	WB	
	LOS	DELAY
AM PEAK	B	13
MIDDAY PEAK	B	11
PM PEAK	C	20

BULTMAN AVE AT HERO RD		
APPROACH	INT	
	LOS	DELAY
AM PEAK	C	22
MIDDAY PEAK	C	33
PM PEAK	D	41

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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

INTERSECTION CAPACITY ANALYSIS

DESIGNED:	CHECKED:	DATE: AUGUST 2004
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Figure 2-11

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In addition, the signalized intersection of SR-119 and SR-144 located just north of the cantonment area was analyzed.

The majority of the signalized intersections except for Hero Road at Bultman Avenue, are currently operating at acceptable levels of service throughout the day and are not experiencing capacity deficiencies. The intersection of Hero Road and Bultman Avenue is currently operating at acceptable levels of service overall, however, the westbound approach on East Bultman Avenue is experiencing capacity deficiencies during the noon and afternoon peak periods. The overall westbound approach on East Bultman Avenue is operating at a level of service E during the afternoon peak period. The westbound left turn movement operates at level of service E during the noon peak and F in the afternoon peak period. The poor level of service is due to the protected only left turn phases on East and West Bultman Avenue and insufficient amount of green time given to the minor street approaches.

Intersections currently operating under stop control were analyzed along corridors experiencing traffic congestion during peak periods. The following non-signalized intersections were analyzed:

- Hero Road at McNeely Avenue
- Hero Road at Bundy Avenue
- Hase Road at Bunker Road
- Hase Road at Harmon Avenue
- Hase Road at Lindquist Avenue
- Frank Cochran Drive at West Bultman Avenue
- McFarland Avenue at Divarty Road
- McFarland Avenue at 15th Street

The capacity analyses indicate the following intersections are operating at poor levels of service (F) on the minor street approaches during at least one peak period of a typical weekday:

- Hero Road at McNeely Avenue
- Hero Road at Bundy Avenue
- Hase Road at Harmon Avenue
- Hase Road at Lindquist Avenue

The minor street approaches under stop sign control at Hero Road and McNeely Avenue are currently operating at level of service F during the morning, noon, and afternoon peak periods. Vehicle delays on the minor street approaches range from 153 seconds per vehicle during the morning peak to over 500 seconds per vehicle during the noon peak period.

The westbound approach under stop sign control at the intersection of Hero Road and Bundy Avenue currently operates at LOS F during the morning, noon, and afternoon peak periods. The average delay on the westbound approach exceeds 420 seconds per vehicle during the noon peak and over 500 seconds per vehicle during the PM peak period. The eastbound approach of Bundy Avenue operates at LOS F during the afternoon peak period.

During the noon peak period the westbound approach at the intersection of Hase Road and Harmon Avenue/Pony Soldier is operating at LOS F with a delay of 64 seconds per vehicle. The poor level of service during the noon peak period can be attributed to the V alignment of the minor street approaches at Hase Road and the amount of lunch hour traffic heading to and from the PX and Commissary area.

The minor street approaches under stop sign control at the intersection of Hase Road and Lindquist Avenue are operating at LOS F during the noon and afternoon peak periods based on existing traffic data collected at the intersection. During the noon peak hour traffic on the eastbound approach to the intersection experience an average delay of over 400 seconds per vehicle. The westbound approach has an average delay of over 100 seconds per vehicle.

Traffic Signal Warrant Analyses

The intersections of 6th Street and Bundy Avenue and Hase Road at Lindquist Avenue were evaluated to determine if traffic signals are warranted at the intersections based on existing traffic conditions at the intersections. Existing conditions at the intersection were compared to signal warrant requirements contained in the MUTCD. The MUTCD contains standard engineering practices to determine the needs for a traffic signal. Existing traffic counts on each approach to the intersections were compared to signal warrant volume thresholds contained in the MUTCD.

Based on the results of the signal warrant analyses the intersection of 6th Street and Bundy Avenue satisfy the requirements for a traffic signal based on existing traffic conditions. Although the intersections of Hase Road and Lindquist Avenue does not currently meet the signal warrant criteria contained in the MUTCD, the future demand with the opening of the Troop and Family Care Medical Center on the northwest corner and proposed roadway improvements in the area should increase the volumes at the intersection sufficiently to satisfy the warrant criteria.

Accident Analysis

An analysis of existing traffic data was performed to identify high accident locations that may be experiencing potential safety problems that could be correctable through transportation related improvements.

2003 Accident Summary

Existing accident data for the past 12-month period was obtained for the installation. The accident data was summarized and evaluated by location, date, and type of traffic violation. Data on the types of accidents were not available and must be inferred from the type of traffic violation. Based on the 2003 data, there were a total of 715 accidents recorded by military police. Of the 715 accidents, only accident 440 locations could be determined from the summary data. The summary data listed location of accident, some of which were vague. The accidents where the location could not be determined were not recorded on Figure 2-12 – 2003 Accident Locations, but are reported in the percentages of traffic violations. The types of violations that occurred as a result of the traffic accident are listed in Table 2-4:

Table 2-4
Summary of Accident Data Traffic Violations

Type of Violation	Frequency	Percentages
Improper Left Turn	16	2.24%
Improper Backing	157	21.96%
Improper Right Turn	10	1.40%
Failure to Yield Right of Way	109	15.24%
Following Too Closely	96	13.43%
Failure to Exercise Due Care	38	5.31%
Failure to Maintain Lane	41	5.73%
Improper Lane Usage	14	1.96%
Duty Upon Striking Unattended Vehicle	120	16.78%
Improper Parking	10	1.40%
Failure to Obey Control Device	21	2.94%
Animal 'mishaps'	14	1.96%
Too Fast for Conditions	13	1.82%
Illegal U-Turn	4	0.56%
Improper Passing	9	1.26%
Other	43	6.01%
Total Accidents for 2003:	715	100.00%

The improper backing and duty upon striking unattended vehicle violations are the primary violations that occur in parking lots. The percentage of accidents that occurred in parking lots was approximately forty-five percent. The highest occurrence of parking lot accidents occurred in the PX parking lot, where twenty-seven accidents were recorded. Other parking lot locations of note are the Winn Army Community Hospital, the Shoppette on Frank Cochran Drive, and the parking lots adjacent to Steel Avenue, Gulick Avenue, and William Wilson Avenue.

Traffic violations that involve improper turns and failure to yield right-of-way generally occur at intersections and can indicate excessive vehicle delay or intersection geometry that complicates operation. These violations account for approximately 19 percent of total violations.

Location of Multiple Accidents

Figure 2-12 shows the multiple accident locations based on the 2003 data. The majority of the accidents occurred in parking lots including the Shoppette, Post Exchange, and Barracks and motor pool parking lots along Gulick Avenue and William Wilson Avenue. Intersections having more than two accidents over the 12-month period were recorded on Figure 2-12.

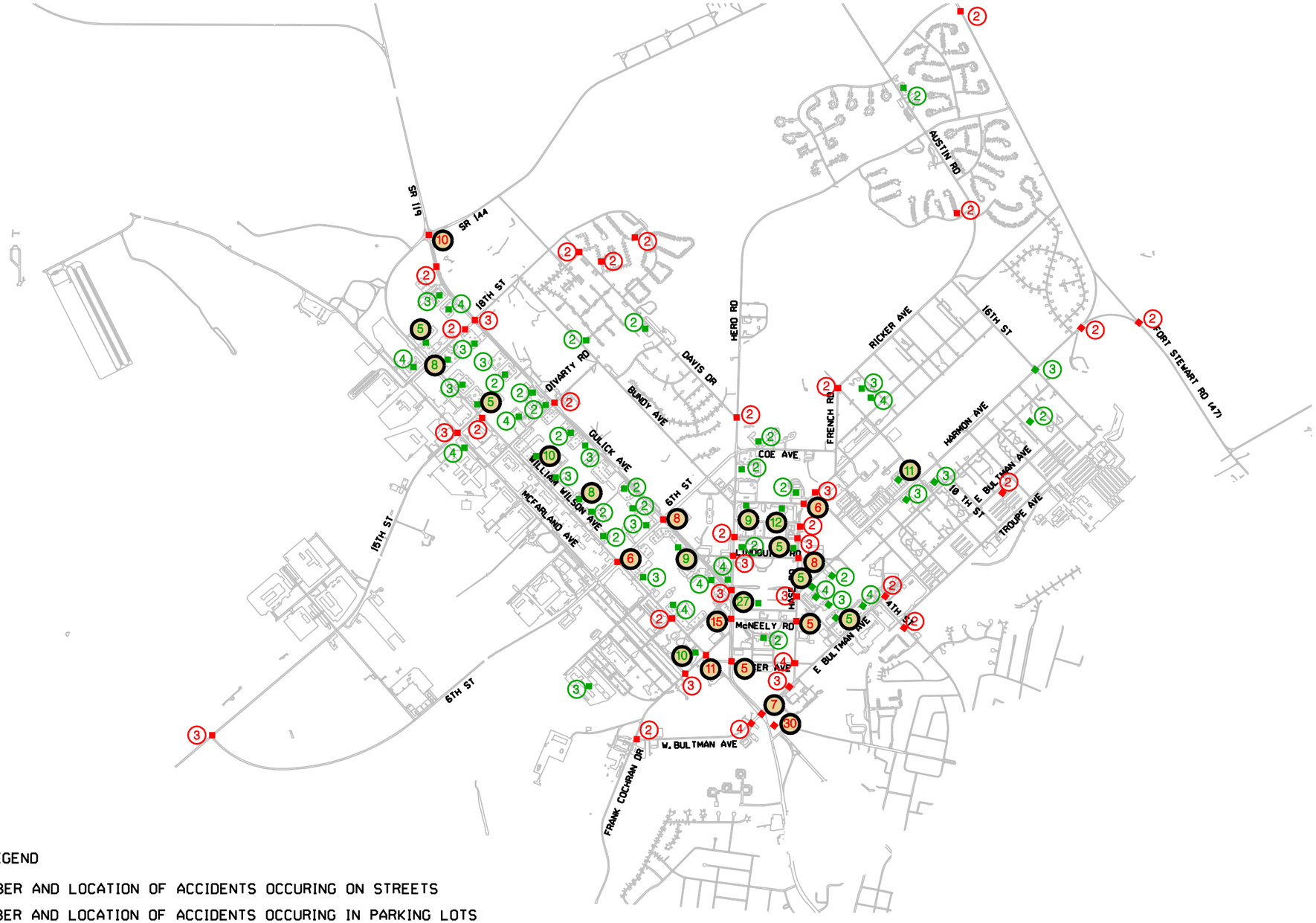
Unsignalized intersections with high volumes experience greater delay and poor LOS which increases the impatience of travelers and the risk the traveler is willing take to accomplish a desired movement. High occurrence of failure to yield violations occurred at the following locations:

- Hero Avenue at McNeely Road (14 of 15 violations)
- Hase Road at McNeely Road (four of five violations)
- Lindquist Avenue at Hase Road (seven of eight violations)
- Hase Road at Steele Avenue (five of six violations)

According to the MUTCD, published by the Federal Highway Administration (FHWA), right angle or left turn with through crashes are the type of accidents considered correctable through signalization. Intersections with five or more of these types of accidents and meeting the volume requirements meet one of the signal warrants. The satisfaction of a traffic signal warrant does not in itself require the installation of a traffic signal.

Signalized intersections with a high rate of accidents occurred at the following locations:

- 6th Street at Gulick Avenue
- 6th Street at William Wilson Avenue
- Frank Cochran Avenue at William Wilson Avenue
- Hero Road at Bultman Avenue
- Bunker Road at Hero Road



LEGEND

- NUMBER AND LOCATION OF ACCIDENTS OCCURING ON STREETS
- NUMBER AND LOCATION OF ACCIDENTS OCCURING IN PARKING LOTS
- LOCATIONS OF 5 OR GREATER ACCIDENTS

NO.	DATE	DESCRIPTION OF REVISION

DWA
Day Wilburn Associates, Inc.

FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

2003 ACCIDENT LOCATIONS

DESIGNED:	CHECKED:	DATE: AUGUST 2004
DRAWN:	JOB NO.	SCALE:

Figure 2-12

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Primary traffic violations occurring at these locations are following too closely. The traffic violations indicate the occurrence of rear-end collisions. The exception is the intersection of Frank Cochran Avenue at William Wilson Avenue where seven of eleven violations were failure to yield right-of-way.

Main Gate at General Screven Way is the only access point to experience a high volume of traffic violations resulting in accidents. The predominant traffic violation is following too closely and improper lane change. This indicates the frustration of drivers experiencing long delays, attempting lane changes in an attempt to improve their position in the queue.

Traffic Origin-Destination Survey

A traffic survey of military, civilian and visitors using the installation was conducted to better understand the traffic patterns ad conditions. The traffic survey was conducted on a typical weekday during January 2004. The traffic survey was conducted using a questionnaire form distributed to all entering vehicles for a 24-hour period at each of the access points to the installation. Survey respondents were requested to drop off the completed surveys at the gate or fax the survey forms to the Directorate of Public Works (DPW). A copy of the survey form is shown below.

The survey consisted of 12 questions pertaining to travel patterns, mode split, trip purpose, destinations, and several other travel characteristics including:

- Military status (active military, retired, civilian, contractor, or visitor)
- Frequently used gates
- Number of trips made to the installation
- Location of Residence (on or off post) Destination on post
- Travel mode (car, bus, walk, bicycle)

A total of 703 responses were obtained and summarized. This amounts to approximately 3.5 percent of the military and civilian personnel currently assigned to the installation. Based on the responses to the survey the following information was obtained.

The majority of the people surveyed were military (70%), 12 percent were civilians 5 percent of which were contractors. The remaining 14 percent were composed of retired military, visitors or others.

Fort Stewart
Traffic Survey Questionnaire

The Directorate of Public Works is conducting a traffic improvement study for Fort Stewart. Please help us by answering the following questions. Upon completing the survey, simply return the completed survey to the MPs at any gate, or fax to Mr. James Thomas at the Directorate of Public Works. We ask that only one form is completed per person.

Thanks for your help.

1. Which applies to you (check one):
   - ☐ Civilian Employee
   - ☐ Military Personnel (including dependents)
   - ☐ Retired Military
   - ☐ Contractor
   - ☐ Visitor
   - ☐ Other:_____

2. What gates do you most frequently use?
   - ☐ Main Gate (Gen. Screven Way)
   - ☐ Troop Gate (E. 4th Street)
   - ☐ Harmon Gate
   - ☐ Gulick Gate (SR 144 at SR 119)
   - ☐ 15th Street Gate
   - ☐ Frank Cochran Gate
   - ☐ Check Point 11 (WAAF)

   Why? _____

3. How often do you travel to Fort Stewart?

   ____ per day _____ per week _____ per month

4. On average, how many trips off the post do you make a day and when do you make them?

   _____
   _____
   _____

5. What is the location of your work or primary destination on post? _____

6. Does your vehicle have a decal?
   ☐ Yes ☐ No

7. Do you live on post?
   - ☐ Yes
   - ☐ No

   If "Yes" where on post do you live? _____
   _____
   If "No" what is your home zip code?

8. How do you travel from your home to your primary (work) destination on post?
   - ☐ Drive
   - ☐ Bus
   - ☐ Walk
   - ☐ Carpool
   - ☐ Bicycle

9. Are there other destinations on post you typically visit on a daily basis? _____
   _____

10. How do you travel on post to other destinations on post?
    - ☐ Drive
    - ☐ Walk
    - ☐ Bicycle

11. How would you rate traffic conditions on post?
    - ☐ Good
    - ☐ Fair
    - ☐ Poor
    - ☐ Very Poor

12. Please help us by identifying specific traffic, parking, and pedestrian needs on Fort Stewart.
    _____
    _____
    _____
    _____
    _____
    _____
    _____
    _____
    _____
    _____

Please drop off survey at any gate or fax your responses to:
Mr. James Thomas
Directorate of Public Works
james.thomas2@stewart.army.mil Fax: 912-767-5916

The majority of the people surveyed (80%) live off post and commute to the installation. Nearly half of those surveyed (49%) indicated that they use the Main Gate to enter and exit the installation and 38% use the Frank Cochran Gate. Approximately 90% of survey respondents possessed a vehicle decal designed to ease the entry process from the gates to the installation. The average survey respondent made 2 trips off the post per day with a similar distribution between morning, midday, and evening trips. This supports the fact that many of the military personnel leave the installation after PT and return later for work. Over 80% of survey respondents live off post. In addition, a high percentage of the installation's personnel leave the post during their lunch hour.

In order to determine the internal travel patterns the installation was divided into ten zones representing the different activity centers within the installation. Figure 2-13 shows the installation divided into the various zones. The most common work destination was Zone 10 (the area between Gulick Avenue and Wilson Avenue), with a 25% response followed by Zone 3 (located between Hero Road and Hase Road), with nearly 13%. The large concentration of entertainment, retail and other services offered in Zone 3 make this area a popular destination. 67% of those living on post indicated that they live in either Zone 8 or Zone 9. The responses indicate that over 90% of work trips are vehicular. Twenty respondents indicated using multiple modes, nearly all of which included using the automobile in tandem with another mode (such as bicycling), but no alternate to the vehicle garnered a mode share greater than 1.4%.

Based on the results of the survey, a majority of responses (52%) indicated that traffic conditions were either "poor" or "very poor". Only 14% of those responding would consider traffic conditions to be "good" and 33% judged that traffic conditions were "fair". Based on the responses received the most frequently cited concern was traffic near the Main Gate and Frank Cochran Gate. People indicated that a lack of personnel and lengthy security check / ID process creates congestion at the gates. Lack of parking, particularly in the hospital area of Zone 4 and motor pool areas of Zones 1 and 10 on McFarland Avenue and Wilson Avenue, was also a common concern among survey respondents. People also identified pedestrian issues, such as a general lack of sidewalks throughout the installation, as a deficiency.

Some responders indicated deficiencies not tied to a particular category, such as the needs to stagger lunch hour times to reduce peak demand, enforce speed limits, add better wayfinding signs, and change routes for morning PT workouts to move runners off main roads.

Assessment of Existing Transportation Deficiencies

Existing traffic conditions at Fort Stewart were evaluated during peak periods to assess how the existing infrastructure of internal roadways, access points, and parking facilities were operating. The purpose of this assessment is to identify areas of congestion, potential safety issues, roadway deficiencies, and develop recommendations for mitigating any deficiencies. Field observations were conducted for the major internal roadways, intersections and access points within the installation. Field observations took into consideration traffic volumes on the major roadways during peak periods, vehicle delay, and queuing at the major intersections within the installation. The following paragraph summarizes the existing traffic operations of the installations transportation infrastructure.

Access Points Deficiencies

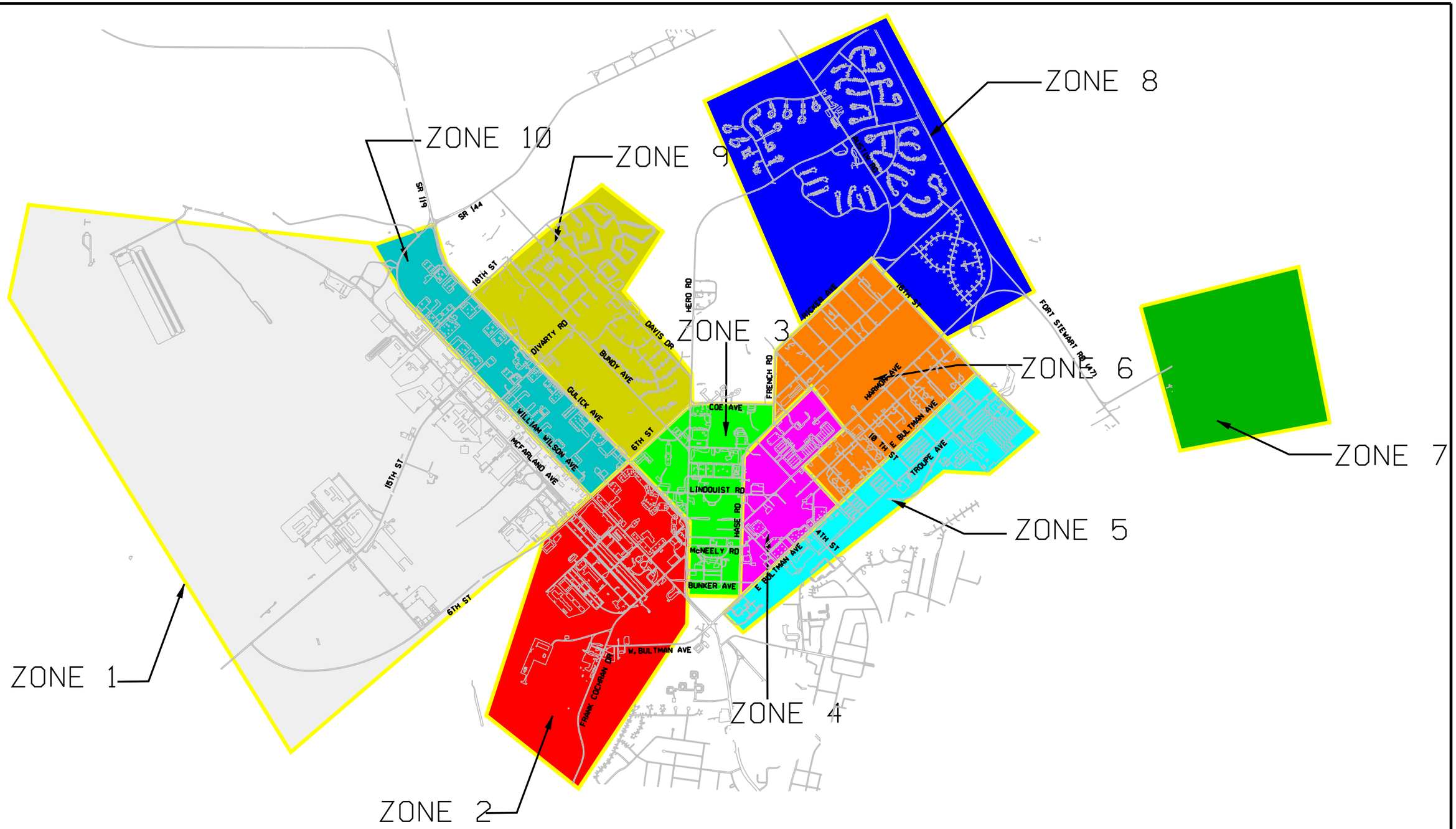
Fort Stewart has currently has six gates that are operational. Two primary gates, Main Gate and Gulick Avenue Gate, located on SR 119 at the north and south of the cantonment area, and four secondary gates located at 4th Street, Harmon Avenue, 15th Street, and Frank Cochran Drive. All of the checkpoints are currently being upgraded to comply with ACP guidelines. Construction of the gates is being performed in phases. Main Gate and 15th Street Gate have completed construction and Gulick Gate is currently close to traffic during construction. The access points to the installation can be characterized as having heavy traffic volumes entering the installation during the morning and afternoon peak periods with long delays and queues. During the peak periods, inbound traffic will frequently experience long delays and queuing inbound to the installation due to the sheer volumes trying to enter over a short period of time. Outbound traffic entering and exiting the installation flows freely with little delay or congestion.

During the noon peak period many of the military and civilian personnel travel outside the installation for lunch or to run errands. This causes congestion between 11:00 and 13:00 at all gates at the southern end of the cantonment area adjacent to City of Hinesville.

The issuance of temporary passes at the gates reduces the manpower and the checkpoint's capacity to handle the large peak hour volumes at all of the gates. The visitor center, under construction at Main Gate, will soon be the only location to issue temporary passes and should greatly affect the efficiency of all the gates.

Main Gate

Construction on Main Gate has recently been completed and brought up to ACP guidelines. Main Gate has three inbound lanes with three tandem checkpoints for each lane. Queuing during the peak hours continues to be to be greater than a half mile even with the improvements to Main Gate. The outermost right inbound lane continues to be almost completely dedicated to the issuing of temporary passes effectively closing the lane to normal traffic flow. Completion of the visitor center and the issuance of visitor passes only at this location should effectively free the outside lane to processing decaled vehicles and increase the efficiency of the checkpoint by one-third.



NO.	DATE	DESCRIPTION OF REVISION

DWA
Day Wilburn Associates, Inc.

FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

SURVEY ZONES

DESIGNED:	CHECKED:	DATE: AUGUST 2004
DRAWN:	JOB NO.	SCALE:

Figure 2-13

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Gulick Gate

Gulick Gate is currently under construction and closed to traffic. 18th Street Gate, which until recently has been closed, is now operating to handle traffic until construction on Gulick Gate is completed. During observations 18th Street Gate experienced some queuing during the peak hour as a result of the capacity reduction from one to two inbound lanes with the shift in gates.

Troupe Gate

Troupe Gate is a secondary gate with one inbound and outbound lane. During peak periods the queue at the gate can extend to one-half mile. The inability to process entering vehicles efficiently during the peak hours is the direct cause of the queue. The gate's close proximity to a high-density residential area and the City of Hinesville contribute to the high volume at this location.

Frank Cochran Drive Gate

Frank Cochran Drive Gate is a secondary gate with two inbound open during the peak periods and outbound lane. During peak periods the queue at the gate can extend close to one-mile. The inability to process entering vehicles efficiently during the peak hours is the direct cause of the queue. The gates close proximity to a high-density residential area and the City of Hinesville contribute to the high volume at this location.

15th Street Gate

15th Street Gate is a secondary gate with one inbound and outbound lane. During peak periods there is minimal queuing at this location. The access point's proximity to a rural, low population density area reduces demand at this location.

Harmon Avenue Gate

Harmon Avenue Gate is a secondary gate with one inbound and outbound lane. Harmon Avenue has two approaches from Fort Stewart Road that merge together before entering the gate. Queuing at the gate continues back prior to the merge complicating the operation of the gate. Further complicating the operation of Harmon Avenue, the right-of-way between the northern segment of Harmon Avenue and Fort Stewart Road is given to Harmon Avenue and Fort Stewart Road on the southern segment. The change in right-of-way affects traveler's expectations and the intersections operation.

Internal Roadway and Intersection Deficiencies

Based on the assessment of existing internal traffic flow, roadway geometry, field observations and accident data, the following roadway deficiencies have been identified.

Local traffic within the installation is heavy during the peak periods for areas of the installation with major destinations. The primary and secondary roadways within the installation that carry the majority of the local traffic consist of Gulick Avenue, William Wilson Avenue, McFarland Avenue, Hero Road, Hase Road, Harmon Avenue, Bultman Avenue, Bunker Avenue, and Frank Cochran Drive.

There is a significant amount of local internal trips heading to and from the motor pools along William Wilson Avenue, McFarland Avenue, PX, Commissary, and Shoppette areas within the installation. These facilities provide food and merchandise, making them popular destinations during lunch hour and after work. In addition, the Winn Army Community Hospital generates a significant amount of traffic on Harmon Avenue. Military and civilian personnel and visitors (e.g. retired military, spouses) entering through Main Gate use Hero Road and Hase Road to access the PX, Commissary, and Shoppette.

Hero Road at Bultman Avenue

Hero Road at Bultman Avenue adjacent to Main Gate experiences high volumes during the peak hours but experiences acceptable LOS. Main Gate's checkpoints regulate the traffic that enters the intersection, improving the operation of the intersection. The signal's left turn phases are currently operating as protected only limiting the volume of vehicles performing the movement. This protected only phase increases the queue for the eastbound left from Bultman Avenue during the AM peak hour and westbound left during the PM peak.

William Wilson Avenue at Frank Cochran Drive

The signalized intersection of William Wilson Avenue at Frank Cochran Drive operates at a good LOS throughout the day. The intersection experiences a high rate of accidents due the complicated geometry of the roadway system between William Wilson Avenue at Frank Cochran Drive and Bunker Avenue at Hero Road. The southern approach splits, one leg turns approximately forty-five degrees and becomes Bunker Avenue, the other continues south and becomes a free flow lane on Hero Road. The area causes confusion to visitors unaccustomed to the network.

Hero Road at McNeely Road

Hero Road at McNeely Road is an unsignalized intersection south of the PX. The intersection experiences failing LOS and long delays for the minor approaches. The high volumes traveling on Hero Road provide little opportunity to vehicles on the minor approaches to cross or turn left. In addition, Gulick Avenue has a raised median and does not allow left turns south of 6th Street until McNeely Road. The high volumes of vehicles performing u-turns from the southbound approach further reduces the gaps available for the minor approaches.

Hero Road at Bundy Avenue

Hero Road at Bundy Avenue is an unsignalized intersection north of the Commissary. The intersection experiences failing LOS and long delays primarily for the westbound minor approach. The high volumes traveling on Hero Road provide little opportunity to vehicles on the minor approaches to cross or turn left. The operation of the intersection is complicated by the channelized southbound Bundy Avenue, which allows two-way traffic flow.

6th Street at Bundy Avenue

6th Street at Bundy Avenue is an unsignalized all-way stop intersection adjacent to the parade grounds. The intersection experiences a high volume of vehicles traveling on 6th Street throughout the day. According to the MUTCD signal warrant criteria analysis the intersection meets the five of seven warrants for signal installation.

Coe Avenue at French Road

Coe Avenue at French Road is an unsignalized offset five-legged intersection that experiences moderate volumes from the westbound Coe Avenue approach. Coe Avenue intersects French Road at a "T" intersection, while 50-feet to the north, 7th Street and Murray Avenue approach French Road from the southeast and northeast, respectively. Effectively, the two intersections operate as one offset intersection. The intersection operates at an acceptable LOS but the geometry of the intersection complicates the operation.

Lindquist Road at Hase Road

Lindquist Road at Hase is an unsignalized intersection near the PX. The intersection experiences failing LOS and long delays primarily for the minor approach. The high volumes traveling on Hero Road provide little opportunity to vehicles on the minor approaches to cross or turn left.

Lindquist Road at Harmon Avenue

Lindquist Road at Harmon Avenue is an unsignalized intersection that has a large channelized eastbound Lindquist Road approach that allows two-way traffic flow. Lindquist Road is one of the few secondary roads that provide east-west access. The current geometry of the intersection does not provide the optimum operation.

Hase Road at Harmon Avenue/Pony Soldier Avenue

Hase Road at Harmon Avenue/Pony Soldier Avenue is an unsignalized intersection with two approaches, Harmon Avenue and Pony Soldier Avenue, intersecting Hase Road from the northeast and southeast, respectively. The intersection operates at a failing LOS during the midday peak hour. The high volumes on Hase Road provide few gaps to vehicles on the minor approaches. The operational difficulties of two approaches on the same side of the intersection create confusion as to who has right-of-way for the minor approach.

Existing Parking Deficiencies

Based on the parking inventory additional parking is required on William Wilson Avenue and McFarland Avenue between 18th Street and Sigma Street, south of 6th Street. The existing parking facilities on William Wilson Avenue are insufficient within close walking distance to their destinations to meet the existing parking demand. Personnel park their vehicles along the grass shoulders of William Wilson Avenue and McFarland Avenue within no parking zones. The lack of enforcement within the no parking zones encourage personnel that could park in lots further away from their destination, where space could be available, to park illegally along the road side. On-street parking reduces sight distance for vehicles as well as pedestrians.

Winn Army Community Hospital also experiences parking lots whose capacity is exceeded by demand. Personnel are parking on the internal circulation roadway system of the parking lots in designated no parking areas. The two-lane entrance adjacent to the 6th Street extension has been reduced to one lane as a result of the on-street parking. Although there is some remaining capacity in the northwest lot not being utilized, the total demand is far greater than any remaining capacity.

Pedestrian Deficiencies

There are limited pedestrian facilities on Fort Stewart. Sidewalk is present primarily around the Headquarters and along 6th Street. Crosswalks with advanced warning signs are provided, connecting the parking lots to the motor pool entrances. However, the crosswalks do not connect to other pedestrian facilities. The high frequency of crosswalks and the advanced warning signs along William Wilson Avenue make it difficult for vehicles to determine the location of the pedestrian facilities.

Signing and Pavement Markings

There are no existing deficiencies regarding signing and pavement markings. The existing signing and pavement markings are in good condition and follow MUTCD standard guidelines.

Signalized Intersections

Protected only signal phasing is reducing the efficiency of signal green time when sight distance is not an issue. Some signal head locations are improperly located and should be repositioned.

Summary of Findings

The overall existing transportation network currently meets the needs of the installation. With the exception of a few isolated areas the existing roadway network and traffic control operate at an acceptable level of service. The assessment of existing conditions used existing traffic data, field observations, accident data and capacity analyses to evaluate the existing transportation network, and identify areas requiring improvements.

Existing Deficiencies

The assessment of existing traffic conditions identified a few isolated locations currently experiencing traffic congestion and safety concerns. Table 2-5 summarizes the location and types of deficiencies identified.

Table 2-5
Existing Transportation Deficiencies

No.	Location	Type of Deficiency
1	Frank Cochran Gate	Capacity and congestion
2	Main Gate	Capacity and congestion
3	Troupe Gate	Capacity and congestion
4	Harmon Gate	Roadway alignment, congestion
5	Hero Road at Bultman Avenue	Capacity and congestion
6	William Wilson Avenue at Frank Cochran Drive	Lane geometry and roadway alignment
7	Hero Road at McNeely Road	Capacity and congestion
8	Hero Road at Bundy Avenue	Lane geometry and congestion
9	6th Street at Bundy Avenue	Capacity and congestion
10	Coe Avenue at French Road	Roadway alignment
11	Lindquist Road at Hase Road	Capacity and congestion
12	Lindquist Road at Harmon Avenue	Intersection configuration
13	Hase Road at Harmon Avenue/Pony Soldier Avenue	Roadway alignment
14	William Wilson Avenue	Parking
15	McFarland Avenue	Parking
16	Winn Army Community Hospital	Parking
	Signalized intersections	Timing, phasing, and signal head placement

Figure 2-14 summarizes the location of the existing deficiencies identified in the Assessment of Existing Conditions.

Conclusion

The Assessment of Existing Conditions identified deficiencies with the existing transportation network. These locations require modifications to improve traffic congestion, safety issues, and parking requirements to meet the existing needs of the installation. Conceptual designs of the recommended improvement projects are included in Section 4 of this report.

LEGEND

LOCATION OF EXISTING DEFICIENCIES

NO.	DATE	DESCRIPTION OF REVISION

DWA
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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

SUMMARY OF EXISTING DEFICIENCIES

DESIGNED:	CHECKED:	DATE: AUGUST 2004
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Figure 2-14

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SECTION 3 – ASSESSMENT OF FUTURE CONDITIONS

Future Development Plans

This section is the second element of a comprehensive traffic engineering study being conducted for the installation. This element evaluates future traffic conditions on and adjacent to the installation based on future development plans and shifts in military and civilian personnel.

The purpose of this element is to evaluate future development and operations for the installation and identify what transportation requirements are needed to meet future traffic and parking demands within and adjacent to the installation. This assessment consists of identifying future developments and shifts in military personnel, forecasting future traffic demand, and identifying needed improvements to accommodate future expansion.

Fort Stewart Master Plan

The current Fort Stewart Master Plan consists of 30 short to long-range projects for the installation. The anticipated time frame for implementing the projects is broken down by construction fiscal year (FY) as follows:

- Under Construction
- FY 2004
- FY 2005
- FY 2006
- FY 2008
- Long-Range (2010 or later)

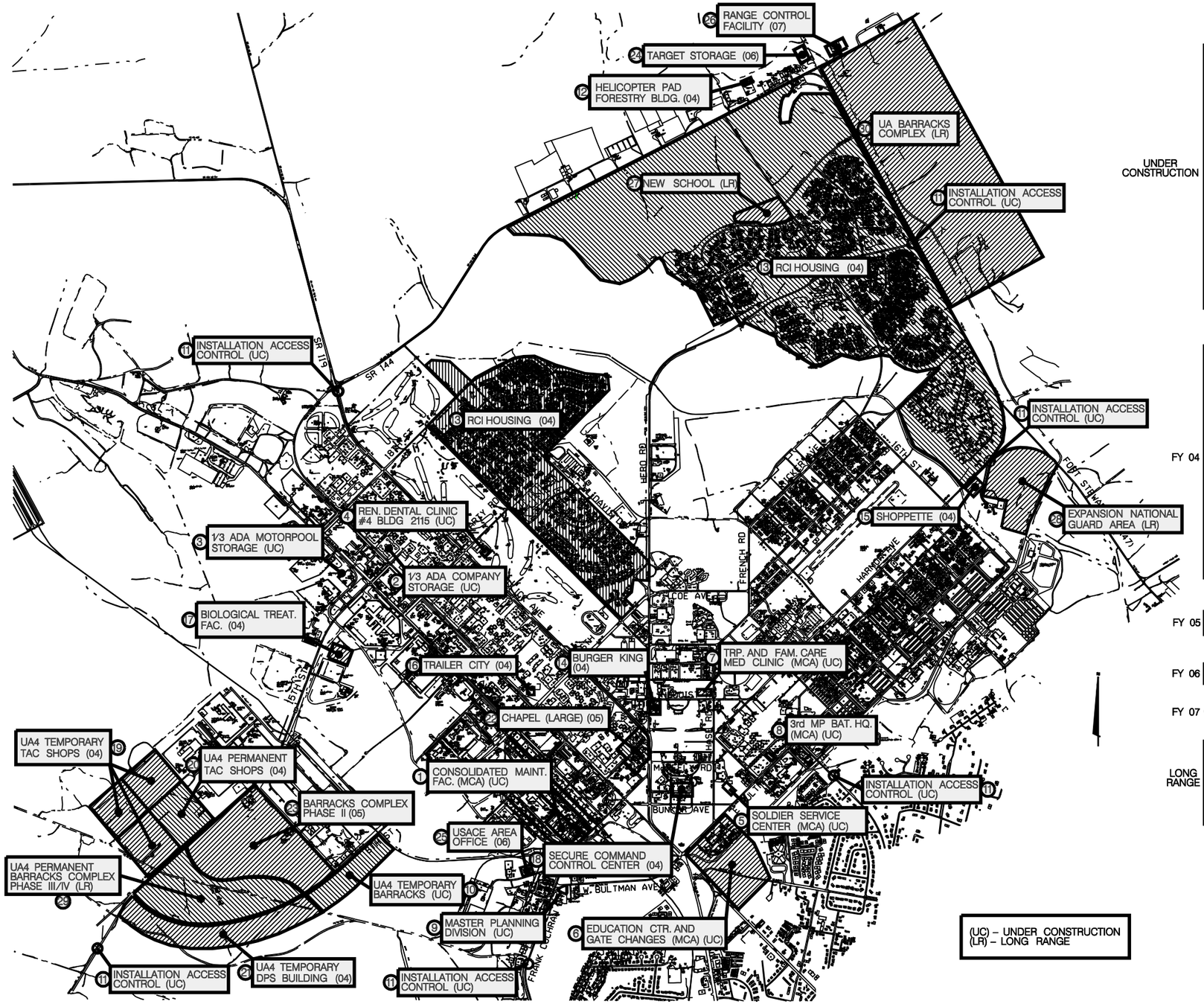
Figure 3-1 shows the current Master Plan for Fort Stewart. The majority of the projects included in the Master Plan are replacement projects for existing facilities that are outdated and no longer meet the needs of the installation. It is anticipated that the facilities being replaced or upgraded are already in operation at Fort Stewart and will not impact future traffic conditions. Table 3-1 summarizes the proposed projects included in the Master Plan, anticipated date of construction and whether the projects will impact future traffic conditions.

Table 3-1 summarizes current and future projects included in the Master Plan. Projects listed in Fort Stewart's Master Plan that will significantly affect the transportation infrastructure are indicated as having local impacts. A brief description of the location and the area of traffic impacts are discussed in the following paragraphs.

Table 3-1
Future Development Plan

Index #	Project Description	FY	Traffic Impacts
1	Consolidate Maintenance Facility	UC	No impacts
2	1/3 ADA Company Storage	UC	No impacts
3	1/3 Motorpool Storage	UC	No impacts
4	Renovate Dental Clinic	UC	No impacts
5	Soldier Service Center	UC	Local traffic impacts
6	Education Center and Gate Changes	UC	Local traffic impacts
7	Troop and Family Care Medical Clinic	UC	Local traffic impacts
8	3RD MP Battalion H.Q.	UC	No impacts
9	Master Planning Division	UC	No impacts
10	UA4 Temporary Barracks	UC	Local traffic impacts
11	Installation Access Control	UC	Local traffic impacts
12	Helicopter Pad and Forestry Bldg.	2004	No impacts
13	RCI housing	2004	Local traffic impacts
14	Burger King Relocation	2004	No impacts
15	Shoppette	2004	Local traffic impacts
16	Trailer City	2004	Local traffic impacts
17	Biological Treatment Center	2004	No impacts
18	Secure Command Control Center	2004	Local traffic impacts
19	UA4 Temporary TAC Shops	2004	Local traffic impacts
20	UA4 Permanent TAC Shops	2004	Local traffic impacts
21	UA4 Temporary DPS Building	2004	Local traffic impacts
22	Chapel	2005	Off-peak traffic impacts
23	Barracks Complex Phase II	2005	Local traffic impacts
24	Target Storage	2006	No impacts
25	USACE Area Office	2006	No impacts
26	Range Control Facility	2007	No impacts
27	New School	LR	Local traffic impacts
28	Expansion National Guard Area	LR	No impacts
29	UA4 Permanent Barracks Complex Phase III/IV	LR	Local traffic impacts
30	UA Barracks Complex	LR	Local traffic impacts

The proposed residential community initiative (RCI) housing project scheduled for construction by the end of 2004 consists of 680 new single-family homes to be located on the northeast quadrant of the cantonment area adjacent to State Route (SR) 144 and Fort Stewart Road. The new housing will be occupied by military personnel currently stationed at Fort Stewart but living off post due to



UNDER CONSTRUCTION

1. CONSOLIDATED MAINT. FAC. (MCA)
2. 1/3 ADA COMPANY STORAGE
3. 1/3 ADA MOTORPOOL STORAGE
4. REN. DENTAL CLINIC #4 BLDG. 2115
5. SOLDIER SERVICE CENTER (MCA)
6. EDUCATION CTR. AND GATE CHANGES (MCA)
7. TRP. AND FAM. CARE MED. CLINIC (MCA)
8. 3rd MP BAT. HQ. (MCA)
9. MASTER PLANNING DIVISION
10. UA4 TEMPORARY BARRACKS
11. INSTALLATION ACCESS CONTROL

FY 04

12. HELICOPTER PAD FORESTRY BLDG.
13. RCI HOUSING
14. BURGER KING
15. SHOPPETTE
16. TRAILER CITY
17. BIOLOGICAL TREAT. FAC.
18. SECURE COMMAND CNTL. CENTER
19. UA4 TEMPORARY TAC SHOPS
20. UA4 PERMANENT TAC SHOPS
21. UA4 TEMPORARY DPS BUILDING

FY 05

22. CHAPEL (LARGE)
23. BKS. COMPLEX PHASE II

FY 06

24. TARGET STORAGE
25. USACE AREA OFFICE

FY 07

26. RANGE CONTROL FACILITY

LONG RANGE

27. NEW SCHOOL
28. EXPANSION NATIONAL GUARD AREA
29. UA4 PERMANENT BARRACKS COMPLEX PHASE III/IV
30. UA BARRACKS COMPLEX

SOURCED BY:
FORT STEWART DIRECTORATE OF PUBLIC WORKS

NO.	DATE	DESCRIPTION OF REVISION

DWA
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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

FORT STEWART MASTER PLAN
2004 1st Qtr

DESIGNED:	CHECKED:	DATE: AUGUST 2004
DRAWN:	JOB NO.	SCALE:

Figure 3-1

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a lack of current housing on the installation. The construction of the new housing will shift some traffic from the access control points to internal roadways, including Hero Avenue, and Ricker Avenue/Austin Road. The new housing should decrease the amount of traffic currently entering/exiting the access control points by reducing the number of personnel living off post.

Completion of the Soldier Service Center, located at the intersection on Hase Road and McNeely Road, will shift a significant amount of existing traffic from various locations on Fort Stewart to this centralized location. This shift will primarily affect Hase Road and the intersection of Hase Road at McNeely Road, where the parking facility access will be located.

The Education Center located southeast of Main Gate, outside of the cantonment area, will serve Fort Stewart as well as the local area residents. Improvements to the external roadway infrastructure have been analyzed in combination with the construction and are not included in this report.

The new Troop and Family Care Medical Center, currently under construction on the northwest corner of the intersection of Haze Road and Lindquist Avenue, will increase future traffic demand at the intersection. The project will primarily shift traffic from the Winn Army Community Hospital area to Lindquist Road and Hase Road.

The construction of the UA4 temporary and permanent barracks, motor pools, and the shops will be located adjacent to 6th Street and 15th Street. Approximately 3,000 new troops will be located in this area, which represents a significant percentage of new troop strength assigned to Fort Stewart. The associated traffic impacts will affect the overall internal roadway infrastructure on the Fort, specifically at the intersection of 6th Street and 15th Street.

Trailer City located on the northeast corner of 6th Street and William Wilson Avenue, will shift approximately 200 troops from various locations on the Fort to office space at this location. The shift will primarily affect the signalized intersection at 6th Street and Wilson Avenue.

A new Command Control Center is planned for construction to the south of the existing facility. There is no significant shift in manpower to the new Command Control Center, but traffic flow may be affected on Bunker Avenue.

Future Traffic Projections

Future traffic projections were based on two conditions. The first condition accounts for an increase throughout the installation due to an increase in military personnel assigned to Fort Stewart. The second condition accounts for a shift in the existing traffic circulation due to new development (i.e. UA4 barracks, and Soldier Service Center). The second condition assumes the same amount of existing traffic redistributed based on the location of new facilities.

The increase in military personnel will be based on permanent increases in installation population and not temporary reassignments. Long-range installation strengths are not available. Future traffic conditions will be based on current assumptions for short-range projects (2004 – 2010) and are subject to change. Currently an overall growth in strength of 3,000 military personnel is being permanently reassigned to Fort Stewart by the end of June 2004. The new personnel are primarily associated with the UA4 shops and the support facilities. The growth of 3,000 new military personnel represents an increase of 15% to the overall population. The increase in personnel will utilize the overall roadway network on the Fort and therefore a growth rate of 15% was applied to the existing traffic volumes currently using the internal roadway infrastructure.

Projects listed in Table 3-1 that are considered to have local traffic impacts will either shift traffic currently at other locations on the Fort or will generate new traffic from facilities supporting the increase in military personnel. Additionally, the expansion of the RCI housing will increase traffic on the internal roadways providing access to the housing development and reduce some of the demand at the gates.

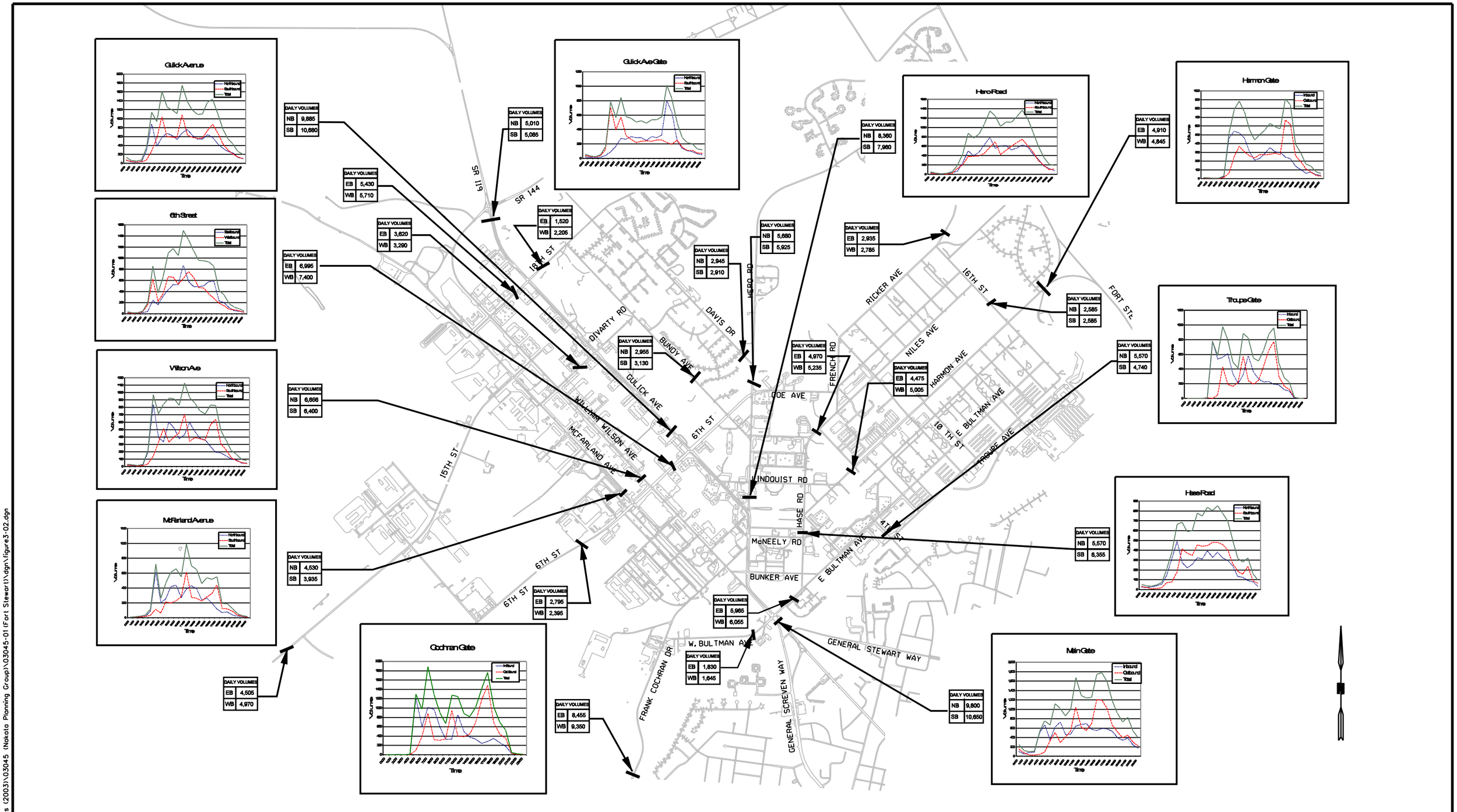
Future Traffic Flow Characteristics

Future traffic volumes were estimated on Fort Stewart's primary and secondary roadway system based on the anticipated increase in military personnel at the installation. In addition, local traffic was redistributed based on the location of new development projects within the installation. The purpose of estimating future traffic volumes is to develop an understanding of future travel patterns and volume levels in order to determine Fort Stewart's long-range transportation needs.

Future traffic volumes were estimated for daily, AM, Midday, and PM peak conditions. Existing traffic counts were factored up by a growth rate based on the percent increase in military personnel to be stationed at Fort Stewart.

Daily Traffic Volumes

Twenty-four hour traffic projections were estimated for a typical weekday based on Fort Stewart's Master Plan. While the traffic projections take into consideration long-range projects included in the 2020 plan, the majority of the increase in traffic will occur within a few years. The future traffic volumes identify how much additional traffic will be on each roadway for a typical day. In addition, they are used to identify the amount of future traffic on each roadway for any particular hour of the day. Figure 3-2 summarizes the future daily traffic volumes on the major roadways in and adjacent to the installation.



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FORT STEWARD COMPREHENSIVE TRAFFIC ENGINEERING STUDY

FUTURE DAILY TRAFFIC VOLUMES

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Figure 3-2

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Table 3-2 summarizes the results of the estimated future 24-hour traffic counts entering and exiting the installation at each of the access points.

Table 3-2
Future Daily Traffic Volumes at Access Points

Access Point	Inbound	Outbound	Total
Gate 1 (Main)	9,800	10,650	20,450
Gate 2 (Troupe Avenue)	5,570	4,740	10,310
Gate 3 (Harmon Avenue)	4,910	4,845	9,755
Gate 4 (Austin Road) **Closed**	N/A	N/A	N/A
Gate 5 (Gulick Avenue)	5,010	5,085	10,095
Gate 6 (Wilson) **Closed**	N/A	N/A	N/A
Gate 7 (15th Street)	4,505	4,970	9,475
Gate 8 (Frank Cochran Drive)	8,455	9,350	17,805
Checkpoint 11 (WAAF)	1,010	740	1,750
Total Traffic	**39,260**	**40,380**	**79,640**

The traffic projections show the future amount of traffic entering and exiting the access points to the installation. Fort Stewart will have an estimated 79,640 vehicles entering and exiting the installation on a daily basis, based on the current Master Plan and estimated personnel strengths. The main access points to the installation are the main gate at General Screven Way with a projected traffic volume of over 20,450 vehicles per day (vpd), Frank Cochran Drive with 17,805 vpd, Troupe Gate with 10,310 vpd, and Harmon Gate with 9,755 vpd. The southern gate volumes, with access to the City of Hinesville's residential area beyond the cantonment area, have been reduced to reflect the shift in traffic as a result of the new RCI development on the installation.

The majority of future traffic (26%) will continue to enter and exit through the main gate on General Screven Way. Frank Cochran Drive Gate services approximately 22 percent of the total future traffic accessing the Fort. Troupe Gate will serve approximately 13 percent of the traffic entering and exiting the installation on a typical weekday. 15th Street Gate provides access for all commercial vehicles as well as military/civilian personnel. The volumes at 15th Street gate will increase to a daily traffic volume of 9,475 vehicles per day as development increases outside of the gate. Gate 11 (WAAF) provides access to Wright Army Airfield with 1,750 vehicles per day and is not predicted to experience any increase in personnel under the future conditions. Gate 4 (Austin Road) and Gate 6 (Wilson Gate) are not anticipated to reopen in the future. The new gate located at Diamond Head Avenue should help alleviate some of the traffic demand using Harmon Gate.

The access control points to the installation feed the primary internal roadway network of the Fort. Traffic is dispersed onto secondary and local roadways to reach the different destinations on post. Gulick Avenue will carry 20,565 vehicles per day with 9,885 traveling northbound and 10,680 in the southbound direction. Hero Road north of Gulick Avenue future volume is 16,320 vehicles per day. 6th Street will have 14,395 vpd with over 6,995 vehicles per day eastbound and 7,400 westbound. Hase Road is projected to carry 5,570 northbound and 6,355 southbound vehicles per day. East Bultman Avenue will have a total traffic volume of 12,060 vehicles per day with 5,965 traveling eastbound and 6,055 westbound. Harmon Avenue will have 9,755 vehicles per day with 4,910 eastbound and 4,845 westbound. Austin Road, serving mainly residential land uses, will carry 5,720 vehicles per day with eastbound 2,935 and 2,785 westbound vehicles per day.

Peak Hour Traffic Volumes

Future peak hour volumes were estimated by factoring up the existing turning movement counts for each of the major intersections located within the installation. Future traffic projections were developed for the AM, Midday and PM peak periods to reflect future traffic conditions. The peak traffic flow is influenced by the standard operating characteristic of the installation and will not change for future conditions.

The typical peak periods (0530 to 0630, 0700 to 0800, 0800 to 0900, 1100 to 1300, and 1600 to 1800) that exist today will be the same peak periods in the future, unless operating procedures change at the installation. Figures 3-3, 3-4 and 3-5 summarize the future intersection volumes for the peak periods.

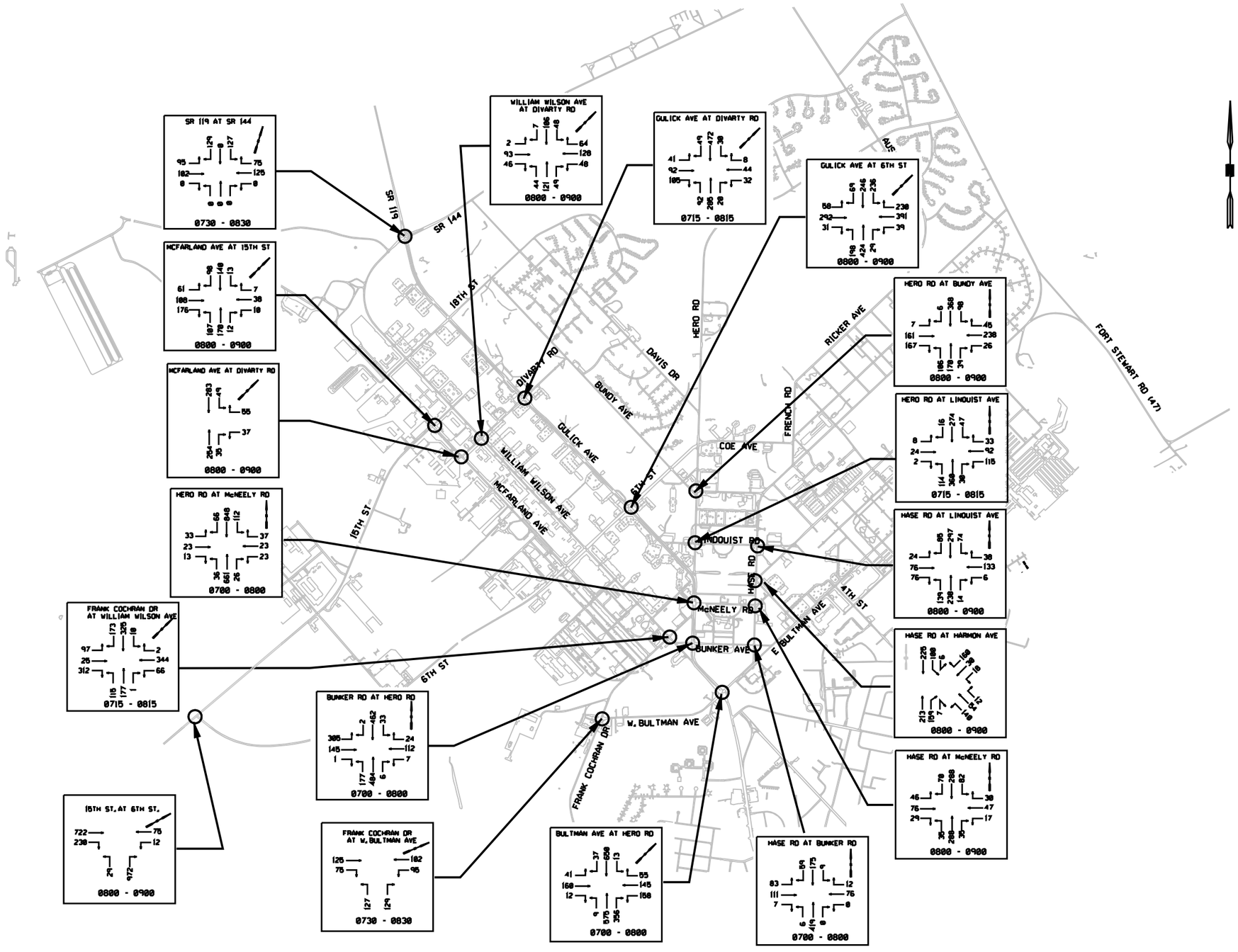
Capacity Analysis

Operational analyses were conducted at the major intersections for future traffic conditions. The operations analyses were performed to determine future operating conditions at the study intersections and help identify future deficiencies. The intersections were analyzed using future traffic projections for AM, Midday and PM peak periods.

Level of service (LOS) for an intersection is based on the vehicular delay at the intersection and is a typical measure of effectiveness used to evaluate intersection operations. The Highway Capacity Manual (HCM) provides ranges of delay for each LOS definition, spanning from very minimal delays (LOS A) to high delays (LOS F). LOS F is considered unacceptable for most drivers.

For unsignalized intersections where side streets or minor streets are controlled by a stop sign, the criterion for evaluating traffic operations is the LOS for the controlled turning movements at the intersection. Synchro software was used to apply the methodology from the HCM and determine the delay and LOS for these turning movements. Synchro software was used to determine the LOS based on the following input data:

- Intersection geometry;
- Lane configuration, and
- Turning movement volumes.



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FUTURE AM PEAK HOUR TURNING MOVEMENTS

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Figure 3-3

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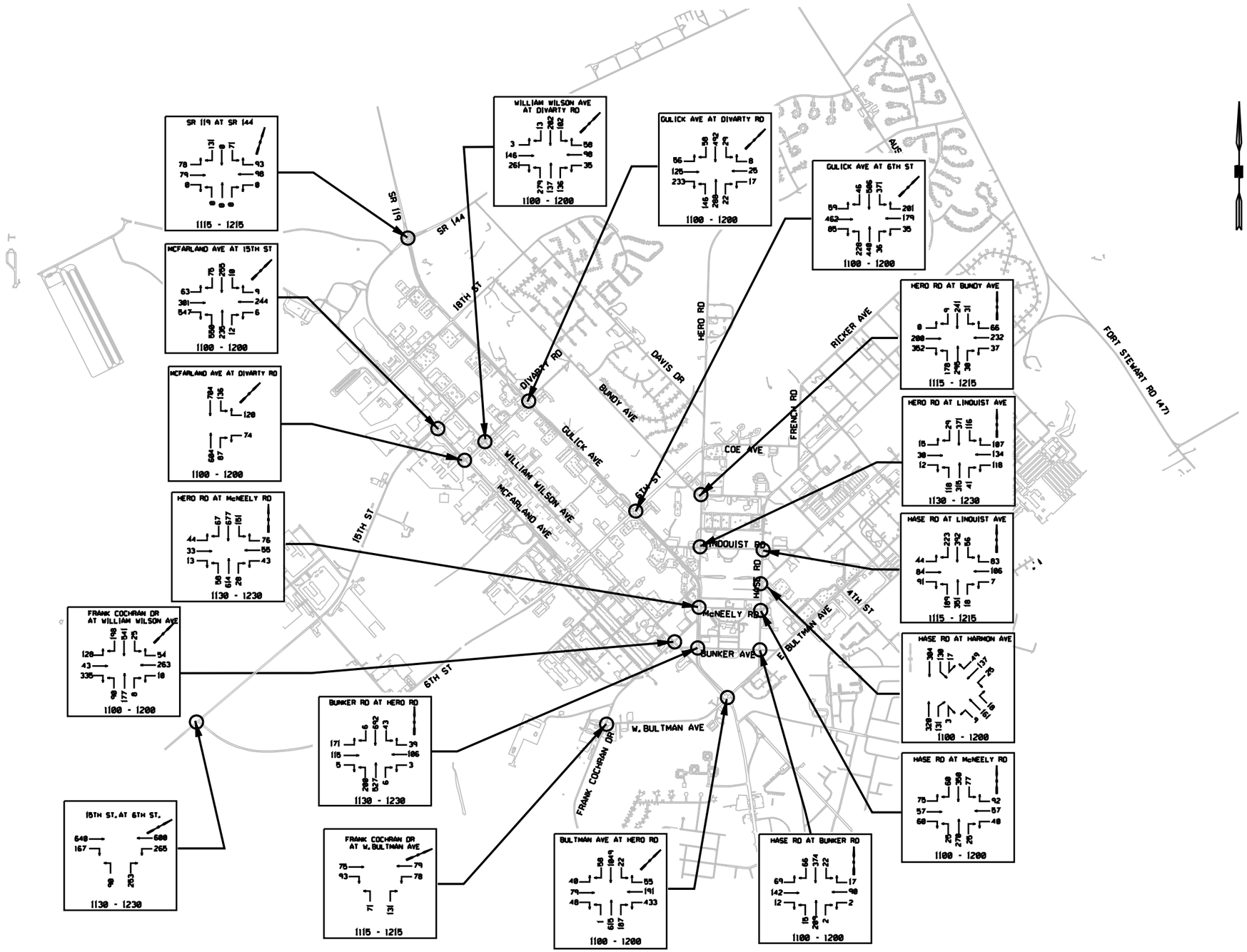

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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

FUTURE MIDDAY PEAK HOUR TURNING MOVEMENTS

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Figure 3-4

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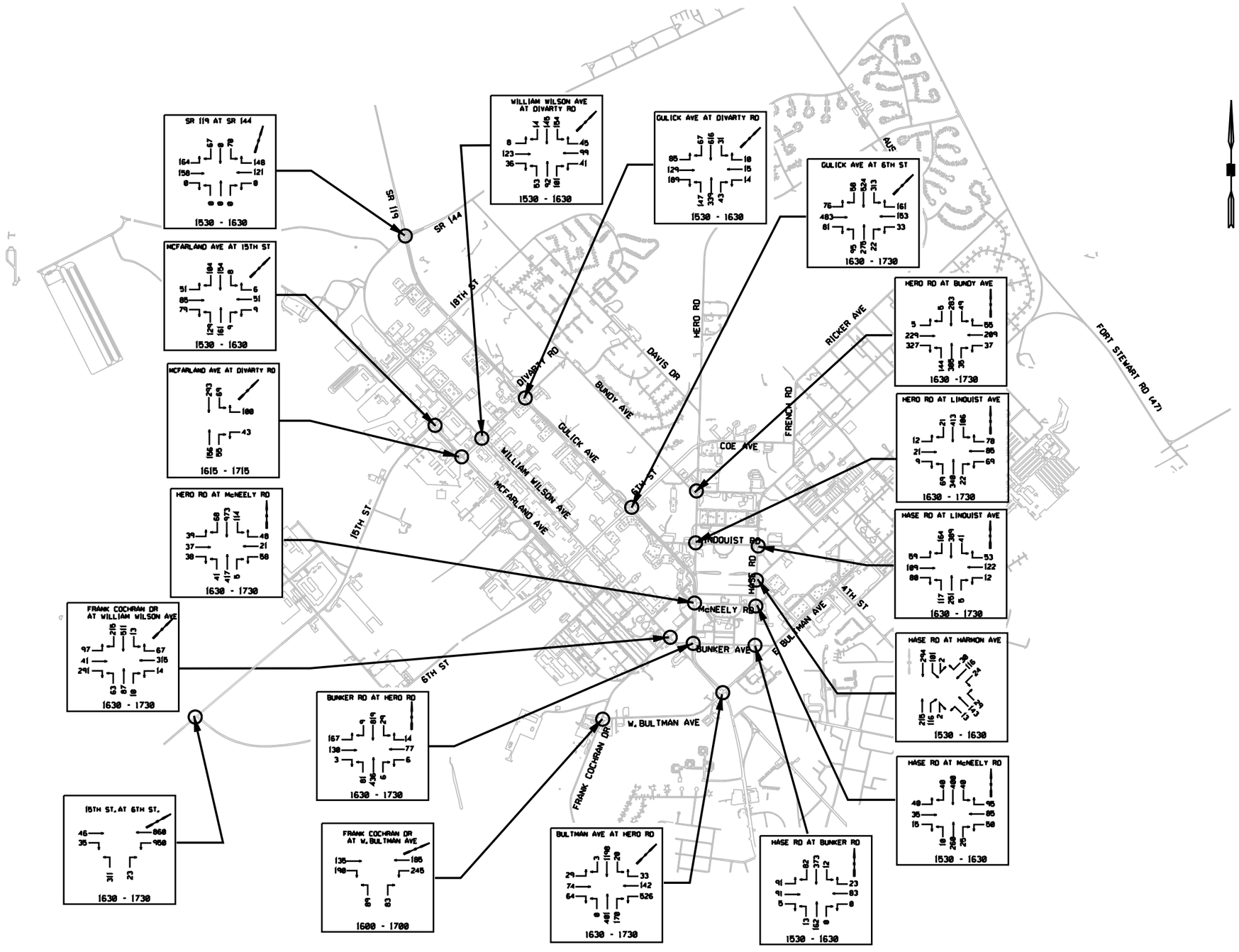

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FUTURE PM PEAK HOUR TURNING MOVEMENTS

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Figure 3-5

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The results for future conditions operations analyses are summarized in Figure 3-6. The analysis was performed for the intersections at the following locations:

- Gulick Avenue at Divarty Road
- Gulick Avenue at 6th Street
- Hero Road at Bunker Avenue
- Hero Road at Bultman Avenue
- Hero Road at Lindquist Avenue
- Frank Cochran Drive at Wilson Avenue
- Wilson Avenue at Divarty Road
- Hero Road at McNeely Road
- Hero Road at Bundy Avenue
- Hase Road at Bunker Avenue
- Hase Road at McNeely Road
- Hase Road at Lindquist Avenue
- Frank Cochran Drive at West Bultman Avenue
- McFarland Avenue at Divarty Road
- McFarland Avenue at 15th Street
- 15th Street at 6th Street

In addition, the signalized intersection of SR 119 at SR 144 located just north of the cantonment area was analyzed.

Based on future traffic conditions, several unsignalized intersections will operate at unacceptable LOS during at least one peak period. The unsignalized intersections were analyzed assuming recommended existing improvements based on existing conditions were in place. The following intersections will operate at a poor LOS:

- Hero Road at McNeely Road
- Hero Road at Bundy Avenue
- Hase Road at Lindquist Road
- Hase Road at McNeely Road
- 15th Street at 6th Street
- 15th Street at McFarland Avenue

The intersection of Hero Road at McNeely Road will operate at a poor LOS during the AM, Midday and PM peak periods. The McNeely Road approaches experience long delays that cannot be relieved with geometric improvements. The close proximity of the intersection to the signalized intersection of Gulick Avenue at Hero Road does not make this intersection a good candidate for signalization.

The intersection of Hero Road at Bundy Avenue will operate at a poor LOS during the AM, Midday and PM peak periods. The Bundy Avenue approaches experience long delays and LOS F for all peak hours of the day due to the heavy amount of future traffic projected on Hero Road.

The intersection of Hase Road at McNeely Road will experience LOS F on the minor street approaches (McNeely Road) throughout the peak periods of the day. The increased traffic volumes at the intersection are attributed to the new Soldier Service Center and the recommended closure of Pony Soldier Avenue at the intersection with Hase Road.

Hase Road at Lindquist Avenue will experience LOS F on the minor approaches of Lindquist Road throughout the peak periods of the day. The future traffic volumes generated by the new Troop and Family Care Medical Clinic, the proposed realignment of Harmon Avenue to Lindquist Avenue, and the new RCI housing causes the intersection to operate poorly based on stop sign control.

The intersection of 15th Street at 6th Street is adjacent to the new AU4 TAC shops and barracks which will greatly increase the traffic at the intersection. Based on the existing lane geometry, the intersection will experience LOS F during the Midday and PM peak hours due to the heavy traffic generated by the new development.

15th Street at McFarland Avenue will experience poor LOS during the Midday peak hour for the eastbound McFarland approach. The additional traffic generated by the new AU4 TAC shops and barracks will increase the traffic volumes along 15th Street, degrading the operating conditions at the intersection.

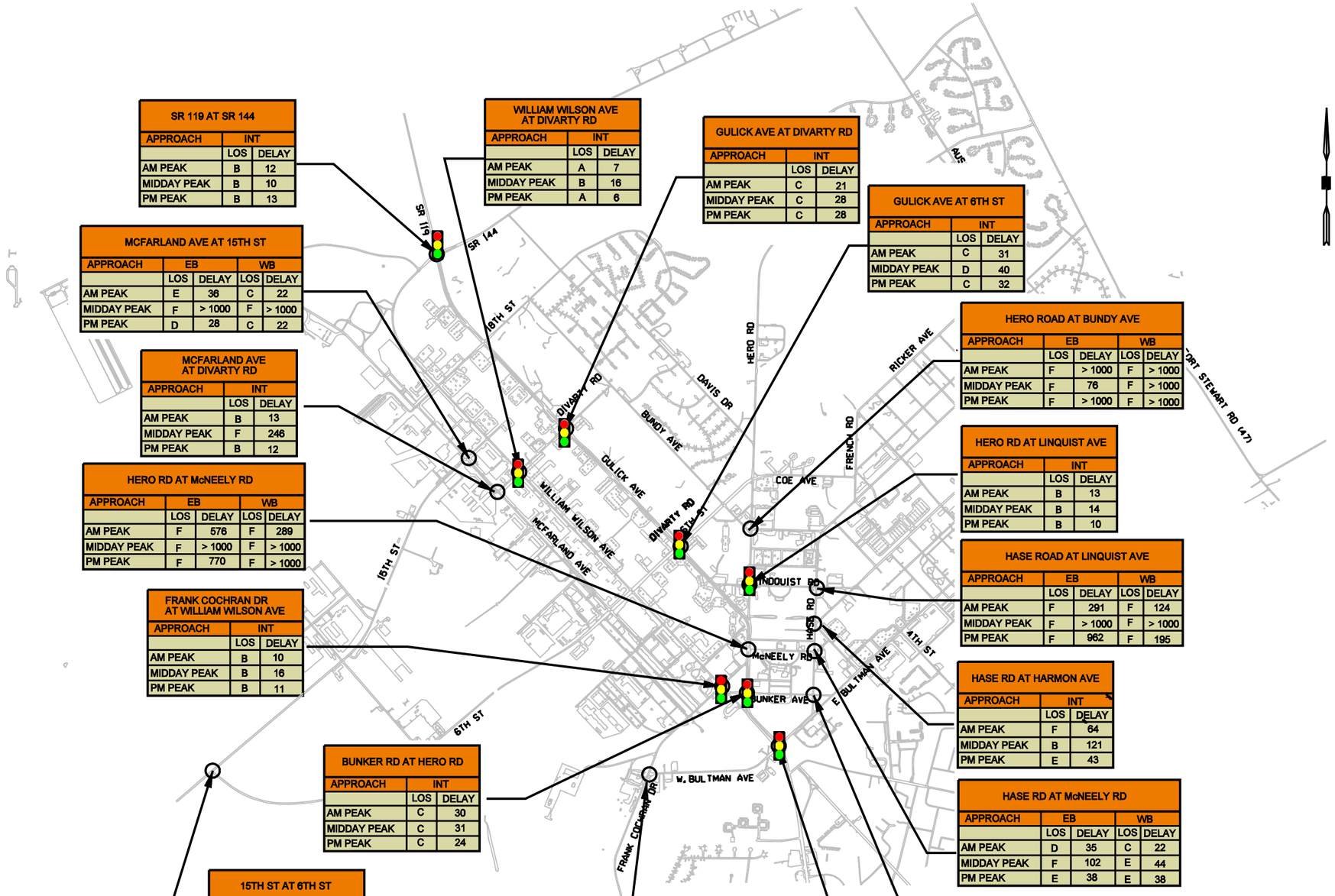
The signalized intersections will operate at acceptable LOS throughout the day and will not experience capacity deficiencies based on future conditions.

<u>All-Way Stop and Signal Warrant Analyses</u>

Based on the results of the capacity analyses, several intersections will operate at poor LOS during peak periods due to future traffic conditions. In order to meet the needs of future traffic demand several intersections were analyzed for all-way stops and/or traffic signals.

McFarland Avenue at 15th Street

Intersection turn lane improvements were analyzed to improve the delay and LOS at the intersection with future traffic volumes. The addition of an eastbound right turn lane and northbound left turn lane failed to improve the intersection LOS to acceptable levels.



SR 119 AT SR 144		
APPROACH	INT	
	LOS	DELAY
AM PEAK	B	12
MIDDAY PEAK	B	10
PM PEAK	B	13

WILLIAM WILSON AVE AT DIVARTY RD		
APPROACH	INT	
	LOS	DELAY
AM PEAK	A	7
MIDDAY PEAK	B	16
PM PEAK	A	6

GULICK AVE AT DIVARTY RD		
APPROACH	INT	
	LOS	DELAY
AM PEAK	C	21
MIDDAY PEAK	C	28
PM PEAK	C	28

GULICK AVE AT 6TH ST		
APPROACH	INT	
	LOS	DELAY
AM PEAK	C	31
MIDDAY PEAK	D	40
PM PEAK	C	32

MCFARLAND AVE AT 15TH ST				
APPROACH	EB		WB	
	LOS	DELAY	LOS	DELAY
AM PEAK	E	36	C	22
MIDDAY PEAK	F	> 1000	F	> 1000
PM PEAK	D	28	C	22

MCFARLAND AVE AT DIVARTY RD		
APPROACH	INT	
	LOS	DELAY
AM PEAK	B	13
MIDDAY PEAK	F	246
PM PEAK	B	12

HERO ROAD AT BUNDY AVE				
APPROACH	EB		WB	
	LOS	DELAY	LOS	DELAY
AM PEAK	F	> 1000	F	> 1000
MIDDAY PEAK	F	76	F	> 1000
PM PEAK	F	> 1000	F	> 1000

HERO RD AT LINQUIST AVE		
APPROACH	INT	
	LOS	DELAY
AM PEAK	B	13
MIDDAY PEAK	B	14
PM PEAK	B	10

HERO RD AT McNEELY RD				
APPROACH	EB		WB	
	LOS	DELAY	LOS	DELAY
AM PEAK	F	576	F	289
MIDDAY PEAK	F	> 1000	F	> 1000
PM PEAK	F	770	F	> 1000

HASE ROAD AT LINQUIST AVE				
APPROACH	EB		WB	
	LOS	DELAY	LOS	DELAY
AM PEAK	F	291	F	124
MIDDAY PEAK	F	> 1000	F	> 1000
PM PEAK	F	962	F	195

FRANK COCHRAN DR AT WILLIAM WILSON AVE		
APPROACH	INT	
	LOS	DELAY
AM PEAK	B	10
MIDDAY PEAK	B	16
PM PEAK	B	11

HASE RD AT HARMON AVE		
APPROACH	INT	
	LOS	DELAY
AM PEAK	F	64
MIDDAY PEAK	B	121
PM PEAK	E	43

BUNKER RD AT HERO RD		
APPROACH	INT	
	LOS	DELAY
AM PEAK	C	30
MIDDAY PEAK	C	31
PM PEAK	C	24

HASE RD AT McNEELY RD				
APPROACH	EB		WB	
	LOS	DELAY	LOS	DELAY
AM PEAK	D	35	C	22
MIDDAY PEAK	F	102	E	44
PM PEAK	E	38	E	38

15TH ST AT 6TH ST		
APPROACH	NB	
	LOS	DELAY
AM PEAK	F	> 1000
MIDDAY PEAK	F	> 1000
PM PEAK	F	> 1000

FRANK COCHRAN DR AT W. BULTMAN AVE		
APPROACH	WB	
	LOS	DELAY
AM PEAK	C	15
MIDDAY PEAK	B	12
PM PEAK	D	29

BULTMAN AVE AT HERO RD		
APPROACH	INT	
	LOS	DELAY
AM PEAK	C	29
MIDDAY PEAK	D	38
PM PEAK	D	51

HASE RD AT BUNKER RD				
APPROACH	EB		WB	
	LOS	DELAY	LOS	DELAY
AM PEAK	E	40	C	19
MIDDAY PEAK	F	60	C	21
PM PEAK	E	38	C	17

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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

FUTURE INTERSECTION CAPACITY ANALYSIS

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Figure 3-6

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The intersection was analyzed under all-way stop conditions, which resulted in an intersection LOS F during the Midday peak hour with moderate delay. LOS for the AM and PM peak hours is B and does not indicate the need for signalization. However, the intersection should be monitored to determine any future signalization needs.

15th Street at 6th Street

Construction of the AU4 barracks and shops will result in increased traffic demand at the intersection. Analysis indicates that the addition of turn lanes at each of the approaches will not be sufficient to improve the poor LOS. All-way stop conditions analysis at the intersection resulted in an unacceptable LOS for each of the peak hours. Based on the future traffic projections, analysis indicates the need for signalization at this location.

Hero Road at McNeely Road

Based on the proposed widening of Frank Cochran Drive to a four-lane facility terminating at Hero Road and poor LOS at the intersection of Hero Road at McNeely Road, it's recommended that the westbound McNeely Road approach intersect Frank Cochran Drive at a plus intersection. The resulting intersection realignment will essentially combine the two intersection traffic volumes. Based on the future traffic projections, analysis indicates the need for signalization at this location.

Hero Road at Bundy Avenue

Analysis indicates the addition of left turn lanes on the Hero Road approaches to Bundy Avenue, and a right turn lane on westbound Bundy Avenue, will not eliminate the poor approach LOS on Bundy Avenue for the AM, Midday, and PM peak hours based on future conditions. Therefore, the intersection was analyzed under signalized conditions, which results in acceptable LOS for the intersection.

Assessment of Future Transportation Deficiencies

Future traffic conditions at Fort Stewart were evaluated to assess if the existing infrastructure of internal roadways, access control points, and parking facilities will meet the needs of planned development and future increases in military personnel. The purpose of this assessment is to identify areas where future concerns may occur including potential safety issues, roadway deficiencies, parking and traffic control. The assessment of future conditions, combined with our understanding of existing traffic operations, will aid us better to ensure the transportation infrastructure meets the future needs of the installation. The following paragraphs summarize the assessment of future traffic operating conditions of the installation's transportation infrastructure and identify future deficiencies.

Future Access Points Deficiencies

Hero Gate, Troupe Gate and Frank Cochran Gate will continue to experience heavy traffic volumes during peak periods throughout the day. Traffic entering and exiting the gates will continue to increase due to future increases in military personnel stationed at Fort Stewart. During the AM and Midday peak periods, inbound traffic will frequently experience long delays and queuing entering the installation due to the sheer volumes over a short period of time. The increase in military personnel (an estimated 3,000) stationed on the Fort and construction of additional RCI housing will increase the internal traffic volumes on Fort Stewart. A large portion of the new trips may be captured within the cantonment area during the AM and PM peak hours because of the proximity of the AU4 Barracks to the AU4 shops. The Midday peak is characterized by trips to eating establishments out of the cantonment area in Hinesville and as a result the gates adjacent to that area may experience increased traffic volumes. The reconstruction of the checkpoint facilities at Fort Stewart should increase the ability to efficiently process more traffic volume.

The construction of the new access control point on Diamond Head Avenue will help alleviate Harmon Avenue Gate operations. In addition, the Harmon Avenue roadway realignment improvements currently under construction will improve operations at the gate. The improved operation of the Harmon Avenue checkpoint should help offset any increase in future traffic volumes.

Internal Roadway Deficiencies

The results of the assessment of future traffic conditions have identified several locations within the installation that will experience future deficiencies. The following future roadway deficiencies have been identified.

Local traffic within the installation will continue to be heavy during the peak periods for areas of the installation with major destinations. The primary and secondary roadways within the installation will service the majority of the additional traffic generated by planned development and increases in personnel on the installation.

The internal roadways providing access to the PX, Commissary, Credit Union, and Troop and Family Care Medical Clinic will experience significant growth in traffic as future development occurs. Gulick Avenue, Hero Road, Hase Road and Harmon Avenue are the main roadways used to access these destinations, creating congestion during the AM, Midday, and PM peak periods. Military and civilian personnel and visitors (e.g. retired military, spouses) will continue to enter through Main Gate to use Fort Stewart's facilities.

The construction of 680 residential units will increase traffic significantly on Austin Road, Hase Road, Ricker Avenue and Hero Road. Hero Road and Hase Road will experience the majority of the growth in traffic volumes. Hero Road will accommodate in excess of 16,000 vehicles per day, which is approaching the capacity of a two-lane roadway. Left turn lanes on Hero Road and Hase Road will need to be added at all major intersections along the corridor in order to achieve acceptable operating conditions. In addition, signalization of all major intersections along Hero Road will be necessary to improve the intersection operations.

Circulation Deficiencies

As the installation continues to develop the need for better east-west circulation will increase. The growth along 15th Street, in the area of the AU4 barracks and shops, will increase demand to access the support facilities between Hase Road and Hero Road. The widening of Frank Cochran Drive to a four-lane facility would be a good location to improve east-west connectivity by providing a connection east to McNeely Road and the new Soldier Service Center.

Existing Parking Deficiencies

Based on the parking inventory additional parking will be required on William Wilson Avenue and McFarland Avenue between 18th Street and Sigma Street, south of 6th Street. The existing parking facilities within close walking distance to the major destinations on William Wilson Avenue are insufficient to meet the future parking demand. The construction of the Troop and Family Care Medical Clinic, and the recommended additional parking facilities for the Winn Army Community Hospital, will alleviate the parking shortage at the facility.

Pedestrian Deficiencies

There are limited existing pedestrian facilities on Fort Stewart. Sidewalks are primarily present around the Headquarters and along 6th Street. Future planned developments should be evaluated for the need of additional pedestrian facilities, including sidewalks and crosswalks. Pedestrian sidewalks and crosswalks should be incorporated into the site plans for the new Troop and Family Care Medical and AU4 barracks and shops. Additional mid-block crossings should also be considered on 15th Street between the proposed barracks and shops.

Summary of Findings

The overall existing transportation network will accommodate the future growth as shown in Fort Stewart's Master Plan (Figure 3-1) with the exception of a few isolated areas. The majority of the existing roadway network and traffic control will continue to operate at an acceptable level of service based on future development plans and increases in personnel. This assessment of future conditions used future traffic projections and analyses to evaluate the existing transportation network, and identify areas requiring improvements to meet the future demands of the installation.

Future Deficiencies

The *Assessment of Future Conditions* identified deficiencies requiring improvements to mitigate future traffic congestion and possible safety concerns. Table 3-3 summarizes the locations and types of deficiencies identified.

Table 3-3
Future Transportation Deficiencies

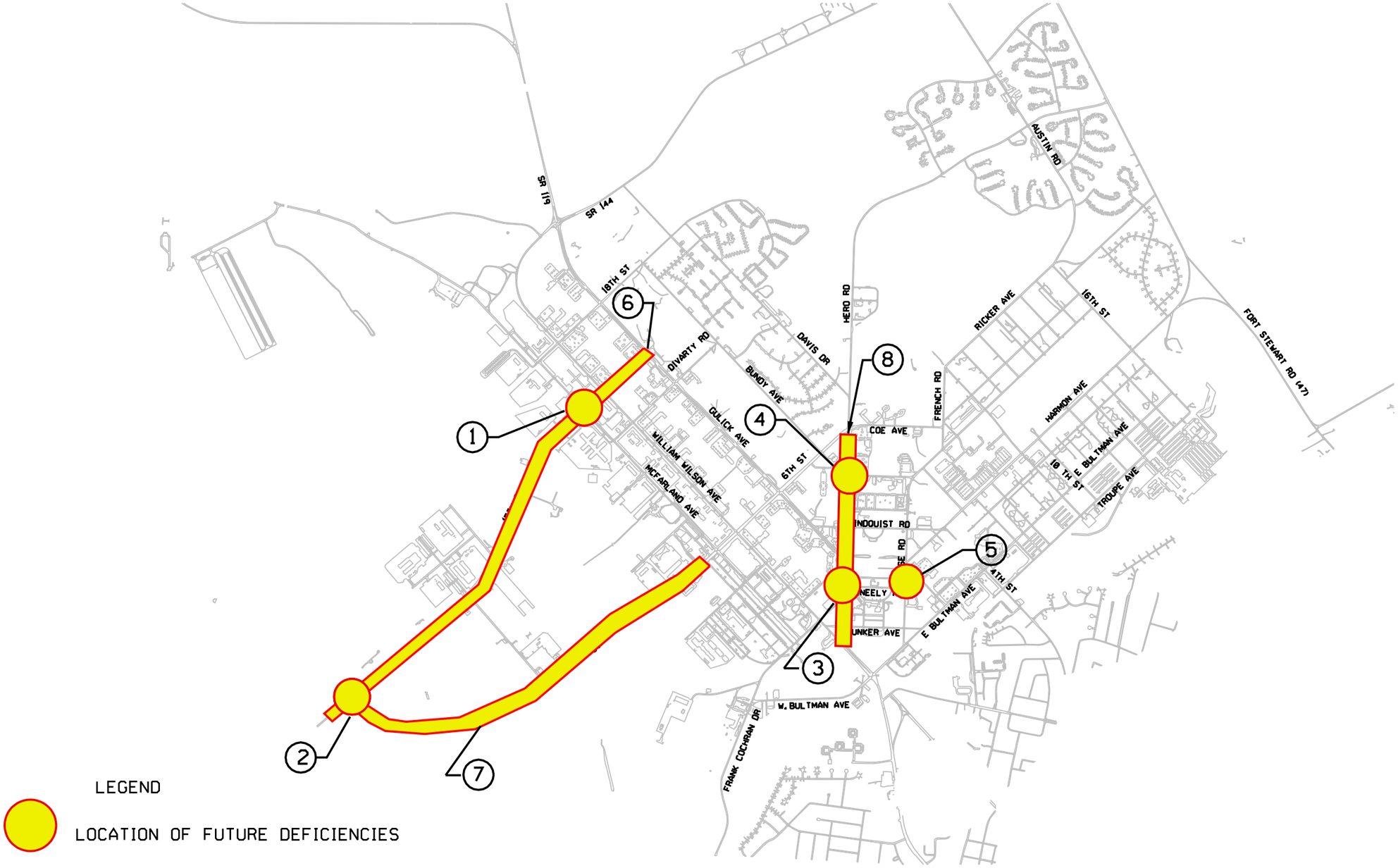
Location		Type of Deficiency
1	McFarland Avenue at 15th Street	Congestion and lane geometrics
2	15th Street at 6th Street	Congestion and lane geometrics
3	Hero Road at McNeely Road *	Congestion and lane geometrics
4	Hero Road at Bundy Avenue *	Congestion and traffic control
5	Hase Road at McNeely Road	Congestion and traffic control
6	15th Street from William Wilson Avenue to Gulick Avenue	Circulation and access
7	6th Street from 15th Street to McFarland Avenue	Circulation and access
8	Hero Road from Gulick Avenue to 6th Street	Circulation and access

* Location indicates an existing deficiency

Figure 3-7 summarizes the location of the future deficiencies identified in the *Assessment of Future Conditions.*

Conclusion

The *Assessment of Future Conditions* identified potential deficiencies with the existing transportation network. These locations will require modifications to minimize future traffic congestion, safety issues, and parking requirements in order to meet the future needs of the installation.



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SUMMARY OF FUTURE DEFICIENCIES

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Figure 3-7

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SECTION 4 – IMPLEMENTATION OF RECOMMENDED IMPROVEMENTS

This section of the study summarizes recommended improvement projects for mitigating the deficiencies identified in the first two elements of the study; *Assessment of Existing Conditions* and *Assessment of Future Conditions*. This section discusses implementation of recommended transportation improvement projects relating to traffic control, pedestrian facilities, roadway improvements, parking, and signing and markings. Detailed conceptual drawings are presented for each of the recommendations.

Projects are prioritized into one of three categories short-range, mid-range or long-range projects for implementation according to need for the improvement. In addition, preliminary construction cost estimates have been prepared for each alternative and are summarized in this section.

RECOMMENDED IMPROVEMENT PROJECTS

Recommended improvement projects were developed based on the existing transportation deficiencies identified in Section 2 *Assessment of Existing Conditions* and the future needs determined in Section 3 *Assessment of Future Conditions* of this study. These deficiencies and future needs require modifications of the existing transportation system to improve traffic congestion, safety, circulation, access, and parking requirements in order to meet the needs of the installation.

The recommended improvement projects are divided into the following eight categories based on the type of improvement being recommended. Several projects may fall under more than one category. The recommended projects are categorizes as follows:

- Intersection Improvements
- Access and Circulation Improvements
- Parking Improvements
- Signing and Markings Improvements
- Traffic Control Improvements
- Roadway improvements
- Pedestrian Improvements

Estimated construction costs were developed for each of the recommended improvement projects. The cost estimates were based on estimated quantities of materials determined from the conceptual improvements. Actual itemized costs are based on the Georgia Department of Transportation's (GDOT) mean item summary for 2004 projects. Cost estimates assume a 15 percent engineering and contingency to account for unforeseen construction items and inflation. Detailed cost estimates are included in Appendix E. The total cost also includes the engineering design cost.

Although a large number of transportation improvements have been recommended, it is not feasible or desirable to implement all of the projects at one time. A phasing plan was developed to provide decision makers with a starting point to use in prioritizing the recommended improvement projects for implementation based on need for the improvement and cost. The priority of the projects is based on the following criteria:

- Safety
- Operational deficiencies
- Does not meet current design standards
- Construction costs
- Future need
- Difficulty in construction

The recommended improvement projects were grouped into three implementation time periods based on level of priority, estimated cost and difficulty of implementation from a design and construction perspective. The three implementation periods are:

Short-Range (2005 – 2007): Improvements that are of high priority based on existing deficiencies related to safety and traffic congestion.

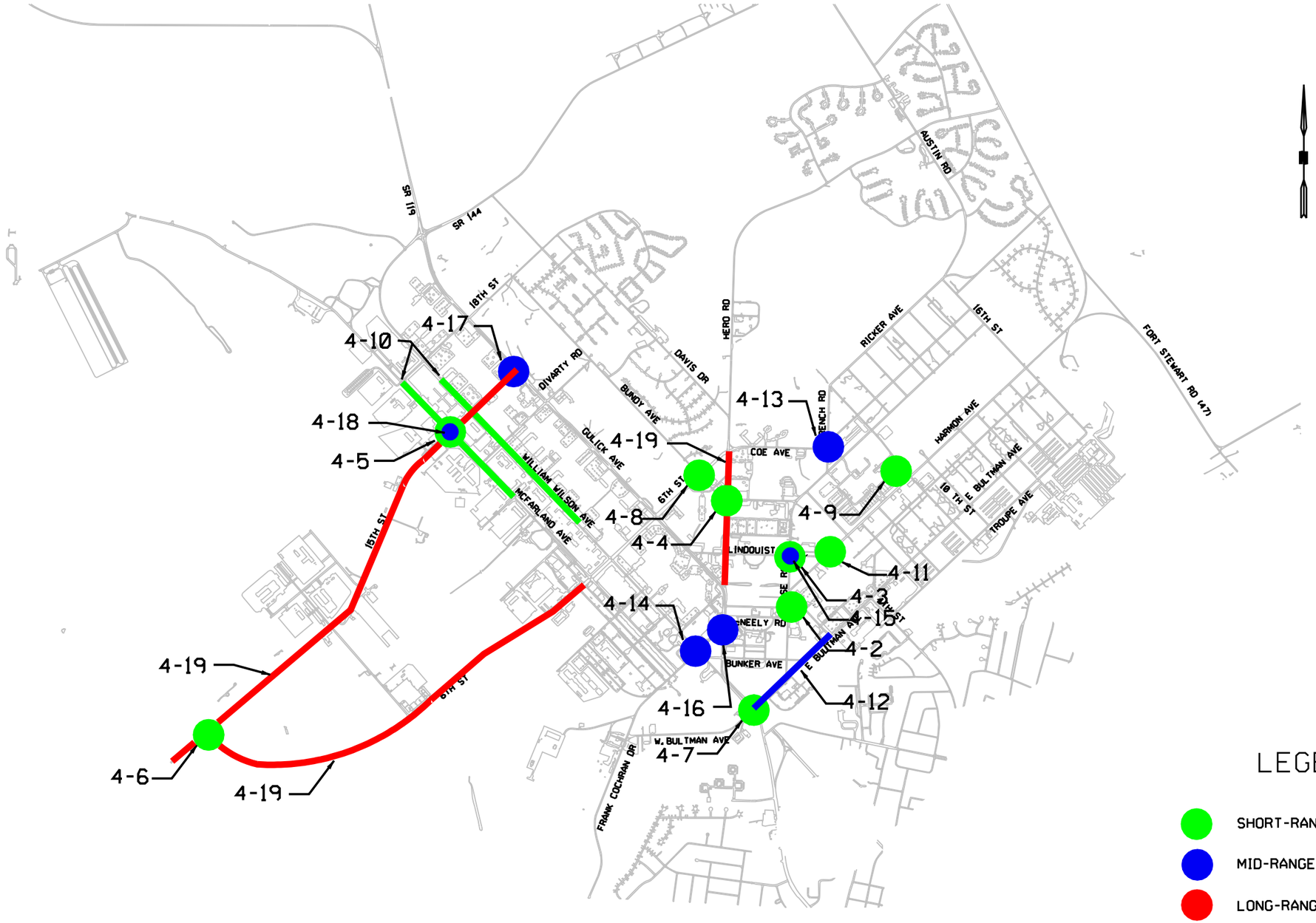
Mid-Range (2008 – 2010): Improvements that are not as high priority based on existing deficiencies and require longer term design and construction.

Long-Range (2011 +): Improvements that are not currently needed, but are anticipated with future conditions. Improvement projects intended to bring existing facilities up to current design standards. Projects with a high construction cost and or difficulty in construction.

Table 4-1 summarizes the recommended improvement projects and estimated construction costs according to priority of implementation. Figure 4-1 shows the location of each of the recommended improvement projects.

Table 4-1
Summary of Recommended Improvements

Recommended Improvement		Type of Improvement	Cost Estimate
Short-Range Projects (2005 – 2007)			
4-2	Hase Road at McNeely Road	Intersection	$277,400
4-3	Hase Road at Lindquist Avenue	Intersection	$218,400
4-4	Hero Road at Bundy Avenue	Intersection	$78,700
4-5	15th Street at McFarland Avenue	Intersection	$35,400
4-6	15th Street at 6th Street	Intersection	$124,000
4-7	Hero Road at Bultman Avenue	Traffic Control	$8,200
4-8	6th Street at Bundy Avenue	Traffic Control	$87,300
4-9	Winn Army Community Hospital	Parking	$529,500
4-10	William Wilson Avenue at McFarland Avenue	Parking	$2,855,000
4-11	Harmon Avenue at Lindquist Avenue	Roadway	$178,800
Mid-Range Projects (2008 – 2010)			
4-12	Bultman Avenue (Hero Road to Pony Soldier Avenue)	Intersection	$130,160
4-13	Coe Avenue at French Road	Intersection	$88,500
4-14	William Wilson Avenue at Frank Cochran Drive	Intersection	$237,700
4-15	Hero Road at Bundy Avenue	Traffic Control	$89,700
4-16	Hero Road at McNeely Road/Frank Cochran Drive	Roadway	$1,117,000
4-17 4-18	15th Street between McFarland Avenue and Gulick Avenue	Roadway	$269,800
Long-Range Projects (2011 +)			
4-19	6th Street, 15th Street, Hero Road	Roadway	$3,068,000



LEGEND

- SHORT-RANGE PROJECT
- MID-RANGE PROJECT
- LONG-RANGE PROJECT

(4-1) CORRELATING PROJECT FIGURE NUMBER

NO.	DATE	DESCRIPTION OF REVISION

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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

SUMMARY OF PROJECT LOCATION

DESIGNED:	CHECKED:	DATE: AUGUST 2004	Figure 4-1
DRAWN:	JOB NO.	SCALE:	

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SHORT – RANGE PROJECTS (2005 – 2007)

Projects included in this phase of implementation were determined based level of existing need determined from the deficiencies identified in Section 2. Table 4-2 summarizes the recommended short-range improvement projects and associated construction costs.

Figure 4-2
Summary of Short-Range Projects

Recommended Improvement		Type of Improvement	Cost Estimate
Short-Range Projects (2005 – 2007)			
4-2	Hase Road at McNeely Road	Intersection	$277,400
4-3	Hase Road at Lindquist Avenue	Intersection	$218,400
4-4	Hero Road at Bundy Avenue	Intersection	$78,700
4-5	15th Street at McFarland Avenue	Intersection	$35,400
4-6	15th Street at 6th Street	Intersection	$124,000
4-7	Hero Road at Bultman Avenue	Traffic Control	$8,200
4-8	6th Street at Bundy Avenue	Traffic Control	$87,300
4-9	Winn Army Community Hospital	Parking	$529,500
4-10	William Wilson Avenue at McFarland Avenue	Parking	$2,855,000
4-11	Harmon Avenue at Lindquist Avenue	Roadway	$178,800

Intersection Improvements

Hase Road at Pony Soldier Avenue/Harmon Avenue (Total Cost is associated with two projects adjacent to this improvement)

The intersection of Hase Road at Pony Soldier Avenue/Harmon Avenue is a four lane intersection with the Pony Soldier Avenue and Harmon Avenue legs on the east side on the intersection. The intersection configuration is confusing and is a safety concern and with increase traffic volumes will operate poorly.

Both the Harmon Avenue and the Pony Soldier legs of the intersection should be closed to traffic. Traffic flow will be facilitated by improvements to the intersection of Hase Road at Lindquist Avenue and Hase Road at McNeely. Improvements and approach closures should be performed in conjunction with one another.

Hase Road at McNeely Road (Total Cost: $277,400)

Figure 4-2 shows the conceptual improvements at the intersection. The intersection of Hase Road at McNeely Road will experience poor LOS on the minor street approaches (McNeely Road) throughout the peak periods of the day. The increased traffic volumes at the intersection are attributed to the new Soldier Service Center and the recommended closure of Pony Soldier Avenue at the intersection with Hase Road will further degrade the operation of the intersection.

In order to improve operations at the intersection the McNeely Road approaches should be realigned to the north to improve the alignment. Right turn lanes should be constructed on the McNealy Road approaches and left turn lanes on Hase Road. The intersection should also be signalized to improve the operation of the intersection.

The recommended improvements may have moderate impacts to existing water utilities. Environmental impacts should be minimal.

Hase Road at Lindquist Avenue (Total Cost: $218,400)

Figure 4-3 shows the conceptual improvements at the intersection. The future traffic volumes generated by the new Troop and Family Care Medical Clinic, the proposed realignment of Harmon Avenue to Lindquist Avenue, and the new RCI housing causes the intersection to operate poorly based on stop sign control.

In order to improve operations at the intersection all approaches to the intersection should be constructed with left turn lanes. Additionally a traffic signal should be installed at the intersection.

The recommended improvements may have high impacts to existing water and sewer utilities. Environmental impacts should be minimal.

Hero Road at Bundy Avenue (Total Cost: $78,700)

Figure 4-4 shows the conceptual improvements at the intersection. The intersection experiences moderate congestion as a result of the inability of the left turning vehicles to pull out of traffic flow on Hase Road. Left turn lane should be constructed on Hero Road to improve the operation along Hero Road. Two way eastbound traffic flow on the channelized lanes should be limited to the eastbound right turning movement. The additional lane width should be stripped out.

The recommended improvements may have moderate impacts to existing sewer utilities as well as the overhead and underground power lines. Environmental impacts should be minimal.

McFarland Avenue at 15th Street (Total Cost: $35,400)

Figure 4-5 shows the conceptual improvements at the intersection. 15th Street at McFarland Avenue will experience poor LOS during the Midday peak hour for the eastbound 15th Street and northbound McFarland approach. The additional traffic generated by the new AU4 TAC shops and barracks will increase the traffic volumes along 15th Street, degrading the operating conditions at the intersection.

In order to improve operations at the intersection right turn lanes should be constructed on the southbound McFarland Avenue and eastbound 15th Street approaches. A left turn lane should be constructed to the northbound McFarland Avenue approach. Due to the heavy traffic volumes the intersection should be placed under all-way stop control to improve its operation. Future traffic volumes do not currently meet the warrants for a traffic signal but the intersection should be monitored to evaluate the impacts of the additional troupe build up.

The recommended improvements may have moderate impacts to existing sewer utilities and overhead power lines. Environmental impacts should be minimal.

6th Street at 15th Street (Total Cost: $124,000)

Figure 4-6 shows the conceptual improvements at the intersection. 6th Street at 15th Street will experience poor LOS during the all peak hours of the day the additional traffic generated by the new AU4 TAC shops and barracks will increase the traffic volumes along 15th Street, degrading the operating conditions at the intersection.

In order to improve operations at the intersection right turn lanes should be constructed on the northbound 6th Street and eastbound 15th Street approaches. A left turn lane should be constructed to the westbound 15th Street approach. Due to the heavy traffic volumes the intersection did not operate adequately under all-way stop control and a traffic signal should be installed at this location.

The recommended improvements may have moderate impacts to existing overhead power lines. Environmental impacts should be minimal.

Traffic Control Improvements

Hero Road at Bultman Avenue (Total Cost: $8,200)

Figure 4-7 shows the conceptual improvements at the intersection. There are protected only phases for the left turn movements that extend the overall cycle length of the signal timing. Vehicles arriving at the intersection after the protected only phase have to wait a long time until they receive green time to get through the intersection. The delay causes long queues to build and spill back through the left turn phase. There is adequate sight distance to permit the left turn movement to continue through the approach signal phase.

The traffic signal timing should be adjusted to allow for protected/permitted left turns. Additionally, the northbound Hero Road signal heads are out of alignment and should be adjusted to provide better visibility.

6th Street at Bundy Avenue (Total Cost: $87,300)

Figure 4-8 shows the conceptual improvements at the intersection. The intersection of 6th Street at Bundy Avenue will experience poor LOS attributed to the heavy volumes on 6th Street. Signal warrant analysis was performed which indicates the need for signalization at this location. A two phase traffic signal with no alteration to the existing lane geometry should be installed at this location.

The recommended improvements may have moderate impacts to utilities. Environmental impacts should be minimal.

Parking Improvements

Winn Army Community Hospital (Total Cost: $529,500)

Figure 4-9 shows the conceptual parking improvements at Winn Army Community Hospital. Due to the troop build up on the fort the parking capacity has been exceeded. Vehicles are now parking on the internal parking lot roadways causing congestion. In order to provide additional parking, two new surface lots should be constructed along the driveway to the hospital. This will provide an additional 225 spaces.

The recommended improvements may have moderate impacts to existing utilities. In addition, the project may have minimal environmental impacts.

William Wilson Avenue and McFarland Avenue (Total Cost: $2,855,000)

Figure 4-10 shows the conceptual parking improvements on William Wilson Avenue and McFarland Avenue. Due to a lack of parking capacity additional surface parking lots and off-street parking should be constructed. Two additional surface lots should be constructed on William Wilson Avenue shown in figure 4-9. There is sufficient distance between the travel lanes and the motor pools in many locations along McFarland Avenue to construct off-street angle parking. Drainage will need to be closed at these locations to provide adequate space. The additional parking will provide an additional 300 spaces along William Wilson Avenue and 945

spaces along McFarland Avenue. A typical cross section of the off-street angle parking in provided on figure 4-9. Enforcement of parking violations should be performed after additional parking spaces have been provided to allow clear zones on the sides of the roadways to be maintained.

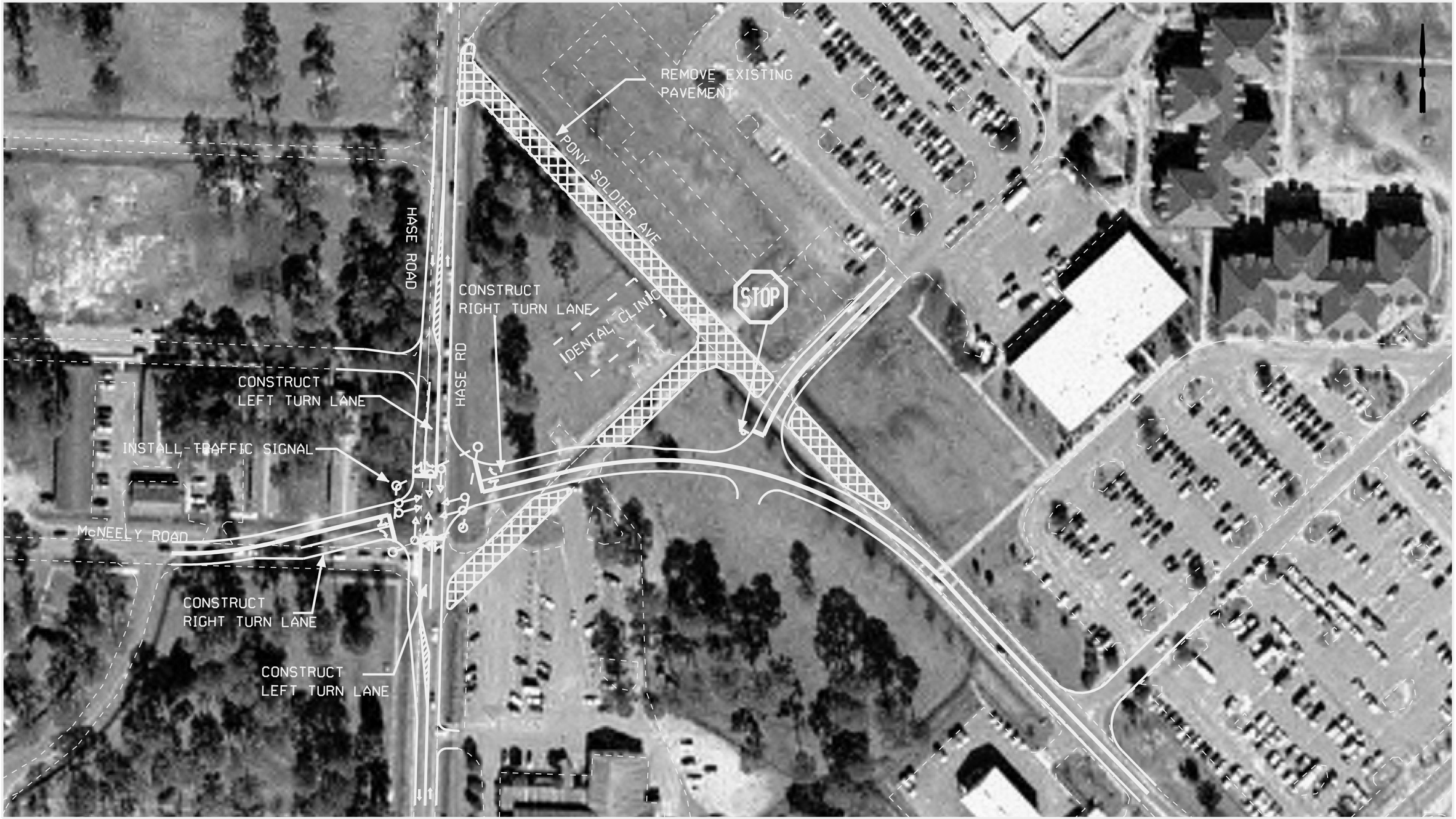
The recommended improvements may have major impacts to existing utilities, including sewer line, water and overhead power lines. In addition, the project may have moderate environmental impacts involving contamination from underground storage tanks.

Roadway Improvements

Harmon Avenue at Lindquist Avenue (Total Cost: $178,800)

Figure 4-11 shows the conceptual roadway improvements for Harmon Avenue in the vicinity of Lindquist Avenue. With the recommended closure of the intersection of Harmon Ave and Hase Road, the alignment of Harmon Avenue should be shifted slightly to the north to better align with to the intersection of Hase Avenue and Lindquist Avenue. The northern West Harmon Avenue leg should intersect Harmon Avenue at a 90-degree angle under stop control.

The recommended improvements may have impacts to existing utilities, including water, telephone, and overhead power. Environmental impacts should be minimal.



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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

SHORT-RANGE PROJECTS
INTERSECTION IMPROVEMENTS
HASE ROAD AT McNEELY ROAD

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Figure 4-2

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SHORT-RANGE PROJECTS
INTERSECTION IMPROVEMENTS
HASE ROAD AT LINDQUIST ROAD

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Figure 4-3

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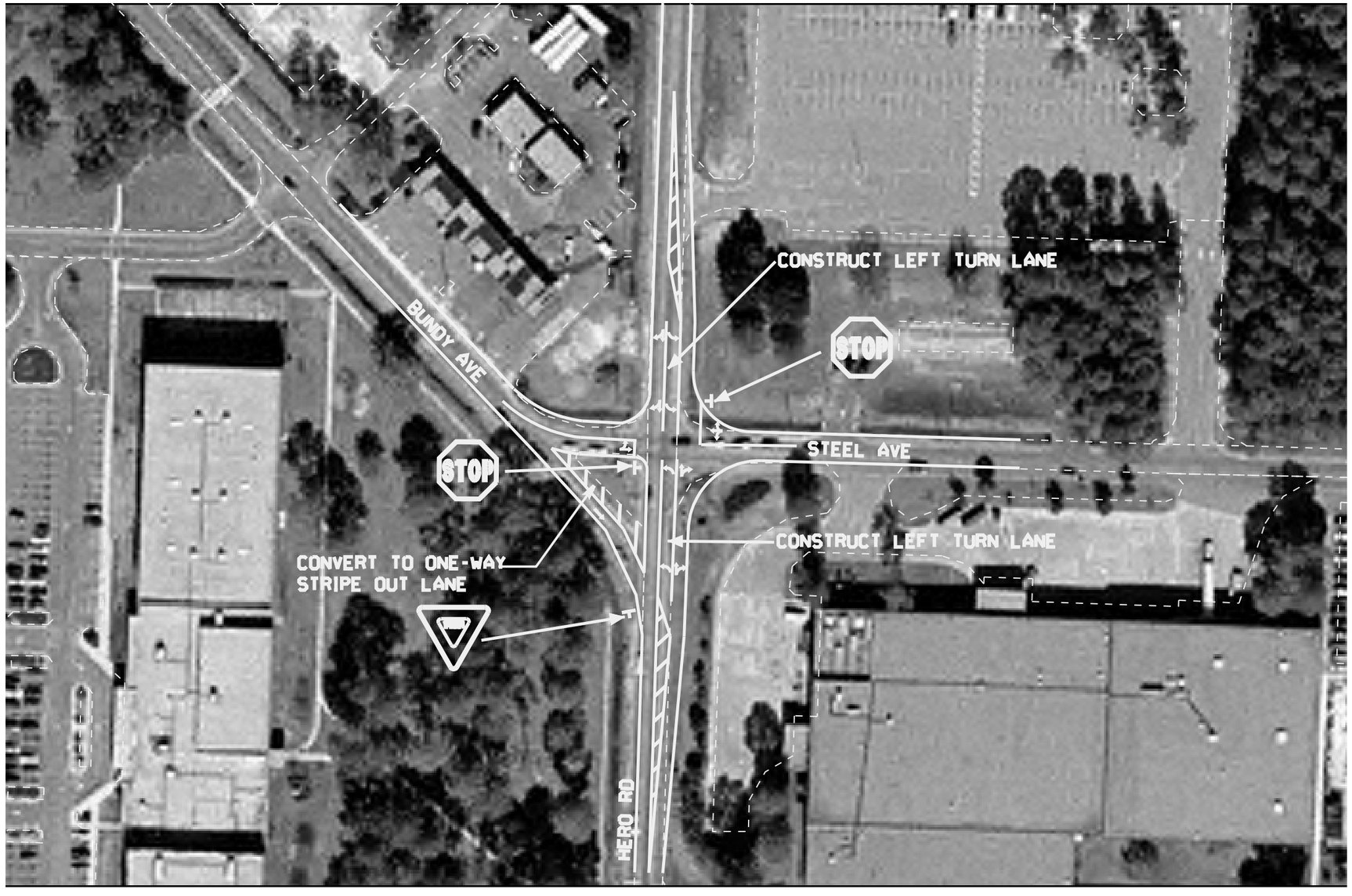

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SHORT-RANGE PROJECTS

INTERSECTION IMPROVEMENTS

HERO ROAD AT BUNDY AVENUE/STEEL AVENUE

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Figure 4-4

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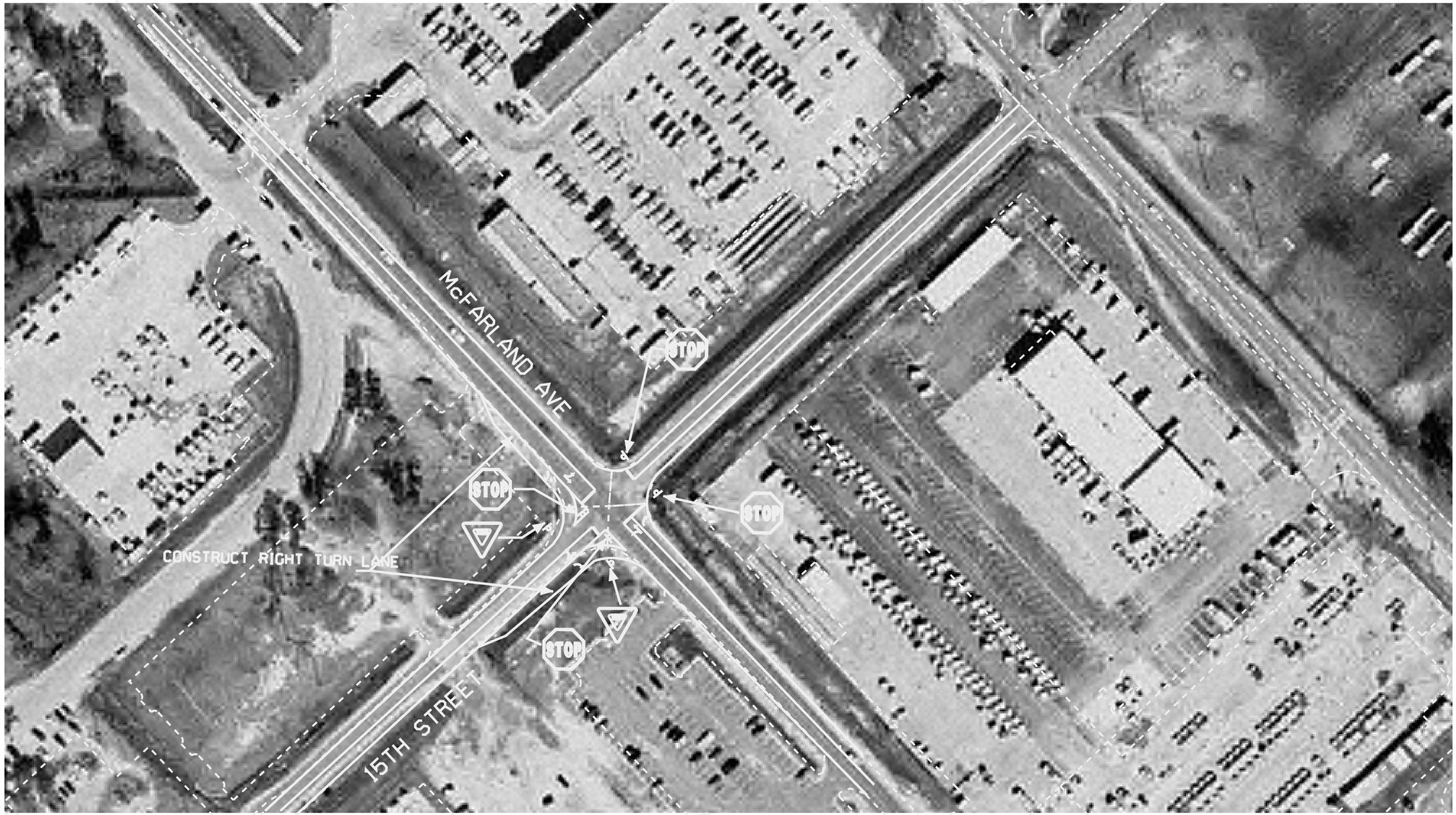

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SHORT-RANGE PROJECTS
ROADWAY IMPROVEMENTS
15TH STREET AT McFARLAND AVENUE

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Figure 4-5

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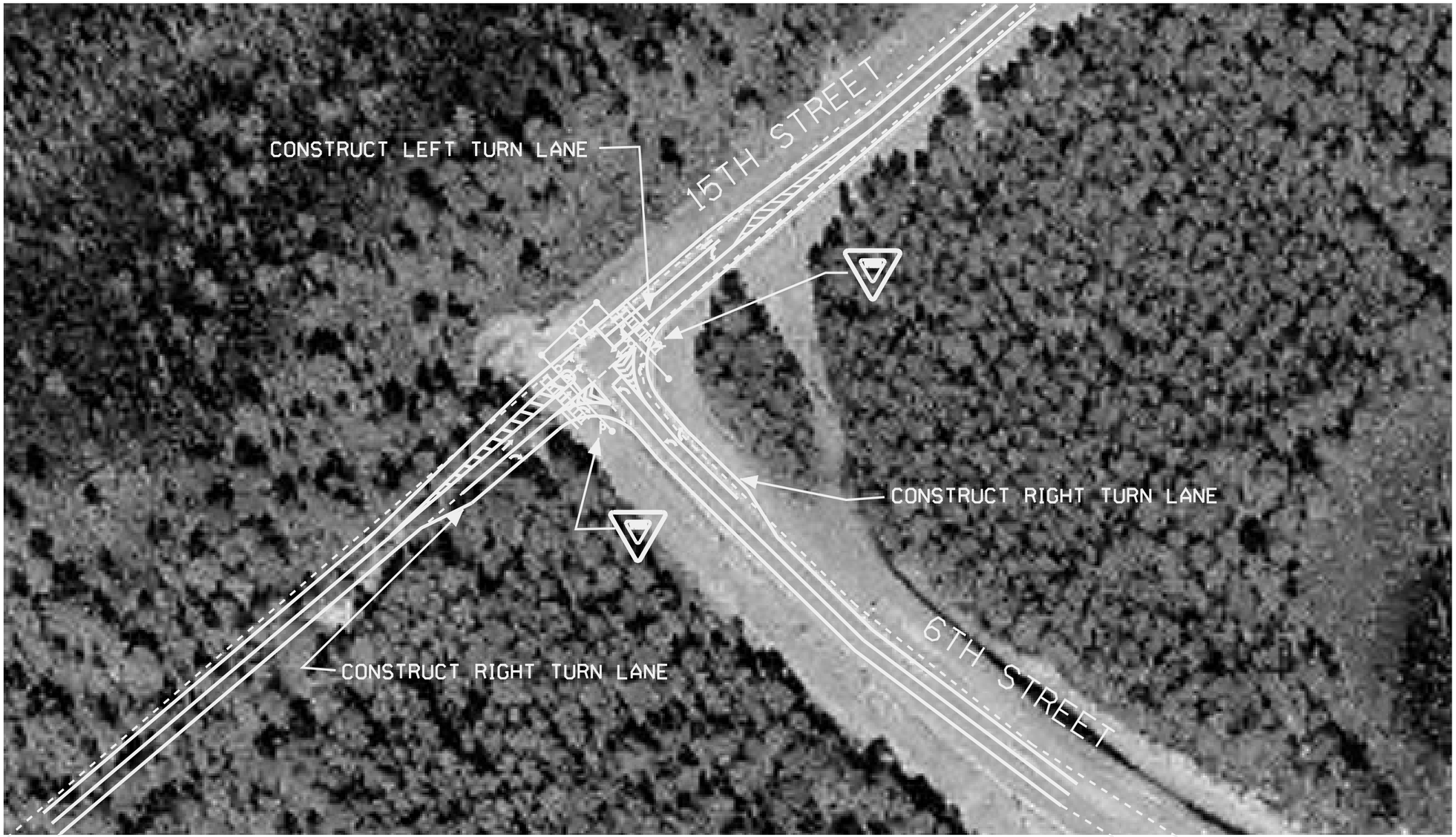

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SHORT-RANGE PROJECTS
INTERSECTION IMPROVEMENTS
15TH STREET AT 6TH STREET

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Figure 4-6

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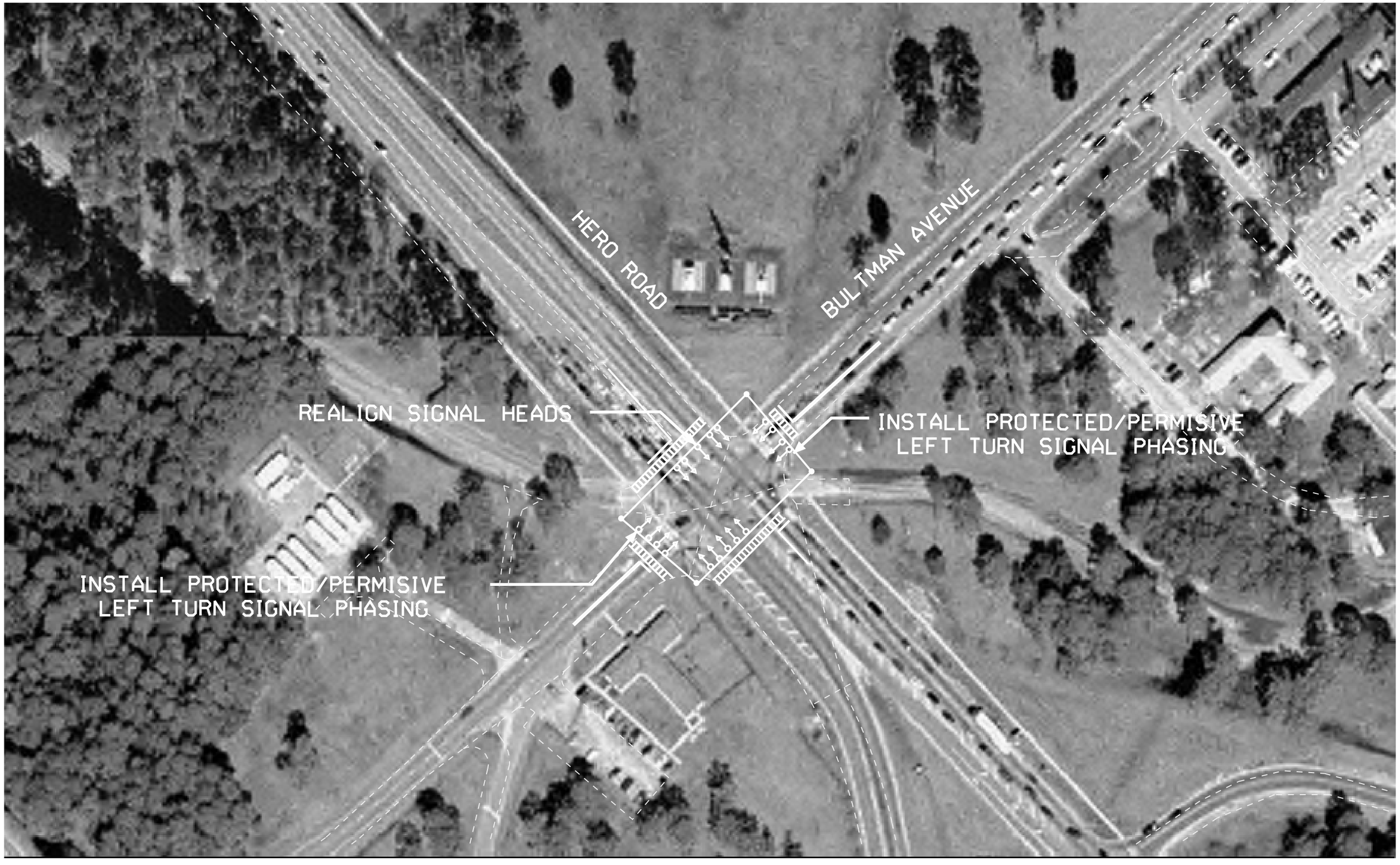

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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

SHORT-RANGE PROJECTS
TRAFFIC CONTROL IMPROVEMENTS
HERO ROAD AT BULTMAN AVENUE

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Figure 4-7

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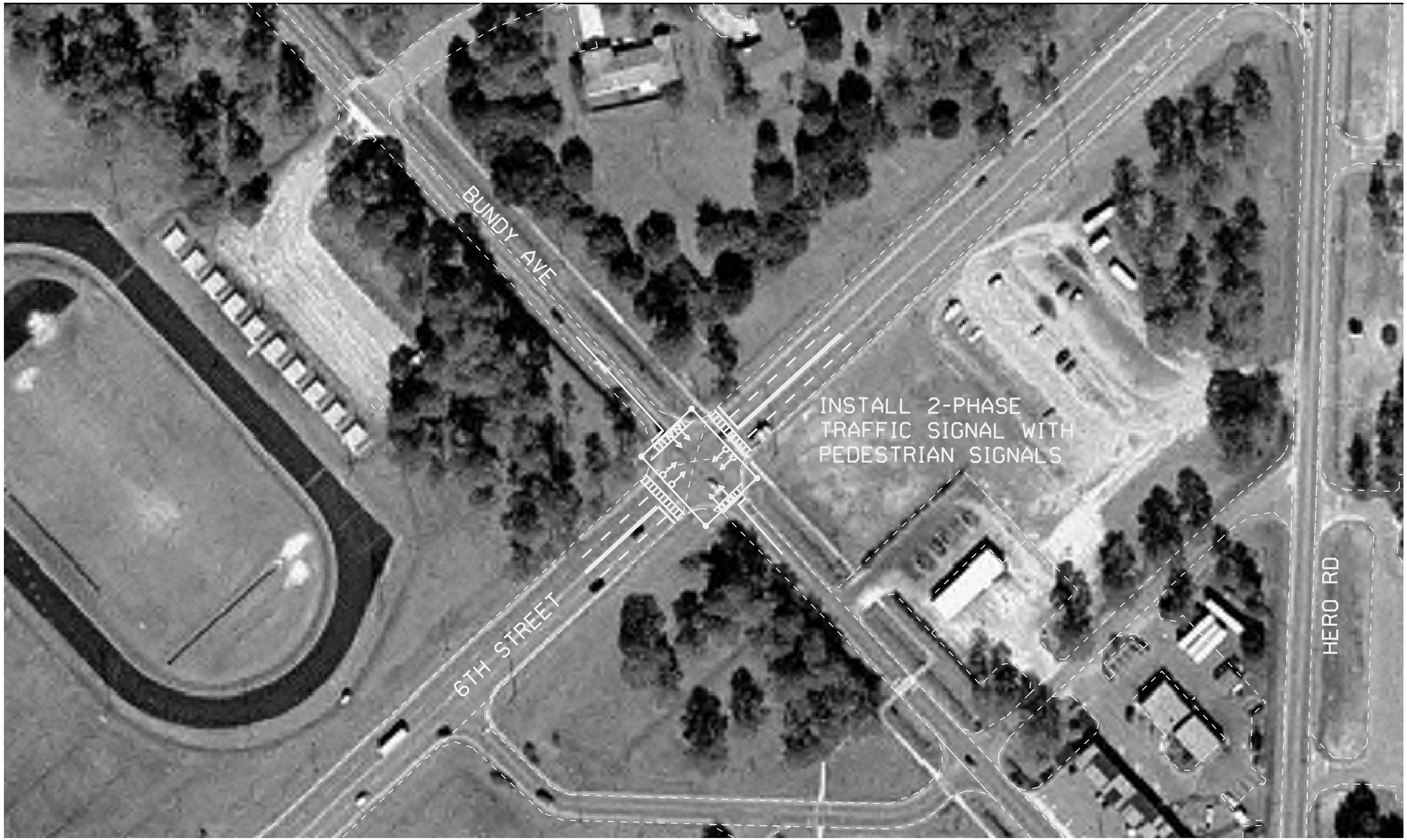

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SHORT RANGE PROJECTS
TRAFFIC CONTROL IMPROVEMENTS
6TH STREET AT BUNDY AVENUE

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Figure 4-8

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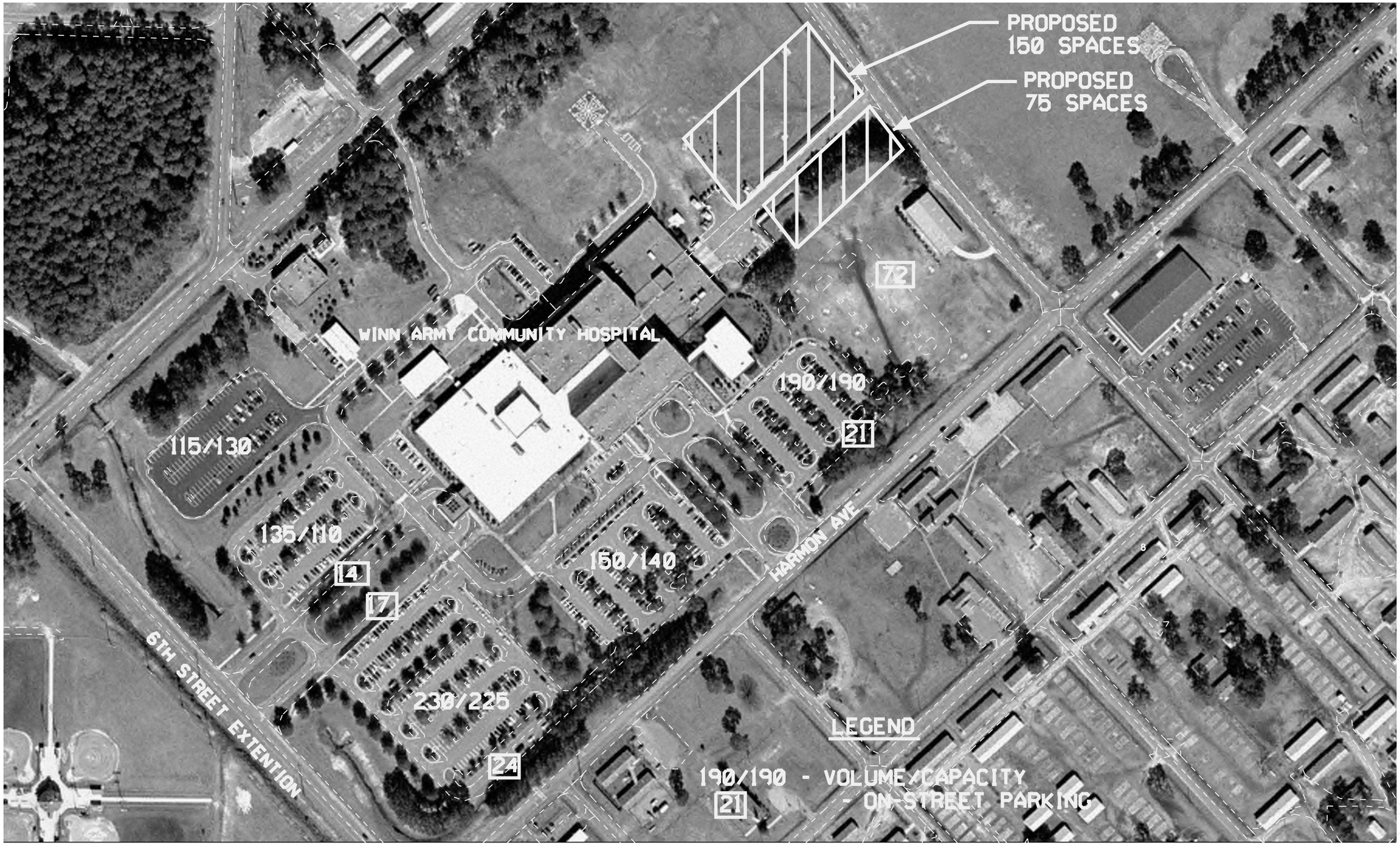

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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

SHORT-RANGE PROJECTS

PARKING IMPROVEMENTS

WINN ARMY COMMUNITY HOSPITAL PARKING

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Figure 4-9

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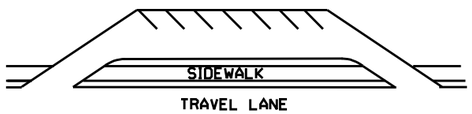
LEGEND

OFF-STREET PARKING

PROPOSED SURFACE PARKING LOT

TYPICAL OFF-STREET ANGLE PARKING SECTION



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SHORT RANGE PROJECTS
PARKING IMPROVEMENTS
WILLIAM WILSON AVENUE AND McFARLAND AVENUE PARKING

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Figure 4-10

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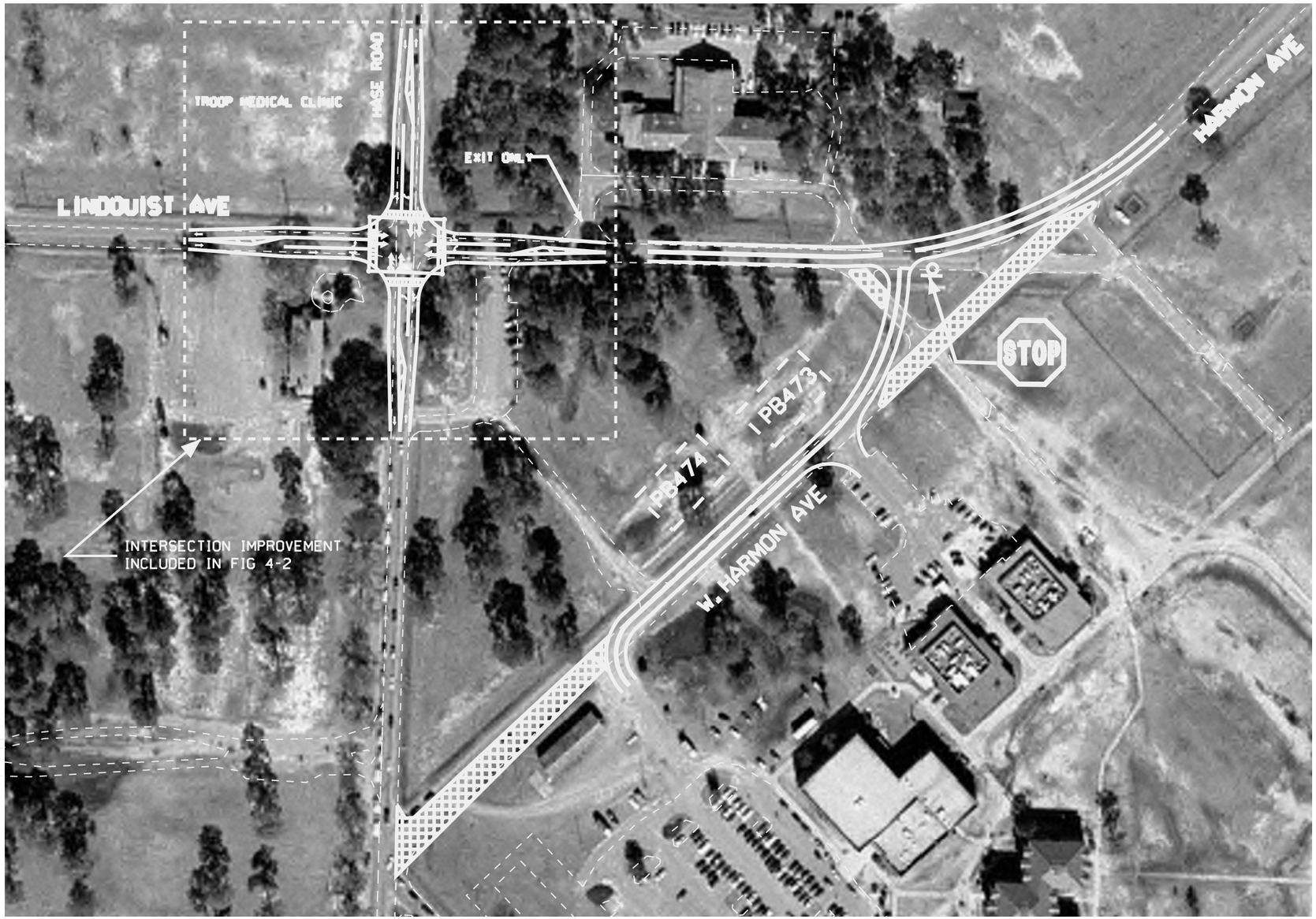

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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

SHORT-RANGE PROJECTS

ROADWAY IMPROVEMENTS

HARMON AVENUE AT LINDQUIST AVENUE

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Figure 4-11

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MID – RANGE PROJECTS (2005 – 2007)

Projects included in this phase of implementation were determined based on level of existing need determined from the deficiencies identified in Section 2 and future needs identified in Section 3. Table 4-3 summarizes the recommended mid-range projects and associated construction costs.

Table 4-3
Summary of Mid-Range Projects

Recommended Improvement		Type of Improvement	Cost Estimate
Mid-Range Projects (2008 – 2010)			
4-12	Bultman Avenue (Hero Road to Pony Soldier Avenue)	Intersection	$130,160
4-13	Coe Avenue at French Road	Intersection	$88,500
4-14	William Wilson Avenue at Frank Cochran Drive	Intersection	$237,700
4-15	Hero Road at Bundy Avenue	Traffic Control	$89,700
4-16	Hero Road at McNeely Road/Frank Cochran Drive	Roadway	$1,117,000
4-17 4-18	15th Street between McFarland Avenue and Gulick Avenue	Roadway	$269,800

Intersection Improvements

Bultman Avenue at Hero Road, Hase Avenue, and Pony Soldier Avenue (Total Cost: $130,160)

Figure 4-12 shows the conceptual improvements at the intersection. An increase in traffic volumes at the intersection of Bultman Avenue at Hase Road and Bultman and Avenue Pony Soldier Avenue can be attributed to the new Soldier Service Center. A left turn lane should be added to the eastbound Bultman Avenue approach at Hase Road to allow left turning traffic to pull out of the traffic flow on Bultman Avenue. Additionally, the left turn storage should be lengthened for the eastbound Bultman Avenue approach at Pony Soldier Avenue (total 250-feet) and westbound Bultman Avenue approach at Hero Road (total 300-feet).

The recommended improvements may have minimal impacts to existing utilities. Environmental impacts should be minimal.

Environmental impacts could be high depending on the location of the underground storage tank.

Coe Avenue at French Road (Total Cost: $88,500)

Figure 4-13 shows the conceptual improvements at the intersection. French Road intersects with three other roadways within approximately 250-feet; Coe Avenue, E. 7th Street, and Murray Ave. Although the relatively light traffic volumes at the intersections do not cause significant operational difficulties during the peak hours realignment of the intersections should be considered. The realignment of the intersections will improve their operation and provide additional connectivity to the Winn Army Community Hospital from 6th Street. Murray Avenue should be realigned to intersect French Road at a 90-degree angle to the north. East 7th Street should be realigned to the south to intersect French Road at a 90-degree angle and form a plus intersection with Coe Avenue. All approaches to French Road will be under stop control.

The recommended improvements may have minimal impacts to existing utilities. Environmental impacts could be high depending on the location of the underground storage tank.

William Wilson Avenue at Frank Cochran Drive (Total Cost: $237,700)

Figure 4-14 shows the conceptual improvements at the intersection. The planned widening of Franck Cochran Drive to a four lane facility is planned to end at the intersection of William Wilson Avenue at Frank Cochran Drive. Although the intersection currently operates at an acceptable LOS during the peak hours left turn lanes should be constructed to improve traffic flow along William Wilson Avenue. Additionally, a right turn lane should be constructed at the westbound Frank Cochran Drive approach.

The recommended improvements may have moderate impacts to existing gas and sewer utilities. Environmental impacts should be minimal

Traffic Control Improvements

Hero Road at Bundy Avenue (Total Cost: $89,700)

Figure 4-15 shows the conceptual improvements at the intersection. The intersection of Hero Road at Bundy Avenue will operate at a poor LOS during the AM, Midday and PM peak periods. The Bundy Avenue approaches experience long delays due to the heavy amount of future traffic projected on Hero Road. Signalization of the intersection will improve its operation to acceptable levels.

The recommended improvements may have moderate impacts to existing sewer utilities as well as the overhead and underground power lines. Environmental impacts should be minimal.

Roadway Improvements

Hero Road at McNeely Road/ Frank Cochran Drive (Total Cost: $1,117,000)

Figure 4-16 shows the conceptual improvements at the intersection. As previously discussed, Franck Cochran Drive is planned to be widened to a four lane facility extending to the intersection

of William Wilson Avenue at Frank Cochran Drive. The 2-lane section of Frank Cochran Drive terminates at Hero Road, just to the north, with a closed median. Additionally, the intersection of Hero Road and McNeely Avenue experiences unacceptable LOS during all peak of the day. McNeely is very close to the signalized intersection of Hero Road and Gulick Avenue and as a result is a poor candidate for signalization. To facilitate better east-west connection and to improve the operation at Hero Road and McNeely the construction of the of 4-lane Frank Cochran Drive should extend to Hero Road. The McNeely Road westbound approach to Hero Road should be shifted to the south to form a plus intersection with Frank Cochran Drive. The new intersection location would allow adequate distance from the adjacent signalized intersections to provide a signal. The realignment would also allow for the closure of Bunker Road between Hero Road and Frank Cochran Drive, alleviating the confusion in the area.

The closure of the western Bunker Road approach would allow the signal at the intersection of Bunker Road and Hero Road to be removed, provided that the Bunker Road eastern approach is converted to a right-out approach to Hero Road. The closure of the western Bunker Road approach would reduce the amount of traffic volumes in the proximity of the Command Center using Bunker Road as a cut-through.

The recommended improvements may have moderate impacts to existing sewer utilities as well as the overhead and underground power lines. Environmental impacts should be minimal.

15th Street between McFarland and Gulick Avenue (Total Cost: $269,800)

Figure 4-17 and 4-18 shows the conceptual improvements at the intersections and the roadway on 15th Street between McFarland and Gulick Avenue. The additional traffic generated by the new AU4 TAC shops and barracks will increase the traffic volumes along 15th Street. Additional traffic demands to future development west of the 15th Street Gate, outside the cantonment area, will add additional traffic on 15th Street. 15th Street should be extended from McFarland and Gulick Avenue to improve the east-west connection to access Gulick Avenue. The extension of 15th Street should be a 4-lane section to provide for any future widening of 15th Street west of McFarland Avenue.

In order to improve operations at the intersection of 15th Street and McFarland Avenue, right turn lanes should be constructed on the southbound McFarland Avenue and eastbound 15th Street approaches. A left turn lane should be constructed to the northbound McFarland Avenue approach. Due to the heavy traffic volumes the intersection should be placed under all-way stop control to improve its operation. Future traffic volumes do not meet the warrants for the installation of a traffic signal but the intersection should be monitored to evaluate the impacts of any additional troop build up.

The 15th Street intersection with and Gulick Avenue and William Wilson Avenue should operate adequately with 15th Street under stop control. As shown in figure 4-16 and 4-17, channelized right turn lanes should be provide at each location.

The recommended improvements may have high impacts to existing water utilities and overhead power lines. Environmental impacts should be minimal.

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1" = 100' HORIZONTAL

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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

MID-RANGE PROJECTS

INTERSECTION IMPROVMENTS

E. BULTMAN AVENUE (BETWEEN HERO AVENUE AND PONY SOLDIER AVENUE)

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Figure 4-12

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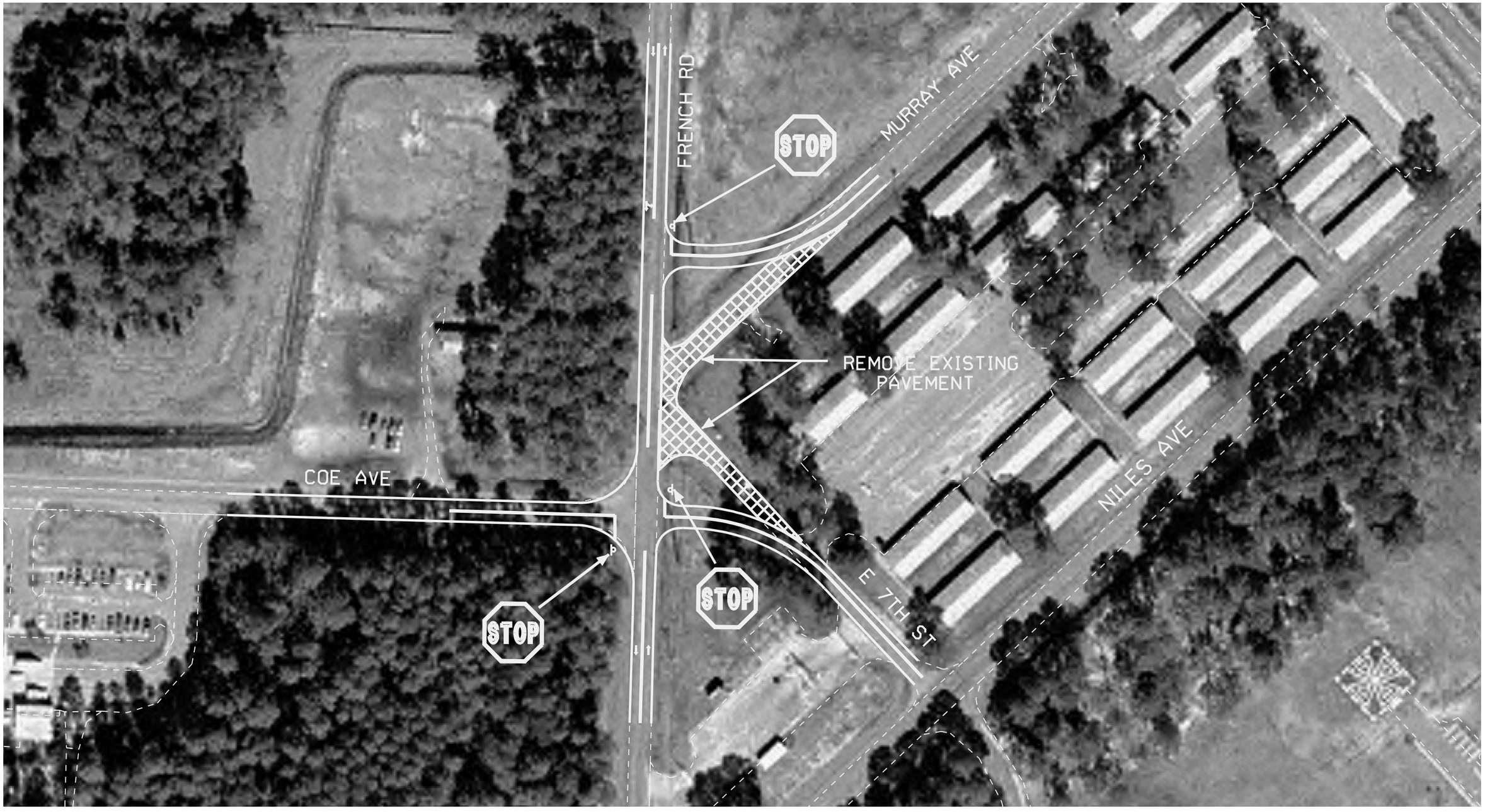

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FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

MID-RANGE PROJECTS
INTERSECTION IMPROVEMENTS
COE AVENUE AT MURRAY AVENUE / 7TH STREET

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Figure 4-13

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MID-RANGE PROJECTS

INTERSECTION IMPROVEMENTS

WILLIAM WILSON AVENUE AT FRANK COCHRAN DRIVE

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MID-RANGE PROJECTS

TRAFFIC CONTROL IMPROVEMENTS

HERO ROAD AT BUNDY AVENUE/STEEL AVENUE

DESIGNED:	CHECKED:	DATE: AUGUST 2004
DRAWN:	JOB NO.	SCALE:

Figure 4-15

Z:\Projects (2003)\D3045 (Nakato Planning Group)\D3045-01 (Fort Stewart)\dgn\figure4-15.dgn

claro

GRAPHIC SCALE
(IN FEET)
100 0 50 100 200
1" = 100' HORIZONTAL

NO.	DATE	DESCRIPTION OF REVISION

DWA
Day Wilburn Associates, Inc.

FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

MID-RANGE PROJECTS
ROADWAY IMPROVEMENTS
McNEELY ROAD AT HERO ROAD

DESIGNED:	CHECKED:	DATE: AUGUST 2004
DRAWN:	JOB NO.	SCALE:

Figure 4-16

Z:\Projects (2003)\03045 (Nakata Planning Group)\03045-01 (Fort Stewart)\dgn\Figure4-16.dgn
clara

GRAPHIC SCALE
(IN FEET)
75 0 75 150
1" = 75' HORIZONTAL

NO.	DATE	DESCRIPTION OF REVISION

DWA
Day Wilburn Associates, Inc.

FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

MID-RANGE PROJECTS
ROADWAY IMPROVEMENTS
15TH STREET AT GULICK AVENUE

DESIGNED:	CHECKED:	DATE: AUGUST 2004
DRAWN:	JOB NO.	SCALE:

Figure 4-17

Z:\Projects (2003)\03045 (Nakata Planning Group)\03045-01 (Fort Stewart)\dgn\figure4-17.dgn
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GRAPHIC SCALE
(IN FEET)
50 0 25 50 100
1" = 50' HORIZONTAL

NO.	DATE	DESCRIPTION OF REVISION

DWA
Day Wilburn Associates, Inc.

FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

MID-RANGE PROJECTS
ROADWAY IMPROVEMENTS
15TH STREET (McFARLAND AVENUE TO GULICK AVENUE)

DESIGNED:	CHECKED:	DATE: AUGUST 2004
DRAWN:	JOB NO.	SCALE:

Figure 4-18

Z:\Projects (2003)\03045 (Nakata Planning Group)\03045-01 (Fort Stewart)\dgn\Figure4-18.dgn
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LONG – RANGE PROJECTS (2011 +)

Long-range projects are improvements that are not currently required due to safety issues or traffic congestion, but are anticipated based on future development plans, operations and shift in military personnel. These improvement projects are intended to bring existing facilities up to current design standards and improve circulation and access within the installation. The majority of these projects have a high construction cost and/or difficulty in construction. Table 4-4 summarizes the long-range projects and associated construction costs.

Table 4-4
Summary of Long-Range Projects

Recommended Improvement		Type of Improvement	Cost Estimate
Long-Range Projects (2011 +)			
4-19	6th Street	Roadway	$3,068,000
	15th Street	Roadway	
	Hero Road	Roadway	

Access and Circulation Improvements

6th Street, 15th Street, Hero Road (Total Cost: $3,068,000)

Figure 4-19 shows the conceptual improvements to the roadways. Cost estimation includes the additional pavement to widening the roadway, signing and marking, and grading. The relocation of utilities, closing drainage, and construction of curb and gutter were not included in the cost.

As the installation continues to expand, the need for better circulation between the major activity areas within the installation will become more critical. The UA4 TAC shops, barracks, and future development outside of the cantonment area adjacent to 15th Street will increase the need to improve the capacity along 15th Street and 6th Street. Widening 15th Street from the 15th Street Gate (ACP 7) to Gulick Avenue to a 4-lane facility would improve the circulation around the northwest quadrant of the cantonment area, by connecting internal arterial roadways. The improved circulation would alleviate some of the pressure along McFarland Avenue and William Wilson Avenue. Improvements to the 15th Street Gate would need to be implemented to accommodate the increased lane width. Additionally, 6th Street should be widened to a 4-lane facility between 15th Street and McFarland Avenue. 6th Street is currently a 4-lane facility with major signalized intersections from McFarland Avenue to Hero Road providing a major east-west connection through the fort. Widening the entirety of 6th Street would improve the circulation along this east-west corridor.

Hero Road provides access to many of the major shopping, medical, and recreational destinations on the fort. The roadway connects to the 4-lane terminus of 6th Street the north and 4-lane Gulick Avenue to the south. Future traffic volumes are approaching the limits a 2-lane roadway has the capacity to operate at acceptable levels. The widening of Hero Road to 4-lanes should be added to the long range improvements for the fort. The widening to 4-lanes would enable the roadway to operate with a greater volume of vehicles while providing a 4-lane connection between 6th Street and Gulick Avenue.

The recommended improvements may impact existing overhead power lines, water and sewer lines, and underground phone lines. The realignment may have environmental impacts to existing wetlands and flood plain.

GENERAL IMPROVEMENT RECOMMENDATIONS

Roadway Improvements

Based on an inventory of the existing roadway network and the buildup of troops on the fort, several secondary roadways within the installation should be upgraded and widened to 4-lanes to provide additional access, primarily in the east-west orientation, between major destinations. The following locations should be widened under the long range projects:

- 6th Street
- 15th Street
- Hero Road

Signing and Markings

A sign inventory was conducted at each of the access control points to the installation. The existing signage at the access control points includes a combination of regulatory, informational and warning signs. The number and size of the signs at the access control point were confusing and often un-readable due to the amount of information and size of the text on the signs. Signing at the entry approaches to the access control points should be limited to regulatory and informational signs necessary for entry into the installation. Signs conveying U.S codes and post regulations not related to entry into the installation should be conveyed through other methods or once inside the installation.

Pedestrian Facilities

The majority of the existing roadway facilities do not have adequate sidewalks and crosswalks. As new development occurs on the installation new pedestrian facilities should be constructed to provide better connectivity between adjacent land uses.

Pedestrian facilities along William Wilson Avenue and McFarland Avenue are not up to current MUTCD standards and should be updated. Pedestrian cross walks should be perpendicular to the roadway and connect to some other pedestrian facility, crosswalk of sidewalk.

There is an overabundance of pedestrian crosswalk signs along the two corridors which causes clutter. As a result of the number of signs the location of the pedestrian crossing becomes blurred to the driver and essentially provides no benefit. Advanced crosswalk warning signs should be limited in such an area where midblock crossings are so frequent.

Sidewalk should also be constructed within the cantonment area along corridors that experience significant pedestrian activity. Particular attention should be given to William Wilson Avenue, McFarland Avenue, Gulick Avenue and Hase Road because of the high pedestrian activity along the major traffic volume corridors.

LEGEND

4 LANE ROADWAY WIDENING

NO.	DATE	DESCRIPTION OF REVISION

DWA
Day Wilburn Associates, Inc.

FORT STEWART COMPREHENSIVE TRAFFIC ENGINEERING STUDY

LONG-RANGE PROJECTS

ACCESS AND CIRCULATION IMPROVEMENTS

ROADWAY WIDENING (15TH STREET, 6TH STREET, HERO ROAD)

DESIGNED:	CHECKED:	DATE: AUGUST 2004	Figure 4-19
DRAWN:	JOB NO.	SCALE:	

Z:\Projects (2003)\D3045 (Nakato Planning Group)\D3045-01 (Fort Stewart)\dgn\figure4-19.dgn

clara

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Transportation Improvement Program

For the Hinesville Area Metropolitan Planning Organization

Fiscal Years 2010-2013

Prepared by the Hinesville Area Metropolitan Planning Organization in cooperation with the Federal Highway Administration, Federal Transit Administration, and the Georgia Department of Transportation.

IX. Section 324 of title 23 U.S.C. regarding the prohibition of discrimination based on gender

- The MPO adheres to the Act on Equality between women and men and prohibits both direct and indirect discrimination based on gender.
- The MPO adheres to the Equal Pay Act of 1963 (EPA), which protects men and women who perform substantially equal work in the same establishment from sex-based wage discrimination;

X. Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794) and 49 CFR part 27 regarding discrimination against individuals with disabilities.

- The MPO adheres to Title I and Title V of the Americans with Disabilities Act of 1990 (ADA), which prohibits employment discrimination against qualified individuals with disabilities in the private sector, and in state and local governments

4/28/2009

Sonny Timmerman, Director — Date
Hinesville-Liberty Planning Commission

Matthew Fowler — April 29, 2009

Matthew Fowler, Assistant State Transportation Planning Administrator — Date
Georgia Department of Transportation, Office of Planning

4/30/09

Angela T. Alexander, State Transportation Planning Administrator — Date
Georgia Department of Transportation, Office of Planning

5-8-09

Steven J. Kish, Transit Program Manager — Date
Georgia Department of Transportation, Division of Intermodal Programs

5/21/09

Harvey D. Keepler, Administrator — Date
Georgia Department of Transportation, Division of Intermodal Programs

(Space Holder)

Hinesville Area Metropolitan Planning Organization
FY 2008 – 2011 Transportation Improvement Program (TIP)

POLICY COMMITTEE
ENDORSEMENT OF HAMPO FY 2008 – 2011
TRANSPORTATION IMPROVEMENT PROGRAM

WHEREAS, federal regulations for urban transportation planning issued in October 1993, require that the Metropolitan Planning Organization, in cooperation with participants in the planning process, develop and annually update the Transportation Improvement Program (TIP); and

WHEREAS, the Hinesville Area Metropolitan Planning Organization has been designated by the Governor as the Metropolitan Planning Organization of the Hinesville urbanized area; and

WHEREAS, the Hinesville Area Metropolitan Planning Organization, in accordance with federal requirements for a Transportation Improvement Program, has developed a four-year integrated program of federally-funded highway and transit projects for the Hinesville urbanized area; and

WHEREAS, the TIP is consistent with all plans, goals, and objectives of the Hinesville Area Metropolitan Planning Organization, and shall be updated at least annually with revision to reflect changes in program emphasis and funding availability; and

WHEREAS, the urban transportation planning regulations require that the TIP be a product of a planning process certified as in conformance with all applicable requirements of law and regulations; and

WHEREAS, the urban transportation planning regulations provide for the certification of the process by the Federal Highway Administration and the Federal Transit Administration; and

WHEREAS, the staff of the Liberty Consolidated Planning Commission, the Federal Highway Administration and the Federal Transit Administration have reviewed the organization an activities of the planning process and certified them to be in conformance with the requirements of law and regulations; and

WHEREAS, the locally developed and adopted process for private sector participation has been followed in the development of the FY 2008-2011 TIP.

NOW, THEREFORE BE IT RESOLVED, that the Hinesville Area Metropolitan Planning Organization Policy Committee endorses the attached four-year Transportation Improvement Program for the period 2008 – 2011.

CERTIFICATION

I hereby certify that the above is a true and correct copy of a Resolution adopted by the Hinesville Area Metropolitan Planning Organization Policy Committee at a meeting held on June 26th, 2007.

John D. McIver, CHAIRMAN
Hinesville Area Metropolitan Planning Organization

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Policy Committee:

Chairman John McIver
Chairman Liberty County Board of Commissioners

Gary Gillard
Commissioner, Liberty County Board of Commissioners

Randall Wilson
Chairman, Long County Board of Commissioners

Lily Baker
Chairwoman, Liberty County Board of Education

Don Hartley
Chairman, Liberty Consolidated Planning Commission

Colonel Kevin W. Milton
Garrison Commander, Fort Stewart

Thomas Hines
Mayor, City of Allenhurst

Sandra Martin
Mayor, City of Flemington

Richard Strickland
Mayor, City of Gum Branch

James Thomas Jr.
Mayor, City of Hinesville

Bobby Ryon
Councilman, City of Hinesville

Don Emmons
Mayor, City of Midway

William Austin
Mayor, City of Riceboro

Daisy Pray
Mayor, City of Walthourville

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Todd Long
Director of Planning, GDOT

Allen Brown
Chairman, Liberty County Development Authority

PC Advisory Non-Voting Members

Joey Brown
County Administrator, Liberty County

Billy Edwards
City Manager, City of Hinesville

Sonny Timmerman
Executive Director, Liberty Consolidated Planning Commission (PC Secretary)

Technical Coordinating Committee:

Joey Brown
County Administrator, Liberty County

Vacant
County Administrator, Long County

Trent Long
County Engineer, Liberty County

Billy Edwards
City Manager, City of Hinesville

Paul Simonton
City Engineer, City of Hinesville

Paul Hawkins
Representative, City of Flemington

Gloria Cook
City of Midway

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City of Allenhurst

Rene Harwell
City of Flemington

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City of Gum Branch

Curtis Velasco
City of Hinesville

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Irene McCall
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Steven Berg
City of Midway

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Harry Rodgers
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Long County

Frankie Brost
Representative, Fort Stewart

Terri Oliver
Representative, Savannah Technical College

Ron Collins
Representative, Armstrong Atlantic State University, Hinesville Campus

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Metropolitan Planning Organization Staff:

Sonny Timmerman, MPO Director
Rachel Hatcher, Transportation and Land Use Planner
Donna Shives, Staff Support
Alissa Davis, Staff Support

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INTRODUCTION

The Hinesville Area Metropolitan Planning Organization (HAMPO) is the designated Metropolitan Planning Organization (MPO) for the Hinesville urbanized area and all of Liberty County and part of Long County. The Governor in cooperation with the major local governments designates MPO's in urbanized areas with a population over 50,000 to administer the federally required transportation planning process. HAMPO develops and administers the urban transportation study, which is a comprehensive, cooperative and continuing process. HAMPO is the forum for decision making on transportation issues. HAMPO is responsible for developing the 20 year Long Range Transportation Plan (LRTP) and the four-year Transportation Improvement Program (TIP). The HAMPO FY 2010 - 2013 Transportation Improvement Program consists of federally funded highway and transit projects programmed for fiscal years 2010 to 2013. The TIP is designed to address the transportation needs of Hinesville and Liberty County and consists of programmed improvements recommended in the Long Range Transportation Plan. The TIP identifies transportation improvements recommended for advancement during the program period, groups the projects into appropriate staging periods and includes realistic estimates of total costs and anticipated funding sources.

It should be emphasized that the TIP is an expression of intent to implement the identified projects and not a final commitment of funds from any agency. All transportation projects must appear in an approved TIP before they may receive federal funds for implementation. The TIP is based on a reasonable estimate of the amount of federal funds expected to be available to Hinesville and Liberty County in the next four fiscal years. The TIP is required to be financially constrained by year over the four year period of FY 2010 to FY 2013.

The HAMPO Technical Coordinating Committee (TCC) is responsible for reviewing the TIP and recommending it for endorsement to the HAMPO Policy Committee (PC). In addition, the Citizens Advisory Committee (CAC) as well as the general public is also invited to review and comment on the proposed TIP.

Through endorsement by the Policy Committee, this document becomes the official TIP for the Hinesville Metropolitan area. Project-by-project review and approval by the Georgia Department of Transportation (GDOT), the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) is also necessary before federal funds become available. It should be understood that the TIP is a flexible program which may be modified in accordance with the procedures outlined in the adopted Public Involvement Plan (PIP) and Participation Plan (PP) by resolution of the Policy Committee if priorities, area goals or funding levels change.

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OVERVIEW

The format of this document should be easy to follow, but if you have any questions, please contact the transportation planning staff of the Hinesville Area Metropolitan Planning Organization (HAMPO) at (912) 408-2030 for assistance.

The table of contents provides a summary of the format, sections and structure of the HAMPO FY 2010 - 2013 TIP. The TIP introduction and the subsequent sections include a summary description of the transportation improvement program, the HAMPO FY 2010 - 2013 TIP development and public involvement process. The TIP project description starts with a **project index** showing programmed highway and bridge projects in Liberty County for FY 2010 - 2013, followed by individual project pages providing more detailed project descriptions. The individual highway and bridge projects are grouped according to their sources of federal funding, followed by the transit section (programming of Title 49 U.S.C. Section 5307 Urbanized Area Formula Program). Examples of the types of projects being funded over the next three fiscal years include new roadways, road widening and reconstruction projects, interchange and intersection reconstruction projects, traffic operational improvements and safety projects, bridge projects and transportation enhancements projects. The individual page descriptions for the highway and other projects include several important items. The HAMPO TIP Number is assigned for administrative use by the staff of the Liberty Consolidated Planning Commission. The State Project Identification (PI) Number is assigned to a project by the GDOT Office of Programming. Preliminary engineering (PE) includes field surveys, project concepts and designs. Right-of-way (ROW) involves land and property acquisition. GDOT directly administers the lump sum program. All the public involvement materials related to the HAMPO FY 2010 - 2013 TIP development process, and the entire TIP amendment documents are included.

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STATE TRANSPORTATION IMPROVEMENT PROGRAM (STIP)

AND

TRANSPORTATION IMPROVEMENT PROGRAM

(TIP)

AMENDMENT PROCESS

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Statewide Transportation Improvement Program (STIP) and Transportation Improvement Program (TIP) Amendment Process

April 2008

The Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) issued the Final Rule to revise the Statewide and Metropolitan Transportation Planning regulations incorporating changes from the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users on February 14, 2007 with an effective date of March 16, 2007. The revised regulations clearly define administrative modifications and amendments as actions to update plans and programs. 23 Code of Federal Regulations (CFR) Part 450.104 defines administrative modifications and amendments as follows:

- Administrative modification "means a minor revision to a long-range statewide or metropolitan transportation plan, Transportation Improvement Program (TIP), or Statewide Transportation Improvement Program (STIP) that includes minor changes to project/project phase costs, minor changes to funding sources of previously-included projects, and minor changes to project/project phase initiation dates. Administrative Modification is a revision that does not require public review and comment, redemonstration of fiscal constraint, or a conformity determination (in nonattainment and maintenance areas)."

- Amendment "means a revision to a long-range statewide or metropolitan transportation plan, TIP, or STIP that involves a major change to a project included in a metropolitan transportation plan, TIP, or STIP, including the addition or deletion of a project or major change in project cost, project/project phase initiation dates, or a major change in design concept or design scope (e.g., changing project termini or the number of through traffic lanes). Changes to projects that are included only for illustrative purposes do not require an amendment. An amendment is a revision that requires public review and comment, redemonstration of fiscal constraint, or a conformity determination (for metropolitan transportation plans and TIPs involving "non-exempt" projects in nonattainment and maintenance areas). In the context of a long-range statewide transportation plan, an amendment is a revision approved by the State in accordance with its public involvement process."

The following procedures have been developed for processing administrative modifications and amendments to the STIP and Metropolitan Planning Organizations (MPOs) TIPs and Long Range Transportation Plans (LRTPs). Processes described below detail procedures that are to be used to update an existing approved STIP or TIP and associated plan, if applicable. A key element of the amendment process is to assure that funding balances are maintained.

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Administrative Modification

The following actions are eligible as Administrative Modifications to the STIP/TIP/LRTP:

A. Revise a project description without changing the project scope, conflicting with the environmental document or changing the conformity finding in nonattainment and maintenance areas (less than 10% change in project termini). This change would not alter the original project intent.

B. Splitting or combining projects.

C. Federal funding category change.

D. Minor changes in expenditures for transit projects.

E. Roadway project phases may have a cost increase less than $2,000,000 or 20% of the amount to be authorized. The 20% scenario amount may not exceed $10,000,000.

F. Shifting projects within the 4-year STIP.

G. Projects may be funded from lump sum banks as long as they are consistent with category definitions.

An administrative modification can be processed in accordance with these procedures provided that:

1. It does not affect the air quality conformity determination, nor the network conformity years found in the travel demand model and the plan for nonattainment and maintenance areas.
2. It does not impact financial constraint.
3. It does not require public review and comment.

The administrative modification process consists of a monthly list of notifications from GDOT to all involved parties, with change summaries sent on a monthly basis to the FHWA and FTA by the GDOT.

The GDOT will submit quarterly reports detailing projects drawn from each lump sum bank with remaining balance to the FHWA.

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Amendment

The following actions are eligible as Amendments to the STIP/TIP/LRTP:

A. Addition or deletion of a project.

B. Addition or deletion of a phase of a project.

C. Roadway project phases that increase in cost over the thresholds described in the Administrative Modification section.

D. Addition of an annual TIP.

E. Major change to scope of work of an existing project. A major change would be any change that alters the original intent i.e. a change in the number of through lanes, a change in termini of more than 10 percent.

F. Shifting projects within the 4-year STIP which require redemonstration of fiscal constraint.

Amendments to the STIP/TIP/LRTP will be developed in accordance with the provisions of 23 CFR Part 450. This requires public review and comment and responses to all comments, either individually or in summary form. For amendments in MPO areas, the public review process should be carried out in accordance with the procedures outlined in the Participation Plan. The GDOT will assure that the amendment process and the public involvement procedures have been followed. Cost changes made to the second, third and fourth years of the STIP will be balanced during the STIP yearly update process. All amendments should be approved by FHWA and/or FTA.

Notes:

1. The date a TIP becomes effective is when the Governor or his designee approves it. For nonattainment and maintenance areas, the effective date of the TIP is based on the date of U.S. Department of Transportation's positive finding of conformity.

2. The date the STIP becomes effective is when FHWA and FTA approve it.

3. The STIP is developed on the state fiscal year which is July 1-June 30.

4. Funds for cost increases will come from those set aside in the STIP financial plan by the GDOT for modifications and cost increases. Fiscal Constraint will be maintained in the STIP at all times.

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TRANSPORTATION IMPROVEMENT PLAN

2010-2013

LUMP SUM PROJECTS

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Lump Sum Funding

A portion of the STIP funding is set aside for eight groups of projects that do not affect the capacity of the roadway. Funds are set up in lump sum categories to undertake projects that are developed after the STIP is approved. These lump sums are listed in a number of funding types for each year for the Department's convenience in managing and accounting for the funding. Funds are drawn from these lump sums during the year and individual projects are programmed. The individual projects may include work at one or several locations for letting and accounting purposes. Listed below are these eight groups and information about them. Except for groups for preliminary engineering and rights of way protective buying, the total available funds are shown as construction for easy accounting but preliminary engineering and rights-of-way may be drawn from this amount when needed in that category.

Group: maintenance

Criteria: existing system maintenance only

This group has six funding/work types: two are for bridge painting/maintenance and the other four are for roadway maintenance. Major types of work undertaken are: resurfacing, pavement rehabilitation, median work, impact attentuators, signing, fencing, pavement markings, landscaping, rest areas, walls, guardrail and shoulder work. Also included is preliminary engineering necessary to prepare plans and rights-of-way needed for work such as landslide repair, sewer hookups and erosion control.

Group: safety

Criteria: work qualifying for the High Hazard Safety Program and other safety projects

This group includes the following work types: signal installation/upgrades, guardrail installation, sign installation, railroad protection devices, operational improvements, railroad crossing hazard elimination, roadway hazard elimination and special safety studies and programs.

Group: preliminary engineering

Criteria: planning, management systems and consultant design services

This group has two funding/work types: planning/management systems and consultant design services

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Group: wetland mitigation

Criteria: site restoration for projects already under construction/complete and wetland banks
This group is a single item.

Group: roadway/interchange lighting

Criteria: lighting

This group is a single item.

Group: rights of way - protective buying and hardship acquisitions

Criteria: purchase of parcel(s) of rights of way (RW) for future projects that are in jeopardy of development and for hardship acquisition. Qualifying projects are those that have preliminary engineering (PE) underway or have a PE, RW or construction phase in the STIP. For counties that are not in conformance for air quality the only qualifying projects are those that have a RW phase in the STIP. This group is a single item.

Group: transportation enhancement

Criteria: projects qualifying for the Transportation Enhancement program (TEA)

TEA projects shown in the STIP will be funded on a first come first served basis. When a project is funded it is drawn down from the lump sum. When all funds are gone, no other projects can be funded until the next fiscal year, which begins on July 1.

This group is a single item.

Group: safe routes to schools

Criteria: To enable and encourage children, including those with disabilities, to walk and bicycle to school; to make walking and bicycling to school safe and more appealing; and to facilitate the planning, development and implementation of projects that will improve safety, and reduce traffic, fuel consumption, and air pollution in the vicinity of schools.

This group has two items; Infrastructure & non-infrastructure.

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MPO Lump Sum Projects Hinesville

Parameters: MPO

Processed Date: 8/10/09 MPO: Hinesville 2010-2013

ALL

PROJECT	PROJECT NUMBER	TIP NO.	DESCRIPTION	PE		ROW		CST		UTL	
0007258	CSSTP-0007-00(258)		EDGE LINE RUMBLE STRIPS @ SEVERAL SR LOCATIONS IN DISTRICT 5	PE	AUTHORIZED			CST	AUTH-PENDING		

LIBERTY

PROJECT	PROJECT NUMBER	TIP NO.	DESCRIPTION	PE		ROW		CST		UTL	
0007408	CSSTP-0007-00(408)		SR 38 @ 3 LOCS; SR 38 CONN @ 1 LOC & SR 144 @ 2 LOCS	PE	AUTHORIZED	ROW	PRECST	CST	PRECST		
0007432	CSSTP-0007-00(432)		CR 45/CASSELS ROAD @ CSX # 637344B	PE	PRECST	ROW	PRECST	CST	PRECST		
0007410	CSSFT-0008-00(862)		OFF-SYSTEM SAFETY IMPROVEMENTS @ 6 LOCS IN LIBERTY COUNTY					CST	AUTH-PENDING		

TRANSPORTATION IMPROVEMENT PLAN

2010 – 2013

AUTHORIZED PROJECTS

The following chart includes Federal or State funded projects that were authorized and/or completed during the years 2007 – 2010. This list is not comprehensive and excludes projects from other funding sources.

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Listing of all funding authorized by GDOT in the Hinesville MPO area during the period of FY 2007 through FY 2010 (as of 10/2/09)

This list contains all project phases authorized for funding by the Georgia Department of Transportation during the period of FY 2007 through FY 2010 and is accurate as of 10/2/09. 'PID' and 'Project No.' are identification numbers used by GDOT and FHWA for reference. The 'TIP No.' is how the project is identified in the Hinesville Transportation Improvement Program (TIP). Note that not all projects are required to be in the TIP and therefore are not assigned a number. The 'Description' is the title of the project; 'Phase' indicates 'PE' for Preliminary Engineering, 'ROW' for Right of Way acquisition and 'CST' for Construction. The 'Auth Date' indicates the fiscal year in which the phase was authorized and the 'Auth Amt' is the the amount of funds authorized.

Roadway, Bridge and Safety Improvements

PID	PROJECT NO.	TIP NO.	DESCRIPTION	PHASE	AUTH DATE	AUTH AMT
0007038	CSBRG-0007-00(038)	2005-Z-1	SR 119 @ RUSSELL SWAMP	PE	2008	$300,000.00
0008188	CSTEE-0008-00(188)	2005-G-1	HINESVILLE STREETSCAPE ENHANCEMENT ON MEMORIAL DRIVE	CST	2009	$625,000.00
0008399	CSNHS-0008-00(399)		I-95 @ SR 25/US 17/OCEAN HIGHWAY INTERCHANGE - LIGHTING	CST	2007	$896,174.27
0008862	CSSFT-0008-00(862)		OFF-SYSTEM SAFETY IMPROVEMENTS @ 6 LOCS IN LIBERTY COUNTY	CST	2010	$101,000.00
0008566	CSSFT-0008-00(566)		CR 41 @1 LOC &CR 111 @1 LOC - OFF-SYSTEM SAFETY IMPROVEMENTS	CST	2008	$83,419.00
0007258	CSSTP-0007-00(258)		EDGE LINE RUMBLE STRIPS @ SEVERAL SR LOCATIONS IN DISTRICT 5	CST	2010	$1,218,123.50

Intermodal (Transit Planning and Capital)

PID	PROJECT NO.	TIP NO.	DESCRIPTION	PHASE	AUTH DATE	AUTH AMT
T001531	MTA00-T001-00(531)		FY 2007 SECTION 5310 CAPITAL FOR HINESVILLE	CST	2007	$21,039.00
T001532	MTA00-T001-00(532)		FY 2008 SECTION 5310 CAPITAL FOR HINESVILLE	CST	2008	$22,091.00
T001752	MTG00-0148-00(005)		FY 2009 SECTION 5310 CAPITAL FOR HINESVILLE	CST	2009	$24,000.00
T002508	MG600-0148-00(004)		FY 2009 SECTION 5307 CAPITAL BUS FOR HINESVILLE	CST	2009	$220,000.00
T002511	MTG00-0148-00(017)		FY 2008 SECTION 5307 OPERATING CONTRACT FOR HINESVILLE	CST	2009	$716,661.00
T002513	MTG00-0148-00(010)		FY 09 SECTION 5303 CAPITAL PLANNING CONTRACT - HINESVILLE	CST	2009	$31,250.00
T002586	AP090-9013-07(179)		HINESVILLE-RWY EXT FEASIBILITY STUDY, ALP, ENGR DESIGN SRVS	CST	2009	$209,745.75
T002613	MTG00T00200613		ARRA SECTION 5307 CAPITAL FOR HINESVILLE	CAP	2009	$885,852.00
T002800			FY 2010 SECTION 5303 PLANNING CONTRACT - HINESVILLE	TPLN	2009	$31,250.00
T002895			ARRA SECTION 5307 CAPITAL FOR HINESVILLE	TCAP	2009	$885,852.00
T002562	MTG00-0143-00(140)		GA-18-X029 5311 CAPITAL COASTAL RDC	CST	2009	$1,105,515.00
T002563	MTG00-0143-00(141)		GA-18-X029 5311 CAPITAL COASTAL RDC	CST	2009	$344,200.00

Maintenance Improvements

PID	PROJECT NO.	TIP NO.	DESCRIPTION	PHASE	AUTH DATE	AUTH AMT
M003676	CSNHS-M003-00(676)		SR 119 & SR 144 FROM TAYLOR CREEK TO TRINITY ROAD	CST	2008	$2,278,622.88

State Aid Projects

PID	PROJECT NO.	TIP NO.	DESCRIPTION	PHASE	AUTH DATE	AUTH AMT
S009380	PRC10-S009-00(380)		MEMORIAL DRIVE (PHASE I) IN HINESVILLE	CST	2008	$320,000.00
S009381	PRC10-S009-00(381)		MEMORIAL DRIVE (PHASE II)	CST	2007	$320,000.00

Transportation Planning

PID	PROJECT NO.	TIP NO.	DESCRIPTION	PHASE	AUTH DATE	AUTH AMT
0008506	PL000-0008-00(506)		PL HINESVILLE - 2008	PLN	2008	$121,250.00
0009790	PL000-0008-00(790)		PL HINESVILLE - 2009	PLN	2009	$153,381.26
0007984	PL000-0007-00(984)		PL HINESVILLE 2007	PLN	2007	$121,250.00
0009241	PL000000900241		PL HINESVILLE - 2010	PLN	2010	$130,303.76

TRANSPORTATION IMPROVEMENT PLAN

2010 – 2013

EXPECTED HIGHWAY STIP FUNDS

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Expected Highway STIP Funds

7/10/2009
hinesville_tip

HINESVILLE
TOTAL EXPECTED HIGHWAY
STIP FUNDS
(MATCHED)
FY 2010 - FY 2013

FUND	CODE	LUMP DESCRIPTION	2010	2011	2012	2013	TOTAL
Bridge	L1C0		$ -	$ -	$ 80,289	$ -	$ 80,289
STP	L200		$ -	$ 6,039,000	$ -	$ -	$ 6,039,000
HPP	LY10		$ -	$ -	$ 1,891,000	$ -	$ 1,891,000
HPP	LY20		$ -	$ 1,961,000	$ -	$ -	$ 1,961,000
NHS	L050	ROAD MAINT	$ 248,000	$ 248,000	$ 248,000	$ 248,000	$ 992,000
NHS	L050	RDWY LIGHT	$ -	$ 6,000	$ 6,000	$ 6,000	$ 18,000
SRS	LU10	SAFE RT SCH PROG	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 8,000
SRS	LU20	SAFE RT SCH INFR	$ 50,000	$ 15,000	$ 15,000	$ 15,000	$ 95,000
SRS	LU30	SAFE RT SCH ANY	$ 6,000	$ 3,000	$ 3,000	$ 3,000	$ 15,000
SFT	LS20	HWY RISK RURAL RDS	$ 19,000	$ 19,000	$ 19,000	$ 19,000	$ 76,000
SFT	LS30	SAFETY LUMP	$ 186,000	$ 167,000	$ 167,000	$ 167,000	$ 687,000
STP	L220	ENHANCE LUMP	$ 161,000	$ 161,000	$ 161,000	$ 161,000	$ 644,000
STP	L240	OPERATIONAL	$ 31,000	$ 31,000	$ 31,000	$ 31,000	$ 124,000
STP	L240	ROAD MAINT	$ 887,000	$ 620,000	$ 620,000	$ 620,000	$ 2,747,000
STP	L240	BRIDGE PAINT	$ 31,000	$ 31,000	$ 31,000	$ 31,000	$ 124,000
STP	L240	SIGNALS	$ 105,000	$ 93,000	$ 93,000	$ 93,000	$ 384,000
STP	L240	PLAN/MGT	$ 6,000	$ 6,000	$ 19,000	$ 19,000	$ 50,000
STP	L240	FA MAINT	$ 93,000	$ 93,000	$ 93,000	$ 93,000	$ 372,000
STP	L240	WETLAND MITIG	$ 112,000	$ 50,000	$ 50,000	$ 50,000	$ 262,000
STP	L240	RW PROTECTIVE BUY	$ 16,000	$ 16,000	$ 16,000	$ 16,000	$ 64,000
STP	LS40	RRX HAZ	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 100,000
STP	LS50	RRX PROT	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 100,000
STP	LZ20	CST MGMT	$ 189,000	$ 180,000	$ -	$ -	$ 369,000
DNR	L940	DNR REC TRAILS	$ -	$ 8,000	$ 8,000	$ 8,000	$ 24,000
TOTAL			$ 2,192,000	$ 9,799,000	$ 3,603,289	$ 1,632,000	$ 17,226,289

TRANSPORTATION IMPROVEMENT PLAN

2010 – 2013 HINESVILLE PROJECT

COST DETAILS

STATE AND FEDERALLY APPROVED FUNDS

DRAFT

7/10/2009

Hinesville Project Cost Detail
FY 2010 thru FY 2013

PI #	MPO TIP ID	Description	Prim Work Type	Prog Date	Phase	Fund Code	Federal	State	Other	Total
0004917	2005-D-1	SR 119/AIRPORT ROAD FROM US 84 TO SR 196 IN HINESVILLE	Widening	2011	ROW	L200	$4,831,200	$1,207,800	$0	$6,039,000
0004917	2005-D-1	SR 119/AIRPORT ROAD FROM US 84 TO SR 196 IN HINESVILLE	Widening	2011	ROW	LY20S	$1,568,800	$392,200	$0	$1,961,000
						FY 2011 Totals:	***$6,400,000***	***$1,600,000***	***$0***	***$8,000,000***
0007038	2005-Z-1	SR 119 @ RUSSELL SWAMP	Bridges	2012	ROW	L1C0	$64,231	$16,058	$0	$80,289
522570-	2005-E-1	US 84 CONN FM 1 MI S SR 196/US 84 INT TO US 84 S FLEMINGTON	Roadway Project	2012	ROW	LY10S	$1,512,800	$378,200	$0	$1,891,000
						FY 2012 Totals:	***$1,577,031***	***$394,258***	***$0***	***$1,971,289***
						Hinesville Totals:	***$7,977,031***	***$1,994,258***	***$0***	***$9,971,289***

Overall Highway Project Locations

The maps and project pages below depict most of the highway projects programmed for FY 2010 - 2013 in Liberty County except the lump sum and other miscellaneous improvement projects that cannot be displayed in maps.

Maps show where each project is located and what types of improvements are programmed. For detailed project information and funding source, please refer to the tables of individual projects that follow.

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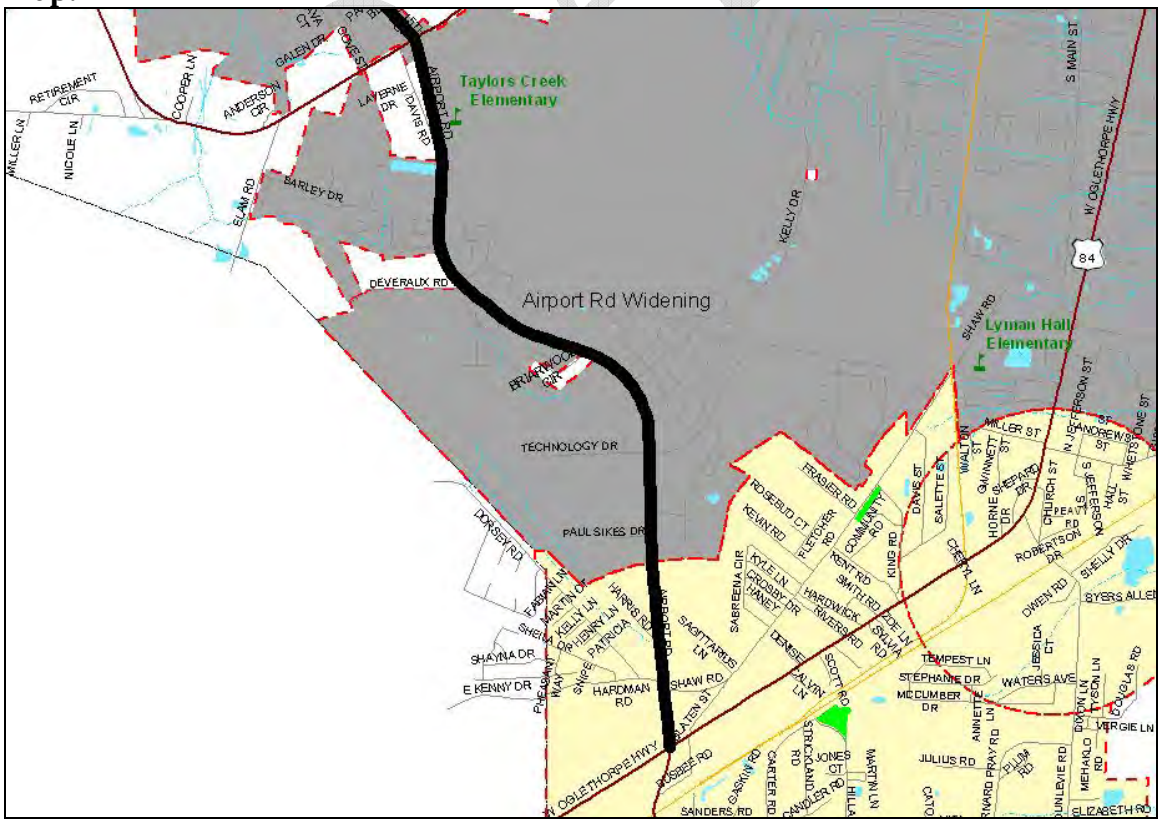
Project Name: Airport Rd Widening **Project Description:** Widening of Airport Rd from 2 lanes to 4 lanes. **From: US 84 To: SR 196 W**		P.I. #: 0004917 TIP #:2005-D-1 COUNTY: Liberty PROJ. #: STP-0004-00(917) FUND: LY20S, L200 GDOT DISTRICT: 5
TRAFFIC VOL. 2006 ADT: 7,660	YEAR 2030: 17,100	CONG. DISTRICT: 1
NO. OF LANES EXISTING: 2	PLANNED: 4 lane divided	RDC: CGRDC
LOCAL ROAD #:	STATE/US ROAD #: SR 119	LENGTH (MI): 3.3

COMMENTS/REMARKS: County has PMA with DOT to do PE and Utilities (local cost in Const is for utilities). The total local cost for preliminary engineering is $680,441. Also note: HAMPO Policy Committee voted (June 21, 2006) to include traffic signalization improvement at the Airport Rd/US 84, Airport Rd/SR 196 W intersections. This should be completed in advance of the project.

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.	Authorized	$0	$0	$0	$0	$0	$680,441
RIGHT-OF-WAY	Fed/State	$0	$ 8,000,000	$0	$0	$8,000,000	$8,000,000
CONSTRUCTION	Fed/State	$0	$0	$0	$0	$0	$14,331,256
PROJECT COST		$0	$8,000,000	$0	$0	$8,000,000	$23,011,697
FEDERAL COST		$0	$6,400,000	$0	$0	$6,400,000	$17,865,004
STATE COST		$0	$1,600,000	$0	$0	$1,600,000	$4,466,251
LOCAL COST		$0	$0	$0	$0	$0	$680,441

Map:

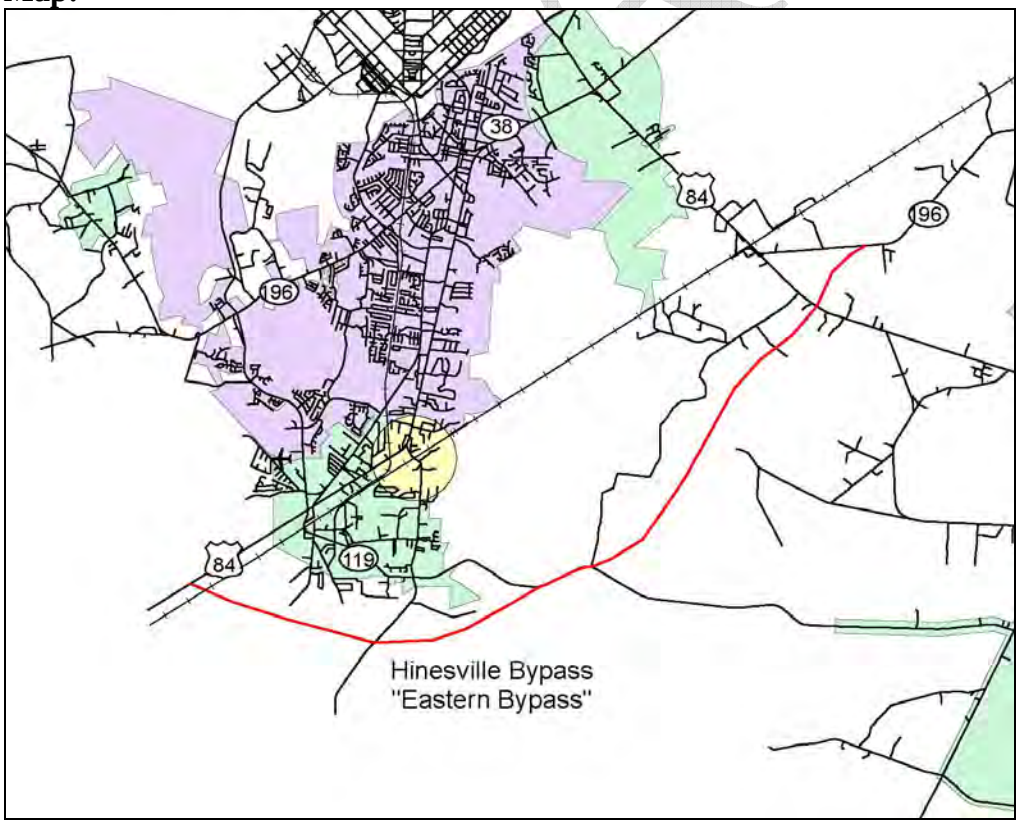


Project Name: Hinesville Bypass Project **Project Description:** "US 84 Conn from 1 mile s of SR 196/US 84 int to US 84 S Flemington (Hinesville Bypass Project)" **From: US 84/SR 196 To: US 84**		P.I. #: 522570 TIP #: 2005-E-1 COUNTY: Liberty PROJ. #: NH-026-3(56)SP FUND: LY10S, L050, GDOT DISTRICT: 5
TRAFFIC VOL. 2006 ADT: NA	YEAR 2030: 13,590	CONG. DISTRICT: 1
NO. OF LANES EXISTING: NA	PLANNED: new 4 lane divided	RDC: CGRDC
LOCAL ROAD #: NA	STATE/US ROAD #: NA	LENGTH (MI): 12.4 miles (+/-)

COMMENTS/REMARKS: County has PMA with DOT to do PE and Utilities (local cost in Const is for utilities). The total local cost for preliminary engineering is $1,500,000. Also note: HAMPO Policy Committee voted (June 21, 2006) to include traffic signalization improvement at the Airport Rd/US 84, Airport Rd/SR 196 W intersections. This should be completed in advance of the project. The construction estimate is based on a two lane development. All cost estimates are based on the YOE report.

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.	Authorized	$0	$0	$0	$0	$0	$1,500,000
RIGHT-OF-WAY	Fed/State	$0	$0	$1,891,000	$0	$1,891,000	$18,045,063
CONSTRUCTION	-	$0	$0	$0	$0	$0	$33,036,071
PROJECT COST		$0	$0	$1,891,000	$0	$1,891,000	$52,581,134
FEDERAL COST		$0	$0	$1,512,800	$0	$1,512,800	$26,428,856
STATE COST		$0	$0	$378,200	$0	$378,200	$6,607,214
LOCAL COST		$0	$0	$0	$0	$0	$1,500,000

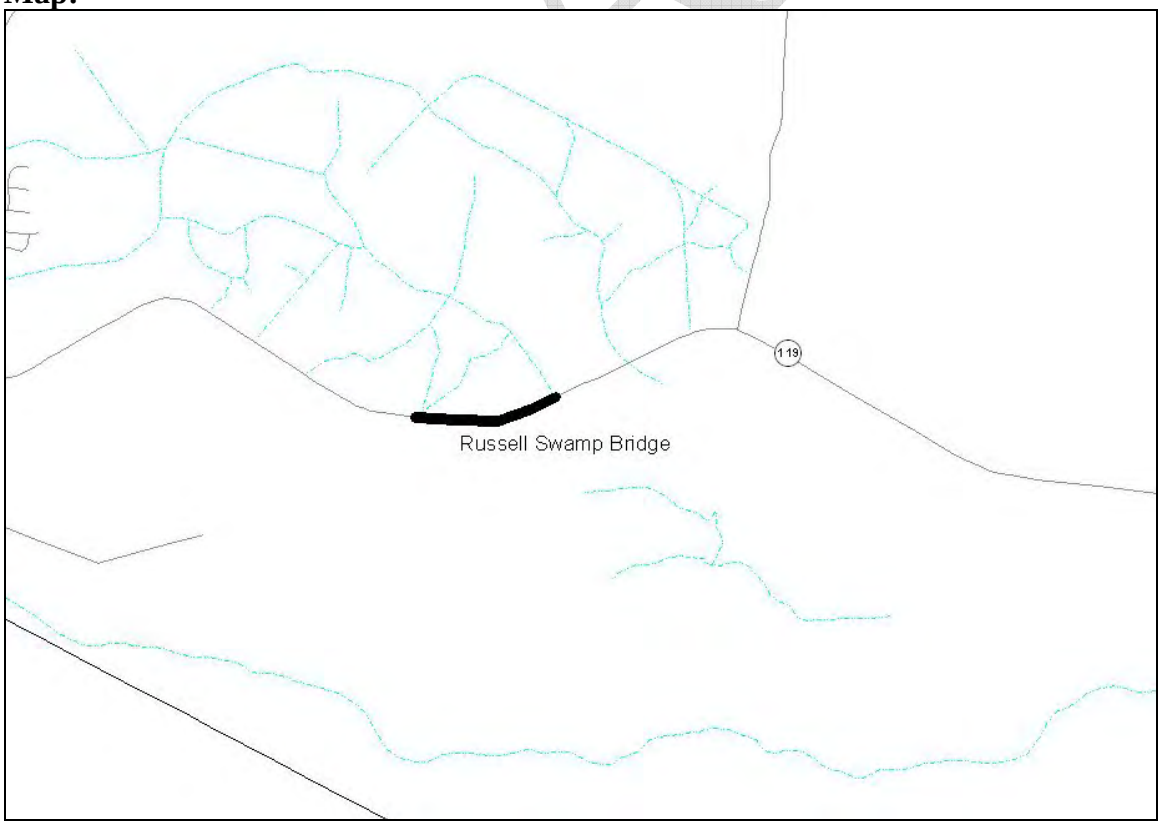
Map:



Project Name: SR 119 @ Russell Swamp **Project Description:** Bridge replacement.	P.I. #: 0007038 TIP #: 2005-Z-1 COUNTY: Liberty PROJ. #:CSBRG-0007-00(038) FUND: L1C0 GDOT DISTRICT: 5
TRAFFIC VOL. 2006 ADT: 3,310 / YEAR 2030: 8,150	CONG. DISTRICT: 1
NO. OF LANES EXISTING: 2 / PLANNED: 2	RDC: CGRDC
LOCAL ROAD #: / STATE/US ROAD #: SR 119	LENGTH (MI): 0.4
COMMENTS/REMARKS:	

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.	Authorized	$0	$0	$0	$0	$0	$300,000
RIGHT-OF-WAY	Fed/State	$0	$0	$80,289	$0	$80,289	$80,289
CONSTRUCTION	Fed/State	$0	$0	$0	$0	$0	$6,234,901
PROJECT COST				$80,289		$80,289	$6,315,190
FEDERAL COST				$64,231		$64,231	$5,052,152
STATE COST				$16,058		$16,058	$1,563,038
LOCAL COST		$0	$0	$0	$0	$0	$0

Map:



Local and Unfunded TIP Projects

all projects listed are in the current LRTP

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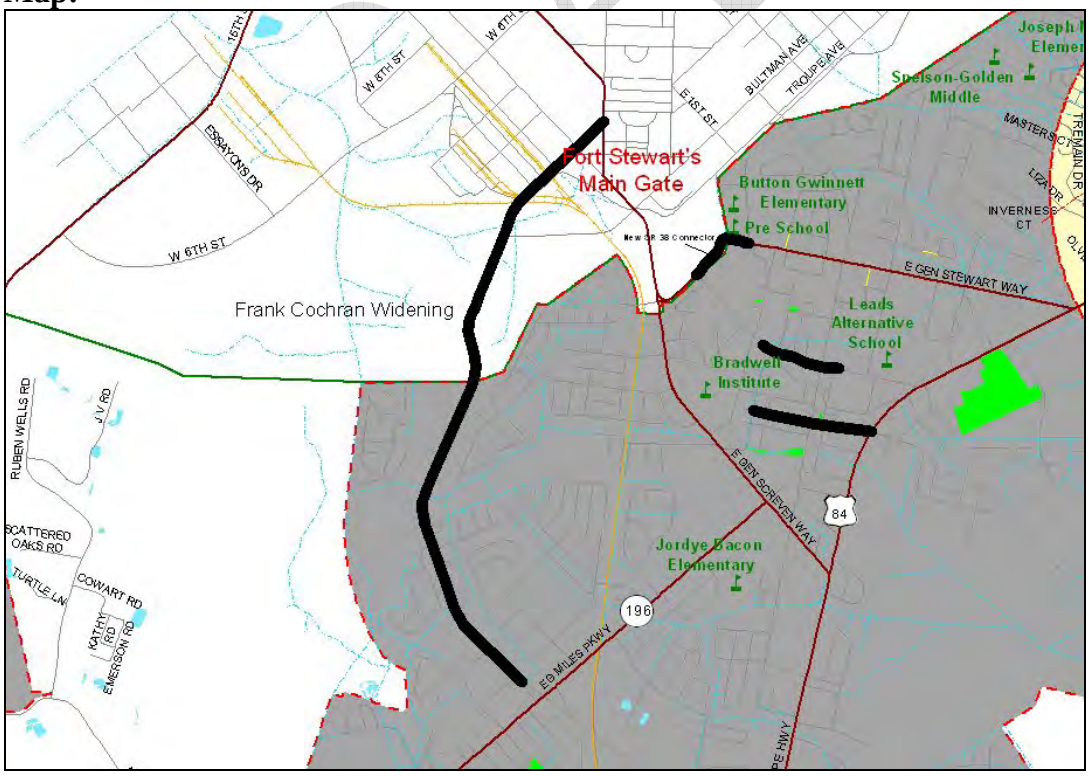
Project Name: Frank Cochran Drive Widening **Project Description:** Widening on Frank Cochran from 2 lanes to 4 lanes **From: SR 196 W To: Hase Road (Fort Stewart)**	P.I. #: 550600 TIP #: 2005-F-1 COUNTY: Liberty PROJ. #:STP-2610(4) FUND: L200, LOC GDOT DISTRICT: 5
TRAFFIC VOL. 2006 ADT: 13,120 / YEAR 2030: 24,010	CONG. DISTRICT: 1
NO. OF LANES EXISTING: 2 / PLANNED: 4 lane divided	RDC: CGRDC
LOCAL ROAD #: / STATE/US ROAD #:	LENGTH (MI): 2.7 miles
COMMENTS/REMARKS: PMA with the City of Hinesville to do PE and ROW - PE is UW; ROW is scheduled for CY 2007 DOT scheduled let date is FY 2012.	

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.	Authorized	$0	$0	$0	$0	$0	$598,030
RIGHT-OF-WAY	Local	$4,000,000	$0	$0	$0	$0	$4,000,000
CONSTRUCTION	State/Fed	$0	$0	$0	$0	$0	$11,935,262
PROJECT COST	-	$4,000,000	$0	$0	$0	$0	$16,533,292
FEDERAL COST		$0	$0	$0	$0	$0	$9,548,209
STATE COST		$0	$0	$0	$0	$0	$2,387,052
LOCAL COST		$4,000,000	$0	$0	$0	$4,000,000	$4,598,030

Map:

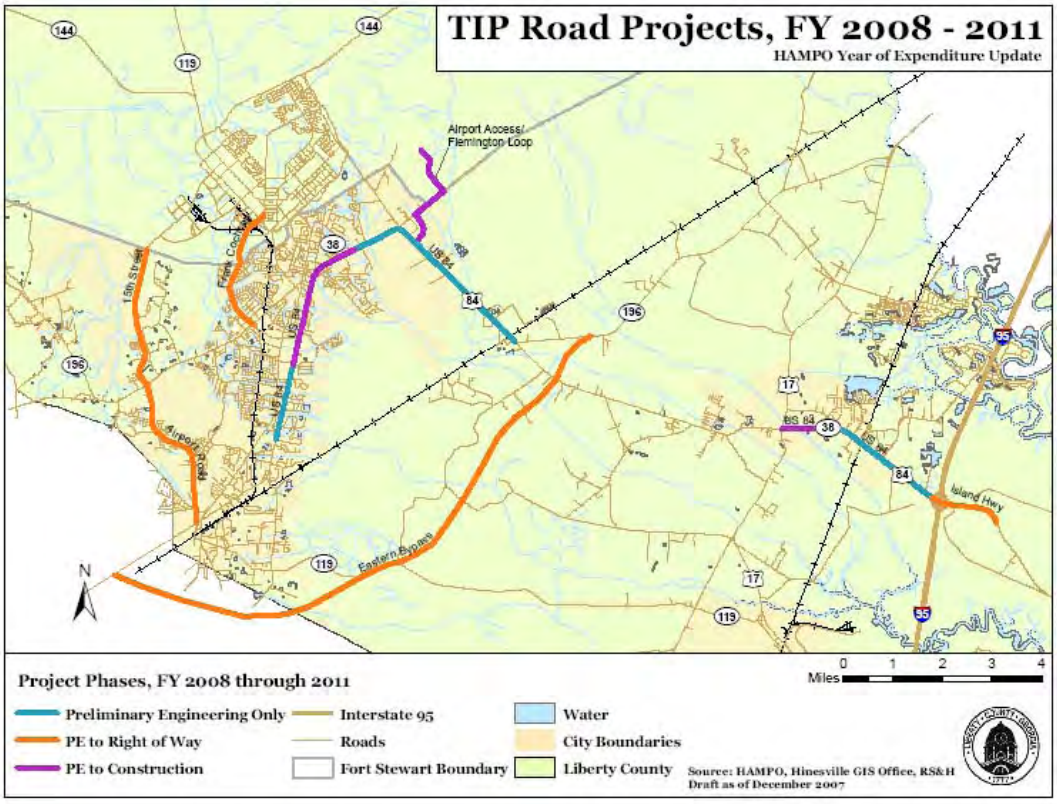


Project Name: US 84 Safety Improvements **Project Description:** To incorporate the recommendations from the US 84 corridor study completed in 2007. **FROM: East of General Stewart Way** **TO: SR 196**		P.I. #: TIP #:2007-B-1 COUNTY: Liberty PROJ. #: FUND: TBD GDOT DISTRICT: 5
TRAFFIC VOL. 2006 ADT: 23,120	YEAR 2030:	CONG. DISTRICT: 1
NO. OF LANES EXISTING: 4	PLANNED:4 w/ median	RDC: CGRDC
LOCAL ROAD #:	STATE/US ROAD #: 38/84	LENGTH (MI): 3.78 mi

COMMENTS/REMARKS: This is an unfunded high priority project in the US 84 Corridor, from General Stewart Way to SR 196. Of the five US 84 improvement projects, this ranks as project priority 1C. The MPO will pursue federal and state funding for this project as those resources become available.

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.	-	$0	$0	$0	$0	$0	$866,847
RIGHT-OF-WAY	-	$0	$0	$0	$0	$0	$0
CONSTRUCTION	-	$0	$0	$0	$0	$0	$6,651,847
PROJECT COST		$0	$0	$0	$0	$0	$7,518,694
FEDERAL COST		$0	$0	$0	$0	$0	$6,014,955
STATE COST		$0	$0	$0	$0	$0	$1,503,738
LOCAL COST		$0	$0	$0	$0	$0	$866,847

Map:

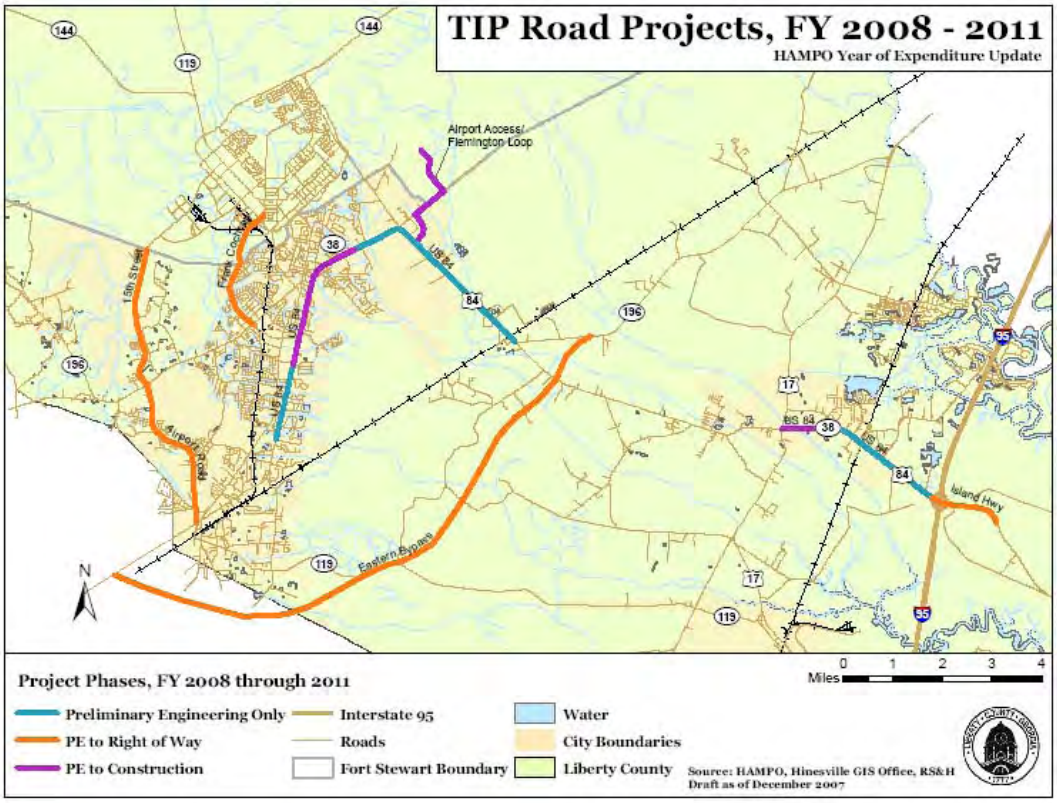


Project Name: US 84 Safety Improvements **Project Description:** To incorporate the recommendations from the US 84 corridor study completed in 2007. **FROM: West (south) of General Stewart Way TO: Flowers Dr.**		P.I. #: TIP #:2007-B-1 COUNTY: Liberty PROJ. #: FUND: TBD GDOT DISTRICT: 5
TRAFFIC VOL. 2006 ADT: 29,670	YEAR 2030:	CONG. DISTRICT: 1
NO. OF LANES EXISTING: 4	PLANNED:4 w/ median	RDC: CGRDC
LOCAL ROAD #:	STATE/US ROAD #: 38/84	LENGTH (MI): 2.93 mi

COMMENTS/REMARKS: This is an unfunded high priority project in the US 84 Corridor, from General Stewart Way to Flowers Dr. Of the five US 84 improvement projects, this ranks as project priority 1A. The MPO will pursue federal and state funding for this project as those resources become available.

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.	-	$0	$0	$0	$0	$0	$532,950
RIGHT-OF-WAY	-	$0	$0	$0	$0	$0	$0
CONSTRUCTION	-	$0	$0	$0	$0	$0	$3,762,998
PROJECT COST		$0	$0	$0	$0	$0	$4,295,948
FEDERAL COST		$0	$0	$0	$0	$0	$3,436,759
STATE COST		$0	$0	$0	$0	$0	$859,189
LOCAL COST		$0	$0	$0	$0	$0	$532,950

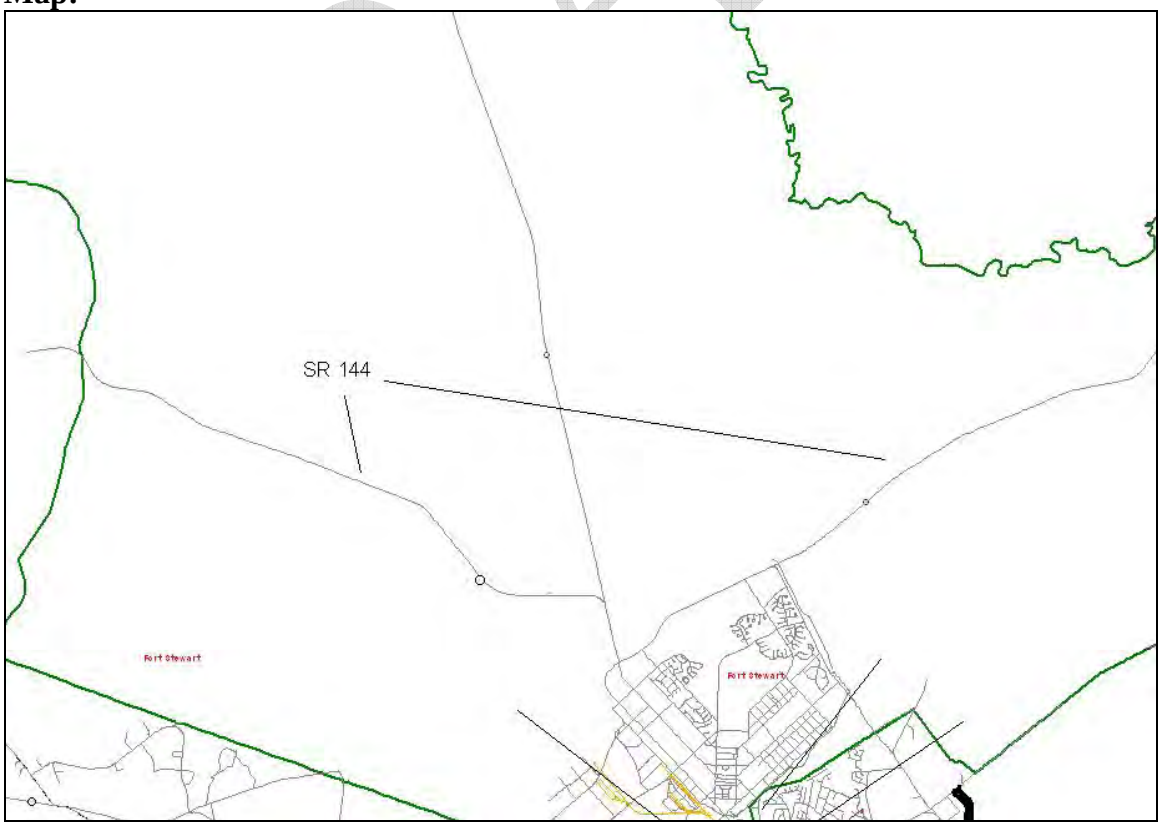
Map:



Project Name: SR 144 Passing Lanes **Project Description:** Construction of Passing Lanes thru Fort Stewart Reservation **From:** SR 144 West: WB mp 5.75 to mp 7.0, EB mp 2.0 to mp 3.25. SR 144 East: EB mp 16.50 to mp 17.70, WB mp 19.10 to 20.50	P.I. #: 532600 TIP #:2005-X-1 COUNTY: Liberty PROJ. #: STP-147-1(10) FUND: L200 GDOT DISTRICT: 5
TRAFFIC VOL. 2006 ADT: 7,150 / YEAR 2030: 5,780	CONG. DISTRICT: 1
NO. OF LANES EXISTING: 2 / PLANNED: 4 (passing lanes)	RDC: CGRDC
LOCAL ROAD #: / STATE/US ROAD #: SR 144	LENGTH (MI): 5.01 miles
COMMENTS/REMARKS: Working on concept, project is in Long Range	

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.	Authorized	$ 0	$0	$0	$0	$0	$110,000
RIGHT-OF-WAY	-	$0	$0	$0	$0	$0	$0
CONSTRUCTION	-	$0	$0	$0	$0	$0	$3,761,877
PROJECT COST		$0	$0	$0	$0	$0	$3,871,877
FEDERAL COST		$0	$0	$0	$0	$0	$3,097,501
STATE COST		$0	$0	$0	$0	$0	$774,375
LOCAL COST		$0	$0	$0	$0	$0	$0

Map:

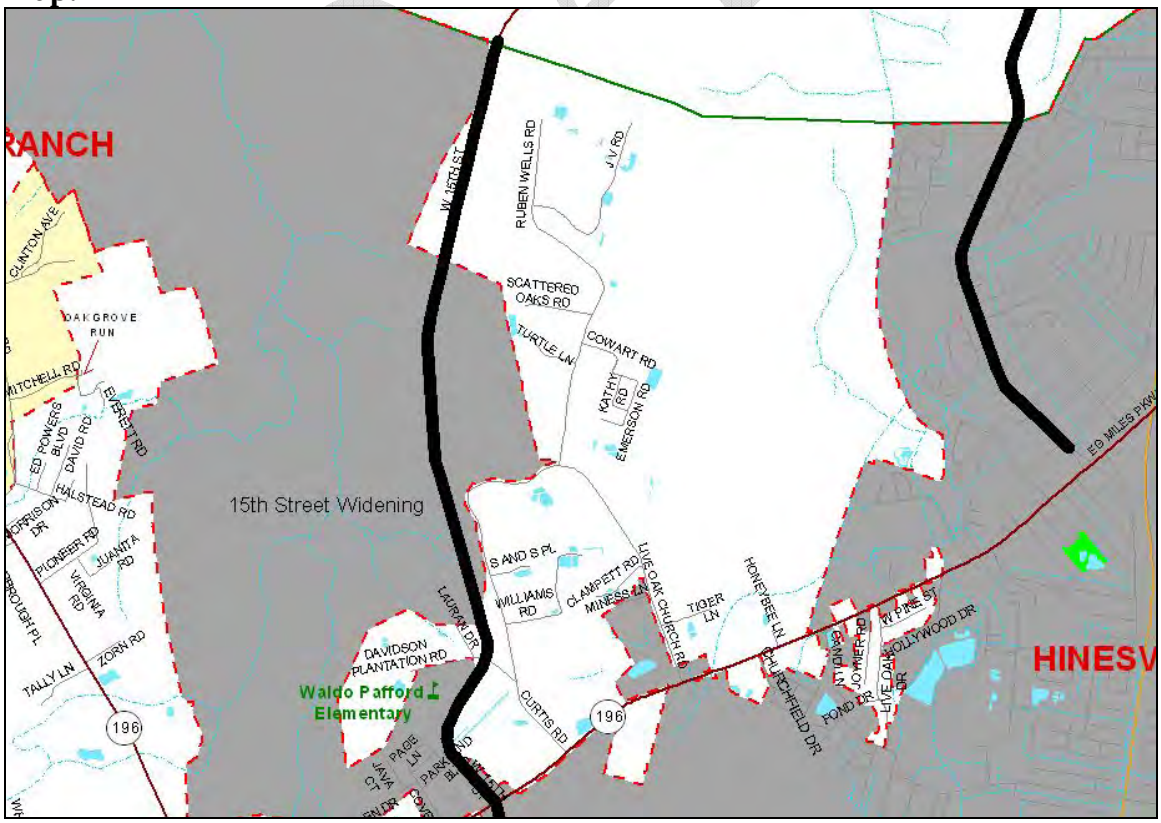


Project Name: 15th Street Widening **Project Description:** Widening of 15th Street from 2 lanes to 4 lanes **From: SR 196 To: Fort Stewart Boundary**		P.I. #: TIP #:2005-D-2 COUNTY: Liberty County PROJ. #: FUND: TBD GDOT DISTRICT: 5
TRAFFIC VOL. 2006 ADT: N/A	YEAR 2030: 16,870	CONG. DISTRICT: 1
NO. OF LANES EXISTING: 2	PLANNED: 4 lane divided	RDC: CGRDC
LOCAL ROAD #: 15th Street	STATE/US ROAD #: NA	LENGTH (MI): 3.2 miles

COMMENTS/REMARKS: County is doing PE w/ local funds. Studies are being coordinated by the same consultant (Thomas & Hutton). MPO intends to seek Federal funding for this local roadway project in the future. Proposed Independence PUD development is planned to occur west of 15th Street. The local cost for preliminary engineering is $680,441.

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.	Local	$0	$0	$0	$0	$0	$680,441
RIGHT-OF-WAY	-	$0	$0	$0	$0	$0	$781,060
CONSTRUCTION	-	$0	$0	$0	$0	$0	$14,041,410
PROJECT COST		$0	$0	$0	$0	$0	$15,502,911
FEDERAL COST		$0	$0	$0	$0	$0	$11,233,128
STATE COST		$0	$0	$0	$0	$0	$2,808,282
LOCAL COST		$0	$0	$0	$0	$781,060	$781,060

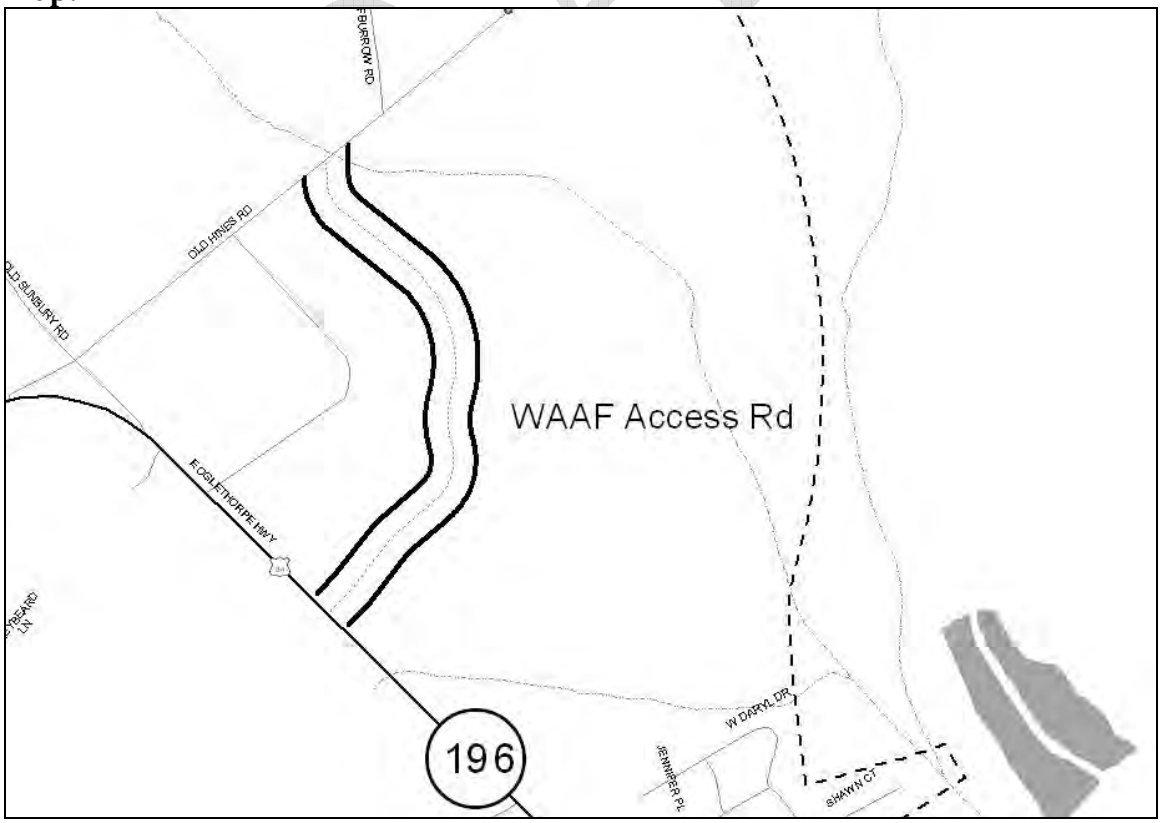
Map:



Project Name: WAAF access road **Project Description:** New road construction to access the WAAF **From: Old Hines To: US 84**		P.I. #: TIP #:2005-I-1 COUNTY: Liberty PROJ. #: FUND: Local/DOD/FAA GDOT DISTRICT: 5
TRAFFIC VOL. 2006 ADT: N/A	YEAR 2030: 3,250	CONG. DISTRICT: 1
NO. OF LANES EXISTING:	PLANNED: new 2 lane	RDC: CGRDC
LOCAL ROAD #:	STATE/US ROAD #:	LENGTH (MI): 2.7 miles
COMMENTS/REMARKS: MPO to seek state aid and DOD funds. Construction of a new terminal and extension of the runway have been completed.		

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.	LOCAL	$0	$0	$0	$0	$0	$105,000
RIGHT-OF-WAY	-	$0	$0	$0	$0	$0	$500,000
CONSTRUCTION	-	$0	$0	$0	$0	$0	$1,228,700
PROJECT COST		$0	$0	$0	$0	$0	$1,833,700
FEDERAL COST		$0	$0	$0	$0	$0	$982,960
STATE COST		$0	$0	$0	$0	$0	$245,740
LOCAL COST		$0	$0	$0	$0	$0	$605,000

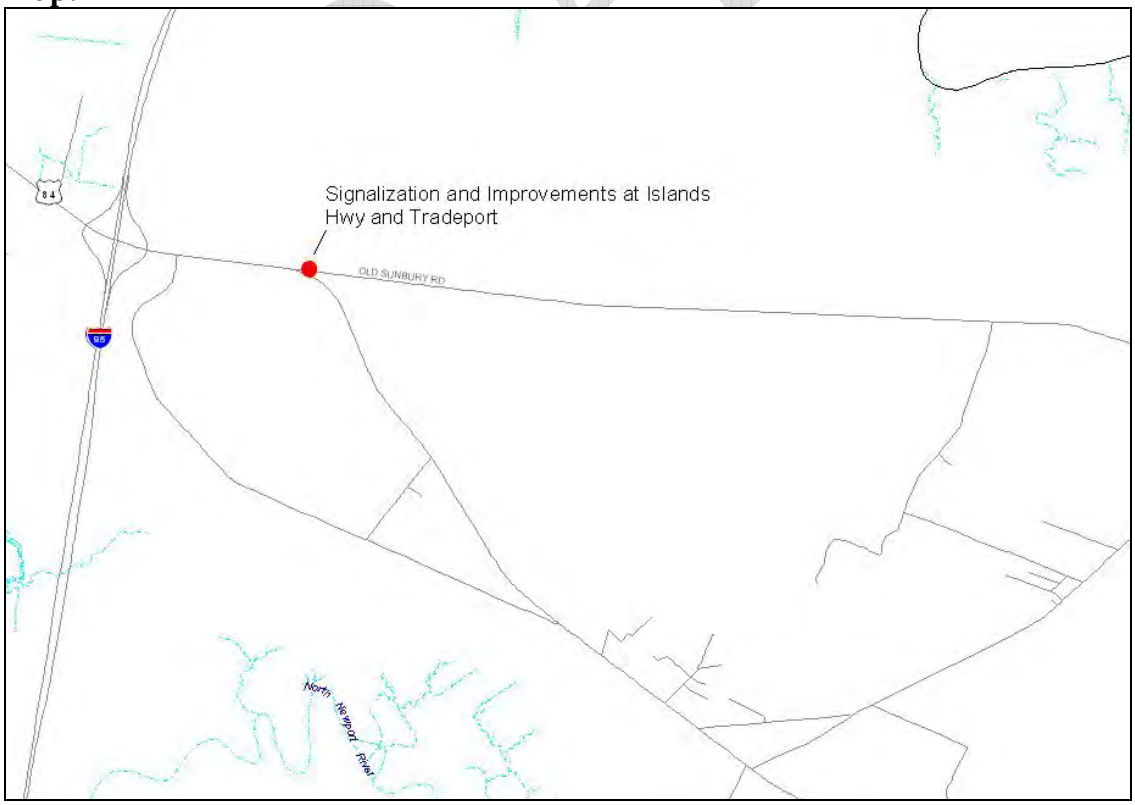
Map:



Project Name: Intersection signalization and improvements at Tradeport **Project Description:** Signalization and improvements for Islands Hwy at Tradeport		P.I. #: TIP #:2005-Y-1 COUNTY: Liberty PROJ. #: FUND: TBD GDOT DISTRICT: 5
TRAFFIC VOL. 2006 ADT: 2,700	YEAR 2030: 7,700	CONG. DISTRICT: 1
NO. OF LANES EXISTING: 2	PLANNED:4	RDC: CGRDC
LOCAL ROAD #: Islands Hwy	STATE/US ROAD #:	LENGTH (MI): NA
COMMENTS/REMARKS: MPO desires to seek funds for Project.		

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.		$0	$0	$0	$0	$0	$0
RIGHT-OF-WAY		$0	$0	$0	$0	$0	$0
CONSTRUCTION		$0	$0	$0	$0	$0	$0
PROJECT COST		$0	$0	$0	$0	$0	$0
FEDERAL COST		$0	$0	$0	$0	$0	$0
STATE COST		$0	$0	$0	$0	$0	$0
LOCAL COST		$0	$0	$0	$0	$0	$0

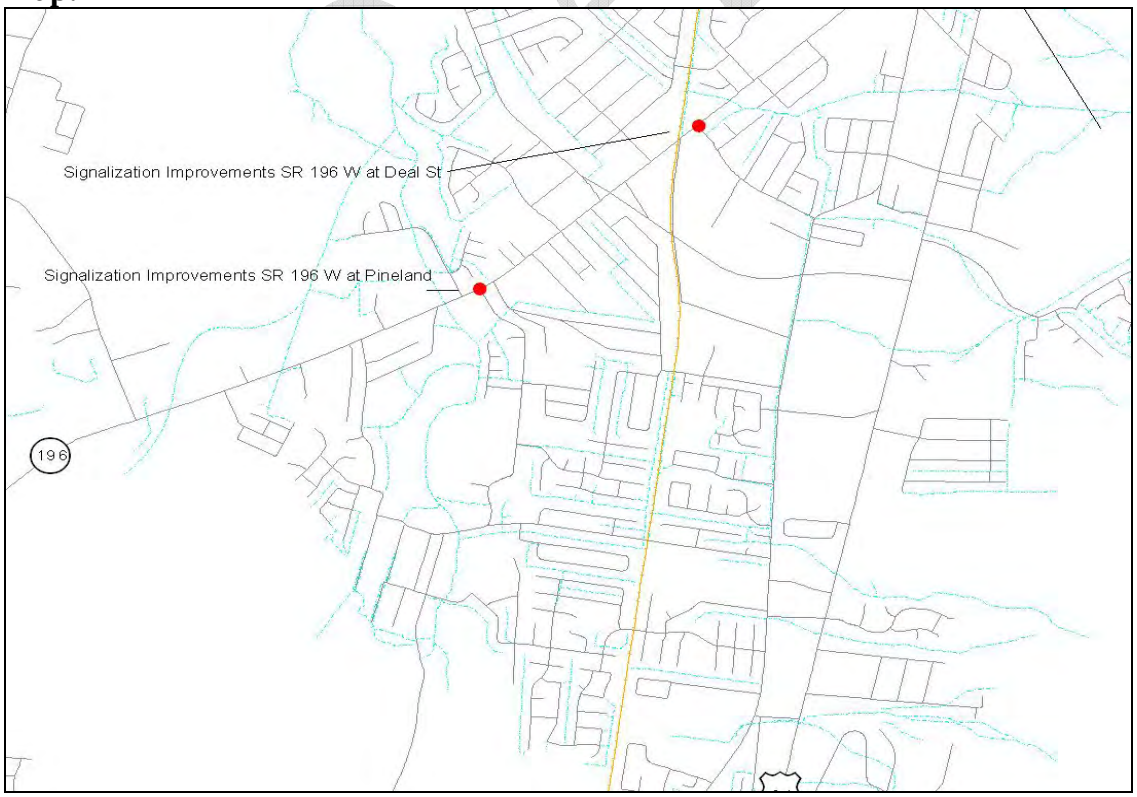
Map:



Project Name: Signalization and improvements for SR 196 W at Pineland Ave. **Project Description:** Improve the intersection of SR 196 W at Pineland Ave.		P.I. #:
		TIP #:2005-R-1
		COUNTY: Liberty
		PROJ. #:
		FUND: TBD
		GDOT DISTRICT: 5
TRAFFIC VOL. 2006 ADT: 14,610	YEAR 2030: 17,840	CONG. DISTRICT: 1
NO. OF LANES EXISTING: 4	PLANNED: 4	RDC: CGRDC
LOCAL ROAD #:	STATE/US ROAD #: SR 196 W	LENGTH (MI): NA
COMMENTS/REMARKS: MPO desires to seek funds for Project.		

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.		$0	$0	$0	$0	$0	$0
RIGHT-OF-WAY		$0	$0	$0	$0	$0	$0
CONSTRUCTION		$0	$0	$0	$0	$0	$0
PROJECT COST		$0	$0	$0	$0	$0	$0
FEDERAL COST		$0	$0	$0	$0	$0	$0
STATE COST		$0	$0	$0	$0	$0	$0
LOCAL COST		$0	$0	$0	$0	$0	$0

Map:



Project Name: Signalization and Intersection Improvements on US 84 at Sandy Run **Project Description:** Signalization and intersection improvements on US 84 at Sandy Run		P.I. #:
		TIP #:2005-Q-1
		COUNTY: Liberty
		PROJ. #:
		FUND: TBD
		GDOT DISTRICT: 5
TRAFFIC VOL. 2006 ADT: 26,660	YEAR 2030: 33,000	CONG. DISTRICT: 1
NO. OF LANES EXISTING: 4	PLANNED:4	RDC: CGRDC
LOCAL ROAD #:	STATE/US ROAD #: US 84	LENGTH (MI): NA
COMMENTS/REMARKS: MPO desires to seek funds for Project.		

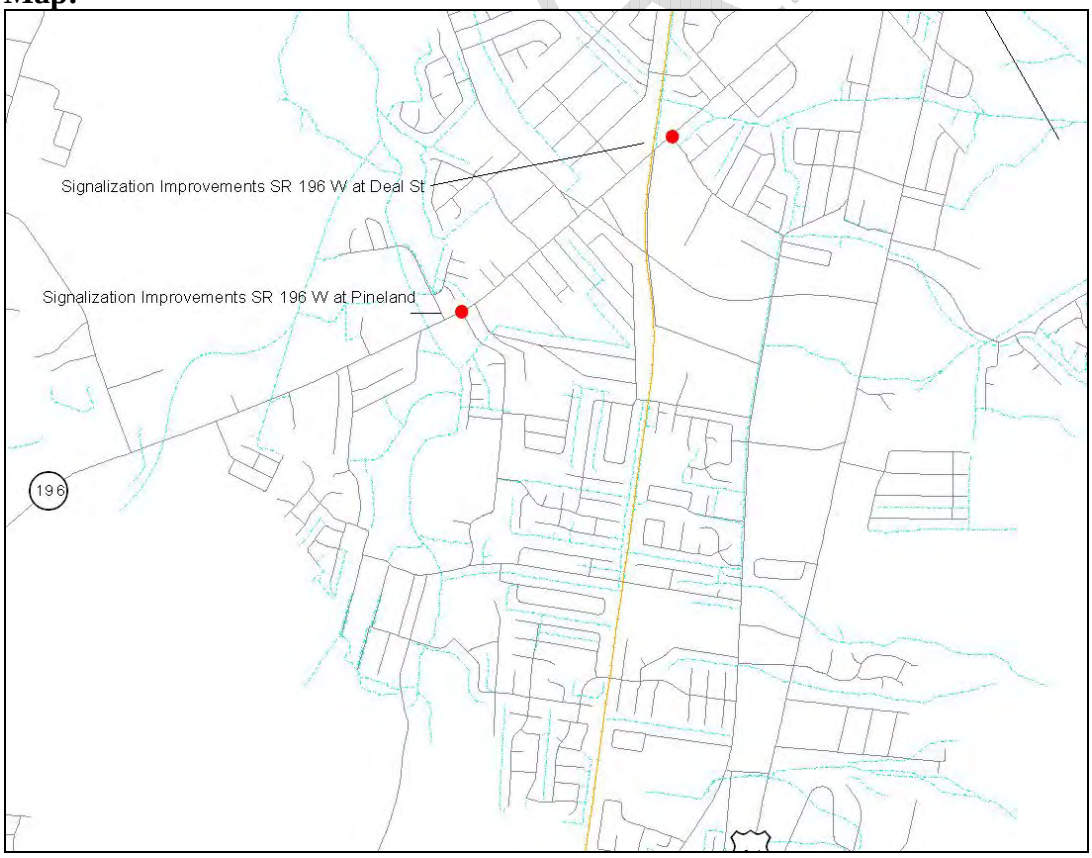
PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.		$0	$0	$0	$0	$0	$0
RIGHT-OF-WAY		$0	$0	$0	$0	$0	$0
CONSTRUCTION		$0	$0	$0	$0	$0	$0
PROJECT COST		$0	$0	$0	$0	$0	$0
FEDERAL COST		$0	$0	$0	$0	$0	$0
STATE COST		$0	$0	$0	$0	$0	$0
LOCAL COST		$0	$0	$0	$0	$0	$0

Map:

Project Name: Signalization and improvements for SR 196 W at Deal St. **Project Description:** Improve the intersection of SR 196 W at Deal St.		P.I. #:
		TIP #:2005-S-1
		COUNTY: Liberty
		PROJ. #:
		FUND: TBD
		GDOT DISTRICT: 5
TRAFFIC VOL. 2006 ADT:22,940	YEAR 2030: 26,990	CONG. DISTRICT: 1
NO. OF LANES EXISTING: 4	PLANNED:	RDC: CGRDC
LOCAL ROAD #:	STATE/US ROAD #: SR 196 W	LENGTH (MI): NA
COMMENTS/REMARKS: MPO desires to seek funds for Project.		

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.		$0	$0	$0	$0	$0	$0
RIGHT-OF-WAY		$0	$0	$0	$0	$0	$0
CONSTRUCTION		$0	$0	$0	$0	$0	$0
PROJECT COST		$0	$0	$0	$0	$0	$0
FEDERAL COST		$0	$0	$0	$0	$0	$0
STATE COST		$0	$0	$0	$0	$0	$0
LOCAL COST		$0	$0	$0	$0	$0	$0

Map:

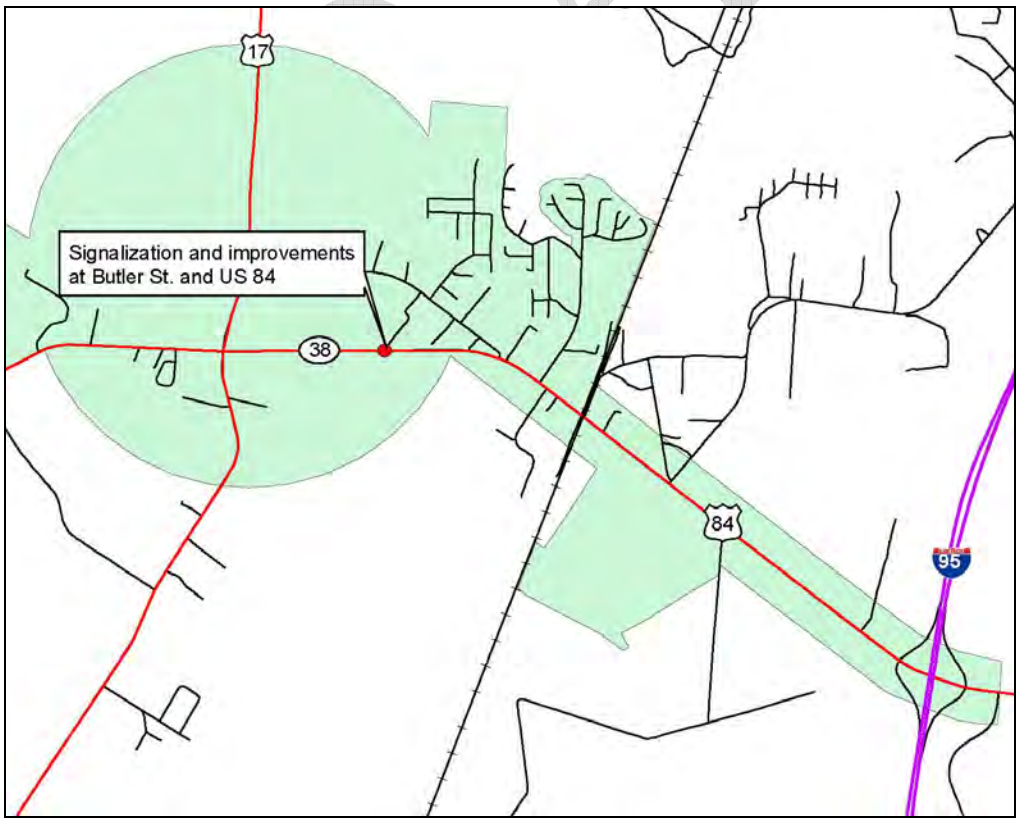


Project Name: Signalization and improvements for US 84 at Butler St. **Project Description:** Improve the intersection of US 84 W at Butler St.		P.I. #:
		TIP #:2005-T-1
		COUNTY: Liberty
		PROJ. #:
		FUND: TBD
		GDOT DISTRICT: 5
TRAFFIC VOL.	YEAR 2030:	CONG. DISTRICT: 1
NO. OF LANES EXISTING: 4	PLANNED:	RDC: CGRDC
LOCAL ROAD #:	STATE/US ROAD #: US 84	LENGTH (MI): NA

COMMENTS/REMARKS: MPO desires to seek funds for Project. This is an unfunded high priority project in the US 84 Corridor.

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.		$0	$0	$0	$0	$0	$0
RIGHT-OF-WAY		$0	$0	$0	$0	$0	$0
CONSTRUCTION		$0	$0	$0	$0	$0	$0
PROJECT COST		$0	$0	$0	$0	$0	$0
FEDERAL COST		$0	$0	$0	$0	$0	$0
STATE COST		$0	$0	$0	$0	$0	$0
LOCAL COST		$0	$0	$0	$0	$0	$0

Map:

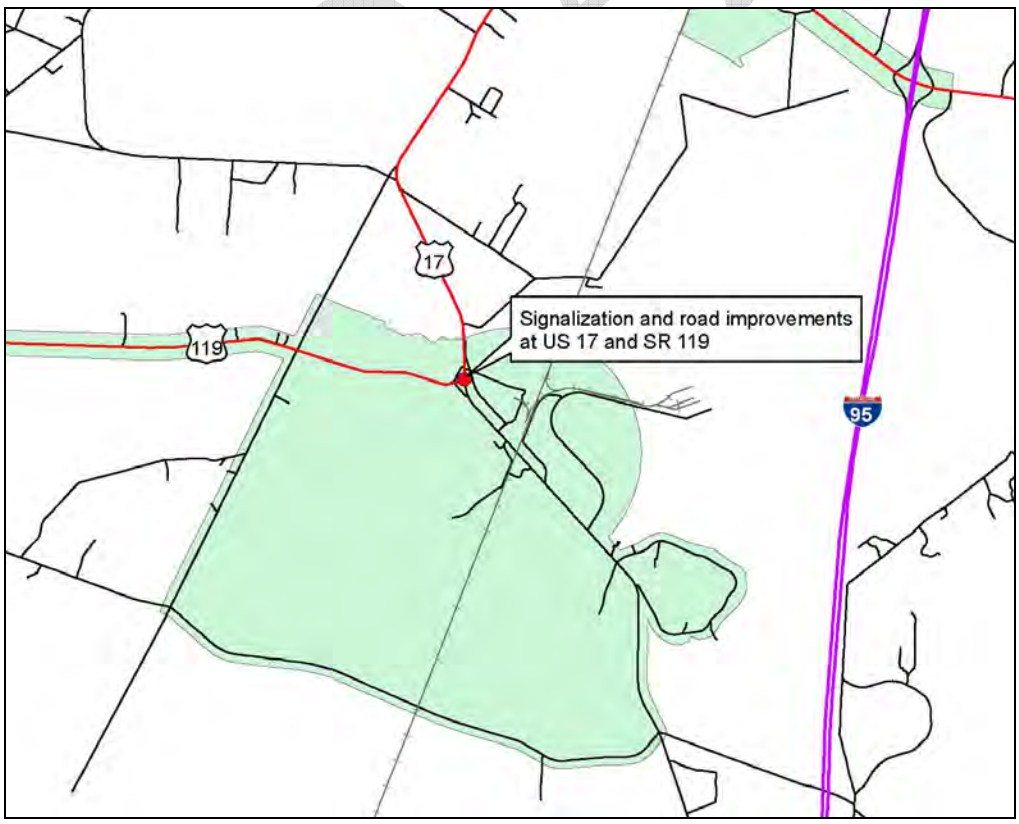


Project Name: Signalization and improvements for US 17 and SR 119 **Project Description:** Improve the intersection of US 17 and SR 119		P.I. #:
		TIP #:2005-U-1
		COUNTY: Liberty
		PROJ. #:
		FUND: TBD
		GDOT DISTRICT: 5
TRAFFIC VOL.	YEAR 2030:	CONG. DISTRICT: 1
NO. OF LANES EXISTING: 2	PLANNED:	RDC: CGRDC
LOCAL ROAD #:	STATE/US ROAD #: US 84 and US 17	LENGTH (MI): NA

COMMENTS/REMARKS: MPO desires to seek funds for Project. A portion of this improvement project includes the relocation and improvements of Chemtal Industrial Park entrance at a cost of $275,025 including PE and Construction. This expense is excluded from the calculations shown below and will be borne by Chemtal.

PROJECT PHASE	$ SOURCE	FY 2010	FY 2011	FY 2012	FY 2013	TIP TOTAL	PROJECT TOTAL
PRELIM. ENGR.	-	$0	$0	$0	$0	$0	$51,600
RIGHT-OF-WAY	-	$0	$0	$0	$0	$0	$12,500
CONSTRUCTION	-	$0	$0	$0	$0	$0	$450,000
PROJECT COST		$0	$0	$0	$0	$0	$514,100
FEDERAL COST		$0	$0	$0	$0	$0	$0
STATE COST		$0	$0	$0	$0	$0	$0
LOCAL COST		$0	$0	$0	$0	$0	$0

Map:



FY 2010 – 2013

FEDERAL AND STATE FUNDED

TRANSIT PROJECTS

DRAFT

FY 2010-2013 Capital Improvement Justification for Liberty Transit

The Hinesville Area Transit program as of this writing is scheduled to be operational by April 2010. The tables below include the programming of American Reinvestment and Recovery Act (ARRA) capital transit assistance as well as the use of Title 49 U.S.C. Section 5307 Urbanized Area Formula Program funds. The tables below show the Liberty Transit system costs.

Project Name: Capital Assistance Urban Transit

Project Description: American Recovery and Reinvestment Act (ARRA) and Section 5307 (Urban Capital) Expenses for the Liberty Transit system in Hinesville-Flemington-Fort Stewart

P.I. #:
TIP #: 2008-TR1
COUNTY: Liberty
PROJ. #:
FUND: ARRA, 49 USC 5307
GDOT DISTRICT: 5
CONG. DISTRICT: 1
RDC: CGRDC

COMMENTS/REMARKS:

$ SOURCE	CAPITAL ITEM / DESCRIPTION	UNIT COST	FY 2010	FY 2011	FY 2012	FY 2013	TOTAL
ARRA	24-passenger Transit Bus Vehicles (9)	$ 117,700	$ 1,059,300	$ -	$ -	$ -	$ 1,059,300
ARRA	Preventive Maintenance	NA	$ 6,300	$ -	$ -	$ -	$ 6,300
ARRA	Bus stop signage (50)	$ 35	$ 1,750	$ -	$ -	$ -	$ 1,750
ARRA	Mobility Management (planning studies)	NA	$ 200,000	$ -	$ -	$ -	$ 200,000
ARRA	Bus shelters (8)	NA	$ 80,000	$ -	$ -	$ -	$ 80,000
ARRA	Safety / Security (DriveCam cameras) (9)	$ 2,000	$ 18,000	$ -	$ -	$ -	$ 18,000
ARRA	Other capital items	NA	$ 28,876	$ 28,876	$ 28,876	$ 28,876	$ 115,502
ARRA	GPS - Automatic Location Devices System (9)	NA	$ 50,000	$ -	$ -	$ -	$ 50,000
ARRA	Operations and Maintenance Facility	$ 450,000	$ 450,000	$ -	$ -	$ -	$ 450,000
49 USC 5307	Preventive Maintenance	NA	$ 6,615	$ 6,946	$ 7,293	$ 7,658	$ 28,511
49 USC 5307	Mobility Management (planning studies)	NA	$ -	$ 40,000	$ 40,000	$ 40,000	$ 80,000
49 USC 5307	Support Equipment	NA	$ -	$ 1,000	$ 1,000	$ 1,000	$ 2,000
TOTAL COST OF PROJECTS			$ 1,900,841	$ 76,821	$ 77,169	$ 77,533	$ 2,091,363
FEDERAL COST			$ -	$ -	$ -	$ -	$ -
STATE COST			$ -	$ -	$ -	$ -	$ -
LOCAL COST			$ -	$ -	$ -	$ -	$ -

Project Name: Operations Assistance Schedule for Public Transit	P.I. #:
	TIP #: 2008-TR2
Project Description: Section 5307 (Urban Operating) Expenses for the Liberty Transit system in Hinesville-Flemington-FortStewart. Funding is estimated to provide for net operating costs.	COUNTY: Liberty
	PROJ. #:
	FUND: 49 USC 5307
	GDOT DISTRICT: 5
	CONG. DISTRICT: 1
	RDC: CGRDC

COMMENTS/REMARKS:

operations.

in the state. These funds will be requested by the City of Hinesville. Supplemental funding above the apportionment to the Hinesville Urbanized Area is not guaranteed.

3. Estimated operating revenue is excluded from operations cost estimates.

$ SOURCE	DESCRIPTION		FY 2010 [1,2]	FY 2011 [2]	FY 2012 [2]	FY 2013 [2]	TOTAL
49 USC 5307	Operations Assistance		$ 866,667	$ 1,365,000	$ 1,433,250	$ 1,504,913	$ 3,664,917
TOTAL COST OF PROJECTS [3]			$ 866,667	$ 1,365,000	$ 1,433,250	$ 1,504,913	$ 3,664,917
FEDERAL COST			$ 433,333	$ 682,500	$ 716,625	$ 752,456	$ 2,584,915
STATE COST			$ -	$ -	$ -	$ -	$ -
LOCAL COST			$ 433,333	$ 682,500	$ 716,625	$ 752,456	$ 2,584,915

DRAFT

FY 2010 – 2013

FEDERAL AND STATE FUNDED

AVIATION PROJECTS

***The following information is non-binding and for informational use only.**

DRAFT

State of Georgia
Department of Transportation
Aviation Programs

AIRPORT HISTORICAL CIP REPORT

10/2/2009

FORT STEWART(HINESVILLE) - WRIGHT AAF (FORT STEWART)/MIDCOAST RGNL

Fiscal Year	Description		Federal Cost	State Cost	Local Cost	Total Cost
2006						
	Rehabilitate Runway 6/24		$2,505,083	$659,232	$65,923	$3,230,238.00
		Annual Total:	**$2,505,083**	**$659,232**	**$65,923**	**$3,230,238**
2009						
	Rwy Ext Feasibility Study, ALP Update;Design Rehabilitsito		$128,697	$81,049	$29,274	$239,020.00
		Annual Total:	**$128,697**	**$81,049**	**$29,274**	**$239,020**
		Grand Total:	**$2,633,780**	**$740,281**	**$95,197**	**$3,469,258**

State of Georgia
Department of Transportation
Aviation Programs

AIRPORT CIP REPORT

10/2/2009

FORT STEWART(HINESVILLE) - WRIGHT AAF (FORT STEWART)/MIDCOAST RGNL

Fiscal Year	Description	Federal Cost	State Cost	Local Cost	Total Cost
2010					
	RUNWAY 15/33 AND TAXIWAY "B" REHABILITATION	$1,912,350	$50,325	$50,325	$2,013,000
	EA - RUNWAY 6/24 EXTENSION	$33,250	$875	$875	$35,000
	DESIGN - EXTENSION OF RUNWAY 6/24 AND AND TAXI	$223,250	$5,875	$5,875	$235,000
	2011 DBE PLAN UPDATE	$7,125	$188	$187	$7,500
	Annual Total:	**$2,175,975**	**$57,263**	**$57,262**	**$2,290,500**
2011					
	CONSTRUCT CORPORATE HANGARS (3)	$0	$0	$900,000	$900,000
	DESIGN - GA HANGAR PHASE 2 AND FENCING	$64,125	$1,688	$1,687	$67,500
	CONSTRUCT RUNWAY 6/24 1500' EXTENSION & PARTI	$5,237,350	$137,825	$137,825	$5,513,000
	2012 DBE PLAN UPDATE	$7,125	$188	$188	$7,500
	Annual Total:	**$5,308,600**	**$139,701**	**$1,039,700**	**$6,488,000**
2012					
	INSTALL SECURITY FENCING - PERIMETER	$760,000	$20,000	$20,000	$800,000
	2013 DBE PLAN UPDATE	$7,125	$188	$187	$7,500
	CONSTRUCT GA HANGARS - PHASE 2	$0	$0	$713,000	$713,000
	DESIGN - GLIDE SLOPE AND MALSR	$47,500	$1,250	$1,250	$50,000
	Annual Total:	**$814,625**	**$21,438**	**$734,437**	**$1,570,500**
2013					
	DESIGN - PARTIAL PARALLEL TAXIWAYFOR RUNWAY	$90,250	$2,375	$2,375	$95,000
	GLIDE SLOPE/LOCALIZER AND MALSF	$1,722,350	$45,325	$45,325	$1,813,000
	Annual Total:	**$1,812,600**	**$47,700**	**$47,700**	**$1,908,000**
2014					
	CONSTRUCT PARTIAL PARALLEL TAXIWAY FOR 15/33	$0	$984,750	$328,250	$1,313,000
	Annual Total:	**$0**	**$984,750**	**$328,250**	**$1,313,000**
	Grand Total:	**$10,111,800**	**$1,250,852**	**$2,207,349**	**$13,570,000**

APPENDIX A

PUBLIC INVOLVEMENT MATERIALS

Public Affairs

The following meetings are open to the public.

City of Allenhurst
Allenhurst City Council typically meets at 7:30 p.m. on the first Monday of the month. For information, call 876-2180.

City of Flemington
Flemington City Council typically meets at 4:30 p.m. on the second Tuesday of the month. For information, call 877-3223.

City of Gum Branch
Gum Branch City Council typically meets the third Monday of every month at 7:30 p.m. For information, call 876-5945.

City of Hinesville
Hinesville City Council typically meets at 1 p.m. on the first and third Thursdays of the month in the main council room on the second floor. For more information call 876-3564.

City of Ludowici
Ludowici City Council typically meets at 6 p.m. each second Tuesday at city hall. The meeting is open to the public.

City of Midway
Midway City Council typically meets at 6 p.m. on each second Monday of the month. City hall is open every Monday through Friday from 8 a.m. to 4 p.m. For information, call Gloria at 884-3344.

City of Riceboro
Riceboro City Council typically meets at 6 p.m. on the first Tuesday of the month. For information, call 884-2986.

City of Walthourville
Walthourville City Council typically meets at 6 p.m. on the second and fourth Thursday of the month. For information, call 368-7501.

Coastal Society of Human Resource Management
Coastal Society of Human Resource Management meets on the fourth Thursday of every month. If you are a human resource professional and would like to attend a meeting or receive more information, call Holly Stevens-Brown at 876-3564.

Hinesville Downtown Development Authority
The Hinesville Downtown Development Authority typically meets every fourth Thursday at 1 p.m. in the city hall council room. The public is welcome to attend to gain an understanding of the plans for Hinesville's downtown district. For more information, call Vicki Davis at 368-3473.

Hinesville Planning Committee
Hinesville Area Metropolitan Planning Commission Policy Committee typically meets on the second Thursday of even months at 10 a.m. in city hall. For information, call Brandon Wescott at 408-2030.

Liberty Consolidated Planning Commission

APPENDIX G

AIR QUALITY / AIR INVENTORY

3D Infantry Division (M)

2007 AIR EMISSIONS INVENTORY
FORT STEWART, GEORGIA

Prepared for:
Department of the Army
Headquarters 3rd Infantry Division (Mechanical) and Fort Stewart
Directorate of Public Works, Environmental Branch
Fort Stewart, GA 31314-4927

Prepared Under Contract With:
U.S. Army Corps of Engineers, Norfolk District
803 Front Street
Norfolk, VA 23510-1096
Contract Number: W91236-04-D-0083-0110

Prepared by:

Versar, Inc., GEOMET Division
20251 Century Blvd.
Germantown, MD 20874

March 2009

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LIST OF ABBREVIATIONS AND ACRONYMS

AAFES	Army and Air Force Exchange Service
AEI	Air Emissions Inventory
AFFF	aqueous film forming foam
AP-42	*Compilation of Air Pollutant Emission Factors – Volume 1*
AST	Aboveground Storage Tank
AQCR	Air Quality Control Region
atm	atmosphere(s)
bbl	barrel
Bldg.	Building
Btu	British thermal unit(s)
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CEP	Central Energy Plant
CFC	chlorofluorocarbon
CO	carbon monoxide
COCO	Contractor Owned Contractor Operated
CTG	cartridge
cuft	cubic foot
CY	calendar year
DCAS	Directorate of Community Activities and Services
DMMC	3rd Infantry Division
DODIC	Department of Defense Identification Code
DOL	Directorate of Logistics
DOR	Directorate of Readiness
DPW	Directorate of Public Works
EG	Emission Guideline
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
EPD	Environmental Protection Division
Eq.	Equation
°F	degrees Fahrenheit
FIRE	*Factor Information Retrieval System*, Version 6.2
ft	feet
ft^2	square feet
ft^3	cubic feet
g	gram(s)
gal	gallon(s)
GANG	Georgia Army National Guard
gmol	gram mole(s)
GOV	government-owned vehicles
gr	grain(s)
HAP	hazardous air pollutant
HCFC	hydrochlorofluorocarbon
HFC	hydrofluorocarbon
hp	horsepower
hr	hour(s)
HVAC	heating, venting, and air conditioning
HVLP	high volume-low pressure

IC	internal combustion
ID	identification
IWWTP	Industrial Wastewater Treatment Plant
JP-8	jet propellant no. 8 (jet fuel)
k	methane generation rate
°K	degrees Kelvin
kg	kilogram(s)
kW	kilowatt(s)
L	liter
lb	pound(s)
lb-mol	pound mole(s)
Lo	methane generation capacity
LPG	liquefied petroleum gas
m^3	cubic meter(s)
MACT	Maximum Achievable Control Technology
MATES	Mobilization and Training Equipment Site
Mg	Megagrams
MIBK	methyl isobutyl ketone
MIDAS	Munition Items Disposition Action System
min	minute
mm	millimeter
MM	million (in Table 14-1 MM is used to represent millimeters)
MMBtu	million British thermal units
mo	month
M&O	munitions and ordnance
MOGAS	motor gasoline
MSDS	material safety data sheet(s)
MTBE	methyl tert-butyl ether
NAAQS	national ambient air quality standards
NESHAP	national emission standard(s) for hazardous air pollutants
NEW	net explosive weight
NG	natural gas
NGTC	National Guard Training Center
NMTOC	non-methane total organic compounds
No.	Number
No. 2	distillate oil
NO_X	oxides of nitrogen
NSN	national stock number
NSPS	new source performance standards
OB	open burning
OD	open detonation
ODC	ozone depleting chemical
ODS	ozone depleting substance
%v	percent by volume
%w	percent by weight
oz	ounce
Pb	lead
PM	particulate matter
PM-2.5	particulate matter with an aerodynamic diameter less than 2.5 microns
PM-10	particulate matter with an aerodynamic diameter less than 10 microns
POC	point of contact

POM	polycyclic organic matter
POV	privately owned vehicles
ppmv	part(s) per million by volume
psi	pound(s) per square inch
psia	pound(s) per square inch, absolute
PTE	potential to emit
Ref	Reference
RFMSS	Range Facility Management Support System
°R	degrees Rankine
RVP	Reid vapor pressure
SCL	South Central Landfill
SG	specific gravity
SO_2	sulfur dioxide
SO_X	oxides of sulfur
TANKS4.0	storage tank emissions calculation software, version 4.0
THC	total hydrocarbons
TOC	total organic compounds
2,2,4-TMP	2,2,4-trimethylpentane
tpy	ton(s) per year
TSP	total suspended particulate matter
UST	underground storage tank
VOC	volatile organic compounds
WAAF	Wright Army Airfield
wk	week
WWTP	wastewater treatment plant
yr	year(s)
µm	micrometer

EXECUTIVE SUMMARY

Versar, Inc. (GEOMET Division) performed an air emission inventory for the year 2007 for Fort Stewart, Georgia. The US Army Corp of Engineers, Norfolk District, awarded the work. The emission inventory is an important tool that can be used to ensure that Fort Stewart's Title V permit is up to date, provides backup to fee payment determinations and can be used as a tool to help comply with air quality regulations.

With respect to environmental regulations, Fort Stewart is located in the Savannah-Beaufort Interstate Air Quality Control Region (AQCR), an area classified as attainment/unclassifiable for all national ambient air quality standards. In an attainment area a facility is considered a major source if its emissions of criteria pollutants (regulated pollutants under the Clean Air Act) exceed 100 tons per year (tpy). This definition may change if the attainment status of the region changes. The source can also become a major if any of the potential emissions of any individual regulated hazardous air pollutant (HAP) is more than 10 tpy or potential emissions of all HAP combined is more than 25 tpy. This inventory verified Fort Stewarts's status as a "major source" for criteria pollutants and for HAP.

Air emission estimates in this inventory are based on the data collected by Versar engineers during two visits that were conducted in the summer and early fall of 2008. Data was also obtained through telephone discussions and email. Emissions have been calculated for different air emission source categories that include Heating Units, Stationary Internal Combustion Engines, Engine Testing, Abrasive Blasting, Storage Tanks, Fueling Operations, Spray Painting Booths, Organic Solvent Cleaning Units, Miscellaneous Product Usage, Landfills, Wastewater Treatment, Prescribed Burning, Ordnance Detonation, Refrigerant Usage, Fire Fighter Training, and Wood Working. Emissions were calculated for criteria pollutants and HAP. Both actual and potential emissions have been estimated and included in this report. In addition, emissions of ozone depleting substances covered under Title VI of the Clean Air Act have been estimated. The following table presents the total (actual and potential) 2007 emissions for criteria pollutants and hazardous air pollutants for Fort Stewart.

Total Facility Wide Emissions* (Actual and Potential)
For the Year 2007

Emission Type	CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC	HAP
Actual (lb/yr)[a]	36,325	49,291	4,066	9,161	5,304	5,271	254,466	29,703
Actual (lb/yr)[b]	18,481,032	353,679	4,124	2,850,508	2,067,050	2,067,017	703,317	35,362
Actual (ton/yr)[a]	18.2	24.6	2.0	4.6	2.7	2.6	127.2	14.9
Actual (ton/yr)[b]	9,240.5	176.8	2.1	1,425.3	1,033.5	1,033.5	351.7	17.7
Potential (lb/yr)[c]	1,089,300	1,340,458	567,788	102,462	64,479	60,689	740,224	179,268
Potential (ton/yr)[c]	544.6	670.2	283.9	51.2	32.2	30.3	370.1	89.6

Table Notes:

* CO: Carbon Monoxide, NO_X: Oxides of Nitrogen (used to represent NO_2), SO_2: Sulfur Dioxide, PM: Particulate Matter, PM-10: Particulate Matter less than 10 microns, PM-2.5: Particulate Matter less than 2.5 microns, VOC: Volatile Organic Compounds (precursor for ozone formation), HAP: Hazardous Air Pollutant, Lead emissions are included under the HAP category.

[a] Total **without** Prescribed Burning and Ordnance Detonation.

[b] *Total **with** Prescribed Burning and Ordnance Detonation.*

[c] Totals **do not include** criteria pollutants from fugitive emission source categories- Prescribed Burning, Ordnance Detonation, Miscellaneous Product Usage, Wastewater Treatment, Fire Fighting Training Exercises, and Landfills without gas collection device(s). Emissions of criteria pollutants from these fugitive emission source categories are not included in installation-wide Title V potential-to-emit calculations. HAP emission totals reflect emissions from all source categories including the fugitive emission sources.

The pollutant emission rates from the fugitive emission source categories for prescribed burning and, to a much lesser degree, for ordnance detonation with respect to PM are many times/orders of magnitude greater than the emission rates from the point source emission categories. Therefore, relatively small year-to-year changes in these fugitive source categories (particularly prescribed burning) will greatly affect Fort Stewart's total annual emissions, even if the level of activity for all the other point source categories remains relatively consistent from year to year. As a result, for comparison purposes between years for the point source categories and with potential emissions, the actual emission totals are shown with and without ordnance detonation and prescribed burning.

If prescribed burning and ordnance detonation are not considered, the pollutant with the highest emission rate is VOC (127.2 tpy). NO_x had the next highest emission rate (24.6 tpy). All other pollutants had emission rates less than 20 tpy. If prescribed burning is considered, emission rates increase dramatically. For example, VOC emission rate becomes 351.7 tpy and several other pollutants exceed 1,000 tpy. Overall emissions in 2007 were lower than 2006 primarily because of increased use of natural gas at the Central Energy Plant over the use of oil and wood, reduced paint use, less gallons of gasoline dispensed, and less prescribed burning.

Potential emissions were highest for NO_X (670.2 tpy) and CO (544.6 tpy). Since these and the emission rates for VOC and SO_2 are above 100 tons per year, Fort Stewart continues to be a major source for criteria pollutants. Potential combined HAP emissions are estimated to be 89.6 tpy. Therefore, Fort Stewart also continues to be a major source for HAP. As a result, Fort Stewart must comply with Maximum Achievable Control Technology (MACT)/National Emissions Standards for Hazardous Air Pollutants (NESHAP) requirements that apply to major HAP sources.

1.0 INTRODUCTION

1.1 BACKGROUND

VERSAR Inc (GEOMET Division), under a contract through the US Army Corps of Engineers, Norfolk District, prepared an emission inventory update for Fort Stewart, Georgia for calendar year 2007. The scope of work included emission estimation for criteria pollutants and hazardous air pollutants (HAP) regulated under Title III of the Clean Air Act Amendments of 1990 (CAAA). The procedures for preparing the emission estimates, and emissions results for both actual and potential emissions are presented.

Results from the inventory provide emission source data that can be used to 1) determine the need for and provide the data for permits/permit update(s) (including Title V), 2) identify sources subject to air pollution control requirements, and 3) provide data that can be used to determine annual emission statement fees.

1.2 AIR PERMITTING STATUS

Fort Stewart is located in the Savannah-Beaufort Interstate Air Quality Control Region (AQCR), an area classified by the U.S. Environmental Protection Agency (EPA) as attainment/unclassifiable for all national ambient air quality standards (NAAQS) for all criteria pollutants. As per Clean Air Act requirements, a source having potential to emit more than 100 tons per year of any of the criteria pollutants is considered a major source. Sources can also become a major if the potential emissions for any single HAP exceed 10 tons per year or combined HAP exceeds 25 tons per year. Fort Stewart is a major source for criteria pollutants and HAP, and thus is subject to Title V permit requirements of the Clean Air Act. As a result, Fort Stewart has obtained a Title V permit.

1.3 METHODOLOGY

This emission inventory is based on the operations during calendar year 2007. The emissions have been estimated for all criteria pollutants and HAP, and are based on the operational data collected during the site visits by Versar. Engineers from Versar visited the installation during July and September of 2008. During the visits, information was obtained from source operators and managers. A list of the persons contacted is given in Table 1.0. Some of the information was obtained through follow-up telephone conversations and email. Other sources of information, such as a recent Title V renewal application and field reports of Versar engineers' monthly site visits, have been used to verify the information. A complete verification of air emission sources through a site inspection was not done, as this was beyond the scope of this effort.

Emissions have been calculated for different emission source categories, including Heating Units, Stationary Internal Combustion (IC) Engines, Engine Testing, Abrasive Blasting, Storage Tanks, Fueling Operations, Spray Painting Booths, Organic Solvent Cleaning Units,

Miscellaneous Product Usage, Landfills, Wastewater Treatment, Prescribed Burning, Ordnance Detonation, Refrigerant Usage, Fire Fighter Training, and Wood Working. Technical data for calculations, such as emission factors or variable values, have been taken from standard reference documents. A list of references has been provided at the end of this report in Section 19.0.

This 2007 update includes all the emission source categories that were included in the previous 2006 inventory.

TABLE 1.0
Points of Contact

Emission Source Category	Point of Contact (POC)	POC Organization	Data Description	Phone Number
Boilers & Heaters	Victoria Post	Griffin Services	DPW 2007 Boiler List	912-767-6828
	Robert Smith	GANG Maintenance	GANG Boiler Data	912-213-1225
	Robert Woods	J&J Maintenance, Hospital and Dental Clinics	Boiler Fuel Use	912-876-6030
	Billy Todd	GANG	GANG Natural Gas Use	912- 767-9731 or 912- 448-4053
	Denise Kelley	DPW	Fuel Oil Use (Except CEP)	912-767-5027
	David Montano	DPW Environmental	Fort Stewart Rolling Fuel Log (Includes CEP)	912-767-0250
	Randy Parks	CEP/Griffin Services	CEP Boiler Use	912-767-1676
Internal Combustion Engines	Victoria Post	Griffin Services	DPW 2007 Generator List	912-767-6828
	Robert Woods	J&J Maintenance, Hospital and Dental Clinics	Emergency Generator Use	912-876-6030
	Adam Seiler	Willbros Gov't Service	COCO Emergency Generator	912-876-6858
	Robert Smith	GANG Maintenance	Emergency Generator	912-213-1225
Engine Testing	Harry Sikes, Bobby Parker, and Jack Willson	Maint. Div. DOL	Engine Test Data	912-767-2113
Abrasive Blasting	Greg Upperman	Maint. Div. DOL	Blast Media, Bldg. 1170, 1065	912-767-8386
	Allan Deloach	DOL	Blast Media, Bldg. 1074	912-767-8352 or 2599
	CW5 Leslie Groover	GANG MATES	Abrasive Amount Used	912-448-4277
Fueling Operations & Storage Tanks	Debra Downs	AAFES/Victory Shoppette	Service Station Data/ Fuel Throughput	912-876-8434
	Mary Ann or Lavay Sphar	AAFES/Bryan Village Shoppette	Service Station Data/ Fuel Throughput	912-368-2237
	Denise Kelley	DPW	Fuel/Diesel Fuel Tanks (Except CEP)	912-767-5027
	Glen Golden	GANG Bldg. & Grounds	Fuel Throughput Bldg. 10511 (near Bldg. 10506)	912-448-4082
	Adam Seiler	Willbros Gov't Service	COCO Fuel Storage/Transfer/Dispensing	912-876-6858
	Greg Upperman	Maint. Div. DOL	Fuel Storage/Dispensing Bldg. 1175 & 1171	912-767-8386
	Sam Hunes	DPTMS Range Control (Chief Supply & Maintenance)	Storage Tanks/Fuel Use for Ranges	912- 435-8099

Emission Source Category	Point of Contact (POC)	POC Organization	Data Description	Phone Number
	Cheryl Noel	DPW	Forestry Fuel Use, Bldg. 8064	912-767-1002
	Jim Clapp	DOL	Diesel fuel usage at Bldg. 17003	912-435-0146 (Cell 912-320-5845)
	Craig Christopher	DPW	Off spec JP-8, Bldg. 1157	912-767-1234
	Steven Gordon	DPW	Fuel Dispensing/Storage at Bldg. 1412	912-767-8242
	Scott Tootle	GANG MATES	Fuel Dispensing /Storage at Bldg. 10522	912-767-5150
	Adrienne T. Freda	DPW Environmental	Golf Course Fuel Use	912-767-7921
	David Montano	DPW Environmental	Bldg 2902 Fuel Use Log	912-767-0250
	Randy Powell-Jones	DPW Environmental	List of Storage Tanks	912 767-3566
Spray Paint Booths	Allan Deloach	DOL	DOL Paint Use, Bldg. 1073	912-767-8352 or 2599
	SGT. Major Hall/ Lt. Boutwell	GANG	Paint Booth, Bldg. 10531	912-448-4282
	Victoria Post	Griffin Services	Verification Rregarding DPW Paint Booth	912-767-6828
	David Montano	DPW Environmental	Paint Logs (MILVAN, Tracks, Bldg. 1073, & 10531)	912-767-0250
Organic Solvent Cleaning Units	Various	Various	Building Walk Through Inspections	N/A
Miscellaneous Product Usage	Barbra Mize	DOL, Hazmart	Miscellaneous Chemical List	912-767-2950
	Mary Smiley	GANG	GANG Miscellaneous Chemical Use	912-448-4284
Landfills	Ron King	DPW Environmental	All Landfills / Capacity Reports	912-767-8880
Wastewater Treatment	Stanley Thomas	DPW Environmental	-	912 - 767-4139
	David Montano	DPW Environmental	Permitted Flows & Actual 2007 Flows	912-767-0250
Prescribed Burning	David Pope	DPW- Forestry Branch	Acres & Vegetation Burned (via email to David Montano)	912- 767-5184
Ordnance Detonation	Srgt. Mercer	38th Ord Co (EOD)	Explosive Ordnance Disposal	912- 767-0146
	James Pearson	Training Division Directorate of Plans, Training, Mobilization and Security	Ordnance Expended	912- 767-8679
	Brenda Higginbotham	Training Ammunition Manager	Ordnance Data	912-767-3888
Refrigerant Use	CW5 Leslie Groover	GANG MATES	Refrigerant Used	912-448-4277
	James Shepard	GANG MATES	Refrigerant Used	912-448-4301
	Robert Smith	GANG Maintenance	Refrigerant Used	912-213-1225
	Victoria Post	Griffin Services	DPW Refrigerant Used	912-767-6828
Fire Fighter Training	Jackie Goode / Johnny Driggers	Fire Prevention and Protection Division, DPS	Propane Used	912-767-7019
Woodworking	CW5 Leslie Groover	GANG MATES	GANG Carpentry Shop – Bldg 10501	912-448-4277
	Victoria Post	Griffin Services	DPW Carpentry Shop Bldg. 1105	912-767-6828
	Mike Croft	-	Carpentry Shop, Bldg. 1065	-

Emission Source Category	Point of Contact (POC)	POC Organization	Data Description	Phone Number
	Robert Smith	GANG Maintenance	Carpentry Shop, Bldg. 10504	912-213-1225
General Data	David Montano	DPW Environmental	Data Various Air Emission Sources	912-767-0250
	Adrienne T. Freda	DPW Environmental	Data Various Air Emission Sources	912-767-7921
	CW5 Leslie Groover	GANG MATES	GANG Various Emission Sources	912-448-4277
	Leroy Lott	MATES Org. Shop (Bldg. 10501	Data Various Air Emission Sources	912-448-4210

Emissions are reported for criteria pollutants [i.e., air pollutants for which air quality "criteria" have been established under Section 108 of the Clean Air Act (CAA)], HAP (as defined by Section 112 of the CAA), and ozone depleting substances, or ODS (as defined by Title VI of the CAA). Criteria pollutants include carbon monoxide (CO), lead, oxides of nitrogen (NO_x) (used to represent NO_2), particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM-10), particulate matter with an aerodynamic diameter less than or equal to 2.5 microns (PM-2.5) sulfur dioxide (SO_2), and ozone (O_3). Ozone is formed in the troposphere by the reaction of NO_x and volatile organic compounds (VOC) in sunlight; therefore, VOC emissions are reported as a surrogate for ozone.

Sources of emissions described in this report have been designated as "significant," "insignificant," or "trivial," as required by the Georgia EPD. Significant sources are capable of emitting substantial amounts of air pollution and must be described in detail in a Title V permit application. Insignificant sources are capable of emitting moderate amounts of air pollution and must be listed in a Title V permit application, but they do not need to be described in detail. Trivial sources are emission units and activities without specific applicable requirements and typically emit very small amounts of air pollution. Emissions from trivial sources must be included in potential-to-emit (PTE) estimates when determining whether a facility is a major source of air pollution. However, because a determination has already been made that Fort Stewart is a major source, trivial emissions were not quantified, and trivial sources are not discussed further in this report.

In addition, this inventory only includes stationary (including fugitive) sources. Mobile sources of air pollution [e.g., government-owned vehicles (GOV), privately-owned vehicles (POV), aerospace ground equipment (AGE), field ground equipment, and aircraft] are not included in the inventory.

Potential emissions from most source categories were determined. Title 40, Part 70.2 of the *Code of Federal Regulations* (40 CFR 70.2) defines potential to emit (PTE) as:

"*…the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of a source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design, if the limitation is enforceable by the Administrator…*"

The approach to preparing potential emission estimates for each source category is described in the appropriate section of the report.

1.4 FORMAT OF THE REPORT

Sections 2.0 through 17.0 present the emission estimates for each source category. Section 18.0 provides a summary of the results. This section includes a facility-wide rollup of actual and potential emissions for criteria pollutants and combined HAP from all source categories. References are given in Section 19.0.

Each of the source category sections is divided into three (3) subsections. The first subsection provides background information on the air emission sources. The second subsection describes how emissions were estimated for the source category (including sample calculations) and provides an emission summary. The emission summary shows the total actual and potential emissions specific to the source category. Any significant changes from the 2006 inventory are provided after the emissions summary. The final subsection provides the details and emissions of each individual source. Any emission factors used in the emission calculations are also provided in this section.

In Section 18, the facility-wide rollup for potential emissions shows all source categories. However, fugitive criteria emissions are not included in installation-wide Title V potential-to-emit calculations. As a result, potential emissions for the sources categories for prescribed burning, miscellaneous product usage, ordnance detonation, wastewater treatment, fire training exercises, and landfills (inactive landfills without gas collection devices) are not included in the facility-wide potential to emit totals.

2.0 HEATING UNITS

Title V Source Designation(s)

X Significant	*Heating units with heat inputs ≥10 MMBtu/hr firing natural gas and/or LPG*
	Heating units with heat inputs ≥5 MMBtu/hr firing distillate oil
	Heating units with heat inputs >1 MMBtu/hr firing fuels other than natural gas, LPG, or distillate oil
X Insignificant	*Heating units with heat inputs <10 MMBtu/hr firing natural gas and/or LPG*
	Heating units with heat inputs <5 MMBtu/hr firing distillate oil
	Heating units with heat inputs ≤1 MMBtu/hr
X Trivial	*Electric heating units and space heaters*

2.1 BACKGROUND

Fort Stewart operates and maintains over 2,000 heating units including boilers, water heaters, furnaces, space heaters, and heat pumps. Data regarding the heating equipment including, heat input capacities, fuel types, and annual fuel usage were obtained from organizations and point of contacts (POCs) shown earlier in Table 1.0. Table 2.1 in Section 2.3 provides a summary of heating fuel consumption data provided by the Fort Stewart POCs and Table 2.2 lists the heating sources identified that qualified as either significant or insignificant sources. Space heaters and electric heaters that qualify as trivial heating units were not included in the table or addressed in this report.

Heating on Fort Stewart is accomplished through the use of a Central Energy Plant (Bldg. 1412) and a distributed network of boilers and heaters. The Central Energy Plant (CEP) consists of four boilers. Two of the boilers (H010 and H011) are new, replacing boilers H002 and H003. Boiler H011 came on line very late in 2006. Boiler H010 installation was completed in 2007 and was operated for the first time in December of 2007. Three of the boilers are dual fired units using natural gas and No. 2 oil. The forth boiler (Unit ID H004-S) is a 140 MMBtu/hr boiler that burns wood/bark. In past years this boiler has provided the majority of the installation's heat (on a British thermal units [Btu] basis) however in 2007 this unit burned no wood. The wood fired boiler is also equipped with a Venturi scrubber. Air pollution control equipment is not installed on any of the other heating units on post. All the CEP boilers along with a 12 MMBtu/hr boiler (Unit ID H008-S) have been classified as significant heating units in Fort Stewarts Title V permit.

Natural gas and distillate oil (No. 2) are the fuels fired by the majority of the installation's distributed heating units. In addition there are a small number of units using liquefied petroleum gas (LPG/propane). The input capacities of the distributed boilers and heaters range from less than 0.3 MMBtu/hr up to 7.0 MMBtu/hr. Table 2.2 shown in Section 2.3, lists all the boilers

identified in 2007. Insignificant boilers with heat input capacities ranging from 1 to less than 10 MMBtu/hr have been assigned a unique Unit ID as shown in the Table. Units less than 1 MMBtu/hr have been grouped together based on heat input capacity and the type of fuel used. The units were further segregated based on whether they belonged to the Georgia Air National Guard (GANG) or Fort Stewart.

During 2007, Fort Stewart maintained logs that recorded the quantities of fuel used by the individual boilers at the CEP. In addition, there were post-wide fuel totals available for the distributed units. However, for a number of distributed units burning oil, records of fuel oil deliveries to storage tanks associated with a boiler/heater were used to estimate the heating unit's fuel consumption. For the remaining fuel oil boilers, facility wide fuel usage (minus fuel used by other sources) was assigned using a proportion based on individual unit input capacities.

With the exception of the post clinics (Bldg. 350, 440, and 2115), for the distributed natural gas and LPG fired boilers there was no fuel consumption data available by individual unit. To obtain fuel consumption for these units the facility wide gas/propane usage was proportioned based on individual unit or grouped unit capacities. The same approach was used to assign natural gas use to the GANG units using data obtained from monthly utility bills and compiled in the Fort Stewart rolling fuel log. For example, the calculation used to estimate the quantity of natural gas consumed in heating unit H104-S is presented below.

Unit/Equipment Identification (ID):	H104-S
Rated heat input capacity:	1.26 MMBtu/hr
Rated heat input of all natural gas heating units except those at the CEP, Clinics, and GANG units:	99.551 MMBtu/hr
Natural gas used in all heating units except those at the CEP, Clinics, and GANG units:	319,862,000 cuft

Fuel use = [(1.26 MMBtu/hr) / (99.551 MMBtu/hr)] * (319,862,000 cuft) * (1/1,000,000)
= 4.05 MMcuft

In the cases where a unit's fuel use was estimated rather than measured, there is some uncertainty concerning the actual emissions per heating unit. However, this methodology accurately estimates the aggregate emissions from these heating units. Fuel consumption data by Permit/Unit ID is shown in Section 2.3, Table 2.2.

Base specific information regarding heating values for the various fuels burned in the heating units was not available. Therefore, the following heating values have been used for the fuels burned at Fort Stewart [All values were obtained from AP-42 (Ref. 1)].

Natural Gas =1,020 Btu/ft^3 (AP-42, Section 1.4.1)
Distillate Oil (No.2 Fuel Oil) = 140,000 Btu/gal (AP-42, Section 1.3.4.3).
Liquid Petroleum Gas (LPG)/propane = 90,500 Btu/gal (AP-42, Section 1.5.1)
Wood /Bark = 4,500 Btu/lb* (AP-42, Section 1.6.1) (*only used for potential emission calculations in 2007)

2.2 EMISSION ESTIMATES

The method used to calculate actual and potential emissions is described below. Also provided is a summary of total emissions for all heating units.

Actual Emissions

Actual emissions were estimated by multiplying a unit's fuel usage by standard EPA emission factors. The emission factors used are presented in Section 2.3, Tables 2.7 through 2.10. For example, the calculation used to estimate CO emissions from the combustion of fuel oil by heating unit H101-S is presented below.

Unit/Equipment ID:	H101-S
Rated heat input:	2.25 MMBtu/hr
Type of fuel:	Fuel Oil No. 2
Quantity of fuel consumed:	1,827 gal/yr
CO emission factor:	5.0 lb/1,000 gal

Actual CO emissions = (1,827 gal/yr) * (5.0 lb/1000 gal)
= 9.14 lb/yr

The estimated criteria pollutant emissions from each heating unit are presented in Section 2.3, Table 2.2 and actual HAP emissions are presented in Tables 2.3 and 2.6.

Potential Emissions

The Title V permit base-wide limit to burn no more than 6.62 million gallons of liquid fuels (including No. 2 fuel oil, diesel fuel, JP-8, and used oil) was considered when determining potential fuel use for estimating potential emissions.

For the distributed heating units firing exclusively No. 2 fuel oil or exclusively natural gas, the potential emissions were estimated assuming each heating unit could operate on those fuels 24 hours per day, 365 days per year (i.e., 8,760 hours per year). The rated heat input capacity of each heating unit was divided by the heating value of the fuel and the resulting quotient was multiplied by 8,760 hr/yr to estimate maximum fuel consumption. However, for dual fuel fired heating units using No. 2 fuel oil and natural gas, the quantity of liquid fuel available was obtained after subtracting out (from the Title V limit of 6.62 million gallons) the sum of potential fuel used by 1) engine testing (JP-8), 2) IC engines (No. 2 fuel oil), and 3) No. 2 fuel fired boiler/heater units. The available potential fuel for dual fuel fired heating units was then distributed to the dual fired (natural gas & oil boilers) in the CEP and at Bldg, 350.

Because of permit limits on annual fuel use for the CEP boilers (422,566 gallons for H009-S and 280,000 gallons for H010 and H011 combined) Fort Stewart did not have the potential to reach the facility wide fuel oil limit of 6.62 million gallons. As a result it was not necessary to assign natural gas use to the non-CEP dual fired boilers and thus their potential emissions were based on fuel oil combustion only. The following summarizes the methodology to assign potential fuel use to the individual CEP boilers.

- Old Boilers H002-S and H003-S (Oil and Natural Gas), have been replaced are no longer included in the inventory.
- H004–S (Wood/Bark Fired), no wood burned in 2007, but boiler still exists. Thus potential wood consumption was based on 8,760 hours of boiler operation.
- H009-S (Oil & Natural Gas), in service for all of 2007. Potentials fuel use was based on the boiler's permit limit of 442,566 gallons per year. Based on a maximum fuel firing rate of 395 gal per hour the boiler would operate 1,120 hours per year. The number of hours the boiler could operate on No. 2 fuel oil was then subtracted from the 8,760 hours to establish the number of hours that the unit could operated on natural gas. The result was used to determine potential natural gas consumption.
- H010-S and H011 (Oil & Natural Gas), installation completed in 2007 for H010 (fist use was December 2007). H011 was used operationally for all of 2007. The total combined fuel use limit for H010 and H011 is 280,000 gallons for fuel oil No. 2 and 80 million cubic feet for natural gas. These limits were divided evenly between the two units for the purpose of assigning potential fuel use.

The potential quantity of fuel consumed was multiplied by the appropriate emission factor to estimate potential emissions. For example, the calculation used to estimate potential CO emissions from the combustion of wood/bark in heating unit H004-S is presented below.

Unit ID:	H004-S
Rated heat input capacity:	140 MMBtu/hr
Type of fuel:	Wood/bark
Fuel heating value:	4,500 Btu/lb [9.00 MMBtu/ton]
Potential hours of operation:	8,760 hr/yr
CO emission factor:	0.6 lb/MMBtu

Emission factor (lb/ton) = (0.6 lb/10^6btu) * [(4,500 Btu/lb * 2,000 lb/ton) /10^6]
= 5.4 lb/ton

Potential wood use = (140 MMBtu/hr) * (1 ton/9 MMBtu) * (8,760 hr/yr)
= 136,266.67 ton/yr

Potential CO emissions = (136,266.67 ton/yr) * (5.4 lb/ton)
= 735,840 lb/yr

The estimated potential pollutant emissions from each heating unit are presented in Section 2.3, Tables 2.4, 2.5 and 2.6.

Emissions Summary

Table 2.0 below indicates the total emissions of criteria pollutants and combined HAP from heating units at Fort Stewart.

TABLE 2.0
Emissions Summary* – Heating Units

Emission Type	CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC	HAP
Actual Emissions (lb/yr)	35,326.37	44,809.23	3,763.22	969.59	924.76	910.99	2,462.15	827.95
Actual Emissions (ton/yr)	17.66	22.40	1.88	0.48	0.46	0.46	1.23	0.41
Potential Emissions (lb/yr)	905,331.69	532,681.21	491,092.75	15,657.39	13,107.78	11,736.59	33,597.52	52,008.95
Potential Emissions (ton/yr)	452.67	266.34	245.55	7.83	6.55	5.87	16.80	26.00

* Criteria pollutant lead is also a HAP and thus is included under the HAP category.

Emission Source Updates

The following updates were made from the 2006 inventory.

Central Energy Plant:

- Deleted Unit ID H003-S. Unit ID H003-S and H002-S (removed in 2006 inventory) have been replaced by Unit ID H010-S and H011-S. Also in 2007 the wood fired boiler (Unit ID H-004-S) was not used.

Fort Stewart Distributed Boilers:

- Deleted H110-S (Bldg. 1056): Building was demolished.
- Added H163-S, (Bldg. 3003: 1.12 MMBtu/hr natural gas water heater.
- Added H164-S and H-165-S (Bldg. 3010 and 3011): 1.02 MMBtu/hr natural gas boilers.
- Added H166-S and H-167-S (Bldg. 7500): 2.0 MMBtu/hr natural gas boilers.
- Included emissions for H153-S through H159-S (New Barracks*): 1.02 MMBtu/hr natural gas boilers

  *: Units were installed in mid/late 2006 & Barracks were mainly unoccupied until late 2006 and early 2007. No emissions were accounted for in 2006 but they are now included in the 2007 inventory.

- H201-S, H202-S, H203-S (Post-wide Boiler Groups): Updated number of units in each group and total combined capacity. Group H203-S was updated with a JP-8 fired steam cleaner located at Building 1171. Group H201-S updates included a steam cleaner at Building 1065.

GANG Distributed Boilers:

- No updates for 2007.

2.3 DETAILED SOURCE AND EMISSIONS TABLES

Table 2.1 provides an overview of base wide fuel consumption; Tables 2.2 through 2.6 provide heater/boiler details and a breakdown of emissions by individual heating unit. Emission factors used in determining emissions are given in Tables 2.7 through 2.10.

TABLE 2.1
Summary of Base-Wide Fuel Consumption for CY2007

Location	Natural Gas (cubic feet)	No. 2 Fuel Oil (gallons)	LPG (gallons)	Wood (tons)
CEP	81,431,770	3,339	-	0
GANG	26,149,000 [b]	-	-	-
Bldg. 350	2,729,000	0	-	-
Bldg. 440	86,570	-	-	-
Bldg. 2115	84,110	-	-	-
Post-wide[a]	319,862,000	49,613	78,180	-

[a] All sources post-wide, excluding CEP, GANG, and Buildings 350, 440, and 2115.
[b] Total gas use given on Fort Stewart rolling fuel log.

TABLE 2.2
Source Details and Actual Criteria Pollutant Emissions for Heating Units

Unit ID	Building Number	Maximum Capacity (MMBtu/hr)	Fuel Type	Estimated Annual Fuel Use	Units of Fuel Usage	Actual Emissions (lb/yr)						
						CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
H004-S[a]	1412	140.00	Wood	0	lb	0	0	0	0	0	0	0
			No. 2 Oil	0	gal	0	0	0	0	0	0	0
			NG	0	MMcuft	0	0	0	0	0	0	0
H008-S[a]	350	12.00	No. 2 Oil	0	gal	0	0	0	0	0	0	0
			NG	1.72	MMcuft	144.78	172.36	1.03	3.27	3.27	3.27	9.48
H009-S[a]	1412	55.30	No. 2 Oil	0	gal	0	0	0	0	0	0	0
			NG	50.01	MMcuft	4,200.97	5,001.16	30.01	95.02	95.02	95.02	275.06
H010-S[a]	1412	55.30	No. 2 Oil	729	gal	3.65	14.58	51.76	1.46	0.729	0.182	0.248
			NG	0.068	MMcuft	5.71	6.80	0.041	0.129	0.129	0.129	0.374
H011-S[a]	1412	55.30	No. 2 Oil	2,610	gal	13.05	52.20	185.31	5.22	2.61	0.65	0.89
			NG	31.352	MMcuft	2,633.58	3,135.22	18.81	59.57	59.57	59.57	172.44
H101-S	1	2.25	No. 2 Oil	1,827	gal	9.14	36.55	129.75	3.65	1.97	1.517	0.621
H103-S	350	7.00	NG	1.01	MMcuft	84.46	100.54	0.603	1.910	1.910	1.910	5.53
H104-S	403	1.26	NG	4.05	MMcuft	340.07	404.85	2.43	7.69	7.69	7.69	22.27
H105-S	419	1.38	No. 2 Oil	12,316	gal	61.58	246.33	874.46	24.63	13.30	10.22	4.19
H106-S	421	1.83	NG	5.88	MMcuft	493.91	587.99	3.53	11.17	11.17	11.17	32.34
H114-S	1073	2.75	NG	8.84	MMcuft	742.22	883.59	5.30	16.79	16.79	16.79	48.60
H115-S	1205	1.00	NG	3.21	MMcuft	269.90	321.31	1.93	6.10	6.10	6.10	17.67
H116-S	1245	1.51	No. 2 Oil	4,836	gal	24.18	96.73	343.38	9.67	5.22	4.01	1.64
H117-S	1630	2.00	No. 2 Oil	2,916	gal	14.58	58.32	207.04	5.83	3.15	2.42	0.991
H118-S	4950	1.48	NG	4.75	MMcuft	398.91	474.89	2.85	9.02	9.02	9.02	26.12
H120-S	19104	2.16	No. 2 Oil	4,481	gal	22.41	89.63	318.18	8.96	4.84	3.72	1.52
H121-S	19225	1.20	No. 2 Oil	4,266	gal	21.33	85.32	302.89	8.53	4.61	3.54	1.45
H125-S	100A	1.26	NG	4.05	MMcuft	340.07	404.85	2.43	7.69	7.69	7.69	22.27

Unit ID	Building Number	Maximum Capacity (MMBtu/hr)	Fuel Type	Estimated Annual Fuel Use	Units of Fuel Usage	Actual Emissions (lb/yr)						
						CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
H126-S	100A	1.26	NG	4.05	MMcuft	340.07	404.85	2.43	7.69	7.69	7.69	22.27
H127-S	439	1.47	NG	4.71	MMcuft	395.94	471.36	2.83	8.96	8.96	8.96	25.92
H128-S	1160	1.50	NG	4.82	MMcuft	404.85	481.96	2.89	9.16	9.16	9.16	26.51
H129-S	1160	1.50	NG	4.82	MMcuft	404.85	481.96	2.89	9.16	9.16	9.16	26.51
H130-S	1215	1.08	NG	3.47	MMcuft	291.49	347.01	2.08	6.59	6.59	6.59	19.09
H131-S	1220	1.00	NG	3.21	MMcuft	269.90	321.31	1.93	6.10	6.10	6.10	17.67
H132-S	1320	2.00	NG	6.43	MMcuft	539.79	642.61	3.86	12.21	12.21	12.21	35.34
H133-S	1320	1.70	NG	5.46	MMcuft	458.82	546.22	3.28	10.38	10.38	10.38	30.04
H134-S	1509	1.70	NG	5.46	MMcuft	458.82	546.22	3.28	10.38	10.38	10.38	30.04
H135-S	1509	1.70	NG	5.46	MMcuft	458.82	546.22	3.28	10.38	10.38	10.38	30.04
H136-S	1720	1.70	NG	5.46	MMcuft	458.82	546.22	3.28	10.38	10.38	10.38	30.04
H137-S	1720	2.00	NG	6.43	MMcuft	539.79	642.61	3.86	12.21	12.21	12.21	35.34
H138-S	4502	1.70	NG	5.46	MMcuft	458.82	546.22	3.28	10.38	10.38	10.38	30.04
H139-S	4502	1.70	NG	5.46	MMcuft	458.82	546.22	3.28	10.38	10.38	10.38	30.04
H140-S	4577	1.70	NG	5.46	MMcuft	458.82	546.22	3.28	10.38	10.38	10.38	30.04
H141-S	4577	1.74	NG	5.59	MMcuft	469.62	559.07	3.35	10.62	10.62	10.62	30.75
H142-S	4578	1.70	NG	5.46	MMcuft	458.82	546.22	3.28	10.38	10.38	10.38	30.04
H143-S	7704	1.01	No. 2 Oil	3,741	gal	18.71	74.82	265.61	7.48	4.04	3.11	1.27
H145-S	1340	1.00	NG	3.21	MMcuft	269.90	321.31	1.93	6.10	6.10	6.10	17.67
H146-S	1509	1.00	NG	3.21	MMcuft	269.90	321.31	1.93	6.10	6.10	6.10	17.67
H147-S	1510	1.00	NG	3.21	MMcuft	269.90	321.31	1.93	6.10	6.10	6.10	17.67
H148-S	1620	1.00	NG	3.21	MMcuft	269.90	321.31	1.93	6.10	6.10	6.10	17.67
H149-S	2916	1.29	NG	4.14	MMcuft	347.90	414.16	2.48	7.87	7.87	7.87	22.78
H150-S	10531	2.54	NG	8.16	MMcuft	685.54	816.12	4.90	15.51	15.51	15.51	44.89
H151-S	5602	1.13	NG	3.64	MMcuft	305.52	363.72	2.18	6.91	6.91	6.91	20.00
H152-S	HQ C&C	1.83	NG	5.87	MMcuft	493.10	587.03	3.52	11.15	11.15	11.15	32.29

Unit ID	Building Number	Maximum Capacity (MMBtu/hr)	Fuel Type	Estimated Annual Fuel Use	Units of Fuel Usage	Actual Emissions (lb/yr)						
						CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
	Center											
H153-S	3004	1.02	NG	3.28	MMcuft	275.29	327.73	1.97	6.23	6.23	6.23	18.03
H154-S	3005	1.02	NG	3.28	MMcuft	275.29	327.73	1.97	6.23	6.23	6.23	18.03
H155-S	3006	1.02	NG	3.28	MMcuft	275.29	327.73	1.97	6.23	6.23	6.23	18.03
H156-S	3007	1.02	NG	3.28	MMcuft	275.29	327.73	1.97	6.23	6.23	6.23	18.03
H157-S	3008	1.02	NG	3.28	MMcuft	275.29	327.73	1.97	6.23	6.23	6.23	18.03
H158-S	3009	1.02	NG	3.28	MMcuft	275.29	327.73	1.97	6.23	6.23	6.23	18.03
H159-S	3012	1.02	NG	3.28	MMcuft	275.29	327.73	1.97	6.23	6.23	6.23	18.03
H160-S	DFAC	1.13	NG	3.61	MMcuft	303.63	361.47	2.17	6.87	6.87	6.87	19.88
H162-S	1540	1.00	NG	3.21	MMcuft	269.90	321.31	1.93	6.10	6.10	6.10	17.67
H163-S	3003	1.12	NG	3.60	MMCUFT	302.28	359.86	2.16	6.84	6.84	6.84	19.79
H164-S	3010	1.02	NG	3.28	MMCUFT	275.29	327.73	1.97	6.23	6.23	6.23	18.03
H165-S	3011	1.02	NG	3.28	MMCUFT	275.29	327.73	1.97	6.23	6.23	6.23	18.03
H166-S	7560	2.00	NG	6.43	MMCUFT	539.79	642.61	3.86	12.21	12.21	12.21	35.34
H167-S	7560	2.00	NG	6.43	MMCUFT	539.79	642.61	3.86	12.21	12.21	12.21	35.34
H201-S	POST WIDE (0.3-<1)	29.27	NG	94.14	MMcuft	7,907.52	9,413.71	56.48	178.86	178.86	178.86	517.75
H202-S	POST WIDE (<0.3)	6.34	NG	20.46	MMcuft	818.36	1,923.14	12.28	38.87	38.87	38.87	112.52
H203-S	POST WIDE (0.3-<1)	5.50	No. 2 Oil	10,706	gal	53.53	214.11	760.10	21.41	11.56	8.89	3.64
H204-S	POST WIDE (<0.3)	0.68	No. 2 Oil	878	gal	4.39	15.80	62.33	0.35	0.35	0.35	0.626
H205-S	POST WIDE (0.3-<1)	1.42	LPG	51,065	gal	382.99	663.85	2.76	35.75	35.75	35.75	51.07
H206-S	POST WIDE (<0.3)	0.75	LPG	27,115	gal	203.36	352.49	1.46	18.98	18.98	18.98	27.11
H208-S	GANG-9100 (<0.3)	1.54	NG	0.489	MMcuft	19.55	45.95	0.293	0.929	0.929	0.929	2.69

Unit ID	Building Number	Maximum Capacity (MMBtu/hr)	Fuel Type	Estimated Annual Fuel Use	Units of Fuel Usage	Actual Emissions (lb/yr)						
						CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
	GANG- 9100 (0.3-<1)	1.94	NG	0.614	MMcuft	51.61	61.44	0.369	1.17	1.17	1.17	3.38
H209-S	GANG-9500 (<0.3)	2.74	NG	0.869	MMcuft	34.77	81.72	0.522	1.65	1.65	1.65	4.78
H210-S	GANG-9900 (<0.3)	2.89	NG	0.917	MMcuft	36.66	86.15	0.550	1.74	1.74	1.74	5.04
H211-S	GANG-10100 (<0.3)	1.87	NG	0.592	MMcuft	23.70	55.69	0.355	1.13	1.13	1.13	3.26
	GANG-10100 (0.3-<1.0)	3.60	NG	1.14	MMcuft	95.92	114.19	0.685	2.17	2.17	2.17	6.28
H212-S	GANG-10200 (<0.3)	2.27	NG	0.721	MMcuft	28.84	67.78	0.433	1.37	1.37	1.37	3.97
	GANG-10200 (0.3 - <1.0)	3.60	NG	1.142	MMcuft	95.92	114.19	0.685	2.17	2.17	2.17	6.28
H213-S	GANG-10300 (<0.3)	1.79	NG	0.567	MMcuft	22.68	53.31	0.340	1.08	1.08	1.08	3.12
	GANG-10300 (0.3 -<1.0)	3.60	NG	1.14	MMcuft	95.92	114.19	0.685	2.17	2.17	2.17	6.28
H214-S	GANG-10500 (<0.3)	2.54	NG	0.806	MMcuft	32.23	75.73	0.483	1.53	1.53	1.53	4.43
H215-S	GANG-12700 (<0.3)	1.94	NG	0.615	MMcuft	24.60	57.81	0.369	1.17	1.17	1.17	3.38
H216-S	GANG-12900 (<0.3)	6.51	NG	2.07	MMcuft	82.61	194.15	1.24	3.92	3.92	3.92	11.36
	GANG-12900 (0.3 to <1.0)	5.60	NG	1.78	MMcuft	149.20	177.62	1.07	3.37	3.37	3.37	9.77
H217-S	GANG-13100 (<0.3)	7.29	NG	2.31	MMcuft	92.55	217.49	1.39	4.40	4.40	4.40	12.73
	GANG-13100 (0.3 to<1.0)	4.40	NG	1.40	MMcuft	117.23	139.56	0.837	2.65	2.65	2.65	7.68
H218-S	GANG-13300 (<0.3)	5.87	NG	1.86	MMcuft	74.48	175.03	1.12	3.54	3.54	3.54	10.24
	GANG-13300 (0.3 to<1.0)	5.60	NG	1.78	MMcuft	149.20	177.62	1.07	3.37	3.37	3.37	9.77
H219-S	GANG-13400	3.73	NG	1.18	MMcuft	47.30	111.15	0.709	2.25	2.25	2.25	6.50

Unit ID	Building Number	Maximum Capacity (MMBtu/hr)	Fuel Type	Estimated Annual Fuel Use	Units of Fuel Usage	Actual Emissions (lb/yr)						
						CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
	(<0.3)											
H220-S	GANG-13500 (<0.2)	10.40	NG	3.30	MMcuft	131.95	310.08	1.98	6.27	6.27	6.27	18.14
H221-S	GANG - 9300 (< 0.3)	0.20	NG	0.063	MMcuft	2.52	5.93	0.038	0.120	0.120	0.120	0.347
H222-S	GANG - 9700 (<0.3)	2.52	NG	0.799	MMcuft	31.97	75.13	0.480	1.52	1.52	1.52	4.40
Total (lb/yr)						**35,326.37**	**44,809.23**	**3,763.22**	**969.59**	**924.76**	**910.99**	**2,462.15**
Total (ton/yr)						**17.66**	**22.40**	**1.88**	**0.48**	**0.46**	**0.46**	**1.23**

[a] Significant Boiler, NG = Natural Gas
Unit IDs in italics are new.

TABLE 2.3
Actual Emissions of Hazardous Air Pollutants for Heating Units

Unit ID	Building. No.	Fuel Type	Arsenic	Benzene	Beryllium	Cadmium	Chromium	Cobalt	Copper	Dichlorobenzene	Formaldehyde	Hexane	Manganese	Mercury	Naphthalene	Nickel	POM	Selenium	Toluene	Zinc	Lead
H004-S[a]	1412	Wood[b]	0	0	-	0	0	0	0	-	0	-	0	0	0	0	-	0	0	0	0
		No. 2 Oil	0	-	0	0	0	-	0	-	0	-	0	0	-	0	0	0	-	0	-
		NG	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
H008-S[a]	350	No. 2 Oil	0	-	0	0	0	-	0	-	0	-	0	0	-	0	0	0	-	0	0
		NG	3.4E-04	0.004	0.000	0.002	0.002	1.4E-04	-	0.002	0.129	3.102	6.5E-04	4.5E-04	0.001	0.004	1.5E-04	4.1E-05	0.006	0.050	8.6E-04
H009-S[a]	1412	No. 2 Oil	0	-	0	0	0	-	0	-	0	-	0	0	-	0	0	0	-	0	0
		NG	0.010	0.105	0.001	0.055	0.070	0.004	-	0.060	3.751	90.02	0.019	0.013	0.031	0.105	0.004	0.001	0.170	1.450	0.025
H010-S[a]	1412	No. 2 Oil	0	-	0	0	0	-	0	-	0	-	0	0	-	0	0	0	-	0	0
		NG	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
H011-S[a]	1412	No. 2 Oil	1.5E-03	-	0.001	0.001	0.002	-	0.002	-	0.125	-	0.002	0.001	-	0.001	0.009	0.005	-	0.001	0.003
		NG	0.006	0.066	3.8E-04	0.034	0.044	0.003	-	0.038	2.351	56.434	0.012	0.008	0.019	0.066	0.003	7.5E-04	0.107	0.909	0.016
H101-S	1	No. 2 Oil	0.001	-	7.7E-04	7.7E-04	7.7E-04	-	0.002	-	0.088	-	0.002	7.7E-04	-	7.7E-04	8.4E-07	0.004	-	0.001	0.002
H103-S	350	NG	2.0E-04	0.002	1.2E-05	0.001	0.001	8.4E-05	-	0.001	0.075	1.810	3.8E-04	2.6E-04	6.1E-04	0.002	8.8E-05	2.4E-05	0.003	0.029	5.0E-04
H104-S	403	NG	8.1E-04	0.009	4.9E-05	0.004	0.006	3.4E-04	-	0.005	0.304	7.29	0.002	0.001	0.002	0.009	3.6E-04	9.7E-05	0.014	0.117	0.002
H105-S	419	No. 2 Oil	0.007	-	0.005	0.005	0.005	-	0.010	-	0.591	-	0.010	0.005	-	0.005	5.7E-06	0.026	-	0.007	0.016
H106-S	421	NG	1.2E-03	0.012	7.1E-05	0.006	0.008	4.9E-04	-	0.007	0.441	10.58	0.002	0.002	0.004	0.012	5.2E-04	1.4E-04	0.020	0.171	0.003
H114-S	1073	NG	0.002	0.019	1.1E-04	0.010	0.012	7.4E-04	-	0.011	0.663	15.90	0.003	0.002	0.005	0.019	7.8E-04	2.1E-04	0.030	0.256	0.004
H115-S	1205	NG	6.4E-04	0.007	3.9E-05	0.004	0.004	2.7E-04	-	0.004	0.241	5.78	0.001	0.001	0.002	0.007	2.8E-04	7.7E-05	0.011	0.093	0.002
H116-S	1245	No. 2 Oil	0.003	-	0.002	0.002	0.002	-	0.004	-	0.232	-	0.004	0.002	-	0.002	2.2E-06	0.010	-	0.003	0.006
H117-S	1630	No. 2 Oil	0.002	-	0.001	0.001	0.001	-	0.002	-	0.140	-	0.002	0.001	-	0.001	1.3E-06	0.006	-	0.002	0.004
H118-S	4950	NG	9.5E-04	0.010	5.7E-05	0.005	0.007	4.0E-04	-	0.006	0.356	8.55	0.002	0.001	0.003	0.010	4.2E-04	1.1E-04	0.016	0.138	0.002
H120-S	19104	No. 2 Oil	0.003	-	0.002	0.002	0.002	-	0.004	-	0.215	-	0.004	0.002	-	0.002	2.1E-06	0.009	-	0.003	0.006
H121-S	19225	No. 2 Oil	0.002	-	0.002	0.002	0.002	-	0.004	-	0.205	-	0.004	0.002	-	0.002	2.0E-06	0.009	-	0.002	0.005

Unit ID	Building. No.	Fuel Type	Arsenic	Benzene	Beryllium	Cadmium	Chromium	Cobalt	Copper	Dichlorobenzene	Formaldehyde	Hexane	Manganese	Mercury	Naphthalene	Nickel	POM	Selenium	Toluene	Zinc	Lead
H125-S	100A	NG	8.1E-04	0.009	4.9E-05	0.004	0.006	3.4E-04	-	0.005	0.304	7.29	0.002	0.001	0.002	0.009	3.6E-04	9.7E-05	0.014	0.117	0.002
H126-S	100A	NG	8.1E-04	0.009	4.9E-05	0.004	0.006	3.4E-04	-	0.005	0.304	7.29	0.002	0.001	0.002	0.009	3.6E-04	9.7E-05	0.014	0.117	0.002
H127-S	439	NG	9.4E-04	0.010	5.7E-05	0.005	0.007	4.0E-04	-	0.006	0.354	8.48	0.002	0.001	0.003	0.010	4.1E-04	1.1E-04	0.016	0.137	0.002
H128-S	1160	NG	9.6E-04	0.010	5.8E-05	0.005	0.007	4.0E-04	-	0.006	0.361	8.68	0.002	0.001	0.003	0.010	4.2E-04	1.2E-04	0.016	0.140	0.002
H129-S	1160	NG	9.6E-04	0.010	5.8E-05	0.005	0.007	4.0E-04	-	0.006	0.361	8.68	0.002	0.001	0.003	0.010	4.2E-04	1.2E-04	0.016	0.140	0.002
H130-S	1215	NG	6.9E-04	0.007	4.2E-05	0.004	0.005	2.9E-04	-	0.004	0.260	6.25	0.001	9.0E-04	0.002	0.007	3.1E-04	8.3E-05	0.012	0.101	0.002
H131-S	1220	NG	6.4E-04	0.007	3.9E-05	0.004	0.004	2.7E-04	-	0.004	0.241	5.78	0.001	8.4E-04	0.002	0.007	2.8E-04	7.7E-05	0.011	0.093	0.002
H132-S	1320	NG	0.001	0.013	7.7E-05	0.007	0.009	5.4E-04	-	0.008	0.482	11.57	0.002	0.002	0.004	0.013	5.7E-04	1.5E-04	0.022	0.186	0.003
H133-S	1320	NG	0.001	0.011	6.6E-05	0.006	0.008	4.6E-04	-	0.007	0.410	9.83	0.002	0.001	0.003	0.011	4.8E-04	1.3E-04	0.019	0.158	0.003
H134-S	1509	NG	0.001	0.011	6.6E-05	0.006	0.008	4.6E-04	-	0.007	0.410	9.83	0.002	0.001	0.003	0.011	4.8E-04	1.3E-04	0.019	0.158	0.003
H135-S	1509	NG	0.001	0.011	6.6E-05	0.006	0.008	4.6E-04	-	0.007	0.410	9.83	0.002	0.001	0.003	0.011	4.8E-04	1.3E-04	0.019	0.158	0.003
H136-S	1720	NG	0.001	0.011	6.6E-05	0.006	0.008	4.6E-04	-	0.007	0.410	9.83	0.002	0.001	0.003	0.011	4.8E-04	1.3E-04	0.019	0.158	0.003
H137-S	1720	NG	0.001	0.013	7.7E-05	0.007	0.009	5.4E-04	-	0.008	0.482	11.57	0.002	0.002	0.004	0.013	5.7E-04	1.5E-04	0.022	0.186	0.003
H138-S	4502	NG	0.001	0.011	6.6E-05	0.006	0.008	4.6E-04	-	0.007	0.410	9.83	0.002	0.001	0.003	0.011	4.8E-04	1.3E-04	0.019	0.158	0.003
H139-S	4502	NG	0.001	0.011	6.6E-05	0.006	0.008	4.6E-04	-	0.007	0.410	9.83	0.002	0.001	0.003	0.011	4.8E-04	1.3E-04	0.019	0.158	0.003
H140-S	4577	NG	0.001	0.011	6.6E-05	0.006	0.008	4.6E-04	-	0.007	0.410	9.83	0.002	0.001	0.003	0.011	4.8E-04	1.3E-04	0.019	0.158	0.003
H141-S	4577	NG	0.001	0.012	6.7E-05	0.006	0.008	4.7E-04	-	0.007	0.419	10.06	0.002	0.001	0.003	0.012	4.9E-04	1.3E-04	0.019	0.162	0.003
H142-S	4578	NG	0.001	0.011	6.6E-05	0.006	0.008	4.6E-04	-	0.007	0.410	9.83	0.002	0.001	0.003	0.011	4.8E-04	1.3E-04	0.019	0.158	0.003
H143-S	7704	No. 2 Oil	0.002	-	0.002	0.002	0.002	-	0.003	-	0.180	-	0.003	0.002	-	0.002	1.7E-06	0.008	-	0.002	0.005
H145-S	1340	NG	6.4E-04	0.007	3.9E-05	0.004	0.004	2.7E-04	-	0.004	0.241	5.78	0.001	0.001	0.002	0.007	2.8E-04	7.7E-05	0.011	0.093	0.002
H146-S	1509	NG	6.4E-04	0.007	3.9E-05	0.004	0.004	2.7E-04	-	0.004	0.241	5.78	0.001	0.001	0.002	0.007	2.8E-04	7.7E-05	0.011	0.093	0.002
H147-S	1510	NG	6.4E-04	0.007	3.9E-05	0.004	0.004	2.7E-04	-	0.004	0.241	5.78	0.001	0.001	0.002	0.007	2.8E-04	7.7E-05	0.011	0.093	0.002
H148-S	1620	NG	6.4E-04	0.007	3.9E-05	0.004	0.004	2.7E-04	-	0.004	0.241	5.78	0.001	0.001	0.002	0.007	2.8E-04	7.7E-05	0.011	0.093	0.002
H149-S	2916	NG	8.3E-04	0.009	5.0E-05	0.005	0.006	3.5E-04	-	0.005	0.311	7.45	0.002	0.001	0.003	0.009	3.6E-04	9.9E-05	0.014	0.120	0.002

Unit ID	Building. No.	Fuel Type	Arsenic	Benzene	Beryllium	Cadmium	Chromium	Cobalt	Copper	Dichlorobenzene	Formaldehyde	Hexane	Manganese	Mercury	Naphthalene	Nickel	POM	Selenium	Toluene	Zinc	Lead
H150-S	10531	NG	0.002	0.017	9.8E-05	0.009	0.011	6.9E-04	-	0.010	0.612	14.69	0.003	0.002	0.005	0.017	7.2E-04	2.0E-04	0.028	0.237	0.004
H151-S	5602	NG	7.3E-04	0.008	4.4E-05	0.004	0.005	3.1E-04	-	0.004	0.273	6.55	0.001	0.001	0.002	0.008	3.2E-04	8.7E-05	0.012	0.105	0.002
H152-S	HQ C&C Center	NG	0.001	0.012	7.0E-05	0.006	0.008	4.9E-04	-	0.007	0.440	10.57	0.002	0.002	0.004	0.012	5.2E-04	1.4E-04	0.020	0.170	0.003
H153-S	3004	NG	0.001	0.007	3.9E-05	0.004	0.005	2.8E-04	-	0.004	0.246	5.899	0.001	0.001	0.002	0.007	2.9E-04	7.9E-05	0.011	0.095	0.002
H154-S	3005	NG	0.001	0.007	3.9E-05	0.004	0.005	2.8E-04	-	0.004	0.246	5.899	0.001	0.001	0.002	0.007	2.9E-04	7.9E-05	0.011	0.095	0.002
H155-S	3006	NG	0.001	0.007	3.9E-05	0.004	0.005	2.8E-04	-	0.004	0.246	5.899	0.001	0.001	0.002	0.007	2.9E-04	7.9E-05	0.011	0.095	0.002
H156-S	3007	NG	0.001	0.007	3.9E-05	0.004	0.005	2.8E-04	-	0.004	0.246	5.899	0.001	0.001	0.002	0.007	2.9E-04	7.9E-05	0.011	0.095	0.002
H157-S	3008	NG	0.001	0.007	3.9E-05	0.004	0.005	2.8E-04	-	0.004	0.246	5.899	0.001	0.001	0.002	0.007	2.9E-04	7.9E-05	0.011	0.095	0.002
H158-S	3009	NG	0.001	0.007	3.9E-05	0.004	0.005	2.8E-04	-	0.004	0.246	5.899	0.001	0.001	0.002	0.007	2.9E-04	7.9E-05	0.011	0.095	0.002
H159-S	3012	NG	0.001	0.007	3.9E-05	0.004	0.005	2.8E-04	-	0.004	0.246	5.899	0.001	0.001	0.002	0.007	2.9E-04	7.9E-05	0.011	0.095	0.002
H160-S	DFAC	NG	7.2E-04	0.008	4.3E-05	0.004	0.005	3.0E-04	-	0.004	0.271	6.51	0.001	0.001	0.002	0.008	3.2E-04	8.7E-05	0.012	0.105	0.002
H162-S	1540	NG	6.4E-04	0.007	3.9E-05	0.004	0.004	2.7E-04	-	0.004	0.241	5.78	0.001	0.001	0.002	0.007	2.8E-04	7.7E-05	0.011	0.093	0.002
H163-S	3003	NG	7.2E-04	0.008	4.3E-05	0.004	0.005	3.0E-04	-	0.004	0.270	6.48	0.001	0.001	0.002	0.008	3.2E-04	8.6E-05	0.012	0.104	0.002
H164-S	3010	NG	6.6E-04	0.007	3.9E-05	0.004	0.005	2.8E-04	-	0.004	0.246	5.90	0.001	0.001	0.002	0.007	2.9E-04	7.9E-05	0.011	0.095	0.002
H165-S	3011	NG	6.6E-04	0.007	3.9E-05	0.004	0.005	2.8E-04	-	0.004	0.246	5.90	0.001	0.001	0.002	0.007	2.9E-04	7.9E-05	0.011	0.095	0.002
H166-S	7560	NG	0.001	0.013	7.7E-05	0.007	0.009	5.4E-04	-	0.008	0.482	11.57	0.002	0.002	0.004	0.013	5.7E-04	1.5E-04	0.022	0.186	0.003
H167-S	7560	NG	0.001	0.013	7.7E-05	0.007	0.009	5.4E-04	-	0.008	0.482	11.57	0.002	0.002	0.004	0.013	5.7E-04	1.5E-04	0.022	0.186	0.003
H201-S	POST WIDE (0.3-<1)	NG	0.019	0.198	0.001	0.104	0.132	0.008	-	0.113	7.060	169.45	0.036	0.024	0.057	0.198	0.008	0.002	0.320	2.730	0.047
H202-S	POST WIDE (<0.3)	NG	0.004	0.043	2.5E-04	0.023	0.029	0.002	-	0.025	1.534	36.83	0.008	0.005	0.012	0.043	0.002	4.9E-04	0.070	0.593	0.010
H203-S	POST WIDE (0.3-<1)	No. 2 Oil	0.006	-	0.004	0.004	0.004	-	0.009	-	0.514	-	0.009	0.004	-	0.004	4.9E-06	0.022	-	0.006	0.013
H204-S	POST WIDE (<0.3)	No. 2 Oil	4.9E-04	-	3.7E-04	3.7E-04	3.7E-04	-	0.001	-	0.042	-	0.001	3.7E-04	-	3.7E-04	4.1E-07	0.002	-	4.9E-04	0.001
H205-S	POST WIDE (0.3-<1)	LPG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Unit ID	Building. No.	Fuel Type	Arsenic	Benzene	Beryllium	Cadmium	Chromium	Cobalt	Copper	Dichlorobenzene	Formaldehyde	Hexane	Manganese	Mercury	Naphthalene	Nickel	POM	Selenium	Toluene	Zinc	Lead
H206-S	POST WIDE (<0.3)	LPG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H208-S	GANG-9100 (<0.3)	NG	9.8E-05	0.001	5.9E-06	0.001	0.001	4.1E-05	-	0.001	0.037	0.88	1.9E-04	1.3E-04	3.0E-04	0.001	4.3E-05	1.2E-05	0.002	0.014	2.4E-04
	GANG- 9100 (0.3-<1)	NG	1.2E-04	0.001	7.4E-06	0.001	0.001	5.2E-05	-	0.001	0.046	1.106	2.3E-04	1.6E-04	3.7E-04	0.001	5.4E-05	1.5E-05	0.002	0.018	3.1E-04
H209-S	GANG-9500 (<0.3)	NG	1.7E-04	0.002	1.0E-05	0.001	0.001	7.3E-05	-	0.001	0.065	1.56	3.3E-04	2.3E-04	0.001	0.002	7.7E-05	2.1E-05	0.003	0.025	4.3E-04
H210-S	GANG-9900 (<0.3)	NG	1.8E-04	0.002	1.1E-05	0.001	0.001	7.7E-05	-	0.001	0.069	1.65	3.5E-04	2.4E-04	0.001	0.002	8.1E-05	2.2E-05	0.003	0.027	4.6E-04
H211-S	GANG-10100 (<0.3)	NG	1.2E-04	0.001	7.1E-06	0.001	0.001	5.0E-05	-	0.001	0.044	1.07	2.3E-04	1.5E-04	3.6E-04	0.001	5.2E-05	1.4E-05	0.002	0.017	0.000
	GANG-10100 (0.3-<1.0)	NG	2.3E-04	0.002	1.4E-05	0.001	0.002	9.6E-05	-	0.001	0.086	2.055	4.3E-04	3.0E-04	0.001	0.002	1.0E-04	2.7E-05	0.004	0.033	0.001
H212-S	GANG-10200 (<0.3)	NG	1.4E-04	0.002	8.7E-06	0.001	0.001	6.1E-05	-	0.001	0.054	1.30	2.7E-04	1.9E-04	4.4E-04	0.002	6.3E-05	1.7E-05	0.002	0.021	3.6E-04
	GANG-10200 (0.3 - <1.0)	NG	2.3E-04	0.002	1.4E-05	0.001	0.002	9.6E-05	-	0.001	0.086	2.055	4.3E-04	3.0E-04	0.001	0.002	1.0E-04	2.7E-05	0.004	0.033	0.001
H213-S	GANG-10300 (<0.3)	NG	1.1E-04	0.001	6.8E-06	0.001	0.001	4.8E-05	-	0.001	0.043	1.02	2.2E-04	1.5E-04	3.5E-04	0.001	5.0E-05	1.4E-05	0.002	0.016	2.8E-04
	GANG-10300 (0.3 -<1.0)	NG	2.3E-04	0.002	1.4E-05	0.001	0.002	9.6E-05	-	0.001	0.086	2.055	4.3E-04	3.0E-04	0.001	0.002	1.0E-04	2.7E-05	0.004	0.033	0.001
H214-S	GANG-10500 (<0.3)	NG	1.6E-04	0.002	9.7E-06	0.001	0.001	6.8E-05	-	0.001	0.060	1.45	3.1E-04	2.1E-04	4.9E-04	0.002	7.1E-05	1.9E-05	0.003	0.023	4.0E-04
H215-S	GANG-12700 (<0.3)	NG	1.2E-04	0.001	7.4E-06	0.001	0.001	5.2E-05	-	0.001	0.046	1.11	2.3E-04	1.6E-04	3.8E-04	0.001	5.4E-05	1.5E-05	0.002	0.018	3.1E-04
H216-S	GANG-12900 (<0.3)	NG	4.1E-04	0.004	2.5E-05	0.002	0.003	1.7E-04	-	0.002	0.155	3.72	0.001	5.4E-04	0.001	0.004	1.8E-04	5.0E-05	0.007	0.060	0.001
	GANG-12900 (0.3 to <1.0)	NG	3.6E-04	0.004	2.1E-05	0.002	0.002	1.5E-04	-	0.002	0.133	3.197	0.001	4.6E-04	0.001	0.004	1.6E-04	4.3E-05	0.006	0.052	0.001
H217-S	GANG-13100 (<0.3)	NG	4.6E-04	0.005	2.8E-05	0.003	0.003	1.9E-04	-	0.003	0.174	4.16	0.001	0.001	0.001	0.005	2.0E-04	5.6E-05	0.008	0.067	0.001
	GANG-13100 (0.3 to<1.0)	NG	2.8E-04	0.003	1.7E-05	0.002	0.002	1.2E-04		0.002	0.105	2.512	0.001	3.6E-04	0.001	0.003	1.2E-04	0.000	0.005	0.040	0.001
H218-S	GANG-13300 (<0.3)	NG	3.7E-04	0.004	2.2E-05	0.002	0.003	1.6E-04	-	0.002	0.140	3.35	0.001	4.8E-04	0.001	0.004	1.6E-04	4.5E-05	0.006	0.054	0.001

Unit ID	Building. No.	Fuel Type	Arsenic	Benzene	Beryllium	Cadmium	Chromium	Cobalt	Copper	Dichlorobenzene	Formaldehyde	Hexane	Manganese	Mercury	Naphthalene	Nickel	POM	Selenium	Toluene	Zinc	Lead
	GANG-13300 (0.3 to<1.0)	NG	3.6E-04	0.004	2.1E-05	0.002	0.002	1.5E-04	-	0.002	0.133	3.197	0.001	4.6E-04	0.001	0.004	1.6E-04	4.3E-05	0.006	0.052	0.001
H219-S	GANG-13400 (<0.3)	NG	2.4E-04	0.002	1.4E-05	0.001	0.002	9.9E-05	-	0.001	0.089	2.13	4.5E-04	3.1E-04	0.001	0.002	1.0E-04	2.8E-05	0.004	0.034	0.001
H220-S	GANG-13500 (<0.2)	NG	0.001	0.007	4.0E-05	0.004	0.005	2.8E-04	-	0.004	0.247	5.94	0.001	0.001	0.002	0.007	2.9E-04	7.9E-05	0.011	0.096	0.002
H221-S	GANG - 9300 (< 0.3)	NG	1.3E-05	1.3E-04	7.6E-07	6.9E-05	8.8E-05	5.3E-06	-	7.6E-05	0.005	0.11	2.4E-05	1.6E-05	3.9E-05	1.3E-04	5.6E-06	1.5E-06	2.1E-04	0.002	3.2E-05
H222-S	GANG - 9700 (<0.3)	NG	1.6E-04	0.002	9.6E-06	0.001	0.001	6.7E-05	-	0.001	0.060	1.44	3.0E-04	2.1E-04	4.9E-04	0.002	7.0E-05	1.9E-05	0.003	0.023	4.0E-04
Total (lb/yr)			**0.11**	**0.90**	**0.03**	**0.49**	**0.62**	**0.04**	**0.04**	**0.52**	**34.64**	**774.62**	**0.20**	**0.13**	**0.26**	**0.92**	**0.05**	**0.11**	**1.46**	**12.51**	**0.28**
Total (ton/yr)			**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.02**	**0.39**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**

[a] Significant Boiler
[b] Additional Hazardous Air Pollutants for the wood fired boiler (Unit ID H004-S) are given in Table 2.6.
Unit IDs in italics are new.

TABLE 2.4
Source Details and Potential Criteria Pollutant Emissions for Heating Units

Unit ID	Building Number	Maximum Capacity (MMBtu/hr)	Fuel Type	Estimated Potential Fuel Use	Units of Fuel Usage	Potential Emissions (lb/yr)						
						CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
H004-S[a]	1412	140.00	Wood	272,533,333	lb	735,840.0	269,808.0	306,600.0	6,394.4	6,297.6	6,297.6	20,848.8
			No. 2 Oil	0	gal	0	0	0	0	0	0	0
			NG	0	MMcuft	0	0	0	0	0	0	0
H008-S[a]	350	12.00	No. 2 Oil	750,857	gal	3,754.3	15,017.1	53,310.9	1,501.7	750.9	187.7	255.3
			NG	0	MMcuft	0	0	0	0	0	0	0
H009-S[a]	1412	55.30	No. 2 Oil	442,566	gal	2,212.8	8,851.3	31,422.2	885.1	442.6	110.6	150.5
			NG	414.19	MMcuft	34,791.5	41,418.5	248.5	787.0	787.0	787.0	2,278.0
H010-S[a]	1412	55.30	No. 2 Oil	140,000	gal	700.0	2,800.0	9,940.0	280.0	140.0	35.0	47.60
			NG	40	MMcuft	3,360.0	4,000.0	24.00	76.00	76.00	76.0	220.0
H011-S[a]	1412	55.30	No. 2 Oil	140,000	gal	700.0	2,800.0	9,940.0	280.0	140.0	35.0	47.60
			NG	40	MMcuft	3,360.0	4,000.0	24.00	76.0	76.0	76.0	220.0
H101-S	1	2.25	No. 2 Oil	140,786	gal	703.9	2,815.7	9,995.8	281.6	152.0	116.9	47.87
H103-S	350	7.00	NG	60.12	MMcuft	5,049.9	6,011.8	36.07	114.2	114.2	114.2	330.6
H104-S	403	1.26	NG	10.82	MMcuft	909.0	1,082.1	6.49	20.56	20.56	20.56	59.52
H105-S	419	1.38	No. 2 Oil	86,349	gal	431.7	1,727.0	6,130.7	172.7	93.26	71.67	29.36
H106-S	421	1.83	NG	15.72	MMcuft	1,320.2	1,571.6	9.43	29.86	29.86	29.86	86.441
H114-S	1073	2.75	NG	23.62	MMcuft	1,983.9	2,361.8	14.17	44.87	44.87	44.87	129.9
H115-S	1205	1.00	NG	8.59	MMcuft	721.4	858.8	5.15	16.32	16.32	16.32	47.24
H116-S	1245	1.51	No. 2 Oil	94,483	gal	472.4	1,889.7	6,708.3	189.0	102.0	78.42	32.12
H117-S	1630	2.00	No. 2 Oil	125,143	gal	625.7	2,502.9	8,885.1	250.3	135.2	103.87	42.55
H118-S	4950	1.48	NG	12.69	MMcuft	1,066.2	1,269.3	7.616	24.12	24.12	24.12	69.81
H120-S	19104	2.16	No. 2 Oil	135,154	gal	675.8	2,703.1	9,596.0	270.3	146.0	112.2	45.952
H121-S	19225	1.20	No. 2 Oil	75,086	gal	375.4	1,501.7	5,331.1	150.2	81.09	62.32	25.53
H125-S	100A	1.26	NG	10.82	MMcuft	909.0	1,082.1	6.49	20.56	20.56	20.56	59.52
H126-S	100A	1.26	NG	10.82	MMcuft	909.0	1,082.1	6.49	20.56	20.56	20.56	59.52

Unit ID	Building Number	Maximum Capacity (MMBtu/hr)	Fuel Type	Estimated Potential Fuel Use	Units of Fuel Usage	Potential Emissions (lb/yr)						
						CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
H127-S	439	1.47	NG	12.60	MMcuft	1,058.3	1,259.9	7.56	23.94	23.94	23.94	69.29
H128-S	1160	1.50	NG	12.88	MMcuft	1,082.1	1,288.2	7.73	24.48	24.48	24.48	70.85
H129-S	1160	1.50	NG	12.88	MMcuft	1,082.1	1,288.2	7.73	24.48	24.48	24.48	70.85
H130-S	1215	1.08	NG	9.28	MMcuft	779.1	927.5	5.57	17.62	17.62	17.62	51.01
H131-S	1220	1.00	NG	8.59	MMcuft	721.4	858.8	5.15	16.32	16.32	16.32	47.24
H132-S	1320	2.00	NG	17.18	MMcuft	1,442.8	1,717.6	10.31	32.64	32.64	32.64	94.47
H133-S	1320	1.70	NG	14.60	MMcuft	1,226.4	1,460.0	8.76	27.74	27.74	27.74	80.30
H134-S	1509	1.70	NG	14.60	MMcuft	1,226.4	1,460.0	8.76	27.74	27.74	27.74	80.30
H135-S	1509	1.70	NG	14.60	MMcuft	1,226.4	1,460.0	8.76	27.74	27.74	27.74	80.30
H136-S	1720	1.70	NG	14.60	MMcuft	1,226.4	1,460.0	8.76	27.74	27.74	27.74	80.30
H137-S	1720	2.00	NG	17.18	MMcuft	1,442.8	1,717.6	10.31	32.64	32.64	32.64	94.47
H138-S	4502	1.70	NG	14.60	MMcuft	1,226.4	1,460.0	8.76	27.74	27.74	27.74	80.30
H139-S	4502	1.70	NG	14.60	MMcuft	1,226.4	1,460.0	8.76	27.74	27.74	27.74	80.30
H140-S	4577	1.70	NG	14.60	MMcuft	1,226.4	1,460.0	8.76	27.74	27.74	27.74	80.30
H141-S	4577	1.74	NG	14.94	MMcuft	1,255.3	1,494.4	8.97	28.39	28.39	28.39	82.19
H142-S	4578	1.70	NG	14.60	MMcuft	1,226.4	1,460.0	8.76	27.74	27.74	27.74	80.30
H143-S	7704	1.01	No. 2 Oil	63,072	gal	315.4	1,261.4	4,478.1	126.1	68.12	52.35	21.44
H145-S	1340	1.00	NG	8.59	MMcuft	721.4	858.8	5.15	16.32	16.32	16.32	47.24
H146-S	1509	1.00	NG	8.59	MMcuft	721.4	858.8	5.15	16.32	16.32	16.32	47.24
H147-S	1510	1.00	NG	8.59	MMcuft	721.4	858.8	5.15	16.32	16.32	16.32	47.24
H148-S	1620	1.00	NG	8.59	MMcuft	721.4	858.8	5.15	16.32	16.32	16.32	47.24
H149-S	2916	1.29	NG	11.07	MMcuft	929.9	1,107.0	6.64	21.03	21.03	21.03	60.89
H150-S	10531	2.54	NG	21.81	MMcuft	1,832.4	2,181.4	13.09	41.45	41.45	41.45	120.0
H151-S	5602	1.13	NG	9.72	MMcuft	816.6	972.2	5.83	18.47	18.47	18.47	53.47
H152-S	HQ C&C Center	1.83	NG	15.69	MMcuft	1,318.0	1,569.1	9.41	29.81	29.81	29.81	86.30

Unit ID	Building Number	Maximum Capacity (MMBtu/hr)	Fuel Type	Estimated Potential Fuel Use	Units of Fuel Usage	Potential Emissions (lb/yr)						
						CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
H153-S	3004	1.02	NG	8.76	MMcuft	735.8	876.0	5.26	16.64	16.64	16.64	48.18
H154-S	3005	1.02	NG	8.76	MMcuft	735.8	876.0	5.26	16.64	16.64	16.64	48.18
H155-S	3006	1.02	NG	8.76	MMcuft	735.8	876.0	5.26	16.64	16.64	16.64	48.18
H156-S	3007	1.02	NG	8.76	MMcuft	735.8	876.0	5.26	16.64	16.64	16.64	48.18
H157-S	3008	1.02	NG	8.76	MMcuft	735.8	876.0	5.26	16.64	16.64	16.64	48.18
H158-S	3009	1.02	NG	8.76	MMcuft	735.8	876.0	5.26	16.64	16.64	16.64	48.18
H159-S	3012	1.02	NG	8.76	MMcuft	735.8	876.0	5.26	16.64	16.64	16.64	48.18
H160-S	DFAC	1.13	NG	9.66	MMcuft	811.6	966.2	5.80	18.36	18.36	18.36	53.14
H162-S	1540	1.00	NG	8.59	MMcuft	721.4	858.8	5.15	16.32	16.32	16.32	47.24
H163-S	3003	1.12	NG	9.62	MMcuft	808.0	961.9	5.77	18.28	18.28	18.28	52.90
H164-S	3010	1.02	NG	8.76	MMcuft	735.8	876.0	5.26	16.64	16.64	16.64	48.18
H165-S	3011	1.02	NG	8.76	MMcuft	735.8	876.0	5.26	16.64	16.64	16.64	48.18
H166-S	7560	2.00	NG	17.18	MMcuft	1,442.8	1,717.6	10.31	32.64	32.64	32.64	94.47
H167-S	7560	2.00	NG	17.18	MMcuft	1,442.8	1,717.6	10.31	32.64	32.64	32.64	94.47
H201-S	POST WIDE (0.3-<1)	29.27	NG	251.40	MMcuft	21,117.2	25,139.6	150.8	477.7	477.7	477.7	1,382.7
H202-S	POST WIDE (<0.3)	6.34	NG	54.45	MMcuft	2,178.1	5,118.6	32.67	103.46	103.46	103.46	299.50
H203-S	POST WIDE (0.3-<1)	5.50	No. 2 Oil	344,393	gal	1,722.0	6,887.9	24,451.9	688.8	371.9	285.8	117.1
H204-S	POST WIDE (<0.3)	0.68	No. 2 Oil	42,549	gal	212.7	765.9	3,020.9	17.02	17.02	17.02	30.34
H205-S	POST WIDE (0.3-<1)	1.42	LPG	137,450	gal	1,030.9	1,786.8	7.42	96.21	96.21	96.21	137.45
H206-S	POST WIDE (<0.3)	0.75	LPG	72,984	gal	547.4	948.8	3.94	51.09	51.09	51.09	72.98
H208-S	GANG-9100 (<0.3)	1.54	NG	13.23	MMcuft	529.4	1,244.0	7.94	25.15	25.15	25.15	72.79
	GANG- 9100 (0.3-<1)	1.94	NG	16.64	MMcuft	1,397.4	1,663.5	9.98	31.61	31.61	31.61	91.49

Unit ID	Building Number	Maximum Capacity (MMBtu/hr)	Fuel Type	Estimated Potential Fuel Use	Units of Fuel Usage	Potential Emissions (lb/yr)						
						CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
H209-S	GANG-9500 (<0.3)	2.74	NG	23.54	MMcuft	941.6	2,212.7	14.12	44.72	44.72	44.72	129.5
H210-S	GANG-9900 (<0.3)	2.89	NG	24.82	MMcuft	992.7	2,332.8	14.89	47.15	47.15	47.15	136.5
H211-S	GANG-10100 (<0.3)	1.87	NG	16.04	MMcuft	641.7	1,507.9	9.63	30.48	30.48	30.48	88.23
	GANG-10100 (0.3-<1.0)	3.60	NG	30.92	MMcuft	2,597.1	3,091.8	18.55	58.74	58.74	58.74	170.0
H212-S	GANG-10200 (<0.3)	2.27	NG	19.53	MMcuft	781.0	1,835.4	11.72	37.10	37.10	37.10	107.4
	GANG-10200 (0.3 - <1.0)	3.60	NG	30.92	MMcuft	2,597.1	3,091.8	18.55	58.74	58.74	58.74	170.0
H213-S	GANG-10300 (<0.3)	1.79	NG	15.35	MMcuft	614.2	1,443.4	9.21	29.17	29.17	29.17	84.45
	GANG-10300 (0.3 -<1.0)	3.60	NG	30.92	MMcuft	2,597.1	3,091.8	18.55	58.74	58.74	58.74	170.0
H214-S	GANG-10500 (<0.3)	2.54	NG	21.81	MMcuft	872.6	2,050.5	13.09	41.45	41.45	41.45	120.0
H215-S	GANG-12700 (<0.3)	1.94	NG	16.65	MMcuft	666.1	1,565.3	9.99	31.64	31.64	31.64	91.59
H216-S	GANG-12900 (<0.3)	6.51	NG	55.92	MMcuft	2,236.9	5,256.8	33.55	106.25	106.25	106.25	307.6
	GANG-12900 (0.3 to <1.0)	5.60	NG	48.09	MMcuft	4,039.9	4,809.4	28.86	91.38	91.38	91.38	264.5
H217-S	GANG-13100 (<0.3)	7.29	NG	62.65	MMcuft	2,505.9	5,888.9	37.59	119.0	119.0	119.0	344.6
	GANG-13100 (0.3 to<1.0)	4.40	NG	37.79	MMcuft	3,174.2	3,778.8	22.67	71.80	71.80	71.80	207.8
H218-S	GANG-13300 (<0.3)	5.87	NG	50.42	MMcuft	2,016.7	4,739.3	30.25	95.79	95.79	95.79	277.3
	GANG-13300 (0.3 to<1.0)	5.60	NG	48.09	MMcuft	4,039.9	4,809.4	28.86	91.38	91.38	91.38	264.5
H219-S	GANG-13400 (<0.3)	3.73	NG	32.02	MMcuft	1,280.7	3,009.6	19.21	60.83	60.83	60.83	176.1
H220-S	GANG-13500	10.40	NG	89.32	MMcuft	3,572.7	8,395.9	53.59	169.7	169.7	169.7	491.2

Unit ID	Building Number	Maximum Capacity (MMBtu/hr)	Fuel Type	Estimated Potential Fuel Use	Units of Fuel Usage	Potential Emissions (lb/yr)						
						CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
	(<0.2)											
H221-S	GANG - 9300 (< 0.3)	0.20	NG	1.71	MMcuft	68.4	160.7	1.03	3.25	3.25	3.25	9.40
H222-S	GANG - 9700 (<0.3)	2.52	NG	21.64	MMcuft	865.7	2,034.4	12.99	41.12	41.12	41.12	119.0
Total (lb/yr)						**905,331.7**	**532,681.2**	**491,092.8**	**15,657.4**	**13,107.8**	**11,736.6**	**33,597.5**
Total (ton/yr)						**452.67**	**266.34**	**245.55**	**7.83**	**6.55**	**5.87**	**16.80**

[a] Significant Boiler
Unit IDs in italics are new

TABLE 2.5
Potential Emissions of Hazardous Air Pollutants for Heating Units

Unit ID	Building. No.	Fuel Type	Arsenic	Benzene	Beryllium	Cadmium	Chromium	Cobalt	Copper	Dichlorobenzene	Formaldehyde	Hexane	Manganese	Mercury	Naphthalene	Nickel	POM	Selenium	Toluene	Zinc	Lead
H004-S[a]	1412	Wood[b]	26.98	5,150.9	1.35	5.03	25.75	7.97	60.09	-	5,396.2	-	1,962.2	4.29	119.0	40.47	-	3.43	1,128.3	515.1	58.87
		No. 2 Oil	0	-	0	0	0	-	0	-	0	-	0	0	-	0	0	0	-	0	0
		NG	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
H008-S[a]	350	No. 2 Oil	0.420	-	0.315	0.315	0.631	-	0.631	-	36.04	-	0.631	0.315	-	0.315	2.48	1.577	-	0.420	0.946
		NG	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
H009-S[a]	1412	No. 2 Oil	0.248	-	0.186	0.186	0.372	-	0.372	-	21.24	-	0.372	0.186	-	0.186	1.46	0.93	-	0.248	0.558
		NG	0.083	0.870	0.005	0.456	0.580	0.035	-	0.497	31.06	745.5	0.157	0.108	0.253	0.870	0.036	0.010	1.4	12.0	0.207
H010-S[a]	1412	No. 2 Oil	0.078	-	0.059	0.059	0.118	-	0.118	-	6.720	-	0.118	0.059	-	0.059	0.462	0.294	-	0.078	0.176
		NG	0.008	0.084	4.8E-04	0.044	0.056	0.003	-	0.048	3.00	72.00	0.015	0.010	0.024	0.084	0.004	9.6E-04	0.136	1.160	0.020
H011-S[a]	1412	No. 2 Oil	0.078	-	0.059	0.059	0.118	-	0.118	-	6.72	-	0.118	0.059	-	0.059	0.462	0.294	-	0.078	0.176
		NG	0.008	0.084	4.8E-04	0.044	0.056	0.003	-	0.048	3.00	72.00	0.015	0.010	0.024	0.084	0.004	9.6E-04	0.136	1.160	0.020
H101-S	1	No. 2 Oil	0.079	-	0.059	0.059	0.059	-	0.118	-	6.76	-	0.118	0.059	-	0.059	6.5E-05	0.296	-	0.079	0.177
H103-S	350	NG	0.012	0.126	0.001	0.066	0.084	0.005	-	0.072	4.51	108.2	0.023	0.016	0.037	0.126	0.005	0.001	0.204	1.743	0.030
H104-S	403	NG	0.002	0.023	1.3E-04	0.012	0.015	0.001	-	0.013	0.812	19.48	0.004	0.003	0.007	0.023	0.001	2.6E-04	0.037	0.314	0.005
H105-S	419	No. 2 Oil	0.048	-	0.036	0.036	0.036	-	0.073	-	2.59	-	0.073	0.036	-	0.036	4.0E-05	0.181	-	0.048	0.109
H106-S	421	NG	0.003	0.033	1.9E-04	0.017	0.022	0.001	-	0.019	1.18	28.29	0.006	0.004	0.010	0.033	0.001	3.8E-04	0.053	0.456	0.008
H114-S	1073	NG	0.005	0.050	2.8E-04	0.026	0.033	0.002	-	0.028	1.77	42.51	0.009	0.006	0.014	0.050	0.002	0.001	0.080	0.685	0.012
H115-S	1205	NG	0.002	0.018	1.0E-04	0.009	0.012	0.001	-	0.010	0.644	15.46	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.029	0.249	0.004
H116-S	1245	No. 2 Oil	0.053	-	0.040	0.040	0.040	-	0.079	-	4.54	-	0.079	0.040	-	0.040	4.4E-05	0.198	-	0.053	0.119
H117-S	1630	No. 2 Oil	0.070	-	0.053	0.053	0.053	-	0.105	-	6.01	-	0.105	0.053	-	0.053	5.8E-05	0.263	-	0.070	0.158
H118-S	4950	NG	0.003	0.027	0.000	0.014	0.018	0.001	-	0.015	0.952	22.85	0.005	0.003	0.008	0.027	0.001	3.0E-04	0.043	0.368	0.006
H120-S	19104	No. 2 Oil	0.076	-	0.057	0.057	0.057	-	0.114	-	6.49	-	0.114	0.057	-	0.057	6.2E-05	0.284	-	0.076	0.170
H121-S	19225	No. 2 Oil	0.042	-	0.032	0.032	0.032	-	0.063	-	3.60	-	0.063	0.032	-	0.032	3.5E-05	0.158	-	0.042	0.095

Unit ID	Building. No.	Fuel Type	Arsenic	Benzene	Beryllium	Cadmium	Chromium	Cobalt	Copper	Dichlorobenzene	Formaldehyde	Hexane	Manganese	Mercury	Naphthalene	Nickel	POM	Selenium	Toluene	Zinc	Lead
H125-S	100A	NG	0.002	0.023	1.3E-04	0.012	0.015	0.001	-	0.013	0.812	19.48	0.004	0.003	0.007	0.023	0.001	2.6E-04	0.037	0.314	0.005
H126-S	100A	NG	0.002	0.023	1.3E-04	0.012	0.015	0.001	-	0.013	0.812	19.48	0.004	0.003	0.007	0.023	0.001	2.6E-04	0.037	0.314	0.005
H127-S	439	NG	0.003	0.026	1.5E-04	0.014	0.018	0.001	-	0.015	0.945	22.68	0.005	0.003	0.008	0.026	0.001	3.0E-04	0.043	0.365	0.006
H128-S	1160	NG	0.003	0.027	1.5E-04	0.014	0.018	0.001	-	0.015	0.966	23.19	0.005	0.003	0.008	0.027	0.001	3.1E-04	0.044	0.374	0.006
H129-S	1160	NG	0.003	0.027	1.5E-04	0.014	0.018	0.001	-	0.015	9.7E-01	23.19	0.005	0.003	0.008	0.027	0.001	3.1E-04	0.044	0.374	0.006
H130-S	1215	NG	0.002	0.019	1.1E-04	0.010	0.013	0.001	-	0.011	0.696	16.70	0.004	0.002	0.006	0.019	0.001	2.2E-04	0.032	0.269	0.005
H131-S	1220	NG	0.002	0.018	1.0E-04	0.009	0.012	0.001	-	0.010	0.644	15.46	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.029	0.249	0.004
H132-S	1320	NG	0.003	0.036	2.1E-04	0.019	0.024	0.001	-	0.021	1.29	30.92	0.007	0.004	0.010	0.036	0.002	4.1E-04	0.058	0.498	0.009
H133-S	1320	NG	0.003	0.031	1.8E-04	0.016	0.020	0.001	-	0.018	1.10	26.28	0.006	0.004	0.009	0.031	0.001	3.5E-04	0.050	0.423	0.007
H134-S	1509	NG	0.003	0.031	1.8E-04	0.016	0.020	0.001	-	0.018	1.10	26.28	0.006	0.004	0.009	0.031	0.001	3.5E-04	0.050	0.423	0.007
H135-S	1509	NG	0.003	0.031	1.8E-04	0.016	0.020	0.001	-	0.018	1.10	26.28	0.006	0.004	0.009	0.031	0.001	3.5E-04	0.050	0.423	0.007
H136-S	1720	NG	0.003	0.031	1.8E-04	0.016	0.020	0.001	-	0.018	1.10	26.28	0.006	0.004	0.009	0.031	0.001	3.5E-04	0.050	0.423	0.007
H137-S	1720	NG	0.003	0.036	2.1E-04	0.019	0.024	0.001	-	0.021	1.29	30.92	0.007	0.004	0.010	0.036	0.002	4.1E-04	0.058	0.498	0.009
H138-S	4502	NG	0.003	0.031	1.8E-04	0.016	0.020	0.001	-	0.018	1.10	26.28	0.006	0.004	0.009	0.031	0.001	3.5E-04	0.050	0.423	0.007
H139-S	4502	NG	0.003	0.031	1.8E-04	0.016	0.020	0.001	-	0.018	1.10	26.28	0.006	0.004	0.009	0.031	0.001	3.5E-04	0.050	0.423	0.007
H140-S	4577	NG	0.003	0.031	1.8E-04	0.016	0.020	0.001	-	0.018	1.10	26.28	0.006	0.004	0.009	0.031	0.001	3.5E-04	0.050	0.423	0.007
H141-S	4577	NG	0.003	0.031	1.8E-04	0.016	0.021	0.001	-	0.018	1.12	26.90	0.006	0.004	0.009	0.031	0.001	3.6E-04	0.051	0.433	0.007
H142-S	4578	NG	0.003	0.031	1.8E-04	0.016	0.020	0.001	-	0.018	1.10	26.28	0.006	0.004	0.009	0.031	0.001	3.5E-04	0.050	0.423	0.007
H143-S	7704	No. 2 Oil	0.035	-	0.026	0.026	0.026	-	0.053	-	3.03	-	0.053	0.026	-	0.026	2.9E-05	0.132	-	0.035	0.079
H145-S	1340	NG	0.002	0.018	1.0E-04	0.009	0.012	0.001	-	0.010	0.644	15.46	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.029	0.249	0.004
H146-S	1509	NG	0.002	0.018	1.0E-04	0.009	0.012	0.001	-	0.010	0.644	15.46	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.029	0.249	0.004
H147-S	1510	NG	0.002	0.018	1.0E-04	0.009	0.012	0.001	-	0.010	0.644	15.46	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.029	0.249	0.004
H148-S	1620	NG	0.002	0.018	1.0E-04	0.009	0.012	0.001	-	0.010	0.644	15.46	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.029	0.249	0.004
H149-S	2916	NG	0.002	0.023	1.3E-04	0.012	0.015	0.001	-	0.013	0.830	19.93	0.004	0.003	0.007	0.023	0.001	2.7E-04	0.038	0.321	0.006

Unit ID	Building. No.	Fuel Type	Arsenic	Benzene	Beryllium	Cadmium	Chromium	Cobalt	Copper	Dichlorobenzene	Formaldehyde	Hexane	Manganese	Mercury	Naphthalene	Nickel	POM	Selenium	Toluene	Zinc	Lead
H150-S	10531	NG	0.004	0.046	2.6E-04	0.024	0.031	0.002	-	0.026	1.64	39.27	0.008	0.006	0.013	0.046	0.002	0.001	0.074	0.633	0.011
H151-S	5602	NG	0.002	0.020	1.2E-04	0.011	0.014	0.001	-	0.012	0.729	17.50	0.004	0.003	0.006	0.020	0.001	2.3E-04	0.033	0.282	0.005
H152-S	HQ C&C Center	NG	0.003	0.033	1.9E-04	0.017	0.022	0.001	-	0.019	1.18	28.24	0.006	0.004	0.010	0.033	0.001	3.8E-04	0.053	0.455	0.008
H153-S	3004	NG	0.002	0.018	0.000	0.010	0.012	0.001	-	0.011	0.657	15.768	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.030	0.254	0.004
H154-S	3005	NG	0.002	0.018	1.1E-04	0.010	0.012	0.001	-	0.011	0.657	15.768	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.030	0.254	0.004
H155-S	3006	NG	0.002	0.018	1.1E-04	0.010	0.012	0.001	-	0.011	0.657	15.768	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.030	0.254	0.004
H156-S	3007	NG	0.002	0.018	1.1E-04	0.010	0.012	0.001	-	0.011	0.657	15.768	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.030	0.254	0.004
H157-S	3008	NG	0.002	0.018	1.1E-04	0.010	0.012	0.001	-	0.011	0.657	15.768	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.030	0.254	0.004
H158-S	3009	NG	0.002	0.018	1.1E-04	0.010	0.012	0.001	-	0.011	0.657	15.768	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.030	0.254	0.004
H159-S	3012	NG	0.002	0.018	1.1E-04	0.010	0.012	0.001	-	0.011	0.657	15.768	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.030	0.254	0.004
H160-S	DFAC	NG	0.002	0.020	1.2E-04	0.011	0.014	0.001	-	0.012	0.725	17.39	0.004	0.003	0.006	0.020	0.001	2.3E-04	0.033	0.280	0.005
H162-S	1540	NG	0.002	0.018	1.0E-04	0.009	0.012	0.001	-	0.010	0.644	15.46	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.029	0.249	0.004
H163-S	3003	NG	0.002	0.020	1.2E-04	0.011	0.013	0.001	-	0.012	0.721	17.31	0.004	0.003	0.006	0.020	0.001	2.3E-04	0.033	0.279	0.005
H164-S	3010	NG	0.002	0.018	1.1E-04	0.010	0.012	0.001	-	0.011	0.657	15.77	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.030	0.254	0.004
H165-S	3011	NG	0.002	0.018	1.1E-04	0.010	0.012	0.001	-	0.011	0.657	15.77	0.003	0.002	0.005	0.018	0.001	2.1E-04	0.030	0.254	0.004
H166-S	7560	NG	0.003	0.036	2.1E-04	0.019	0.024	0.001	-	0.021	1.288	30.92	0.007	0.004	0.010	0.036	0.002	4.1E-04	0.058	0.498	0.009
H167-S	7560	NG	0.003	0.036	2.1E-04	0.019	0.024	0.001	-	0.021	1.288	30.92	0.007	0.004	0.010	0.036	0.002	4.1E-04	0.058	0.498	0.009
H201-S	POST WIDE (0.3-<1)	NG	0.050	0.528	0.003	0.277	0.352	0.021	-	0.302	18.85	452.5	0.096	0.065	0.153	0.528	0.022	0.006	0.855	7.290	0.126
H202-S	POST WIDE (<0.3)	NG	0.011	0.114	0.001	0.060	0.076	0.005	-	0.065	4.08	98.02	0.021	0.014	0.033	0.114	0.005	0.001	0.185	1.579	0.027
H203-S	POST WIDE (0.3-<1)	No. 2 Oil	0.193	-	0.145	0.145	0.145	-	0.289	-	16.53	-	0.289	0.145	-	0.145	1.6E-04	0.723	-	0.193	0.434
H204-S	POST WIDE (<0.3)	No. 2 Oil	0.024	-	0.018	0.018	0.018	-	0.036	-	2.04	-	0.036	0.018	-	0.018	2.0E-05	0.089	-	0.024	0.054
H205-S	POST WIDE (0.3-<1)	LPG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Unit ID	Building. No.	Fuel Type	Arsenic	Benzene	Beryllium	Cadmium	Chromium	Cobalt	Copper	Dichlorobenzene	Formaldehyde	Hexane	Manganese	Mercury	Naphthalene	Nickel	POM	Selenium	Toluene	Zinc	Lead
H206-S	POST WIDE (<0.3)	LPG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H208-S	GANG-9100 (<0.3)	NG	0.003	0.028	1.6E-04	0.015	0.019	0.001	-	0.016	0.993	23.82	0.005	0.003	0.008	0.028	0.001	3.2E-04	0.045	0.384	0.007
	GANG- 9100 (0.3-<1)	NG	0.003	0.035	2.0E-04	0.018	0.023	0.001	-	0.020	1.25	29.94	0.006	0.004	0.010	0.035	0.001	4.0E-04	0.057	0.482	0.008
H209-S	GANG-9500 (<0.3)	NG	0.005	0.049	2.8E-04	0.026	0.033	0.002	-	0.028	1.77	42.37	0.009	0.006	0.014	0.049	0.002	0.001	0.080	0.683	0.012
H210-S	GANG-9900 (<0.3)	NG	0.005	0.052	3.0E-04	0.027	0.035	0.002	-	0.030	1.86	44.67	0.009	0.006	0.015	0.052	0.002	0.001	0.084	0.720	0.012
H211-S	GANG-10100 (<0.3)	NG	0.003	0.034	1.9E-04	0.018	0.022	0.001	-	0.019	1.20	28.88	0.006	0.004	0.010	0.034	0.001	3.9E-04	0.055	0.465	0.008
	GANG-10100 (0.3-<1.0)	NG	0.006	0.065	3.7E-04	0.034	0.043	0.003	-	0.037	2.32	55.65	0.012	0.008	0.019	0.065	0.003	0.001	0.105	0.897	0.015
H212-S	GANG-10200 (<0.3)	NG	0.004	0.041	2.3E-04	0.021	0.027	0.002	-	0.023	1.46	35.15	0.007	0.005	0.012	0.041	0.002	4.7E-04	0.066	0.566	0.010
	GANG-10200 (0.3 - <1.0)	NG	0.006	0.065	3.7E-04	0.034	0.043	0.003	-	0.037	2.32	55.65	0.012	0.008	0.019	0.065	0.003	0.001	0.105	0.897	0.015
H213-S	GANG-10300 (<0.3)	NG	0.003	0.032	1.8E-04	0.017	0.021	0.001	-	0.018	1.15	27.64	0.006	0.004	0.009	0.032	0.001	3.7E-04	0.052	0.445	0.008
	GANG-10300 (0.3 -<1.0)	NG	0.006	0.065	3.7E-04	0.034	0.043	0.003	-	0.037	2.32	55.65	0.012	0.008	0.019	0.065	0.003	0.001	0.105	0.897	0.015
H214-S	GANG-10500 (<0.3)	NG	0.004	0.046	2.6E-04	0.024	0.031	0.002	-	0.026	1.64	39.27	0.008	0.006	0.013	0.046	0.002	0.001	0.074	0.633	0.011
H215-S	GANG-12700 (<0.3)	NG	0.003	0.035	2.0E-04	0.018	0.023	0.001	-	0.020	1.25	29.97	0.006	0.004	0.010	0.035	0.001	0.000	0.057	0.483	0.008
H216-S	GANG-12900 (<0.3)	NG	0.011	0.117	0.001	0.062	0.078	0.005	-	0.067	4.19	100.7	0.021	0.015	0.034	0.117	0.005	0.001	0.190	1.622	0.028
	GANG-12900 (0.3 to <1.0)	NG	0.010	0.101	0.001	0.053	0.067	0.004	-	0.058	3.61	86.57	0.018	0.013	0.029	0.101	0.004	0.001	0.164	1.395	0.024
H217-S	GANG-13100 (<0.3)	NG	0.013	0.132	0.001	0.069	0.088	0.005	-	0.075	4.70	112.8	0.024	0.016	0.038	0.132	0.006	0.002	0.213	1.817	0.031
	GANG-13100 (0.3 to<1.0)	NG	0.008	0.079	4.5E-04	0.042	0.053	0.003	-	0.045	2.83	68.02	0.014	0.010	0.023	0.079	0.003	0.001	0.128	1.096	0.019
H218-S	GANG-13300 (<0.3)	NG	0.010	0.106	0.001	0.055	0.071	0.004	-	0.061	3.78	90.75	0.019	0.013	0.031	0.106	0.004	0.001	0.171	1.462	0.025

Unit ID	Building. No.	Fuel Type	Arsenic	Benzene	Beryllium	Cadmium	Chromium	Cobalt	Copper	Dichlorobenzene	Formaldehyde	Hexane	Manganese	Mercury	Naphthalene	Nickel	POM	Selenium	Toluene	Zinc	Lead
	GANG-13300 (0.3 to<1.0)	NG	0.010	0.101	0.001	0.053	0.067	0.004	-	0.058	3.61	86.57	0.018	0.013	0.029	0.101	0.004	0.001	0.164	1.395	0.024
H219-S	GANG-13400 (<0.3)	NG	0.006	0.067	3.8E-04	0.035	0.045	0.003	-	0.038	2.40	57.63	0.012	0.008	0.020	0.067	0.003	0.001	0.109	0.928	0.016
H220-S	GANG-13500 (<0.2)	NG	0.018	0.188	0.001	0.098	0.125	0.008	-	0.107	6.70	160.8	0.034	0.023	0.054	0.188	0.008	0.002	0.304	2.590	0.045
H221-S	GANG - 9300 (< 0.3)	NG	3.4E-04	0.004	2.1E-05	0.002	0.002	1.4E-04	-	0.002	0.13	3.08	0.001	4.4E-04	0.001	0.004	1.5E-04	4.1E-05	0.006	0.050	0.001
H222-S	GANG - 9700 (<0.3)	NG	0.004	0.045	2.6E-04	0.024	0.030	0.002	-	0.026	1.62	38.96	0.008	0.006	0.013	0.045	0.002	0.001	0.074	0.628	0.011
Total (lb/yr)			**28.85**	**5,155.3**	**2.46**	**8.44**	**30.42**	**8.15**	**62.26**	**2.54**	**5,677.3**	**3,811.1**	**1,965.2**	**5.93**	**120.3**	**46.00**	**5.05**	**8.90**	**1,135.5**	**577.9**	**63.18**
Total (ton/yr)			**0.01**	**2.58**	**<0.01**	**<0.01**	**0.02**	**<0.01**	**0.03**	**<0.01**	**2.84**	**1.91**	**0.98**	**<0.01**	**0.06**	**0.02**	**<0.01**	**<0.01**	**0.57**	**0.29**	**0.03**

[a] Significant Boiler
[b] Additional Hazardous Air Pollutants for the wood fired boiler (Unit ID H004-S) are given in Table 2.6.
Unit IDs in italics are new.
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TABLE 2.6
Additional Wood Fired Boiler Hazardous Air Pollutants Emissions

Pollutant	Actual		Potential	
	lb/yr	ton/yr	lb/yr	ton/yr
Acetaldehyde	0	0	1,017.9	0.51
Acrolein	0	0	4,905.6	2.45
Carbon Tetrachloride	0	0	55.19	0.03
Chlorine	0	0	968.9	0.48
Chlorobenzene	0	0	40.47	0.02
Chloroform	0	0	34.34	0.02
Chloromethane	0	0	28.21	0.01
Dichloromethane	0	0	355.7	0.18
Propylene Dichloride	0	0	40.47	0.02
Ethylbenzene	0	0	38.02	0.02
Hydrogen Chloride	0	0	23,301.6	11.65
Phenol	0	0	62.55	0.03
Propionaldehyde	0	0	74.81	0.04
Styrene	0	0	2,330.2	1.17
2,3,7,8-Tetrachlorodibenzo-p-furans	0	0	1.1E-04	5.5E-08
o-Xylene	0	0	30.66	0.02
Antimony	0	0	9.69	4.8E-03
Totals	0	0	**33,294.18**	**16.65**

TABLE 2.7
Emission Factors for Heating Units - Natural Gas Combustion

Pollutant	Emission Factor (lb/10^3 gal)[a, b]	
	0.3 to 100 MMBtu/hr	<0.3 MMBtu/hr
Criteria Pollutants		
CO	84	40
Lead	5.0×10^{-4}	5.0×10^{-4}
NO_x	100	94
PM[c]	7.6	7.6
PM-10[c]	7.6	7.6
PM-2.5[c]	7.6	7.6
SO_2	0.6	0.6
VOC	5.5	5.5
Hazardous Air Pollutants [d]		
Arsenic	2.0×10^{-4}	2.0×10^{-4}
Benzene	2.1×10^{-3}	2.1×10^{-3}

Pollutant	Emission Factor (lb/10^3 gal)[a, b]	
	0.3 to 100 MMBtu/hr	<0.3 MMBtu/hr
Beryllium	$1.2x10^{-5}$	$1.2x10^{-5}$
Cadmium	$1.1x10^{-3}$	$1.1x10^{-3}$
Chromium	$1.4x10^{-3}$	$1.4x10^{-3}$
Cobalt	$8.4x10^{-5}$	$8.4x10^{-5}$
Formaldehyde	$7.5x10^{-2}$	$7.5x10^{-2}$
Hexane	1.8	1.8
Lead	$5.0x10^{-4}$	$5.0x10^{-4}$
Manganese	$3.8x10^{-4}$	$3.8x10^{-4}$
Mercury	$2.6x10^{-4}$	$2.6x10^{-4}$
Naphthalene	$6.1x10^{-4}$	$6.1x10^{-4}$
Nickel	$2.1x10^{-3}$	$2.1x10^{-3}$
POM	$8.8x10^{-5}$	$8.8x10^{-5}$
Selenium	$2.4x10^{-5}$	$2.4x10^{-5}$
Toluene	$3.4x10^{-3}$	$3.4x10^{-3}$

[a] Emission factors from EPA Document AP-42, Section 1.4-9 (Ref. 1).
[b] Emission factors based on burning NG with a heating value of 1,020 Btu/ft^3.
[c] Emission factor for total particulate matter (condensable and filterable).
[d] Emission factors are independent of heating unit heat input capacity or firing configuration.

TABLE 2.8
Emission Factors for Heating Units - Distillate Fuel Oil Combustion

Pollutant	Emission Factor (lb/10^3 gal) [a, b]			
	>100 MMBtu/hr	10 to 100 MMBtu/hr	0.3 to <10 MMBtu/hr	<0.3 MMBtu/hr
CO	5	5	5	5
NO_x	24	20	20	18
PM[c]	2	2	2	0.4
PM-10[c]	1.0	1.0	1.08	0.4
PM-2.5[c]	0.25	0.25	0.83	0.4
SO_2[e]	142(S)	142(S)	142(S)	142(S)
VOC[f]	0.2	0.2	0.34	0.713
Formaldehyde	0.048	0.048	0.048	0.048
POM	0.0033	0.0033	0.0033	0.0033
Emission Factor (lb/10^{12} Btu) [g]				
Arsenic	4	4	4	-
Beryllium	3	3	3	-
Cadmium	3	3	3	-
Chromium	3	3	3	-
Copper	6	6	6	-

Pollutant	Emission Factor (lb/10^3 gal) [a, b]			
	>100 MMBtu/hr	10 to 100 MMBtu/hr	0.3 to <10 MMBtu/hr	<0.3 MMBtu/hr
Lead	9	9	9	-
Manganese	6	6	6	-
Mercury	3	3	3	-
Nickel	3	3	3	-
Selenium	15	15	15	-
Zinc	4	4	4	-

[a] Emission factors from EPA document AP-42, Section 1.3-1 (Ref. 1).
[b] Emission factors based on burning No. 2 fuel oil with a heating value of 140,000 Btu/gal.
[c] Emission factors for filterable particulate matter only.
[d] No factor was provided for <0.3 MMBtu/hr heating units; therefore, the emission factor for 0.3 to <10 MMBtu/hr heating units was used.
[e] The variable S in the emission factors equals the sulfur content of the fuel expressed as percent weight. A maximum sulfur content of $0.5\%_w$ was assumed for the distillate oil burned at Fort Stewart; therefore, the SO_2 factors were assumed to equal the values presented times 0.5.
[f] NMTOC emission factors provided; assumed VOC equals NMTOC.
[g] Emission factors are independent of heating unit heat input capacity.

TABLE 2.9
Emission Factors for Heating Units – LPG/Propane Combustion

Pollutant	Emission Factor (lb/10^3 gal)[a,b]	
	10 to 100 MMBtu/hr	0.3 -10 MMBtu/hr
Criteria Pollutants		
CO	7.5	7.5
NO_x	13	13
PM[c]	0.7	0.7
PM-10[c]	0.7	0.7
PM-2.5	0.7	0.7
SO_2[d]	0.10(S)	0.10(S)
VOC	1	1

[a] Emission factors based on information contained in EPA document AP-42, Section 1.5-3 (Ref. 1).
[b] Emission factors based on a heating value of 90,500 Btu/gal.
[c] Emission factors for filterable particulate matter only.
[d] The variable S in the emission factor equals the sulfur content of the fuel expressed as gr/100 ft^3. The LPG sulfur content was unknown; therefore, the sulfur content for LPG was assumed to be 0.54 gr/100 ft^3. The SO_2 factors are equal to the values presented times 0.54.

TABLE 2.10
Emission Factors for Heating Units – Wood/Bark Combustion

Pollutant	Emission Factor (lb/MMBtu)[a,b]
Criteria Pollutants	
CO[c]	0.60
NO_x	0.22
PM[d]	0.066
PM-10[d]	0.065
PM-2.5[d]	0.065
SO_2[c]	0.025
VOC	0.038
Hazardous Air Pollutants	
Acetaldehyde	8.30E-04
Acrolein	4.00E-03
Benzene	4.20E-03
Carbon Tetrachloride	4.50E-05
Chlorine	7.90E-04
Chlorobenzene	3.30E-05
Chloroform	2.80E-05
Chloromethane	2.30E-05
Dichloromethane	2.90E-04
Propylene Dichloride	3.30E-05
Ethylbenzene	3.10E-05
Formaldehyde	4.40E-03
Hydrogen Chloride	1.90E-02
Naphthalene	9.70E-05
Phenol	5.10E-05
Propionaldehyde	6.10E-05
Styrene	1.90E-03
2,3,7,8-Tetrachlorodibenzo-p-furans	9.00E-11
Toluene	9.20E-04
o-Xylene	2.50E-05
Antimony	7.90E-06
Arsenic	2.20E-05
Beryllium	1.10E-06
Cadmium	4.10E-06
Chromium, total	2.10E-05
Cobalt	6.50E-06
Copper	4.90E-05
Lead	4.80E-05
Manganese	1.60E-03

Pollutant	Emission Factor (lb/MMBtu)[a,b]
Mercury	3.50E-06
Nickel	3.30E-05
Selenium	2.80E-06
Zinc	4.20E-04

[a] Emission factors from AP-42, Section 1.6 (Ref. 1).
[b] Emission factors units are in lb of pollutant/million Btu (MMBtu) of heat input. To convert from lb/MMBtu to lb/ton, multiply by (2,000 HHV), where HHV is the higher heating value (4,500 Btu/lb).
[c] Emission factor for stoker boilers.
[d] Emission factor for a heating unit controlled with a wet scrubber/venturi.

3.0 INTERNAL COMBUSTION ENGINES

Title V Source Designation(s)

__*Significant*	*Internal Combustion (IC) engines that are not considered insignificant or trivial, as defined below*
_X_*Insignificant*	*IC engines fired with natural gas, gasoline, LPG, and/or diesel fuel that are used exclusively for emergency power generation*
	IC engines fired with natural gas, gasoline, LPG, and/or diesel fuel that are used for peaking power generation and are operated ≤200 hr/yr (actual, not potential, hours)
	IC engines fired with natural gas, LPG, and/or diesel fuel that have power output ratings ≤298 kW (≤400 hp) and are operated ≤2,000 hr/yr (actual, not potential, hours)
	IC engines fired with gasoline that have power output ratings ≤74.5 kW (≤100 hp) and are operated ≤500 hr/yr (actual, not potential, hours)
__*Trivial*	*Hand-carried units*

3.1 BACKGROUND

Seventy-three (73) stationary internal combustion (IC) engine units (i.e. emergency generators and pumps) were identified in 2007. Ten of the generators are new. All the units identified are listed in Table 3.1. Three generators (G187-S, G190-S, and Temporary) that were installed after 2007 were included in the Table but were not assigned usage and were not included in the potential emission calculations. They are listed for informational purposes and to aid the development of the 2008 inventory. In addition, two of the new generators (G188-S & G189-S), installed in late 2007 and one (G181-S) installed in 2006 were not operated. See Section 3.3 for a list of all changes since the 2006 inventory.

Power outputs for the engines that operated in 2007 ranged from 11 kW to 500 kW. All of the IC engines identified used diesel fuel.

As per Georgia Air Pollution Control rules (391-2-03) source designations for stationary IC engines are based on the unit's power output, the purpose for which the unit is used, and its potential operating hours. Based on the classification guidelines given in the rules, all of the inventoried units are designated as "insignificant" sources of air pollution in the Title V permit. In addition, the Georgia EPD has designated emergency generators that may be carried by hand as "trivial" sources, and field equipment equipped with IC engines are considered mobile sources of air pollution. As a result, emissions from these units are not addressed in this inventory.

Total 2007 operating hours were available for all of the engines. In addition, fuel use was also available for most of the generators (See Section 1.0, Table 1.0 for data sources/contacts). In the

few cases where only operating hours were available, fuel use was estimated based on the size of the engine and its 2007 operating hours. This was also the basis for calculating potential fuel use used in potential emissions calculations as described below.

To calculate potential fuel use and actual fuel use for generators that only had operating hours available, a fuel heating value of 140,000 Btu/gal (Ref. 1, Section 1.3), and brake-specific fuel consumption value of 7,000 Btu/hp-hr (Ref. 1, Section 3.3) were used to convert power output to fuel input. A load factor (the power actually used divided by the power available) of 0.75 was used for actual fuel use estimation. For potential fuel use estimation it was assumed each engine could operate at full load (Load Factor of 1.0).

For example, the calculation used to estimate the potential quantity of fuel consumed by the IC engine located at Building 3 is presented below.

Unit ID:	G102-S
Type of fuel:	Diesel
Power output:	275 kW
Hours of operation:	500 hr/yr (see note below)
Load factor:	1.0
Brake-specific fuel consumption:	7,000 Btu/hp-hr
Fuel heating value:	140,000 Btu/gal

Potential fuel usage = (275 kW) * (500 hr/yr) * (1.0) * (7,000 Btu/hp-hr) * (1.34 hp/kW) * (1 gal/140,000 Btu)
= 9,212.5 gal/yr

Note: Emergency power generators were assumed to have the potential to operate at a maximum of 500 hr/yr. The remaining IC engine units (pumps) were assumed to operate a maximum of 1,000 hr/yr.

Actual fuel use data provided by Fort Stewart and potential fuel usage determined using the method above is shown for all IC engines in Section 3.3, Table 3.1.

3.2 EMISSION ESTIMATES

The method used to calculate actual and potential emissions is described below. Also provided is a summary of total emissions for all stationary internal combustion engines.

Actual Emissions

Actual emissions were estimated for each IC engine unit using emission factors from AP-42, Sections 3.3 and 3.4 (Ref. 1). The emission factors (presented in Section 3.3, Table 3.2) are dependent upon the engine power output rating, with a change in emission factors occurring at a power rating of 447 kW. Actual emissions from each IC engine were estimated by multiplying the actual fuel use, the fuel heating value, and the appropriate emission factor. For example, the

calculation used to estimate actual CO emissions from the IC engine located at Building 3 is presented below.

Unit ID:	G102-S
Type of fuel:	Diesel
Actual fuel use:	352.9 gal/yr
Diesel fuel heating value:	140,000 Btu/gal = 0.14 MMBtu/gal
CO emission factor:	0.95 lb/MMBtu

CO Emissions = (352.9 gal/yr) * (0.14 MMBtu/gal) * (0.95 lb/MMBtu)
= 46.94 lb/yr

The estimated actual criteria pollutant emissions for all IC engines are presented in Section 3.3, Table 3.3. Table 3.4 presents the estimated actual hazardous air pollutants (HAP) emissions.

Potential Emissions

Potential emissions from each IC engine were estimated by multiplying the potential fuel use (gal/yr) calculated as described in Section 3.1, the fuel heating value, and the appropriate emission factor. The same methodology and emission factors that were used to calculate actual emissions were also used to calculate potential emissions. No potential emissions were calculated for G181-S (Bldg. 1425) as the unit is not operational, and for the two generators (G188-S & G189-S) that were installed very late in 2007.

The estimated potential emissions (criteria pollutants and HAPs) for each emission unit are presented in Tables 3.5 and 3.6 respectively.

Emissions Summary

Table 3.0 given below summarizes actual and potential criteria pollutant and HAP emissions from internal combustion engines at Fort Stewart.

TABLE 3.0
Emissions Summary – Stationary IC Engines

Emission Type		CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC	HAP
Actual	lb/yr	955.15	4,370.93	294.15	293.10	292.96	273.93	341.67	3.73
	ton/yr	0.48	2.19	0.15	0.15	0.15	0.14	0.17	<0.01
Potential	lb/yr	30,539.05	138,267.74	8,991.41	8,933.25	8,925.28	8,342.36	10,446.13	115.65
	ton/yr	15.27	69.13	4.50	4.47	4.46	4.17	5.22	0.06

Emission Source Updates

The following updates were made from the 2006 inventory.

- Changed capacity of G115-S (Bldg. 4); 17.5 kW generator was replaced by new 350 kW unit.
- Added the following sources: G182-S (Bldg. 10499), G183-S (Gate 1), G184-S (Gate 5/ Bldg. 821), G185-S (Gate 7/Bldg. 4501), G186-S Gate 8/Bldg. 1100), G187-S (Next to Bldg. 311), G188-S (Behind Bldg. 9719), G189-S (Bldg. HQ001), G190-S (Bldg. 1727), Temp (Bldg. TFSS2).
- G171-S: Renamed location from SOSS4 to SOSS1.
- G172-S: Renamed location from CRSS5 to CRSS1.

3.3 DETAIL SOURCE AND EMISSION TABLES

Tables 3.1 through 3.6 below provide a breakdown of emissions sources identified, emission factors used when calculating emissions, and a detailed emission summary by each engine unit.

TABLE 3.1
Internal Combustion Engine Information for CY2007

Unit ID	Bldg. No.	Capacity (kW)	Hours of Operation (hr/yr)	Actual Fuel Usage (gal)	Potential Fuel Usage (gal)
G102-S	3	275	28	352.9	9,212.5
G103-S	7	150	26	177.3	5,025.0
G104-S	9	300	97	1,337.2	10,050.0
G108-S	350	500	9	301.5	16,750.0
G109-S	350	500	9	301.5	16,750.0
G110-S	421	30	37	49.9	1,005.0
G112-S	456	230	30	320.5	7,705.0
G113-S	457	22.5	22	21.9	753.8
G115-S	933	350	4	64.4	11,725.0
G116-S	899	75	20	68.7	2,512.5
G117-S	1345	230	32	181.7	7,705.0
G119-S	1591	50	35	79.3	1,675.0
G121-S	4420 A	100	20	92.4	3,350.0
G122-S	4524	125	28	162.7	4,187.5
G123-S	5018	20	22	20.1	670.0
G127-S	7000	150	18	123.5	5,025.0
G129-S [a]	7705	95	12	51.1	6,365.0
G130-S [a]	7731	125	1	5.7	8,375.0

Unit ID	Bldg. No.	Capacity (kW)	Hours of Operation (hr/yr)	Actual Fuel Usage (gal)	Potential Fuel Usage (gal)
G131-S	7754	125	34	193.2	4,187.5
G132-S	7761	50	27	62.8	1,675.0
G133-S	7851	60	24	67.1	2,010.0
G134-S [a]	9961	150	2	11.7	10,050.0
G135-S	10504	60	6	24.5	2,010.0
G136-S	15003	45	19	38.3	1,507.5
G139-S	19107	30	32	44.1	1,005.0
G140-S	19222	30	46	63.1	1,005.0
G141-S	19298	11	18	9.3	368.5
G142-S	19501	11	23	11.5	368.5
G144-S	15505	11	22	11.1	368.5
G145-S	16010	25	99	114.3	837.5
G146-S	2916	240	19	210.8	8,040.0
G147-S [a]	2916	136	13	104.4	9,112.0
G148-S	4420 B	60	19	51.3	2,010.0
G149-S	4588	175	15	120.8	5,862.5
G150-S	6599	25	25	21.1	837.5
G151-S	19108	40	20	36.6	1,340.0
G152-S	280	25	30	34.3	837.5
G153-S	939	200	31	287.9	6,700.0
G154-S	5653	13	27	15.9	435.5
G155-S	6875	40	40	53.7	1,340.0
G156-S	7199	25	46	52.8	837.5
G157-S	6800	25	17	19.9	837.5
G158-S	9599	20	32	29.4	670.0
G159-S	19221	50	24	54.5	1,675.0
G160-S	1071	15	79	54.7	502.5
G161-S	203	22	51	51.3	737.0
G163-S	1860	100	26	174.2	3,350.0
G164-S	3000	100	35	160.5	3,350.0
G165-S	7710	80	19	70.7	2,680.0
G166-S	15017	80	30	109.3	2,680.0
G167-S	19231	80	27	98.4	2,680.0
G168-S	LWSS1	50	44	104.4	1,675.0
G169-S	LWSS2	50	18	40.5	1,675.0
G170-S	LWSS3	35	17	28.1	1,172.5
G171-S	SOSS1	35	35	23.3	1,172.5
G172-S	CRSS1	35	35	25.1	1,172.5

Unit ID	Bldg. No.	Capacity (kW)	Hours of Operation (hr/yr)	Actual Fuel Usage (gal)	Potential Fuel Usage (gal)
G174-S	7723	28	0	0	938.0
G176-S	305 (DOIM Next to 306)	80	27	99.3	2,680.0
G177-S	625	80	22	80.2	2,680.0
G178-S	8080 (Rte. 144 DOIM)	80	22	79.5	2,680.0
G179-S	19100	80	21	78.0	2,680.0
G180-S	Gate 3 (next to 7808)	74	19	52.9	2,479.0
G181-S	1412	565	0	0	0.0
G182-S	10499	60	16	43.1	2,010.0
G183-S	Gate 1	60	41	112.6	2,010.0
G184-S	Gate 5 (Bldg. 821)	60	25	69.6	2,010.0
G185-S	Gate 7 (Bldg,4501)	80	25	91.3	2,680.0
G186-S	Gate 8 (Bldg. 1100)	80	84	141.3	2,680.0
G187-S	Next to Bldg. 311	150	0	0	0
G188-S	Behind Bldg. 9719	33	0	0	0
G189-S	HQ Bldg. (HQ001)	1,000	0	0	0
G190-S	1727	35	0	0	0
Temporary	TFSS2	35	0	0	0

[a] Pumps
Unit IDs in italics are new.

TABLE 3.2
Emission Factors for Stationary IC Engines

Pollutant	Emission Factor (lb/MMBtu fuel input)[a]	
	Diesel Fuel	
	0-447 kW	>447 kW
Criteria Pollutants		
CO	0.95	0.85
NO_x	4.41	3.2
PM	0.31[b]	0.0697
PM-10	0.31	0.0573
PM-2.5	0.31[b]	0.0556
SO_2[c]	0.29	1.01(S)[d]
VOC	0.36[e]	0.0819[,f]
Hazardous Air Pollutants		
Acetaldehyde	7.67×10^{-4}	2.52×10^{-5}
Acrolein	9.25×10^{-5}	7.88×10^{-6}

Pollutant	Emission Factor (lb/MMBtu fuel input)[a]	
	Diesel Fuel	
	0-447 kW	>447 kW
Benzene	9.33×10^{-4}	7.76×10^{-4}
1,3-Butadiene	3.91×10^{-5}	--
Formaldehyde	1.18×10^{-3}	7.89×10^{-5}
Naphthalene	8.48×10^{-5}	1.30×10^{-4}
POM	8.32×10^{-5}	8.20×10^{-5}
Toluene	4.09×10^{-4}	2.81×10^{-4}
Xylene	2.85×10^{-4}	1.93×10^{-4}

[a] Emission factors are from EPA document AP-42, Section 3.3, Tables 3.3-1 and 3.3-2 and Section 3.4, Tables 3.4-1 through 3.4-4 (Ref. 1).
[b] PM and PM-2.5 factors are equal to the PM-10 factor because all emitted PM are typically < 1 μm in diameter.
[c] SO_x factor provided; assumed SO_2 equaled SO_x.
[d] The variable S in the emission factor equals the sulfur content of the fuel expressed as percent weight. The sulfur content of diesel fuel is limited to $0.05\%_w$ [CAAA of 1990, PL101-549; Section 211(i)(1)]. Therefore, the SO_2 factor was assumed to equal the value presented times 0.05.
[e] TOC factor provided; assumed VOC equaled TOC.
[f] TOC factor provided and additional data indicated that NMTOC equaled 91% of TOC; therefore, assumed VOC equaled 91% of TOC.

TABLE 3.3
Actual Emissions of Criteria Pollutants from Stationary IC Engines

IC Engine Details		Emissions (lb/yr)						
Unit ID	Building No.	CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
G102-S	3	46.94	217.88	15.32	15.32	15.32	14.33	17.79
G103-S	7	23.58	109.47	7.69	7.69	7.69	7.20	8.94
G104-S	9	177.85	825.59	58.03	58.03	58.03	54.29	67.39
G108-S	350	35.88	135.07	2.94	2.42	2.35	2.13	3.46
G109-S	350	35.88	135.07	2.94	2.42	2.35	2.13	3.46
G110-S	421	6.64	30.81	2.17	2.17	2.17	2.03	2.51
G112-S	456	42.63	197.88	13.91	13.91	13.91	13.01	16.15
G113-S	457	2.91	13.52	0.950	0.950	0.950	0.889	1.10
G115-S	933	8.57	39.76	2.79	2.79	2.79	2.61	3.25
G116-S	899	9.14	42.42	2.98	2.98	2.98	2.79	3.46
G117-S	1345	24.17	112.18	7.89	7.89	7.89	7.38	9.16
G119-S	1591	10.55	48.96	3.44	3.44	3.44	3.22	4.00
G121-S	4420 A	12.29	57.05	4.01	4.01	4.01	3.75	4.66
G122-S	4524	21.64	100.45	7.06	7.06	7.06	6.61	8.20
G123-S	5018	2.67	12.41	0.872	0.872	0.872	0.816	1.01
G127-S	7000	16.43	76.25	5.36	5.36	5.36	5.01	6.22

IC Engine Details		Emissions (lb/yr)						
Unit ID	**Building No.**	**CO**	**NO_X**	**SO_2**	**PM**	**PM-10**	**PM-2.5**	**VOC**
G129-S	7705	6.80	31.55	2.22	2.22	2.22	2.07	2.58
G130-S	7731	0.76	3.52	0.247	0.247	0.247	0.231	0.287
G131-S	7754	25.70	119.28	8.38	8.38	8.38	7.84	9.74
G132-S	7761	8.35	38.77	2.73	2.73	2.73	2.55	3.17
G133-S	7851	8.92	41.43	2.91	2.91	2.91	2.72	3.38
G134-S	9961	1.56	7.22	0.508	0.508	0.508	0.475	0.590
G135-S	10504	3.26	15.14	1.06	1.06	1.06	1.00	1.24
G136-S	15003	5.09	23.65	1.66	1.66	1.66	1.55	1.93
G139-S	19107	5.87	27.23	1.91	1.91	1.91	1.79	2.22
G140-S	19222	8.39	38.96	2.74	2.74	2.74	2.56	3.18
G141-S	19298	1.24	5.74	0.404	0.404	0.404	0.378	0.469
G142-S	19501	1.53	7.10	0.499	0.499	0.499	0.467	0.580
G144-S	15505	1.48	6.85	0.482	0.482	0.482	0.451	0.559
G145-S	16010	15.20	70.57	4.96	4.96	4.96	4.64	5.76
G146-S	2916	28.04	130.15	9.15	9.15	9.15	8.56	10.62
G147-S	2916	13.89	64.46	4.53	4.53	4.53	4.24	5.26
G148-S	4420 B	6.82	31.67	2.23	2.23	2.23	2.08	2.59
G149-S	4588	16.07	74.58	5.24	5.24	5.24	4.90	6.09
G150-S	6599	2.81	13.03	0.916	0.916	0.916	0.857	1.06
G151-S	19108	4.87	22.60	1.59	1.59	1.59	1.49	1.84
G152-S	280	4.56	21.18	1.49	1.49	1.49	1.39	1.73
G153-S	939	38.29	177.75	12.49	12.49	12.49	11.69	14.51
G154-S	5653	2.11	9.82	0.690	0.690	0.690	0.646	0.801
G155-S	6875	7.14	33.15	2.33	2.33	2.33	2.18	2.71
G156-S	7199	7.02	32.60	2.29	2.29	2.29	2.14	2.66
G157-S	6800	2.65	12.29	0.864	0.864	0.864	0.808	1.00
G158-S	9599	3.91	18.15	1.28	1.28	1.28	1.19	1.48
G159-S	19221	7.25	33.65	2.37	2.37	2.37	2.21	2.75
G160-S	1071	7.28	33.77	2.37	2.37	2.37	2.22	2.76
G161-S	203	6.82	31.67	2.23	2.23	2.23	2.08	2.59
G163-S	1860	23.17	107.55	7.56	7.56	7.56	7.07	8.78
G164-S	3000	21.35	99.09	6.97	6.97	6.97	6.52	8.09
G165-S	7710	9.40	43.65	3.07	3.07	3.07	2.87	3.56
G166-S	15017	14.54	67.48	4.74	4.74	4.74	4.44	5.51
G167-S	19231	13.09	60.75	4.27	4.27	4.27	4.00	4.96
G168-S	LWSS1	13.89	64.46	4.53	4.53	4.53	4.24	5.26
G169-S	LWSS2	5.39	25.00	1.76	1.76	1.76	1.64	2.04
G170-S	LWSS3	3.74	17.35	1.22	1.22	1.22	1.14	1.42
G171-S	SOSS1	3.10	14.39	1.01	1.01	1.01	0.95	1.17
G172-S	CRSS1	3.34	15.50	1.09	1.09	1.09	1.02	1.27

IC Engine Details		Emissions (lb/yr)						
Unit ID	**Building No.**	**CO**	**NO_X**	**SO_2**	**PM**	**PM-10**	**PM-2.5**	**VOC**
G174-S	7723	0	0	0	0	0	0	0
G176-S	305 (DOIM Next to 306)	13.21	61.31	4.31	4.31	4.31	4.03	5.00
G177-S	625	10.67	49.52	3.48	3.48	3.48	3.26	4.04
G178-S	8080 (Rte. 144 DOIM)	10.57	49.08	3.45	3.45	3.45	3.23	4.01
G179-S	19100	10.37	48.16	3.39	3.39	3.39	3.17	3.93
G180-S	Gate 3 (next to 7808)	7.04	32.66	2.30	2.30	2.30	2.15	2.67
G181-S	1412	0	0	0	0	0	0	0
G182-S	10499	5.73	26.61	1.87	1.87	1.87	1.75	2.17
G183-S	Gate 1	14.98	69.52	4.89	4.89	4.89	4.57	5.68
G184-S	Gate 5 (Bldg. 821)	9.26	42.97	3.02	3.02	3.02	2.83	3.51
G185-S	Gate 7 (Bldg,4501)	12.14	56.37	3.96	3.96	3.96	3.71	4.60
G186-S	Gate 8 (Bldg. 1100)	18.79	87.24	6.13	6.13	6.13	5.74	7.12
G187-S	Next to Bldg. 311	0	0	0	0	0	0	0
G188-S	Behind Bldg. 9719	0	0	0	0	0	0	0
G189-S	HQ Bldg. (HQ001)	0	0	0	0	0	0	0
G190-S	1727	0	0	0	0	0	0	0
Temporary	TFSS2	0	0	0	0	0	0	0
Total (lb/yr)		**955.15**	**4,370.93**	**294.15**	**293.10**	**292.96**	**273.93**	**341.67**
Total (ton/yr)		**0.48**	**2.19**	**0.15**	**0.15**	**0.15**	**0.14**	**0.17**

TABLE 3.4
Actual HAP Emissions from Stationary IC Engines

IC Engine Details		Emissions (lb/yr)								
Unit ID	Bldg. No.	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Formaldehyde	Naphthalene	POM	Toluene	Xylene
G102-S	3	0.038	0.005	0.046	0.002	0.058	0.004	0.004	0.020	0.014
G103-S	7	0.019	0.002	0.023	0.001	0.029	0.002	0.002	0.010	0.007
G104-S	9	0.144	0.017	0.175	0.007	0.221	0.016	0.016	0.077	0.053
G108-S	350	0.001	3.3E-04	0.033	-	0.003	0.005	0.003	0.012	0.008
G109-S	350	0.001	3.3E-04	0.033	-	0.003	0.005	0.003	0.012	0.008
G110-S	421	0.005	0.001	0.007	2.7E-04	0.008	0.001	0.001	0.003	0.002
G112-S	456	0.034	0.004	0.042	0.002	0.053	0.004	0.004	0.018	0.013
G113-S	457	0.002	2.8E-04	0.003	1.2E-04	0.004	2.6E-04	2.6E-04	0.001	0.001
G115-S	933	0.007	0.001	0.008	3.5E-04	0.011	0.001	0.001	0.004	0.003
G116-S	899	0.007	0.001	0.009	3.8E-04	0.011	0.001	0.001	0.004	0.003
G117-S	1345	0.020	0.002	0.024	0.001	0.030	0.002	0.002	0.010	0.007
G119-S	1591	0.009	0.001	0.010	4.3E-04	0.013	0.001	0.001	0.005	0.003
G121-S	4420 A	0.010	0.001	0.012	0.001	0.015	0.001	0.001	0.005	0.004
G122-S	4524	0.017	0.002	0.021	0.001	0.027	0.002	0.002	0.009	0.006
G123-S	5018	0.002	0.000	0.003	1.1E-04	0.003	0.000	0.000	0.001	0.001
G127-S	7000	0.013	0.002	0.016	0.001	0.020	0.001	0.001	0.007	0.005
G129-S	7705	0.005	0.001	0.007	2.8E-04	0.008	0.001	0.001	0.003	0.002
G130-S	7731	0.001	7.4E-05	0.001	3.1E-05	0.001	6.8E-05	6.6E-05	3.3E-04	0.000
G131-S	7754	0.021	0.003	0.025	0.001	0.032	0.002	0.002	0.011	0.008
G132-S	7761	0.007	0.001	0.008	3.4E-04	0.010	0.001	0.001	0.004	0.003
G133-S	7851	0.007	0.001	0.009	3.7E-04	0.011	0.001	0.001	0.004	0.003
G134-S	9961	0.001	1.5E-04	0.002	6.4E-05	0.002	1.4E-04	1.4E-04	0.001	0.000
G135-S	10504	0.003	3.2E-04	0.003	1.3E-04	0.004	2.9E-04	2.9E-04	0.001	0.001
G136-S	15003	0.004	5.0E-04	0.005	2.1E-04	0.006	4.5E-04	4.5E-04	0.002	0.002
G139-S	19107	0.005	0.001	0.006	2.4E-04	0.007	0.001	0.001	0.003	0.002
G140-S	19222	0.007	0.001	0.008	3.5E-04	0.010	0.001	0.001	0.004	0.003
G141-S	19298	0.001	1.2E-04	0.001	5.1E-05	0.002	1.1E-04	1.1E-04	0.001	3.7E-04
G142-S	19501	0.001	1.5E-04	0.002	6.3E-05	0.002	1.4E-04	1.3E-04	0.001	4.6E-04
G144-S	15505	0.001	1.4E-04	0.001	6.1E-05	0.002	1.3E-04	1.3E-04	0.001	4.4E-04
G145-S	16010	0.012	0.001	0.015	0.001	0.019	0.001	0.001	0.007	0.005
G146-S	2916	0.023	0.003	0.028	0.001	0.035	0.003	0.002	0.012	0.008
G147-S	2916	0.011	0.001	0.014	0.001	0.017	0.001	0.001	0.006	0.004
G148-S	4420 B	0.006	0.001	0.007	2.8E-04	0.008	0.001	0.001	0.003	0.002
G149-S	4588	0.013	0.002	0.016	0.001	0.020	0.001	0.001	0.007	0.005
G150-S	6599	0.002	2.7E-04	0.003	1.2E-04	0.003	2.5E-04	2.5E-04	0.001	0.001
G151-S	19108	0.004	4.7E-04	0.005	2.0E-04	0.006	4.3E-04	4.3E-04	0.002	0.001
G152-S	280	0.004	4.4E-04	0.004	1.9E-04	0.006	4.1E-04	4.0E-04	0.002	0.001
G153-S	939	0.031	0.004	0.038	0.002	0.048	0.003	0.003	0.016	0.011
G154-S	5653	0.002	2.1E-04	0.002	8.7E-05	0.003	1.9E-04	1.9E-04	0.001	0.001
G155-S	6875	0.006	0.001	0.007	2.9E-04	0.009	0.001	0.001	0.003	0.002

IC Engine Details		Emissions (lb/yr)								
Unit ID	Bldg. No.	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Formaldehyde	Naphthalene	POM	Toluene	Xylene
G156-S	7199	0.006	0.001	0.007	2.9E-04	0.009	0.001	0.001	0.003	0.002
G157-S	6800	0.002	2.6E-04	0.003	1.1E-04	0.003	2.4E-04	2.3E-04	0.001	0.001
G158-S	9599	0.003	3.8E-04	0.004	1.6E-04	0.005	3.5E-04	3.4E-04	0.002	0.001
G159-S	19221	0.006	0.001	0.007	3.0E-04	0.009	0.001	0.001	0.003	0.002
G160-S	1071	0.006	0.001	0.007	3.0E-04	0.009	0.001	0.001	0.003	0.002
G161-S	203	0.006	0.001	0.007	2.8E-04	0.008	0.001	0.001	0.003	0.002
G163-S	1860	0.019	0.002	0.023	0.001	0.029	0.002	0.002	0.010	0.007
G164-S	3000	0.017	0.002	0.021	0.001	0.027	0.002	0.002	0.009	0.006
G165-S	7710	0.008	0.001	0.009	3.9E-04	0.012	0.001	0.001	0.004	0.003
G166-S	15017	0.012	0.001	0.014	0.001	0.018	0.001	0.001	0.006	0.004
G167-S	19231	0.011	0.001	0.013	0.001	0.016	0.001	0.001	0.006	0.004
G168-S	LWSS1	0.011	0.001	0.014	0.001	0.017	0.001	0.001	0.006	0.004
G169-S	LWSS2	0.004	0.001	0.005	2.2E-04	0.007	4.8E-04	4.7E-04	0.002	0.002
G170-S	LWSS3	0.003	3.6E-04	0.004	1.5E-04	0.005	3.3E-04	3.3E-04	0.002	0.001
G171-S	SOSS1	0.003	3.0E-04	0.003	1.3E-04	0.004	2.8E-04	2.7E-04	0.001	0.001
G172-S	CRSS1	0.003	3.3E-04	0.003	1.4E-04	0.004	3.0E-04	2.9E-04	0.001	0.001
G174-S	7723	0	0	0	0	0	0	0	00	0
G176-S	305 (DOIM Next to 306)	0.011	0.001	0.013	0.001	0.016	0.001	0.001	0.006	0.004
G177-S	625	0.009	0.001	0.010	4.4E-04	0.013	0.001	0.001	0.005	0.003
G178-S	8080 (Rte. 144 DOIM)	0.009	0.001	0.010	4.4E-04	0.013	0.001	0.001	0.005	0.003
G179-S	19100	0.008	0.001	0.010	4.3E-04	0.013	0.001	0.001	0.004	0.003
G180-S	Gate 3 (next to 7808)	0.006	0.001	0.007	2.9E-04	0.009	0.001	0.001	0.003	0.002
G181-S	1412	0	0	0	-	0	0	0	0	0
G182-S	10499	0.005	0.001	0.006	2.4E-04	0.007	0.001	0.001	0.002	0.002
G183-S	Gate 1	0.012	0.001	0.015	0.001	0.019	0.001	0.001	0.006	0.004
G184-S	Gate 5 (Bldg. 821)	0.007	0.001	0.009	0.000	0.011	0.001	0.001	0.004	0.003
G185-S	Gate 7 (Bldg,4501)	0.010	0.001	0.012	5.0E-04	0.015	0.001	0.001	0.005	0.004
G186-S	Gate 8 (Bldg. 1100)	0.015	0.002	0.018	0.001	0.023	0.002	0.002	0.008	0.006
G187-S	Next to Bldg. 311	0	0	0	0	0	0	0	0	0
G188-S	Behind Bldg. 9719	0	0	0	0	0	0	0	0	0
G189-S	HQ Bldg. (HQ001)	0	0	0	-	0	0	0	0	0
G190-S	1727	0	0	0	0	0	0	0	0	0
Temporary	TFSS2	0	0	0	0	0	0	0	0	0
Total (lb/yr)		**0.72**	**0.09**	**0.93**	**0.04**	**1.10**	**0.09**	**0.08**	**0.40**	**0.28**
Total (ton/yr)		**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**

TABLE 3.5
Potential Emissions of Criteria Pollutants from Stationary IC Engines

IC Engine Details		Emissions (lb/yr)						
Unit ID	Building No.	CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
G102-S	3	1,225.26	5,687.80	399.82	399.82	399.82	374.03	464.31
G103-S	7	668.33	3,102.44	218.09	218.09	218.09	204.02	253.26
G104-S	9	1,336.65	6,204.87	436.17	436.17	436.17	408.03	506.52
G108-S	350	1,993.25	7,504.00	163.45	134.37	130.38	118.42	192.06
G109-S	350	1,993.25	7,504.00	163.45	134.37	130.38	118.42	192.06
G110-S	421	133.67	620.49	43.62	43.62	43.62	40.80	50.65
G112-S	456	1,024.77	4,757.07	334.40	334.40	334.40	312.82	388.33
G113-S	457	100.25	465.37	32.71	32.71	32.71	30.60	37.99
G115-S	933	1,559.43	7,239.02	508.87	508.87	508.87	476.04	590.94
G116-S	899	334.16	1,551.22	109.04	109.04	109.04	102.01	126.63
G117-S	1345	1,024.77	4,757.07	334.40	334.40	334.40	312.82	388.33
G119-S	1591	222.78	1,034.15	72.70	72.70	72.70	68.01	84.42
G121-S	4420 A	445.55	2,068.29	145.39	145.39	145.39	136.01	168.84
G122-S	4524	556.94	2,585.36	181.74	181.74	181.74	170.01	211.05
G123-S	5018	89.11	413.66	29.08	29.08	29.08	27.20	33.77
G127-S	7000	668.33	3,102.44	218.09	218.09	218.09	204.02	253.26
G129-S	7705	846.55	3,929.75	276.24	276.24	276.24	258.42	320.80
G130-S	7731	1,113.88	5,170.73	363.48	363.48	363.48	340.03	422.10
G131-S	7754	556.94	2,585.36	181.74	181.74	181.74	170.01	211.05
G132-S	7761	222.78	1,034.15	72.70	72.70	72.70	68.01	84.42
G133-S	7851	267.33	1,240.97	87.23	87.23	87.23	81.61	101.30
G134-S	9961	1,336.65	6,204.87	436.17	436.17	436.17	408.03	506.52
G135-S	10504	267.33	1,240.97	87.23	87.23	87.23	81.61	101.30
G136-S	15003	200.50	930.73	65.43	65.43	65.43	61.20	75.98
G139-S	19107	133.67	620.49	43.62	43.62	43.62	40.80	50.65
G140-S	19222	133.67	620.49	43.62	43.62	43.62	40.80	50.65
G141-S	19298	49.01	227.51	15.99	15.99	15.99	14.96	18.57
G142-S	19501	49.01	227.51	15.99	15.99	15.99	14.96	18.57
G144-S	15505	49.01	227.51	15.99	15.99	15.99	14.96	18.57
G145-S	16010	111.39	517.07	36.35	36.35	36.35	34.00	42.21
G146-S	2916	1,069.32	4,963.90	348.94	348.94	348.94	326.42	405.22
G147-S	2916	1,211.90	5,625.75	395.46	395.46	395.46	369.95	459.24
G148-S	4420 B	267.33	1,240.97	87.23	87.23	87.23	81.61	101.30
G149-S	4588	779.71	3,619.51	254.43	254.43	254.43	238.02	295.47

IC Engine Details		Emissions (lb/yr)						
Unit ID	**Building No.**	**CO**	**NO_X**	**SO_2**	**PM**	**PM-10**	**PM-2.5**	**VOC**
G150-S	6599	111.39	517.07	36.35	36.35	36.35	34.00	42.21
G151-S	19108	178.22	827.32	58.16	58.16	58.16	54.40	67.54
G152-S	280	111.39	517.07	36.35	36.35	36.35	34.00	42.21
G153-S	939	891.10	4,136.58	290.78	290.78	290.78	272.02	337.68
G154-S	5653	57.92	268.88	18.90	18.90	18.90	17.68	21.95
G155-S	6875	178.22	827.32	58.16	58.16	58.16	54.40	67.54
G156-S	7199	111.39	517.07	36.35	36.35	36.35	34.00	42.21
G157-S	6800	111.39	517.07	36.35	36.35	36.35	34.00	42.21
G158-S	9599	89.11	413.66	29.08	29.08	29.08	27.20	33.77
G159-S	19221	222.78	1,034.15	72.70	72.70	72.70	68.01	84.42
G160-S	1071	66.83	310.24	21.81	21.81	21.81	20.40	25.33
G161-S	203	98.02	455.02	31.99	31.99	31.99	29.92	37.14
G163-S	1860	445.55	2,068.29	145.39	145.39	145.39	136.01	168.84
G164-S	3000	445.55	2,068.29	145.39	145.39	145.39	136.01	168.84
G165-S	7710	356.44	1,654.63	116.31	116.31	116.31	108.81	135.07
G166-S	15017	356.44	1,654.63	116.31	116.31	116.31	108.81	135.07
G167-S	19231	356.44	1,654.63	116.31	116.31	116.31	108.81	135.07
G168-S	LWSS1	222.78	1,034.15	72.70	72.70	72.70	68.01	84.42
G169-S	LWSS2	222.78	1,034.15	72.70	72.70	72.70	68.01	84.42
G170-S	LWSS3	155.94	723.90	50.89	50.89	50.89	47.60	59.09
G171-S	SOSS1	155.94	723.90	50.89	50.89	50.89	47.60	59.09
G172-S	CRSS1	155.94	723.90	50.89	50.89	50.89	47.60	59.09
G174-S	7723	124.75	579.12	40.71	40.71	40.71	38.08	47.28
G176-S	305 (DOIM Next to 306)	356.44	1,654.63	116.31	116.31	116.31	108.81	135.07
G177-S	625	356.44	1,654.63	116.31	116.31	116.31	108.81	135.07
G178-S	8080 (Rte. 144 DOIM)	356.44	1,654.63	116.31	116.31	116.31	108.81	135.07
G179-S	19100	356.44	1,654.63	116.31	116.31	116.31	108.81	135.07
G180-S	Gate 3 (next to 7808)	329.71	1,530.53	107.59	107.59	107.59	100.65	124.94
G181-S	1412	0	0	0	0	0	0	0
G182-S	10499	267.33	1,240.97	87.23	87.23	87.23	81.61	101.30
G183-S	Gate 1	267.33	1,240.97	87.23	87.23	87.23	81.61	101.30
G184-S	Gate 5 (Bldg. 821)	267.33	1,240.97	87.23	87.23	87.23	81.61	101.30
G185-S	Gate 7 (Bldg,4501)	356.44	1,654.63	116.31	116.31	116.31	108.81	135.07
G186-S	Gate 8 (Bldg.	356.44	1,654.63	116.31	116.31	116.31	108.81	135.07

IC Engine Details		Emissions (lb/yr)						
Unit ID	**Building No.**	**CO**	**NO_X**	**SO_2**	**PM**	**PM-10**	**PM-2.5**	**VOC**
	1100)							
G187-S	Next to Bldg. 311	0	0	0	0	0	0	0
G188-S	Behind Bldg. 9719	0	0	0	0	0	0	0
G189-S	HQ Bldg. (HQ001)	0	0	0	0	0	0	0
G190-S	1727	0	0	0	0	0	0	0
Temporary	TFSS2	0	0	0	0	0	0	0
Total (lb/yr)		**30,539.05**	**138,267.74**	**8,991.41**	**8,933.25**	**8,925.28**	**8,342.36**	**10,446.13**
Total (ton/yr)		**15.27**	**69.13**	**4.50**	**4.47**	**4.46**	**4.17**	**5.22**

TABLE 3.6
Potential HAP Emissions from Stationary IC Engines

IC Engine Details		Emissions (lb/yr)								
Unit ID	**Bldg. No.**	**Acetaldehyde**	**Acrolein**	**Benzene**	**1,3-Butadiene**	**Formaldehyde**	**Naphthalene**	**POM**	**Toluene**	**Xylene**
G102-S	3	0.989	0.119	1.20	0.050	1.52	0.109	0.107	0.528	0.368
G103-S	7	0.540	0.065	0.656	0.028	0.830	0.060	0.059	0.288	0.200
G104-S	9	1.08	0.130	1.31	0.055	1.66	0.119	0.117	0.575	0.401
G108-S	350	0.059	0.018	1.82	-	0.185	0.305	0.192	0.659	0.453
G109-S	350	0.059	0.018	1.82	-	0.185	0.305	0.192	0.659	0.453
G110-S	421	0.108	0.013	0.13	0.006	0.166	0.012	0.012	0.058	0.040
G112-S	456	0.827	0.100	1.01	0.042	1.27	0.091	0.090	0.441	0.307
G113-S	457	0.081	0.010	0.098	0.004	0.125	0.009	0.009	0.043	0.030
G115-S	933	1.26	0.152	1.53	0.064	1.94	0.139	0.137	0.671	0.468
G116-S	899	0.270	0.033	0.328	0.014	0.415	0.030	0.029	0.144	0.100
G117-S	1345	0.827	0.100	1.01	0.042	1.27	0.091	0.090	0.441	0.307
G119-S	1591	0.180	0.022	0.219	0.009	0.277	0.020	0.020	0.096	0.067
G121-S	4420 A	0.360	0.043	0.438	0.018	0.553	0.040	0.039	0.192	0.134
G122-S	4524	0.450	0.054	0.547	0.023	0.692	0.050	0.049	0.240	0.167
G123-S	5018	0.072	0.009	0.088	0.004	0.111	0.008	0.008	0.038	0.027
G127-S	7000	0.540	0.065	0.656	0.028	0.830	0.060	0.059	0.288	0.200
G129-S	7705	0.683	0.082	0.831	0.035	1.05	0.076	0.074	0.364	0.254
G130-S	7731	0.899	0.108	1.09	0.046	1.38	0.099	0.098	0.480	0.334
G131-S	7754	0.450	0.054	0.547	0.023	0.692	0.050	0.049	0.240	0.167
G132-S	7761	0.180	0.022	0.219	0.009	0.277	0.020	0.020	0.096	0.067
G133-S	7851	0.216	0.026	0.263	0.011	0.332	0.024	0.023	0.115	0.080
G134-S	9961	1.08	0.130	1.31	0.055	1.66	0.119	0.117	0.575	0.401

IC Engine Details		Emissions (lb/yr)								
Unit ID	Bldg. No.	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Formaldehyde	Naphthalene	POM	Toluene	Xylene
G135-S	10504	0.216	0.026	0.263	0.011	0.332	0.024	0.023	0.115	0.080
G136-S	15003	0.162	0.020	0.197	0.008	0.249	0.018	0.018	0.086	0.060
G139-S	19107	0.108	0.013	0.131	0.006	0.166	0.012	0.012	0.058	0.040
G140-S	19222	0.108	0.013	0.131	0.006	0.166	0.012	0.012	0.058	0.040
G141-S	19298	0.040	0.005	0.048	0.002	0.061	0.004	0.004	0.021	0.015
G142-S	19501	0.040	0.005	0.048	0.002	0.061	0.004	0.004	0.021	0.015
G144-S	15505	0.040	0.005	0.048	0.002	0.061	0.004	0.004	0.021	0.015
G145-S	16010	0.090	0.011	0.109	0.005	0.138	0.010	0.010	0.048	0.033
G146-S	2916	0.863	0.104	1.05	0.044	1.33	0.095	0.094	0.460	0.321
G147-S	2916	0.978	0.118	1.19	0.050	1.51	0.108	0.106	0.522	0.364
G148-S	4420 B	0.216	0.026	0.263	0.011	0.332	0.024	0.023	0.115	0.080
G149-S	4588	0.630	0.076	0.766	0.032	0.968	0.070	0.068	0.336	0.234
G150-S	6599	0.090	0.011	0.109	0.005	0.138	0.010	0.010	0.048	0.033
G151-S	19108	0.144	0.017	0.175	0.007	0.221	0.016	0.016	0.077	0.053
G152-S	280	0.090	0.011	0.109	0.005	0.138	0.010	0.010	0.048	0.033
G153-S	939	0.719	0.087	0.875	0.037	1.107	0.080	0.078	0.384	0.267
G154-S	5653	0.047	0.006	0.057	0.002	0.072	0.005	0.005	0.025	0.017
G155-S	6875	0.144	0.017	0.175	0.007	0.221	0.016	0.016	0.077	0.053
G156-S	7199	0.090	0.011	0.109	0.005	0.138	0.010	0.010	0.048	0.033
G157-S	6800	0.090	0.011	0.109	0.005	0.138	0.010	0.010	0.048	0.033
G158-S	9599	0.072	0.009	0.088	0.004	0.111	0.008	0.008	0.038	0.027
G159-S	19221	0.180	0.022	0.219	0.009	0.277	0.020	0.020	0.096	0.067
G160-S	1071	0.054	0.007	0.066	0.003	0.083	0.006	0.006	0.029	0.020
G161-S	203	0.079	0.010	0.096	0.004	0.122	0.009	0.009	0.042	0.029
G163-S	1860	0.360	0.043	0.438	0.018	0.553	0.040	0.039	0.192	0.134
G164-S	3000	0.360	0.043	0.438	0.018	0.553	0.040	0.039	0.192	0.134
G165-S	7710	0.288	0.035	0.350	0.015	0.443	0.032	0.031	0.153	0.107
G166-S	15017	0.288	0.035	0.350	0.015	0.443	0.032	0.031	0.153	0.107
G167-S	19231	0.288	0.035	0.350	0.015	0.443	0.032	0.031	0.153	0.107
G168-S	LWSS1	0.180	0.022	0.219	0.009	0.277	0.020	0.020	0.096	0.067
G169-S	LWSS2	0.180	0.022	0.219	0.009	0.277	0.020	0.020	0.096	0.067
G170-S	LWSS3	0.126	0.015	0.153	0.006	0.194	0.014	0.014	0.067	0.047
G171-S	SOSS1	0.126	0.015	0.153	0.006	0.194	0.014	0.014	0.067	0.047
G172-S	CRSS1	0.126	0.015	0.153	0.006	0.194	0.014	0.014	0.067	0.047
G174-S	7723	0.101	0.012	0.123	0.005	0.155	0.011	0.011	0.054	0.037
G176-S	305 (DOIM Next to 306)	0.288	0.035	0.350	0.015	0.443	0.032	0.031	0.153	0.107
G177-S	625	0.288	0.035	0.350	0.015	0.443	0.032	0.031	0.153	0.107
G178-S	8080 (Rte. 144 DOIM)	0.288	0.035	0.350	0.015	0.443	0.032	0.031	0.153	0.107
G179-S	19100	0.288	0.035	0.350	0.015	0.443	0.032	0.031	0.153	0.107
G180-S	Gate 3 (next to 7808)	0.266	0.032	0.324	0.014	0.410	0.029	0.029	0.142	0.099

IC Engine Details		Emissions (lb/yr)								
Unit ID	**Bldg. No.**	**Acetaldehyde**	**Acrolein**	**Benzene**	**1,3-Butadiene**	**Formaldehyde**	**Naphthalene**	**POM**	**Toluene**	**Xylene**
G181-S	1412	0	0	0	N/A	0	0	0	0	0
G182-S	10499	0.216	0.026	0.263	0.011	0.332	0.024	0.023	0.115	0.080
G183-S	Gate 1	0.216	0.026	0.263	0.011	0.332	0.024	0.023	0.115	0.080
G184-S	Gate 5 (Bldg. 821)	0.216	0.026	0.263	0.011	0.332	0.024	0.023	0.115	0.080
G185-S	Gate 7 (Bldg,4501)	0.288	0.035	0.350	0.015	0.443	0.032	0.031	0.153	0.107
G186-S	Gate 8 (Bldg. 1100)	0.288	0.035	0.350	0.015	0.443	0.032	0.031	0.153	0.107
G187-S	Next to Bldg. 311	0	0	0	0	0	0	0	0	0
G188-S	Behind Bldg. 9719	0	0	0	0	0	0	0	0	0
G189-S	HQ Bldg. (HQ001)	0	0	0	-	0	0	0	0	0
G190-S	1727	0	0	0	0	0	0	0	0	0
Temporary	TFSS2	0	0	0	0	0	0	0	0	0
Total (lb/yr)		**21.56**	**2.62**	**29.72**	**1.09**	**33.35**	**2.98**	**2.71**	**12.75**	**8.87**
Total (ton/yr)		**0.01**	**<0.01**	**0.01**	**<0.01**	**0.02**	**<0.01**	**<0.01**	**0.01**	**<0.01**

4.0 ENGINE TESTING

Title V Source Designation(s)

X Significant	*Testing of IC engines burning natural gas, LPG, and/or diesel fuel with power outputs >400 hp or test durations >2,000 hr/yr*
	Testing of IC engines burning gasoline with power outputs >100 hp or test durations >500 hr/yr
__Insignificant	*Testing of IC engines burning natural gas, LPG, and/or diesel fuel with power outputs ≤400 hp and test durations ≤2,000 hr/yr*
	Testing of IC engines burning gasoline with power outputs ≤100 hp and test durations ≤500 hr/yr
__Trivial	*Not applicable*

4.1 BACKGROUND

Fort Stewart operated five engine test cells (E001-S through E005-S) that were used to perform maintenance-related tests on reciprocating internal combustion engines and transmissions used in military vehicles. There is also an additional cell with an electric motor (Cell 6) that is used for testing transmissions (E006-S) but is not considered in the emission calculations because it does not generate air emissions.

Overall the engine testing load has gone down when compared to previous years. Cell 1 was not used in 2007. Test Cells 2 and 3 test a variety of engine types. In 2007 these cells were used to test two different Detroit engines, two different Cummins engines, a 6.2L HUMMV engine and several 30 and 60 kW generators. With the exception of the 30 and 60 kW generators (40 and 80 hp), the engines tested in Cells 2 and 3 ranged between 130 and 500 hp. Cells 4 & 5 were used to test transmissions for the M113A3 Armored Personnel Carriers, M1A1 Abrams Tanks, and M88 Recovery Vehicles using a 210 hp 6V53 Detroit engine, 295 hp Cummings engine and a 550 hp AVDS 1790 engine respectively. In addition, construction of a seventh test cell at the GANG/National Guard Training Center (NGTC) facility was never completed. There are no plans to complete this cell in the foreseeable future and thus it has not been included in this inventory.

The test cells are equipped with dynamometers to accurately measure engine characteristics such as power output and engine speed. A log of engines tested and engine run times was provided for CY 2007. In 2007 the total combined engine run times in Cells 2 and 3 was 3.62 hours and for the transmission cells (Cells 4 & 5) 8.75 hours. Information regarding engine test time by engine type and test cell is summarized in Table 4.1.

The Georgia EPD has designated the operation of diesel-fired internal combustion engines with power ratings greater than 400 horsepower as “significant” sources of air pollution. Because each of the engine test cells may be used to test IC engines with power ratings greater than 400 horsepower, they are all designated as significant sources for Title V permitting purposes.

4.2 EMISSION ESTIMATES

Actual Emissions

Engine tests are conducted using jet propellant No. 8 (JP-8) fuel. Emission factors for the combustion of JP-8 fuel in internal combustion (IC) engines are not available; therefore, emission factors for the combustion of diesel fuel in IC engines were used to estimate emissions. Reciprocating engine emission factors were obtained from Sections 3.3 and 3.4 of AP-42 (Ref. 1) and are presented in Section 4.3, Table 4.2. These emission factors are dependent upon the power output (i.e., horsepower) of the engine tested, with a change in emission factors occurring at a power rating of 600 horsepower (447 kW).

Estimates of actual emissions from engine testing were done using 100 percent of the rated horsepower of each engine for the duration of the test. Actual emissions from engine testing were estimated by multiplying the engine power rating by the test duration, and the appropriate emission factor. For example, the calculation used to estimate actual CO emissions from the testing of transmissions using the 295 hp Cummings engine is given below.

Unit ID:	E004-S (Test Cell 4, Building 1064)
Type of engine:	Cummings 295 hp
Engine power rating:	295 hp, assumed to run at 100% capacity
Test duration:	1.25 hr/yr
CO emission factor:	6.68 $x10^{-3}$ lb/hp-hr

CO emissions = (295 hp) * (1.25 hr/yr) * (6.68 $x10^{-3}$ lb/hp-hr) * (1.0)
= 2.46 lb/yr

As shown in the example above, the emission factors for CO and many of the criteria pollutants are given in terms of lb/hp-hr (power output). The emission factors for particulates from engines > 600 hp and for HAPs were expressed in terms of lb/MMBtu (fuel input). Using an average brake-specific fuel consumption value of 7,000 Btu/hp-hr (Ref. 1, AP-42 Section 3.3), the HAP emission and particulate emissions for engines > 600 hp were calculated from the emission factors based on fuel input. For example, the following calculation illustrates how benzene emissions were determined for the emission unit (E004-S) shown above.

Benzene emissions = (295 hp) * (1.25 hr/yr) * (1.0) * (9.33 $x10^{-4}$ lb/MMBtu/hr) * (7,000 Btu/hp-hr)
= 0.002 lb/yr

The detailed emission estimates for engine testing are presented in Section 4.3, Tables 4.3 and 4.4.

Potential Emissions

Potential emissions were based on the maximum number of hours that could potentially be spent conducting engine tests in each cell. It was assumed that engine testing could occur 24 hours per day, 365 days per year. Historically the maximum length of each engine test conducted at E002-

S and E004-S has been 2.75 hours (engine run time) + 15 minutes for set-up and take-down (total time 3 hours per test). Therefore eight tests (24 hr/3 hr) could be conducted in one day and the potential testing hours per year would be 8,030 (2.75 hr/test * 8 tests/day * 365 days/yr). The same operating schedule was assumed for the other cells.

For the potential emissions it is assumed based on historical data, that Cell 1only tests a 750 hp AVDS 1790 2DR engine. For Cells 2 and 3, the largest engine tested in 2007 was the 430 hp 8V92 Detroit Engine. However, the 2005 AEI shows a 600 hp 903T-600 Cummins engine was tested. Site personnel indicated that this engine could be tested in future years in Cells 2 and 3, and thus the 600 hp engine was assumed for the potential emission calculations. Also, in 2007 the largest engine used in the transmissions test cells (Cells 4 and 5) was 550 hp. In 2005 the 750 hp AVDS 1790 2DR engine was used. Site personnel also indicated that this engine could also be used in the future. Thus this engine was also used for the potential emission calculations associated with Cells 4 and 5.

Potential emissions were estimated in the same manner as actual emissions, but based on the potential number of test hours; these estimates are presented in Section 4.3, Tables 4.5 and 4.6.

Emissions Summary

Table 4.0 below provides the total emissions of criteria pollutants and combined HAP from engine testing at Fort Stewart. The actual emissions for the test cells are quite low. In 2007 all of the test cells were run less than 12 hours in total. Thus, in terms of actual emissions engine testing was a comparatively minor source of air emissions when compared to the other fuel combustion sources on Fort Stewart.

TABLE 4.0
Emissions Summary – Engine Testing

Emission Type	CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC	HAP
Actual (lb/yr)	23.84	107.57	8.81	5.18	5.01	4.88	6.09	0.074
Actual (ton/yr)	0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Potential (lb/yr)	153,429.21	669,509.28	67,704.13	13,610.57	11,189.17	9,353.60	17,896.82	307.36
Potential (ton/yr)	76.71	334.75	33.85	6.81	5.59	4.68	8.95	0.15

Emission Source Updates

No significant changes from the 2006 inventory.

4.3 DETAILED SOURCE AND EMISSION TABLES

Tables 4.1 through 4.6 below provide a breakdown of the engines tested (including fuel used), emission factors used, and emission estimates for each engine.

TABLE 4.1
Engine Testing Information for CY2007

Description of Engine Tested	Actual Engine Operating Hours[a]				
	CELL 1 (E001-S)	CELL 2 (E002-S)	CELL 3 (E003-S)	CELL 4 (E004-S)	CELL 5 (E005-S)
JP-8, AVDS 1790 - 550 HP	--	--	--	--	3.67
JP-8, 6V53T DETROIT - 210 HP	--	0.65	--	--	3.83
JP-8, 8V92 DETROIT - 430 HP	--	0.13	0.22	--	--
JP-8, 6.2L HUMMV – 160 HP	--	0.07	0.20	--	--
JP-8, NTC 400 CUMMINS – 400 HP	--	0.36	0.23	--	--
JP-8, NTC 250 CUMMINS - 250 HP	--	0.30	0.05	--	--
ALLIS-CHALMERS 60KW GEN. – 80 HP	--	0.27	--	--	--
6.5L N.A. (HUMMWV) – 160 HP	--	0.12	--	--	--
30 kW ENGINE – 40 HP	--	0.11	0.92	--	--
JP-8, CUMMINS – 295 HP	--	--	--	1.25	--
Total	--	**2.00**	**1.62**	**1.25**	**7.50**

[a] Potential emissions were based on 8,031 testing hours. For Cells 1, 4, and 5 the engine type assumed was AVDS 1790-DR (750 hp). For Cells 2 and 3 the engine type assumed was 903T-600 (612 hp Cummings engine used in 2005). These were the largest engines tested over the past five years.

TABLE 4.2
Emission Factors for Engine Testing Using Diesel[a] or JP-8

Pollutant	Engine Output Rating	
	0 to 600 hp	>600 hp
Emission Factor - Criteria Pollutants (lb/hp-hr)		
CO	6.68E-03	5.50E-03
NO_X	0.031	0.024
PM	2.20E-03 [b]	0.0697 (lb/MMBtu)
PM-10	2.20E-03	0.0573 (lb/MMBtu)
PM-2.5	2.20E-03 [b]	0.0479 (lb/MMBtu)
SO_2 [c]	2.05E-03	8.09E-03(S)[d]
VOC [e]	2.51E-03	6.416E-04 [f]
Emission Factor - Hazardous Air Pollutants (lb/MMBtu[a])		
Acetaldehyde	7.67×10^{-4}	2.52×10^{-5}
Acrolein	9.25×10^{-5}	7.88×10^{-6}
Benzene	9.33×10^{-4}	7.76×10^{-4}
1,3-Butadiene	3.91×10^{-5}	--
Formaldehyde	1.18×10^{-3}	7.89×10^{-5}
Naphthalene	8.48×10^{-5}	1.30×10^{-4}

Pollutant	Engine Output Rating	
	0 to 600 hp	>600 hp
POM	8.32×10^{-5}	8.20×10^{-5}
Toluene	4.09×10^{-4}	2.81×10^{-4}
Xylenes	2.85×10^{-4}	1.93×10^{-4}

[a] Emission factors for JP-8 were assumed to equal the diesel fuel emission factors, emission factors are from EPA document AP-42, Section 3.3,Tables 3.3-1 and 3.3-2 and Section 3.4, Tables 3.4-1 through 3.4-4 (Ref. 1). A brake specific fuel consumption (BSFC) value of 7,000 Btu/hp-hr was used to convert between power output and fuel input (AP-42, Section 3.3, Ref. 1).

[b] PM and PM-2.5 factors are equal to the PM-10 factor because all emitted PM are typically < 1 μm in diameter.

[c] SO_x factor provided; assumed SO_2 equaled SO_x.

[d] The variable S in the emission factor equals the sulfur content of the fuel expressed as percent weight. The sulfur content of JP-8 fuel is limited to 0.3%w [Military Specification MIL-T-83133] Therefore, 0.3 was the value assumed for the fuel sulfur content.

[e] TOC factor provided; assumed VOC equaled TOC.

[f] TOC factor provided and additional data indicated that NMTOC equaled 91% of TOC; therefore, assumed VOC equaled 91% of TOC.

TABLE 4.3
Actual Criteria Pollutant Emissions From Engine Testing

Unit ID	Cell No.	CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
E001-S	Cell 1	0	0	0	0	0	0	0
E002-S	Cell 2	3.12	14.48	0.96	1.03	1.03	1.03	1.17
E003-S	Cell 3	1.79	8.30	0.549	0.589	0.589	0.589	0.673
E004-S	Cell 4	2.46	11.43	0.756	0.811	0.811	0.811	0.927
E005-S	Cell 5	16.47	73.36	6.54	2.75	2.58	2.45	3.32
Total (lb/yr)		**23.84**	**107.57**	**8.81**	**5.18**	**5.01**	**4.88**	**6.09**
Total (ton/yr)		**0.01**	**0.05**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**

TABLE 4.4
Actual HAP Emissions from Engine Testing

Unit ID	Emissions (lb/yr)								
	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Formaldehyde	Naphthalene	POM	Toluene	Xylenes
E001-S	0	0	0	0	0	0	0	0	0
E002-S	0.003	3.0E-04	0.003	1.3E-04	0.004	2.8E-04	2.7E-04	0.001	0.001
E003-S	0.001	1.7E-04	0.002	7.3E-05	0.002	1.6E-04	1.6E-04	0.001	0.001
E004-S	0.002	2.4E-04	0.002	1.0E-04	0.003	2.2E-04	2.1E-04	0.001	0.001
E005-S	0.005	0.001	0.016	2.2E-04	0.008	0.002	0.002	0.006	0.004
Total (lb/yr)	**0.011**	**0.001**	**0.023**	**0.001**	**0.017**	**0.003**	**0.002**	**0.009**	**0.007**
Total (ton/yr)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**

TABLE 4.5
Potential Criteria Pollutant Emissions From Engine Testing

Unit ID	Cell No.	CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
E001-S	Cell 1	33,123.75	144,540.00	14,616.61	2,938.38	2,415.62	2,019.34	3,863.73
E002-S	Cell 2	27,028.98	117,944.64	11,927.15	2,397.72	1,971.15	1,647.78	3,152.81
E003-S	Cell 3	27,028.98	117,944.64	11,927.15	2,397.72	1,971.15	1,647.78	3,152.81
E004-S	Cell 4	33,123.75	144,540.00	14,616.61	2,938.38	2,415.62	2,019.34	3,863.73
E005-S	Cell 5	33,123.75	144,540.00	14,616.61	2,938.38	2,415.62	2,019.34	3,863.73
Total (lb/yr)		**153,429.21**	**669,509.28**	**67,704.13**	**13,610.57**	**11,189.17**	**9,353.60**	**17,896.82**
Total (ton/yr)		**76.71**	**334.75**	**33.85**	**6.81**	**5.59**	**4.68**	**8.95**

TABLE 4.6
Potential HAP Emissions from Engine Testing

Unit ID	Emissions (lb/yr)								
	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Formaldehyde	Naphthalene	POM	Toluene	Xylenes
E001-S	1.06	0.332	32.71	-	3.33	5.48	3.46	11.85	8.14
E002-S	0.867	0.271	26.69	-	2.71	4.47	2.82	9.67	6.64
E003-S	0.867	0.271	26.69	-	2.71	4.47	2.82	9.67	6.64
E004-S	1.06	0.332	32.71	-	3.33	5.48	3.46	11.85	8.14
E005-S	1.06	0.332	32.71	-	3.33	5.48	3.46	11.85	8.14
Total (lb/yr)	**4.92**	**1.54**	**151.53**	**-**	**15.41**	**25.39**	**16.01**	**54.87**	**37.69**
Total (ton/yr)	**<0.01**	**<0.01**	**0.08**	**-**	**0.01**	**0.01**	**0.01**	**0.03**	**0.02**

5.0 ABRASIVE BLASTING

Title V Source Designation(s)

___	*Significant*	*Any abrasive blasting operation that is not considered "insignificant" or "trivial" as described below*
X	*Insignificant*	*Abrasive blasting operations that are stationary provided that the activity is performed indoors, no significant fugitive particulate emissions enter the environment, and no visible emissions enter the outdoor atmosphere.* *Portable blast-cleaning equipment* *Blast-cleaning equipment using a suspension of abrasive in water and any exhaust system or collector serving them exclusively*
___	*Trivial*	*Repair or maintenance activities that are not related to the source's primary business activity and do not otherwise trigger a permit modification or do not utilize control devices (i.e., required to be listed in Title V permit application).*

5.1 BACKGROUND

Fort Stewart conducts abrasive blasting operations (i.e., rust, corrosion, or paint removal operations conducted using sand and glass beads) at many locations on post. Nine stationary, indoor abrasive blasting operations were identified. The drive-in blasting booth (Unit ID A105-S, Bldg. 1074) is used to conduct all of the blasting that was previously performed outside. Data regarding the location, type of operation conducted, air pollution control equipment used, type and quantity of blasting media used, and quantity of dust collected was obtained during a site visit (see Table 1.0 for data POCs) and is summarized in Table 5.0. With the exception of the drive in booth, all the units identified were self-contained glove box blast cabinets.

The inventoried operations are stationary, all activities are performed indoors, allow no significant fugitive particulate emissions to enter the environment, and allow no visible emissions to enter the outdoor environment. Therefore, they are categorized as "insignificant" sources of air pollution.

5.2 EMISSION ESTIMATES

Actual Emissions

Abrasive blasting operations are sources of particulate emissions. The quantity of particulate emissions is dependent upon the quantity of abrasive blasting waste produced and the efficiency of the control device. Fabric filters and/or cyclones control the particulate emissions from each of these operations; however, no specific data were available regarding the particulate control efficiency of the control devices.

Fabric filters are capable of capturing and controlling most particulate emissions that are 5 microns or greater in diameter. The particulate matter control efficiency for fabric filter-controlled abrasive blasting operations is 98 percent or greater. For the seven-glove box cabinets the quantity of abrasive used is small and all exhaust is vented to a cyclone followed by a fabric filter.

Emissions from each of the abrasive blasting operations were estimated using mass balance procedures described in Section 2 of the U.S. Air Force Document *Air Emission Inventory Guidance Document for Stationary Source at Air Force Installation* (Ref. 2). The emissions were estimated using the amount of blasting media used in the unit during the year and by assuming a fabric/cyclone collection efficiency of 98 percent. The amount of media was estimated by shop personnel are shown in Table 5.0. The following example illustrates how emissions were calculated.

Unit ID:	A105-S
Total amount of dust collected*:	27,000 lb/year *: Weight of dust collected that was assumed to represent weight of blast media used.
Particulate matter captured by control:	98%

Particulate matter emissions = (27,000 lb/yr) * (1-0.98%) = 540.00 lb/yr

All of the particulate emissions from the abrasive blasting operations were assumed to be classified as PM-10 and PM-2.5.

Potential Emissions

Emissions from abrasive blasting operations are proportional to the number of hours the operations are conducted per year. The number of hours per year for abrasive blasting operations was assumed proportional to the number of hours the installation operates per year. Actual installation operations were estimated to occur 2,080 hours per year. Potentially, the installation could operate at 8,760 hours per year. The actual emissions were multiplied by a factor of 4.21 (8,760/2,080).

The use of air pollution control equipment should not be included in potential emission estimates unless the use of the control equipment is included as a federally enforceable condition in a permit. The use of particulate control equipment on Fort Stewart's abrasive blasting operations is not federally enforceable. However, the control devices installed on the inventoried units are integral components of the operational equipment. As such, abrasive blasting operations are not conducted without the operation of the control device and thus the control efficiencies were accounted for when determining potential emissions.

Emissions Summary

Table 5.0 below provides the total emissions of criteria pollutants from abrasive blasting operations at Fort Stewart.

TABLE 5.0
Abrasive Blasting Details and Emissions Summary

Unit ID	Building Number	Media Type	Capture Efficiency (%)	Blast Media Used (lb/yr)		PM Emissions (lb/yr)	
				Actual	Potential	Actual	Potential
A101-S	SS1052	Glass Beads	98	106	446	2.12	8.93
A105-S	1074	Sand	98	27,000*	113,712	540.00	2,274.23
A106-S	1170	Glass Beads	98	106	446	2.12	8.93
A107-S	1503	Sand	99.99	0	446	0.00	0.04
A108-S	10531	Glass Beads	98	477	2,009	9.54	40.18
A109-S	1170	Glass Beads	98	106	446	2.12	8.93
A110-S	1170	Glass Beads	98	106	446	2.12	8.93
A111-S	1065	Glass Beads	98	106	446	2.12	8.93
A112-S	1065	Glass Beads	98	106	446	2.12	8.93
A113-S	10501	Glass Beads	98	0	446	0	8.93
					Total (lb/yr)	**562.26**	**2,376.95**
					Total (ton/yr)	**0.28**	**1.19**

*: Amount of dust collected, assumed equal to the amount of blast media used.

Emission Source Updates

The following updates were made from the 2006 inventory.

- Added A113-S (Bldg. 10501), unit located outside and not used in 2007 (calculated potential emissions only).

6.0 STORAGE TANKS

Title V Source Designation(s)

X Significant	*Petroleum storage tanks with a capacity ≥40,000 gallons storing a liquid with a true vapor pressure >0.50 psia*
	Petroleum storage tanks with a capacity ≥10,000 gallons storing a liquid with a true vapor pressure of >2.0 psia
	Petroleum storage tanks that are subject to any standard, limitation, or other requirement under Sections 111 or 112 (excluding Section 112(r)) of the CAAA of 1990
	Chemical storage tanks storing a liquid with a true vapor pressure >0.19 psia
X Insignificant	*Petroleum storage tanks storing a liquid with a true vapor pressure ≤0.50 psia*
	Petroleum storage tanks with a capacity <40,000 gallons storing a liquid with a true vapor pressure of ≤2.0 psia that are not subject to any standard, limitation, or other requirement under Sections 111 or 112 (excluding Section 112(r)) of the CAAA of 1990
	Petroleum storage tanks with a capacity <10,000 gallons
	Chemical storage tanks storing a liquid with a true vapor pressure ≤0.19 psia
X Trivial	*Storage tanks storing substances that will not emit any VOC or HAPs*

6.1 BACKGROUND

Fort Stewart operates and maintains numerous fuel storage tanks throughout the installation. The tanks contain jet fuel (JP-8), motor gasoline (MOGAS), diesel fuel, fuel oil, used/waste oil, off-specification JP-8, and LPG. Data regarding storage tanks and fuel throughput was obtained during the site visits, through email, and over the telephone. No data were obtained for storage tanks containing used/waste oil or LPG because air pollution emissions from these tanks are negligible.

One hundred thirty-four (134) storage tanks were identified for this inventory. See Section 6.3, Table 6.1 for a list of the tanks identified. A small number of larger tanks handle a majority of the fuel stored on Fort Stewart. The fuel stored in the greatest quantity is JP-8. Six (6) aboveground storage tanks (ASTs) located at the Contractor Owned Contractor Operated (COCO) bulk storage facility handle a majority of the JP-8 used on Fort Stewart. The JP-8 tank capacities range between 20,000 and 40,000 gallons. In addition, the COCO facility also has two (2) storage tanks for diesel and one (1) for MOGAS. The vast majority of the fuel stored at the COCO facility is loaded into tank trucks (See Section 7.0 Fuel Loading) and distributed across Fort Stewart. A relatively small potion of the fuel is dispensed from retail pumps. The single MOGAS tank utilizes Stage I vapor recovery.

A majority of the MOGAS stored at Fort Stewart is associated with retail service stations for privately owned vehicle (POV) fueling. Three (3) 12,000 gallon underground storage tanks (USTs) store MOGAS at the AAFES service station located at Building 7336 (Bryan Village Shoppette), and one (1) 10,000 gallon and three (3) 12,000 gallon USTs store MOGAS at the AAFES service station located at Building 939 (Victory Shoppette). All of these tanks utilize Stage I vapor recovery when they are loaded.

Twenty-two of the tanks identified (T301-S through T354-S) store fuel oil used by boilers or other heating equipment. Fuel oil for the CEP (Bldg. 1412) is stored in two 165,000-gallon ASTs (T333-S and T334-S). Sixty-five of the tanks identified (T602-S through T678-S) store diesel fuel that is used by stationary internal combustion engines (pumps and emergency generators). A majority of the remaining tanks identified support fueling operations for government owned vehicles (GOV).

Tanks storing MOGAS with a capacity greater than 10,000 gallons were classified as significant sources. All remaining tanks qualified as ether trivial or insignificant sources.

Fuel throughputs for the storage tank that support stationary engine testing operations and the tanks that support emergency generators and pumps were calculated based on the engines' power ratings and hours of operation as discussed in the Sections 3.0 and 4.0. Fuel throughput for tanks associated with heating units was obtained from DPW records. See Table 1.0 for the primary POCs that provided tank and fuel throughput data.

6.2 EMISSION ESTIMATES

The method used to calculate actual and potential emissions is described below. Also provided is a summary of total emissions for all storage tanks.

Actual Emissions

Storage tank emissions are the result of tank breathing and working losses. Breathing losses may be responsible for a significant fraction of the overall emissions from aboveground storage tanks, but these losses are typically negligible from underground storage tanks. However, breathing losses from underground storage tanks that are used to store gasoline can be responsible for a significant fraction of their overall emissions.

Uncontrolled working (filling) and breathing (standing) losses from above-ground storage tanks and working losses from underground storage tanks were determined using the AP-42 equations in Section 7.1.3.1 (Ref. 1) and through the use of EPA's TANKS program (Ref. 3). The fuel throughputs used in estimating the emissions are given in Table 6.1. The emissions form USTs associated with the AAFES service stations (Buildings 7736 and 939) were determined using the methodology and emission factors given in AP-42, Section 5.2, Table 5.2-7 (Ref. 1). JP-8 properties were taken from the *Air Emission Inventory Guidance Document for Stationary Sources at Air Force Installations* (Ref. 2) and from *Useful Properties/Characteristics of JP-8 Fuel for Performing Air Emissions Inventories* (Ref. 4). Due to the complexity of the equations

used to calculate VOC emissions from ASTs a sample calculation is not shown. A sample calculation is presented for VOC emissions from USTs associated with POV service stations, and for the fuel oil/diesel USTs. The example calculations are shown below.

Gasoline Service Station UST

Unit ID:	T002-S (Tank has Balanced Submerged Filling (Stage I)
Capacity:	12,000 gal
Gasoline Throughput:	1,494,275 gal/yr
VOC Emission Factor:	0.3 lb/1000 gal (Displacement Loss with Stage I)[a]
VOC Emission Factor:	1.0 lb/1000 gal (Breathing Loss)[a]

[a] Emission factors from AP-42, Section 5.2, Table 5.2-7 (Ref. 1)

VOC losses/emissions = (1,494,275 gal/yr) * (0.3lb/1,000 gal + 1.0 lb/1,000 gal) * (1/1,000 gal)
= 1,942.56 lb/yr

Fuel Oil UST Emission Calculation

Working loss = (0.0010) * (M_v) * (P_{VA}) * (Q) * (K_N) * (K_p) (AP-42 Section 7.1.3.1)

M_v = molecular weight of vapor (lb/lb mole)
P_{VA} = true vapor pressure of vapor (psia)
K_N = turnover factor (= 1.0 for N <36)
K_p = product factor (1.0 for all organic liquids except crude oil)
Q = annual throughput bbl/yr

Unit ID:	T301-S (Fuel Oil No.2)
Capacity:	4,000 gal
Fuel Throughput, (Q):	1,827.4 gal/yr
Vapor pressure, P_{VA}	0.0074 psi
Molecular Wt, M_v	130 lb/lb mole

VOC working loss = (0.0010) * (130 lb/lb mole) * (0.0074 psi) * (1,827.4 gal) * (1.0) * (1.0) * [1 barrel/42 gallons]
= 0.042 lb/yr

Note: Breathing losses associated with USTs storing fuel oil No. 2/diesel and JP-8 were considered negligible and thus were not calculated.

In addition to VOCs, several HAPs are emitted from fuel storage tanks. HAPs present in JP-8, diesel fuel, and MOGAS were identified based on the speciated profiles presented in Section 6.3, Tables 6.2, 6.3 and 6.4, respectively. Because of the similarity between No.2 fuel oil and diesel fuel, the HAP present in No.2 fuel oil were assumed to be the same as those present in diesel fuel.

The quantity of HAP emitted from each fuel storage tank was estimated by multiplying the quantity of fuel vapor emitted from each tank (VOC) by each HAP vapor phase weight percent from the applicable speciated profile. For example, the calculation used to estimate the quantity of benzene emitted from the storage of MOGAS in tank T002-S is shown below.

Unit ID:	T002-S (UST storing MOGAS)
VOC losses:	1,942.56 lb/yr
Benzene content VOC vapor:	0.6 $\%_w$ (MOGAS fuel profile)

Benzene Emissions = (1,942.56 lb/yr) * (0.6)* (1/100)
= 11.66 lb/yr

Actual VOC and HAP emissions from fuel storage tanks are found in Section 6.3, Table 6.5.

Potential Emissions

Storage tank emissions are proportional to fuel throughput. Potential emissions were estimated by increasing the fuel throughput for each tank to the maximum physical or operational limit. Throughputs for tanks supporting the COCO facility were based upon maximum tank loading and unloading rates and the time (overhead time) needed to prepare a fuel delivery prior to unloading. The maximum amount of fuel that could be processed through the COCO facility tanks was determined in Section 7.0, Fueling Operations. One limiting factor for the COCO facility is that pumps can be used for fuel receiving and issues but cannot perform both operations simultaneously. For a complete description on how the potential throughput was determined see Section 7.0.

Potential throughputs for the MOGAS USTs at the Victory and Bryan Village Shoppettes (Service Stations) were based on potential gallons dispensed as determined in Section 7.0. The methodology used was based on EPAs' *Technical Support Document for Potential to Emit Guidance Memo* (Ref. 5). The methodology assumed a per vehicle fuel dispensing rate of 10 gallons per minute and that each vehicle being refueled is replaced by another vehicle every 10 minutes (6 vehicles per hour). Also considered in the methodology is the number of refueling positions.

Potential throughputs for storage tanks that support GOV fueling operations were assumed to be proportional to the number of hours the installation operates per year. Actual installation operations were estimated to occur 2,080 hours per year. Potentially, the installation could operate 8,760 hours per year. Thus the potential throughputs were estimated by multiplying the actual throughputs for each tank by the ratio of 8,760/2,080.

Potential throughputs for storage tanks supporting heating units/boilers, IC engine units, and engine testing operations are limited by the maximum consumption rates of the units they supply. Potential throughput estimates for heating units, IC engines, and engine testing operations are discussed in detail in Sections 2.0, 3.0, and 4.0 respectively.

Potential VOC and HAP emissions from fuel storage tanks are found in Section 6.3, Table 6.6.

Emissions Summary

Table 6.0 provides the total emissions of VOCs and combines HAPs from fuel storage tanks at Fort Stewart.

TABLE 6.0
Emissions Summary – Fuel Storage Tanks

Emission Type	VOC	HAP
Actual (lb/yr)	13,004.26	947.52
Actual (ton/yr)	6.50	0.47
Potential (lb/yr)	28,044.74	1,994.77
Potential (ton/yr)	14.02	1.00

Emission Source Updates

The following updates were made from the 2006 inventory:

- T104-S: Updated building number from 2905 to 2902.
- T305-S (Bldg. 9), T316-S (Bldg. 450): Updated tank type from AST to UST.
- Deleted T310-S (Bldg. 402 - Demolished) and T315-S (Bldg. 419).
- T663-S, T669-S, and T670-S: Updated building numbers.
- Added the following ASTs associated with new generators: T673-S (Bldg. 10499), T674-S (Bldg. 7808), T675-S (Gate 1), T676-S (Gate 5), T677-S (Gate 7), and T678-S (Gate 8).
- Added T672-S (Bldg. 203).

6.3 DETAILED SOURCE AND EMISSIONS TABLES

Tables 6.1 through 6.6 below provide a breakdown of the fuel storage tanks, fuel speciation profiles, and emission estimates for each tank.

TABLE 6.1
Storage Tanks

Unit ID	Building No. / Location	Capacity (gal)	Tank Type	Fuel Stored	Throughput (gal/yr)	
					Actual	Potential
T001-S	350	20,000	AST	Diesel	0	750,857
T002-S[a]	939	12,000	UST	MOGAS	1,494,275	2,687,480
T003-S[a]	939	10,000	UST	MOGAS	1,245,229	2,239,567
T004-S[a]	939	10,000	UST	MOGAS	403,734	726,123
T005-S[a]	939	10,000	UST	MOGAS	363,650	654,031
T022-S[a]	COCO	20,000	AST	MOGAS	245,480	22,365,957
T023-S[a]	7336	12,000	UST	MOGAS	1,075,112	4,428,219
T024-S[a]	7336	12,000	UST	MOGAS	126,236	519,946
T025-S[a]	7336	12,000	UST	MOGAS	74,738	307,834
T101-S	1175	1,000	AST	MOGAS	8,400	35,377
T102-S	2151	550	AST	Diesel	2,200	9,265
T103-S	2151	550	AST	MOGAS	3,600	15,162
T104-S	2905	5,000	AST	Diesel	14,362	60,486
T108-S	GANG 10511	6,000	AST	Diesel	3,752	15,802
T109-S	GANG 10511	1,500	AST	MOGAS	1,653	6,962
T114-S	GANG Alpha Range	500	AST	Diesel	653	2,751
T116-S	GANG Fox Trot Range	500	AST	Diesel	653	2,751
T118-S	GANG Golf Range	500	AST	Diesel	0	0
T121-S	GANG MPRC Range	500	AST	Diesel	653	2,751
T122-S	COCO	20,000	AST	Diesel	91,999	10,690,169
T123-S	COCO	20,000	AST	JP-8	130,830	7,423,729
T124-S	COCO	30,000	AST	JP-8	196,244	11,135,593
T125-S	COCO	30,000	AST	JP-8	196,244	11,135,593
T126-S	8064 - Forestry	5,000	AST	MOGAS	18,437	77,648
T127-S	8064 - Forestry	5,000	AST	Diesel	38,348	161,504
T128-S	8073 - Range Supply	500	AST	MOGAS	957	4,031
T129-S	8081-Range Control	500	AST	Diesel	653	2,751
T130-S	1157	12,000	AST	JP-8	30,399	128,027
T131-S	1171	250	AST	JP-8	1,800	7,581
T132-S	1171	250	AST	JP-8	1,800	7,581
T133-S	1175	1,000	AST	JP-8	9,600	40,431
T134-S	1175	500	AST	Kerosene	0	0

Unit ID	Building No. / Location	Capacity (gal)	Tank Type	Fuel Stored	Throughput (gal/yr)	
					Actual	Potential
T135-S	COCO	40,000	AST	JP-8	261,659	14,847,458
T136-S	COCO	40,000	AST	JP-8	261,659	14,847,458
T137-S	COCO	40,000	AST	JP-8	261,659	14,847,458
T138-S	COCO	40,000	AST	Diesel	183,997	21,380,339
T139-S	GANG Hotel Range	500	AST	JP-8	653	2,751
T140-S	17003 - Ammo. Supply Pt.	500	AST	Diesel	*454*	1,912
T141-S	1412	500	AST	Diesel	*4,000*	16,846
T142-S	DMMC Hotel Range	500	AST	MOGAS	*957*	4,031
T143-S	DMMC Alpha Range	500	AST	MOGAS	*957*	4,031
T144-S	DMMC Fox Trot Range	500	AST	MOGAS	*957*	4,031
T145-S	DMMC Golf Range	500	AST	MOGAS	*0*	0
T146-S	DMMC MPRC Range	500	AST	MOGAS	*957*	4,031
T206-S	10522	10,000	AST	JP-8	11,181	47,089
T207-S	1064 - DOL Test Cells	1,500	AST	JP-8	*354*	1,597,812
T301-S	1	4,000	UST	No. 2	1,827	140,786
T302-S	4	1,000	UST	No. 2	286	29,409
T305-S	9	550	UST	No. 2	421	11,826
T311-S	410	1,000	UST	No. 2	2,140	43,112
T313-S	418	1,000	UST	No. 2	250	30,410
T314-S	419	4,000	UST	No. 2	12,316	86,349
T316-S	450	550	UST	No. 2	777	12,389
T330-S	1245	5,000	UST	No. 2	4,836	94,483
T331-S	1310	1,000	UST	No. 2	558	25,029
T333-S	1412	165,000	AST	No. 2	1,670	361,283
T334-S	1412	165,000	AST	No. 2	1,670	361,283
T335-S	1630	6,000	UST	No. 2	2,916	125,143
T336-S	1820	1,500	UST	No. 2	2,205	40,546
T337-S	2150	1,000	UST	No. 2	189	21,837
T339-S	7704	1,000	AST	No. 2	3,741	63,072
T342-S	8084	500	AST	No. 2	1,494	36,604
T345-S	17003	500	AST	No. 2	250	6,507
T346-S	17005	500	AST	No. 2	738	19,898
T347-S	19102	1,500	UST	No. 2	2,968	25,467

Unit ID	Building No. / Location	Capacity (gal)	Tank Type	Fuel Stored	Throughput (gal/yr)	
					Actual	Potential
T348-S	19103	3,000	UST	No. 2	2,311	40,546
T349-S	19104	3,000	UST	No. 2	4,481	135,154
T353-S	19225	3,000	UST	No. 2	4,266	75,086
T354-S	1186	500	UST	No. 2	*250*	11,826
T602-S	3	1,000	AST	Diesel	353	9,213
T603-S	7	1,000	AST	Diesel	177	5,025
T604-S	9	1,000	AST	Diesel	1,337	10,050
T608-S	421	500	AST	Diesel	50	1,005
T610-S	456	250	AST	Diesel	321	7,705
T611-S	457	250	AST	Diesel	22	754
T613-S	899	1,000	AST	Diesel	69	2,513
T614-S	933	1,000	AST	Diesel	64	11,725
T615-S	1345	250	AST	Diesel	182	7,705
T617-S	1591	500	AST	Diesel	79	1,675
T619-S	4420A	2,000	AST	Diesel	92	3,350
T620-S	4524	1,000	AST	Diesel	163	4,188
T621-S	5018	500	AST	Diesel	20	670
T623-S	5653	250	AST	Diesel	16	436
T625-S	7000	250	AST	Diesel	124	5,025
T626-S	7199	250	AST	Diesel	53	838
T627-S	7705	500	AST	Diesel	51	6,365
T628-S	7731	250	AST	Diesel	6	8,375
T629-S	7754	1,000	AST	Diesel	193	4,188
T630-S	7761	500	AST	Diesel	63	1,675
T631-S	7851	1,000	AST	Diesel	67	2,010
T632-S	9961	2,000	AST	Diesel	12	10,050
T633-S	10504	500	AST	Diesel	25	2,010
T634-S	15003	500	AST	Diesel	38	1,508
T636-S	16010	250	AST	Diesel	114	838
T637-S	19107	500	AST	Diesel	44	1,005
T638-S	19222	500	AST	Diesel	63	1,005
T639-S	19298	250	AST	Diesel	9	369
T640-S	19501	250	AST	Diesel	12	369
T641-S	15505	250	AST	Diesel	11	369
T642-S	2916	250	AST	Diesel	211	8,040
T643-S	2916	300	AST	Diesel	104	9,112
T644-S	4420B	500	AST	Diesel	51	2,010
T645-S	4588	1000	AST	Diesel	121	5,863

Unit ID	Building No. / Location	Capacity (gal)	Tank Type	Fuel Stored	Throughput (gal/yr)	
					Actual	Potential
T646-S	6599	500	AST	Diesel	21	838
T647-S	19108	1,000	AST	Diesel	37	1,340
T648-S	280	500	AST	Diesel	34	838
T649-S	939	500	AST	Diesel	288	6,700
T650-S	6875	125	AST	Diesel	54	1,340
T651-S	7199	250	AST	Diesel	53	838
T652-S	6800	85	AST	Diesel	20	838
T653-S	9599	260	AST	Diesel	29	670
T654-S	19221	600	AST	Diesel	55	1,675
T655-S	1071	500	AST	Diesel	55	503
T658-S	1860	194	AST	Diesel	174	3,350
T659-S	3000 - DOIM	500	AST	Diesel	161	3,350
T660-S	LWSS1	145	AST	Diesel	101	1,675
T661-S	LWSS2	145	AST	Diesel	41	1,675
T662-S	LWSS3	145	AST	Diesel	28	1,173
T663-S	SOSS1	145	AST	Diesel	23	1,173
T664-S	625-DOIM	303	AST	Diesel	80	2,680
T665-S	19100 - DOIM Evans Field	303	AST	Diesel	78	2,680
T666-S	7710 - DOIM	305	AST	Diesel	71	2,680
T667-S	15017 -DOIM	305	AST	Diesel	109	2,680
T668-S	19231 -DOIM	305	AST	Diesel	98	2,680
T669-S	305 - DOIM	303	AST	Diesel	99	2,680
T670-S	8080 - DOIM	303	AST	Diesel	80	2,680
T671-S	7723	250	AST	Diesel	0	0
T672-S	203	500	AST	Diesel	51	737
T673-S	10499	305*	AST	Diesel	43	2,010
T674-S	7808	305*	AST	Diesel	53	2,479
T675-S	Gate1	305*	AST	Diesel	113	2,010
T676-S	Gate 5	305*	AST	Diesel	70	2,010
T677-S	Gate 7	305*	AST	Diesel	91	2,680
T678-S	Gate 8	305*	AST	Diesel	141	2,680

[a] Significant Title V Source
Unit IDs in italics are new.

TABLE 6.2
Speciated Profiles for JP-8 Fuel

Hazardous Air Pollutant	Content ($\%_w$)	
	Liquid Phase	Vapor Phase
Benzene	0.033	0.613
Cumene	0.179	0.330
Ethylbenzene	0.157	0.271
Naphthalene	0.264	0.003
Toluene	0.216	1.143
2,2,4-Trimethylpentane	0.001	0.010
Xylenes	1.173	1.877

Source: *Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations*, Chapter 13 (Ref. 2).

TABLE 6.3
Speciated Profiles for Diesel Fuel

Hazardous Air Pollutant	Content ($\%_w$)[a]	
	Liquid Phase	Vapor Phase
Benzene	0.2	7.2
Cumene	0.1	0.4
Ethylbenzene	0.2	0.7
Hexane	0.04	2.3
Naphthalene	0.2	Negligible
Toluene	0.4	4.1
Xylenes	0.8	2.5

Source: *Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations*, Chapter 13 (Ref. 2).

TABLE 6.4
Speciated Profiles for MOGAS

Hazardous Air Pollutant	Content ($\%_w$)	
	Liquid Phase	Vapor Phase
Benzene	1.8	0.6
Cumene	0.5	0.02
Ethylbenzene	1.4	0.04
Hexane	1.0	0.5
Methyl tert-Butyl Ether	4.5	4.6
Naphthalene	0.3	Negligible
Toluene	7.0	0.7
2,2,4-Trimethylpentane	4.0	0.7
Xylenes	7.0	0.2

Source: *Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations*, Chapter 15 (Ref. 2).

TABLE 6.5
Actual Emissions from Storage Tanks

Unit ID	Fuel Stored	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
T001-S	Diesel	0	0	0	0	0	-	0	0	-	0
T002-S	MOGAS	1,942.56	11.66	0.389	0.78	9.71	89.36	0	13.60	13.60	3.89
T003-S	MOGAS	1,618.80	9.71	0.324	0.648	8.09	74.46	0	11.33	11.33	3.24
T004-S	MOGAS	524.85	3.15	0.105	0.210	2.62	24.14	0	3.67	3.67	1.05
T005-S	MOGAS	472.75	2.84	0.095	0.189	2.36	21.75	0	3.31	3.31	0.95
T022-S	MOGAS	3,640.28	21.84	0.728	1.46	18.20	167.45	0	25.48	25.48	7.28
T023-S	MOGAS	1,397.65	8.39	0.280	0.559	6.99	64.29	0	9.78	9.78	2.80
T024-S	MOGAS	164.11	0.985	0.033	0.066	0.82	7.55	0	1.15	1.15	0.328
T025-S	MOGAS	97.16	0.583	0.019	0.039	0.486	4.47	0	0.680	0.680	0.194
T101-S	MOGAS	288.99	1.73	0.058	0.116	1.44	13.29	0	2.02	2.02	0.578
T102-S	Diesel	0.19	0.014	0.001	0.001	0.004	-	0	0.008	-	0.005
T103-S	MOGAS	158.43	0.95	0.032	0.063	0.792	7.29	0	1.11	1.11	0.317
T104-S	Diesel	1.74	0.125	0.007	0.012	0.040	-	0	0.071	-	0.044
T108-S	Diesel	1.51	0.109	0.006	0.011	0.035	-	0	0.062	-	0.038
T109-S	MOGAS	310.38	1.86	0.062	0.124	1.55	14.28	0	2.17	2.17	0.62
T114-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T116-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T118-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T121-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T122-S	Diesel	7.17	0.516	0.029	0.050	0.165	-	0	0.294	-	0.179
T123-S	JP-8	48.23	0.296	0.159	0.131	-	-	1.4E-03	0.551	4.8E-03	0.905
T124-S	JP-8	72.11	0.442	0.238	0.195	-	-	2.2E-03	0.824	7.2E-03	1.35
T125-S	JP-8	72.11	0.442	0.238	0.195	-	-	2.2E-03	0.824	7.2E-03	1.35
T126-S	MOGAS	1,021.03	6.13	0.204	0.408	5.11	46.97	0	7.15	7.15	2.04

Unit ID	Fuel Stored	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
T127-S	Diesel	2.21	0.159	0.009	0.015	0.051	-	0	0.091	-	0.055
T128-S	MOGAS	124.55	0.747	0.025	0.050	0.623	5.73	0	0.87	0.872	0.249
T129-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T130-S	JP-8	21.33	0.131	0.070	0.058	-	-	6.4E-04	0.244	2.1E-03	0.400
T131-S	JP-8	0.65	0.004	0.002	0.002	-	-	2.0E-05	0.007	6.5E-05	0.012
T132-S	JP-8	0.65	0.004	0.002	0.002	-	-	2.0E-05	0.007	6.5E-05	0.012
T133-S	JP-8	2.80	0.017	0.009	0.008	-	-	8.4E-05	0.032	2.8E-04	0.053
T134-S	Kerosene	0	-	-	-	-	-	-	-	-	-
T135-S	JP-8	95.94	0.588	0.317	0.260	-	-	2.9E-03	1.1E+00	9.6E-03	1.80
T136-S	JP-8	95.94	0.588	0.317	0.260	-	-	2.9E-03	1.1E+00	9.6E-03	1.80
T137-S	JP-8	95.94	0.588	0.317	0.260	-	-	2.9E-03	1.1E+00	9.6E-03	1.80
T138-S	Diesel	14.27	1.027	0.057	0.100	0.328	-	0	0.585	-	0.357
T139-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T140-S	Diesel	0.13	0.009	0.001	0.001	0.003	-	0	0.005	-	0.003
T141-S	Diesel	0.23	0.017	0.001	0.002	0.005	-	0	0.009	-	0.006
T142-S	MOGAS	143.28	0.860	0.029	0.057	0.716	6.59	0	1.00	1.00	0.287
T143-S	MOGAS	149.85	0.899	0.030	0.060	0.749	6.89	0	1.05	1.05	0.300
T144-S	MOGAS	122.45	0.735	0.024	0.049	0.612	5.63	0	0.857	0.857	0.245
T145-S	MOGAS	113.47	0.681	0.023	0.045	0.567	5.22	0	0.794	0.794	0.227
T146-S	MOGAS	122.45	0.735	0.024	0.049	0.612	5.63	0	0.857	0.857	0.245
T206-S	JP-8	15.61	0.096	0.052	0.042	-	-	4.7E-04	0.178	1.6E-03	0.293
T207-S	JP-8	1.88	0.012	0.006	0.005	-	-	5.6E-05	0.021	1.9E-04	0.035
T301-S	No. 2	0.04	0.003	1.7E-04	2.9E-04	0.001	-	0	0.002	-	0.001
T302-S	No. 2	0.01	4.7E-04	2.6E-05	4.6E-05	1.5E-04	-	0	2.7E-04	-	1.6E-04
T305-S	No. 2	0.01	0.001	3.9E-05	6.7E-05	2.2E-04	-	0	4.0E-04	-	2.4E-04

Unit ID	Fuel Stored	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
T311-S	No. 2	0.05	0.004	2.0E-04	3.4E-04	0.001	-	0	0.002	-	0.001
T313-S	No. 2	0.01	4.1E-04	2.3E-05	4.0E-05	1.3E-04	-	0	2.3E-04	-	0.000
T314-S	No. 2	0.28	0.020	1.1E-03	0.002	0.006	-	0	0.012	-	0.007
T316-S	No. 2	0.02	0.001	7.1E-05	1.2E-04	4.1E-04	-	0	0.001	-	4.4E-04
T330-S	No. 2	0.11	0.008	4.4E-04	7.8E-04	0.003	-	0	0.005	-	0.003
T331-S	No. 2	0.01	0.001	5.1E-05	8.9E-05	2.9E-04	-	0	0.001	-	0.000
T333-S	No. 2	15.36	1.106	0.061	0.108	0.353	-	0	0.630	-	0.384
T334-S	No. 2	15.36	1.106	0.061	0.108	0.353	-	0	0.630	-	0.384
T335-S	No. 2	0.07	0.005	2.7E-04	4.7E-04	0.002	-	0	0.003	-	0.002
T336-S	No. 2	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T337-S	No. 2	0.00	3.1E-04	1.7E-05	3.0E-05	1.0E-04	-	0	1.8E-04	-	1.1E-04
T339-S	No. 2	0.33	0.024	0.001	0.002	0.008	-	0	0.014	-	0.008
T342-S	No. 2	0.16	0.012	0.001	0.001	0.004	-	0	0.007	-	0.004
T345-S	No. 2	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T346-S	No. 2	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T347-S	No. 2	0.07	0.005	2.7E-04	4.8E-04	0.002	-	0	0.003	-	0.002
T348-S	No. 2	0.05	0.004	2.1E-04	3.7E-04	0.001	-	0	0.002	-	0.001
T349-S	No. 2	0.10	0.007	4.1E-04	0.001	0.002	-	0	0.004	-	0.003
T353-S	No. 2	0.10	0.007	3.9E-04	0.001	0.002	-	0	0.004	-	0.002
T354-S	No. 2	0.01	0.000	2.3E-05	4.0E-05	1.3E-04	-	0	2.3E-04	-	1.4E-04
T602-S	Diesel	0.24	0.017	0.001	0.002	0.006	-	0	0.010	-	0.006
T603-S	Diesel	0.24	0.017	0.001	0.002	0.006	-	0	0.010	-	0.006
T604-S	Diesel	0.27	0.019	0.001	0.002	0.006	-	0	0.011	-	0.007
T608-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T610-S	Diesel	0.06	0.004	2.4E-04	4.2E-04	0.001	-	0	0.002	-	0.002

Unit ID	Fuel Stored	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
T611-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T613-S	Diesel	0.23	0.017	0.001	0.002	0.005	-	0	0.009	-	0.006
T614-S	Diesel	0.23	0.017	0.001	0.002	0.005	-	0	0.009	-	0.006
T615-S	Diesel	0.06	0.004	2.4E-04	4.2E-04	0.001	-	0	0.002	-	0.002
T617-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T619-S	Diesel	0.46	0.033	0.002	0.003	0.011	-	0	0.019	-	0.012
T620-S	Diesel	0.24	0.017	0.001	0.002	0.006	-	0	0.010	-	0.006
T621-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T623-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T625-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T626-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T627-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T628-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T629-S	Diesel	0.24	0.017	0.001	0.002	0.006	-	0	0.010	-	0.006
T630-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T631-S	Diesel	0.23	0.017	0.001	0.002	0.005	-	0	0.009	-	0.006
T632-S	Diesel	0.46	0.033	0.002	0.003	0.011	-	0	0.019	-	0.012
T633-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T634-S	Diesel	0.13	0.009	5.2E-04	0.001	0.003	-	0	0.005	-	0.003
T636-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T637-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T638-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T639-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T640-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T641-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001

Unit ID	Fuel Stored	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
T642-S	Diesel	0.06	0.004	2.4E-04	4.2E-04	0.001	-	0	0.002	-	0.002
T643-S	Diesel	0.06	0.004	2.4E-04	4.2E-04	0.001	-	0	0.002	-	0.002
T644-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T645-S	Diesel	0.22	0.016	0.001	0.002	0.005	-	0	0.009	-	0.006
T646-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T647-S	Diesel	0.22	0.016	0.001	0.002	0.005	-	0	0.009	-	0.006
T648-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T649-S	Diesel	0.13	0.009	0.001	0.001	0.003	-	0	0.005	-	0.003
T650-S	Diesel	0.03	0.002	1.2E-04	2.1E-04	0.001	-	0	0.001	-	0.001
T651-S	Diesel	0.06	0.004	2.4E-04	4.2E-04	0.001	-	0	0.002	-	0.002
T652-S	Diesel	0.03	0.002	1.2E-04	2.1E-04	0.001	-	0	0.001	-	0.001
T653-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T654-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T655-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T658-S	Diesel	0.06	0.004	2.4E-04	4.2E-04	0.001	-	0	0.002	-	0.002
T659-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T660-S	Diesel	0.03	0.002	1.2E-04	2.1E-04	0.001	-	0	0.001	-	0.001
T661-S	Diesel	0.03	0.002	1.2E-04	2.1E-04	0.001	-	0	0.001	-	0.001
T662-S	Diesel	0.03	0.002	1.2E-04	2.1E-04	0.001	-	0	0.001	-	0.001
T663-S	Diesel	0.03	0.002	1.2E-04	2.1E-04	0.001	-	0	0.001	-	0.001
T664-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T665-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T666-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T667-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T668-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002

Unit ID	Fuel Stored	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
T669-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T670-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T671-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T672-S	Diesel	0.12	0.009	4.8E-04	8.4E-04	0.003	-	0	0.005	-	0.003
T673-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T674-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T675-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T676-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T677-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T678-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
Total (lb/yr)		**13,004.26**	**82.58**	**4.48**	**6.86**	**63.63**	**571.00**	**0.02**	**95.66**	**86.94**	**36.35**
Total (ton/yr)		**6.50**	**0.04**	**<0.01**	**<0.01**	**0.03**	**0.29**	**<0.01**	**0.05**	**0.04**	**0.02**

TABLE 6.6
Potential Emissions from Storage Tanks

Unit ID	Fuel Stored	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
T001-S	Diesel	22.31	1.61	0.089	0.156	0.513	-	0	0.915	-	0.558
T002-S	MOGAS	3,493.72	20.96	0.699	1.40	17.47	160.71	0	24.46	24.46	6.99
T003-S	MOGAS	2,911.44	17.47	0.582	1.16	14.56	133.93	0	20.38	20.38	5.82
T004-S	MOGAS	943.96	5.66	0.189	0.378	4.72	43.42	0	6.61	6.61	1.89
T005-S	MOGAS	850.24	5.10	0.170	0.340	4.25	39.11	0	5.95	5.95	1.70
T022-S	MOGAS	5,612.08	33.67	1.12	2.24	28.06	258.16	0	39.28	39.28	11.22
T023-S	MOGAS	5,756.69	34.54	1.15	2.30	28.78	264.81	0	40.30	40.30	11.51
T024-S	MOGAS	675.93	4.06	0.135	0.270	3.38	31.09	0	4.73	4.73	1.35
T025-S	MOGAS	400.18	2.40	0.080	0.160	2.00	18.41	0	2.80	2.80	0.800
T101-S	MOGAS	530.27	3.18	0.106	0.212	2.65	24.39	0	3.71	3.71	1.06
T102-S	Diesel	0.38	0.027	0.002	0.003	0.009	-	0	0.016	-	0.010
T103-S	MOGAS	266.97	1.60	0.053	0.107	1.33	12.28	0	1.87	1.87	0.534
T104-S	Diesel	3.53	0.254	0.014	0.025	0.081	-	0	0.145	-	0.088
T108-S	Diesel	1.83	0.132	0.007	0.013	0.042	-	0	0.075	-	0.046
T109-S	MOGAS	360.22	2.16	0.072	0.144	1.80	16.57	0	2.52	2.52	0.720
T114-S	Diesel	0.19	0.014	0.001	0.001	0.004	-	0	0.008	-	0.005
T116-S	Diesel	0.19	0.014	0.001	0.001	0.004	-	0	0.008	-	0.005
T118-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T121-S	Diesel	0.19	0.014	0.001	0.001	0.004	-	0	0.008	-	0.005
T122-S	Diesel	68.61	4.94	0.274	0.480	1.578	-	0	2.81	-	1.72
T123-S	JP-8	315.44	1.93	1.04	0.855	-	-	0.009	3.61	0.032	5.92
T124-S	JP-8	472.08	2.89	1.56	1.28	-	-	0.014	5.40	0.047	8.86
T125-S	JP-8	472.08	2.89	1.56	1.28	-	-	0.014	5.40	0.047	8.86
T126-S	MOGAS	1,576.92	9.46	0.315	0.631	7.88	72.54	0	11.04	11.04	3.15

Unit ID	Fuel Stored	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
T127-S	Diesel	5.50	0.396	0.022	0.039	0.127	-	0	0.226	-	0.138
T128-S	MOGAS	153.41	0.920	0.031	0.061	0.767	7.06	0	1.07	1.07	0.307
T129-S	Diesel	0.19	0.014	0.001	0.001	0.004	-	0	0.008	-	0.005
T130-S	JP-8	36.55	0.224	0.121	0.099	-	-	0.001	0.418	0.004	0.686
T131-S	JP-8	1.55	0.010	0.005	0.004	-	-	4.7E-05	0.018	1.6E-04	0.029
T132-S	JP-8	1.55	0.010	0.005	0.004	-	-	4.7E-05	0.018	1.6E-04	0.029
T133-S	JP-8	6.75	0.041	0.022	0.018	-	-	2.0E-04	0.077	0.001	0.127
T134-S	Kerosene	0.00	-	-	-	-	-	-	-	-	-
T135-S	JP-8	628.79	3.85	2.08	1.70	-	-	0.019	7.19	0.063	11.80
T136-S	JP-8	628.79	3.85	2.08	1.70	-	-	0.019	7.19	0.063	11.80
T137-S	JP-8	628.79	3.85	2.08	1.70	-	-	0.019	7.19	0.063	11.80
T138-S	Diesel	136.87	9.85	0.547	0.958	3.15	-	0	5.61	-	3.42
T139-S	Diesel	0.19	0.014	0.001	0.001	0.004	-	0	0.008	-	0.005
T140-S	Diesel	0.17	0.012	0.001	0.001	0.004	-	0	0.007	-	0.004
T141-S	Diesel	0.57	0.041	0.002	0.004	0.013	-	0	0.023	-	0.014
T142-S	MOGAS	239.01	1.43	0.048	0.096	1.20	10.99	0	1.67	1.67	0.478
T143-S	MOGAS	266.69	1.60	0.053	0.107	1.33	12.27	0	1.87	1.87	0.533
T144-S	MOGAS	151.31	0.908	0.030	0.061	0.757	6.96	0	1.06	1.06	0.303
T145-S	MOGAS	113.47	0.681	0.023	0.045	0.57	5.22	0	0.794	0.794	0.227
T146-S	MOGAS	151.31	0.908	0.030	0.061	0.757	6.96	0	1.06	1.06	0.303
T206-S	JP-8	21.21	0.130	0.070	0.057	-	-	0.001	0.242	0.002	0.398
T207-S	JP-8	49.52	0.304	0.163	0.134	-	-	0.001	0.566	0.005	0.929
T301-S	No. 2	3.22	0.232	0.013	0.023	0.074	-	0	0.132	-	0.081
T302-S	No. 2	0.67	0.048	0.003	0.005	0.015	-	0	0.028	-	0.017
T305-S	No. 2	0.27	0.020	0.001	0.002	0.006	-	0	0.011	-	0.007

Unit ID	Fuel Stored	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
T311-S	No. 2	0.99	0.071	0.004	0.007	0.023	-	0	0.040	-	0.025
T313-S	No. 2	0.70	0.050	0.003	0.005	0.016	-	0	0.029	-	0.017
T314-S	No. 2	1.98	0.142	0.008	0.014	0.045	-	0	0.081	-	0.049
T316-S	No. 2	0.28	0.020	0.001	0.002	0.007	-	0	0.012	-	0.007
T330-S	No. 2	2.16	0.156	0.009	0.015	0.050	-	0	0.089	-	0.054
T331-S	No. 2	0.57	0.041	0.002	0.004	0.013	-	0	0.024	-	0.014
T333-S	No. 2	24.97	1.798	0.100	0.175	0.574	-	0	1.024	-	0.624
T334-S	No. 2	24.97	1.798	0.100	0.175	0.574	-	0	1.024	-	0.624
T335-S	No. 2	2.87	0.206	0.011	0.020	0.066	-	0	0.118	-	0.072
T336-S	No. 2	0.93	0.067	0.004	0.007	0.021	-	0	0.038	-	0.023
T337-S	No. 2	0.50	0.036	0.002	0.004	0.012	-	0	0.021	-	0.013
T339-S	No. 2	1.31	0.094	0.005	0.009	0.030	-	0	0.054	-	0.033
T342-S	No. 2	0.68	0.049	0.003	0.005	0.016	-	0	0.028	-	0.017
T345-S	No. 2	0.29	0.021	0.001	0.002	0.007	-	0	0.012	-	0.007
T346-S	No. 2	0.60	0.043	0.002	0.004	0.014	-	0	0.025	-	0.015
T347-S	No. 2	0.58	0.042	0.002	0.004	0.013	-	0	0.024	-	0.015
T348-S	No. 2	0.93	0.067	0.004	0.007	0.021	-	0	0.038	-	0.023
T349-S	No. 2	3.10	0.223	0.012	0.022	0.071	-	0	0.127	-	0.077
T353-S	No. 2	1.72	0.124	0.007	0.012	0.040	-	0	0.071	-	0.043
T354-S	No. 2	0.27	0.020	0.001	0.002	0.006	-	0	0.011	-	0.007
T602-S	Diesel	0.48	0.035	0.002	0.003	0.011	-	0	0.020	-	0.012
T603-S	Diesel	0.37	0.027	0.001	0.003	0.009	-	0	0.015	-	0.009
T604-S	Diesel	0.50	0.036	0.002	0.004	0.012	-	0	0.021	-	0.013
T608-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T610-S	Diesel	0.26	0.019	0.001	0.002	0.006	-	0	0.011	-	0.007

Unit ID	Fuel Stored	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
T611-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T613-S	Diesel	0.30	0.022	0.001	0.002	0.007	-	0	0.012	-	0.008
T614-S	Diesel	0.55	0.040	0.002	0.004	0.013	-	0	0.023	-	0.014
T615-S	Diesel	0.26	0.019	0.001	0.002	0.006	-	0	0.011	-	0.007
T617-S	Diesel	0.16	0.012	0.001	0.001	0.004	-	0	0.007	-	0.004
T619-S	Diesel	0.55	0.040	0.002	0.004	0.013	-	0	0.023	-	0.014
T620-S	Diesel	0.34	0.024	0.001	0.002	0.008	-	0	0.014	-	0.009
T621-S	Diesel	0.13	0.009	0.001	0.001	0.003	-	0	0.005	-	0.003
T623-S	Diesel	0.06	0.004	2.4E-04	4.2E-04	0.001	-	0	0.002	-	0.002
T625-S	Diesel	0.19	0.014	0.001	0.001	0.004	-	0	0.008	-	0.005
T626-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T627-S	Diesel	0.29	0.021	0.001	0.002	0.007	-	0	0.012	-	0.007
T628-S	Diesel	0.26	0.019	0.001	0.002	0.006	-	0	0.011	-	0.007
T629-S	Diesel	0.34	0.024	0.001	0.002	0.008	-	0	0.014	-	0.009
T630-S	Diesel	0.16	0.012	0.001	0.001	0.004	-	0	0.007	-	0.004
T631-S	Diesel	0.29	0.021	0.001	0.002	0.007	-	0	0.012	-	0.007
T632-S	Diesel	0.73	0.053	0.003	0.005	0.017	-	0	0.030	-	0.018
T633-S	Diesel	0.17	0.012	0.001	0.001	0.004	-	0	0.007	-	0.004
T634-S	Diesel	0.16	0.012	0.001	0.001	0.004	-	0	0.007	-	0.004
T636-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T637-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T638-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T639-S	Diesel	0.06	0.004	2.4E-04	4.2E-04	0.001	-	0	0.002	-	0.002
T640-S	Diesel	0.06	0.004	2.4E-04	4.2E-04	0.001	-	0	0.002	-	0.002
T641-S	Diesel	0.06	0.004	2.4E-04	4.2E-04	0.001	-	0	0.002	-	0.002

Unit ID	Fuel Stored	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
T642-S	Diesel	0.26	0.019	0.001	0.002	0.006	-	0	0.011	-	0.007
T643-S	Diesel	0.31	0.022	0.001	0.002	0.007	-	0	0.013	-	0.008
T644-S	Diesel	0.17	0.012	0.001	0.001	0.004	-	0	0.007	-	0.004
T645-S	Diesel	0.38	0.027	0.002	0.003	0.009	-	0	0.016	-	0.010
T646-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T647-S	Diesel	0.25	0.018	0.001	0.002	0.006	-	0	0.010	-	0.006
T648-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T649-S	Diesel	0.30	0.022	0.001	0.002	0.007	-	0	0.012	-	0.008
T650-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T651-S	Diesel	0.08	0.006	3.2E-04	0.001	0.002	-	0	0.003	-	0.002
T652-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T653-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T654-S	Diesel	0.17	0.012	0.001	0.001	0.004	-	0	0.007	-	0.004
T655-S	Diesel	0.13	0.009	0.001	0.001	0.003	-	0	0.005	-	0.003
T658-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T659-S	Diesel	0.21	0.015	0.001	0.001	0.005	-	0	0.009	-	0.005
T660-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T661-S	Diesel	0.07	0.005	2.8E-04	4.9E-04	0.002	-	0	0.003	-	0.002
T662-S	Diesel	0.06	0.004	2.4E-04	4.2E-04	0.001	-	0	0.002	-	0.002
T663-S	Diesel	0.06	0.004	2.4E-04	4.2E-04	0.001	-	0	0.002	-	0.002
T664-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T665-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T666-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T667-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T668-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004

Unit ID	Fuel Stored	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
T669-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T670-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T671-S	Diesel	0.05	0.004	2.0E-04	3.5E-04	0.001	-	0	0.002	-	0.001
T672-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T673-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T674-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T675-S	Diesel	0.10	0.007	4.0E-04	0.001	0.002	-	0	0.004	-	0.003
T676-S	Diesel	0.12	0.009	4.8E-04	0.001	0.003	-	0	0.005	-	0.003
T677-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
T678-S	Diesel	0.14	0.010	0.001	0.001	0.003	-	0	0.006	-	0.004
Total (lb/yr)		**28,044.74**	**190.33**	**16.97**	**20.92**	**129.81**	**1,124.88**	**0.10**	**221.91**	**171.50**	**118.35**
Total (ton/yr)		**14.02**	**0.10**	**0.01**	**0.01**	**0.06**	**0.56**	**<0.01**	**0.11**	**0.09**	**0.06**

7.0 FUELING OPERATIONS

Title V Source Designation(s)

X	*Significant*	*Fueling operations that are not considered insignificant as listed below*
X	*Insignificant*	*Gasoline storage and handling equipment at loading facilities handling < 20,000 gallons per day or at vehicle dispensing facilities that are not subject to any standard, limitation, or other requirement under Section 111 or 112 (excluding 112(r)) if the Federal Clean Air Act* *Other fueling operations that are not subject to any specific state or federal standard or permit condition that have potential emissions <10,000 lb/yr of any regulated air pollutant, <1,000 lb/yr of any regulated HAP, and <2,500 lb/yr of a combination of regulated HAPs*
__	*Trivial*	*Not applicable*

7.1 BACKGROUND

To serve the operational needs of GOV, POV, and other fuel burning equipment, Fort Stewart has a number of fueling operations. A fueling operation is defined as the transfer of fuel from 1) a storage tank into to a tank truck or vehicle, or 2) a tank truck into a vehicle (including aircraft). These types of operations result in VOC and HAP emissions. Fuel transfers from tank trucks into storage tanks also generate VOC and HAP emissions; however, emissions from those transfers were previously addressed as emissions from storage tanks (see Section 6.0).

All liquid fuels that support Fort Stewart fueling operations are supplied to Fort Stewart by commercial tank trucks. Contractors deliver JP-8, diesel, and MOGAS to the storage tanks located at the COCO fueling facility. Contractors also deliver MOGAS directly to the storage tanks located at the Bryan Village Shoppette, the Victory Shoppette, and other fuel dispensing points on Fort Stewart. In a similar manner contractors deliver diesel fuel to various fuel dispensing points. Table 7.1 given in Section 7.3 shows the various locations on Fort Stewart that are engaged in fueling operations and provides data on the amount of fuel dispensed and/or transferred in 2007. The primary fuel loading activity (transfer of fuel from storage tanks to tank trucks) occurs at the COCO plant. The vast majority of the remaining fueling operations are fuel dispensing into vehicles (POV, GOV) and equipment. Most significant are the operations that involve the transfer and dispensing of MOGAS as these operations emit VOCs at rates that are between 37 and 350 times greater than VOC emission rates associated with JP-8 and diesel transfer/fueling operations.

Information on the quantities of fuel transferred/dispensed was obtained from multiple sources. The primary points of contacts for this information are given in Section 1.0, Table 1.0.

Except for gasoline handling systems at vehicle fuel dispensing facilities the Georgia EPD has not provided specific guidance regarding the designation of fueling operations as "significant," "insignificant," or "trivial" sources of air pollution. However, as per Georgia EPD *Major Source Operating Permit Application Introduction and Instructions*, an activity is designated as an insignificant source if it is: (1) not subject to any specific state or federal standard or permit condition and (2) generates potential emissions that are less than 10,000 lb/yr of any regulated air pollutant, less than 1,000 lb/yr of any regulated HAP, and less than 2,500 lb/yr of a combination of regulated HAPs. Based on these specifications, the gasoline dispensing activities located at Buildings 939 (F001-S) and 7336 (F002-S) are designated as significant sources.

7.2 EMISSION ESTIMATES

The method used to calculate actual and potential emissions is described below. Also provided is a summary of total emissions for all fueling operations, and a discussion of changes since the 2006 inventory.

Actual Emissions

Fueling operations result in the displacement of vapor from tank trucks and from aircraft/vehicle fuel tanks. The discussion of how emissions are estimated is segregated based on the type of fueling operation.

Tank Truck Fuel Loading Operations

Vapor displacement emissions from tank truck fuel loading were estimated using the "loading loss" equation for loading petroleum liquids from AP-42, Section 5.2, Equation 1 (Ref. 1). The emission factor is dependent upon the fuel temperature, vapor pressure, molecular weight, and a saturation factor, as follows:

$$E_R = 12.46 * [(M) * (P) * (S) / (T)] \qquad \text{Equation (Eq.) 7.1}$$

where: E_R = Emissions due to vapor displacement (lb/1,000 gal fuel transferred)
M = Fuel vapor molecular weight (lb/pound moles [lb-mol])
P = True fuel vapor pressure (psia)
S = Saturation factor for fuel loading method
T = Temperature of fuel loaded, °R (degrees Fahrenheit [°F] + 460)

All of the tank trucks and aircraft use a submerged loading method without vapor recovery. Values for the variables in Equation 7.1 along with the calculated emission factors (E_R) are presented in Section 7.3, Table 7.2.

Actual VOC emissions due to vapor displacement from tank truck fuel loading were calculated by multiplying the quantities of fuel transferred by the appropriate emission factor (E_R). For example, the calculation used to estimate the quantity of VOC emitted from the transfer/loading of JP-8 to tank trucks is presented below.

Unit ID/Activity.:	F139-S (JP-8 Loading to Tank Truck at COCO Bulk Storage Facility)
Quantity of JP-8 loaded:	1,176,887 gal/yr
Vapor displacement emission factor:	0.07129 lb/1,000 gal
VOC content of vapor:	$100\%_w$

VOC emissions = (1,176,887 gal/yr) * (0.07129 lb/1,000 gal) * (1.0)
= 83.90 lb/yr

In addition to VOC, several HAPs are emitted during fuel loading. HAPs present in JP-8, MOGAS and diesel fuel were already presented in Section 6.0, Tables 6.2 through 6.4. Because of the similarity between No. 2 fuel oil and diesel fuel, the HAP present in No. 2 fuel oil were assumed to be the same as those present in diesel fuel. The quantity of each HAP emitted due to vapor displacement was estimated by multiplying the quantity of vapor/VOC emitted by the HAP vapor phase weight percent. For example, the calculation used to estimate the quantity of benzene emitted from the transfer of JP-8 to tank trucks is presented below.

Unit ID:	F139-S
Diesel vapor displacement emissions:	83.90 lb/yr
Benzene content of JP-8 vapor:	$0.613\ \%_w$

Benzene emissions = (83.90 lb/yr) * (0.613%)
= 0.514 lb/yr

In addition to filling losses, organic fuel vapors are emitted from tank trucks due to standing/breathing losses; these emissions are called transit losses. Currently, the only documented emission factor for tank truck transit losses is 0.01 lb of organic vapor per 1,000 gallons of MOGAS transported [EPA document AP-42, Section 5.2 (Ref. 1)]. No factors have been developed for the transport of other fuels. Transit losses were included in the estimation of emissions from the MOGAS tank truck filling operation at the COCO fuel storage facility.

Vehicle Fuel Dispensing Operations

Vapor displacement emissions from GOV and POV vehicle fuel dispensing operations were estimated using emission factors from EPA document AP-42, Section 5.2 (Ref. 1). The emission factor for fueling MOGAS-powered vehicles (AP-42, Section 5.2, Equation 6) is dependent upon the temperature of the fuel in the vehicle fuel tank, the temperature of the dispensed fuel, and the Reid vapor pressure of the fuel. The MOGAS emission factor is calculated as follows:

$$E_R = 2.2046 * [(0.0884) * (T_D) + (0.485) * (RVP) - (0.0949)* (\Delta T) - 5.909] \quad \text{Eq. 7.2}$$

where: E_R = Emissions due to vapor displacement (lb/1,000 gal fuel transferred)
T_D = Temperature of dispensed fuel (°F)
RVP = Reid vapor pressure (psia)
ΔT = Temperature difference (°F) between fuel in vehicle tank and dispensed fuel

There is no similar equation for fueling of non-MOGAS-powered vehicles. Therefore, the "loading loss" equation for petroleum liquids (Eq. 7.1 shown previously) was used with the splash loading value entered for the saturation factor (S). The resulting emission factors for splash loading of diesel and JP-8 were used to estimate the VOC emissions associated with fuel dispensing for diesel and JP-8.

Representative values for the variables in Equations 7.1 and 7.2, along with the calculated emission factors (E_R) are presented in Section 7.3, Table 7.3*.

***Note**: The vapor displacement factor determined for MOGAS fuel dispensing was calculated using area specific values for the variables (RVP, T_D, ΔT) in equation 7.2 and does not account for Stage II controls for vapor recovery. Inspection of the MOGAS dispensing facilities verified that none of the fuel dispensing activities on Fort Stewart has a vapor recovery system.

Actual VOC emissions due to vapor displacement from GOV and POV fuel dispensing operations were calculated by multiplying the quantities of fuel transferred by the appropriate emission factor as demonstrated previously under the tank truck fuel-loading example.
In the case of MOGAS dispensing the vapor displacement factor was added to an emission factor that accounted for vapor losses that result from fuel spillage. The spillage factor (0.7 lb per 1,000 gallons of fuel dispensed) was obtained from AP-42, Section 5.2, Table 5.2-7 (Ref. 1). The example below shows the calculation for VOC emissions due to MOGAS dispensing at the Bryan Village Shoppette (Unit ID F002-S).

Unit ID:	F002-S
MOGAS throughput:	1,299,877 gal/yr
Uncontrolled refueling losses:	13.3627 lb/10^3 gal [AP-42, Section 5.2, Eq. 6 (Ref. 1) & EPA Guidance Document: 50/3-91-022a (Ref. 6)]
Spillage losses:	0.7 lb/1,000 gal [AP-42 Section 5.2, Table 5.2-7 (Ref. 1)]

VOC emissions = (1,299,877 gal/yr * 0.7 lb/1,000 gal * 1/1,000 gal) + (1,299,877 gal/yr * 13.3627 lb/1,000 gal * 1/1,000 gal)
= 909.91 + 17,369.87 = 18,279.78 lb/yr

The quantity of each HAP emitted due to fuel dispensing was estimated by multiplying the VOC fueling losses by the HAP <u>liquid</u> phase weight percent. For example, the calculation used to estimate the quantity of benzene emitted due to MOGAS fuel dispensing at the Bryan Shoppette is presented below.

Unit ID:	F002-S
VOC emissions:	18,279.78 lb/yr
Benzene content of vapor gasoline:	$0.6\%_w$

Benzene Emissions = (18,279.78 lb/yr) * (0.006) = 109.68 lb/yr

Actual VOC and HAP emissions from fueling operations (i.e., cumulative emissions from each source due to vapor displacement, transit losses, and/or fuel spillage) are presented in Section 7.3, Table 7.4.

Potential Emissions

Emissions from fueling operations are proportional to the quantity of fuel transferred. Potential gasoline dispensed at the Victory and Bryan Village Shopettes were based on EPAs *Technical Support Document for Potential to Emit Guidance Memo, Documentation of Emission Calculations* (Ref. 5). The methodology presented assumed a per vehicle fuel dispensing rate of 10 gallons per minute and that each vehicle being refueled is replaced by another vehicle every 10 minutes (6 vehicles per hour). This is equivalent to one gallon per minute [10 gallons/minute * 6 * 1/60) minutes) for each refueling position. The number of refueling positions is the number of vehicles that could be pumping fuel simultaneously. For the Bryan Village Shoppette it was determined that there are 10 refueling positions. For the Victory Shoppette 12 refueling positions were identified. Thus for example, the potential gasoline dispensed for the Bryan Village Shoppette (F002-S) would be calculated as follows:

Potential MOGAS dispensed = (1 gal/min) * (8,760 hr/yr) * (60 min/hr) * 10
= 5,256,000 gal/yr

The amount of potential fuel transferred into tank trucks at the COCO facility is limited by the rate at which the facility can receive fuel. The following was used to determine the rate at which fuel can be received into the facility. The result will then be used as the potential fuel transfer/issues to tank trucks.

The potential amount of fuel (JP-8, MOGAS & Diesel) transferred to tank trucks at the COCO facility was calculated based on the following:

1. Four bulk fueling stations [two (2) 300 gal/min pumps for the transfer of JP-8, one (1) 125 gal/min pump for the transfer of MOGAS, and one (1) 220 gal/min pump for the transfer of diesel].
2. Each pump can be used for fuel receiving and issues **but cannot perform both operations simultaneously**. Thus, the maximum amount of fuel received over 6 months would represent the maximum amount of fuel that could be issued in the following 6-month period. These issues would represent the potential fuel transfer for a year. However, as described in number 3 below the amount of fuel that can be received at the COCO facility cannot be a continuous process.
3. Thirty (30) minutes of overhead time is required for each fuel delivery (no tank loading occurs during this period – this time is spent preparing each delivery for the loading operation).
4. The typical size of tank trucks delivering fuel to the facility is 8,000 gallons.

The following example illustrates how the potential fuel receipts were calculated:

Unload/pump time per delivery = (8,000 gal / 300 gal/min) = 26.66 min
Total time per delivery = (26.66 min + 30 min) = 56.6 min = 0.944 hour
Max receiving rate = 8,000 gal/0.944 hour
Max receipts (6 mo) = 8,000 gal/0.944 hr * 4,380 hr/6 mo = 37,188,644 gal/ 6 mo
Total potential JP-8 receipts[a] = (2 receiving points) * 37,118,644 gal
Total potential JP-8 receipts[a] = 74,237,288 gal/yr

[a] Represents the maximum amount of fuel that can be transferred to tank trucks in one year

For the remaining fueling operations, including the retail fuel dispensing at the COCO, it was assumed the amount of fuel transferred and/or dispensed is proportional to the number of hours the installation operates per year. Actual installation operations were estimated to occur 2,080 hours per year (40 hours per week * 52 week per year). The installation could potentially operate 8,760 hours per year. Therefore, the potential quantities of fuel were estimated by multiplying actual fuel transfers by the ratio of 8,760/2,080.

Using the potential fuel data determined from the methods above, the calculations to estimate potential VOC and HAP emissions were done using the same methodology used for the actual VOC and HAP emissions. Potential VOC and HAP from fueling operations are presented in Section 7.3, Table 7.5.

Emissions Summary

Table 7.0 below provides the total emissions of VOC and combined HAP from fueling operations at Fort Stewart.

TABLE 7.0
Emissions Summary - Fueling Operations

Emission Type	VOC	HAP
Actual (lb/yr)	71,911.07	5,290.41
Actual (ton/yr)	35.96	2.65
Potential (lb/yr)	306,726.04	22,460.93
Potential (ton/yr)	153.36	11.23

Emission Source Updates

No updates were made from the 2006 inventory. However, range fuel use was down because of closures to construct a digital multi purpose range complex (MPRC) and changes in support contracts.

7.3 DETAILED SOURCE AND EMISSIONS TABLES

Tables 7.1 through 7.5 below provide a breakdown of the fueling operations, fuel characteristics, and emission estimates for each fueling activity.

TABLE 7.1
Fueling Operations

Unit ID	Building No.	Description of Activity	Type of Fuel Handled	Fuel Amount Handled (gal/yr)	
				Actual	Potential
F001-S[a]	939	POV Fuel Dispensing - Victory Shoppette	MOGAS	3,519,493	6,307,200
F002-S[a]	7336	POV Fuel Dispensing - Bryan Village	MOGAS	1,299,877	5,256,000
F101-S	1157	Tank Truck Loading - HazWaste Turn-In Center	Used JP-8	30,399	128,027
F104-S	1175	GOV Fuel Dispensing - DOL Yard Equipment	MOGAS	8,400	35,377
F105-S	2151	Fuel Dispensing - Golf Course	Diesel	2,200	9,265
F106-S	2151	Fuel Dispensing - Golf Course	MOGAS	3,600	15,162
F107-S	2902	GOV Fuel Dispensing - Central Handling Facility	Diesel	16,152	68,025
F113-S	10511	GOV Fuel Dispensing - GANG Bldg. & Grounds	Diesel	3,752	15,802
F114-S	10511	GOV Fuel Dispensing - GANG Bldg. & Grounds	MOGAS	1,653	6,962
F115-S	10522	GOV Fuel Dispensing - GANG RTI	JP-8	8,542	35,975
F124-S	Alpha Range	GOV Fuel Dispensing	Diesel	653	2,751
F126-S	Fox Trot Range	GOV Fuel Dispensing	Diesel	653	2,751
F128-S	Golf Range	GOV Fuel Dispensing	Diesel	0	0
F131-S	MPRC Range	GOV Fuel Dispensing	Diesel	653	2,751
F136-S	8064	GOV Fuel Dispensing - Forestry	MOGAS	18,437	77,648
F137-S	COCO	GOV Fuel Dispensing – Bulk Storage Facility	JP-8	112,304	472,973
F138-S	8064	GOV Fuel Dispensing - Forestry	Diesel	38,348	161,504
F139-S	COCO	Tank Truck Loading - Bulk Storage Facility	JP-8	1,176,887	74,237,288

Unit ID	Building No.	Description of Activity	Type of Fuel Handled	Fuel Amount Handled (gal/yr)	
				Actual	Potential
F140-S	COCO	Tank Truck Loading - Bulk Storage Facility	Diesel	68,546	32,070,508
F141-S	COCO	GOV Retail Fuel Dispense- Bulk Storage Facility	Diesel	206,697	870,512
F142-S	COCO	GOV Fuel Dispense - Bulk Storage Facility	MOGAS	246,299	1,037,298
F143-S	8073	GOV Fuel Dispensing DMMC - Range Control	MOGAS	957	4,031
F144-S	8081	GOV Fuel Dispensing - Range Control	Diesel	653	2,751
F146-S	COCO	Tank Truck Fuel Loading - Bulk Storage Facility	MOGAS	6,376	22,365,957
F148-S	1412	GOV Fuel Dispensing – Central Energy Plant	Diesel	4,000	16,846
F149-S	17003	GOV Fuel Dispensing – Ammo Supply Point	Diesel	454	1,912
F150-S	Hotel Range	GOV Fuel Dispensing	Diesel	653	2,751
F153-S	1175	GOV Fuel Dispensing - DOL	JP-8	9,600	40,431
F154-S	Alpha Range	GOV Fuel Dispensing	MOGAS	957	4,031
F-155S	Fox Trot Range	GOV Fuel Dispensing	MOGAS	957	4,031
F-156S	Golf Range	GOV Fuel Dispensing	MOGAS	0	0
F-157S	Hotel Range	GOV Fuel Dispensing	MOGAS	957	4,031
F-158-S	MPRC Range	GOV Fuel Dispensing	MOGAS	957	4,031

[a] Significant Source

TABLE 7.2
Data for Estimating Vapor Displacement Emissions for Aircraft and Tank Truck Fueling Operations

Variable[a]	Fuel Transferred		
	MOGAS	**Diesel**	**JP-8**
M (lb/lb-mol)	67[b]	130[c]	152[d]
P (psia)	5.7[,e]	8.5×10^{-3}[,c]	0.033[,d]
S[f]	6.0×10^{-1}	6.0×10^{-1}	6.0×10^{-1}
T (°R)[g]	526	526	526
E_R (lb/1,000 gal)[h]	5.43[h]	0.0157	0.0713

[a] Variables from Equation 7.1. M=Molecular weight of vapors, P=true fuel vapor pressure, S-see footnote f, T-see footnote g, E_R = Emissions due to vapor displacement
[b] Based on data contained in AP-42 (Ref. 1)Table 7.1-2 and EPA-50/3-91-022a (Ref. 6). A yearly average Reid Vapor pressure of 10.7 psia was estimated for MOGAS used at the installation.
[c] EPA document, AP-42, Section 7, Table 7.1-2 (Ref. 1).
[d] Based on data summarized in *Useful Properties/Characteristics of JP-8 Fuel for Performing Air Emissions Inventories* (Ref. 4).
[e] Based on data contained in AP-42, Section 7.0, Table 7.1-2 and Figure 7.1-14a (Ref. 1).
[f] Saturation factor = 0.6 for submerged loading, dedicated normal service; EPA document AP-42, Section 5, Table 5.2-1(Ref. 1).
[g] Average yearly temperature for Savannah, Georgia = 66.3 °F.
[h] Emission factor includes transit losses of 0.01 lb/1,000 gallons fuel transferred.

TABLE 7.3
Data for Estimating Vapor Displacement Emissions for GOV and POV Fueling Operations

Variable[a]	Fuel Transferred		
	MOGAS (Eq. 7.2)	Diesel (Eq. 7.1)	JP-8 (Eq. 7.1)
RVP (psia)[b]	10.7	--	--
T_D (°F)[c]	81	--	--
ΔT (°F)[d]	4.0	--	--
M (lb/lb-mol)	--	130[e]	152[f]
P (psia)	--	8.5×10^{-3},[e]	0.033,[f]
T (°R)[c]	--	526	526
S[g]	1.45	1.45	1.45
E_R (lb/1,000 gal)[h]	14.06 [h]	0.038	0.172

[a] Variables from Equations 7.1 and 7.2.
[b] EPA-50/3-91-022a, Table 3-3 (Ref. 6).
[c] EPA-50/3-91-022a, Table 3-4 (Ref. 6).
[d] EPA-50/3-91-022a, Table 3-5 (Ref. 6).
[e] EPA document, AP-42, Section 7, Table 7.1-2.
[f] Based on data summarized in *Useful Properties/Characteristics of JP-8 Fuel for Performing Air Emissions Inventories* (Ref. 4).
[g] Saturation Factor for Splash Landing Dedicated Normal Service, taken from AP-42, Section 5, Table 5.2-1 (Ref. 1).
[h] 13.36 lb/1,000 gal (determined from Eq. 7.2) + 0.7 lb/1,000 gal spillage loss [AP-42, Section 5, Table 5.2-7 (Ref. 1)].

TABLE 7.4
Actual Emissions from Fueling Operations

Unit ID	Fuel Type	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
F001-S[a]	MOGAS	49,493.72	296.96	9.90	19.80	247.47	2,276.71	-	346.46	346.46	98.99
F002-S[a]	MOGAS	18,279.83	109.68	3.66	7.31	91.40	840.87	-	127.96	127.96	36.56
F101-S	Used JP-8	2.17	0.013	0.007	0.006	-	-	6.5E-05	0.025	2.2E-04	0.041
F104-S	MOGAS	118.13	0.71	0.024	0.047	0.591	5.43	-	0.827	0.827	0.236
F105-S	Diesel	0.083	0.006	3.3E-04	5.8E-04	0.002	-	-	0.003	-	0.002
F106-S	MOGAS	50.63	0.304	0.010	0.020	0.253	2.33	-	0.354	0.354	0.101
F107-S	Diesel	0.613	0.044	0.002	0.004	0.014	-	-	0.025	-	0.015
F113-S	Diesel	0.142	0.010	0.001	0.001	0.003	-	-	0.006	-	0.004
F114-S	MOGAS	23.25	0.139	0.005	0.009	0.116	1.069	-	0.163	0.163	0.046
F115-S	JP-8	1.47	0.009	0.005	0.004	-	-	4.E-05	0.017	1.E-04	0.028
F124-S	Diesel	0.025	0.002	9.9E-05	1.7E-04	0.001	-	-	0.001	-	0.001
F126-S	Diesel	0.025	0.002	9.9E-05	1.7E-04	0.001	-	-	0.001	-	0.001
F128-S	Diesel	0	0	0	0	0	-	-	0	-	0
F131-S	Diesel	0.025	0.002	9.9E-05	1.7E-04	0.001	-	-	0.001	-	0.001
F136-S	MOGAS	259.27	1.56	0.052	0.104	1.30	11.93	-	1.81	1.81	0.519
F137-S	JP-8	19.35	0.119	0.064	0.052	-	-	0.001	0.221	0.002	0.363
F138-S	Diesel	1.46	0.105	0.006	0.010	0.033	-	-	0.060	-	0.036
F139-S	JP-8	83.90	0.514	0.277	0.227	-	-	0.003	0.96	0.008	1.57
F140-S	Diesel	1.08	0.078	0.004	0.008	0.025	-	-	0.044	-	0.027
F141-S	Diesel	7.85	0.565	0.031	0.055	0.180	-	-	0.322	-	0.196
F142-S	MOGAS	3,463.64	20.78	0.693	1.385	17.32	159.33	-	24.25	24.25	6.93
F143-S	MOGAS	13.46	0.081	0.003	0.005	0.067	0.619	-	0.094	0.094	0.027
F144-S	Diesel	0.025	0.002	9.9E-05	1.7E-04	0.001	-	-	0.001	-	0.001
F146-S	MOGAS	35.25	0.211	0.007	0.014	0.176	1.621	-	0.247	0.247	0.070
F148-S	Diesel	0.152	0.011	0.001	0.001	0.003	-	-	0.006	-	0.004
F149-S	Diesel	0.017	0.001	6.9E-05	1.2E-04	4.0E-04	-	-	0.001	-	4.3E-04

Unit ID	Fuel Type	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
F150-S	Diesel	0.025	0.002	9.9E-05	1.7E-04	0.001	-	-	0.001	-	0.001
F153-S	JP-8	1.65	0.010	0.005	0.004	-	-	5.0E-05	0.019	0.000	0.031
F154-S	MOGAS	13.46	0.081	0.003	0.005	0.067	0.619	-	0.094	0.094	0.027
F-155S	MOGAS	13.46	0.081	0.003	0.005	0.067	0.619	-	0.094	0.094	0.027
F-156S	MOGAS	0	0	0	0	0	0	-	0	0	0
F-157S	MOGAS	13.46	0.081	0.003	0.005	0.067	0.619	-	0.094	0.094	0.027
F-158-S	MOGAS	13.46	0.081	0.003	0.005	0.067	0.619	-	0.094	0.094	0.027
Total (lb/yr)		**71,911.07**	**432.24**	**14.76**	**29.09**	**359.22**	**3,302.39**	**3.3E-03**	**504.25**	**502.55**	**145.91**
Total (ton/yr)		**35.96**	**0.22**	**0.01**	**0.01**	**0.18**	**1.65**	**<0.01**	**0.25**	**0.25**	**0.07**

[a] Significant Source

TABLE 7.5
Potential Emissions from Fueling Operations

Unit ID	Fuel Type	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
F001-S	MOGAS	88,696.53	532.18	17.74	35.48	443.48	4,080.04	-	620.88	620.88	177.39
F002-S	MOGAS	73,913.77	443.48	14.78	29.57	369.57	3,400.03	-	517.40	517.40	147.83
F101-S	Used JP-8	9.13	0.056	0.030	0.025	-	-	2.7E-04	0.104	0.001	0.171
F104-S	MOGAS	497.50	2.98	0.099	0.199	2.49	22.88	-	3.48	3.48	0.995
F105-S	Diesel	0.352	0.025	1.4E-03	0.002	0.008	-	-	0.014	-	0.009
F106-S	MOGAS	213.21	1.279	0.043	0.085	1.066	9.81	-	1.492	1.492	0.426
F107-S	Diesel	3	0.186	0.010	0.018	0.059	-	-	0.106	-	0.065
F113-S	Diesel	0.600	0.043	0.002	0.004	0.014	-	-	0.025	-	0.015
F114-S	MOGAS	97.90	0.587	0.020	0.039	0.490	4.50	-	0.685	0.685	0.196
F115-S	JP-8	6.198	0.038	0.020	0.017	-	-	1.9E-04	0.071	0.001	0.116
F124-S	Diesel	0.104	0.008	4.2E-04	0.001	0.002	-	-	0.004	-	0.003
F126-S	Diesel	0.104	0.008	4.2E-04	7.3E-04	0.002	-	-	0.004	-	0.003
F128-S	Diesel	0	0	0	0	0	-	-	0	-	0
F131-S	Diesel	0.104	0.008	4.2E-04	0.001	0.002	-	-	0.004	-	0.003
F136-S	MOGAS	1,091.95	6.55	0.218	0.437	5.46	50.23	-	7.644	7.644	2.184
F137-S	JP-8	81.49	0.500	0.269	0.221	-	-	0.002	0.931	0.008	1.53
F138-S	Diesel	6.13	0.441	0.025	0.043	0.141	-	-	0.251	-	0.153
F139-S	JP-8	5,292.53	32.44	17.47	14.34	-	-	0.159	60.49	0.529	99.34
F140-S	Diesel	503.68	36.265	2.015	3.526	11.585	-	-	20.651	-	12.592
F141-S	Diesel	33.04	2.38	0.132	0.231	0.760	-	-	1.355	-	0.826
F142-S	MOGAS	14,587.25	87.52	2.917	5.835	72.94	671.01	-	102.11	102.11	29.17
F143-S	MOGAS	56.69	0.340	0.011	0.023	0.283	2.61	-	0.397	0.397	0.113
F144-S	Diesel	0.104	0.008	0.000	0.001	0.002	-	-	0.004	-	0.003
F146-S	MOGAS	121,400.56	728.40	24.280	48.560	607.003	5,584.43	-	849.804	849.804	242.801
F148-S	Diesel	0.639	0.046	0.003	0.004	0.015	-	-	0.026	-	0.016
F149-S	Diesel	0.073	0.005	2.9E-04	0.001	0.002	-	-	0.003	-	0.002

Unit ID	Fuel Type	Emissions (lb/yr)									
		VOC	Benzene	Cumene	Ethylbenzene	Hexane	MTBE	Naphthalene	Toluene	2,2,4-TMP	Xylenes
F150-S	Diesel	0.104	0.008	4.2E-04	0.001	0.002	-	-	0.004	-	0.003
F153-S	JP-8	6.97	0.043	0.023	0.019	-	-	2.1E-04	0.080	0.001	0.131
F154-S	MOGAS	56.69	0.340	0.011	0.023	0.283	2.61	-	0.397	0.397	0.113
F-155S	MOGAS	56.69	0.340	0.011	0.023	0.283	2.61	-	0.397	0.397	0.113
F-156S	MOGAS	0	0	0	0	0	0	-	0	0	0
F-157S	MOGAS	56.69	0.340	0.011	0.023	0.283	2.61	-	0.397	0.397	0.113
F-158-S	MOGAS	56.69	0.340	0.011	0.023	0.283	2.61	-	0.397	0.397	0.113
Total (lb/yr)		**306,726.04**	**1,877.20**	**80.15**	**138.77**	**1,516.51**	**13,835.98**	**0.162**	**2,189.61**	**2,106.01**	**716.54**
Total (ton/yr)		**153.36**	**0.94**	**0.04**	**0.07**	**0.76**	**6.92**	**<0.01**	**1.09**	**1.05**	**0.36**

[a] Significant Source

8.0 SPRAY PAINT BOOTHS

Title V Source Designation(s)

X Significant	*Spray paint booths that have potential emissions ≥10,000 lb/yr of any regulated air pollutant, ≥1,000 lb/yr of any regulated HAP, or ≥2,500 lb/yr of a combination of regulated HAPs* *Spray paint booths that are subject to any specific state or federal standard or permit condition*
X Insignificant	*Spray paint booths that are not subject to any specific state or federal standard or permit condition that have potential emissions <10,000 lb/yr of any regulated air pollutant, <1,000 lb/yr of any regulated HAP, and <2,500 lb/yr of a combination of regulated HAPs*
__Trivial	*Not applicable*

8.1 BACKGROUND

Five spray paint booths were identified on Fort Stewart. Two of the paint booths identified (P101-S and P102-S) were not used in 2007. One of the three active booths (P001-S, Bldg. 1073) is used by the DOR. The Directorate of Community Activities and Services (DCAS) and the GANG/MATES organization typically use the second active booth (P103-S). In the past this booth has been leased to DOR when their workload is high. However, in 2007 GANG/MATES were the primary users. Spray painting operations at P001-S and P103-S include painting GOV and miscellaneous components. The third active booth (P106-S) is operated by Eagle Services and replaces the outdoor painting activities for MILVAN containers (P104-S in the 2006 inventory) and for tracks used by tactical and combat vehicles (P105-S in the 2006 inventory).

The inactive booth (P101-S) belongs to the DPW carpentry shop and is currently being used as a storeroom. There are no plans to activate the DPW booth in the foreseeable future. The second inactive booth (P102-S) is located at the Libby Auto Craft Center. The manager of the Craft Center reported that the paint booth was closed due to fire hazard concerns, and thus there was no usage in CY2007.

Detailed product usage records were maintained for the active spray booths. General information regarding each of the spray painting operations and data on the quantity of paints used is presented in Section 8.3, Tables 8.1 and 8.2. See Section 1.0, Table 1.0 for a list of data sources.

The Georgia EPD has not provided specific guidance regarding the designation of spray paint booths as “significant,” “insignificant,” or “trivial” sources of air pollution. Based on Fort Stewart’s Title V permit, P001-S (Building 1073) is designated as a significant source while the remaining spray painting operations are designated as insignificant sources.

8.2 EMISSION ESTIMATES

Spray painting is a source of PM, PM-10, PM-2.5, VOC, and HAP emissions. Material safety data sheets (MSDS) for each of the products (paints and thinners) used were obtained. The method used to calculate actual and potential emissions is described below. Also provided is a summary of total emissions for the identified spray paint activities.

Actual Emissions

Composition of each product is based on data contained in the MSDS. VOC and volatile HAP emissions were estimated assuming all VOC and volatile HAP were released to the atmosphere. As an example, the calculation used to estimate VOC emissions from the application of a tan-colored polyurethane coating is presented below.

Unit ID:	P001-S
Product applied:	Polyurethane Coating, Tan, 33446
National stock number:	8010-01-276-3640
Quantity sprayed:	3,295 gal/yr
VOC content of paint:	3.471 lb/gal (from MSDS)

VOC emissions = (3,295 gal/yr) * (3.471 lb/gal) = 11,436.95 lb/yr

PM, PM-10, PM-2.5, and particulate HAP emissions were also calculated. Two factors, particulate controls and paint application/transfer method, will affect how much particulate matter is emitted to the atmosphere.

Painting operations, which are conducted within a paint spray booth with dry filter or waterfall controls, will have reduced PM emissions. The overall particulate emissions will be reduced by the particulate removal efficiency of the controls. A conservative value for fabric filter control system efficiency was estimated to be 60 percent using *Perry's Chemical Engineering Handbook* (Ref. 7). Some fabric control systems however, have efficiencies at or above 90 percent. Waterfall controls are estimated to reduce particulate emissions by 85 percent. The paint booth at GANG/MATES (P103-S) has a waterfall control while the DOL booth (P001-S) and the Eagle Services booth (P106-S) have fabric filters.

Typical transfer efficiencies were obtained from Section 30, Table 30-1 of the U.S. Air Force Document *Air Emission Inventory Guidance Document for Stationary Sources at Air Force Installations* (Ref. 2). The transfer efficiencies associated with the various paint application methods are presented in Section 8.3, Table 8.3.

Very little data was available concerning the breakdown of PM emissions from spray painting. As a default, 46.7% of PM emissions were assumed to be PM-10 and PM-2.5. In a paint booth appreciable amounts of the paint particles do not reach the control device due to deposition on the paint booth floor and walls. This fact was not taken into consideration because of the lack of information available to estimate overspray fall-out.

The following calculation provides an example of how particulate emissions were estimated.

Unit ID:	P001-S
Product applied:	Hentzen, 08609TUZ, Tan
National stock number:	8010-01-276-3640
Quantity sprayed:	3,295 gal/yr
Density of paint:	10.2075 lb/gal
Pigment composition:	$40.81\%_w$
Paint transfer efficiency:	40% (Airless Spray Gun)
Particulate control efficiency:	60% (Filters)

TSP/PM emissions = (3,295 gal/yr) * (10.2075 lb/gal) * (0.4081) * (1-0.40) * (1-0.60)
= 3,294.30 lb/yr

Note: If reliable solids content data were not available from the MSDS, then the solid content in an applied coating was estimated to equal one hundred minus the weight percent of VOC, exempt solvents (i.e., solvents that are not classified as VOC), and water.

HAP emissions were estimated by multiplying the quantity of paint applied (lb) by the weight percent of the hazardous component. If the hazardous component was a particulate the control and transfer efficiencies were applied in the same manner as in the example above. Both HAP and criteria pollutant emissions by individual painting operation are shown in Section 8.3, Table 8.4.

Potential Emissions

Emissions from spray paint booths are proportional to the quantity of products applied. For P001-S the potential emissions for the paint use were based on data provided by the paint booth operators (See Section 1.0, Table 1.0 for POCs). The following information was provided as the scenario (See note) that could lead to the highest potential paint use.

- For every hour during which painting could be conducted, at least 30 minutes is spent on preparation.
- For four (4) hours in a day (24 hours) no painting can be conducted due to cleaning and shift changes.
- Painters use a maximum of 7 gallons to paint the largest vehicle in a one-hour block (30 minutes is the maximum painting time/hr – see above).

Based on the above the potential paint use for P001-S was determined as follows:

Hours/shift spent without painting = (4 hr) / (3 shifts) = 1.33 hr/shift
Hours/shift spent painting = (8 hr/shift) – (1.33 hr/shift not painting) = 6.67 hr/shift
Gallons used/shift = (6.67 hr/shift) * (7 gal/hr) = 46.69 gal/shift
Potential gal/day = (46.69 gal/shift) * (3 shift/day) = 140 gal/day
Potential gal/yr = (140 gal/day) * (365 day/yr) = 51,100 gal/yr

Potential thinner use at P001-S was based on a use rate of use 5-10 gallons of thinner per shift. This equates to 15-20 gal of thinner per day, and 7,300 gallons per year.

Note: The above scenario to estimate potential paint and thinner use was based on discussions with paint shop personnel in 2007 for the 2006 inventory. In 2008 paint shop personnel indicated that the given scenario would still be applicable for the 2007 inventory

P103-S and P106-S operated over 12-months in 2007. The potential product/paint usage for these booths was assumed proportional to the number of hours the installation operates per year. Actual installation operations were estimated to occur 2,080 hours per year (40 hours per week * 52 week per year). The installation could potentially operate 8,760 hours per year. Therefore, the potential quantities of paint were estimated by multiplying actual fuel transfers by the ratio of 8,760/2,080.

Potential emissions calculations from the active spray paint booths were estimated using the same mass balance procedures that were used to estimate actual emissions. However, control equipment should not be included in potential emissions estimates unless the use of the control equipment is included as a federally enforceable condition in a permit. The use of particulate control on P001-S is required by the Title V permit for the installation. However, the control equipment is not required for the other spray paint booths. Therefore, potential PM emissions were estimated by assuming that the particulate control equipment was not present on units P103-S and P106-S. Potential emissions by individual painting operation are shown in Section 8.3, Table 8.5.

Because P101-S and P102-S will not be operated in the foreseeable future their potential emissions were not estimated.

Emissions Summary

Table 8.0 given below summarizes actual and potential HAP emissions from spray paint booths and outdoor spray painting at Fort Stewart.

TABLE 8.0
Emissions Summary - Spray Paint Booths

Emission Type	VOC	PM	PM-10	PM-2.5	HAP
Actual (lb/yr)	37,844.70	7,072.90	3,303.04	3,303.04	9,741.56
Actual (ton/yr)	18.92	3.54	1.65	1.65	4.87
Potential (lb/yr)	234,403.17	61,586.39	28,760.85	28,760.85	74,639.81
Potential (ton/yr)	117.20	30.79	14.38	14.38	37.32

Emission Source Updates

The Eagle Services outdoor MILVAN and track painting operations (Unit IDs P104-S and P105-S in the 2006 Inventory) are no longer conducted. All Eagle Services painting is now conducted in a new paint spray booth that has been assigned the Unit ID P106-S). The Unit IDs P104-S and P105-S have been deleted in the 2007 inventory.

In 2007 there was approximately a 63 percent reduction in the amount of paint used across Fort Stewart when compared to 2006.

8.3 DETAIL SOURCE AND EMISSION TABLES

Tables 8.1 through 8.5 below provide information on spray paints used and estimates of emissions for each painting activity.

TABLE 8.1
Summary of Paint Spray Booth Activities

Unit ID	Building No.	Organization / Shop	Items Painted	Spray Gun Type	Pollution Control Equipment	2007 Paint Sprayed (gal)
P001-S[a]	1073	DOR / Allied Trades	GOV, Equipment	Airless	Dry filters	5,200
P101-S	1105	DPW / Carpentry	--	--	--	Inactive
P102-S	1503	Libby Auto Craft Center	--	--	--	Inactive
P103-S	10531	GANG / MATES	GOV, Equipment	Airless	Waterfall	904
P106-S[b]	1210	Eagle Services	MILVAN Containers, Tracks, Small Parts	HVLP	Dry filters	42

[a] Significant paint booth
[b] Replaces P104-S and P105-S (outdoor painting that used tarps for overspray control)
HVLP = high volume-low pressure

TABLE 8.2
Spray Paint Information

NSN	Material Description	Color/Type	VOC Content (lb/gal)	Actual Use (gal)	Potential Use (gal)
UNIT ID P001-S *(Airless Spray Guns, Fabric Particulate Filters[a])*					
8010-01-229-7547	HENTZEN, 08605GUZ-GD	GREEN	3.49	30	148
8010-01-229-7544	HENTZEN, 08606TAU-GD	BROWN	3.496	1	5
8010-01229-7541	HENTZEN, 08610KUZ-GD	BLACK	3.495	1	5
8010-01-276-3640	HENTZEN, 08609TUZ-GD	TAN	3.471	3,295	16,235
8010-00-181-8079	CHEMICAL SPECIALIST, TYPE 1	THINNER	7.42	780	5,788
8010-01-187-9820	NILES CHEM., N-1088A	WHITE PRIMER	4.26	104	512
8010-01-187-9820	NILES CHEM., N-1088B, 4:1 BLEND	-	5.17	26	128
8010-01-229-7547	SHER. WILLAMS, F93G104	GREEN	3..27	47	488
-	SHER.WILLIAMS, B53W311	WATER BASED TAN	0.65	760	7,896
8010-01-276-3640	SHER. WILLIAMS, F93H107	TAN	3.36	2,373	24,654
8010-00-181-8079	NILES CHEM. PAINT, TYPE 1	THINNER	7.42	668	4,300
8010-01-212-1704	NILES CHEM. PAINT, TYPE 2	THINNER	7.00	88	566
8010-01-187-9820	SHER. WILLIAMS, E90W201	WHITE PRIMER	3.88	82	852
8010-01-187-9820	SHER. WILLIAMS, V93V202, 4:1 BLEND	-	5.89	17	177
UNIT ID P103-S *(Airless Spray Guns, Waterfall Particulate Control[b])*					
8010-01-276-3640	SHERWIN-WILLIAMS, F93H107	TAN	3.36	902	3799
8010-01-187-9820	SHERWIN WILLIAMS, E90W201	WHITE PRIMER	3.88	2	868
8010-01-212-1704	NILES CHEM. PAINT, TYPE 2	THINNER	7.00	206[c]	8
UNIT ID P106-S *(HVLP Spray Guns, Fabric Particulate Control[b])*					
-	SHER. WILLIAMS, B53B300	BLACK	1.60	29	122
-	SHER. WILLIAMS, B53W311 (BASE)	TAN	1.59	7	29
-	SHER. WILLIAMS, B53W311 (BASE)	WHITE	1.59	1	4
-	SHER. WILLIAMS, B53W311 (BASE)	GREEN	1.59	5	21

[a] Assumed 60 percent particulate control efficiency for fabric filters (filters efficiencies can be as high as 90 percent or greater).
[b] Assumed 85 percent particulate control efficiency for waterfall control.
[c] Thinner use estimated based on the thinner to paint ratio determined at Bldg. 1073 (paint use for Bldg. 10531 paint booth multiplied by the ratio).

TABLE 8.3
Summary of Spray Application Methods

Application Method	Transfer Efficiency Range ($\%_w$)[a]
Air Atomizing	30
Airless	40
Air-Assisted Airless	45
HVLP	65
Electrostatic	80

[a] Minimum value of a range cited in a 1992 EPA paper titled *VOC Pollution Prevention Operations in the Surface Coating Industry*.
HVLP – high volume-low pressure

TABLE 8.4
Actual Emissions from Spray Paint Activities

Unit ID	Criteria Pollutants (lb/yr)				Hazardous Air Pollutants (lb/yr)								
	VOC	PM	PM-10	PM-2.5	Total HAP	Ethyl Benzene	MIBK	Chromium Compounds	Xylene	Toluene	Naphthalene	Hexamethylene Diisocyanate	Cobalt Compounds
P001-S	33,239.92	6,667.15	3,113.56	3,113.56	7,643.92	259.30	3,149.02	207.00	2,112.54	1,618.84	125.23	15.93	156.06
P103-S	4,481.86	397.74	185.74	185.74	2,097.64	37.45	1,383.34	19.66	187.26	376.31	46.81	0	46.81
P106-S	122.93	8.01	3.74	3.74	0	0	0	0	0	0	0	0	0
Total (lb/yr)	**37,844.70**	**7,072.90**	**3,303.04**	**3,303.04**	**9,741.56**	**296.76**	**4,532.36**	**226.66**	**2,299.79**	**1,995.15**	**172.04**	**15.93**	**202.87**
Total (ton/yr)	**18.92**	**3.54**	**1.65**	**1.65**	**4.87**	**0.15**	**2.27**	**0.11**	**1.15**	**1.00**	**0.09**	**0.01**	**0.10**

TABLE 8.5
Potential Emissions from Spray Paint Activities

Unit ID	Criteria Pollutants (lb/yr)				Hazardous Air Pollutants (lb/yr)								
	VOC	PM	PM-10	PM-2.5	Total HAP	Ethyl Benzene	MIBK	Chromium Compounds	Xylene	Toluene	Naphthalene	Hexamethylene Diisocyanate	Cobalt Compounds
P001-S	215,009.94	50,385.47	23,530.02	23,530.02	65,805.52	1830.73	31,969.81	1,089.59	13,202.61	14,721.87	1,301.06	78.48	1,611.37
P103-S	18,875.51	11,167.19	5,215.08	5,215.08	8,834.29	157.73	5,825.99	82.81	788.63	1,584.83	197.16	0	197.16
P106-S	517.72	33.73	15.75	15.75	0	0	0	0	0	0	0.00	0	0
Total (lb/yr)	**234,403.17**	**61,586.39**	**28,760.85**	**28,760.85**	**74,639.81**	**1,988.46**	**37,795.80**	**1,172.39**	**13,991.24**	**16,306.69**	**1,498.22**	**78.48**	**1,808.53**
Total (ton/yr)	**117.20**	**30.79**	**14.38**	**14.38**	**37.32**	**0.99**	**18.90**	**0.59**	**7.00**	**8.15**	**0.75**	**0.04**	**0.90**

9.0 ORGANIC SOLVENT CLEANING UNITS

Title V Source Designation(s)

__*Significant*	*Organic solvent cleaning units with surface areas >10 ft^2*
	Organic solvent cleaning units that use halogenated solvents
X *Insignificant*	*Organic solvent cleaning units with surface areas ≤10 ft^2 that do not use halogenated solvents*

9.1 BACKGROUND

It was estimated that there were approximately 78 parts cleaning units (tanks) that were operated for at least part of 2007. In addition, it was estimated that there were approximately 25 inactive units. These inactive units are operable but not in use (i.e. no solvent in the units or the unit remains off and closed). Because of troop deployments the exact number of parts cleaners in use during the course of the year can vary. In addition, Eagle Services sometimes uses motor pools and parts cleaning units that were used by troops that are now deployed. Furthermore, although the parts cleaners are not portable, they are small enough that they can occasionally be moved between motor pools or other maintenance areas based on workload and the type of maintenance activities that need to be conducted. Therefore the list of parts cleaners provided later in this section is a snapshot in time, as over the course of the year there can be variations.

These maintenance-type cold cleaners are used to remove grease, oils, and soil from various metal, glass, and plastic items. A majority of the units are located in motor pools or maintenance shops. Many of the cold cleaners use the solvent Safety-Kleen Premium 150, Safety-Kleen 700, or Safety-Kleen 850. Safety-Kleen Premium 150 has a low volatility and does not contain HAPs or ODCs, while Safety-Kleen 700 and 800 are aqueous-based cleaners that do not contain VOC, HAPs, or ODCs. The cold cleaners are drained and refilled as needed and waste solvent from the units is picked up by Safety-Kleen for off-site disposal. Additional cleaning units are from manufacturers such as Graymills, Zep Purewash, Better Engineering, R&D Industries, Herkules, Little Scrubber, Hill Manufacturing, System One, Clarus, and Mansur. Many of these units use PD 680 Type II solvent. Recently there has been a trend to switch out the older units including Safety Kleen parts washers with new Clarus units.

None of the cold cleaners at Fort Stewart use halogenated solvents. All units have solvent bath surface areas covering less than 10 square feet; consequently, these units are designated as "insignificant" sources of air pollution. Data regarding Fort Stewart's organic solvent cleaning units are presented in Table 9.1.

9.2 EMISSION ESTIMATES

The method used to calculate actual and potential emissions is described below. Also provided is a summary of total emissions for all parts cleaning units.

Actual Emissions

Typically emissions from organic solvent cleaning operations are estimated based on the consumption of solvent, less the solvent that is removed for disposal. This information was not available for Fort Stewart. In such a case emissions from organic solvent cleaners can be estimated using emission factors for organic solvent cleaners from Table 4.6-2 of AP-42 (Ref. 1). The emission factors are general in nature, as they were derived from the entire population of degreasers in the U.S.

Based on AP-42, there are three sources of emissions from cold cleaners: bath evaporation, solvent carryout, and waste solvent evaporation. Emissions from each of these sources are affected by the work practices employed by the personnel utilizing the degreasers. Covering the solvent bath when the degreaser is not in use and/or using a solvent cleaning unit that is equipped with a remote solvent reservoir may reduce emissions due to bath evaporation. Allowing solvent on cleaned parts to drain back into the solvent bath may reduce solvent carryout emissions; the recommended draining time is 15 seconds. Finally, waste solvent evaporation may be reduced in a number of ways, the most effective of which (for the solvent user) is to ship it off site for disposal. Shown below is a summary of the emission estimation information provided in AP-42 that was used to estimate VOC emissions from the cold cleaners.

Emission Estimation based on Tables 4.6-1 and 4.6-2 AP-42 (Ref. 1)
Uncontrolled VOC emissions: 0.08 lb/ft^2/hr
Emission reduction:
- 15-second drain
- Close cover when not inserting or removing parts
- Waste solvent reclamation

Total emission reduction: 28% – 83%, mid point = 55%

In order to accurately estimate VOC losses using the above AP-42 method it is important to be able to monitor the parts cleaner for a reasonable amount of time to evaluate/determine work practices and usage time.

VOC emissions for the parts cleaners at Fort Stewart were estimated based on the surface area of each parts washer and on assumptions related to work practices and operating schedule. Typically parts washers are used for short periods during the day. It is difficult to accurately assess how long each degreaser is uncovered and actively cleaning parts unless it is observed over a period of time. Parts cleaning operations from Building 1065 were investigated in 2006 to estimate a typical usage for a part washer/cleaner in a vehicle maintenance facility. This shop has a significant annual maintenance load and multiple parts cleaning units. Shop personnel estimated that the total cumulative use of all parts cleaners (14) is approximately 6 hours per day. Thus it is clear that the part cleaner units operate well less 8 hr/day or 2,080 hr/yr (8 hours * 5 days/week * 52 weeks/yr). The parts cleaners are typically used for 15-minute intervals and do not all operate simultaneously.

The above scenario was used to estimate 2007 operating hours. Although the above methodology yields an average per unit use rate of less than 1 hour per day, to be conservative we assumed usage was 1 hour per day for each unit. Actual usage can vary greatly from shop to

shop depending on work load, the type of equipment being maintained, the number of cleaning units in the shop, the number of users/mechanics, troop deployment levels, etc.

There was some data available regarding 2007 troop deployments. If troops were deployed for a portion of a year and those troops had a parts cleaning unit that they used on Fort Stewart the cleaning unit use was scaled down proportionally based on the number of months of deployment. Prior to scaling down usage it was also confirmed that Eagle Services did not take over use of the cleaning unit. When a majority of deployed soldiers/equipment return average use of parts washers should increase.

It was also assumed that emissions were reduced by using recommended emission control practices (e.g. allowing parts to drain for at least 15 seconds after immersion or washing with solvent, closing the cover on the parts washer when parts were not being placed into or being removed from the washer and sending used solvent off post to be reclaimed). An example of the calculation used to estimate actual VOC emissions from Unit D243-S is presented below.

Unit ID:	D243-S (Bldg. 1065)
Surface area of parts washer:	7.93 ft^2
Type of solvent:	Safety-Kleen Premium 150
Hours of Operation:	260 hr/yr (1 hr/day * 5 day/wk * 52 wk/yr)
Emission factor (Table 4.6-1, AP-42)	0.08 $lb/hr/ft^2$
Reduction due to work practices:	55% (28 – 83%, average is 55%)
VOC content of solvent:	$100\%_w$

VOC emissions = (7.93 ft^2) * (0.08 lb/hr/ ft^2) * (260 hr/yr) * (100%-55%)
= 74.22 lb/yr

Estimates of actual emissions from organic solvent cleaning activities at Fort Stewart are presented in Section 9.3, Table 9.1.

Potential Emissions

Normal installation operations were assumed to be 2,080 hours per year (40 hours/week * 52 weeks/yr). Potentially, the installation could operate 8,760 hours per year. Thus, potential hours from organic solvent cleaning units were estimated by multiplying actual hours by the ratio of 8,760/2,080. Using the potential hours emissions were calculated as shown in the equation above. Potential emissions for each individual unit are shown in Section 9.3, Table 9.1.

Emissions Summary

Table 9.0 below provides the total emissions of criteria pollutants from organic solvent cleaning units at Fort Stewart.

TABLE 9.0
Emissions Summary – Organic Solvent Cleaning Units

Emission Type	VOC
Actual (lb/yr)	4,527.23
Actual (ton/yr)	2.26
Potential (lb/yr)	23,276.24
Potential (ton/yr)	11.64

Emission Source Updates

The following updates were made since the 2006 inventory.

- Added D261-S (Bldg. 10531), D262-S (Bldg. 10506), D263-S (Bldg. S0921), D264-S (Bldg. S0920), D265-S and D266-S (Bldg.1160).

9.3 DETAILED SOURCE AND EMISSIONS TABLES

Table 9.1 below provides the actual and potential emissions for each parts cleaning unit at Fort Stewart.

TABLE 9.1
Organic Solvent Cleaning Unit Information and Emissions for CY2007

Unit ID	Building Number	Surface Area (ft^2)	Estimated Annual Operating Hours		VOC Emissions (lb/yr)	
			Actual[a]	Potential	Actual	Potential
D102-S	230	5.2	108	1,095	20.40	206.17
D132-S	1129	5.2	260	1,095	48.95	206.17
D143-S	1503	4.5	0	1,095	0.00	177.39
D145-S	4577	5.2	260	1,095	48.95	206.17
D146-S	4577	5.2	260	1,095	48.95	206.17
D147-S	4577	5.2	260	1,095	48.95	206.17
D148-S	8031	5.2	0	1,095	0.00	206.17
D153-S	9898	4.5	260	1,095	42.12	177.39
D154-S	10501	6.0	260	1,095	56.16	236.52
D155-S	10501	6.0	260	1,095	56.16	236.52
D156-S	10501	6.0	260	1,095	56.16	236.52
D157-S	10501	6.0	260	1,095	56.16	236.52
D158-S	10501	6.0	260	1,095	56.16	236.52
D159-S	10501	6.0	260	1,095	56.16	236.52
D171-S	10531	6.0	260	1,095	56.16	236.52

Unit ID	Building Number	Surface Area (ft^2)	Estimated Annual Operating Hours		VOC Emissions (lb/yr)	
			Actual[a]	Potential	Actual	Potential
D172-S	10531	6.0	260	1,095	56.16	236.52
D173-S	10531	6.0	260	1,095	56.16	236.52
D175-S	9392	6.0	260	1,095	56.16	236.52
D176-S	1503	6.0	260	1,095	56.16	236.52
D177-S	4577	9.4	108	1,095	36.47	369.76
D186-S	1503	5.2	260	1,095	48.95	206.17
D187-S	2152	5.2	260	1,095	48.95	206.17
D188-S	9896	9.4	260	1,095	87.80	369.76
D189-S	9897	9.4	260	1,095	87.80	369.76
D190-S	9899	9.4	260	1,095	87.80	369.76
D195-S	1170	5.3	260	1,095	49.61	208.93
D196-S	1170	5.3	260	1,095	49.61	208.93
D197-S	1170	5.3	260	1,095	49.61	208.93
D198-S	1170	8.8	260	1,095	82.37	346.90
D199-S	1170	5.3	260	1,095	49.61	208.93
D200-S	1170	5.3	260	1,095	49.61	208.93
D201-S	1170	5.3	260	1,095	49.61	208.93
D202-S	1170	5.3	260	1,095	49.61	208.93
D203-S	1208	6.0	260	1,095	56.16	236.52
D204-S	1261	6.0	260	1,095	56.16	236.52
D205-S	2910	1.0	260	1,095	9.36	39.42
D206-S	4528	6.0	260	1,095	56.16	236.52
D207-S	4577	6.0	108	1,095	23.40	236.52
D208-S	4577	6.0	108	1,095	23.40	236.52
D209-S	4577	6.0	108	1,095	23.40	236.52
D210-S	4577	5.3	108	1,095	20.67	208.93
D211-S	4578	8.8	260	1,095	82.37	346.90
D212-S	9392	2.0	260	1,095	18.72	78.84
D213-S	9796	9.4	260	1,095	87.80	369.76
D214-S	9797	6.8	260	1,095	63.18	266.09
D215-S	10531	6.0	260	1,095	56.16	236.52
D216-S	10537	6.0	260	1,095	56.16	236.52
D218-S	S1538	6.0	260	1,095	56.16	236.52
D223-S	1160	6.0	260	1,095	56.16	236.52
D224-S	1160	6.0	260	1,095	56.16	236.52
D225-S	1170	5.3	0	1,095	0.00	208.93
D226-S	1201	4.9	0	1,095	0.00	192.37

Unit ID	Building Number	Surface Area (ft^2)	Estimated Annual Operating Hours		VOC Emissions (lb/yr)	
			Actual[a]	Potential	Actual	Potential
D227-S	1205	6.0	0	1,095	0.00	236.52
D228-S	1208	6.0	0	1,095	0.00	236.52
D229-S	1208	6.0	0	1,095	0.00	236.52
D230-S	1209	6.0	0	1,095	0.00	236.52
D231-S	1210	6.0	0	1,095	0.00	236.52
D232-S	1211	6.0	0	1,095	0.00	236.52
D233-S	1259	6.0	0	1,095	0.00	236.52
D234-S	1259	6.0	0	1,095	0.00	236.52
D235-S	1620	6.0	260	1,095	56.16	236.52
D236-S	1620	6.0	260	1,095	56.16	236.52
D237-S	1620	6.0	260	1,095	56.16	236.52
D238-S	1620	6.0	260	1,095	56.16	236.52
D239-S	4577	6.0	108	1,095	23.40	236.52
D240-S	4578	5.2	108	1,095	20.28	204.98
D241-S	s1087	5.3	0	1,095	0.00	210.50
D242-S	s1087	4.9	0	1,095	0.00	192.37
D243-S	1065	7.9	260	1,095	74.27	312.78
D244-S	1065	7.9	260	1,095	74.27	312.78
D245-S	1065	7.9	260	1,095	74.27	312.78
D246-S	1065	7.9	260	1,095	74.27	312.78
D247-S	1065	7.9	260	1,095	74.27	312.78
D248-S	1065	7.9	260	1,095	74.27	312.78
D249-S	1065	7.9	260	1,095	74.27	312.78
D250-S	1065	7.9	260	1,095	74.27	312.78
D251-S	1065	7.9	260	1,095	74.27	312.78
D252-S	1065	7.9	260	1,095	74.27	312.78
D253-S	1065	7.9	260	1,095	74.27	312.78
D254-S	1065	7.9	260	1,095	74.27	312.78
D255-S	1065	7.9	260	1,095	74.27	312.78
D256-S	1065	7.9	260	1,095	74.27	312.78
D257-S	12700	9.4	260	1,095	87.80	369.76
D258-S	12900	9.4	260	1,095	87.80	369.76
D259-S	13100	9.4	260	1,095	87.80	369.76
D260-S	13300	9.4	260	1,095	87.80	369.76
D261-S	10531	5.3	260	1,095	50.05	210.79
D262-S	10506	1.8	260	1,095	17.11	72.06
D263-S	S0921	7.9	260	1,095	73.94	311.42

Unit ID	Building Number	Surface Area (ft^2)	Estimated Annual Operating Hours		VOC Emissions (lb/yr)	
			Actual[a]	Potential	Actual	Potential
D264-S	S0920	7.9	260	1,095	73.94	311.42
D265-S	1160	7.9	260	1,095	73.94	311.42
D266-S	1160	7.9	260	1,095	73.94	311.42
Total (lb/yr)					**4,527.23**	**23,276.24**
Total (ton/yr)					**2.26**	**11.64**

[a] Use estimated to be 1 hour or less per day based on use at Building 1065 (Operational data for each degreaser in other buildings was not obtained).

Unit IDs in italics are new for the 2007 inventory.

10.0 MISCELLANEOUS PRODUCT USAGE

Title V Source Designation(s)

_X_ *Significant*	*Products used in the direct support of the installation's mission that have potential emissions ≥10,000 lb/yr of any regulated air pollutant, ≥1,000 lb/yr of any regulated HAP, or ≥2,500 lb/yr of a combination of regulated HAPs*
	Products used in the direct support of the installation's mission that are subject to any specific state or federal standard or permit condition
__*Insignificant*	*Products used in the direct support of the installation's mission that are not subject to any specific state or federal standard or permit condition that have potential emissions <10,000 lb/yr of any regulated air pollutant, <1,000 lb/yr of any regulated HAP, and <2,500 lb/yr of a combination of regulated HAPs*
_X_ Trivial	*Products used during installation maintenance and upkeep activities*

10.1 BACKGROUND

Many products (e.g., sealing compounds, cleaners, adhesives, aerosol paints, and solvents) that contain VOC, volatile HAP, and ODC are used in numerous maintenance and repair activities across Fort Stewart. This Section addresses emissions from the use of these "miscellaneous" products. Products used in spray painting booths and enclosures, and in organic solvent cleaning units have been addressed in other sections of this report. Products used during installation maintenance and upkeep operations were not inventoried because the Georgia EPD has designated these activities as "trivial" sources of air pollution. In addition, products that clearly contribute negligible or no air pollution, such as batteries, were not inventoried, even though they are used.

Data on the miscellaneous product usage for 2007 was obtained from a hazardous material database used to track chemicals used on both Fort Stewart and Hunter Army Airfield. Emphasis was placed on identifying products which have VOCs, evaporation rates that are not negligible, and have a reasonable opportunity to be exposed to the outside air (not used exclusively in a closed system). Cleaning/degreasing and lubricating/penetrating oil products accounted for the vast majority of the products for which emissions were estimated. These products along with their usage are shown in Table 10.1. Overall the products shown in the table account for only a small portion of the miscellaneous chemical products used on Fort Stewart. Products that were used in large quantities for which emissions were not estimated included engine lubricating oil, brake fluid, hydraulic/transmission fluid, and antifreeze/coolant. These types of products are used primarily in closed circuits/equipment (engines, radiators, transmissions, etc.) and thus have very little opportunity to be released to the outside environment.

The Georgia EPD has not provided any specific guidance regarding the designation of miscellaneous product usage in support of the installation's mission as a "significant," "insignificant," or "trivial" source of air pollution. Miscellaneous chemicals represent multiple fugitive sources that are located installation wide. These activities, are grouped together here as one source category. Miscellaneous product usage is listed in Title V permit as a significant source.

10.2 EMISSION ESTIMATES

The method used to calculate actual and potential emissions is described below. Also provided is a summary of total emissions for all miscellaneous product usage.

Actual Emissions

It was assumed all products listed in the hazardous materials database were used. This will likely overstate emissions, as some portion of these products is likely kept in inventory. Emissions were estimated assuming all VOC and volatile HAP in each product were released to the atmosphere. Composition (VOC content and HAP content) of each product is based on data contained in the product's MSDS. A particular product's MSDS was obtained based upon the national stock number and product description given in the hazardous materials database.

The calculation used to estimate VOC emissions from "WD-40" is presented below.

WD-40 Corrosion preventative:	1,781 (16 oz) cans/yr (NSN: 8030-01-439-0681)
Product specific gravity (SG):	0.8121 (from MSDS)
Product density:	6.81 lb/gal (SG * 8.319)
VOC content of products:	3.4383 lb/gal (from MSDS)

VOC emissions = (1,781 can/yr) * (16 oz/can) * (1 lb/16 oz) * [(3.4383 lb/gal) / (6.81 lb/gal)]
= 899.20 lb/yr

Many of the products used (e.g., oils, greases, and antifreeze) contain constituents that are technically classified as VOC. However, the use of these products typically results in negligible air emissions because the product constituents have low volatilities and/or the products are used within closed systems. To avoid overestimating VOC emissions it was assumed that no VOC emissions resulted from the use of these products.

Potential Emissions

Actual emissions from the use of miscellaneous products are proportional to the number of units (quantity) of each product used per year. The number of units of each product used was assumed proportional to the number of hours the installation operates per year. Actual installation operations were estimated to occur 2,080 hours per year. Potentially the installation could operate at 8,760 hours per year. Potential emissions were thus estimated by multiplying the actual emissions by the ratio of 8,760/2,080.

Because emissions from miscellaneous product usage are classified as "fugitive" emissions, criteria pollutant and ODC emissions from this source category are not included in facility wide potential-to-emit determinations.

Emissions Summary

Table 10.0 below provides the total emissions of VOC and HAP from miscellaneous product usage at Fort Stewart.

TABLE 10.0
Emissions Summary - Miscellaneous Product Usage

Emission Type	VOC	HAP (Methanol)*
Actual (lb/yr)	20,029.52	2,549.24
Actual (ton/yr)	10.01	1.27
Potential (lb/yr)	83,707.84	10,736.22
Potential (ton/yr)	41.85	5.37

*: Only one HAP identified

Emission Source Updates

No emissions calculated for antifreeze/coolants.

10.3 DETAILED SOURCE AND EMISSION TABLES

Table 10.1 shows the miscellaneous chemicals for which emission were estimated.

TABLE 10.1
Miscellaneous Product Usage Information for CY2007[a]

National Stock Number	Product Name	Annual Use		Potential Use	
		Gallons	Pounds	Gallons	Pounds
2910006469727	Engine Starter Cylinder	-	17	-	69
6810002010907	Denatured Alcohol	110	728	463	3,068
6810005437415	Denatured Ethyl Alcohol	67	455	282	1,916
6810002865435	Isopropyl Alcohol	70	458	295	1,928
6840005843129	Pine Oil Disinfectant Detergent (gal)	208	1,652	876	6,960
6840006877904	Pine Oil Disinfectant Detergent (qt)	109	864	458	3,639
6850001395297	Rain Repellent	5	31	19	130
6850002246663	Rifle Bore Cleaning Cmpd	24	180	*101*	759
6850009262275	Windshield Wash	384	3,062	1,617	12,894
7930013425316	Simple Green	1,225	10,413	5,159	43,853

National Stock Number	Product Name	Annual Use		Potential Use	
		Gallons	Pounds	Gallons	Pounds
8030014390681	WD-40 Corrosion Preventive	-	1,781	-	7,501
6850011670678	Brakleen Brake Parts Cleaner	-	6,510	-	27,417
9150010536688	Cleaner, Lubricant, & Preservative	275	1,972	1,158	8,307
9150010546453	Cleaner, Lubricant, & Preservative	91	684	384	2,882
9150010400947	Primer Adhesive	-	724	-	3,048
9150002617899	Penetrating Oil Type 1 - 1 Pint Can	1	6	4	25
9150005297518	Penetrating Oil - Aerosol Can	-	221	-	932
9150010796124	Cleaner, Lubricant, & Preservative	4	29	17	122
6850014742317	Cleaning Compound MIL PRF 680	1,200	7,676	5,054	32,328
6840012843982	Insect Repellant (2 oz tubes)	69	584	69	584
9150011021473	Cleaner, Lubricant, & Preservative	4	31	18	132
6850009652332	Carbon Removing Compound	55	472	232	1,990
6840012781336	Insect Repellant Clothing	-	540	-	2,274

[a] Products that have VOCs, evaporation rates that are not negligible, and have a reasonable opportunity to be exposed to the outside air (not used exclusively in a closed system).

11.0 LANDFILLS

Title V Source Designation(s)

__Significant	*Landfills that are subject to any standard, limitation, or other requirement under Sections 111 or 112 (excluding Section 112(r)) of the CAAA.*
_X_ Insignificant	*Landfills that are not subject to any standard, limitation, or other requirement under Sections 111 or 112 (excluding Section 112(r)) of the CAAA.*
__Trivial	*Not applicable*

11.1 BACKGROUND

This section describes VOC, ODC, and HAP emissions from both active and inactive landfills. Five landfills are located at Fort Stewart. During 2007, one of the landfills, L101-S, was active while the remaining four sites were inactive. Either area or trench and fill methods have been used at each landfill. Although none of the landfills are equipped with emission control devices, 14 passive methane vent pipes were installed at the active landfill site during June 2000. This landfill is equipped with a gas collection device (i.e., vent pipes) and as per Georgia Environmental Protection Division Rules for Air Quality this landfill is classified as a point emission source, while the remaining landfills, which are not equipped with any type of gas collection device, are classified as fugitive emission sources.

The Georgia EPD has designated landfills that are not subject to any standard, limitation, or other requirement under Sections 111 or 112 (excluding Section 112(r)) of the CAAA as "insignificant" sources of air pollution. Because none of the landfills at Fort Stewart are subject to Sections 111 or 112, the landfills are designated as insignificant sources.

Data for all landfills was obtained from the 2005 and 2006 Fort Stewart Emission Inventory Reports, and from the contact(s) listed in Table 1. The South Central Landfill (L101-S) was opened during 1983. It is expected to remain open until 2020. Most of the waste discarded at L101-S consists of household trash, paper, plastics, and putresible garbage. This landfill is an area fill type with a surface area of 75 acres consisting of 15-foot deep-stacked cells giving a refuse depth of 30 feet. When filled, each cell contains 13 feet (depth) of refuse and is capped with 2 feet of soil. Each day, between 4 and 5 feet (depth) of refuse are added to a cell and all exposed refuse is covered with 6 inches of fill at the end of the day.

The inactive landfills were operated for varying time periods between 1970 and 1982. The trench and fill disposal method was used on these landfills.

Before emissions could be estimated, the maximum quantity of waste (capacity) that can be accumulated in each landfill had to be estimated. Trenches were estimated to account for 50 percent of the volume for a trench and fill landfill. Eighty percent of the volume of each trench in a trench and fill landfill was estimated to contain waste and the remaining 20 percent was

estimated to contain inorganic fill. Area fill landfills were also estimated to contain 75 percent waste and 25 percent inorganic fill by volume. Using a density of 54 pounds per cubic foot for landfill waste, the quantity of waste disposed in each landfill was calculated. For example, the calculation used to determine the quantity of refuse contained in an area fill landfill is presented below:

Unit ID:	L101-S
Landfill:	South Central Landfill
Fill method:	Area
Surface area:	75 acres
Waste depth:	30 feet (ft)
Volume containing refuse:	75%
Density of refuse:	54 lb/ft^3

Maximum waste (tons) = (75 acres) * (43,560 ft^2/acre) * (30 ft) * (0.75) *(54 lb/ft^3) * (1 ton/2,000 lb)
= 1,984,703 tons

Maximum waste (megagrams [Mg]) = 1984703 * 0.9071847
= 1,800,492 Mg

As an additional example, the calculation used to determine the quantity of refuse disposed in a trench and fill landfill is presented below:

Unit ID:	L102-S
Landfill:	South Central Landfill (SCL) - Closed 1
Fill method:	Trench and fill
Surface area:	27 acres
Waste depth:	7 ft
Trench volume in landfill:	50%
Trench volume containing refuse:	80%
Density of refuse:	54 lb/ft^3

Quantity of Waste = (27 acres) * (43,560 ft^2/acre) * (7 ft) * (0.50) * (0.80) * (54 lb/ft^3) (1 ton/2,000 lb)
= 88,900 tons

11.2 EMISSION ESTIMATES

The method used to calculate actual and potential emissions is described below. Also provided is a summary of total emissions for all landfills.

Actual Emissions

EPA's Landfill Air Emissions Estimation Model (Ref. 8) was used to estimate methane gas emissions from the inactive and active landfills. The following parameters were required in order to estimate emissions: the date the landfill opened, the date the landfill closed, current date,

the capacity (Mg), the average refuse acceptance rate (Mg), the methane generation rate (k), and the potential methane generation capacity (Lo).

The average refuse acceptance rate for the active landfill was estimated by dividing the total mass of refuse in the landfill by the number of years the landfill operated. The other landfills are already closed and thus assumed to have reached their capacity. Default values for k (0.04/yr) and Lo (3,530 ft^3 methane/ton of refuse) that were used in the model were taken from AP-42, Section 2.4 (Ref. 1). [**Note:** The AP-42 default values for k and Lo are not as conservative as those required to be used in order to demonstrate compliance with the recent New Source Performance Standard (NSPS)/Emission Guideline (EG). However, the landfills at Fort Stewart are not subject to the NSPS/EG because they were each designed to hold less than 2.5 million megagrams (2.76 million tons) of waste. Therefore, the use of the AP-42 default values for k and Lo to estimate emissions from Fort Stewart's landfills is appropriate.]

VOC, HAP, and ODC emissions from each landfill were determined using an emission estimation methodology from AP-42, Section 2.4 (Ref. 1). Based on this methodology, emission factors for each pollutant are dependent upon the quantity of methane emitted, the median concentration of each compound in the total emissions, the molecular weight of each compound, and the temperature of the emissions. Methane gas is estimated to account for approximately 55 percent of the emissions from each landfill and an emission temperature of 77 °F (298 °K) was estimated. Emission factors for each pollutant were calculated using Equations 3 and 4 from AP-42. For example, the calculation used to determine an emission factor for toluene is presented below.

Ratio of total emissions to methane emissions: 1.82 (100 percent by volume [$\%_v$]/ 55$\%_v$)

Toluene median concentration:	165 parts per million by volume (ppmv)
Toluene molecular weight:	92.13 g/gram mole(s) (gmol)
Conversion constant:	8.205×10^{-5} cubic meters (m^3)-atmosphere (atm)/gmol- °K
Temperature of emissions:	298 °K
Pressure of emissions:	1 atm

Toluene Emission Factor $= [(1.82) * (165/10^6) * (92.13\ g/gmol) * (1\ atm)] / [(8.205 \times 10^{-5}\ m^3\text{-atm/gmol-°K}) * (1{,}000\ g/kg) * (298\ °K)]$
$= 1.13 \times 10^{-3}\ kg/m^3$ methane

Emissions from each landfill were estimated by multiplying the methane emission rate by the appropriate emission factor. For example, the calculation used to determine the quantity of toluene emitted from the South Central Landfill is presented below:

Unit ID:	L101-S
Methane emission rate:	2,511,863 m^3/yr
Toluene emission factor:	1.13×10^{-3} kg/m^3

Toluene emissions = (2,511,863 m^3/yr) * ($1.13x10^{-3}$ kg/m^3) * (2.2046 lb/kg)
= 6,257.55 lb/yr

Emission results are presented in Section 11.3, Tables 11.4 and 11.5.

Potential Emissions

Emissions from the active landfill (Unit ID L101-S) are expected to increase as the quantity of waste contained in the landfill increases. At the same time, emissions from each of the four inactive landfills are expected to decrease as the waste present in each of these landfills continues to decompose. It was estimated that the increase in emissions at the active landfill would be more than offset by the decrease in emissions at the inactive landfills. Therefore, potential emissions from the landfills were conservatively estimated to be the same as actual emissions from the landfills.

Criteria pollutant and ODC emissions from the inactive landfills that are classified as fugitive sources due to no gas-collection devices are not included in the installation-wide potential emission estimates. However, potential criteria pollutant and ODC emissions from the active landfill that is classified as a point source are included in the installation-wide potential emission estimates. Therefore, the "totaled" potential VOC and ODC emissions only include the emissions from the active landfill.

Emissions Summary

Table 11.0 below provides the total emissions of VOC and HAP from the landfill at Fort Stewart.

TABLE 11.0
Emissions Summary - Landfills

Emission Type	VOC	HAP	ODC
Actual (lb/yr)	96,214.43	10,341.42	1,130.09
Actual (ton/yr)	48.11	5.17	0.57
Potential (lb/yr)*	85,833.64	9,225.66	1,008.16
Potential (ton/yr)*	42.92	4.61	0.50

* Potential emissions for L101-S only (landfill classified as a point source because passive methane vent pipes are installed & thus potentials were determined)

Emission Source Updates

There were no changes to landfill operations in 2007.

11.3 DETAILED SOURCE AND EMISSION TABLES

Tables 11.1 through 11.5 present the characteristics of the landfill, methane generation rate and HAP emission factors and a summary of emissions.

TABLE 11.1
Landfill Information for CY2007

Unit ID	Landfill Name	Year Opened	Year Closed	Surface Area (acre)	Refuse Depth (ft)	Fill Method	Maximum Refuse Mass	
							Tons	Mg
L101-S[a]	South Central Landfill	1983	Active	75	30	Area	1,984,703	1,800,492
L102-S	SCL-Closed 1	1970	1982	27	7	Trench	88,900	80,648.7
L103-S	SCL-Closed 2	1940	1970	30	7	Trench	98,800	89,629.85
L104-S	Camp Oliver	1970	1979	10	6	Trench	28,200	25,582.61
L105-S	TAC-X	1970	1979	5	5.5	Trench	12,900	11,702.68

[a] Passive methane vent pipes are installed at this landfill; therefore, this landfill is classified as a point source.

TABLE 11.2
Methane Emission Rates for Landfills

Unit ID	Methane[a] Emission Rate (m^3/yr)
L101-S	2,511,863.34
L102-S	165,236.02
L103-S	66,442.42
L104-S	49,509.39
L105-S	22,599.09

[a] Methane emission rate calculated using the Landfill Air Emissions Estimation Model (Ref. 8).

TABLE 11.3
Emission Factors and Associated Data for Pollutants Emitted from Landfills

Pollutant	Molecular Weight (g/gmol)[a]	Median Concentration (ppmv)[a]	Emission Factor (kg/m^3 methane)[b]
Criteria Pollutants			
VOC	86.18	2,420[c]	$1.55x10^{-2}$
Hazardous Air Pollutants			
Acrylonitrile	53.06	6.33	$2.50x10^{-5}$
Benzene	78.11	11.1[c]	$6.45x10^{-5}$
Carbon Disulfide	76.13	0.58	$3.29x10^{-6}$
Carbonyl Sulfide	60.07	0.49	$2.19x10^{-6}$
Carbon Tetrachloride	153.84	0.004	$4.58x10^{-8}$
Chlorobenzene	112.56	0.25	$2.09x10^{-6}$
Chloroform	119.39	0.03	$2.67x10^{-7}$
Ethylbenzene	106.16	4.61	$3.64x10^{-5}$
Ethyl Chloride	64.52	1.25	$6.00x10^{-6}$
Ethylene Dichloride	98.96	0.41	$3.02x10^{-6}$
Ethylidene Dichloride	98.95	2.35	$1.73x10^{-5}$
Hexane	86.18	6.57	$4.21x10^{-5}$
Mercury Compounds	200.61	$2.92x10^{-4}$	$4.36x10^{-9}$
Chloromethane	50.49	1.21	$4.55x10^{-6}$
Methyl Chloroform	133.41	0.48	$4.77x10^{-6}$
Methylene Chloride	84.94	14.3	$9.04x10^{-5}$
MIBK	100.16	1.87	$1.39x10^{-5}$
Propylene Dichloride	112.99	0.18	$1.51x10^{-6}$
1,1,2,2-Tetrachloroethane	167.85	1.11	$1.39x10^{-5}$
Tetrachloroethylene	165.83	3.73	$4.60x10^{-5}$
Toluene	92.13	165[c]	$1.13x10^{-3}$
Trichloroethylene	131.40	2.82	$2.76x10^{-5}$
Vinyl Chloride	62.50	7.34	$3.41x10^{-5}$
Vinylidene Chloride	96.94	0.20	$1.45x10^{-6}$
Xylenes	106.16	12.1	$9.56x10^{-5}$
Ozone Depleting Substances			

Pollutant	Molecular Weight (g/gmol)[a]	Median Concentration (ppmv)[a]	Emission Factor (kg/m^3 methane)[b]
Carbon Tetrachloride	153.84	0.004	4.58×10^{-8}
Fluorotrichloromethane (R-11)	137.38	0.76	7.77×10^{-6}
Dichlorodifluoromethane (R-12)	120.91	15.7	1.41×10^{-4}
Dichlorofluoromethane (R-21)	102.92	2.62	2.01×10^{-5}
Chlorodifluoromethane (HCFC-22)	86.47	1.30	8.37×10^{-6}
Methyl Chloroform	133.41	0.48	4.77×10^{-6}

[a] Data from EPA document AP-42, Section 2.4, Tables 2.4-1 and 2.4-2 (Ref. 1).
[b] Emission factors calculated using EPA document AP-42, Section 2.4, Equations 3 and 4 (Ref. 1).
[c] Value for co-disposal of municipal solid waste and nonresidential waste.

TABLE 11.4
Actual and Potential[a] VOC and HAP Emissions from Landfills

Unit ID	VOC	Acrylonitrile	Benzene	Carbon Disulfide	Carbonyl Sulfide	Carbon Tetrachloride	Chlorobenzene	Chloroform	Ethylbenzene	Ethyl Chloride	Ethylene Dichloride	Ethylidene Dichloride	Hexane	Mercury Compounds	Chloromethane
L101-S[a]	85,833.64	138.44	357.18	18.22	12.13	0.254	11.57	1.479	201.57	33.23	16.72	95.80	233.14	0.024	25.20
L102-S	5,646.33	9.11	23.50	1.198	0.798	0.017	0.761	0.097	13.26	2.186	1.10	6.30	15.34	0.002	1.66
L103-S	2,270.42	3.66	9.45	0.482	0.321	0.007	0.306	0.039	5.332	0.879	0.442	2.53	6.17	0.001	0.666
L104-S	1,691.80	2.73	7.04	0.359	0.239	0.005	0.228	0.029	3.973	0.655	0.330	1.89	4.60	4.8E-04	0.497
L105-S	772.24	1.25	3.21	0.164	0.109	0.002	0.104	0.013	1.814	0.299	0.150	0.862	2.10	2.2E-04	0.227
Total (lb/yr) [b]	**96,214.43**	**155.18**	**400.38**	**20.42**	**13.59**	**0.284**	**12.97**	**1.66**	**225.95**	**37.24**	**18.75**	**107.39**	**261.33**	**0.03**	**28.24**
Total (ton/yr) [b]	**48.11**	**0.08**	**0.20**	**0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**0.11**	**0.02**	**0.01**	**0.05**	**0.13**	**<0.01**	**0.01**

TABLE 11.4 (Continued)

Unit ID	Methyl Chloroform	Methylene Chloride	MIBK	Propylene Dichloride	1,1,2,2-Tetrachloroethane	Tetrachloroethylene	Toluene	Trichloroethylene	Vinyl Chloride	Vinylidene Chloride	Xylenes
L101-S[a]	26.41	500.60	76.97	8.36	76.97	254.73	6257.55	152.84	188.83	8.03	529.40
L102-S	1.74	32.93	5.06	0.550	5.06	16.76	411.64	10.05	12.42	0.528	34.83
L103-S	0.699	13.24	2.04	0.221	2.04	6.74	165.52	4.04	4.99	0.212	14.00
L104-S	0.521	9.867	1.52	0.165	1.52	5.02	123.34	3.01	3.72	0.158	10.43
L105-S	0.238	4.504	0.693	0.075	0.693	2.29	56.30	1.38	1.70	0.072	4.76
Total (lb/yr) [b]	**29.61**	**561.15**	**86.28**	**9.37**	**86.28**	**285.54**	**7,014.34**	**171.32**	**211.67**	**9.00**	**593.43**
Total (ton/yr) [b]	**0.01**	**0.28**	**0.04**	**<0.01**	**0.04**	**0.14**	**3.51**	**0.09**	**0.11**	**<0.01**	**0.30**

[a] Except for L101-S (landfill with passive methane vent pipes), this fugitive criteria pollutant source category are not included in installation-wide Title V PTE.
[b] Actual and potential totals

TABLE 11.5
Actual and Potential ODC Emissions from Landfills

Unit ID	Carbon Tetrachloride	R-11	R-12	R-21	HCFC-22	Methyl Chloroform
L101-S	0.254	43.03	780.81	111.31	46.35	26.41
L102-S	0.017	2.83	51.36	7.32	3.05	1.74
L103-S	0.007	1.14	20.65	2.94	1.23	0.699
L104-S	0.005	0.848	15.39	2.19	0.914	0.521
L105-S	0.002	0.387	7.02	1.00	0.417	0.238
Total (lb/yr) [a]	**0.284**	**48.23**	**875.24**	**124.77**	**51.96**	**29.61**
Total (ton/yr) [a]	**<0.01**	**0.02**	**0.44**	**0.06**	**0.03**	**0.01**

[a] Actual and potential totals

R-11: Fluorotrichlormethane, R-12: Dichlorodifluoromethane, R-21: Dichlorofluoromethane, HCFC-22: Chlorodifluoromethane

12.0 WASTEWATER TREATMENT

Title V Source Designation(s)

X Significant	*Wastewater collection and treatment systems or equipment that are subject to any standard, limitation, or other requirement under Sections 111 or 112 (excluding Section 112(r)) of the CAAA.*
	Industrial wastewater treatment systems
X Insignificant	*Sanitary wastewater collection and treatment systems or equipment that are not subject to any standard, limitation, or other requirement under Sections 111 or 112 (excluding Section 112(r)) of the CAAA.*
__ Trivial	*Not applicable*

12.1 BACKGROUND

There are six wastewater treatment plants (WWTPs) located at Fort Stewart. The post operates and maintains five of the treatment plants, (one industrial and four sanitary WWTPs). The sixth treatment plant is owned and operated by the City of Hinesville and treats the majority of the sanitary wastewater generated at Fort Stewart. The Hinesville WWTP is not considered part of Fort Stewart's operations and should not be included in the post's Title V permit. Therefore, emissions from the Hinesville WWTP are not included in this emissions inventory. The remaining wastewater treatment operations have been included in the inventory because they are sources of fugitive air emissions.

Information regarding the treatment plant was obtained from the 2005 and 2006 Emission Inventories. Data on the quantities of wastewater treated were obtained from Directorate of Public Work contacts Mr. David Montano and Mr. Stanley Thomas (See Section 1.0, Table 1.0 for contact information). The industrial WWTP (IWWTP) is located in the main cantonment area of Fort Stewart (Building 4420) and treats a mixture of water, oils, and greases from motor pool sumps and wash racks located throughout the post. This treatment plant employs a series of passive treatments and is comprised of three grit chambers, a skimmer system, an equalization basin (approximately 6 acres), and four sand-filled filter beds. The grit chambers and skimmer system act as an oil/water separator, while the equalization basin holds the water for a sufficient length of time to allow for the settling of sedimentation. After the equalization basin, wastewater is passed through the filter beds and is subsequently discharged. Induced biodegradation, mechanical aeration, and chlorine are not used at the IWWTP.

Two of the sanitary WWTPs consist of aeration ponds and spray fields. These treatment plants are located at Camp Oliver and at Wright Army Airfield (WAAF). The WWTP at Camp Oliver is comprised of a mechanically aerated pond, an oxidation pond, and a spray field. Together, the two ponds have a surface area of approximately 2 acres and an average wastewater depth of approximately 2 feet. The WWTP at WAAF is comprised of one pond, partially separated in the middle with a dike, and a spray field. The pond has a surface area of approximately 1 acre and an average wastewater depth of approximately 4 feet. At both of these treatment plants, the wastewater is treated with chlorine prior to being discharged to the spray fields.

The remaining two sanitary WWTPs are packaged treatment plants and are located at Evans Field and at TAC-X. Both treatment plants consist of a single AST with a capacity of approximately 35,000 gallons. The tanks are subdivided into several compartments in which the wastewater is aerated and solids are allowed to settle out. At both WWTPs, the wastewater is treated with chlorine prior to being discharged. Recent upgrades to the TAC-X system include an aerated lagoon followed by a sedimentation basin and chlorine addition.

The Georgia EPD has designated sanitary wastewater collection and treatment systems or equipment that are not subject to any standard, limitation, or other requirement under Sections 111 or 112 (excluding Section 112(r)) of the CAAA as "insignificant" sources of air pollution. Because none of the sanitary WWTPs at Fort Stewart are subject to Sections 111 or 112, these WWTPs are designated as insignificant sources. The industrial WWTP is designated as a significant source of air pollution.

12.2 EMISSIONS ESTIMATES

The method used to calculate actual and potential emissions is described below. A summary of emissions from all wastewater treatment activities is presented in Table 12.0. Section 12.3, Table 12.1 provides the details and emissions for each wastewater treatment activity individually.

Actual Emissions

The EPA document, *Procedures for the Preparation of Emissions Inventories for CO and Precursors of Ozone, Volume I: General Guidance for Stationary Source,* Section 3.5-1, p. 3-14 (Ref. 9) identifies a VOC emission factor of 1.1×10^{-4} pounds per gallon of industrial wastewater treated. VOC emissions from sanitary wastewater were assumed to be insignificant. Data regarding the industrial wastewater component (i.e., percent by volume) of the influent treated at each treatment plant were provided by the Directorate of Public Works.

Actual VOC emissions were estimated by multiplying the average wastewater treatment rate by 1) the operating schedule, 2) the industrial component factor, and 3) the VOC emission factor. The calculation used to estimate actual VOC emissions from the IWWTP is presented below:

Unit ID:	W001-S
Average treatment rate:	204,153 gal/day
Operating schedule:	365 day/yr
Industrial wastewater component:	$99\%_v$
VOC emission factor:	1.1×10^{-4} lb/gal industrial wastewater

$$\text{VOC emissions} = (204{,}153\ \text{gal/day})*(365\ \text{day/yr})*(0.99)*(1.1 \times 10^{-4}\ \text{lb/gal}) = 8{,}114.78\ \text{lb/yr}$$

All of the treatment plants except for the Industrial WWTP treat chlorinated wastewater. The chloroform emission factor of 1.17×10^{-7} pounds per gallon of treated (chlorinated) wastewater was obtained from Fort Stewart's 1994 Emission Statement and was used as follows to estimate

actual chloroform emissions. The calculation used to estimate actual chloroform emissions from the sanitary WWTP located at Camp Oliver is presented below:

Unit ID:	W101-S
Average treatment rate:	2,664.49 gal/day
Operating schedule:	365 days/yr
Chloroform emission factor:	1.17×10^{-7} lb/gal wastewater

Chloroform Emissions = (2,664.49 gal/day) * (365 days/yr) * (1.17×10^{-7} lb/gal)
= 0.113 lb/yr

Potential Emissions

Emissions from wastewater treatment operations are proportional to the quantity of wastewater treated. Potential emissions from each treatment plant were estimated assuming the plants could operate at their permitted capacities for an entire year. Total potential VOC emissions are not presented in the inventory/report summary tables because fugitive criteria pollutant emissions from this source category are not included in installation-wide potential-to-emit determinations. The calculation used to estimate potential VOC emissions from the IWWTP is presented below:

Unit ID:	W001-S
Permitted treatment rate:	500,000 gal/day
Operating schedule:	365 days/yr
Industrial wastewater component:	$99\%_v$
VOC emission factor:	1.1×10^{-4} lb/gal industrial wastewater

VOC emissions = (500,000 gal/day)*(365 day/yr)*(0.99)*(1.1×10^{-4} lb/gal)
= 19,874.25 lb/yr

Emissions Summary

Table 12.0 below provides the total emissions of VOC for all wastewater treatment activities at Fort Stewart.

TABLE 12.0
Emissions Summary - Wastewater Treatment

Emission Type	Emissions (lb/yr)	
	VOC	HAP (Chloroform)
Actual	8,121.6	0.718
Potential	N/A	6.34

Emission Source Updates

No significant changes were noted for wastewater treatment during the 2007 inventory data collection activity.

12.3 DETAILED SOURCE AND EMISSION TABLES

Table 12.1 presents the details for all the Fort Stewart wastewater treatment operations.

TABLE 12.1
Wastewater Treatment Details and Emissions

Unit ID	Treatment Plant	Industrial Component ($\%_v$)	Wastewater Treated (gal/day)		Actual Emissions (lb/yr)		Potential Emissions (lb/yr)	
			Actual	Permitted	VOC	Chloroform	VOC [a]	Chloroform
W001-S[b]	Industrial WWTP	99	204,153	500,000	8114.78	0	19,874.25	0
W101-S	Camp Oliver	1	2,664	70,000	1.07	0.11	28.11	2.96
W102-S	Evans Field	1	4,196	35,000	1.68	0.18	14.05	1.48
W103-S	TAC-X	1	8,244	35,000	3.31	0.35	14.05	1.48
W104-S	Wright AAF	1	1,884	10,000	0.76	0.08	4.02	0.42
Total (lb/yr)					**8,121.60**	**0.72**	**19,934.48**	**6.34**
Total (ton/yr)					**4.06**	**<0.01**	**9.97**	**<0.01**

[a] Fugitive criteria pollutant emissions from this source category are not included in installation-wide Title V potential-to-emit calculations.
[b] Significant Title V Source

13.0 PRESCRIBED BURNING

Title V Source Designation(s)

__ *Significant*	*Prescribed burning not considered "insignificant" or "trivial" as described below*
_x_ *Insignificant*	*Open burning in compliance with Georgia Rule 3910301.02(5) (which includes prescribed burning of any forest land by the owner or owner's designee)*
_x_ *Trivial*	*Wildfires and other accidental fires*

13.1 BACKGROUND

Fort Stewart uses prescribed burning operations on approximately 279,000 acres of forested/grass land to control undergrowth, to reduce forest fire fuel, to increase training maneuverability, and to create a healthy forest environment. The installation is on a 3-year burn cycle, mandated by the U.S. Fish and Wildlife Service, and approximately one third of the total acreage is typically burned per year. Prescribed burning releases substantial quantities of fugitive emissions.

During 2007, the installation controlled litter accumulations using prescribed burning methods on 29,824 acres, including 8,947 acres of grassland, 5,965 acres of palmetto, and 14,912 acres of long needle pine. The prescribed burning operations were conducted using head, backing, flanking, and spot fires.

Due to differences between estimating emissions from the burning of grassland, palmetto, and long needle pine litter, these activities were separated into three distinct emission sources. The total acreage of each type of fuel burned was used to estimate emissions.

The Georgia EPD has designated certain open burning activities as "insignificant" (Georgia Rule 391-3-1-.03(10)(g)). Since all prescribed burning at Fort Stewart is fire set under controlled conditions to burn forest understory and used as a forest management practice by the owner or owner's designee, all three prescribed burning emission sources are designated "insignificant" (Georgia Rule 391-3-1-.02(5)).

Wildfires or other unplanned fires are considered one-time events that are not part of the installation's normal business operations. Therefore, these fires are designated as trivial sources of air pollution and have not been included in this inventory.

13.2 EMISSIONS ESTIMATES

The method used to calculate actual and potential emissions is described below. Also provided is a summary of total emissions for the prescribed burning activity.

Actual Emissions

Both criteria pollutants and HAP are emitted from prescribed burning operations. Criteria pollutant emissions were estimated using emission factors from AP-42, Section 13.1 (Ref.1). These emission factors, which are dependent upon the type of fuel consumed, are presented in Section 13.3, Table 13.1.

Emissions from prescribed burning operations are influenced by the quantity of fuel that is consumed during the operations. For grassland, the quantity of fuel present per acre is dependent upon the number of years between burns. Based on a 3-year accumulation period, 0.71 tons of fuel is present per acre of grassland. The quantity of fuel present in palmetto stands is dependent upon the number of years between burns and the height of the palmetto. Based on a 3-year accumulation period and an average vegetative height of 3 feet, 2.70 tons of fuel is present per acre of palmetto. The quantity of fuel present in long needle pine stands is dependent upon the number of years between burns and the stand basal area (tree cross-sectional area at chest height). Based on a 3-year accumulation period and an average stand basal area of 65 square feet per acre, 3.58 tons of fuel is present per acre of long needle pine forest. Data used to estimate emissions from prescribed burning is presented in Section 13.3, Table 13.2.

Actual criteria pollutant emissions from prescribed burns were estimated by multiplying the number of acres burned by the quantity of fuel consumed per acre and the appropriate emission factor. For example, the calculation used to estimate actual CO emissions from the prescribed burning of grassland is presented below:

Unit ID:	B001-S
Type of litter:	Grassland
Total acreage burned:	8,947 acres/yr
Litter consumed:	0.71 tons/acre
CO emission factor:	75 lb/1,000 lb litter

CO emissions = (8,947 acres/yr) * (0.71 ton/acre) * (2,000 lb/ton) * (75 lb/1,000 lb)
= 952,856 lb/yr

The estimated VOC and HAP emissions from prescribed burning are found in Section 13.3, Tables 13.3 and 13.4.

Potential Emissions

Because emissions from prescribed burning operations are classified as “fugitive” emissions, criteria pollutant emissions from this source category are not included in facility-wide potential-to-emit determinations. No potential emissions were calculated for prescribed burning. Potential HAP emissions were assumed equal to actual HAP emissions.

Emissions Summary

Table 13.0 given below summarizes estimated actual criteria pollutant and HAP emissions from prescribed burning at Fort Stewart. Detailed criteria and HAP emission tables that present emissions for each unit are presented in Section 13.3.

TABLE 13.0
Emissions Summary* - Prescribed Burning

Emissions	CO	NO_x	SO_2	PM	PM-10	PM-2.5	VOC	HAP
lb/yr	18,432,240	303,371	0	2,777,822	1,998,221	1,998,221	448,434	4,967.28
ton/yr	9,216.12	151.69	0	1,388.91	999.11	999.11	224.22	2.48

* Criteria pollutant lead is also a HAP and thus is included under the HAP category

Emission Source Updates

No significant changes were noted for prescribed burning during the 2007 inventory data collection activity.

13.3 DETAIL SOURCE AND EMISSION TABLES

Tables 13.1 through 13.6 below provide a summary of emission factors used, 2007 prescribed burning data, and a detailed breakdown of estimated emissions.

TABLE 13.1
Criteria Pollutant Emission Factors for Prescribed Burning Operations

Pollutant	Emission Factors (lb/1,000 lb litter burned)[a]		
	Grassland	Palmetto	Long Needle Pine
CO	75	125	126
NO_x[b]	2.5	2.5	2.5
PM	10	16	20
PM-10	10	15	13
PM-2.5	10[c]	15[c]	13
VOC	0	--	4.2

[a] Emission factors from AP-42, Section 13.1, Tables 13.1-3 and 13.1-4 (Ref. 1).
[b] A NO_x emission factor of 2 to 8 lb/ton litter burned is provided in AP-42 (Ref. 1). The midpoint of 5 lb/ton litter burned (2.5 lb/1,000 lb litter burned) was assumed for emission estimation purposes.
[c] PM-10 factor provided; assumed PM-2.5 equals PM-10.

TABLE 13.2
Prescribed Burning Information for CY2007

Unit ID	Type of Vegetation	Fuel Loading (tons/acre)	Area Burned (acres/yr)
B001-S	Grassland	0.71	8,947
B002-S	Palmetto	2.7	5,965
B003-S	Long Needle Pine	3.58	14,912

Source: AP-42, Section 13.1 (Ref. 1)

TABLE 13.3
Actual Criteria Pollutant Emissions from Prescribed Burning Operations

Unit ID	Type of Vegetation	Emissions (lb/yr)						
		CO	NO_x	SO_2	PM	PM-10	PM-2.5	VOC
B001-S	Grassland	952,856	25,409	0	127,047	127,047	127,047	0
B002-S	Palmetto	4,026,375	64,422	0	515,376	483,165	483,165	0
B003-S	Long Needle Pine	13,453,010	213,540	0	2,135,398	1,388,009	1,388,009	448,434
Total (lb/yr)		**18,432,240**	**303,371**	**0**	**2,777,822**	**1,998,221**	**1,998,221**	**448,434**
Total (ton/yr)		**9,216.12**	**151.69**	**0**	**1,388.91**	**999.11**	**999.11**	**224.22**

TABLE 13.4
Actual Hazardous Air Pollutant Emissions from Prescribed Burning Operations

Unit ID	Type of Vegetation	Emissions (lb/yr)					
		Cadmium	Chromium	Lead	Manganese	Nickel	POM
B001-S	Grassland	0	0	2.54	34.30	0	0
B002-S	Palmetto	159.77	10.31	51.54	56.69	10.31	669.99
B003-S	Long Needle Pine	661.97	42.71	213.54	234.89	42.71	2776.02
Total (lb/yr)		**821.74**	**53.02**	**267.62**	**325.89**	**53.02**	**3,446.01**
Total (ton/yr)		**0.41**	**0.03**	**0.13**	**0.16**	**0.03**	**1.72**

14.0 ORDNANCE DETONATION

Title V Source Designation(s)

X Significant	*Ordnance detonation operations that have potential emissions ≥10,000 lb/yr of any regulated air pollutant, ≥1,000 lb/yr of any regulated HAP, or ≥2,500 lb/yr of a combination of regulated HAPs*
	Ordnance detonation operations that are subject to any specific state or federal standard or permit condition
X Insignificant	*Ordnance detonation operations that are not subject to any specific state or federal standard or permit condition that have potential emissions <10,000 lb/yr of any regulated air pollutant, <1,000 lb/yr of any regulated HAP, and <2,500 lb/yr of a combination of regulated HAPs*
__Trivial	*Not applicable*

14.1 BACKGROUND

This Section discusses the fugitive emissions that are generated by the detonation of ordnance. As part of their training, Fort Stewart personnel use a variety of ordnance including small arms, large arms, and smoke devices. For the purposes of this inventory, small arms include ordnance ranging in size from 5.56 millimeters (mm) to 50 caliber (0.5 inch) and large arms include ammunition and weaponry greater than 50 caliber such as mortars, artillery shells, and grenades. Smoke devices include sources such as markers, grenades, and smoke pots. Explosive ordnance disposal (EOD) is also conducted at Fort Stewart and is accounted for in this Section. Information regarding the type and quantity of ordnance used during 2007 was made available from Fort Stewart's Range Facility Management Support System (RFMSS). See Section 1.0 for a list of data sources/point of contacts. The net explosive weight (NEW) and the type of explosive used in each type of ordnance were determined using 1) the U.S. Army Defense Ammunition Center, *Munitions Items Disposition Action System* (MIDAS) (Ref. 10), 2) the *Ammunition Book Complete* (Ref. 11), and 3) the *Hazard Classification of U.S. Military Explosives and Munitions* (Ref. 12).

Tables 14.1 through 14.3 in Section 14.3 present the ordnance data compiled for 2007.

The Georgia EPD has not provided specific guidance regarding the designation of ordnance detonation operations as "significant," "insignificant," or "trivial" sources of air pollution. However, as per the Georgia Environmental Protection Division, *Major Source Operating Permit Application Introduction and Instructions*, any activity that is not subject to any specific state or federal standard or permit condition that generates potential emissions that are less than 10,000 lb/yr of any regulated air pollutant, less than 1,000 lb/yr of any regulated HAP, and less than 2,500 lb/yr of a combination of regulated HAPs is designated as an insignificant source. Therefore, the significance of each ordnance detonation operation was determined after

estimating potential emissions (see Potential Emissions). Since small arms, large arms, and smoke devices are all used in the same locations, emissions from these three sources were combined prior to determining their significance. Explosive ordnance destruction (EOD) is conducted at a separate location and was considered separately from ordnance firing of small arms, large arms, and smoke devices. Based on these specifications, small arms detonation, large arms detonation, and smoke device detonation are designated as significant sources, while EOD operations are designated as an insignificant source.

14.2 EMISSION ESTIMATES

Actual Emissions

Emissions from the use of small arms ordnance (Unit ID O001-S) were estimated using emission factors from AP-42, Section 13.3 (Ref. 1)*. Actual CO, and PM/lead emissions were calculated by multiplying the amount of explosive in each round (i.e., NEW) by the number of rounds fired and by the appropriate emission factor.

Emissions from the use of large arms ordnance (Unit ID O002-S) and ordnance disposal (Unit ID No. O101-S), were estimated using the *Air Pathway Screening Assessments for Resource Conservation and Recovery Act Subpart X Permitting* document (Ref. 13)*. This document contains open burning (OB) and open detonation (OD) emission factors for munitions and ordnance (M&O), however, only OD emission factors were used to calculate emissions. OD emission factors for M&O were assumed representative of munitions firing. This document also states that the metallic HAP emission factors were derived by assuming that all of the metallic HAPs present in a generic population of ordnance are emitted when the ordnance is used or destroyed. These emission factors produced reasonable emissions estimates for each metallic HAP except lead; the lead emission factor appeared to be unreasonably high. To better quantify lead emissions from large arms ordnance usage, all of the lead present in the ordnance was assumed to have been emitted upon destruction. Other criteria pollutant and HAP emissions were estimated by multiplying the NEW by the number of rounds fired and by the appropriate emission factor.

Air emissions from the use of smoke devices (Unit ID O003-S) were estimated using the PM emission factors from Ref. 13 described above. All emission factors used are shown in Section 14.3 Tables 14.8 and 14.9.

*** Note:** AP-42 (Ref. 1) now provides a Chapter (15.0) dedicated to ordnance detonation. All but one of the Chapter 15.0 subsections presented are listed as draft. As these subsections are updated to final they should be used whenever possible as the basis for future emission calculations related to Fort Stewart ordnance detonation. AP-42, Chapter 15 was not used for this 2007 Emission Inventory Update.

The calculation used to estimate CO emissions from the use of one type of small arms ordnance is presented below:

Type of ordnance:	5.56 mm ball F/M16A2 (Department of Defense Identification Code No. A059)
Net explosive weight:	0.0038 lb_{NEW}/round
No. of rounds fired:	1,691,731 rounds/yr
CO emission factor:	0.0385 lb/lb NEW

CO emissions = (0.0038 lb_{NEW}/round) * (1,691,731 rounds/yr) * (0.0385 lb/lb $_{NEW}$)
= 247.50 lb/yr

The detailed actual emission estimates from ordnance detonation are found in Section 14.3, Tables 14.4 and 14.5.

For EOD (Unit ID O101-S) a log of unexploded ordnance destroyed was available, however it did not provide a detailed enough description of the ordnance to determine the NEW. In addition, because of troop deployment and changing assignments personnel were not readily available to provide the more detailed NEW information needed. As a result emissions for this source category were not determined. However in Table 14-3 a general description of the unexploded ordnance destroyed is provided. Overall the amount of ordnance destroyed (approximately 40 rounds) is far less than one half of one percent of the total ordnance used on Fort Stewart. Thus the resulting emissions would be trivial relative to the emissions of all the other ordnance used/detonated in 2007. In addition, there was no data on the C4 explosive used to destroy unexploded ordnance.

Potential Emissions

Emissions from ordnance detonation operations are proportional to the quantity of ordnance used and destroyed. Ordnance usage and destruction were assumed proportional to the number of hours the installation operates per year. Actual installation operations were estimated to occur 2,080 hours per year. The installation could potentially operate 8,760 hours per year. Therefore, the potential quantities of ordnance used and destroyed were estimated by multiplying the actual quantities by the ratio of 8,760/2,080.

Potential hazardous air pollutant emissions from ordnance detonation operations are presented in Section 14.3, Tables 14.6 and 14.7. Fugitive criteria pollutant emissions from this source category are not included in installation-wide Title V potential-to-emit determinations.

Emissions Summary

Table 14.0 below provides the total emissions of criteria pollutants and combined HAP from Ordnance detonation at Fort Stewart.

TABLE 14.0
Emissions Summary* - Ordnance Denotation

Emission Type		CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC	HAP
Actual	lb/yr	12,465.65	1,016.26	57.33	63,524.55	63,524.55	63,524.55	416.93	692.39
	ton/yr	6.23	0.51	0.03	31.76	31.76	31.76	0.21	0.35
Potential	lb/yr	52,499.56	4,280.03	241.44	267,536.10	267,536.10	267,536.10	1,755.91	2,805.46
	ton/yr	26.25	2.14	0.12	133.77	133.77	133.77	0.88	1.40

* Criteria pollutant lead is also a HAP and thus is included under the HAP category

Emission Source Updates

In 2007 the amount of ordnance used was approximately 37 percent (4,621,968 rounds) less than what was used in 2006.

14.3 DETAIL SOURCE AND EMISSION TABLES

Tables 14.1 through 14.9 below provide a summary of 2007 ordnance detonation, a detailed breakdown of emissions, and emission factors used.

TABLE 14.1
Small and Large Arms Usage for 2007

DODIC	NSN / Description	2007 Rounds/Units Expended	NEW[a] (lb/round)	Lead (lb/round)
SMALL ARMS - Unit ID O001-S				
A059	CTG 5.56MM BALL M855 F/M16A2 RIFLE	1,691,731	0.0038	4.4E-03
A062	CTG 5.56MM BALL M855 LINKED	218,403	0.0039	4.4E-03
A063	CTG 5.56MM TR M856 F/RIFLE M16A2	28,157	0.0036	3.9E-03
A064	CTG 5.56MM BALL M855 1 TR M856 LINKED	877,967	0.0085	8.3E-03
A065	CTG 5.56MM BALL PLASTIC M862	17,900	0.0013	-
A068	CTG 5.56MM TR M196 FOR RIFLE M16	2,800	0.0046	-
A075	CTG 5.56MM BLANK W/M27 LINKS (SAWS)	30,950	0.0011	1.0E-05
A076	DUMMY CTG 5.56MM M232 SERIES	400	N/A	-
A080	CTG 5.56MM BLANK M200 F/RIFLE M16	96,967	0.0016	1.0E-05
A111	CTG 7.62MM BLANK M82 LINKED	18,940	0.0025	2.2E-05
A130	CTG 7.62MM BALL M80 F/RIFLE M14 5/CLIP	19,750	0.0067	1.6E-02
A131	CTG 7.62MM LINKED 4 BALL M80 1 TR M62	1,538,235	0.0079	1.3E-02
A136	CTG 7.62MM SPEC BALL M118	1,882	0.0064	1.5E-02
A143	CTG 7.62MM BALL M80 LINKED F/MG M60	196,858	0.0071	1.6E-02
A151	CTG 7.62MM LINKED 4 BALL M80 1 TR M62 F	400	0.0067	2.2E-02

DODIC	NSN / Description	2007 Rounds/Units Expended	NEW[a] (lb/round)	Lead (lb/round)
A165	CTG 7.62MM LINKED 4 BALL M80 1 TR M62	37,000	0.0067	2.6E-02
A191	CTG CAL .30 RIFLE BALL MATCH GRADE	6,090	0.0095	-
A254	CTG, 7.62MM	1,072	0.0039	2.0E-02
A260	CTG.9MM,SUBSONI	1,400	0.0007	-
A358	CTG 9MM TP-T M939	3,460	0.0012	0
A360	9MM BALL M1 (OLD)	144	*0.0009*	2.5E-04
A362	CTG, 9MM BALL MK144 MOD 0	340	*0.0007*	-
A363	CTG 9MM M882 BALL (NEW)	19,901	0.0009	1.4E-02
A531	CTG CAL.50 API M8	845	0.0358	1.6E-03
A532	.50 API M8 CTN PK	565	0.0329	-
A555	CTG CAL.50 LINKED BALL M2 OR M33	29,450	0.0342	8.0E-03
A557	CTG CAL.50 LINKED 4 BALL M2 OR M33 1	479,318	0.0424	8.0E-03
A577	.50 LKD 4 API 1API	3,466	0.0361	-
A598	CTG CAL.50 BLANK M1A1 W/M9 LINKS	9808	-	-
A606	CTG .50 CAL ARMOR PIERCING-INCENDIARY	732	0.0039	2.3E-03
AA11	CTG 7.62MM M118 L RANGE	13,270	0.0064	1.5E-02
AA12	CTG 9MM RED MARKING SESAM	102	0.0001	-
AA31	12 GAGE FIN STAB RUBBER	25,770	0.0008	-
AA33	5.56MM BALL COMMER PACK, CTG	2,103,029	0.0039	4.4E-03
AA38	SABOT ARM Piercing-Tracer (SLAP-T)	15,919	0.0406	-
AA45	CTG 5.56MM BALL M855,10/CLP-LF	2,250	0.0038	1.1E-05
AA49	CARTRIDGE, 9MM BALL M882	205,598	0.0009	1.4E-02
AA53	CTG 5.56MM.BALL MOLY COATED	4,420	0.0036	-
AA59	BALL,LONG RIF,LEAD FREE,PISTOL	6,680	-	-
AA68	CTG, 5.56MM SR TRNG M862	400	0.0013	-
QA66	CTG 5.56MM BALL	12	-	-
LARGE ARMS – Unit ID O002-S				
A010	CTG 10 GAGE SHOTGUN BLANK	41	0.0038	-
A011	CTG 12 GAGE SHOTGUN #00 BUCKSHOT M19	5,696	0.0028	7.9E-03
A014	CTG 12 GAGE SHOTGUN NR 7 1/2	93	0.0027	-
A015	CTG, 12 GAGE #8 SHOT	140	0.0038	-
A017	CTG 12 GAGE #9 SHOT	40	0.0055	-
A023	CTG.12 GAGE, SLUG LOADED, w/Plastic Case	60	-	-
A792	20MM HEIT (VULCAN)	25	0.0182	-
A940	CTG 25MM TPDS-T M910	45,409	0.2261	2.6E-05
A976	CTG 25MM TP-T M793	32,553	0.2205	1.1E-04
AA60	Cartridge, 12 Gauge #00 Buckshot	40	0.0053	-
B118	CTG 30MM TP M788 (CTN PK)	29,934	0.1113	3.7E-04
B470	40MM HEDP HIVEL LCHD (M384)	208	0.1169	-
B519	CTG 40MM PRACTICE M781 W/WO/FUZE	38,402	0.0008	1.2E-06

DODIC	NSN / Description	2007 Rounds/Units Expended	NEW[a] (lb/round)	Lead (lb/round)
B535	CTG 40MM WHITE STAR PARACHUTE M583	24	0.2080	-
B542	CTG 40MM HEDP M430 W/FUZE M549 W/M16A2	6,432	0.0942	2.1E-05
B546	CTG 40MM HEDP M433 W/FUZE PIBD M550	926	0.1017	6.1E-05
B568	40MM HEDP LOWVEL LCHD (M406)	203	0.0780	8.3E-06
B571	CTG 40MM HE M383 W/M16A2 LINKS	1,783	0.1199	-
B578	CTG 40MM FIXED PRAC M387	30	0.0031	-
B584	40MM TP M918 (MK 19)	60,142	0.0131	6.0E-05
B627	CTG 60MM ILLUM M83A1 OR M83A2 W/F TIME	42	0.5806	-
B630	CTG 60MM W/P M302 SERIES W/FUZE	48	-	-
B642	CTG 60MM HE M720 W/FUZE MULTIOPTION	1,051	0.8869	3.6E-04
B643	CTG 60MM HE M888 W/FZ PD M935	129	0.9004	-
BA04	Ctg 60mm Illum XM767 IR	80	0.4057	-
BA07	CTG, 40MM FOAM RUBBER BATON	100	0.0020	-
BA08	CTG, 40MM RUBBER BALL	50	0.0012	-
BA11	CTG 40MM HI VELOC CANIST M1001	50	0.0124	-
BA15	CTG 60MM FULL RANGE PRACTICE M769	172	0.0813	-
BA17	CTG 60MM HE M783, M768	396	0.8820	-
C226	CTG 81MM ILLUM M301A3 W/FUZE TIME M84A1	25	1.7843	5.1E-03
C256	CTG 81MM HE M374A2 W/FUZE PD M524A6	473	2.4280	2.0E-04
C379	CTG 120MM HE M934 W/MO FZ M734 F/ MORTAR	600	7.9177	-
C382	CTG, 84MM HE, FFV 441B FOR RAAWS	78	1.6000	-
C384	CTG,84MM ILLUM FFV545B F/RAAWS	15	2.1303	-
C385	CTG,84MM HE FFV441B F/RAAWS	43	0.8741	-
C386	CTG,84MM TP FFV552 F/RAAWS	65	1.4430	-
C429	105MM HEP-T M393A1 M393E	20	12.2000	-
C444	105MM HE M1 W/FUZE	20	7.4500	-
C484	CTG 81MM ILLUM INFRARED	7	0.9636	-
C623	CTG 120MM HE M933 W/PD FZ M745 F/MORTAR	329	7.9200	0
C784	CTG 120MM TP-T M831 F/TNKGUN	1,823	13.9662	2.5E-05
C785	CTG 120MM TPCSDS-T M865 F/TNKGUN	2,192	19.6000	0
C868	CTG 81MM HE M821 W/MO FUZE (IUK)	329	2.3420	0
C869	CTG 81MM HE M889 IUK W/M935 PD FUZE	63	2.3536	-
C995	AT4 LTWT MULTI-PURPOSE WPN	363	1.8404	0
CA03	CTG 120MM WP M929A1 F/MORTAR M120/M121	273	1.4694	-
CA07	CTG 120MM IR ILLUM XM983	221	2.4551	-
CA09	CTG 120MM FULL RANGE PRACTICE (FRP) M931	528	1.3638	0
CA31	Cartridge, 120mm TP-T	57	16.4423	-
D505	PROJ 155MM ILLUM M485 F/HOW M1 M1A1 M45	584	6.2518	5.1E-05
D509	PROJ 155MM RAAMS M741	21	11.7423	-
D544	PROJ 155MM HE M107 SERIES W/SUPPL CHG	3,620	15.7100	3.9E-05
D550	PROJ 155MM WP M110 SERIES F/HOW	15	0.4600	-

DODIC	NSN / Description	2007 Rounds/Units Expended	NEW[a] (lb/round)	Lead (lb/round)
G878	FUZE HAND GRENADE PRACTICE M228	1,875	0.0045	6.7E-07
G881	GRENADE HAND FRAG M67 W/FUZE M213	40	0.4137	-
GG09	M84 NON LETHAL STUN GRENADE (M84)	18	0.0094	-
H185	RKT, MLRS, PRACTICE, SINGLE RD	40	1300.0000	-
H463	HYDRA 70 RKT MPSM PRAC	4,321	7.2640	-
HA12	ROCKET 2.75IN HE W/WHD M151 FZ M423 MTR	448	9.4380	-
HA13	ROCKET, 2.75 IN SIG PRAC M274 W/MTR MK66	32	7.2089	-
HA16	84MM HEAT	36	2.3959	-
K031	IGNITER ASSY F/MINE	50	-	-
K143	MINE APERS M18A1 T48E3 W/ACCS CAP BLAST	57	1.5700	3.1E-04
K145	MINE M18A1 W/O FIRING DEVICE & TEST SET	70	1.5000	-
K765	RIOT CONTROL AGENT CS CAPSULE	53		-
L116	KIT FLARE PERS DIST RED	120	0.0617	-
L312	SIGNAL ILLUM GROUND PARACHUTE M127 T73	52	0.2827	-
L386	CC TP	11	-	-
L601	SIMULATOR HAND GRENADE M116 SERIES	87	0.0813	1.3E-08
M023	CHARGE DEMOLITION BLOCK COMP C-4 1 1/4 LB	577	1.2500	0
M028	DEMOLITION KIT BANGALORE TORPEDO M1A2	10	118.3550	1.9E-07
M039	CHARGE DEMOLITION BLOCK 40 LB CRATERING	14	40.4300	0
M131	CAP BLASTING NON-ELECTRIC M7 SPECIAL	15	0.0028	1.4E-07
M421	CHARGE DEMOLITION SHAPE M3A1 40LB	14	30.0000	1.6E-07
M456	CORD DETONATING REINFORCED PLIOFILM	2,724	0.0070	0
M929	ROCKET MOTOR, MK83 MOD 0	70	0.0623	-
M933	ROCKET MOTOR, MK92 MOD 0/1	420	6.5000	-
M983	CHG, DEMO SHEET 15 FT	50	1.3400	-
ML47	CAP BLASTING NON-ELECTRIC M11	103	0.0029	1.4E-07
MN03	CAP BLASTING NON-ELECTRIC M13	23	-	1.4E-07
MN06	CAP BLASTING NON-ELECTRIC DELAY M14	25	0.0364	1.4E-07
MN08	IGNITER TIME BLASTING FUSE M81	62	0.0001	2.6E-07
MN90	DUAL NON-ELECTRIC BLASTING CAP ASSY M23	45	0.0110	-
PL95	GM, INTERCEPT-AERIAL, WPN RND	10	0.8700	-
PL96	GM, INTERCEPT-AERIAL, MSL RND (1 BCU)	12	0.8700	-
X455	DETA PRIME BOOSTER	15	0.0441	-
X471	MM51 ECT 600 GR	99	-	-
X604	DET, NONEL 20 FT CLEAR MINI-TU	15	-	-
X605	DET, NONEL 40 FT CLEAR MINI-TU	8	-	-
X606	DET, NENEL 60 FT CLEAR MINI-TU	15	-	-
X618	DET, NONEL 200 FT CLEAR MINI-T	113	-	-
X699	FLASH BANG, 9-BANG SOUND FLASH	85	-	-
X104	CTG, 12 GA BREECHING F/AUTO	99	0.0038	-

- Data not available

TABLE 14.2
Smoke Device Usage for CY2007

DODIC	NSN / Description	2007 Rounds/Units Expended	NEW (lb/round)	Yield Factor
B508	CTG 40MM YELLOW SMOKE GROUND MARKER M716	923	0.1721	5 [a]
C276	CTG 81MM SMOKE WP M375A2 W/FUZE PD M524A6	80	2.3350	5
C624	CTG 120MM SMOKE WP XM929 W/PD FZ M745 F/MORTAR M12	147	1.4694	5
D446	SMOKE CANISTER,GREEN	1	0.1650	5 [a]
G930	GRENADE HAND SMOKE HC AN MB W/FUZE M201A1	20	1.2000	1 [a]
G940	GRENADE HAND M18 GREEN SMOKE W/FUZE M201A1	22	0.7200	1
G945	GRENADE HAND M18 YELLOW SMOKE W/FUZE M201A1	11	0.7200	1
G955	GRENADE HAND M18 VIOLET SMOKE W/FUZE M201A1	9	0.7200	1
G982	GRENADE, HAND SMOKE, TA, PRACTICE, M83	49	0.0148	1

[a] Yield Factor assumed

TABLE 14.3
Explosive Ordnance Destroyed in CY2007

Description of Ordnance Destroyed	No. Rounds Destroyed
Rifle grenade 2" dia. X12 long	3
Rifle grenade 2" dia. X12 long	3
Mortar round, 120mm	2
M21 Anti Tank Mine	1
155mm or smaller	4-5
40MM Rounds	8-9
RoundsTPT 3 rds HE	12
40 MM HE round	1
Vintage grenades	Several
Damaged tank round	1
84MM mortar round	1
Mortar round	1
Hand grenade	1

TABLE 14.4
Actual Criteria Pollutant Emissions from Ordnance Detonation

Unit ID	Ordnance Type	CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
O001-S	Small Arms	2,303.01	-	-	34.42	34.42	34.42	-
O002-S	Large Arms	10,162.64	1,016.26	57.33	62,799.90	62,799.90	62,799.90	416.93
O003-S	Smoke Devices	-	-	-	690.23	690.23	690.23	-
O101-S	EOD	0	0	0	0	0	0	0
Total (lb/yr)		**12,465.65**	**1,016.26**	**57.33**	**63,524.55**	**63,524.55**	**63,524.55**	**416.93**
Total (ton/yr)		**6.23**	**0.51**	**0.03**	**31.76**	**31.76**	**31.76**	**0.21**

Note: O001-S, O002-S, O003-S have been combined as a significant source.

TABLE 14.5
Actual Emissions of Hazardous Air Pollutants from Ordnance Detonation

Unit ID	Acetophenone	Antimony Compounds	Benzene	Bis(2-ethylhexyl) Phthalate	1,3-Butadiene	Cadmium Compounds	o-Cresol	Dibenzofuran	Dibutyl Phthalate	Dimethyl Phthalate	Ethylbenzene	Hexane	Naphthalene	Nickel Compounds	4-Nitrophenol	Phenol	POM	Styrene	Toluene	Xylenes	Lead
O001-S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.42
O002-S	0.039	52.12	33.88	0.495	1.72	135.50	0.162	0.063	2.55	0.063	2.61	2.08	0.782	62.54	0.047	0.469	153.74	112.05	17.46	14.07	65.53
O003-S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	--
O101-S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (lb/yr)	**0.039**	**52.12**	**33.88**	**0.495**	**1.72**	**135.50**	**0.162**	**0.063**	**2.55**	**0.063**	**2.61**	**2.08**	**0.782**	**62.54**	**0.047**	**0.469**	**153.74**	**112.05**	**17.46**	**14.07**	**99.95**
Total (ton/yr)	**<0.01**	**0.03**	**0.02**	**<0.01**	**<0.01**	**0.07**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.03**	**<0.01**	**<0.01**	**0.08**	**0.06**	**0.01**	**0.01**	**0.05**

TABLE 14.6
Potential Criteria Pollutant Emissions from Ordnance Detonation

Unit ID	Cell No.	CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
O001-S	Small Arms	9,699.21	-	-	144.97	144.97	144.97	-
O002-S	Large Arms	42,800.35	4,280.03	241.44	264,484.18	264,484.18	264,484.18	1,755.91
O003-S	Smoke Devices	-	-	-	2,906.9	2,906.9	2,906.9	-
O101-S	EOD	0	0	0	0	0	0	0
Total (lb/yr)		**52,499.56**	**4,280.03**	**241.44**	**267,536.10**	**267,536.10**	**267,536.10**	**1,755.91**
Total (ton/yr)		**26.25**	**2.14**	**0.12**	**133.77**	**133.77**	**133.77**	**0.88**

TABLE 14.7
Potential Emissions of Hazardous Air Pollutants from Ordnance Detonation

Unit ID	Acetophenone	Antimony Compounds	Benzene	Bis(2-ethylhexyl) Phthalate	1,3-Butadiene	Cadmium Compounds	o-Cresol	Dibenzofuran	Dibutyl Phthalate	Dimethyl Phthalate	Ethylbenzene	Hexane	Naphthalene	Nickel Compounds	4-Nitrophenol	Phenol	POM	Styrene	Toluene	Xylenes	Lead
O001-S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.42
O002-S	0.165	219.49	142.67	2.09	7.24	570.67	0.680	0.263	10.75	0.263	10.97	8.78	3.292	263.39	0.198	1.98	647.49	471.90	73.53	59.26	275.96
O003-S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	--
O101-S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (lb/yr)	**0.165**	**219.49**	**142.67**	**2.085**	**7.24**	**570.67**	**0.680**	**0.263**	**10.75**	**0.263**	**10.97**	**8.78**	**3.292**	**263.39**	**0.198**	**1.975**	**647.49**	**471.90**	**73.53**	**59.26**	**310.39**
Total (ton/yr)	**<0.01**	**0.11**	**0.07**	**<0.01**	**<0.01**	**0.29**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**<0.01**	**0.13**	**<0.01**	**<0.01**	**0.32**	**0.24**	**0.04**	**0.03**	**0.16**

TABLE 14.8
Emission Factors for Small Arms Ordnance Usage

Pollutant	Emission Factor[a]
CO	0.0385 (lb/lb NEW)
Lead Compounds	0.0006 (lb/lb Lead)
PM[b]	0.0006 (lb/lb Lead)
PM-10[b]	0.0006 (lb/lb Lead)
PM-2.5[b]	0.0006 (lb/lb Lead)

[a] Source AP-42, Section 13.3 (Ref. 1) (Section 15.0 Ordnance Detonation, was not used because it is not yet final and the draft small arms subsection was not published until February 2008).
[b] Lead emission factor provided; assumed PM, PM-10, and PM-2.5 factors equal the lead factor.

TABLE 14.9
Emission Factors for Large Arms Ordnance Use and Explosive Ordnance Destruction[+]

Pollutant	Emission Factor[a] (lb/lb NEW unless noted otherwise)
Criteria Pollutants	
CO	0.039
Lead[b]	1 lb/lb lead present
NO_x[c]	0.0039
PM[d]	0.241
PM-10	0.241
PM-2.5[d]	0.241
SO_2	0.00022
VOC	0.0016
Hazardous Air Pollutants	
Acetophenone	1.5×10^{-7}
Antimony Compounds	2.0×10^{-4}
Benzene	1.3×10^{-4}
Bis(2-ethylhexyl) Phthalate	1.9×10^{-6}
1,3-Butadiene	6.6×10^{-6}
Cadmium Compounds	5.2×10^{-4}
o-Cresol	6.2×10^{-7}
Dibenzofuran	2.4×10^{-7}
Dibutyl Phthalate	9.8×10^{-6}
Dimethyl Phthalate	2.4×10^{-7}
Ethylbenzene	1.0×10^{-5}
Hexane	8.0×10^{-6}

Pollutant	Emission Factor[a] (lb/lb NEW unless noted otherwise)
Lead Compounds[b]	1 lb/lb lead present
Naphthalene	$3.0x10^{-6}$
Nickel Compounds	$2.4x10^{-4}$
4-Nitrophenol	$1.8x10^{-7}$
Phenol	$1.8x10^{-6}$
POM[e]	$5.9x10^{-4}$
Styrene	$4.3x10^{-4}$
Toluene	6.7x10-5
Xylenes	5.4x10-5

[+] Smoke device emissions based on PM emission factors given in the Table.

[a] Emission factors from *Air Pathway Screening Assessments for Resource Conservation and Recovery Act, Subpart X Permitting,* Table 4.1.2.2-2, page 4.1.2.2-4, Table 4.1.2.2-5 and 4.1.2.2-6, pages 4.1.2.2-7 to 4.1.2.2-8 (Ref. 13). (AP-42, Section 15.0 Ordnance Detonation, was not used in 2007 because it is not yet final).

[b] All lead present in large arms ordnance and ordnance destroyed was assumed to have been emitted.

[c] Includes emission factors for nitrogen oxide (NO) and NO_2.

[d] PM-10 emission factor provided; assumed PM and PM-2.5 equal PM-10.

[e] POM emission factor listed as aromatics, including benzene. The benzene emission factor was subtracted from the emission factor listed in Ref. 13.

15.0 REFRIGERANT USAGE

Title V Source Designation(s)

__*Significant*	*HVAC units that have potential emissions ≥10,000 lb/yr of any regulated air pollutant, ≥1,000 lb/yr of any regulated HAP, or ≥2,500 lb/yr of a combination of regulated HAPs*
	HVAC units that are subject to any specific state or federal standard or permit condition
_X_ *Insignificant*	*HVAC units that are not subject to any specific state or federal standard or permit condition that have potential emissions <10,000 lb/yr of any regulated air pollutant, <1,000 lb/yr of any regulated HAP, and <2,500 lb/yr of a combination of regulated HAPs*
_X_ *Trivial*	*HVAC units that use a refrigerant not regulated by Title VI of the CAAA and not classified as a HAP*
	Cold storage refrigeration equipment

15.1 BACKGROUND

Refrigerants including chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and hydrofluorocarbons (HFCs) are used in numerous refrigeration units and heating, venting, and air conditioning (HVAC) units across Fort Stewart. The CFCs and HCFCs used at the installation are categorized as ozone depleting chemicals (ODCs) and are regulated under Title VI of the Clean Air Act. Because of the large number of refrigeration and HVAC units at the installation and the small quantities of CFCs or HCFCs released from each unit, this source category has been treated as an area source of fugitive emissions.

The Fort Stewart DPW and the GANG provided data on the types and quantities of refrigerants purchased for 2007. CFCs and HCFCs may have been added to stationary refrigeration and HVAC units by other organizations at the installation; however, GANG and DPW perform the vast majority of the maintenance operations conducted for stationary units.

For reporting purposes, all of the cold storage refrigeration and HVAC units at the installation have been grouped together (Unit ID R101-S). The Georgia EPD has designated cold storage refrigeration equipment as a "trivial" source of air pollution. However, the Georgia EPD has not provided specific guidance regarding the designation of HVAC units as "significant," "insignificant," or "trivial" sources. However, as per the Georgia Environmental Protection Division, *Major Source Operating Permit Application Introduction and Instructions*, any activity that is not subject to any specific state or federal standard or permit condition and generates potential emissions that are less than 10,000 lb/yr of any regulated air pollutant, less than 1,000 lb/yr of any regulated HAP, and less than 2,500 lb/yr of a combination of regulated HAPs is designated as an insignificant source. Thus the HVAC units at Fort Stewart have been designated as an insignificant source.

15.2 EMISSION ESTIMATES

Actual Emissions

Fort Stewart has an active recycling/reclamation program for refrigerants used in stationary units. A total of 2,478 lb of refrigerant was purchased by DPW during 2007, of which 2,400 lb was R-22 (an HCFC), 30 lb was R-134 A (an HFC), and 48 lb was R-404A (an HFC). GANG MATES used 60 lb of R-134a and 30 lb of R-22. GANG Maintenance did not order any refrigerant in 2007.

The refrigerants purchased have been assumed to been added to refrigerant units because of leak or repair. Thus, the amount of refrigerant added to units was assumed equal to the amount of refrigerant lost (emitted) to the atmosphere.

Potential Emissions

Emissions from HVAC units are proportional to the number of units in operation. Because the number of HVAC units on Fort Stewart is expected to remain relatively constant during the foreseeable future, potential emissions for this source category were assumed to be equal to actual emissions. However, fugitive ODC emissions from this source category are not included in installation-wide Title V potential-to-emit determinations.

Emissions Summary

A Summary of the refrigerants used and emitted on Fort Stewart is given in Table 15.0 below.

TABLE 15.0
Refrigerant Usage and ODC Emissions Summary

Unit ID	Refrigerant		Quantity Used (lb/yr)	Quantity Emitted (lb/yr)
	ASHRAE No.	Common/Trade Name		
R101-S	R-22	HCFC-22	2,430	2,430
	R-134A*	HFC	90	N/A
	R-404A*	HFC	48	N/A
Total (lb/yr)			**2,538**	**2,430**

* R-134A and R-404A are thus not categorized as an ODC and therefore their emissions are not reported.

Emission Source Updates

No significant changes were noted for refrigerant use during the 2007 inventory data collection activity.

16.0 FIRE FIGHTER TRAINING EXERCISES

Title V Source Designation(s)

__Significant	*Not applicable*
_X_Insignificant	*Fire fighter training exercises*
__Trivial	*Not applicable*

16.1 BACKGROUND

Fire fighter training exercises are conducted at Fort Stewart using two fire simulators that use propane as the combustion fuel. One simulator is a two-story building (structure) and the other simulator is an aircraft. The simulators are mobile and are moved between Fort Stewart and Hunter Army Airfield. There is also a smoke generation machine, which uses a biodegradable product that does not have any air emissions. Actual propane usage data for 2007 was provided for Fort Stewart and Hunter Army Airfield combined. It was assumed one half of the total was used at Fort Stewart. There also was no breakdown on how much of the propane was burned at the building structure versus the aircraft simulator. This breakdown was available in 2006 and was used to estimate the 2007 distribution. Using the 2006 distribution it was estimated that 400 gallons of propane was burned at the aircraft simulator and 200 gallons in the building structure. Fire suppressants such as Halons and aqueous film forming foam (AFFF) were not used in fire fighter training exercises. Only water was used to extinguish the training fires.

Fire fighter training exercises are a source of fugitive emissions and have been designated as "insignificant" sources of air pollution by the Georgia EPD.

16.2 EMISSIONS ESTIMATES

Actual Emissions

Emissions from the burning of propane were estimated using pollutant emission factors from AP-42, Sections 1.5 and 13.5 (Ref. 1); these factors are presented in Section 16.3, Table 16.1. Actual emissions were estimated by multiplying the quantity of propane burned by the heating value of propane [90,500 Btu/gal) (Ref. 1)] and by the appropriate emission factors. For example, the calculation used to estimate actual CO emissions from the fire training exercises conducted in the two-story house simulator is presented below.

Unit ID:	X101-S
Quantity of propane burned:	200 gal/yr
Heating value of propane:	90,500 Btu/gal
CO emission factor:	3.7×10^{-1} lb/10^6 Btu

CO emissions = (200 gal/yr) * (90,500 Btu/gal) * (3.7×10^{-1} lb/10^6 Btu)
= 6.70 lb/yr

Potential Emissions

Because emissions from fire fighter training exercises are classified as "fugitive" emissions, criteria pollutants emissions from this source category are not included in facility-wide potential-to-emit determinations. Therefore, potential emissions were not calculated.

Emissions Summary

Table 16.0 below provides the total emissions from fire fighting training exercises at Fort Stewart.

TABLE 16.0
Emissions Summary – Fire Fighter Training Exercises

Emission Type	CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
Actual (lb/yr)	20.09	3.69	0.032	187.88	187.88	187.88	3.42
Actual (ton/yr)	0.01	<0.01	<0.01	0.09	0.09	0.09	<0.01

Emission Source Updates

No significant changes were noted for fire fighter training during the 2007 inventory data collection activity.

16.3 DETAILED SOURCE AND EMISSION TABLES

Tables 16.1 and 16.2 below show the emission factors used and a breakdown of fire training exercise emissions.

TABLE 16.1
Emission Factors for Propane Combustion During Fire Fighter Training Exercises

Pollutant	Emission Factor[a] (lb/10^6 Btu)
CO	3.7×10^{-1}
NO_x	6.8×10^{-2}
PM[b]	3.46
PM-10[c]	3.46
PM-2.5[c]	3.46
SO_2[d]	5.9×10^{-4}
VOC[e]	6.3×10^{-2}

[a] Emission factors, except for SO_2, from EPA Document AP-42, Section 13.5, Table 13.5-1 (Ref. 1). These emission factors are for industrial flares.
[b] Emission factor for soot was provided; assumed that PM equals soot. The emission factor was given as a range: 0 to 274 μg/L of stack exhaust gases, depending upon the amount of smoke produced. Because propane is burned in the fire training exercises in order to produce smoke, the PM emission factor was assumed to equal 274 μg/L. Data presented in Flare Efficiency Study, Engineering-Science, Inc., Table 10, were used to convert the PM emission factor from units of μg/L to units of lb/10^6 Btu.
[c] No PM-10 or PM-2.5 factors or size distribution data were provided; therefore, assumed PM-10 and PM-2.5 equaled PM.
[d] SO_2 emission factor based upon LPG combustion SO_2 factor from AP-42, Section 1.5 (Ref. 1).
[e] Emission factor for THC as methane provided and the methane component of the THC was estimated to average 55 percent; therefore, the VOC emission factor was assumed to equal 45 percent of the THC factor.

TABLE 16.2
Actual Emissions from Fire Fighter Training Exercises

Unit ID	Emissions (lb/yr)						
	CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC
X101-S	6.70	1.23	0.011	62.63	62.63	62.63	1.14
X102-S	13.39	2.46	0.021	125.25	125.25	125.25	2.28
Total (lb/yr)	**20.09**	**3.69**	**0.032**	**187.88**	**187.88**	**187.88**	**3.42**
Total (ton/yr)	**0.01**	**<0.01**	**<0.01**	**0.09**	**0.09**	**0.09**	**<0.01**

17.0 WOODWORKING

Title V Source Designation(s)

_ *Significant*	*Woodworking operations that produce visible emissions in the outdoor atmosphere or allow significant fugitive particulate emissions to enter the atmosphere*
X *Insignificant*	*Woodworking operations that are stationary provided that the activity is performed indoors, no significant fugitive particulate emissions enter the environment, and no visible emissions enter the outdoor atmosphere*
X *Trivial*	*Repair or maintenance activities that are not related to the source's primary business activity and do not otherwise trigger a permit modification or do not utilize control devices (i.e., required to be listed in Title V permit application)*

17.1 BACKGROUND

Fort Stewart conducts woodworking operations at several locations on the installation. Although most of the post's woodworking operations are conducted outdoors without the use of pollution control devices, three stationary, indoor woodworking operations were identified. For all operations, a cover is used to control fugitive emissions when saw dust is transferred from the collection hopper to a bin or trash dumpster. Data regarding the quantity of dust collected from those operations were obtained through emails with Fort Stewart personnel and through site visits. POCs providing the data are listed in Section 1.0.

No records are maintained on the quantity of dust captured from the woodworking operations. The quantity of dust captured was estimated based on the volume of the bin or dumpster into which the cyclone deposits the collected sawdust, the frequency of which the bin is emptied, and the density of sawdust. It was estimated that the dumpster fed by the cyclone at the DPW Carpentry Shop (Bldg. 1105, Unit ID C102-S) was emptied monthly in CY2007 when it was one-fourth full. [We have assumed that the dumpster gets full an average once every 4 months, or 3 times a year.] The dumpster volume is 175 ft^3. The cyclone at C103-S (the shop used by GANG-MATES) empties into two bags that hold 55 gal (7.35 ft^3) each. It was estimated that, on average, both bags are emptied every four months (six bags emptied per year). A sawdust density of 11.5 lb/ft^3 was taken from the US Air Force Document: *Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Ref. 2, Chapter 35).

Bldg. 1065 has a small carpentry shop (C104-S) that builds pallets and crates, with a cyclone dust collector that empties into a 55-gallon drum. The POC of the shop estimated that it gets emptied once every 2 months or about six times per year. There are other carpentry activities at this shop that are controlled by unit-specific dust collection devices and a portable dust collection equipment that does not vent to the outside atmosphere. Likewise, Bldg. 10504 has a small carpentry shop with a vacuum system that empties into 60-gallon plastic bags that are emptied once a year, and which does not vent to the outside atmosphere. We have assumed that dust

emissions from these self-contained units are negligible, and constitute fugitive emissions. Accordingly, we have not estimated emissions from such sources.

An example calculation used to determine the quantity of sawdust collected at Bldg. 1105, Unit ID C102-S is shown below:

Unit ID:	C102-S
Volume of collection device:	175 ft^3 each
Frequency bins are emptied:	3 times/year
Density of sawdust:	11.5 lb/ft^3

Sawdust Collected = (175 ft^3/empty) * (3 empties/yr) * (11.5 lb/ft^3)
= 6,037.5 lb/yr

Information for woodworking activities is presented in Section 17.3, Table 17.1.

Cyclone dust collectors are installed for the carpentry shops located indoors to capture and control particulate emissions. The control device systems are integral components of the operational equipment (i.e., these woodworking activities do not occur without the operation of the control device systems). As per Georgia Rule 391-3-1-.03(10)(g)) these indoor operations are categorized as "insignificant" sources of air pollution as they are equipped with air pollution control devices, performed indoors and do not produce visible emissions in the outdoor atmosphere. Those operations that are conducted outdoors without the use of pollution control devices are categorized as "trivial" sources of air pollution and are not discussed further in this report. No visible emissions result from these operations.

17.2 EMISSIONS ESTIMATES

Actual Emissions

Woodworking operations are sources of particulate emissions. The quantity of particulate emissions emitted depends upon the quantity of sawdust produced and the efficiency of the control device; however, no data was available regarding the particulate control efficiency of these particular control devices.

A cyclone's particulate matter control efficiency increases with increasing particle size. Large diameter, low efficiency cyclones such as those used to control particulate emissions from Fort Stewart's woodworking operations typically capture at least 99 percent of the particulate emissions that are 200 microns in diameter or greater (Ref. 14, Chapter 3, Cyclones and Internal Separators Section, Figure 10). On a mass basis, the quantity of particles generated during woodworking operations that have a diameter below 200 microns is insignificant; therefore, the control efficiency of each woodworking cyclone was conservatively estimated to be 99 percent.

Particulate emissions from each of the woodworking operations were estimated using mass balance procedures as documented in Section 35 of the US Air Force Document: *Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Ref. 2). An

example calculation used to estimate the particulate emissions from woodworking operations conducted in Building 1105 (Unit ID C102) is shown below:

Unit ID:	C102-S
Volume of Sawdust Collected:	6,037.5 lb/yr
Type of control device:	Cyclone
Particulate control efficiency:	99 $\%_w$
Particulate matter emitted:	0.1 $\%_w$

PM emissions = (6,037.5 lb/yr) * (1.0-0.99) = 60.8 lb/yr

Based on data obtained from the USEPA, Factor Retrieval Information System, Version 6.25 (Ref. 15), 40 percent by weight of the particulate emissions from the woodworking cyclone is classified as PM-10; these emissions were also assumed to represent PM-2.5 emissions. All of the particulate emissions from baghouses were assumed to be classified as PM-10 and PM-2.5. Actual emissions from woodworking operations are presented in Section 17.3, Table 17.2.

Potential Emissions

Emissions from woodworking operations are proportional to the number of hours the operations are conducted per year. The number of hours per year that woodworking operations are conducted is assumed proportional to the number of hours the installation operates per year. Actual installation operations were estimated to occur 2,080 hours per year. Potentially, the installation could operate at 8,760 hours per year. Potential emissions were estimated by multiplying the actual emissions by the ratio of 8,760/2,080.

The use of air pollution control equipment should not be included in potential emission estimates unless the use of the control equipment is included as a federally enforceable condition in a permit. The use of particulate control equipment on Fort Stewart's woodworking operations is not federally enforceable. However, emission controls that are installed for the woodworking shops are integral components of the operational equipment. As such, woodworking operations are not conducted without the operation of the control device. Therefore, the use of control devices was included in the potential emission estimates. Potential emissions are presented in Table 17.3.

Emissions Summary

Table 17.0 summarizes actual and potential criteria pollutant emissions from woodworking at Fort Stewart. HAP emissions are assumed to be negligible. Detailed emission tables that present emissions for each unit are presented in Section 17.3 Tables 17.2 and 17.3.

TABLE 17.0
Emissions Summary – Woodworking Operations

Emission Type	PM	PM-10	PM-2.5
Actual (lb/yr)	70.52	28.21	28.21
Actual (ton/yr)	0.04	0.01	0.01
Potential (lb/yr)	296.99	118.80	118.80
Potential (ton/yr)	0.15	0.06	0.06

Emission Source Updates

There were no new sources installed in CY2007, and existing sources were not modified. However, this inventory has been updated to include the carpentry shop in Bldg. 1065, and has been assigned an ID number of C104-S

17.3 DETAILED SOURCE AND EMISSION TABLES

Tables 17.1 through 17.3 provide source and emission details for the woodworking activities conducted at Fort Stewart in 2007.

TABLE 17.1
Woodworking Activities Information for CY2007

Unit ID	Building Number	Capture Efficiency (%)	Actual Sawdust Collected (lb)	Potential Sawdust Collected (lb)
C102-S	1105	99	6,037.5	25,427.16
C103-S	10501	99	507.15	2,135.88
C104-S	1065	99	507.15	2,135.88

TABLE 17.2
Actual Emissions from Woodworking Operations

Unit ID	Bldg. No.	Emissions (lb/year)		
		PM	PM-10	PM-2.5
C102-S	1105	60.38	24.15	24.15
C103-S	10501	5.07	2.03	2.03
C104-S	1065	5.07	2.03	2.03
Total (lb/yr)		**70.52**	**28.21**	**28.21**
Total (ton/yr)		**0.04**	**0.01**	**0.01**

TABLE 17.3
Estimated Potential Emissions from Woodworking Activities

Unit ID	Bldg. No.	Emissions (lb/year)		
		PM	PM-10	PM-2.5
C102-S	1105	254.27	101.71	101.71
C103-S	10501	21.36	8.54	8.54
C104-S	1065	21.36	8.54	8.54
Total (lb/yr)		**296.99**	**118.80**	**118.80**
Total (ton/yr)		**0.15**	**0.06**	**0.06**

18.0 SUMMARY OF RESULTS

Table 18.1 presents actual emission estimates for criteria pollutants and combined HAP by individual source category. As shown in the table, pollutant emission rates from the fugitive emission source category for prescribed burning and, to a much lesser degree, for ordnance detonation with respect to PM emissions are many times/orders of magnitude greater than the emission rates from the point source emission categories. Therefore, relatively small year-to-year changes in these fugitive source categories (particularly prescribed burning) will greatly affect Fort Stewart's total annual emissions, even if the level of activity for all the other point source categories remains relatively consistent from year to year. As a result, for comparison purposes, between years for the point source categories and with potential emissions, the actual emission totals are shown with and without prescribed burning and ordnance detonation.

If prescribed burning and ordnance detonation are not considered the pollutant with the highest emission rate is VOC (127.2 tpy). NO_x had the next highest emission rate (24.6 tpy). All other pollutants had emission rates less than 20 tpy. If prescribed burning is considered emission rates increase dramatically. For example, VOC has an emission rate of 351.7 tpy, NO_x had an emission rate of 176.8 tpy, and CO and PM (PM, PM-10, PM-2.5) had emission rates that exceeded 1,000 tpy.

If the VOC contributions made by prescribed burning and the landfills are not included, fueling operations (particularly AAFES gasoline dispensing, Unit ID F001-S and F002-S) and spray painting by DOR (Unit ID P001-S) accounts for the majority (approximately 63percent) of the VOC emissions. Miscellaneous chemical use also accounts for a significant amount of VOC emitted, approximately 10 tpy. In addition, if prescribed burning is not considered, a majority of the CO, NO_x and SO_2 emissions are due to the heating units at the CEP. Also, if both ordnance detonation and prescribed burning are not considered, PM emissions are the highest for spray painting and heating units. In general emissions were lower in 2007 when compared to 2006 due to 1) an increase natural gas combustion (less oil burned and no wood burned), 2) reduced paint usage 3) less gasoline dispensed, and 4) a significant decrease in prescribed burning.

Table 18.2 presents the base wide potential emissions for the criteria pollutants. The potential totals **do not include** criteria pollutants from fugitive emission source categories for prescribed burning, ordnance detonation, miscellaneous product usage, fire training exercises, wastewater treatment, and landfills without gas collection device(s). Emissions of criteria pollutants from these fugitive emission source categories are not included in installation-wide Title V potential-to-emit calculations. However, potential HAP emissions reflect emissions from all source categories including the fugitive emission sources.

The pollutant with the highest potential emission rate was NO_x (670.2 tpy). VOC, CO, and SO_2 all had potential emission rates exceeding 280 tpy. Since the criteria pollutant emission rates are above 100 tons per year, Fort Stewart continues to be a major source. Potential combined HAP emissions are estimated to be 89.6 tpy. Therefore, Fort Stewart also continues to be a major source for HAP. As a result, Fort Stewart must comply with Maximum Achievable Control

Technology (MACT)/National Emissions Standards for Hazardous Air Pollutants (NESHAP) requirements that apply to major HAP sources.

Table 18.3 presents the total quantity of the individual HAP. A total of 70 HAP were identified from the base-wide operations. None of the individual HAP exceeded 10,000 pounds. Excluding the landfill the source categories with the largest HAP emissions were spray paint activities and fueling operations. Without the landfill the HAP with the largest emission rate was MIBK (4,618.64 lb/yr). The high MIBK emission rate was the result of spray paint activities. However, the MIBK emissions were more than three times less than what was estimated in 2006. Table 18.4 provides a summary of ODC emissions.

TABLE 18.1
Facility-Wide Estimated Emissions of Criteria Pollutants and Combined HAP (lb/yr)

Source Category	CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC	HAP
Heating Units	35,326	44,809	3,763	970	925	911	2,462	827.95
Internal Combustion Engines	955	4,371	294	293	293	274	342	3.73
Engine Testing	23.8	108	8.81	5.18	5.01	4.88	6.09	0.074
Abrasive Blasting	-	-	-	562	562	562	-	-
Storage Tanks	-	-	-	-	-	-	13,004	948
Fuel Operations	-	-	-	-	-	-	71,911	5,290
Spray Paint Booths	-	-	-	7,073	3,303	3,303	37,845	9,742
Parts Cleaners	-	-	-	-	-	-	4,527	-
Miscellaneous Product Usage	-	-	-	-	-	-	20,030	2,549
Landfills	-	-	-	-	-	-	96,214	10,341
Wastewater Treatment	-	-	-	-	-	-	8,122	0.718
Prescribed Burning	18,432,240	303,371	-	2,777,822	1,998,221	1,998,221	448,434	4,967
Ordnance Detonation	12,466	1,016	57.3	63,525	63,525	63,525	417	692
Refrigeration	-		-	-	-	-	-	-
Fire Training	20.1	3.69	0.032	188	188	188	3.42	-
Woodworking	-	-	-	71	28.2	28.2	-	-
Total (lb/yr)[a]	**18,481,032**	**353,679**	**4,124**	**2,850,508**	**2,067,050**	**2,067,017**	**703,317**	**35,362**
Total (ton/yr)[a]	**9,240.5**	**176.8**	**2.1**	**1,425.3**	**1,033.5**	**1,033.5**	**351.7**	**17.7**
Total (lb/yr)[b]	**36,325**	**49,291**	**4,066**	**9,161**	**5,304**	**5,271**	**254,466**	**29,703**
Total (ton/yr)[b]	**18.2**	**24.6**	**2.0**	**4.6**	**2.7**	**2.6**	**127.2**	**14.9**

[a] *Total **with** Prescribed Burning and Ordnance Detonation*
[b] Total **without** Prescribed Burning and Ordnance Detonation
Note: Total values were summed prior to rounding (rounded values are shown in table).

TABLE 18.2
Facility-Wide Estimated Potential Emissions of Criteria Pollutants and Combined HAP (lb/yr)

Source Category	CO	NO_X	SO_2	PM	PM-10	PM-2.5	VOC	HAP
Heating Units	905,332	532,681	491,093	15,657	13,108	11,737	33,598	52,009
Internal Combustion Engines	30,539	138,268	8,991	8,933	8,925	8,342	10,446	116
Engine Testing	153,429	669,509	67,704	13,611	11,189	9,354	17,897	307
Abrasive Blasting	-	-	-	2,377	2,377	2,377	-	-
Storage Tanks	-	-	-	-	-	-	28,045	1,995
Fuel Operations	-	-	-	-	-	-	306,726	22,461
Spray Paint Booths	-	-	-	61,586	28,761	28,761	234,403	74,640
Parts Cleaners	-	-	-	-	-	-	23,276	-
Miscellaneous Product Usage	-	-	-	-	-	-	-	10,736
Landfills	-	-	-	-	-	-	85,834	9,226
Wastewater Treatment	-	-	-	-	-	-	-	6.34
Prescribed Burning	-	-	-	-	-	-	-	4,967
Ordnance Detonation	-	-	-	-	-	-	-	2,805
Refrigeration	-	-	-	-	-	-	-	-
Fire Training	-	-	-	-	-	-	-	-
Woodworking	-	-	-	297	119	119	-	-
Total (lb/yr) [a]	**1,089,300**	**1,340,458**	**567,788**	**102,462**	**64,479**	**60,689**	**740,224**	**179,268**
Total (ton/yr)[a]	**544.6**	**670.2**	**283.9**	**51.2**	**32.2**	**30.3**	**370.1**	**89.6**

[a] Totals **do not include** criteria pollutants from fugitive emission source categories- Prescribed Burning, Ordnance Detonation, Miscellaneous Product Usage, Wastewater Treatment, Fire Fighting Training, and Landfills without gas collection device(s). Emissions of criteria pollutants from these fugitive emission source categories are not included in installation-wide Title V potential-to-emit calculations. HAP emission totals reflect emissions from all source categories including the fugitive emission sources.

Note: Total values were summed prior to rounding (rounded values are shown in table).

TABLE 18.3
Facility-Wide Estimated Individual HAP Emissions

Hazardous Air Pollutants	Actual (lb/yr)	Potential (lb/yr)
1,1,2,2- Tetrachloroethane	86.28*	76.97
1,3-Butadiene	1.76	8.34
2,2,4-TMP	589.49	2,277.52
2,3,7,8-Tetrachlorodibenzo-p-furans	0	1.1E-04
4-Nitrophenol	0.047	0.198
Acetaldehyde	0.726	1,044.39
Acetophenone	0.039	0.165
Acrolein	0.088	4,909.76
Acrylonitrile	155.18*	138.44
Antimony	0	9.69
Antimony Compounds	52.12	219.49
Arsenic	0.114	28.85
Benzene	950.94	7,903.95
Beryllium	0.026	2.46
Bis(2-ethylhexyl) Phthalate	0.495	2.09
Cadmium	822.23	830.18
Cadmium Compounds	135.50	570.67
Carbon Disulfide	20.42*	18.22
Carbon Tetrachloride	0.284	55.44
Carbonyl Sulfide	13.59*	12.13
Chlorine	0	968.86
Chlorobenzene	12.97	52.04
Chloroform	2.38	42.16
Chloromethane	28.24	53.40
Chromium	53.64	83.44
Chromium Compounds	226.66	1,172.39
Cobalt	0.036	8.15
Cobalt Compounds	202.87	1,808.53
Copper	0.041	62.26
Cumene	19.24	97.12
Dibenzofuran	0.063	0.263
Dibutyl Phthalate	2.55	10.75
Dichlorobenzene	0.516	2.54
Dichloromethane	0	355.66
Dimethyl Phthalate	0.063	0.263
Ethyl Chloride	37.24*	33.23
Ethylbenzene	561.26	2,398.71
Ethylene Dichloride	18.75	16.72

Hazardous Air Pollutants	Actual (lb/yr)	Potential (lb/yr)
Ethylidene Dichloride	107.39*	95.80
Formaldehyde	35.76	5,726.02
Hexamethylene Diisocyanate	15.93	78.48
Hexane	1,460.88	5,699.34
Hydrogen Chloride	0	23,301.60
Lead	367.84	641.18
Manganese	326.09	2,291.10
Mercury	0.133	5.93
Mercury Compounds	0.027	0.024
Methanol	2,549.24	10,736.22
Methyl Chloroform	29.61*	26.41
Methylene Chloride	561.15*	500.60
MIBK	4,618.64	37,872.77
MTBE	3,873.39	14,960.85
Naphthalene	173.20	1,650.39
Nickel	53.94	99.02
Nickel Compounds	62.54	263.39
o-Cresol	0.162	0.680
o-Xylene	0	30.66
Phenol	0.469	64.52
POM	3,599.88	4,117.27
Propionaldehyde	0	74.81
Propylene Dichloride	9.37	48.83
Selenium	0.114	8.90
Styrene	112.05	2,802.06
Tetrachloroethylene	285.54*	254.73
Toluene	9,628.73	26,252.40
Trichloroethylene	171.32*	152.84
Vinyl Chloride	211.67*	188.83
Vinylidene Chloride	9.00*	8.03
Xylenes	3,089.83	15,461.36
Zinc	12.51	577.93
Total (lb/yr)	**35,362**	**179,268**
Total (ton/yr)	**17.68**	**89.63**

***** Actual emission rate exceeds potential emission rate because only one of the five landfills had potential emissions.

TABLE 18.4
Facility-Wide Estimated ODC Emissions

Hazardous Air Pollutants	Actual (lb/yr)
Dichlorofluoromethane (R-21)	111.31
Chlorodifluoromethane (HCFC-22)	2476.35
Fluorotrichlormethane (R-11)	43.03
Dichlorodifluoromethane (R-12)	780.81
Carbon Tetrachloride	0.254
Methyl Chloroform	26.41
Total (lb/yr)	**3,438.16**
Total (ton/yr)	**1.72**

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Greenhouse Gas Inventory

Fort Stewart, GA

FORT STEWART, GA

Prepared by:

GEOMET Technologies, LLC, (A Versar Company)

20251 Century Blvd., Suite 300

Germantown, MD 20874

Under Contract with the U.S. Army Corps of Engineers, Fort Worth District

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LIST OF COMMONLY USED ACRONYMS AND ABBREVIATIONS

BTU	British Thermal Unit
CAS#	Chemical Abstract Service Number
CH_4	Methane
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
CNG	Compressed Natural Gas
E-85	Ethanol 85
GAEPD	Georgia Environmental Protection Division
GHG	Greenhouse Gas
GWP	Global Warming Potential
GRP	The Climate Registry's General Reporting Protocol Version 1.1
GSA	U.S. General Services Administration
Ft. Stewart	Fort Stewart
HFC	Hydrofluorocarbons
kWh	Kilowatt-Hour
LPG	Liquefied Petroleum Gas
Lbs	Pounds
MMCF	Millions of Cubic Feet
mpg	Miles Per Gallon
MT	Metric Ton
MWh	Megawatt-Hour
N_2O	Nitrous Oxide
NG	Natural Gas
OH-	Hydroxyl Radical
PFC	Perfluorocarbons
POV	Privately Owned Vehicle(s)
Protocol	California Climate Action Registry General Reporting Protocol, Version 2.2 (March 2007)
SAR	Second Assessment Report of the Intergovernmental Panel on Climate Control
SF_6	Sulfur Hexafluoride
Tons	1 ton (metric) = 2,204.62 pounds; 1 ton (metric) = 1,000 kg
USEPA	United States Environmental Protection Agency
VMT	Vehicle Miles Traveled

EXECUTIVE SUMMARY

The state of Georgia does not have a program or policy requiring the reduction of greenhouse gases (GHG), but Georgia is following the activities associated with the development of a national policy. Congress has directed the United States Environmental Protection Agency (USEPA) to promulgate a rule requiring mandatory reporting of greenhouse gas emissions under the Consolidated Appropriations Act, 2008 (H.R. 2764; Public Law 110–161). The USEPA is also charged with creating the reporting threshold and determining the reporting frequency for greenhouse gas emissions. The proposed rule is scheduled to be ready for review by October 2008 and finalized by June 2009. As of May 21, 2007, the state of Georgia became a member of The Climate Registry. The Climate Registry is a non-profit organization formed by 39 states to develop a standardized methodology for the reporting of greenhouse gas emissions. More information on The Climate Registry can be found at www.theclimateregistry.org. In light of this pending regulation, Fort Stewart contracted GEOMET Technologies to generate a greenhouse gas emissions inventory for Fort Stewart; this report contains the results of the effort.

Fort Stewart is located north of the City of Hinesville, Georgia, in parts of Bryan, Evans, Liberty, Long, and Tattnall Counties. The towns of Glennville, Claxton, Pembroke, Eden, and Richmond Hill are adjacent to Fort Stewart's western, northwestern, northern, northeastern, and eastern boundaries, respectively. Fort Stewart is situated on 279,270 acres of coastal plain and is about 39 miles from east to west and 19 miles from north to south. The northeast boundary of the installation is 10 miles from the City of Savannah, Georgia.

In June 1940, the U.S. Army established an anti-aircraft artillery training center at the current location of Fort Stewart. The installation originally was named Camp Stewart in honor of the Revolutionary War hero General Daniel Stewart. Camp Stewart was renamed Fort Stewart Antiaircraft Artillery and Tank Training Center in April 1956. The U.S. Army designated the training center as U.S. Army Garrison, Fort Stewart in 1972.

Fort Stewart's mission is to provide the 3rd Infantry Division (Mechanized), and tenant activities with the support necessary to effectively train, mobilize, and deploy a mechanized infantry division and follow-on Active Component and Reserve Component units while providing a high standard quality of life. The current force structure at Fort Stewart includes the following primary tenant units: 1st Battalion, 58th Aviation Regiment; 1st Battalion, 75th Ranger Regiment; 3rd Battalion, 160th Special Operations Regiment; 15th Air Support Operations Squadron; 188th Infantry Brigade; Army and Air Force Exchange Service (AAFES); Defense Commissary Agency; Defense Reutilization and Marketing Organization (DRMO); U.S. Army Dental Activity; U.S. Army Medical Department Activity; Winn Army Community Hospital (WACH); and the Georgia Army National Guard (GANG). All base activities were considered in generating the greenhouse gas report.

The guidelines outlined in the California Climate Action Registry General Reporting Protocol Version 2.2 (Protocol) were used to quantify the greenhouse gas emissions for several sources at Fort Stewart. The California Climate Action Registry is closely related to The Climate Registry and the two entities worked together to finalize The Climate Registry's General Reporting Protocol Version 1.1 (GRP). These guidelines are in line with the World Resources Institute's policies on greenhouse gas inventories and therefore are acceptable to the United States Environmental Protection Agency. Greenhouse gas inventories, although not yet mandatory, are helpful in that they provide a record of greenhouse gas emissions. This greenhouse gas report is a preliminary effort and thus is not certifiable by the standards set forth in the California Climate Action Registry (CCAR) or The Climate Registry certification protocols. Certification is a third party process required of registered CCAR participants.

As inventories are compiled in the years following the baseline inventory assessment, reductions in greenhouse gas emissions can be evaluated. Having a baseline inventory will also assist Fort Stewart, when greenhouse gas reporting regulations are put in place. Additionally it can be used to show further proof of the Fort Stewart's environmental commitment.

Table 1 shows that the CO_2 equivalent (CO_2e) emissions for CY2006 from Ft. Stewart were 497,715 metric tons. This baseline inventory indicates that the mobile source sector accounts for the largest part of Fort Stewart's greenhouse gas emissions at 65% of the total greenhouse gas inventory. The electricity use source sector accounts for another 29% of the inventory, and the stationary combustion source sector accounts for a mere 6% of the inventory. Within the stationary source sector, wood combustion makes up the majority of the emissions, followed by natural gas combustion, with a small contribution from fuel oil and propane fuel combustion.

Table 1: Emissions Estimate & Comparison

Source Sector	**Emissions (MMt CO_2e)**	
	Ft. Stewart	Hunter AAF
Electricity	0.144	0.047
Transportation	0.326	0.046
Fuel Combustion (Stationary Source)	0.028	0.005
Waste	N/A	N/A
Agriculture	N/A	N/A
All others	N/A	N/A
Industrial process	N/A	N/A
TOTAL	**0.498**	**0.098**

Measures that we identified to reduce Fort Stewart's greenhouse gas emissions include updating the age of the fleet and conducting an energy audit for the base.

INTRODUCTION

Greenhouse gas inventories assist organizations in the accounting of emissions over a certain time period. The inventories typically account for six gases: carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); sulfur hexafluoride (SF_6); eight varieties of hydrofluorocarbons (HFC); and six varieties of perfluorocarbons (PFC). These gases occur naturally and are also human induced, and are a part of the Kyoto Protocol – an international agreement to reduce greenhouse gas emissions in the atmosphere.

This greenhouse gas report is a preliminary effort and thus is not certifiable by the standards set forth in the California Climate Action Registry or The Climate Registry certification protocols. Certification is a third party process required of registered CCAR participants. A multitude of assumptions were made, especially in the mobile source sector. This was necessary because Fort Stewart is not a part of the registry and the greenhouse gas emission inventory was conducted in order to give a general overview of where Fort Stewart's GHG emissions are generated. These assumptions were necessary to complete the task within the scope of the project, and it was beyond the scope to conduct an in-depth analysis of the mobile sector. A certifiable greenhouse gas emission inventory would require extensive site visits to gather the necessary data. In the future this task may be required.

Rating Scale and Reporting Requirements for Greenhouse Gases

The six GHG gases are rated on a scale called global warming potential (GWP). The GWP is a CO_2-based scale for non-CO_2 emissions. It compares the ability of each gas to cause radiative forcing with that of CO_2. Radiative forcing is a change in the atmospheric balance of incoming and outgoing radiation. The GWP of CO_2 is 1, as CO_2 is the base against which all other GHG pollutants are measured. Methane has a GWP of 21 and nitrous oxide has a GWP of 310. This means that one ton of CH_4 is equivalent to 21 tons of CO_2 and one ton of N_2O is equivalent to 310 tons of CO_2. The synthetic (fluorinated) gases, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride, are powerful greenhouse gases in that their global warming potentials are quite high compared to those of the other gases. The synthetic gases have GWP ranging from 1,300 to 23,900, with one anomaly in the synthetic gases having a GWP of 140 (HFC152a - difluoroethane). Currently there is no mandate to report greenhouse gas emissions to the United States Environmental Protection Agency (USEPA). There is, however, a voluntary reporting structure in some states, and the USEPA has drafted guidelines for states to quantify their greenhouse gas emissions (*State Workbook: Methodologies for Estimating Greenhouse Gas Emissions, 1995*). The USEPA also has guidelines for states to construct State Action Plans to address greenhouse gas emissions (S*tates Guidance Document: Policy Planning to Reduce Greenhouse Gas Emissions, 1998).*

Sources and Sinks of Greenhouse Gases

Greenhouse gases are the result of both human activities and the natural carbon cycle. The greenhouse gases of significance at Ft. Stewart are carbon dioxide, methane, nitrous oxide and hydrofluorocarbons. The other fluorinated gases are not accounted for in the Ft. Stewart 2006 base year inventory. Greenhouse gases originate from many sources.

Carbon dioxide is emitted through the combustion process with the burning of fossil fuels, solid waste, and wood products. Carbon dioxide also is emitted through some non-energy production processes such as cement production. Carbon dioxide is removed from the atmosphere through natural processes when it is absorbed by plants.

Methane is emitted through the production of coal, natural gas and oil and as a by-product of coal mining and incomplete fossil fuel combustion. Methane also is released through natural processes such as animal and municipal solid waste decomposition as well as in the cultivation of rice. Methane is removed from the atmosphere through interaction with the hydroxyl radical (OH-) and eventually is converted to CO_2.

Nitrous oxide is emitted through human activities such as fossil-fuel combustion, agricultural fertilization, and the treatment of waste water. It is produced naturally by several means, such as soil microbial action and manure decomposition. Nitrous oxide is removed from the atmosphere by the photolytic action of the sun in the stratosphere.

The fluorinated gases are wholly synthetic and are emitted from various industrial processes. They can be used as substitutions for ozone-depleting substances and are usually used in smaller quantities. Despite their limited use, their high global warming potentials make them potent greenhouse gases.

1.0 METHODOLOGIES

The greenhouse gas inventory was created by following the methods outlined in the *California Climate Action Registry Protocol Version 2.2(Protocol)*. The steps to create a greenhouse gas inventory include: establishing organizational boundaries; defining the entity; establishing a baseline; gathering data; and calculating the emissions. The boundaries for Ft. Stewart are considered to be the entire base. Fort Stewart's organizational structure is management-controlled and the level of control of the facility is wholly owned. This means that all the operations within Ft. Stewart's boundaries are fully controlled by Ft. Stewart and all the resultant greenhouse gas emissions must be reported. The choice of a baseline year is left to the entity and can be any year from 1990 forward. The baseline year chosen by Ft. Stewart is calendar year 2006, because it is the year for which the data are most readily available for evaluation.

The greenhouse gas emissions at Ft. Stewart are from both direct and indirect sources. The direct emission sources include mobile combustion, stationary combustion and fugitive emissions. The only indirect emission source is electricity use. The greenhouse gas emission sources specific to Ft. Stewart are listed below.

Direct Sources:

- Combustion of fuel for boilers (stationary);
- Combustion of fuel for emergency generators (stationary);
- Mobile combustion (mobile); and

Indirect Sources:

- Electricity use.

The greenhouse gas emissions were calculated using fuel consumption for the stationary combustion sector, vehicle miles traveled and fuel consumption for the mobile combustion sector. Annual electricity consumption was obtained in order to calculate emissions from the electricity use source sector. Emission factors were obtained from the appendices in the *Protocol.*

The final step in calculating emissions in a greenhouse gas inventory was to convert the emissions of methane and nitrous oxide to carbon dioxide equivalents (CO_2e). This step was accomplished by applying the global warming potential factor to the emissions for each gas. The total CO_2 emissions were summed with the CO_2e emissions of methane and nitrous oxide and reported as total metric tons of CO_2e emissions.

1.1 DIRECT EMISSION SOURCES

Direct emissions sources are described in the *Protocol* as emissions from sources that are owned or controlled by the reporting organization. Within the direct emission sources are the source

sectors of mobile combustion, stationary combustion and fugitive emissions. The methodologies used to evaluate the emissions emanating from these source sectors are described below.

1.1.1 MOBILE COMBUSTION

Fort Stewart's mobile emissions were derived using the EPA model MOBILE6.2. MOBILE6.2 is a model for predicting emissions of hydrocarbons (HC), carbon monoxide (CO), nitrogen oxides (NO_x), carbon dioxide (CO_2), particulate matter (PM), and toxics from cars, trucks, and motorcycles under various conditions. This model uses data obtained through vehicle registrations and state emissions programs to generate emission factors for mobile sources. For this effort, the CCAR emissions factors were used to verify MOBILE6.2 emission factors and to generate N_2O emissions since they are not accounted for in MOBILE6.2. Usually mobile combustion is accounted for in terms of both on-road and off-road vehicles. At Fort Stewart, the on-road vehicle fleet consists of government (GSA) and privately owned vehicles (POV) as well as military vehicles. The off-road vehicles are not accounted for in this inventory because the data was not available.

On-Road Vehicles

MOBILE6.2 was used to generate two scenarios for Fort Stewart. Both scenarios included vehicles residing on base and vehicles visiting the base. The difference between the two scenarios is that Scenario I only accounts for the vehicle miles traveled on the base while Scenario II includes travel on and off the base within a distance of 45 miles (the distance to Hunter Army Airfield and nearby towns).

MOBILE6.2 produced emissions factors for both scenarios based on several inputs to the model including: external conditions, vehicle fleet characteristics, gasoline specifications, fuel commands specific to air toxics, state programs and alternative emissions regulations, and control measures. All of these inputs are essential to generating emission factors for the mobile source sector. The defaults for the model were used where site specific values were not attainable or would not benefit the model. One such example is in the vehicle age distribution. The vehicle registration data obtained from Ft. Stewart staff provided inputs for passenger vehicles, light-duty trucks and motorcycles; MOBILE6 default values were used for the remaining classes of vehicles, as data were not available from Fort Stewart.

According to CCAR protocol, the emission factors for mobile on-road combustion are based on one of two variables – either fuel use or vehicle miles traveled (VMT). Carbon dioxide emissions are directly related to the amount of fuel consumed by a vehicle. Therefore its emission factor (10.15 kg/gallon diesel and 8.81 kg/gallon gasoline) is based on fuel consumption. The USEPA maintains a website that provides fuel economy data for most of the gasoline-fueled vehicles in the country. The vehicles on the website range in model year from 1985 to the present model year (www.fueleconomy.gov/feg/). The fuel economies, reported in

miles per gallon (mpg), relate how efficiently a given vehicle uses fuel within average operating conditions. Average operating conditions for a vehicle are considered to be 45% highway driving and 55% city driving. The cumulative miles traveled and the fuel economy both were used to calculate fuel consumption.

The emission factor used for methane and nitrous oxide is based on cumulative vehicle miles traveled and is expressed as mass of pollutant per unit distance traveled. This approach is used because the combustion emissions of CH_4 and N_2O depend more on the emission control technologies in a given vehicle.

Table 2 below summarizes the on-road vehicle data and the associated emission factors for CH_4 and N_2O (for passenger vehicles) as generated through the MOBILE6.2 model and as presented in the California Climate Action Registry General Reporting Protocol.

Table 2
On-Road Fleet Emission Factors for Methane and Nitrous Oxide

MOBILE6.2			California Climate Action Registry		
Scenario		EF (g/mi)			Model Year
		CH_4	CH_4	N_2O	
1	January week-day	0.06	0.06	0.08	1984-1991
	January weekend-day	0.06	0.06	0.07	1992
	July week-day	0.05	0.05	0.05	1993
	July weekend-day	0.05	0.05	0.04	1994-1999
2	January week-day	0.05	0.04	0.04	2000– present
	January weekend-day	0.04			
	July week-day	0.04			
	July weekend-day	0.04			
AVERAGE EF		**0.05**	**0.05**	**0.06**	

*(g/mi) = grams per mile.

In order to compare MOBILE6.2 outputs with the emissions generated through the methodology used in the California Climate Action Registry General Reporting Protocol, we made an effort to calculate the emissions due to mobile sources at Fort Stewart based on fuel use and VMT. Appendix A shows the VMT by vehicle type, age, and fuel type.

We estimated average fuel efficiency of each vehicle class by taking the highest and lowest fuel efficiency by class (passenger cars, trucks and motorcycles) for both highway and city driving. Once average fuel efficiency was established, we calculated the gallons of gasoline used in that year by dividing vehicle miles traveled by average fuel efficiency (miles per gallon). The CCAR methodology requires the model year of each vehicle in the fleet to be known. Table 2 of the technical report "*Mobile Source Air Emissions Inventory for 2008: Fort Stewart, Georgia*" contains the vehicle age mix for the POV at Fort Stewart. Accordingly we weighted each vehicle class by the age mix factor and applied the CCAR emission factors. Table 3 summarizes the findings for CCAR versus MOBILE6.2 emissions.

Table 3
CCAR vs. MOBILE6 Emissions

Pollutants		CH_4	N_2O	CH_4	N_2O	CO_2
		Grams		Tonnes		
Scenario I	MOBILE6.2	2,737,832	n/a	3.02	n/a	27,826
	CCAR	2,422,977	2,603,476	2.67	2.87	25,703
	M6/CCAR ratio	2,737,832	**2,941,785**	3.02	3.24	n/a
*CO_2e emissions				**63.38**	**1,005.26**	**27,826**
Scenario II	MOBILE6.2	24,485,407	n/a	30.33	n/a	316,075
	CCAR	27,514,528	29,564,209	26.99	32.59	291,874
	M6/CCAR ratio	24,485,407	**26,309,436**	26.99	29.00	n/a
*CO_2e emissions				**566.80**	**8,990.37**	**316,075**

*In reporting CO_2e emissions the values obtained from the MOBILE6 model for CH_4 and CO_2 emissions are used and the value for N_2O obtained through the M6/CCAR ratio is used; N_2O and CH_4 are also multiplied by their respective GWP.

The MOBILE model generates an emission factor for NO_x; however NO_x is comprised of NO (nitric oxide) and NO_2 (nitrogen dioxide) both reactive oxides of nitrogen. Nitrous Oxide (N_2O) is a stable form of nitrogen and oxygen. MOBILE6.2 does not generate an emission factor for nitrous oxide, thus the emissions of N_2O were calculated based on the ratio of the MOBILE6.2 model's methane emissions to that obtained using the CCAR methodology. It was found that the difference between M6 and CCAR was approximately 12%. This is most likely due to the many assumptions made regarding the fleet characteristics. This 12% was applied to the CCAR emissions of N_2O to generate a value representative of the MOBILE6.2 model.

The emissions generated for Scenario II are an order of magnitude greater than those generated for Scenario I. This is the result of Scenario II having a greater vehicle count than Scenario I. Scenario II is the more inclusive scenario in that it accounts for emissions for which Fort Stewart is directly and indirectly responsible. It accounts for all delivery and visiting vehicles as well as the GSA and military vehicle fleet. The *Protocol* defines the emissions generated by delivery vehicles and the like as "optional indirect" emissions. These emissions are not required to be reported but help to give a better understanding of the entity's greenhouse gas emission impacts. Scenario II was therefore used in the final evaluation of greenhouse gases for Fort Stewart as it is most representative of the true impact Fort Stewart has on greenhouse gas emissions in the state.

1.1.2 STATIONARY COMBUSTION

The stationary combustion sources contributing to greenhouse gas emissions consist of boilers and generators. The boilers and generators are permitted by Georgia Environmental Protection Division (GAEPD). Included in the permit are operating parameters and operating limits for the units. These limits are imposed to protect air quality in Georgia. Permitted fuels are wood, natural gas, liquefied petroleum gas, and distillate fuel oil (FO#2, JP-8, diesel). Each fuel has to be considered on an individual basis when calculating GHG emissions generated from its combustion. Fort Stewart staff keeps a monthly log of fuel use and electric generation. This log was acquired to calculate the greenhouse gas emissions attributable to the combustion of fuels.

Table 4 summarizes the annual fuel use and the emissions resulting from fuel combustion. Appendix A shows the monthly distribution of fuel usage for the different types of fuel.

Table 4
Fuel Consumption and Emissions Summary for Stationary Combustion Sources

Fuel Type	Fuel Consumption (tons, gallon, or MMBtu)*	Emissions			
		CO_2 (MT)	N_2O ($MTCO_2e$)	CH_4 ($MTCO_2e$)	Total ($MTCO_2e$)
Wood	**12,021**	19,129.62	17.51	88.71	19,235.84
FO#2	**60,886**	617.99	1.89	1.79	621.67
LPG	**75,967**	452.00	2.35	1.60	455.95
NG	**141,316**	7,496.81	4.38	17.51	7,518.70

* Wood is in metric tons; FO#2 and LPG consumption is expressed in gallons; NG consumption is expressed in MMBtu.

1.2 INDIRECT EMISSION SOURCES

Emissions from indirect emission sources are described in the *Protocol* as emissions that occur as a result of an organization's actions, but are produced by sources owned or controlled by another entity. These sources can be electricity use, district heating and cooling, or imported steam and electricity from a co-generation plant. Additional indirect sources of emissions are activities not directly controlled by the entity. The only indirect emission source included in this inventory is electricity use. Electricity use also was identified as a possible source for energy savings. Electricity consumption is tabulated by Ms. Denise Kelley on a monthly basis. The consumption data were obtained to evaluate greenhouse gas emissions due to electricity use.

1.2.1 ELECTRICITY USE

Electricity consumption is a result of energy use by office machines, lights, air conditioners and electrified vehicles. Fort Stewart's consumption is expressed in megawatt hours (MWh) on the monthly compilation worksheet supplied by Ms. Kelley. Table 5 below provides a month-by-month summary of the greenhouse gas emissions resulting from electricity use.

Table 5
Electricity Consumption and Emissions, by Month (CY2006)

Month	Electricity Consumption (kWh)	Emissions (lbs)			Total Emissions ($MTCO_2e$)
		CO_2	CH_4	N_2O	
Jan	14,724,148	10,428.96	0.09	0.15	14,724,148
Feb	12,891,198	9,130.70	0.08	0.13	12,891,198

Month	Electricity Consumption (kWh)	Emissions (lbs)			Total Emissions ($MTCO_2e$)
		CO_2	CH_4	N_2O	
Mar	13,018,238	9,220.69	0.08	0.13	13,018,238
Apr	15,907,008	11,266.77	0.09	0.16	15,907,008
May	16,010,274	11,339.91	0.09	0.16	16,010,274
Jun	19,507,959	13,817.29	0.11	0.20	19,507,959
Jul	21,955,897	15,551.14	0.13	0.23	21,955,897
Aug	22,112,695	15,662.20	0.13	0.23	22,112,695
Sep	21,216,558	15,027.47	0.12	0.22	21,216,558
Oct	16,040,510	11,361.33	0.09	0.16	16,040,510
Nov	14,202,410	10,059.42	0.08	0.15	14,202,410
Dec	14,955,083	10,592.53	0.09	0.15	14,955,083
TOTAL	**202,541,978**	**143,458**	**1.19**	**2.08**	**202,541,978**

Appendix B provides sample calculations for GHG emissions from electricity consumption.

1.2.2 ADDITIONAL INDIRECT SOURCES

The *Protocol* describes other indirect sources of emissions at the Ft. Stewart facility as employee commuting, off-site waste disposal (including transport of the wastes), production of purchased raw materials, product use and disposal, outsourced activities and contracting. Some of these indirect sources were considered in this report, particularly employee commutes, deliveries, and contractor traffic. However, our calculations were based on vehicle registration data, and included many assumptions. In the future, if a more thorough greenhouse gas inventory is needed, it would be advisable to conduct a more thorough data collection effort for these sources in order to have a complete account of activities.

2.0 GHG INVENTORY SUMMARY

There are multiple sources of greenhouse gas emissions at Ft. Stewart. A summary of emissions by source sector and fuel type is provided in Table 6 below. Note that the mobile combustion sector makes up the bulk of the greenhouse gas emissions, followed by the electricity use sector and the stationary combustion sector.

Table 6
Summary of GHG Emissions by Source Sector and Fuel Type

Source Sector	Emissions Type	Fuel Type	CO_2 (MT)	N_2O ($MTCO_2e$)	CH_4 ($MTCO_2e$)	TOTAL ($MTCO_2e$)
Stationary External Combustion	Direct	Wood	19,129.62	17.51	88.71	19,235.84
	Direct	NG	7,496.81	4.38	17.51	7,518.70
	Direct	Fuel Oil	617.99	1.89	1.79	621.67
	Direct	Propane	452.00	2.35	1.60	455.95
Stat. Generators	Direct	Diesel	123.90	0	0	123.90
Mobile Comb.	Direct/Indirect	Gasoline/Diesel	316,075.00	8,989.96	566.80	325,631.76
Electric Use	Indirect	Electricity	143,458.43	24.89	643.65	144,126.97
Total			**487,353.75**	**9,040.98**	**1,320.06**	**497,714.80**

*Values based on Scenario II in Mobile6.2 evaluation.

Mobile Combustion

The emissions generated from the mobile combustion sector account for about 65% of the total greenhouse gas inventory. This is over half of the greenhouse gas emissions generated by Fort Stewart. The direct carbon dioxide emissions account for 97% of the CO_2e emissions, leaving methane and nitrous oxide accounting for only 3% of the total CO_2e emissions. The mobile data that was made available was a sampling of the actual data for Fort Stewart. The absence of the actual data for the military and GSA vehicle fleets could impact the mobile sector's total greenhouse gas emissions. We advise that in the future the mobile combustion sector be closely monitored for growth, and that more exact data be gathered to facilitate a more accurate inventory of this sector. When a more thorough inventory is sought the GSA and military vehicle data will be pertinent in assessing the true impact of the mobile source sector on Fort Stewart's greenhouse gas emissions. The mobile source sector also is important in that it is a key sector where reductions may be sought through simple measures such as vehicle retrofits and fleet modernization.

Electricity Use

The source with the second greatest emissions is electricity use. Greenhouse gas emissions generated from electricity use account for 29% of the carbon-dioxide-equivalent emissions at Ft.

Stewart. In this source sector, as in most, direct carbon dioxide emissions comprise the bulk of the CO_2e emissions, with methane and nitrous oxide making a minuscule contribution. The direct carbon dioxide emissions account for 99.5% of the total greenhouse gas emissions generated as a result of electricity use, with methane and nitrous oxide emissions combined accounting for just half a percent.

Stationary Combustion

The smallest contributor to the greenhouse gas emissions generated at Ft. Stewart is the stationary combustion source sector. This sector accounts for less than 6% of the greenhouse gas emissions. As with electricity use, in this sector the direct carbon dioxide emissions account for the bulk of total greenhouse gas emissions. Direct carbon dioxide emissions are more than 99% of the total GHG emissions, with N_2O and CH_4 contributing the remaining amounts.

2.1 POSSIBLE REDUCTIONS

In the mobile combustion source sector there are many options for reducing greenhouse gas emissions. The fleet data made available for this study consisted of privately owned vehicles, therefore Ft. Stewart has little to no control over the age of these vehicles. The vehicles of concern are owned by personnel and Ft. Stewart cannot influence these owners to exchange them for newer models any time in the near future. Upgrading the government-owned fleet would be one of the easiest ways to reduce the greenhouse gas emissions generated by the mobile source sector. Additionally the purchase of alternative-fuel vehicles may reduce the emissions in the mobile combustion source sector; but again individual preference will prevail in this matter. The age of the fleet is crucial in evaluating greenhouse gas emissions; therefore for future efforts it is pertinent that not only the number and types of vehicle be known but the model years as well.

Reductions may be identified in the electricity use sector's emissions by conducting an energy audit. Such an effort will indicate areas of energy inefficiency which, if addressed, could help in reducing electricity consumption.

APPENDIX A

TABLES FOR VEHICLE MILES TRAVELED AND STATIONARY SOURCE FUEL CONSUMPTION

Table A - 1
Scenario II On-Road Fleet Vehicle Miles Traveled (VMT)

Vehicle Type	Fuel	Model Year	VMT
Passenger Cars	gasoline	2000-present	94,541,749.40
		1994-1999	67,425,751.07
		1993	7,851,498.02
		1992	6,515,933.93
		1984-1991	21,288,082.27
		1980-1983	4,714,945.98
Motorcycles	gasoline	1996-present	2,603,637.14
		1966-1995	271,343.95
Light Duty Trucks	gasoline	2000–present	168,312,809.64
		1994-1999	90,118,843.09
		1993	8,009,245.44
		1992	6,733,698.94
		1984-1991	18,628,911.61
		1980-1983	4,864,875.01

Table A - 2
Fuel Oil Consumption and Emissions

Month	Fuel Oil Consumption (Gallons)	Emissions		
		CO_2 (MT)	N_2O ($MTCO_2e$)	CH_4 ($MTCO_2e$)
Jan-06	9,782	99.29	0.30	0.29
Feb-06	9,461	96.03	0.29	0.28
Mar-06	10,746	109.07	0.33	0.32
Apr-06	3,193	32.41	0.10	0.09
May-06	2,984	30.29	0.09	0.09
Jun-06	0	0.00	0.00	0.00
Jul-06	1,564	15.87	0.05	0.05
Aug-06	250	2.54	0.01	0.01
Sep-06	2,919	29.63	0.09	0.09
Oct-06	4,195	42.58	0.13	0.12
Nov-06	4,846	49.19	0.15	0.14
Dec-06	10,946	111.10	0.34	0.32
TOTAL	**60,886**	**617.99**	**1.89**	**1.79**

Table A - 3
LPG Consumption and Emissions

Month	LPG Usage(gallon)	CO_2 (MT)	N_2O ($MTCO_2e$)	CH_4 ($MTCO_2e$)	Total ($MTCO_2e$)
Jan-06	18,890	112.40	0.59	0.40	113.38
Feb-06	8,840	52.60	0.27	0.19	53.06
Mar-06	14,218	84.60	0.44	0.30	85.34
Apr-06	7,391	43.98	0.23	0.16	44.36
May-06	1,985	11.81	0.06	0.04	11.91
Jun-06	2,322	13.82	0.07	0.05	13.94
Jul-06	965	5.74	0.03	0.02	5.79
Aug-06	0	0.00	0.00	0.00	0.00
Sep-06	2,144	12.76	0.07	0.05	12.87
Oct-06	2,297	13.67	0.07	0.05	13.79
Nov-06	12,485	74.29	0.39	0.26	74.93
Dec-06	4,430	26.36	0.14	0.09	26.59
TOTAL	**75,967**	**452.00**	**2.35**	**1.60**	**455.95**

Table A - 4
Natural Gas Consumption and Emissions

Month	NG Usage (MMcf)	NG Usage (MMBtu)	CO_2 (MT)	N_2O ($MTCO_2e$)	CH_4 ($MTCO_2e$)
Jan-06	17,466.00	17,989.98	954.37	0.56	2.23
Feb-06	17,227.00	17,743.81	941.31	0.55	2.20
Mar-06	18,017.00	18,557.51	984.48	0.58	2.30
Apr-06	12,545.00	12,921.35	685.48	0.40	1.60
May-06	5,864.00	6,039.92	320.42	0.19	0.75
Jun-06	4,854.00	4,999.62	265.23	0.15	0.62
Jul-06	4,299.00	4,427.97	234.90	0.14	0.55
Aug-06	4,753.00	4,895.59	259.71	0.15	0.61
Sep-06	0.00	0.00	0.00	0.00	0.00
Oct-06	14,182.00	14,607.46	774.93	0.45	1.81
Nov-06	16,193.00	16,678.79	884.81	0.52	2.07
Dec-06	21,800.00	22,454.00	1,191.18	0.70	2.78
TOTAL	**137,200**	**141,316**	**7,496.81**	**4.38**	**17.51**

APPENDIX B

SAMPLE CALCULATIONS

GREENHOUSE GAS SAMPLE EMISSIONS CALCULATION

Example A: Formulae used for calculating greenhouse gas emissions from electricity use source sector.

Total CO_2 Emissions (MT)	=	Electricity Use (kWh)	×	Electricity Emission Factor (lbs CO_2/kWh)	÷	2,204.62 lbs/MT

Total N_2O Emissions (MT)	=	Electricity Use (kWh)	×	Electricity Emission Factor (lbs N_2O/kWh)	÷	2,204.62 lbs/MT

MT of CO_2e	=	MT of Non-CO_2 GHG	×	GWP (#SAR, 1996)

Intergovernmental Panel on Climate Change's Second Assessment Reports (SARs)

Example B: Greenhouse gas emissions calculation for electricity use source sector.

i). CO_2 Emissions:
CO_2 Emission factor = 1,164.19lb/MWh
CO_2 Emissions = 1.16 lb/kWh x 46,168,000 kWh = 53,748,324 lb
CO_2 Emissions = 53,748,324 lb/2204.62 lb/metric ton = 24,379.86 metric tons

ii). N_2O Emissions:
N_2O Emission factor = 0.0192 lb/ MWh
1 MWh = 1000 kWh
0.0192 lb/MWh / 1,000 kWh/MWh = 1.92×10^{-5} lb/kWh
N_2O Emissions = 1.92×10^{-5} lb/kWh x 46,168,000 kWh = 886 lb
N_2O Emissions = 886 lb / 2,204.62 lb/metric ton = 0.40 metric tons
The GWP of N_2O is 310
CO_2e (for N_2O) = 0.40 metric tons x 310 = 124.64 metric tons

iii). Methane (CH_4) Emissions:
CH_4 Emission factor = 0.0137 lb/MWh
1 MWh = 1000 kWh
0.0137 lb/MWh / 1,000 kWh/MWh = 1.37×10^{-5} lb/kWh
CH_4 Emissions = 1.37×10^{-5} lb/kWh x 46,168,000 kWh = 633 lb
CH_4 Emissions = 633 lb /2204.62 lb/metric ton = 0.29 metric tons
The GWP of CH_4 is 21
CO_2e (for CH_4) = 0.29 metric tons x 21 = 6.02 metric tons

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TO: Tressa Rutland, David Montano, Ft. Stewart
FROM: Rahul Chettri
DATE: April 24, 2008
RE: Preliminary PSD Analysis: 5th BCT Construction
CC: Radhika Narayanan, GEOMET

A. EXECUTIVE SUMMARY

This findings report in memo format presents the results of our preliminary analysis for planned construction of the 5th BCT Compound at Ft. Stewart. We conducted our analysis in 4 stages:

1. Identification of emission sources - We identified emission sources through relevant documentation (e.g., Form 1391) and discussions with key personnel involved in the planning process at Ft. Stewart. These include Fred Cavedo, Will Ingram (Master Planning), and Fred Louis (Energy). Based on this process we identified fuel combustion for comfort heat (e.g., boilers) as the primary source of pollutant emissions.

2. Estimation of typical energy demand at Ft. Stewart - We estimated the typical energy demand per ft^2 at Ft. Stewart from data on past energy usage and fuel consumption. These data were provided to us by Fred Loius via telephone, but we are still awaiting the data via email or printed format. In the interest of preparing a timely analysis we proceeded with our analysis based on data that we have not fully been able to vet.

3. Application of typical energy demand values to the 5th BCT project – We estimated the energy demands for the project by applying the typical energy demand values for Ft. Stewart to the project based on its planned square footage. Fred Cavedo and Fred Louis indicated that they would prepare a preliminary assessment of energy demand for the project after discussions with Will Ingram and a review of engineering data for the 4th BCT project that is underway. However, we have not yet received those estimates, and we have proceeded with our own analysis.

4. Estimation of emissions – Based on the energy demand for the project we calculated the rated heat capacity that boilers and furnaces would be required to have. After discussions with Fred Cavedo we scaled these values up to account for boiler inefficiencies and heating seasons that are more severe than average. We estimated the quantities of fuel that would be required to satisfy the energy demand, and applied AP-42 emission factors to obtain emission estimates.

Our analysis showed that only 3 pollutants are emitted at noticeable rates – SO_2 and NO_x from fuel combustion, and CO from natural gas combustion. The pollutant emission rates are well below the respective significance level thresholds for PSD. In fact, the margins between expected emissions and the PSD significance levels are so great that the 5th BCT project could double in scope and still not trigger PSD.

B. DISCUSSION OF ANALYSIS & RESULTS

1. Outline of Methodology

We undertook several steps to determine the applicability of Prevention of Significant Deterioration (PSD) to the planned construction of the 5th BCT Compound at Ft. Stewart. As part of our methodology we were required to make a number of assumptions. These assumptions are discussed in the context of our methodology, which is outlined below:

a. Identifying Sources of Emissions

We expect that most of the emissions from the planned construction will come from fuel combustion for the purpose of producing comfort heat. To that end we met with Will Ingram in Master Planning, and with Fred Cavedo. Through our discussions with them and a review of Form 1391 documents we ascertained the following:

- Most of the construction will be associated with buildings, storage areas, and parking areas. Buildings will be for a Brigade HQ and Company Ops, barracks, a dining facility (DFAC), a fitness center, vehicle maintenance shops, and child development centers.
- No decision has been made on whether the project will include a central energy plant (CEP) or will use decentralized heat. If the project includes a CEP it will most likely serve the Brigade HQ and Company Ops buildings, while the barracks, DFAC, fitness center, and other living spaces will have decentralized heat.
- While Will Ingram indicated that the fuel of choice for comfort heating would be natural gas, Fred Cavedo was not as confident. Aside from the expense of constructing the 3-mile pipeline from Ft. Stewart's cantonment area to the 5th BCT Compound, Fred indicated that their current contract with the natural gas supplier may impose some constraints. If natural gas is not an option, then fuel oil or electric heat would be the alternative sources of energy (although both Will and Fred believe that fuel oil will not be used). Wood is not being considered as a fuel option. Other sources of energy, including geothermal and propane will likely not be strongly considered.
- Air conditioning will almost certainly use electric chillers (as opposed to the steam absorption chillers at Ft. Stewart's CEP, which are driven by the boilers). The vehicle maintenance facilities (VMF) will only have heat and no A/C.
- No peak-shaving is planned. Electricity in the area is typically not priced higher for peak usage, and there is no economic advantage to generating electricity on-site.
- There will be some back-up power generation, but neither Will nor Fred knew what the designed power output will be. Will indicated that the Brigade HQ building will probably have a gen-set unit that is similar to the one that is planned for the temporary 5th BCT building being constructed at B618-619. We have been trying to get the design specs for this temporary emergency generator from Jana Turner, but as of 4/24/2008 we have not received that information.

- The facility will likely have a couple of lift stations, which will include back-up generators at each station. No information on their design was available. These generators, along with the one planned for the Brigade HQ building, will have some small fuel storage tanks.
- The VMF will probably have some solvent degreasers, but will not have any engine testing equipment.
- Among the typical sources at an Army installation that are not being planned are paint booths, landfills, and waste-water treatment plants.

Based on the information collected during our site visit and discussions with key personnel, we concluded that the most significant source of emissions would be fuel combustion for comfort heat. There will be some emissions from emergency power generation and from solvent degreasing, but these are likely to be small when compared to those from fuel combustion for comfort heat.

b. Estimating Typical Energy Demand at Ft. Stewart

To estimate emissions from fuel combustion it was first necessary to estimate the quantity of fuel that will be needed to satisfy the comfort heating requirements of the 5th BCT Compound. We have spoken with Fred Cavedo and Fred Loius for such an estimate, but they indicated that it was too early in the design process to have such an estimate. They promised to prepare a preliminary estimate based on the building design to date and the typical energy requirements per square foot of space (including using data derived by Engineering during the design of the 4th BCT project). As of 4/24/2008 we have not received that information.

We proceeded with our own estimate of typical energy demand, and produced two separate estimates of typical energy demand at Ft. Stewart, as outlined below:

- We used Department of Commerce estimates for monthly heating degree days (from *Historical Climatography Series No. 5-1*) to determine that Georgia has 2,884 average heating days per year. This number represents the product of the number of degrees below 65° F and the number of days in which the temperature dropped below 65° F. [The Department of Commerce assumes that comfort heat is necessary when temperatures drop below that point.] Using data from http://www.americansolar.com/products-guide.html we ascertained that when the average heating degree days is less than 4,000 the typical energy demand is 15,900 BTU per occupied square feet.
- We used data on fuel combusted during FY2006 at Ft. Stewart and Hunter AAF (a separate value for Ft. Stewart was not available), calculated the energy produced from that fuel, and divided the FY2006 square footage for both these facilities by that energy value. We arrived at an average of 29,610 BTU per square feet. The data on fuels combusted, plus the results of our calculations, are shown in Table 1.

TABLE 1: ESTIMATED FY06 ENERGY DEMAND AT FT. STEWART & HAAF

Fuel	Quantity	Units	Heat Value	Units	MMBtu/yr
Wood	18514	tons/yr	4,500	Btu/lb	166,626
FO #2	445337	gal/yr	140,000	Btu/gal	62,347
NG	94481	MCF/yr	1,020	Btu/ft3	96,371
Propane	144111	gal/yr	90,500	Btu/gal	13,042
T O T A L					**338,386**
FY2006 Square Footage at Ft. Stewart & HAAF (ft^2)					11,428,000
Energy Use Per Square Foot (BTU/ft^2)					29,610

Notes: Data on fuel usage and square footage were provided by Fred Loius by telephone. As of 4/24/2008 no data had been provided via email, despite numerous requests.
We have discussed these estimates with Fred Cavedo who generally concurs.

c. Estimating Energy Demand for the 5th BCT Compound

To estimate energy demand for the 5th BCT Compound we applied the typical energy demand per square foot (derived above) to the planned square footage of the project. We assumed that the CY2006 estimate of demand for Ft. Stewart and Hunter AAF would be more representative of the demand at the 5th BCT Compound. Also, being the higher of the two values, we are being conservative in the estimate of emissions.

Using data from Form 1391 documentation we identified the planned building square footage for the project and estimated energy demand. In doing so we made some assumptions:

- Fuel combustion will only be used for comfort heat (including space heat and hot water), and will not be used for air-conditioning and cooling. This is consistent with what we were told during our data collection phase.
- All enclosed spaces will be heated. This includes vehicle maintenance facilities, storage buildings, and the unmanned aerial vehicle hangar. The only spaces that will not be heated are the vehicle parking areas and the open secure storage facility. In reality, some of the storage areas may not be heated. However, these account for a small fraction of the overall planned square footage, and we have conservatively included them.
- The Child Development Centers would not need to be included in the PSD analysis, especially if they have their own source of heat. (The CDC are not integral to the functioning of the 5th BCT, and as such EPA allows their exclusion from permit analyses.) However, if there is a central heat plant it will be impractical to separate out the heat used by the CDC, so we have included them here.

Table 2 shows the planned building square footage for the project.

TABLE 2: PLANNED BUILDING SQUARE FOOTAGE OF THE 5TH BCT COMPOUND

Type of Facility	Area (ft^2)	Area ($yard^2$)
Primary Facility		
Barracks	527,040	
Dining Facility	26,500	
Primary Facility		
Company Operations Facilities	364,777	
Covered Hardstand	66,555	
Primary Facility		
Brigade Headquarters	40,100	
Battalion Headquarters	106,900	
Primary Facility		
Vehicle Maintenance Shops	159,870	
Organizational Vehicle Parking		155,511
Organizational Storage Facility	2,300	
Oil Storage Building	2,820	
HAZMAT Storage Building	2,820	
Unmanned Aerial Vehicle Hangar	9,000	
Distro Company Storage	8,000	
Distro Open Secure Storage		445
Primary Facility		
Physical Fitness Facility	64,799	
Indoor Swimming Pool	15,528	
Primary Facility		
Child Development Ctr, 0-5 Yrs	15,850	
Child Development Ctr, 6-10 Yrs	13,929	
Total area of buildings	**1,426,788**	

We applied the estimated typical energy demand per square foot to the data for building square footage, assumed a typical duration of a heating season (i.e., 4 months), and estimated the total annual energy demand. While doing this we made allowances for boiler inefficiencies, transmission losses, and heating seasons that are more severe than average. We discussed this methodology with Fred Cavedo, who indicated that we could safely assume that the actual demand that will be estimated for planning purposes will be 25% greater than the value based strictly on square footage. Accordingly, we have scaled our energy demand values up by 25%. The results of this exercise are shown in Table 3.

TABLE 3: ESTIMATED ENERGY DEMAND FOR THE 5TH BCT COMPOUND

Type of Facility	Area (ft^2)	Energy Demand (MMBtu)	Boiler Rating (MMBtu/hr)	Boiler Rating: 25% Scaled (MMBtu/hr)
Primary Facility				
Barracks	527,040	15605.8	5.34	6.68
Dining Facility	26,500	784.7	0.27	0.34
Primary Facility				
Company Operations Facilities	364,777	10801.1	3.70	4.62
Covered Hardstand	66,555	1970.7	0.67	0.84
Primary Facility				
Brigade Headquarters	40,100	1187.4	0.41	0.51
Battalion Headquarters	106,900	3165.3	1.08	1.36
Primary Facility				
Vehicle Maintenance Shops	159,870	4733.8	1.62	2.03
Organizational Storage Facility	2,300	68.1	0.02	0.03
Oil Storage Building	2,820	83.5	0.03	0.04
HAZMAT Storage Building	2,820	83.5	0.03	0.04
Unmanned Aerial Vehicle Hangar	9,000	266.5	0.09	0.11
Distro Company Storage	8,000	236.9	0.08	0.10
Primary Facility				
Physical Fitness Facility	64,799	1918.7	0.66	0.82
Indoor Swimming Pool	15,528	459.8	0.16	0.20
Primary Facility				
Child Development Ctr, 0-5 Yrs	15,850	469.3	0.16	0.20
Child Development Ctr, 6-10 Yrs	13,929	412.4	0.14	0.18
T O T A L	**1,426,788**	**42,248**	**14.47**	**18.09**

2. Emissions Estimates

Based on the energy demand estimates in the previous section, we estimated emissions under four scenarios, as follows:

- We assumed that there would be a central energy plant that would supply heat to the entire 5th BCT Compound, would use natural gas exclusively, and the total heat input rating required (i.e., 18.09 MMBtu/hr) would be in a single boiler. This is probably not what will be implemented in the event that there is a CEP. Fred Cavedo indicated that the heat input will likely be split into two boilers, with a third boiler serving as a back-up during periods of repair or maintenance on the primary boilers. Regardless, we estimated emissions under this scenario to see if it would result in the worst-case scenario.

- We assumed that there would be a central energy plant that would supply heat to the entire 5th BCT Compound, would use fuel oil exclusively, and the total heat input rating required (i.e., 18.09 MMBtu/hr) would be in a single boiler. Although both Will Ingram and Fred Cavedo indicated that there is a very small likelihood that fuel oil will be used, we have proceeded with this scenario to see if it would result in the worst-case scenario.
- We assumed that the heat capacity for the compound would be split into smaller units, rather than having a single large boiler. We have assumed two units of 9 MMBtu/hr each, as this would be representative of any combination of boilers below 10 MMBtu/hr and over 0.3 MMBtu/hr. To simplify the analysis we have assumed that all boilers will be greater than 0.3 MMBtu/hr. (Emission factors differ for heating units below 0.3 MMBtu/hr, those between 0.3 and 10 MMBtu/hr, and those greater than 10 MMBtu/hr.) In reality, if there is decentralized heating some of the buildings (particularly storage areas) will probably have small space heaters, and will likely have small water heaters. However, in the absence of any data to indicate how much of the heat capacity will be in units less than 0.3 MMBtu/hr we have assumed that it will all be in units greater than 0.3 MMBtu/hr. (This will not significantly affect our analyses, as such small units will probably make up a very small fraction of the overall heat capacity.) Under this scenario we have assumed that the only fuel used will be natural gas.
- We have assumed two units of 9 MMBtu/hr each, and have assumed that the only fuel used will be fuel oil.

If fuel oil is used as a back-up fuel, the most likely scenario will be one in which natural gas is mainly used (as long as natural gas is economical) and fuel oil will be used occasionally. However, the scenarios listed above present us with the worst-case scenario for each pollutant, and will help us to identify if there is a possibility that PSD will be triggered.

To estimate emissions, we applied AP-42 emission factors to the relevant quantities of fuel combusted under the four scenarios. The results are presented in Table 4.

TABLE 4: ESTIMATED EMISSIONS FROM FUEL COMBUSTION FOR COMFORT HEAT

Scenario	Capacity (MMBtu/hr)	Fuel Type	Annual Fuel Consumption	Energy Use (MMBtu/yr)	Emission Rate (ton/yr)					
					TSP	PM10	SO2	CO	VOC	NOx
I	18	Natural Gas	51,773,944	52809.42	0.05	0.05	0.02	2.17	0.14	1.29
II	18	Fuel Oil #2	377,210.2	52809.42	0.38	0.19	13.39	0.94	0.06	3.77
III	9 each	Natural Gas	51,773,944	52809.42	0.05	0.05	0.02	2.17	0.14	1.29
IV	9 each	Fuel Oil #2	377,210	52809.42	0.38	0.20	13.39	0.94	0.06	3.77

Notes: Natural gas burners are assumed to use low-NOx technology
Fuel Oil sulfur content is assumed to be 0.5%

3. Results

In general, pollutant emission rates are the same for boilers at or below 10 MMBtu/hr and those above 10 MMBtu/hr. The exception is particulate emissions when combusting fuel oil, which is

evident from Table 4 (although only marginally so). The table also points out the pollutants emitted at noticeable rates – SO_2 and NO_x from fuel combustion, and CO from natural gas combustion. What is evident is that under each of the scenarios the pollutant emission rates are well below the respective significance level thresholds for PSD, which are as follows:

- CO = 100 tpy
- NO_x = 40 tpy
- SO_2 = 40 tpy
- VOC = 40 tpy
- PM = 25 tpy
- PM10 = 15 tpy

Furthermore, it is clear that the margins between expected emissions and the PSD significance levels are so great that the 5th BCT project could double in scope and still not trigger PSD. Additionally, emission rates of SO_2 (the pollutant of greatest concern) are not likely to be as high as estimated here for the simple reason that it is not currently the fuel of choice for the project. And even if it is used, the SO_2 emissions can be lowered by using fuel oil with a lower sulfur content.

Note that we have not included emissions from internal combustion sources (i.e., emergency generators) because we have no information on what their rated capacities will likely be. Based on moderately sized engines (i.e., 600 hp-hr and smaller), which will probably be adequate for the Brigade HQ building and the lift stations, the emissions for 500 hours of operation will not be high enough to trigger PSD when added to those from the boilers.

Other sources of emissions, such as solvent degreasers, will not contribute significantly to the pollutants of concern. Additionally, we do not have any information on the types and numbers of such sources that will be installed. Accordingly, we have not estimated emissions from such sources. We will update our analysis when such data become available.

Please call me at (727) 791-7884 if you have any questions. After we have received the preliminary energy demand estimates from Fred Cavedo and Fred Louis we will update our analysis as relevant.

APPENDIX H

FACILITIES IN PROJECT FOOTPRINTS

FY 2011 – 2014 Project List				
FY	**Proposed Project**	**Supporting Infrastructure**	**Square Footage**	**Acreage**
RANGE FACILITIES				
2011	Multipurpose Machine Gun Range	Ammunition Breakdown Building	120	
		Classroom Building	800	
		Range Operations and Storage Building	800	
		Range Control Tower	248	
		Vault Latrine	120	
		Covered Bleachers	536	
		Covered Mess	800	
		Supporting access roads / parking / material lay-down		3
		Range Footprint (Alternative B & C)		250
		Approximate Total Acreage		**255**
2011	Infantry Platoon Battle Course	Ammunition Breakdown Building	120	
		Classroom Building	800	
		Range Operations and Storage Building	800	
		Range Operations Tower	248	
		Latrine	200	
		Bleacher Enclosure	536	
		Covered Mess	800	
		Supporting access roads / parking / material lay-down		3
		Range Footprint (Alternative B & C)		1000
		Approximate Total Acreage		**1005**
2011	Modified Record Fire Range	Ammunition Breakdown Building	120	
		Classroom Building	800	
		Range Operations and Storage Building	800	
		Range Control Tower	256	

		Vault Latrine, wet	364	
		Bleacher Enclosure	535	
		Covered Mess	800	
		Supporting access roads / parking / material lay-down		2
		Range Footprint (Alternative B & C)		25
		Approximate Total Acreage		**30**
2013	Infantry Squad Battle Course	Ammunition Breakdown Building	185	
		Classroom Building	800	
		Range Operations and Storage Building	800	
		Range Operations Tower	290	
		Vault Latrine	200	
		Bleacher Enclosure	726	
		Covered Mess	800	
		Supporting access roads / parking / material lay-down		3
		Range Footprint (Alternative B)		270
		Range Footprint (Alternative C)		700
		Approximate Total Acreage (Alternative B)		**275**
		Approximate Total Acreage (Alternative C)		**705**
2013	Qualification Training Range	Ammunition Breakdown Building	185	
		Classroom Building	800	
		Range Operations and Storage Building	800	
		Range Control Tower	290	
		Vault Latrine	200	
		Bleacher Enclosure	726	
		Covered Mess	800	
		Supporting access roads / parking / material lay-down		3
		Range Footprint (Alternative B & C)		250
		Approximate Total Acreage		**255**

2013	Digital Multipurpose Training Range	Ammunition Breakdown Building	185	
		Ammunition Loading Dock	283	
		Instrumentation Dock	900	
		Classroom Building	1,056	
		Operations/Storage Building	800	
		Range Operations Tower	960	
		Range Operations Center	2,000	
		Vault Latrine	200	
		Covered Mess	800	
		Bivouac Area	4,320	
		Supporting access roads / parking / material lay-down		3
		Range Footprint (Alternative B & C)		1,000
		Approximate Total Acreage		**1,005**
2013	10 Meter / 25 Meter Zero Range	Ammunition Breakdown Building	185	
		Range Operations and Storage Building	800	
		Range Control Tower	290	
		Vault Latrine	200	
		Bleacher Enclosure	726	
		Covered Mess	800	
		Supporting access roads / parking / material lay-down		2
		Range Footprint (Alternative B & C)		2
		Approximate Total Acreage		**5**
2013	Combat Pistol Qualification Course	Ammunition Breakdown Building	185	
		Classroom Building	800	
		Range Operations and Storage Building	800	
		Range Operations Tower	290	
		Vault Latrine	200	
		Bleacher Enclosure	726	

		Covered Mess	800	
		Supporting access roads / parking / material lay-down		2
		Range Footprint (Alternative B & C)		2
		Approximate Total Acreage		**5**
2013	Known Distance Range	Ammunition Breakdown Building	185	
		Classroom Building	800	
		Range Operations and Storage Building	800	
		Range Control Tower	290	
		Vault Latrine	200	
		Bleacher Enclosure	726	
		Covered Mess	800	
		Supporting access roads / parking / material lay-down		3
		Range Footprint (Alternative B & C)		80
		Approximate Total Acreage		**85**
2013	Fire and Movement Range	Ammunition Breakdown Building	185	
		Range Operations and Storage Building	800	
		Range Operations Tower	290	
		Vault Latrine	200	
		Bleacher Enclosure	726	
		Covered Mess	800	
		Supporting access roads / parking / material lay-down		2
		Range Footprint (Alternative B & C)		10
		Approximate Total Acreage		**15**
2013	Modified Record Fire Range	Ammunition Breakdown Building	185	
		Classroom Building	800	
		Range Operations and Storage Building	800	
		Range Operations Tower	290	

		Vault Latrine	200	
		Bleacher Enclosure	726	
		Covered Mess	800	
		Supporting access roads / parking / material lay-down		2
		Range Footprint (Alternative B & C)		25
		Approximate Total Acreage		**30**
2014	Convoy Live Fire Range	Range Operations and Storage Building	800	
		Vault Latrine	200	
		Supporting access roads / parking / material lay-down		1
		Engagement Boxes (Alternative B & C)		60
		Approximate Total Acreage		**65**
GARRISON FACILITIES				
2011	10th Engineering Battalion Complex	Company Operations Facilities	78,537	
		Covered Hardstand	15,996	
		Battalion HQs with Classrooms	17,477	
		Supporting access roads / parking / material lay-down (Alternative B)		50
		Supporting access roads / parking / material lay-down (Alternative C)		30
		Approximate Total Acreage (Alternative B)		**55**
		Approximate Total Acreage (Alternative C)		**35**
2011	Sky Warrior Unmanned Aerial Systems Facilities	UAVS Maintenance Hanger	129,360	
		Supporting access roads / parking / material lay-down (Alternative B)		30
		Supporting access roads / parking / material lay-down (Alternative C)		20
		Approximate Total Acreage (Alternative B)		**35**
		Approximate Total Acreage (Alternative C)		**25**

Legend for all tables in this section indicated below:

LEGEND

✖ = Not Feasible – Unacceptable limitations

⊘ = Feasible – Moderate limitations and challenges

● = Feasible – Minor limitations and challenges

✔ = Feasible – No limitations or challenges

n/a = Not Applicable

[1] *For this criterion, that may arise for mitigating potential environmental impacts. It represents only the relative cost of construction for each particular location.*

Summary of Screening Analysis for FY11 MPMGR				
Criteria	**No-Action**	**Alternative B**	**Alternative C**	**COA Eliminated**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	?	?	✔
Has the range been sited to maximize use of the installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	✔	✗
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	✗
Does this course of action avoid and minimize adverse environmental impacts?	✔	⊘	⊘	?
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔	✗
Does this course of action require a new dudded impact area to be established?	n/a	✔	✔	⊘
Does this course of action minimize construction costs for the range? [1]	✔	?	⊘	⊘
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Course of Action Feasibility	✗	⊘	⊘	✗

Summary of Screening Analysis for FY11 IPBC				
Criteria	**No-Action**	**Alternative B**	**Alternative C**	**COA Eliminated**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	?	?	⊘
Has the range been sited to maximize use of the installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	?	?	✗
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	⊘
Does this course of action avoid and minimize adverse environmental impacts?	✔	?	⊘	⊘
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	?	?	?
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	⊘
Does this course of action minimize construction costs for the range? [1]	✔	⊘	⊘	⊘
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Alternative Feasibility	✗	⊘	⊘	✗

Summary of Screening Analysis for FY11 MRFR				
Criteria	**No-Action**	**Alternative B**	**Alternative C**	**COA Eliminated**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	✔	✔	✔
Has the range been sited to maximize use of the installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	⊘	✗
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	✔
Does this course of action avoid and minimize adverse environmental impacts?	✔	?	✔	✔
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔	✔
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	✔
Does this course of action minimize construction costs for the range? [1]	✔	?	⊘	⊘
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Alternative Feasibility	✗	?	⊘	✗

Summary of Screening Analysis for FY13 DMPTR					
Criteria	**No-Action**	**Alternative B**	**Alternative C**	**COA Eliminated (Existing MPRC)**	**COA Eliminated (Old AGR)**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	✔	✔	✔	⊘
Has the range been sited to maximize use of the installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	✔	✗	✗
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	✔	?
Does this course of action avoid and minimize adverse environmental impacts?	✔	?	⊘	✔	⊘
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔	✔	✔
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	✔	⊘
Does this course of action minimize construction costs for the range? [1]	✔	?	?	?	⊘
Does this course of action meet Force Protection and Anti-Terrorism	n/a	✔	✔	✔	✔

measures?					
Summary of Alternative Feasibility	✖	⍰	⊘	✖	✖

Summary of Screening Analysis for FY1 QTR				
Criteria	**No-Action**	**Alternative B**	**Alternative C**	**COA Eliminated**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	✔	✔	✗
Has the range been sited to maximize use of the installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	✔	✗
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	✔
Does this course of action avoid and minimize adverse environmental impacts?	✔	?	⊘	?
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔	✔
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	✔
Does this course of action minimize construction costs for the range? [1]	✔	?	?	?
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Alternative Feasibility	✗	?	⊘	✗

Summary of Screening Analysis for FY13 KDR				
Criteria	**No-Action**	**Alternative B**	**Alternative C**	**COA Eliminated**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	?	?	?
Has the range been sited to maximize use of the installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	✔	✔
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	✔
Does this course of action avoid and minimize adverse environmental impacts?	✔	?	⊘	✗
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔	✔
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	✔
Does this course of action minimize construction costs for the range? [1]	✔	?	?	?
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Alternative Feasibility	✗	?	⊘	✗

Summary of Screening Analysis for FY13 ISBC				
Criteria	**No-Action**	**Alternative B**	**Alternative C**	**COA Eliminated**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	✔	✔	✔
Has the range been sited to maximize use of the installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	✔	⊘
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	✔
Does this course of action avoid and minimize adverse environmental impacts?	✔	⍰	⊘	✗
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔	✔
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	⍰
Does this course of action minimize construction costs for the range? [1]	✔	✔	⍰	⊘
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Alternative Feasibility	✗	⍰	⊘	✗

Summary of Screening Analysis for FY13 FMR				
Criteria	**No-Action**	**Alternative B**	**Alternative C**	**COA Eliminated**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	✔	✔	✔
Has the range been sited to maximize use of the installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	✔	✗
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	✔
Does this course of action avoid and minimize adverse environmental impacts?	✔	✔	?	✔
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔	✔
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	✔
Does this course of action minimize construction costs for the range? [1]	✔	✔	?	✔
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Alternative Feasibility	✗	✔	?	✗

Summary of Screening Analysis for FY13 MRFR				
Criteria	**No-Action**	**Alternative B**	**Alternative C**	**COA Eliminated**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	✔	✔	✔
Has the range been sited to maximize use of the installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	✔	✔
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	✔
Does this course of action avoid and minimize adverse environmental impacts?	✔	?	⊘	✗
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔	✔
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	✔
Does this course of action minimize construction costs for the range? [1]	✔	✔	?	?
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Alternative Feasibility	✗	✔	⊘	✗

Summary of Screening Analysis for FY13 CPQC			
Criteria	**No-Action**	**Alternative B**	**Alternative C**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	✔	✔
Has the range been sited to maximize use of the installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	✔
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔
Does this course of action avoid and minimize adverse environmental impacts?	✔	?	?
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔
Does this course of action require a new duded impact area to be established?	n/a	✔	✔
Does this course of action minimize construction costs for the range? [1]	✔	✔	✔
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔
Summary of Alternative Feasibility	✗	?	?

Summary of Screening Analysis for FY13 10/25 Meter Zero Range				
Criteria	**No-Action**	**Alternative B**	**Alternative C**	**COA Eliminated**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	✔	?	✔
Has the range been sited to maximize use of the installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	✔	✗
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	✔
Does this course of action avoid and minimize adverse environmental impacts?	✔	?	?	?
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔	✔
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	✔
Does this course of action minimize construction costs for the range? [1]	✔	✔	✔	✔
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Alternative Feasibility	✗	?	?	✗

Summary of Screening Analysis for FY14 CLFR				
Criteria	**No-Action**	**Alternative B**	**Alternative C**	**COA Eliminated**
Can the Army standard design in TC 25-8 for this range be accommodated under this course of action within allowable waivers or modifications?	✗	✔	✔	✔
Can the Surface Danger Zone (SDZ) for this range be accommodated without infringing on adjacent training facilities or ranges?	n/a	✔	⊘	⊘
Has the range been sited to maximize use of the installation's Training Area for future requirements by leaving the maximum amount of suitable contiguous land mass available for future needs?	n/a	✔	?	⊘
Is the terrain susceptible to wildfires which could cause safety issues to nearby Interstates or State Highways or lengthy shutdowns?	n/a	✔	✔	✔
Does this course of action avoid and minimize adverse environmental impacts?	✔	?	?	✗
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	✔	✔	✔
Does this course of action require a new duded impact area to be established?	n/a	✔	✔	⊘
Does this course of action minimize construction costs for the range? [1]	✔	✔	✔	✔
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Alternative Feasibility	✗	?	⊘	✗

Summary of Screening Analysis for FY11 UAS Facilities				
Criteria	**No-Action**	**Alternative B**	**Alternative C**	**COA Eliminated**
Can personnel travel easily to site from the cantonment area?	n/a	✔	⍰	✘
Does this course of action accommodate all supporting facilities, access roads, and parking areas?	✘	✔	⍰	⊘
Has the facility been sited above the water table to reduce potential flooding?	n/a	⍰	⍰	⍰
Does the site adversely impact the prescribed burning program?	n/a	✔	✔	✔
Does this course of action avoid and minimize adverse environmental impacts?	✔	⍰	⊘	⊘
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	⍰	⍰	⍰
Is the facility sited in an appropriate land use category?	n/a	✔	✔	✔
Does this course of action minimize construction costs for the facility? [1]	✔	⍰	⍰	⍰
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔	✔
Summary of Alternative Feasibility	✘	⍰	⊘	✘

Summary of Screening Analysis for FY11 10th ENG BN Complex			
Criteria	**No-Action**	**Alternative B**	**Alternative C**
Can personnel travel easily to site from the cantonment area?	n/a	✔	✔
Does this course of action accommodate all supporting facilities, access roads, and parking areas?	✘	✔	⍰
Has the facility been sited above the water table to reduce potential flooding?	n/a	✔	⊘
Does the course of action adversely impact the prescribed burning program?	n/a	✔	✔
Does this course of action avoid and minimize adverse environmental impacts?	✔	⍰	⊘
Does this course of action require either electrical power lines or fiber optic cable in excess of 10,000 feet, or for water lines to be constructed?	n/a	⍰	⍰
Is the facility sited in an appropriate land use category?	n/a	✔	✔
Does this course of action minimize construction costs for the facility? [1]	✔	⍰	⍰
Does this course of action meet Force Protection and Anti-Terrorism measures?	n/a	✔	✔
Summary of Alternative Feasibility	✘	⍰	⊘

APPENDIX I

NOISE

DEPARTMENT OF THE ARMY
US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-EON

26 AUG 2009

MEMORANDUM FOR Environmental Office (IMSE-STW-PWE/Ms. Amber Franks), Directorate of Public Works, 1550 Frank Cochran Drive, Fort Stewart, GA 31314-4928

SUBJECT: Operational Noise Consultation, No. 52-EN-0C0Y-09, Digital Multi-Purpose Training Range Operational Noise Contours for Fort Stewart, GA; August 2009

1. We are enclosing 2 copies of the consultation.

2. Please contact us if this consultation or any of our services did not meet your needs or expectations.

3. The point of contact is Ms. Kristy Broska, Environmental Protection Specialist or Ms. Catherine Stewart, Program Manager, Operational Noise, USACHPPM, at DSN 584-3829, Commercial (410) 436-3829, or email: kristy.broska@us.army.mil or catherine.stewart@us.army.mil.

FOR THE COMMANDER:

Encl

DONALD F. ARCHIBALD
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U.S. Army Center for Health Promotion and Preventive Medicine

OPERATIONAL NOISE CONSULTATION
NO. 52-EN-0C0Y-09
DIGITAL MULTI-PURPOSE TRAINING RANGE
OPERATIONAL NOISE CONTOURS
FORT STEWART, GEORGIA
AUGUST 2009

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EXECUTIVE SUMMARY
OPERATIONAL NOISE CONSULTATION
NO. 52-EN-0C0Y-09
DIGITAL MULTI-PURPOSE TRAINING RANGE
OPERATIONAL NOISE CONTOURS
FORT STEWART, GEORGIA
AUGUST 2009

1. PURPOSE. To provide Fort Stewart noise contours for the projected Digital Multi-Purpose Training Range (DMPTR).

2. CONCLUSIONS.

a. Existing Operating Environment.

(1) The existing demolition and large caliber operating environment would not generate Noise Zone II or Noise III contours that beyond the boundary or into the Fort Stewart housing area.

(2) The existing operating environment has a moderate risk of generating noise complaints near Old River Road and Highway 204 (Fort Argyle Road). The moderate risk of noise complaints also extends into the Fort Stewart housing area.

b. Projected Operating Environment.

(1) The projected operating environment would generate a Noise Zone II contour that extends slightly beyond the northern boundary into an undeveloped area. The projected operating environment under the Course of Action 1 (COA1) location would not generate a Noise Zone II contour that in the Fort Stewart housing area. The projected operating environment under the Course of Action 2 (COA2) location would generate a Noise Zone II contour that extends into the Fort Stewart housing area. The projected operating environment would not generate a Noise III contour that extends beyond the boundary or into the Fort Stewart housing area.

(2) The projected complaint risk contours are identical to the existing complaint risk contours with the exception of the area around the proposed DMPTR. The projected operating environment has a moderate risk of generating noise complaints near Old River Road and Highway 204 (Fort Argyle Road). The moderate risk of noise complaints also extends into the Fort Stewart housing area.

3. RECOMMENDATION.

a. Include the information from this consultation in the appropriate Fort Stewart National Environmental Policy Act (NEPA) documentation.

b. Although no Federal Law prohibits the Department of Defense training and testing activities from making noise, the Services have always tried to be good neighbors. Due to the risk of noise complaints, Fort Stewart should continue its operational noise management and outreach programs to inform the public of possible noise from training. Fort Stewart should monitor both the noise environment and any proposed land use changes surrounding the installation.

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OPERATIONAL NOISE CONSULTATION
NO. 52-EN-0C0Y-09
DIGITAL MULTI-PURPOSE TRAINING RANGE
OPERATIONAL NOISE CONTOURS
FORT STEWART, GEORGIA
AUGUST 2009

1. REFERENCES. A list of the references used in this consultation is in Appendix A. A glossary of terms and abbreviations used are in Appendix B. Appendix C contains the Noise Zone Descriptions and Land Use Guidelines used in this consultation.

2. AUTHORITY. This consultation was funded by the Army Environmental Command, Aberdeen Proving Ground, MD.

3. PURPOSE. To provide Fort Stewart noise contours for the projected Digital Multi-Purpose Training Range (DMPTR). Appendix D contains the range location maps.

4. DEMOLITION AND LARGE CALIBER WEAPONS OPERATIONS.

a. General.

(1) The noise simulation program used to assess demolition and large caliber weapons (20mm and greater) noise is the Blast Noise Impact Assessment (BNOISE2) program (U.S. Army 2003). The BNOISE2 program requires operational data concerning the types of weapons fired from each range or firing point (including demolitions), the number and types of ammunition fired from each weapon, the location of targets for each range or firing point and the amount of propellant used to reach the target. Existing records on range utilization along with reasonable assumptions are used as BNOISE2 inputs.

(2) The assessment period used to create the Fort Stewart C-weighted Day-Night average sound Level (CDNL) contours was 250 days. The complaint risk contours show the predicted peak levels for individual rounds (metric term is PK15(met)). Since the contours are based on peak levels rather than a cumulative or average level, the size of the contours will not change if the number of rounds fired increases.

(3) The inputs used to generate the demolition and large caliber noise contours for this consultation were created using the data summarized in Appendix E. The projected operating environment consists of the existing operating environment activity plus a proposed DMPTR. The difference between the Course of Action 1 (COA1) and Course of Action 2 (COA2) projected operating environment is the location and orientation of the DMPTR.

b. Existing Operating Environment.

(1) Figure 1 contains the noise contours for the existing operating environment. This contour was developed using the existing operating environment table (Table E-1) in Appendix E. The Land Use Planning Zone (LUPZ) 57 decibel (dB) CDNL noise contour extends approximately 2,500 meters beyond the northern boundary and approximately 1,200 meters beyond the southern boundary. The LUPZ (57 dB CDNL) contour encompasses the Fort Stewart housing area. The Noise Zone II (62 dB CDNL) and Noise Zone III (70 dB CDNL) contours do not extend beyond the boundary or into the Fort Stewart housing area.

(2) Figure 2 contains the complaint risk contours for the existing operating environment. The moderate complaint risk contour (PK15(met) 115 dB) extends approximately 2,000 meters beyond the northeastern boundary crossing Old River Road and Highway 204 (Fort Argyle Road) and approximately 1,400 meters beyond the southeastern boundary towards Highway 196. The moderate complaint risk contour (PK15(met) 115 dB) extends approximately 400 meters into the Fort Stewart housing area. The high complaint risk contour (PK15(met) 130 dB) extends approximately 200 meters beyond the northeastern boundary near the aerial gunnery ranges.

c. Projected Operating Environment.

(1) Proposed Course of Action 1 Location.

(a) Figure 3 contains the CDNL noise contours for the DMPTR COA1 location. These contours were developed using the projected operating environment table (Table E-2) in Appendix E. The COA1 projected operating environment creates a LUPZ (57 dB CDNL) noise contour that extends approximately 2,500 meters beyond the northern boundary, encompassing the town of Pembroke and approximately 4,000 meters beyond the southern boundary, into Hinesville. The Noise Zone II (62 dB CDNL) extends beyond the northern boundary approximately 1,300 meters. The Noise Zone III (70 dB CDNL) contour does not extend beyond the boundary.

(b) Figure 4 contains the complaint risk contours for the DMPTR COA1 location. The projected complaint risk contours are identical to the existing complaint risk contours with the exception of the area around the proposed DMPTR. The moderate complaint risk contour (PK15(met) 115 dB) extends approximately 2,000 meters beyond the northeastern boundary and approximately 1,400 meters beyond the southeastern boundary. The moderate complaint risk contour (PK15(met) 115 dB) extends approximately 400 meters into the Fort Stewart housing area. The high complaint risk contour (PK15(met) 130 dB) extends approximately 200 meters beyond the northeastern boundary near the aerial gunnery ranges.

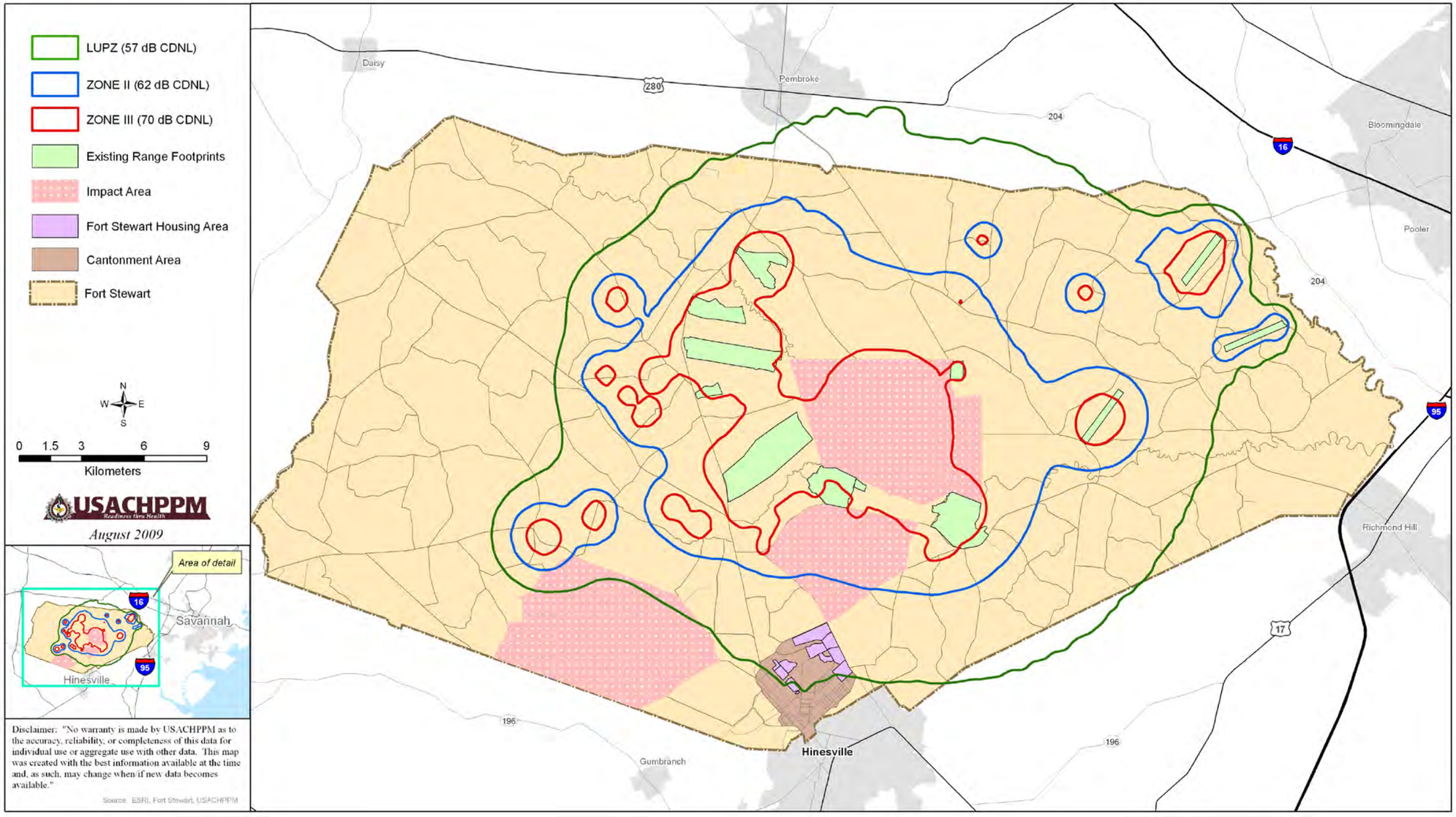

FIGURE 1. FORT STEWART
EXISTING OPERATING ENVIRONMENT
DEMOLITION AND LARGE CALIBER OPERATIONAL NOISE CONTOURS

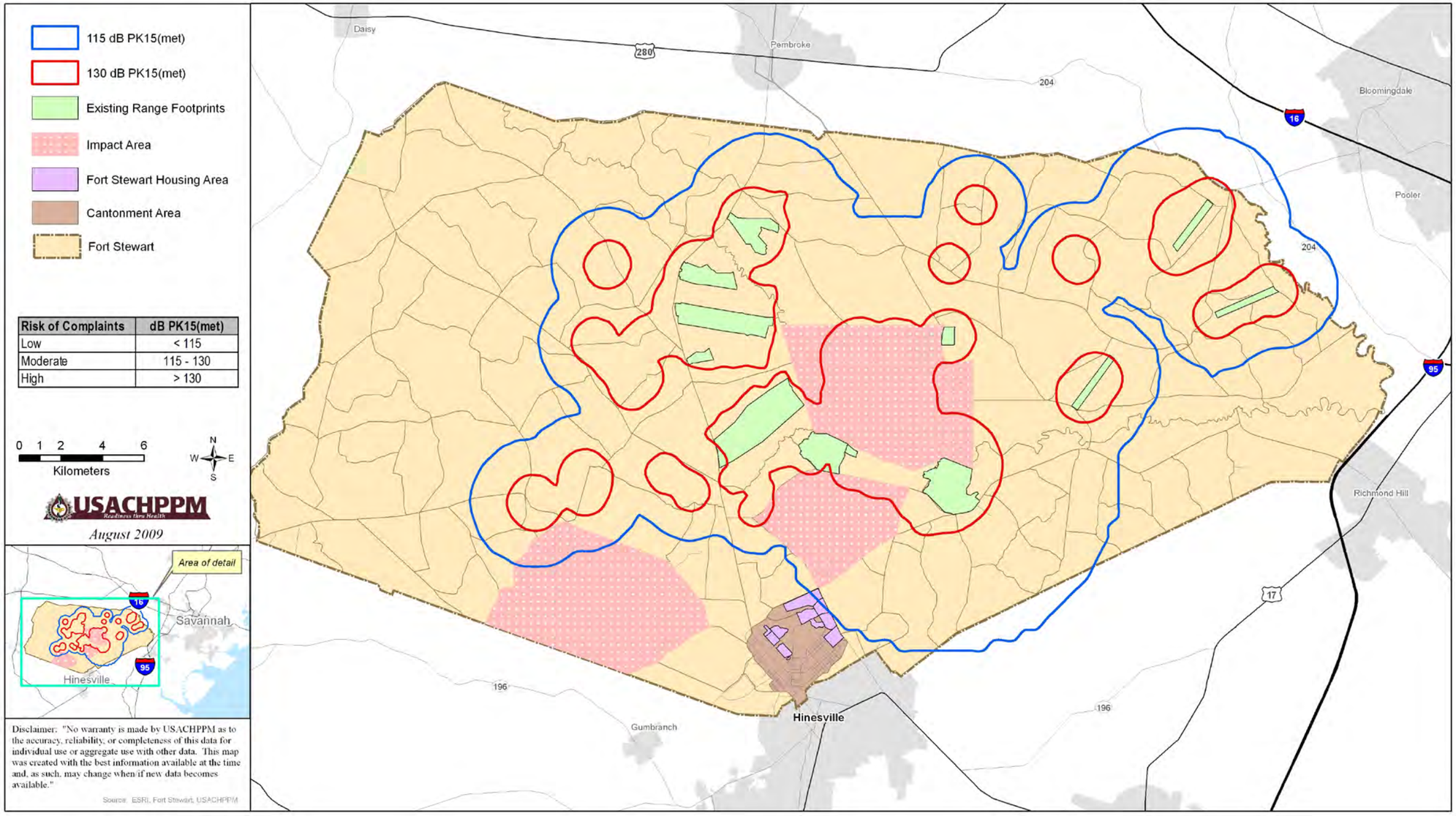

FIGURE 2. FORT STEWART
EXISTING OPERATING ENVIRONMENT
COMPLAINT RISK CONTOURS

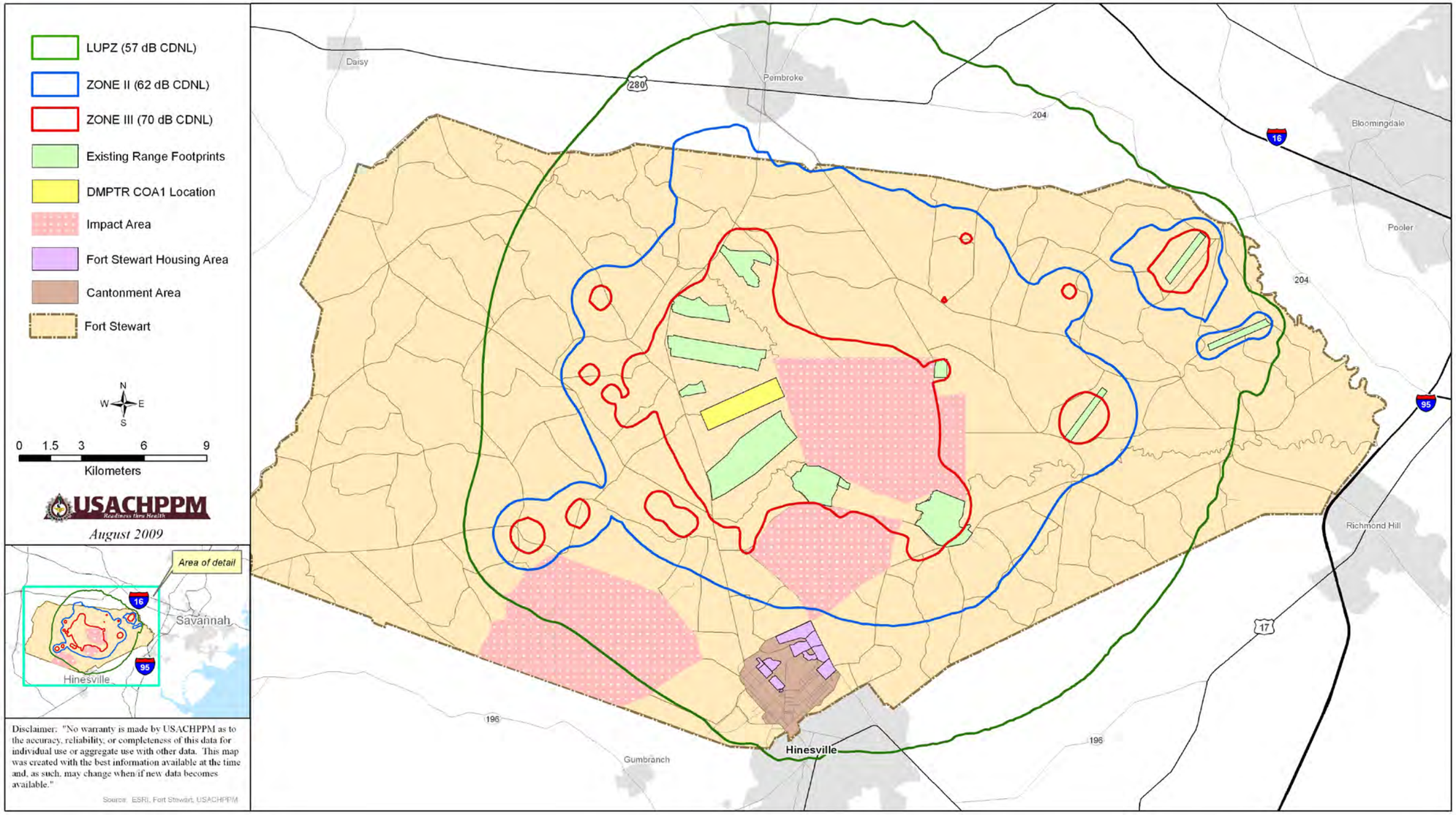

FIGURE 3. FORT STEWART
PROJECTED OPERATING ENVIRONMENT COURSE OF ACTION 1 LOCATION
DEMOLITION AND LARGE CALIBER OPERATIONAL NOISE CONTOURS

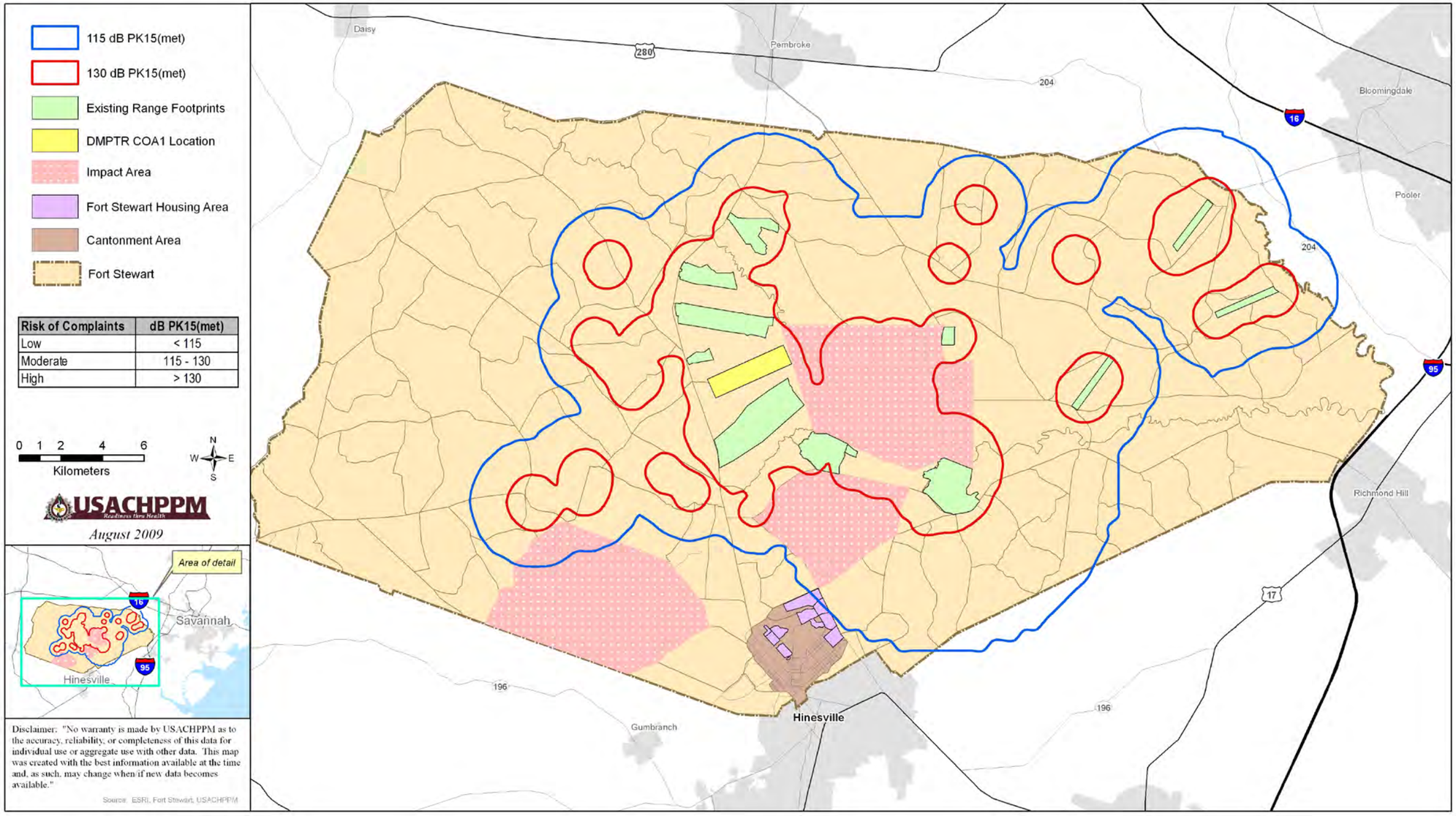

FIGURE 4. FORT STEWART
PROJECTED OPERATING ENVIRONMENT COURSE OF ACTION 1 LOCATION
COMPLAINT RISK NOISE CONTOURS

(2) Proposed Course of Action 2 Location.

(a) Figure 5 contains the CDNL noise contours for the DMPTR COA2 location. These contours were developed using the projected operating environment table (Table E-2) in Appendix E. The COA2 projected operating environment creates a LUPZ (57 dB CDNL) noise contour that extends approximately 2,500 meters beyond the northern boundary, encompassing the town of Pembroke and approximately 4,000 meters beyond the southern boundary, into Hinesville. The Noise Zone II (62 dB CDNL) extends beyond the northern boundary approximately 2,000 meters and approximately 1,000 meters into the Fort Stewart housing area. The Noise Zone III (70 dB CDNL) contour does not extend beyond the boundary or into the Fort Stewart housing area.

(b) Figure 6 contains the complaint risk contours for the DMPTR COA2 location. The projected complaint risk contours are identical to the existing complaint risk contours with the exception of the area around the proposed DMPTR. The moderate complaint risk contour (PK15(met) 115 dB) extends approximately 2,000 meters beyond the northeastern boundary and approximately 1,400 meters beyond the southeastern boundary. The moderate complaint risk contour (PK15(met) 115 dB) extends approximately 400 meters into the Fort Stewart housing area. The high complaint risk contour (PK15(met) 130 dB) extends approximately 200 meters beyond the northeastern boundary near the aerial gunnery ranges.

d. Land Use Compatibility.

(1) Per Army Regulation (AR) 200-1, noise sensitive land uses, such as housing, schools, and medical facilities are acceptable within the LUPZ and the Noise Zone I, normally not recommended in Noise Zone II, and not recommended in Noise Zone III (U.S. Army 2007). Land use surrounding Fort Stewart varies from undeveloped to residential.

(2) The existing operating environment would not generate Noise Zone II or Noise III contours that beyond the boundary or into the Fort Stewart housing area.

(3) The projected operating environment would generate Noise Zone II contour that extends slightly beyond the northern boundary into an undeveloped area. The projected operating environment would generate Noise Zone II contour that extends into the Fort Stewart housing area. The projected conditions would result in noise sensitive land uses in Noise Zone II, on and off post, which is strongly discouraged in AR 200-1 (U.S. Army 2007). In order to account for an up tempo training scenario, the projected operating environment was based upon a 50 percent night utilization at the DMPTR. The actual utilization of night rounds would be less (anticipated actual utilization would be less than 20 percent night). Therefore, the Noise Zone II contours would be smaller and would not extend beyond the boundary or into the Fort Stewart housing area.

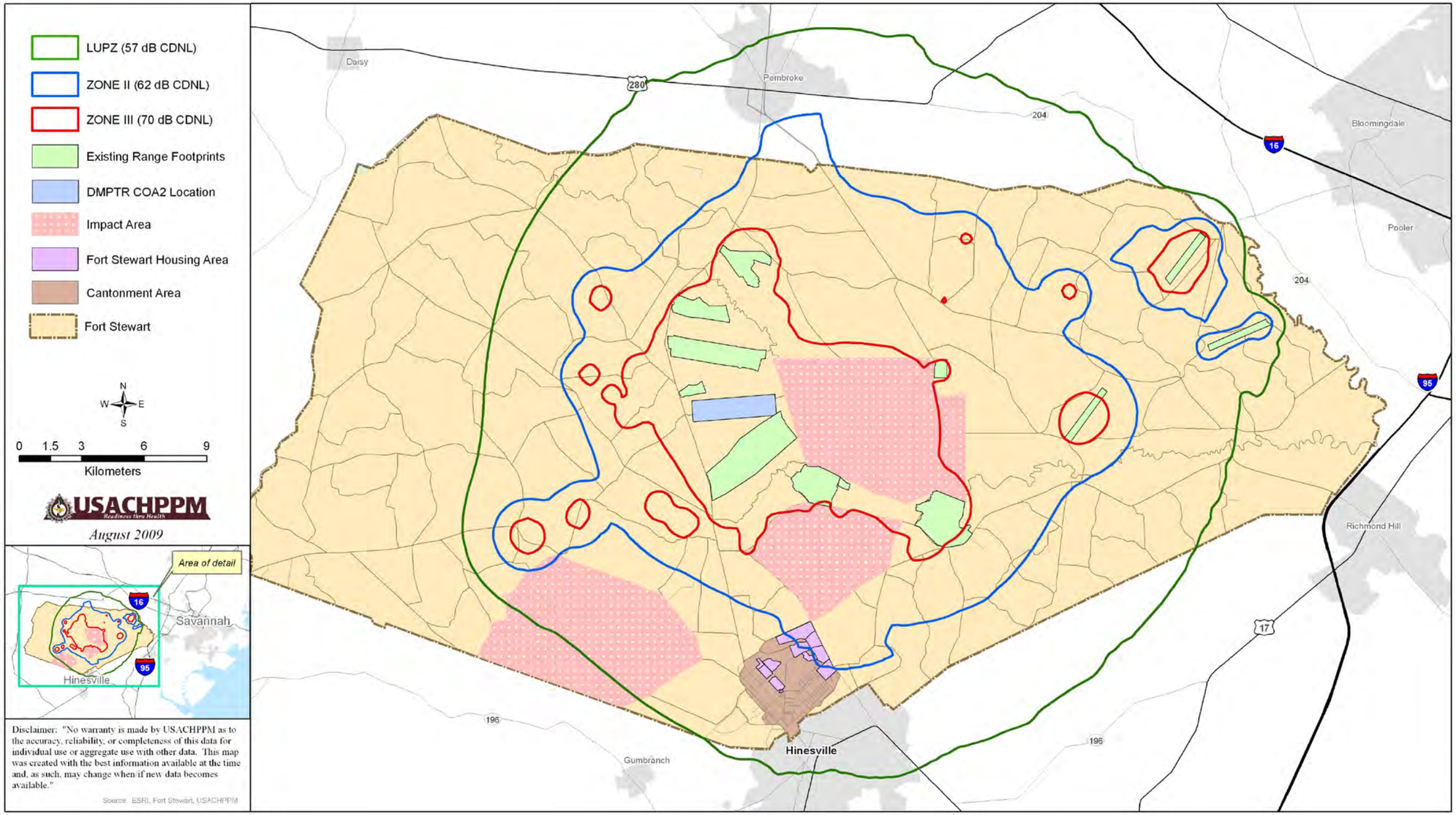

FIGURE 5. FORT STEWART
PROJECTED OPERATING ENVIRONMENT COURSE OF ACTION 2 LOCATION
DEMOLITION AND LARGE CALIBER OPERATIONAL NOISE CONTOURS

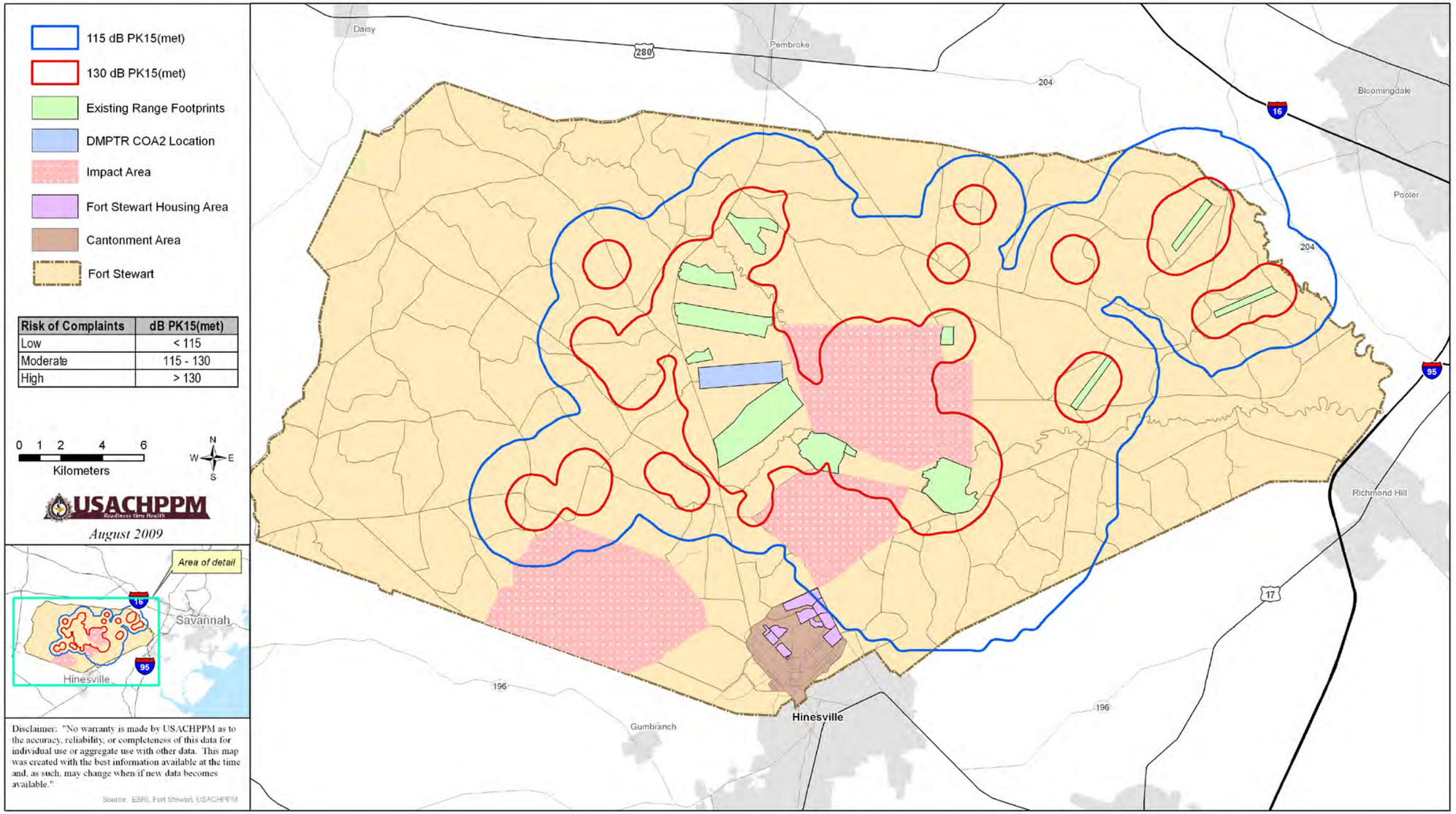

FIGURE 6 FORT STEWART
PROJECTED OPERATING ENVIRONMENT COURSE OF ACTION 2 LOCATION
COMPLAINT RISK NOISE CONTOURS

5. CONCLUSIONS.

a. Existing Operating Environment.

(1) The existing demolition and large caliber operating environment would not generate Noise Zone II or Noise III contours that beyond the boundary or into the Fort Stewart housing area.

(2) The existing operating environment has a moderate risk of generating noise complaints near Old River Road and Highway 204 (Fort Argyle Road). The moderate risk of noise complaints also extends into the Fort Stewart housing area.

b. Projected Operating Environment.

(1) The projected operating environment would generate a Noise Zone II contour that extends slightly beyond the northern boundary into an undeveloped area. The projected operating environment under the COA1 location would not generate a Noise Zone II contour that extends into the Fort Stewart housing area. The projected operating environment under the COA2 location would generate a Noise Zone II contour that extends into the Fort Stewart housing area. The projected operating environment would not generate a Noise III contour that extends beyond the boundary or into the Fort Stewart housing area.

(2) The projected complaint risk contours are identical to the existing complaint risk contours with the exception of the area around the proposed DMPTR. The projected operating environment has a moderate risk of generating noise complaints near Old River Road and Highway 204 (Fort Argyle Road). The moderate risk of noise complaints also extends into the Fort Stewart housing area.

6. RECOMMENDATION.

a. Include the information from this consultation in the appropriate Fort Stewart NEPA documentation.

b. Although no Federal Law prohibits the Department of Defense training and testing activities from making noise, the Services have always tried to be good neighbors. Due to the risk of noise complaints, Fort Stewart should continue its operational noise management and outreach programs to inform the public of possible noise from training. Fort Stewart should monitor both the noise environment and any proposed land use changes surrounding the installation.

Kristy Broska

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APPROVED:

Catherine Stewart

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APPENDIX A

REFERENCES

1. The U.S. Army, 2003, U.S. Army Construction Engineering Research Laboratories, BNOISE2 Computer Model, Version 1.3.2003-07-03.

2. The U.S. Army, 2007, Army Regulation 200-1, Environmental Protection and Enhancement, Chapter 14 Operational Noise.

APPENDIX B

GLOSSARY OF TERMS, ACRONYMS & ABBREVIATIONS

B-1. GLOSSARY OF TERMS.

Average Sound Level - the mean-squared sound exposure level of all events occurring in a stated time interval, plus ten times the common logarithm of the quotient formed by the number of events in the time interval, divided by the duration of the time interval in seconds.

C-Weighted Sound Level - a quantity, in decibels, read from a standard sound level meter with C-weighting circuitry. The C-scale incorporates slight de-emphasis of the low and high portion of the audible frequency spectrum.

Day-Night Average Sound Level (DNL) - the 24-hour average frequency-weighted sound level, in decibels, from midnight to midnight, obtained after addition of 10 decibels to sound levels in the night from midnight up to 7 a.m. and from 10 p.m. to midnight (0000 up to 0700 and 2200 up to 2400 hours).

Decibels (dB) – a logarithmic sound pressure unit of measure.

Land Use Planning Zone (LUPZ) - DNL noise contours represent an annual average that separates the Noise Zone II from the Noise Zone I.

Noise – any sound without value.

PK15(met) - the maximum value of the instantaneous sound pressure for each unique sound source, and applying the 15 percentile rule accounting for meteorological variation.

B-2. GLOSSARY OF ACRONYMS AND ABBREVIATIONS.

BNOISE2	Blast Noise Impact Assessment
CDNL	C-weighted Day-Night Level
COA1	Course of Action 1
COA2	Course of Action 2
dB	Decibels
DMPTR	Digital Multi-Purpose Training Range
LUPZ	Land Use Planning Zone
NEPA	National Environmental Policy Act
PK15(met)	Unweighted Peak, 15 percent Metric
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine

APPENDIX C

NOISE ZONE DESCRIPTIONS

C-1. REFERENCE. U.S. Army, 2007, Army Regulation 200-1, Environmental Protection and Enhancement, Chapter 14 Operational Noise.

C-2. For a detailed explanation of Noise Zone Descriptions and Land Use Guidelines see Army Regulation 200-1, Chapter 14 (U.S. Army 2007).

C-3. Day Night Level (DNL). The DNL is used to describe the cumulative or total noise exposure during a prescribed time period. The DNL is the energy average noise level calculated with a 10 decibel penalty for operations occurring between 2200 and 0700.

C-4. The PK15(met) Noise Contour Description. The PK15(met) is the peak sound level, factoring in the statistical variations caused by weather, that is likely to be exceeded only 15 percent of the time (i.e., 85 percent certainty that sound will be within this range). This "85 percent solution" gives the installation and the community a means to consider the areas impacted by training noise without putting stipulations on land that would only receive high sound levels under infrequent weather conditions that greatly favor sound propagation. The PK15(met) does not take the duration or the number of events into consideration, so the size of the contours will remain the same regardless of the number of events.

C-5. Land Use Guidelines.

a. The Noise Zone III consists of the area around the noise source in which the level is greater than 70 decibels (dB) C-weighted day-night average sound level (CDNL) for large caliber weapons. Noise-sensitive land uses (such as housing, schools, and medical facilities) are not recommended within Noise Zone III.

b. The Noise Zone II consists of an area where the DNL is between 62 and 70 dB CDNL for large caliber weapons. Land within Noise Zone II should normally be limited to activities such as industrial, manufacturing, transportation, and resource production. However, if the community determines that land in Noise Zone II (attributable to small arms or aviation) areas must be used for residential purposes, then noise level reduction (NLR) features of 25 to 30 decibels should be incorporated into the design and construction of *new* buildings to mitigate noise levels. For large caliber weapons, NLR features can not adequately mitigate the low-frequency component of large caliber weapons noise.

c. The Noise Zone I includes all areas around a noise source in which the day-night sound level is less than 62 dB CDNL for large caliber weapons. This area is usually acceptable for all types of land use activities.

d. The Land Use Planning Zone (LUPZ) DNL noise contours (57 dB CDNL or 60 dB ADNL) represent an annual average that separates the Noise Zone II from the Noise Zone I. Taking all operations that occur over the year and dividing by the number of training days generates the contours. But, the noise environment varies daily and seasonally because operations are not consistent through all 365 days of the year. In addition, the Federal Interagency Committee on Urban Noise document states "Localities, when evaluating the application of these guidelines to specific situations, may have different concerns or goals to consider." For residential land uses, depending on attitudes and other factors, a 57 CDNL may be considered by the public as an impact on the community environment. In order to provide a planning tool that could be used to account for days of higher than average operations and possible annoyance, the LUPZ contour is being included on the noise contour maps.

e. See Table C-1 for land use guidelines.

TABLE C-1. Land Use Planning Guidelines.

Noise Zones	**Large-Caliber Weapons (CDNL)**
LUPZ	57 – 62
I	< 62
II	62 - 70
III	> 70

C-6. Complaint Risk Guidelines for Demolition Activity and Large Caliber Weapons.

a. The peak contours show the expected level that one would get on a sound level meter when a weapon was fired. Since weather conditions can cause noise levels to vary significantly from day to day (even from hour to hour) the programs calculate a range of peak levels. By plotting the PK15(met) contour, events would be expected to fall within the contours 85 percent of the time. This metric represents the best available scientific quantification for assessing the complaint risk of large caliber weapons ranges. The complaint risk areas for PK15(met) noise contours are defined as follows:

(1) The high risk of complaint consists of the area around the noise source in which PK15(met) is greater than 130 dB for large caliber weapons.

(2) The moderate risk of complaint area consists of where the PK15(met) noise contour is between 115 dB and 130 dB for large caliber weapons.

(3) The low risk of complaint area is where the PK15(met) noise level is less than 115 dB for large caliber weapons.

b. See Table C-2 for complaint risk guidelines.

TABLE C-2. Complaint Risk Guidelines.

Risk of Complaints	Large Caliber Weapons PK15(met) dB Noise Contour
Low	< 115
Moderate	115 - 130
High	> 130

APPENDIX D

FORT STEWART RANGE LOCATION MAPS

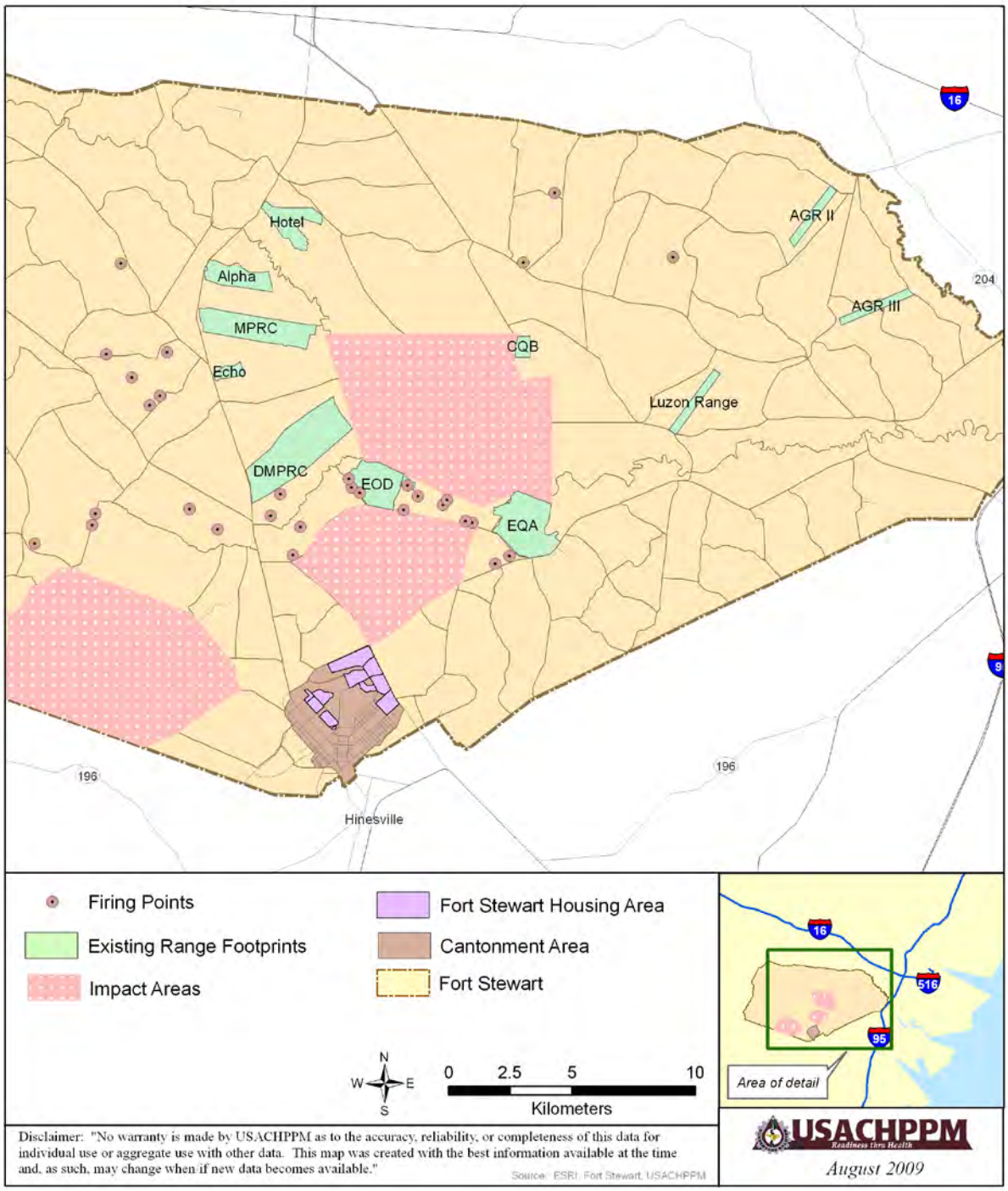

FIGURE D-1. FORT STEWART – EXISTING RANGE LOCATIONS

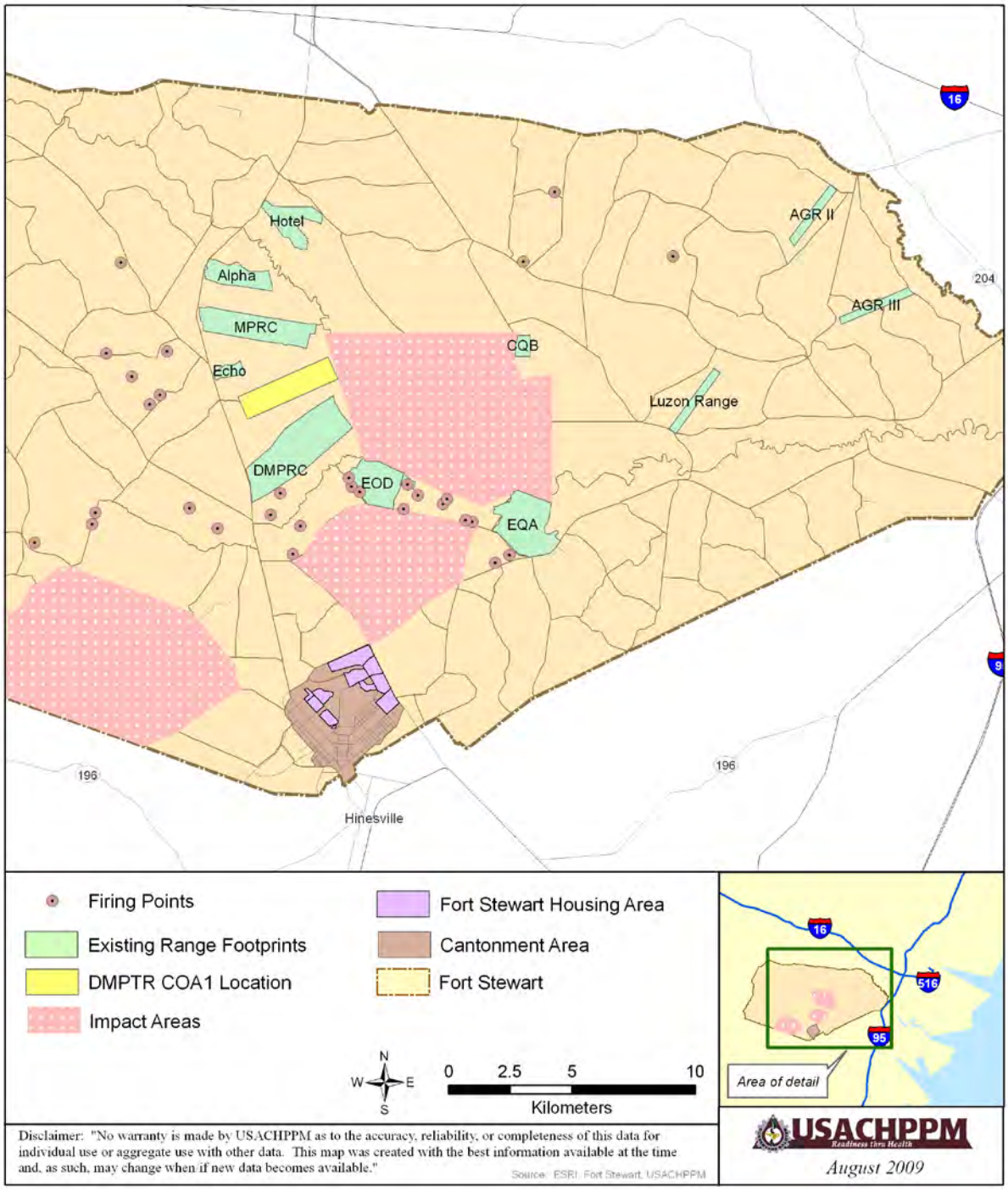

FIGURE D-2. FORT STEWART – COURSE OF ACTION 1 RANGE LOCATION

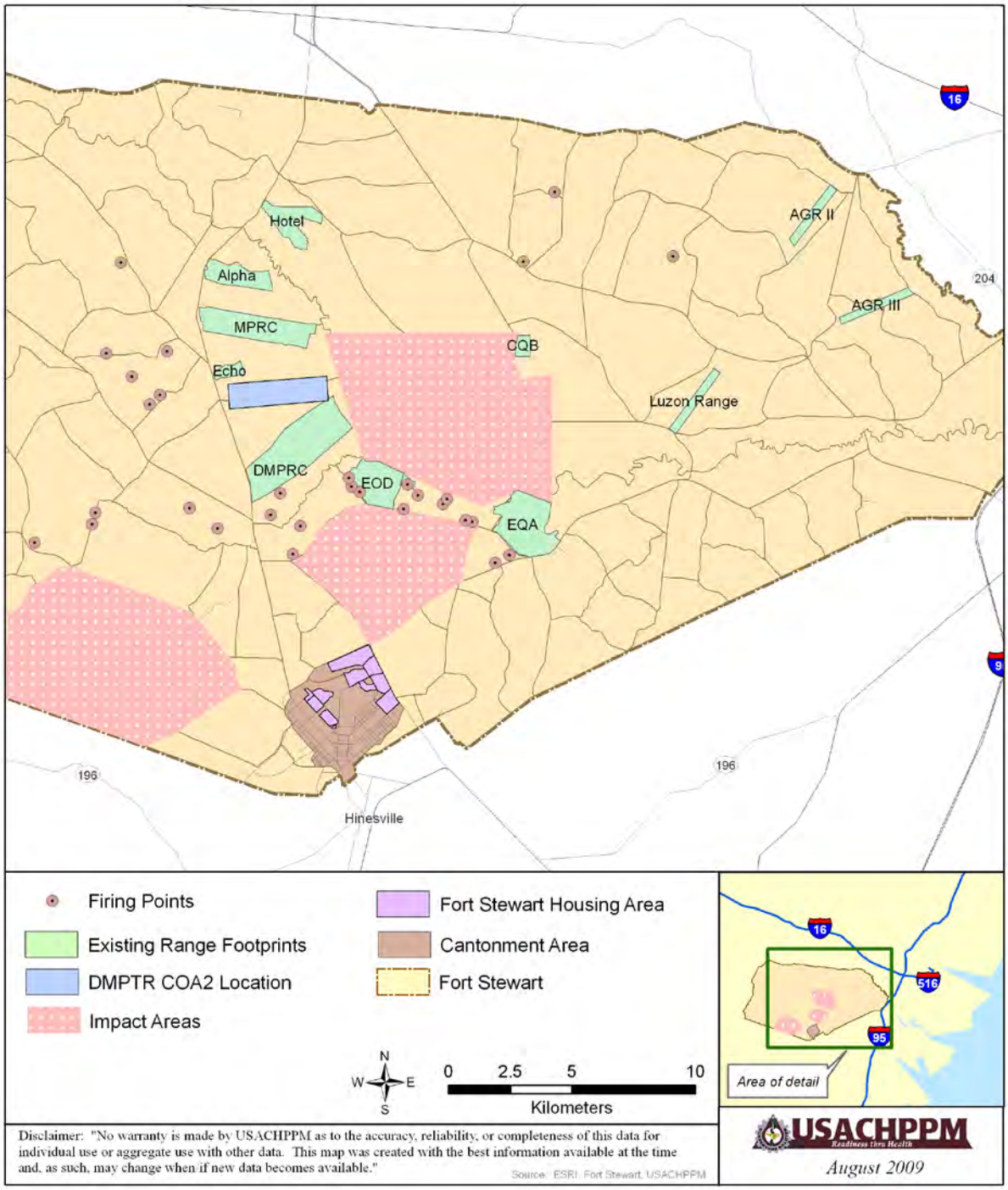

FIGURE D-3. FORT STEWART – COURSE OF ACTION 2 RANGE LOCATION

APPENDIX E

DEMOLITION AND LARGE CALIBER RANGE UTILIZATION

E-1. Table E-1 lists the ranges and type of weapons utilized to develop the existing demolition and large arms noise contours.

TABLE E-1. Fort Stewart – Existing Operating Environment – Demolition and Large Caliber Weapons Utilization.

Firing Location	Weapon and Ammunition Type	DayShots 0700-2200	NightShots 2200-0700
AGR 2	30mm Gun, HE	385	385
	30mm Gun, Inert	4,063	4,062
	40mm Grenade, HE (M129/L60)	211	0
	40mm Grenade, HE (M203)	40	0
	Rocket, AT-4, HE	9	0
	Rocket, RAAWS, HE	16	0
	Rocket, RAAWS, Inert	5	0
	Rocket, 2.75" - Hydra 70, HE	86	86
	Rocket, 2.75" - Hydra 70, Inert	37	36
	Demolition, Bangalore, M028	1	0
AGR 3	40mm Grenade, HE (M129/L60)	6	0
	40mm Grenade, HE (M203)	239	0
	40mm Grenade, HE (MK19)	11	0
	60mm Mortar, HE	20	19
	Rocket, AT-4, HE	6	0
	Rocket, RAAWS, HE	4	0
	Rocket, RAAWS, Inert	7	0
	Rocket, 2.75" - Hydra 70, Inert	6	0
HELLFIRE Z	Missile, Hellfire, HE	200	150
LUZON	20mm Gun, HE	409	409
	30mm Gun, HE	6	0
	40mm Grenade, HE (M129/L60)	710	0
	40mm Grenade, HE (M203)	3,891	0
	40mm Grenade, HE (MK19)	4,499	0
	60mm Mortar, HE	51	50
	Rocket, AT-4, HE	350	114
	Rocket, Dragon, HE	1	0
	Rocket, RAAWS, HE	46	0
	Rocket, RAAWS, Inert	8	0
	Rocket, 2.75" - Hydra 70, HE	8	0
	Missile, Javelin, HE	1	0
CQB	Demolition, C4 (1.25 lbs)	250	0

NOTE: Inert - any round that does not make noise upon impact, i.e. smoke, illum, TP-T, CPR.

TABLE E-1. Fort Stewart – Existing Operating Environment – Demolition and Large Caliber Weapons Utilization, cont'd.

Firing Location	Weapon and Ammunition Type	DayShots 0700-2200	NightShots 2200-0700
Demo Range	Demolition, Bangalore, M026	177	0
	Demolition, Bangalore, M028	97	0
	Demolition, Block C2 (0.5 lbs)	167	0
	Demolition, C2 (2 lbs)	1	0
	Demolition, C4 (1.25 lbs)	1,261	0
	Demolition, Cratering Charge (55 lbs)	40	0
	Demolition, HBX-1 (4.25 lbs)	5	0
	Demolition, PETN (2 lbs)	16	0
	Demolition, Shaped Charge (0.857 lb)	3	0
	Demolition, Shaped Charge (15 lbs)	12	0
	Demolition, Shaped Charge, (0.02 lb)	5	0
	Demolition, Shaped Charge, (0.07 lb)	1	0
	Demolition, Shaped Charge, (0.1287 lb)	3	0
	Demolition, Sheet (0.875 lb)	12	0
	Demolition, Sheet 19 ft (1 lb per ft)	10	0
	Demolition, Sheet 25 ft (0.8 lb per ft)	13	0
	Demolition, Sheet 38 ft (0.5 lb per ft)	4	0
	Demolition, TNT (1 lb)	88	0
	Mine, Anti-tank Heavy, M19	4	0
Road Crater Site	Demolition, Cratering Charge (40 lbs)	26	0
	Demolition, Cratering Charge (56 lbs)	1	0
	Demolition, Shaped Charge (40 lbs)	268	0
Steel Cutting Bunker	Demolition, C4 (1.25 lbs)	150	0
FP-1	155mm Howitzer, HE	166	166
	155mm Howitzer, Inert	24	24
FP-2	155mm Howitzer, HE	210	209
	155mm Howitzer, Inert	30	30
FP-3	155mm Howitzer, HE	166	166
	155mm Howitzer, Inert	24	24
FP-5	155mm Howitzer, HE	208	207
	155mm Howitzer, Inert	30	30
FP-13	155mm Howitzer, HE	83	83
	155mm Howitzer, Inert	12	12
FP-17	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-19	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-20	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6

NOTE: Inert - any round that does not make noise upon impact, i.e. smoke, illum, TP-T, CPR

TABLE E-1. Fort Stewart – Existing Operating Environment – Demolition and Large Caliber Weapons Utilization cont'd.

Firing Location	Weapon and Ammunition Type	DayShots 0700-2200	NightShots 2200-0700
FP-24	155mm Howitzer, HE	249	249
	155mm Howitzer, Inert	36	36
FP-29	155mm Howitzer, HE	457	456
	155mm Howitzer, Inert	66	66
FP-30	155mm Howitzer, HE	747	747
	155mm Howitzer, Inert	108	108
FP-35	155mm Howitzer, HE	291	290
	155mm Howitzer, Inert	42	42
FP-40	155mm Howitzer, HE	291	290
	155mm Howitzer, Inert	42	42
FP-41	155mm Howitzer, HE	249	249
	155mm Howitzer, Inert	36	36
FP-101	105mm Howitzer, HE	67	67
	105mm Howitzer, Inert	2	4
	155mm Howitzer, HE	166	166
	155mm Howitzer, Inert	24	24
FP-106	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-107	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-141	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-143	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-145	155mm Howitzer, HE	145	124
	155mm Howitzer, Inert	18	18
FP-212	155mm Howitzer, HE	125	124
	155mm Howitzer, Inert	18	18
FP-213	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-255	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-256	155mm Howitzer, HE	291	290
	155mm Howitzer, Inert	42	42
FP-310	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-318	155mm Howitzer, HE	83	83
	155mm Howitzer, Inert	12	12

NOTE: Inert - any round that does not make noise upon impact, i.e. smoke, illum, TP-T, CPR

TABLE E-1. Fort Stewart – Existing Operating Environment – Demolition and Large Caliber Weapons Utilization, cont'd.

Firing Location	Weapon and Ammunition Type	DayShots 0700-2200	NightShots 2200-0700
MP-1	60mm Mortar, HE	33	32
	60mm Mortar, Inert	2	2
	81mm Mortar, HE	307	306
	81mm Mortar, Inert	180	180
	120mm Mortar Inert	152	152
	120mm Mortar, HE	237	236
	120mm Tank, Inert	17	16
MP-2	81mm Mortar, HE	307	306
	81mm Mortar, Inert	180	180
	120mm Mortar Inert	152	152
	120mm Mortar, HE	237	236
MP-3	60mm Mortar, HE	422	421
	60mm Mortar, Inert	50	49
	81mm Mortar, HE	307	306
	81mm Mortar, Inert	180	180
	120mm Mortar Inert	152	152
	120mm Mortar, HE	237	236
OP-1	120mm Tank, Inert	27	0
	155mm Howitzer, HE	2	0
OP-4	155mm Howitzer, HE	26	0
	40mm Grenade, HE (MK19)	84	0
	Hand Grenade, Fragmentation	18	0
	Mine, Claymore, M18A1	8	0
	Missile, TOW, HE	16	0
	Rocket, Dragon, HE	2	0
	Rocket, RAAWS, Inert	6	0
AIA	Bomb, 500 lb (MK82)	20	0
Red Cloud - Alpha	120mm Tank, Inert	205	204
	25mm Gun, Inert	326	326
Red Cloud - Echo	25mm Gun, Inert	104	103
Red Cloud - Hotel	120mm Tank, Inert	521	520
	25mm Gun, Inert	1,227	1,227
Red Cloud - MPRC	120mm Tank, Inert	723	722
	25mm Gun, Inert	13,538	13,537
	30mm Gun, Inert	3,360	3,360
	Hand Grenade, Fragmentation	1	0
	Mine, Claymore, M18A1	1	0
	Rocket, RAAWS, Inert	12	2
Red Cloud - DMPRC	120mm Tank, Inert	1,740	1,740

NOTE: Inert - any round that does not make noise upon impact, i.e. smoke, illum, TP-T, CPR

E-2. Table E-2 lists the ranges and type of weapons utilized to develop the projected demolition and large caliber noise contours. The projected operating environment is cumulative and therefore includes the existing activity and the projected activity as appropriate. Only one table of projected utilization is shown as the difference between the Course of Action 1 (COA1) and Course of Action 2 (COA2) projected operating environment is the location and orientation of the DMPTR.

TABLE E-2. Fort Stewart – Projected Operating Environment – Demolition and Large Caliber Weapons Utilization.

Firing Location	Weapon and Ammunition Type	DayShots 0700-2200	NightShots 2200-0700
AGR 2	30mm Gun, HE	385	385
	30mm Gun, Inert	4,063	4,062
	40mm Grenade, HE (M129/L60)	211	0
	40mm Grenade, HE (M203)	40	0
	Rocket, AT-4, HE	9	0
	Rocket, RAAWS, HE	16	0
	Rocket, RAAWS, Inert	5	0
	Rocket, 2.75" - Hydra 70, HE	86	86
	Rocket, 2.75" - Hydra 70, Inert	37	36
	Demolition, Bangalore, M028	1	0
AGR 3	40mm Grenade, HE (M129/L60)	6	0
	40mm Grenade, HE (M203)	239	0
	40mm Grenade, HE (MK19)	11	0
	60mm Mortar, HE	20	19
	Rocket, AT-4, HE	6	0
	Rocket, RAAWS, HE	4	0
	Rocket, RAAWS, Inert	7	0
	Rocket, 2.75" - Hydra 70, Inert	6	0
HELLFIRE Z	Missile, Hellfire, HE	200	150
LUZON	20mm Gun, HE	409	409
	30mm Gun, HE	6	0
	40mm Grenade, HE (M129/L60)	710	0
	40mm Grenade, HE (M203)	3,891	0
	40mm Grenade, HE (MK19)	4,499	0
	60mm Mortar, HE	51	50
	Rocket, AT-4, HE	350	114
	Rocket, Dragon, HE	1	0
	Rocket, RAAWS, HE	46	0
	Rocket, RAAWS, Inert	8	0
	Rocket, 2.75" - Hydra 70, HE	8	0
	Missile, Javelin, HE	1	0
CQB	Demolition, C4 (1.25 lbs)	250	0

NOTE: Inert - any round that does not make noise upon impact, i.e. smoke, illum, TP-T, CPR

TABLE E-2. Fort Stewart – Projected Operating Environment – Demolition and Large Caliber Weapons Utilization, cont'd.

Firing Location	Weapon and Ammunition Type	DayShots 0700-2200	NightShots 2200-0700
Demo Range	Demolition, Bangalore, M026	177	0
	Demolition, Bangalore, M028	97	0
	Demolition, Block C2 (0.5 lbs)	167	0
	Demolition, C2 (2 lbs)	1	0
	Demolition, C4 (1.25 lbs)	1,261	0
	Demolition, Cratering Charge (55 lbs)	40	0
	Demolition, HBX-1 (4.25 lbs)	5	0
	Demolition, PETN (2 lbs)	16	0
	Demolition, Shaped Charge (0.857 lb)	3	0
	Demolition, Shaped Charge (15 lbs)	12	0
	Demolition, Shaped Charge, (0.02 lb)	5	0
	Demolition, Shaped Charge, (0.07 lb)	1	0
	Demolition, Shaped Charge, (0.1287 lb)	3	0
	Demolition, Sheet (0.875 lb)	12	0
	Demolition, Sheet 19 ft (1 lb per ft)	10	0
	Demolition, Sheet 25 ft (0.8 lb per ft)	13	0
	Demolition, Sheet 38 ft (0.5 lb per ft)	4	0
	Demolition, TNT (1 lb)	88	0
	Mine, Anti-tank Heavy, M19	4	0
Road Crater Site	Demolition, Cratering Charge (40 lbs)	26	0
	Demolition, Cratering Charge (56 lbs)	1	0
	Demolition, Shaped Charge (40 lbs)	268	0
Steel Cutting Bunker	Demolition, C4 (1.25 lbs)	150	0
FP-1	155mm Howitzer, HE	166	166
	155mm Howitzer, Inert	24	24
FP-2	155mm Howitzer, HE	210	209
	155mm Howitzer, Inert	30	30
FP-3	155mm Howitzer, HE	166	166
	155mm Howitzer, Inert	24	24
FP-5	155mm Howitzer, HE	208	207
	155mm Howitzer, Inert	30	30
FP-13	155mm Howitzer, HE	83	83
	155mm Howitzer, Inert	12	12
FP-17	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-19	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-20	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6

NOTE: Inert - any round that does not make noise upon impact, i.e. smoke, illum, TP-T, CPR

TABLE E-2. Fort Stewart – Projected Operating Environment – Demolition and Large Caliber Weapons Utilization, cont'd.

Firing Location	Weapon and Ammunition Type	DayShots 0700-2200	NightShots 2200-0700
FP-24	155mm Howitzer, HE	249	249
	155mm Howitzer, Inert	36	36
FP-29	155mm Howitzer, HE	457	456
	155mm Howitzer, Inert	66	66
FP-30	155mm Howitzer, HE	747	747
	155mm Howitzer, Inert	108	108
FP-35	155mm Howitzer, HE	291	290
	155mm Howitzer, Inert	42	42
FP-40	155mm Howitzer, HE	291	290
	155mm Howitzer, Inert	42	42
FP-41	155mm Howitzer, HE	249	249
	155mm Howitzer, Inert	36	36
FP-101	105mm Howitzer, HE	67	67
	105mm Howitzer, Inert	2	4
	155mm Howitzer, HE	166	166
	155mm Howitzer, Inert	24	24
FP-106	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-107	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-141	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-143	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-145	155mm Howitzer, HE	145	124
	155mm Howitzer, Inert	18	18
FP-212	155mm Howitzer, HE	125	124
	155mm Howitzer, Inert	18	18
FP-213	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-255	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-256	155mm Howitzer, HE	291	290
	155mm Howitzer, Inert	42	42
FP-310	155mm Howitzer, HE	42	41
	155mm Howitzer, Inert	6	6
FP-318	155mm Howitzer, HE	83	83
	155mm Howitzer, Inert	12	12

NOTE: Inert - any round that does not make noise upon impact, i.e. smoke, illum, TP-T, CFR

TABLE E-2. Fort Stewart – Projected Operating Environment – Demolition and Large Caliber Weapons Utilization, cont'd.

Firing Location	Weapon and Ammunition Type	DayShots 0700-2200	NightShots 2200-0700
MP-1	60mm Mortar, HE	33	32
	60mm Mortar, Inert	2	2
	81mm Mortar, HE	307	306
	81mm Mortar, Inert	180	180
	120mm Mortar Inert	152	152
	120mm Mortar, HE	237	236
	120mm Tank, Inert	17	16
MP-2	81mm Mortar, HE	307	306
	81mm Mortar, Inert	180	180
	120mm Mortar Inert	152	152
	120mm Mortar, HE	237	236
MP-3	60mm Mortar, HE	422	421
	60mm Mortar, Inert	50	49
	81mm Mortar, HE	307	306
	81mm Mortar, Inert	180	180
	120mm Mortar Inert	152	152
	120mm Mortar, HE	237	236
OP-1	120mm Tank, Inert	27	0
	155mm Howitzer, HE	2	0
OP-4	155mm Howitzer, HE	26	0
	40mm Grenade, HE (MK19)	84	0
	Hand Grenade, Fragmentation	18	0
	Mine, Claymore, M18A1	8	0
	Missile, TOW, HE	16	0
	Rocket, Dragon, HE	2	0
	Rocket, RAAWS, Inert	6	0
AIA	Bomb, 500 lb (MK82)	20	0
Red Cloud - Alpha	120mm Tank, Inert	205	204
	25mm Gun, Inert	326	326
Red Cloud - Echo	25mm Gun, Inert	104	103
Red Cloud - Hotel	120mm Tank, Inert	521	520
	25mm Gun, Inert	1,227	1,227
Red Cloud - MPRC	120mm Tank, Inert	723	722
	25mm Gun, Inert	13,538	13,537
	30mm Gun, Inert	3,360	3,360
	Hand Grenade, Fragmentation	1	0
	Mine, Claymore, M18A1	1	0
	Rocket, RAAWS, Inert	12	2
Red Cloud - DMPRC	120mm Tank, Inert	1,740	1,740

NOTE: Inert - any round that does not make noise upon impact, i.e. smoke, illum, TP-T, CPR

TABLE E-2. Fort Stewart – Projected Operating Environment – Demolition and Large Caliber Weapons Utilization, cont'd.

Firing Location	Weapon and Ammunition Type	DayShots 0700-2200	NightShots 2200-0700
Red Cloud - Proposed	120mm Tank, Inert	5,068	5,068
DMPTR ^	25mm Gun, Inert	186,666	186,666

NOTE: Inert - any round that does not make noise upon impact, i.e. smoke, illum, TP-T, CPR.

^ New activity under projected operating environments COA1 and COA2.

DEPARTMENT OF THE ARMY
US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-EON

27 JUL 2009

MEMORANDUM FOR Environmental Office (IMSE-STW-PWE/Ms. Amber Franks), Directorate of Public Works, 1550 Frank Cochran Drive, Fort Stewart, GA 31314-4928

SUBJECT: Operational Noise Consultation, No. 52-ON-0BY6-09, Operational Noise Contours for Fort Stewart, GA, July 2009

1. We are enclosing 2 copies of the consultation.

2. Please contact us if this consultation or any of our services did not meet your needs or expectations.

3. The point of contact is Ms. Kristy Broska, Environmental Protection Specialist or Ms. Catherine Stewart, Program Manager, Operational Noise, USACHPPM, at DSN 584-3829, Commercial (410) 436-3829, or email: kristy.broska@us.army.mil or catherine.stewart@us.army.mil.

FOR THE COMMANDER:

Encl

DONALD F. ARCHIBALD
COL, MS
Director, Environmental Health Engineering

CF:
AEC, IMAE-TSP (Ms. Booher)

U.S. Army Center for Health Promotion and Preventive Medicine

USCHPPM

OPERATIONAL NOISE CONSULTATION
NO. 52-ON-0BY6-09
OPERATIONAL NOISE CONTOURS
FORT STEWART, GEORGIA
JULY 2009

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EXECUTIVE SUMMARY
OPERATIONAL NOISE CONSULTATION
NO. 52-ON-0BY6-09
OPERATIONAL NOISE CONTOURS
FORT STEWART, GEORGIA
JULY 2009

1. PURPOSE. To provide Fort Stewart noise contours for the projected range facilities.

2. CONCLUSIONS.

a. The existing small caliber ranges generate Noise Zone II contours that extend slightly beyond the northern and southern boundaries. There are small clusters of residential areas within these Noise Zone II contours. The existing small caliber ranges generate a Noise Zone II contour that extends into the Fort Stewart housing area.

b. The proposed small caliber ranges generate Noise Zone II contours that extend slightly beyond the northern and southern boundaries. There are small clusters of residential areas within these Noise Zone II contours. The proposed Course of Action 1 (COA1) Convoy Live Fire (CLFX) facility and the Course of Action 2 (COA2) Fire and Movement (FM) facility generate a Noise Zone III contour that extends slightly beyond the northern boundary. However, there are no noise sensitive land uses within the noise contour.

3. RECOMMENDATIONS. Include the information from this consultation in the appropriate Fort Stewart National Environmental Policy Act (NEPA) documentation.

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OPERATIONAL NOISE CONSULTATION
NO. 52-ON-0BY6-09
OPERATIONAL NOISE CONTOURS
FORT STEWART, GEORGIA
JULY 2009

1. REFERENCES. A list of the references used in this consultation is in Appendix A. A glossary of terms and abbreviations used are in Appendix B. Appendix C contains the Noise Zone Descriptions and Land Use Guidelines used in this consultation.

2. AUTHORITY. This consultation was funded by the Army Environmental Command, Aberdeen Proving Ground, MD.

3. PURPOSE. To provide Fort Stewart noise contours for the projected range facilities. Appendix D contains the range location maps.

a. The Course of Action 1 (COA1) projected operating environment includes:

(1) Projected Facilities – Northern Fort Stewart:

- Fiscal Year (FY) 14 Convoy Live Fire (CLFX)
- FY13 Fire and Movement (FM) Range
- FY11 Infantry Platoon Battle Course (IPBC)

(2) Projected Facilities – Central Fort Stewart:

- FY13 Infantry Squad Battle Course (ISBC)
- FY11 Modified Record Fire (MRF) Range

(3) Projected Facilities – Southern Fort Stewart:

- FY13 25 Meter Zero Range
- FY13 Known Distance (KD) Range
- FY13 MRF Range
- FY11 Multi-Purpose Machine Gun (MPMG) Range
- FY13 Qualification Training (QTR) Range

b. The Course of Action 2 (COA2) projected operating environment includes:

(1) Projected Facilities – Northern Fort Stewart:

- FY14 CLFX
- FY13 FM Range
- FY11 IPBC
- FY13 KD Range

(2) Projected Facilities – Central Fort Stewart:

- FY13 ISBC
- FY11 MRF Range

(3) Projected Facilities – Southern Fort Stewart:

- FY13 25 Meter Zero Range
- FY13 MPMG Range
- FY13 MRF Range
- FY13 QTR Range

4. SMALL CALIBER WEAPONS OPERATIONS.

a. General.

(1) The noise simulation program used to assess small caliber weapons (.50 caliber and below) noise is the Small Arms Range Noise Assessment Model (SARNAM) (U.S. Army 2003). The SARNAM program requires operational data concerning types of weapons fired from each range, firing points, distance to targets, berms, and safety baffles.

(2) The contours for small arms operations at Fort Stewart were created using PK15(met) as prescribed in Army Regulation (AR) 200-1 (U.S. Army 2007). The contours show the predicted peak levels for individual rounds (metric term is PK15(met)). Since the contours are based on peak levels rather than a cumulative or average level, the size of the contours will not change if the number of rounds fired increases.

(3) The inputs used to generate the small caliber noise contours for this consultation were created using the data summarized in Appendix E. Due to the location of several of the existing ranges that utilize small caliber weapons, only those existing ranges that had to potential to impact noise sensitive land uses were analyzed.

b. Existing Operating Environment.

(1) Figures 1 - 3 contain the small caliber weapons contours for the existing operating environment. These contours were developed using the existing operating environment tables (Tables E-1 – E-3) in Appendix E.

(2) The Zone II [PK15(met) 87 dB] noise contour extends less than 1,000 meters beyond the northeastern boundary towards Fort Argyle and Old River Roads. The Zone II [PK15(met) 87 dB] noise contour extends approximately 700 meters into the Fort Stewart Bryan Village North and Liberty Woods housing areas. The Zone II [PK15(met) 87 dB] noise contour extends approximately 1,300 meters beyond the southern boundary towards State Highway 196. The Zone III [PK15(met) 104 dB] noise contours do not extend beyond the boundary or into the Fort Stewart housing area.

c. Projected Operating Environments.

(1) Proposed COA1 Facilities.

(a) Figures 4 – 6 contain the small caliber weapons contours for the COA1 projected operating environment. These contours were developed using the projected operating environment COA1 tables (Table E-4 – E-6) in Appendix E.

(b) The COA1 projected operating environment creates a Zone II [PK15(met) 87 dB] noise contour that extends less than 1,000 meters beyond the northern boundary. The Zone II [PK15(met) 87 dB] noise contour extends less than 1,000 meters beyond the northeastern boundary towards Fort Argyle and Old River Roads. The Zone II [PK15(met) 87 dB] noise contour extends approximately 700 meters into the Fort Stewart Bryan Village North and Liberty Woods housing areas. The Zone II [PK15(met) 87 dB] noise contour extends approximately 1,300 meters beyond the southern boundary towards State Highway 196. The COA1 projected operating environment creates a Zone III [PK15(met) 104 dB] noise contour that extends approximately 50 meters beyond the northern boundary.

(c) The proposed COA1 facilities in the northern area of Fort Stewart create a new Noise Zone II contour that extends slightly beyond the northern boundary. The proposed COA1 facilities in the central area of Fort Stewart do not change the noise contours in the Bryan Village North and Liberty Woods housing areas. The proposed COA1 facilities in the southern area of Fort Stewart create slight changes to the Noise Zone II contour that extends beyond the southern boundary. The proposed COA1 CLFX facility in the northern area of Fort Stewart creates a Noise Zone III contour that extends slightly beyond the northern boundary.

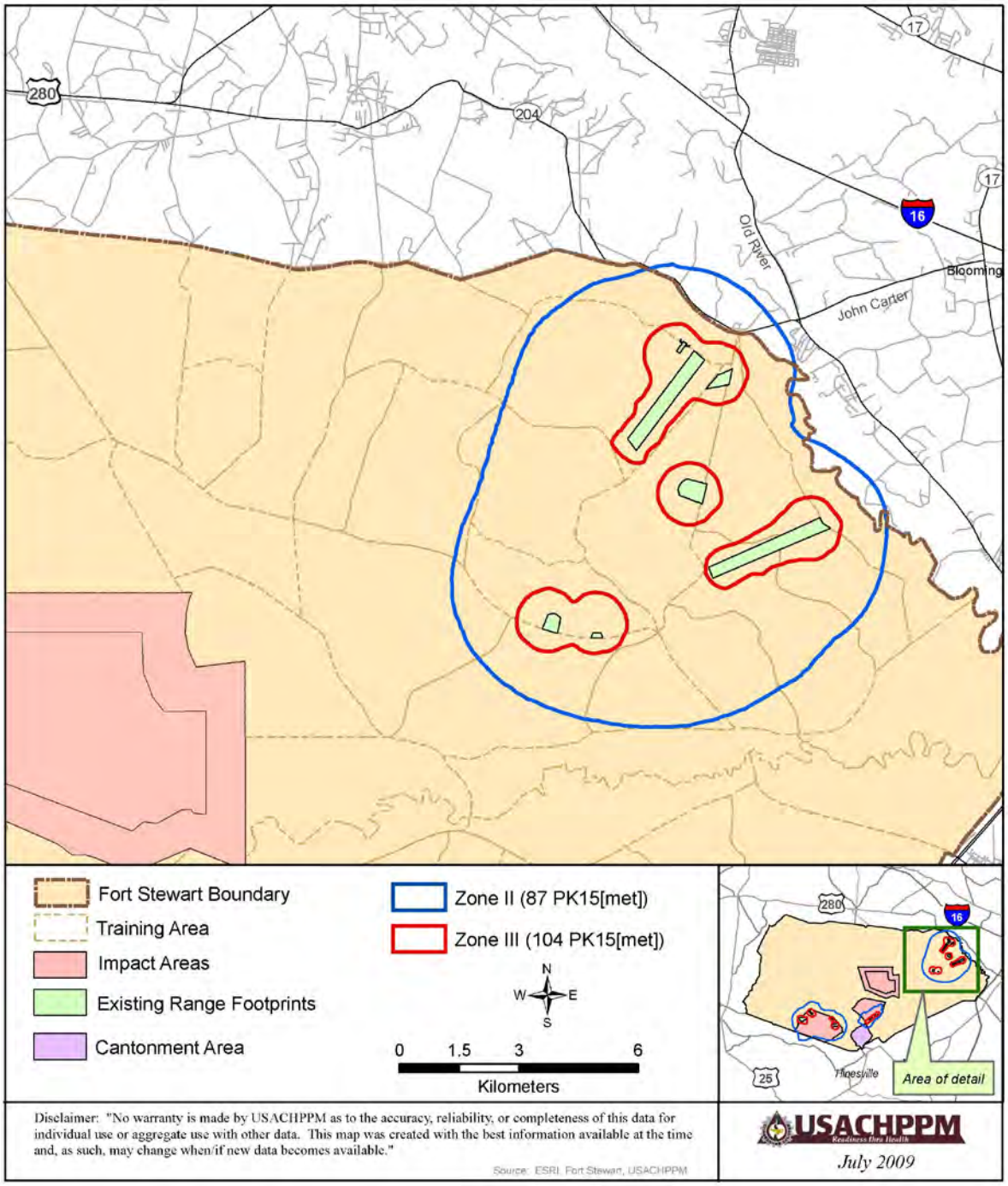

FIGURE 1. FORT STEWART – NORTHERN AREA
EXISTING OPERATING ENVIRONMENT SMALL CALIBER NOISE CONTOURS

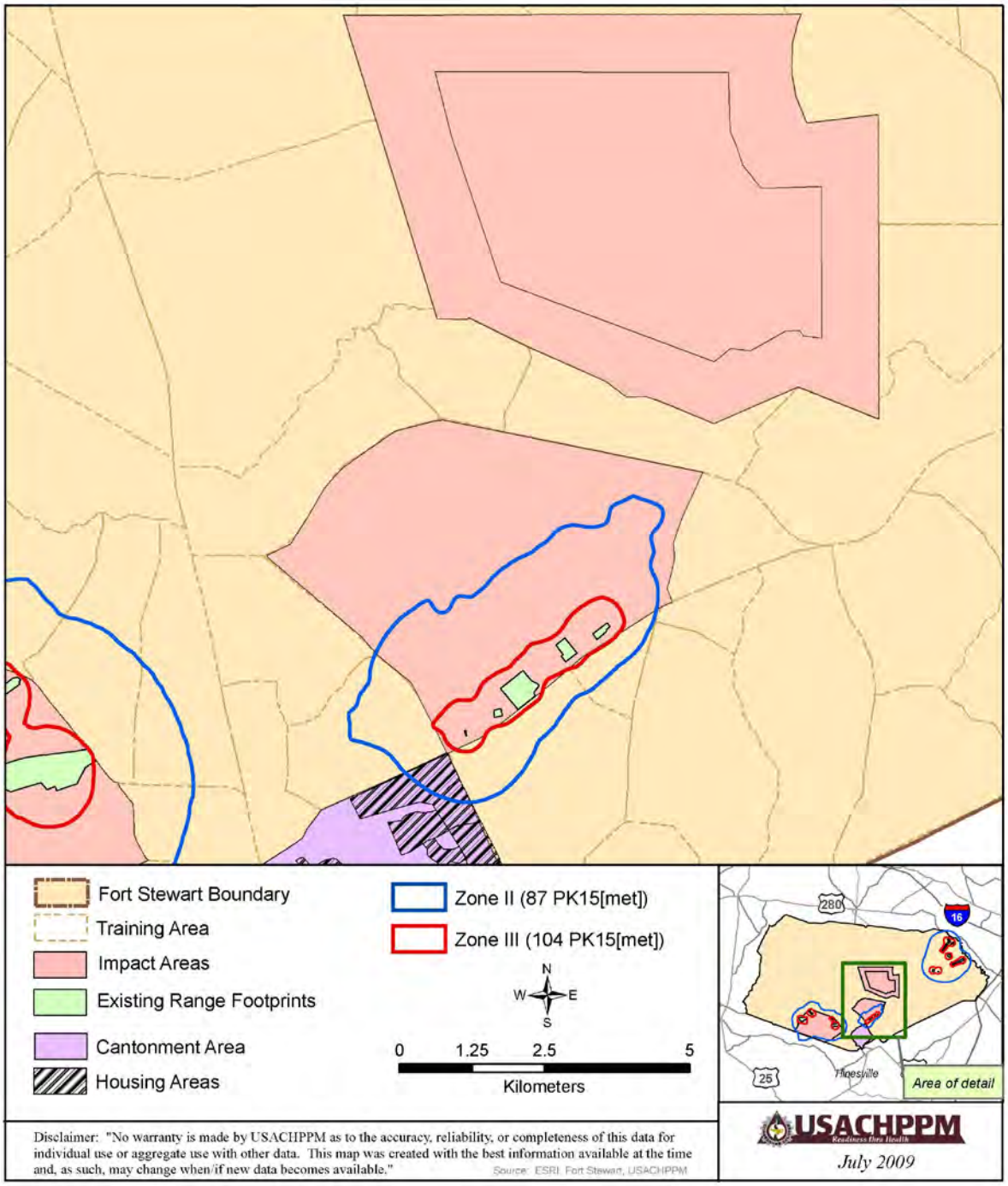

FIGURE 2. FORT STEWART – CENTRAL AREA
EXISTING OPERATING ENVIRONMENT SMALL CALIBER NOISE CONTOURS

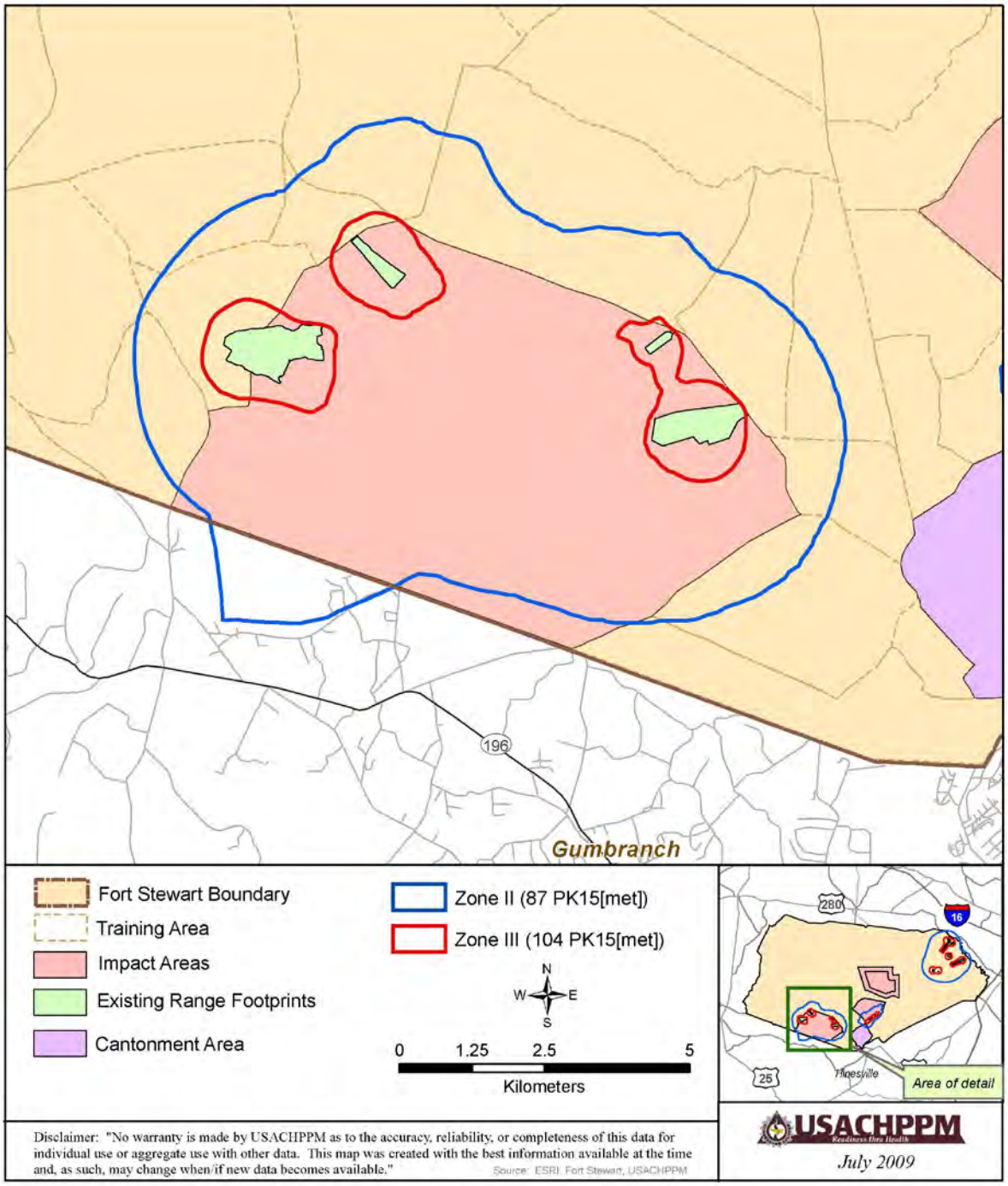

FIGURE 3. FORT STEWART – SOUTHERN AREA
EXISTING OPERATING ENVIRONMENT SMALL CALIBER NOISE CONTOURS

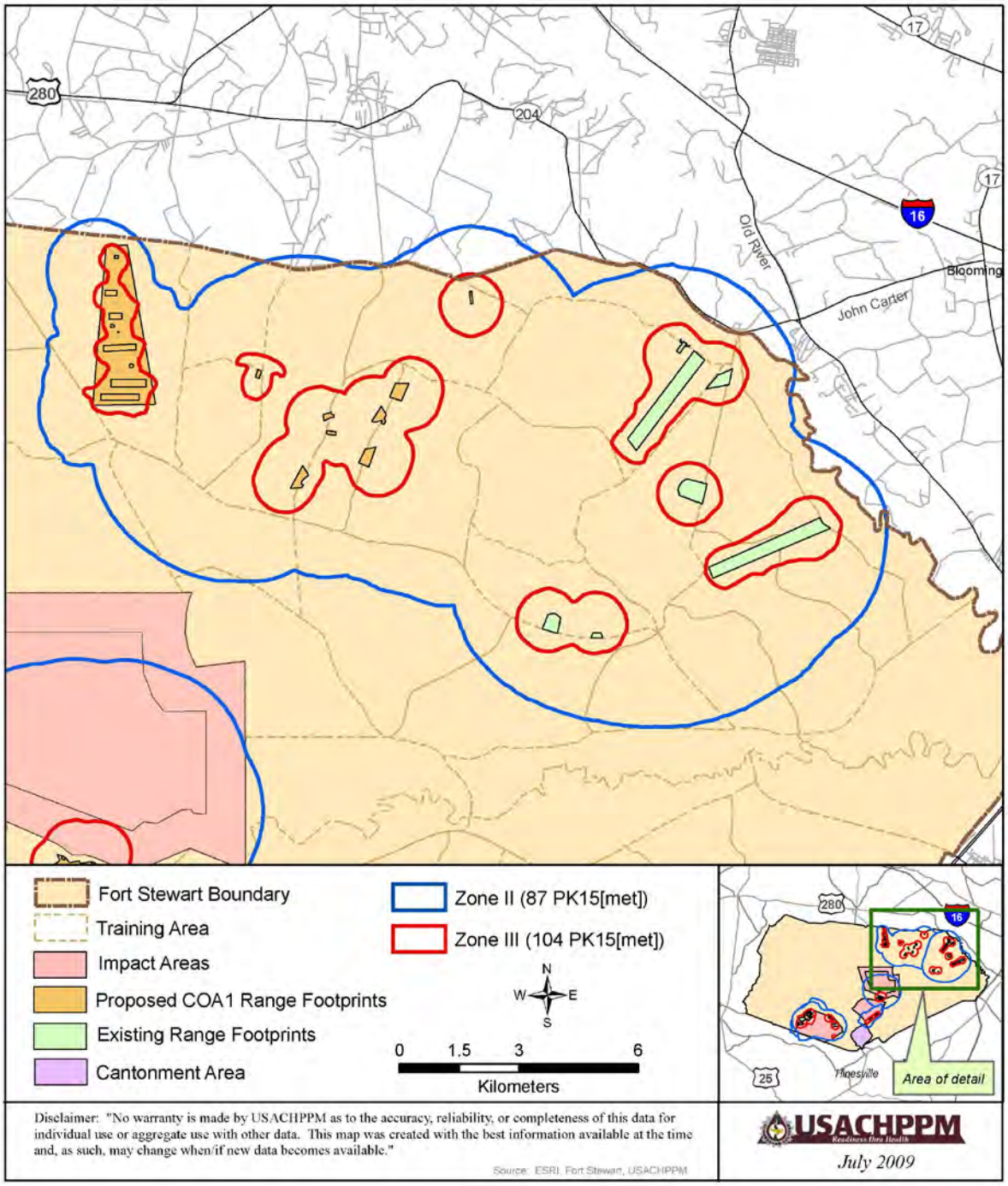

FIGURE 4. FORT STEWART – NORTHERN AREA
PROJECTED OPERATING ENVIRONMENT COURSE OF ACTION 1
SMALL CALIBER NOISE CONTOURS

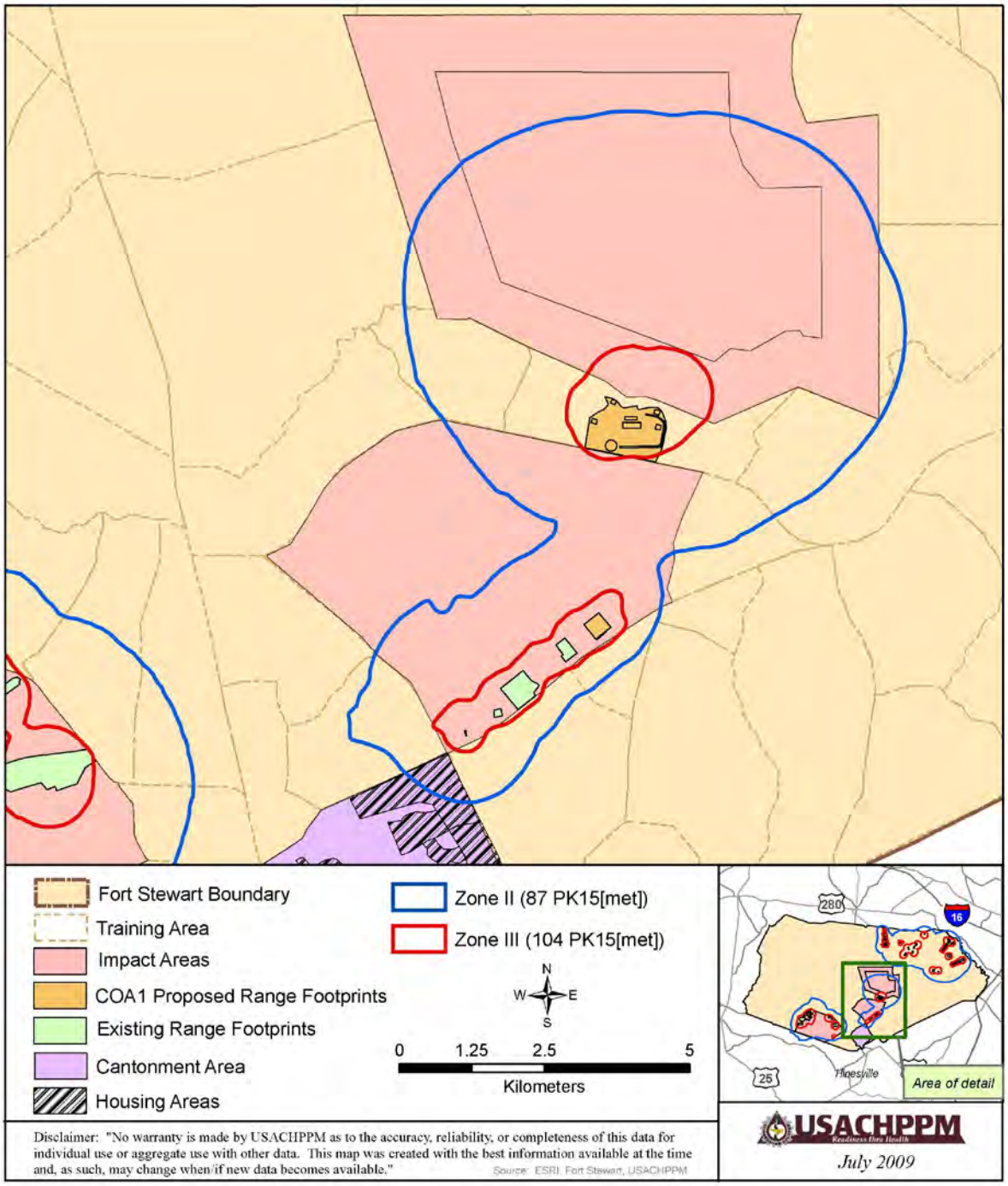

FIGURE 5. FORT STEWART – CENTRAL AREA
PROJECTED OPERATING ENVIRONMENT COURSE OF ACTION 1
SMALL CALIBER NOISE CONTOURS

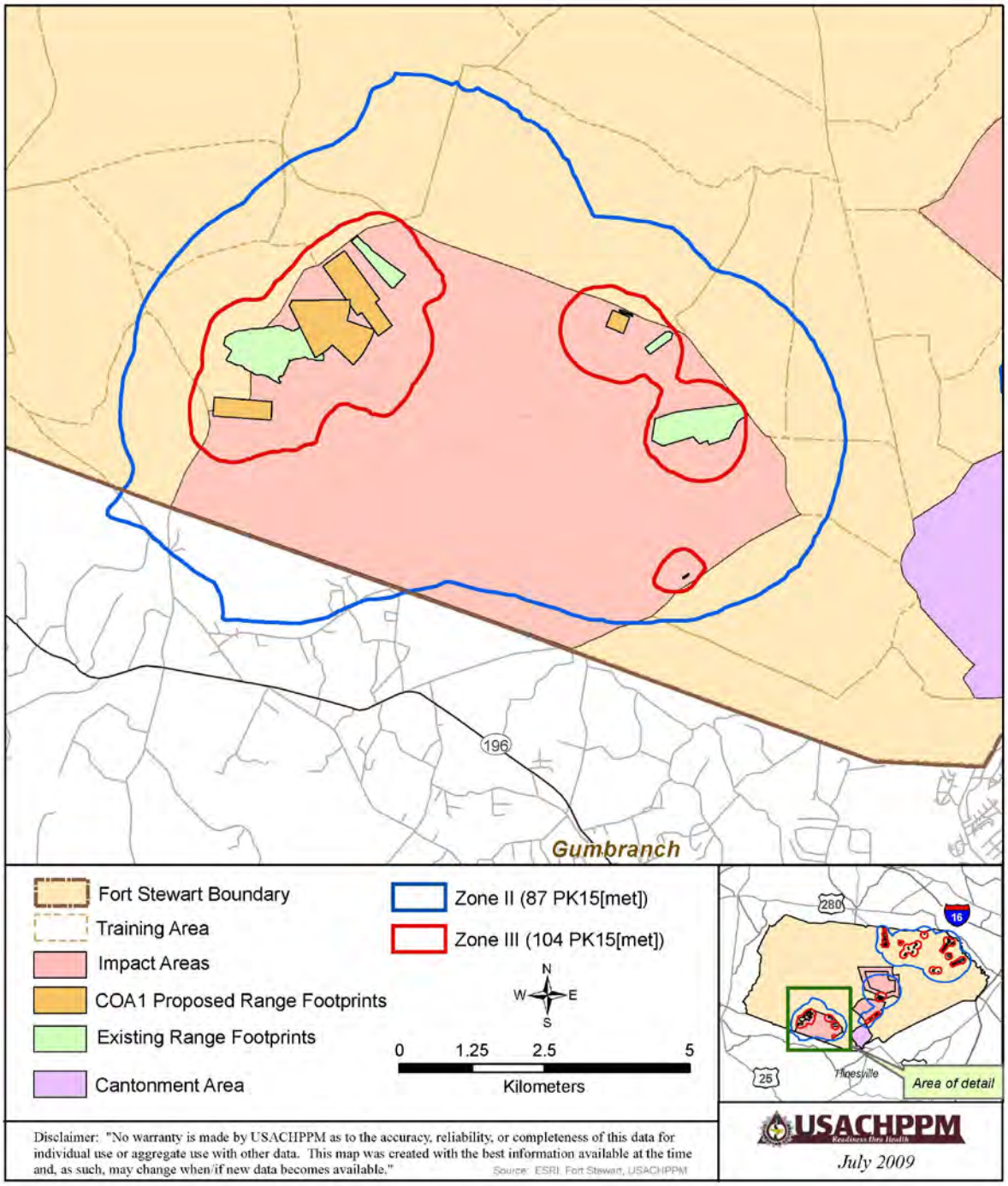

FIGURE 6. FORT STEWART – SOUTHERN AREA
PROJECTED OPERATING ENVIRONMENT COURSE OF ACTION 1
SMALL CALIBER NOISE CONTOURS

(2) Proposed COA2 Facilities.

(a) Figures 7 – 9 contain the small caliber weapons contours for the COA2 projected operating environment. These contours were developed using the projected operating environment COA2 tables (Table E-7 – E-9) in Appendix E.

(b) The COA2 projected operating environment creates a Zone II [PK15(met) 87 dB] noise contour that extends less than 1,000 meters beyond the northern boundary. The Zone II [PK15(met) 87 dB] noise contour extends less than 1,000 meters beyond the northeastern boundary towards Fort Argyle and Old River Roads. The Zone II [PK15(met) 87 dB] noise contour extends approximately 700 meters into the Fort Stewart Bryan Village North and Liberty Woods housing areas. The Zone II [PK15(met) 87 dB] noise contour extends approximately 2,300 meters beyond the southern boundary towards State Highway 196. The COA2 projected operating environment creates a Zone III [PK15(met) 104 dB] noise contour that extends approximately 50 meters beyond the northern boundary.

(c) The proposed COA2 facilities in the northern area of Fort Stewart create a new Noise Zone II contour that extends slightly beyond the northern boundary. The proposed COA2 facilities in the central area of Fort Stewart do not change the noise contours in the Bryan Village North and Liberty Woods housing areas. The proposed COA2 facilities in the southern area of Fort Stewart create changes to the Noise Zone II contour that extends beyond the southern boundary. The proposed COA2 FM facility in the northern area of Fort Stewart creates a Noise Zone III contour that extends slightly beyond the northern boundary.

d. Land Use Compatibility.

(1) Per AR 200-1, noise sensitive land uses, such as housing, schools, and medical facilities are acceptable within the Noise Zone I, normally not recommended in Noise Zone II, and not recommended in Noise Zone III (U.S. Army 2007). Land use surrounding Fort Stewart varies from undeveloped to residential.

(2) The existing small caliber ranges generate a Noise Zone II contours that extend slightly beyond the northern and southern boundaries. There are small clusters of residential areas within these Noise Zone II contours. The existing small caliber ranges generate a Noise Zone II contour that extends into the Fort Stewart housing area.

(3) The proposed small caliber ranges generate Noise Zone II contours that extend slightly beyond the northern and southern boundaries. There are small clusters of residential areas within these Noise Zone II contours. The proposed COA1 CLFX facility and the COA2 FM facility in the northern area of Fort Stewart generate a Noise Zone III contour that extends slightly beyond the northern boundary. However, there are no noise sensitive land uses within the noise contour.

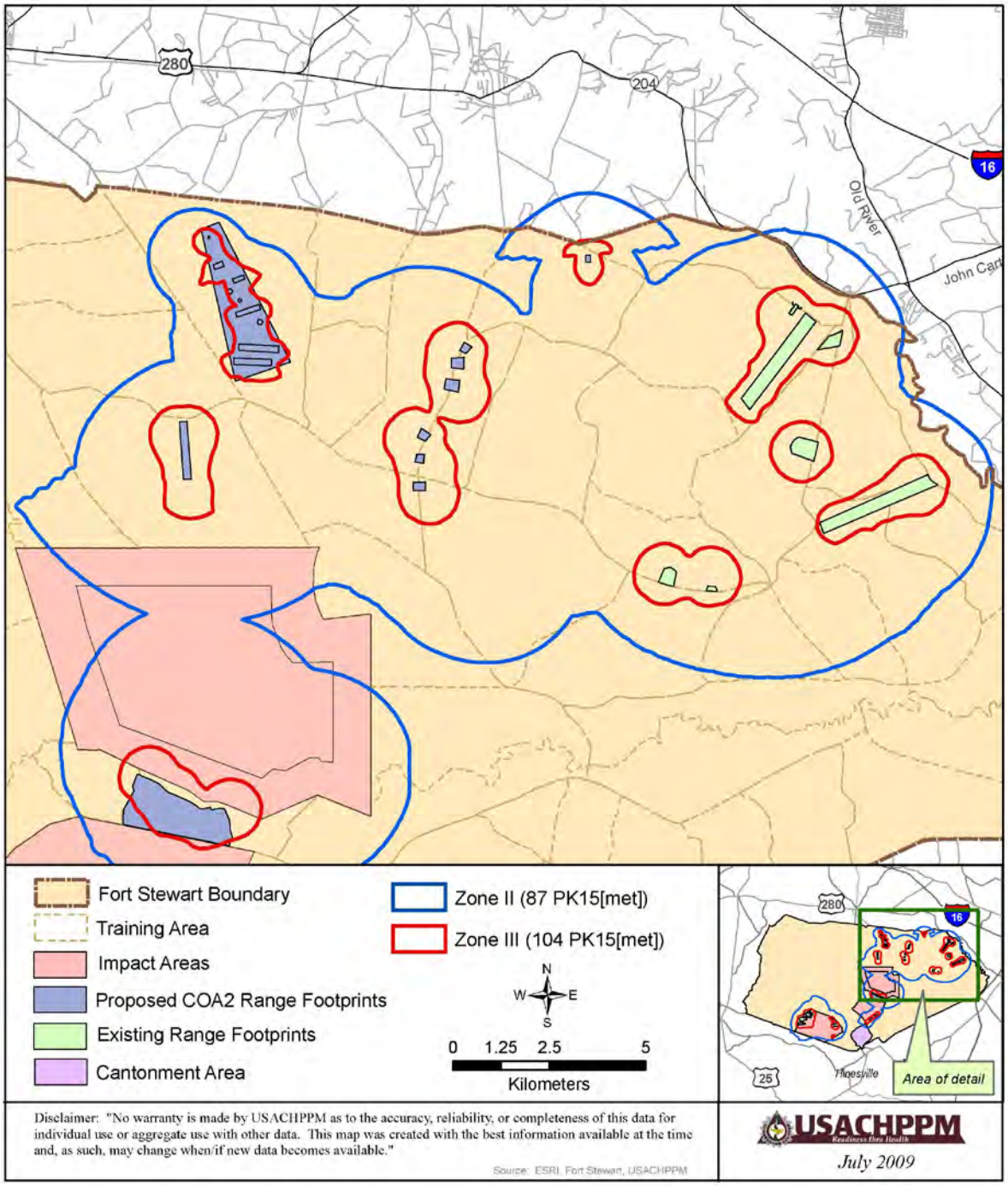

FIGURE 7. FORT STEWART – NORTHERN AREA
PROJECTED OPERATING ENVIRONMENT COURSE OF ACTION 2
SMALL CALIBER NOISE CONTOURS

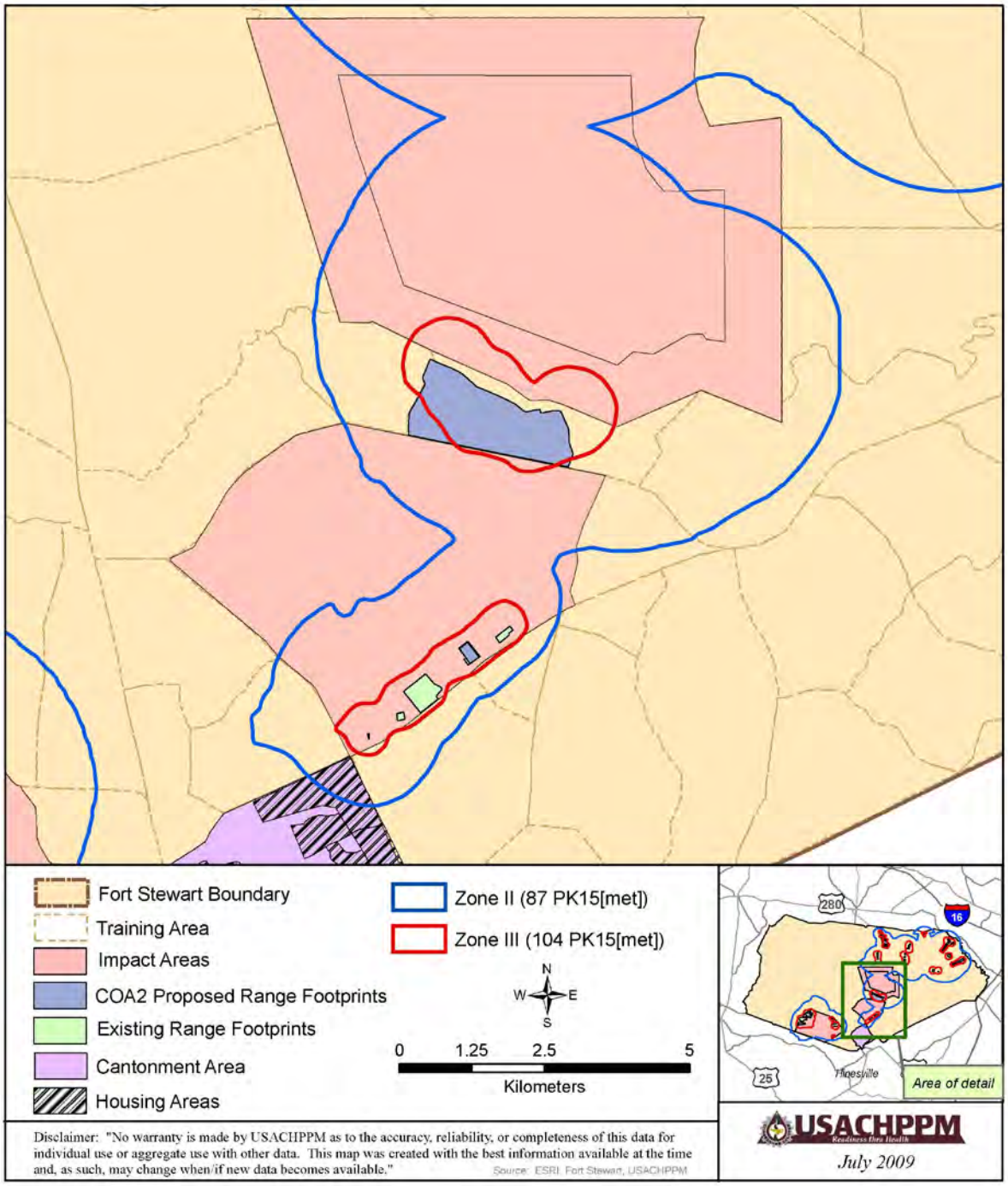

FIGURE 8. FORT STEWART – CENTRAL AREA
PROJECTED OPERATING ENVIRONMENT COURSE OF ACTION 2
SMALL CALIBER NOISE CONTOURS

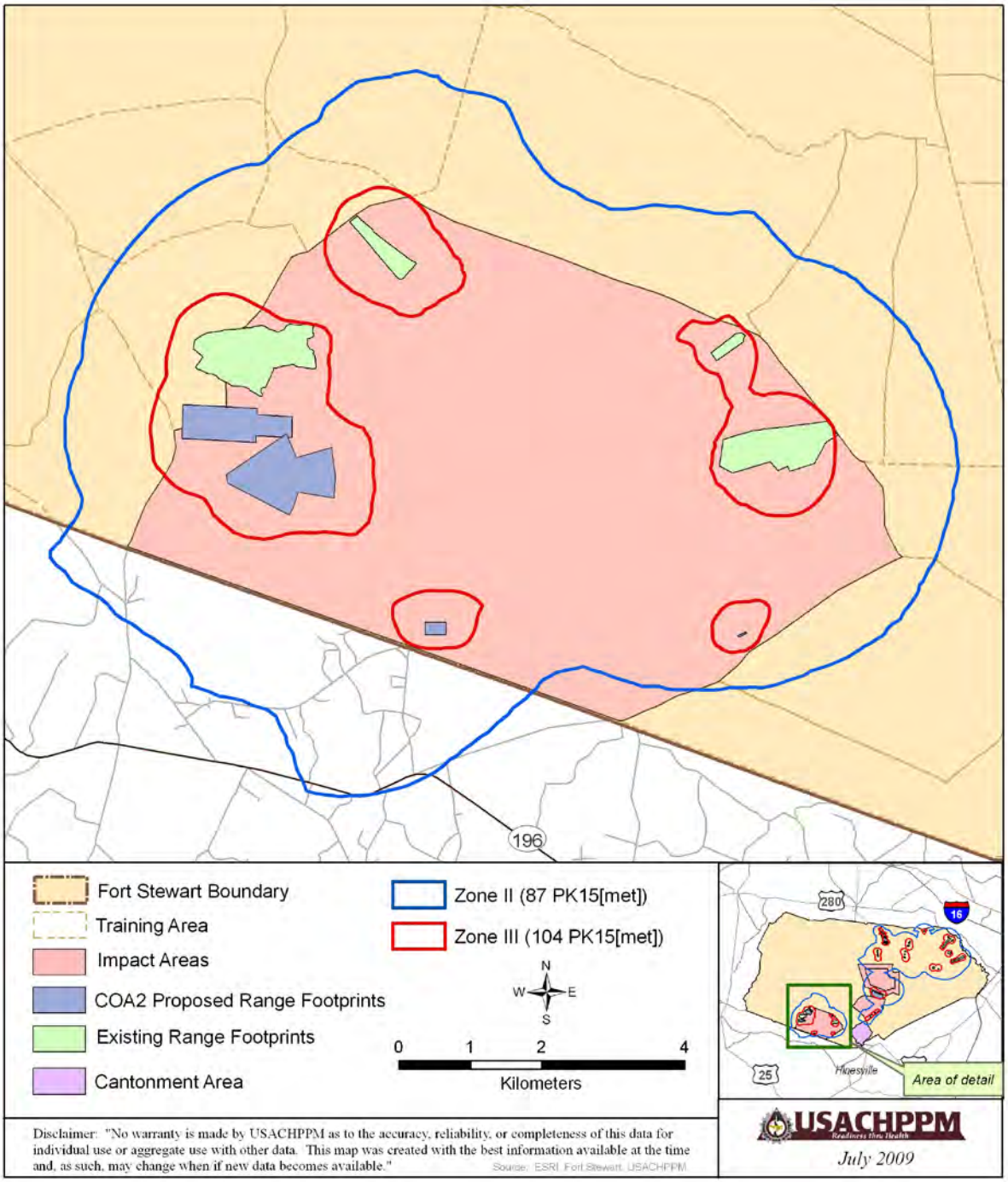

FIGURE 9. FORT STEWART – SOUTHERN AREA
PROJECTED OPERATING ENVIRONMENT COURSE OF ACTION 2
SMALL CALIBER NOISE CONTOURS

5. GRENADE LAUNCHER ACTIVITY.

a. Tables 1 and 2 contain the complaint risk criterion for the launch noise of the 40mm grenade launchers. The distances and levels listed represent a conservative approach and were calculated based upon hearing conservation criteria (U.S. Army 1999) and a known measurement (U.S. Army 1984). This data represents the best available scientific quantification for assessing the complaint risk for the launch noise of the 40mm grenade launcher until a detailed noise measurement study is completed.

TABLE 1. Complaint Risk to the Side of the 40mm Grenade Launcher, Inert* Round.

Risk of Complaints	**Distance from Grenade Launcher**	**Noise Level dBP**
Low	> 300 meters^	< 115 dB
Moderate	65 - 300 meters^	115 dB
High	< 65 meters^	>130 dB
Risk of hearing damage for unprotected ears	< 19 meters+	>140 dB

* *-- Inert is defined as any round that does not make noise upon impact, such as smoke, illum, TP*
^ *– Calculated value*
\+ *– Known value, hearing conservation criteria.*

TABLE 2. Complaint Risk to the Rear of the 40mm Grenade Launcher, Inert* Round.

Risk of Complaints	**Distance from Grenade Launcher**	**Noise Level dBP**
Low	> 110 meters^	< 115 dB
Moderate	25 - 110 meters^	115 dB
High	< 25 meters^	>130 dB
Risk of hearing damage for unprotected ears	< 7 meters+	>140 dB

* *-- Inert is defined as any round that does not make noise upon impact, such as smoke, illum, TP*
^ *– Calculated value*
\+ *– Known value, hearing conservation criteria.*

b. The proposed range development includes ranges which could fire the 40mm Training Practice (TP) rounds.

(1) The proposed COA1 IPBC is oriented to the south and more than 230 meters from the northern boundary. The proposed COA2 IPBC is oriented to the southeast and more than 700 meters from the northern boundary. The proposed COA2 FM range is oriented to the south and approximately 350 meters from the northern boundary. See Appendix D for range location maps.

(2) There are additional proposed ranges which may fire the 40mm TP rounds. However, these ranges are a minimum of 2,000 meters from any noise sensitive land uses.

c. Based upon Tables 1 and 2 and the location and orientation of the proposed ranges, the risk of complaints from the grenade launchers would be low.

6. CONCLUSIONS.

a. The existing small caliber ranges generate Noise Zone II contours that extend slightly beyond the northern and southern boundaries. There are small clusters of residential areas within these Noise Zone II contours. The existing small caliber ranges generate a Noise Zone II contour that extends into the Fort Stewart housing area.

b. The proposed small caliber ranges generate Noise Zone II contours that extend slightly beyond the northern and southern boundaries. There are small clusters of residential areas within these Noise Zone II contours. The proposed COA1 CLFX facility and the COA2 FM facility generate a Noise Zone III contour that extends slightly beyond the northern boundary. However, there are no noise sensitive land uses within the noise contour.

7. RECOMMENDATION. Include the information from this consultation in the appropriate Fort Stewart NEPA documentation.

Kristy Broska

KRISTY BROSKA
Environmental Protection Specialist
Operational Noise

APPROVED:

Catherine Stewart

CATHERINE STEWART
Program Manager
Operational Noise

APPENDIX A

REFERENCES

1. U.S. Army, 1984, Army Environmental Hygiene Agency, Environmental Noise Assessment No. 52-34-0442-84, Noise Measurement Study, Camp Bullis, Texas, 27 February–2 March 1984.

2. U.S. Army, 1999, Center for Health Promotion and Preventive Medicine, Health Hazard Assessment Report on the 40mm XM1001 Canister Cartridge for the MK-19 Mod 3 Grenade Machine Gun, No. 69-37-2735-00, November 1999.

3. U.S. Army, 2003, U.S. Army Construction Engineering Research Laboratories, SARNAM Computer Model, Version 2.6.2003-06-06.

4. U.S. Army, 2007, Army Regulation 200-1, Environmental Protection and Enhancement, Chapter 14 Operational Noise.

APPENDIX B

GLOSSARY OF TERMS, ACRONYMS & ABBREVIATIONS

B-1. GLOSSARY OF TERMS.

Decibels (dB) – a logarithmic sound pressure unit of measure.

Noise – any sound without value.

PK15(met) - the maximum value of the instantaneous sound pressure for each unique sound source, and applying the 15 percentile rule accounting for meteorological variation.

B-2. GLOSSARY OF ACRONYMS AND ABBREVIATIONS.

COA1	Course of Action 1
COA2	Course of Action 2
CLFX	Convoy Live Fire
CPQC	Combat Pistol Qualification Course
dB	Decibels
FM	Fire and Movement
FY	Fiscal Year
IPBC	Infantry Platoon Battle Course
ISBC	Infantry Squad Battle Course
KD	Known Distance
LUPZ	Land Use Planning Zone
MPMG	Multi-Purpose Machine Gun
MRF	Modified Record Fire
NEPA	National Environmental Policy Act
PK15(met)	Unweighted Peak, 15 percent Metric
QTR	Qualification Training Range
SARNAM	Small Arms Range Noise Assessment Model
TP	Training Practice
USACERL	U.S. Army Construction Engineering Research Laboratories
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine

APPENDIX C

NOISE ZONE DESCRIPTIONS

C-1. REFERENCE. U.S. Army, 2007, Army Regulation 200-1, Environmental Protection and Enhancement, Chapter 14 Operational Noise.

C-2. For a detailed explanation of Noise Zone Descriptions and Land Use Guidelines see Army Regulation 200-1, Chapter 14 (U.S. Army 2007).

C-3. Day Night Level (DNL). The DNL is used to describe the cumulative or total noise exposure during a prescribed time period. The DNL is the energy average noise level calculated with a 10 decibel penalty for operations occurring between 2200 and 0700.

C-4. The PK15(met) Noise Contour Description. The PK15(met) is the peak sound level, factoring in the statistical variations caused by weather, that is likely to be exceeded only 15 percent of the time (i.e., 85 percent certainty that sound will be within this range). This "85 percent solution" gives the installation and the community a means to consider the areas impacted by training noise without putting stipulations on land that would only receive high sound levels under infrequent weather conditions that greatly favor sound propagation. The PK15(met) does not take the duration or the number of events into consideration, so the size of the contours will remain the same regardless of the number of events.

C-5. Land Use Guidelines.

a. The Noise Zone III consists of the area around the noise source in which the level is greater than 70 decibels (dB) C-weighted day-night average sound level (CDNL) for large caliber weapons, greater than 104 PK15(met) for small caliber weapons, or greater than 75 dB A-weighted DNL. Noise-sensitive land uses (such as housing, schools, and medical facilities) are not recommended within Noise Zone III.

b. The Noise Zone II consists of an area where the DNL is between 62 and 70 dB CDNL for large caliber weapons, between 87 and 104 PK15(met) for small caliber weapons, or between 65 and 75 dB ADNL. Land within Noise Zone II should normally be limited to activities such as industrial, manufacturing, transportation, and resource production. However, if the community determines that land in Noise Zone II (attributable to small arms or aviation) areas must be used for residential purposes, then noise level reduction (NLR) features of 25 to 30 decibels should be incorporated into the design and construction of *new* buildings to mitigate noise levels. For large caliber weapons, NLR features can not adequately mitigate the low-frequency component of large caliber weapons noise.

c. The Noise Zone I includes all areas around a noise source in which the day-night sound level is less than 62 dB CDNL for large caliber weapons, less than 87 PK15(met) for small arms weapons, or less than 65 dB ANDL. This area is usually acceptable for all types of land use activities.

d. The Land Use Planning Zone (LUPZ) DNL noise contours (57 dB CDNL or 60 dB ADNL) represent an annual average that separates the Noise Zone II from the Noise Zone I. Taking all operations that occur over the year and dividing by the number of training days generates the contours. But, the noise environment varies daily and seasonally because operations are not consistent through all 365 days of the year. In addition, the Federal Interagency Committee on Urban Noise document states "Localities, when evaluating the application of these guidelines to specific situations, may have different concerns or goals to consider." For residential land uses, depending on attitudes and other factors, a 57 CDNL or 60 ADNL may be considered by the public as an impact on the community environment. In order to provide a planning tool that could be used to account for days of higher than average operations and possible annoyance, the LUPZ contour is being included on the noise contour maps.

e. See Table C-1 for land use guidelines.

TABLE C-1. Land Use Planning Guidelines.

Noise Zones	**Large-Caliber Weapons (CDNL)**	**Small Arms PK15(met)**
LUPZ	57 – 62	NA
I	< 62	<87
II	62 - 70	87-104
III	> 70	>104

C-6. Complaint Risk Guidelines for Demolition Activity and Large Caliber Weapons.

a. The peak contours show the expected level that one would get on a sound level meter when a weapon was fired. Since weather conditions can cause noise levels to vary significantly from day to day (even from hour to hour) the programs calculate a range of peak levels. By plotting the PK15(met) contour, events would be expected to fall within the contours 85 percent of the time. This metric represents the best available scientific quantification for assessing the complaint risk of large caliber weapons ranges. The complaint risk areas for PK15(met) noise contours are defined as follows:

(1) The high risk of complaint consists of the area around the noise source in which PK15(met) is greater than 130 dB for large caliber weapons.

(2) The moderate risk of complaint area consists of where the PK15(met) noise contour is between 115 dB and 130 dB for large caliber weapons.

(3) The low risk of complaint area is where the PK15(met) noise level is less than 115 dB for large caliber weapons.

b. See Table C-2 for complaint risk guidelines.

TABLE C-2. Complaint Risk Guidelines.

Risk of Complaints	Large Caliber Weapons PK15(met) dB Noise Contour
Low	< 115
Moderate	115 - 130
High	> 130

APPENDIX D

FORT STEWART RANGE LOCATION MAPS

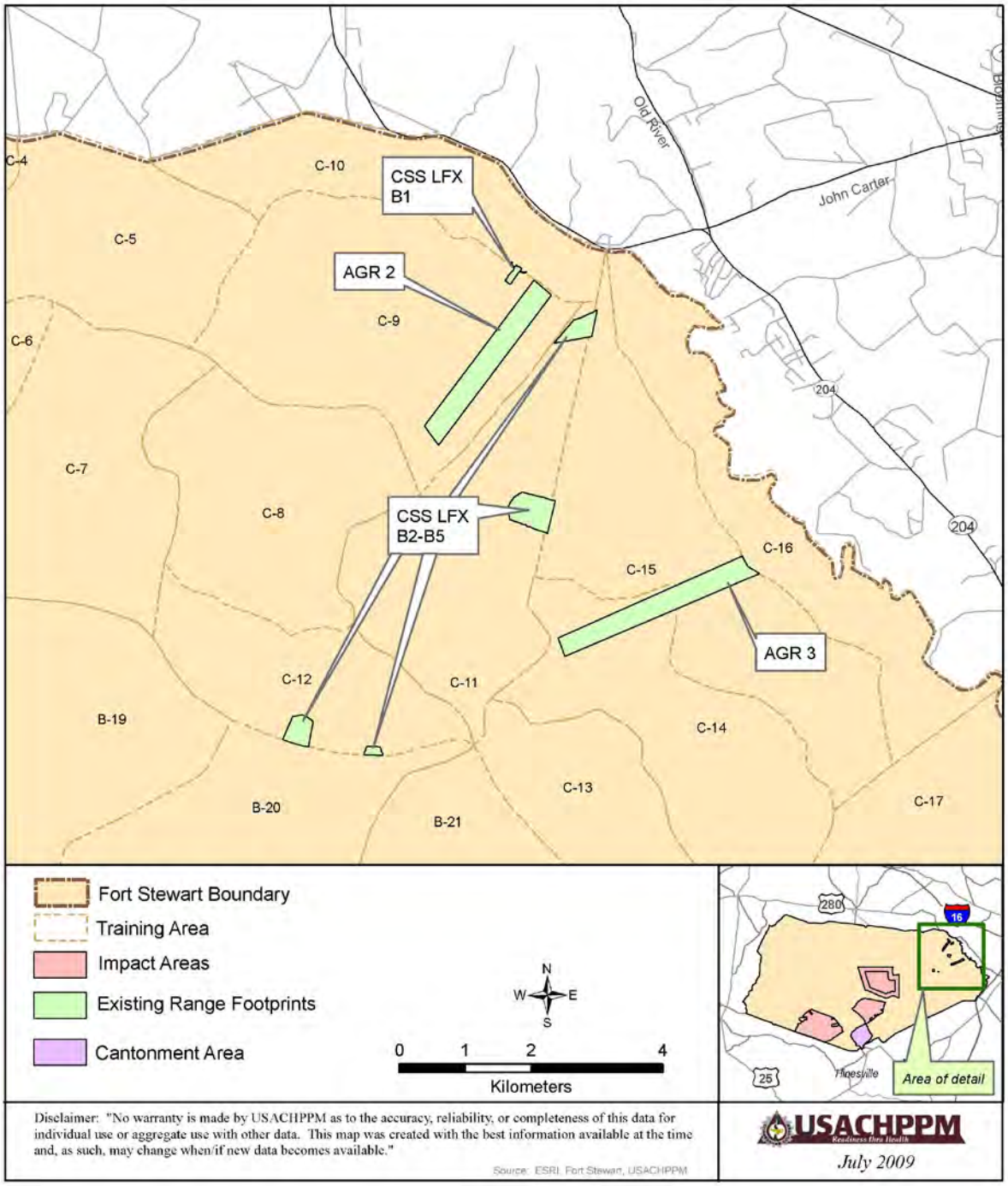

FIGURE D-1. FORT STEWART – NORTHERN AREA EXISTING RANGE LOCATIONS

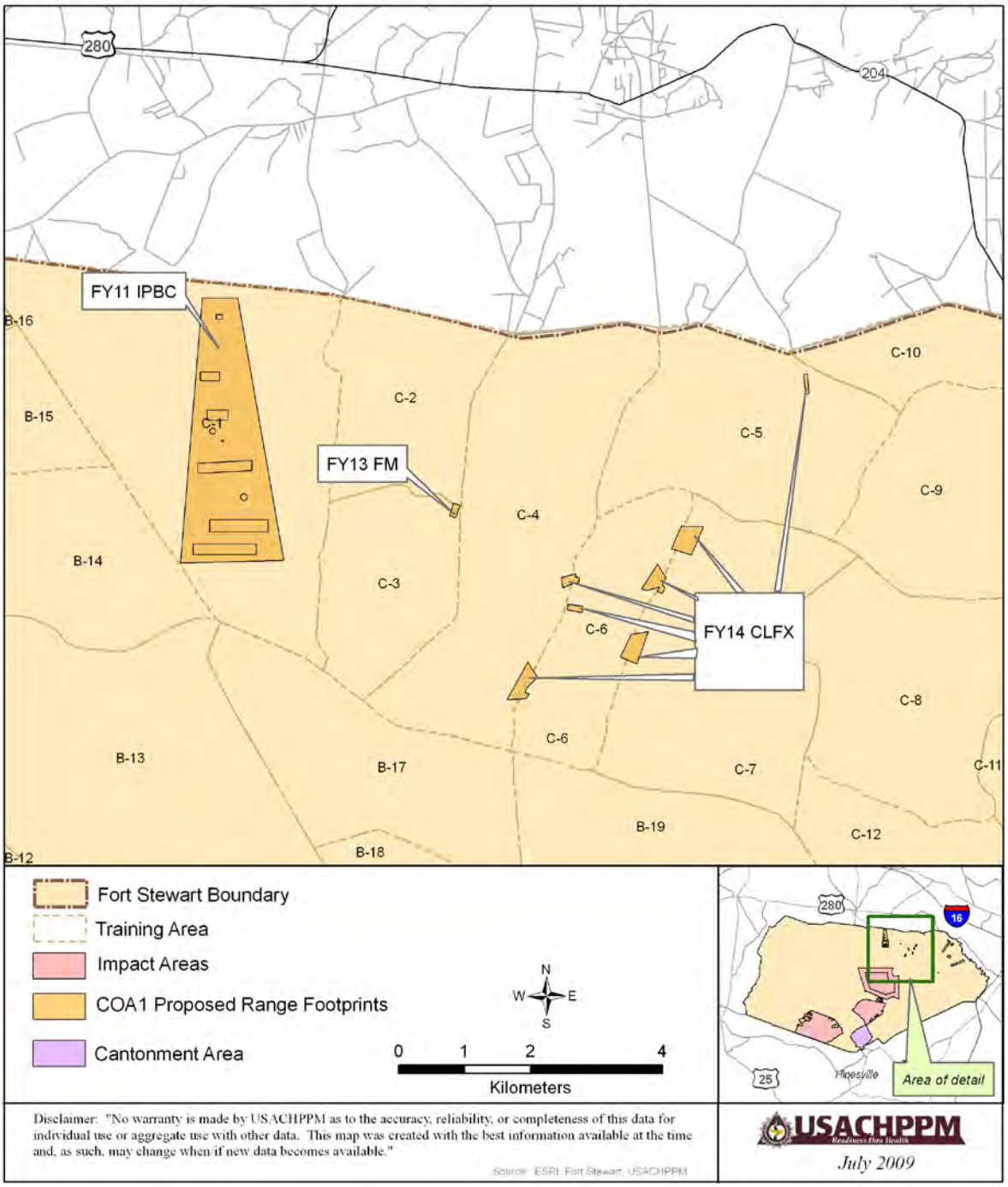

FIGURE D-2. FORT STEWART – NORTHERN AREA
PROPOSED COURSE OF ACTION 1 RANGE LOCATIONS

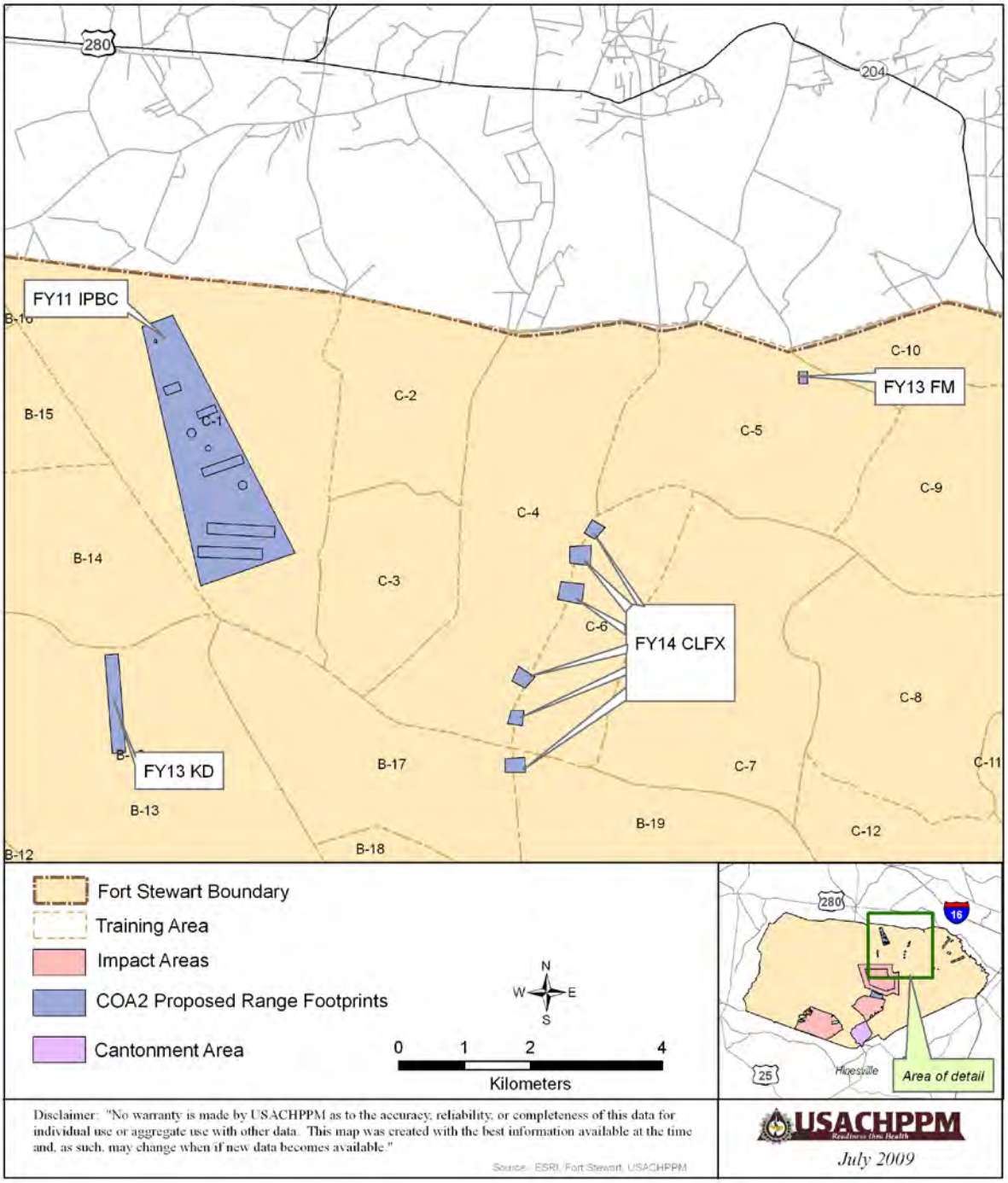

FIGURE D-3. FORT STEWART – NORTHERN AREA
PROPOSED COURSE OF ACTION 2 RANGE LOCATIONS

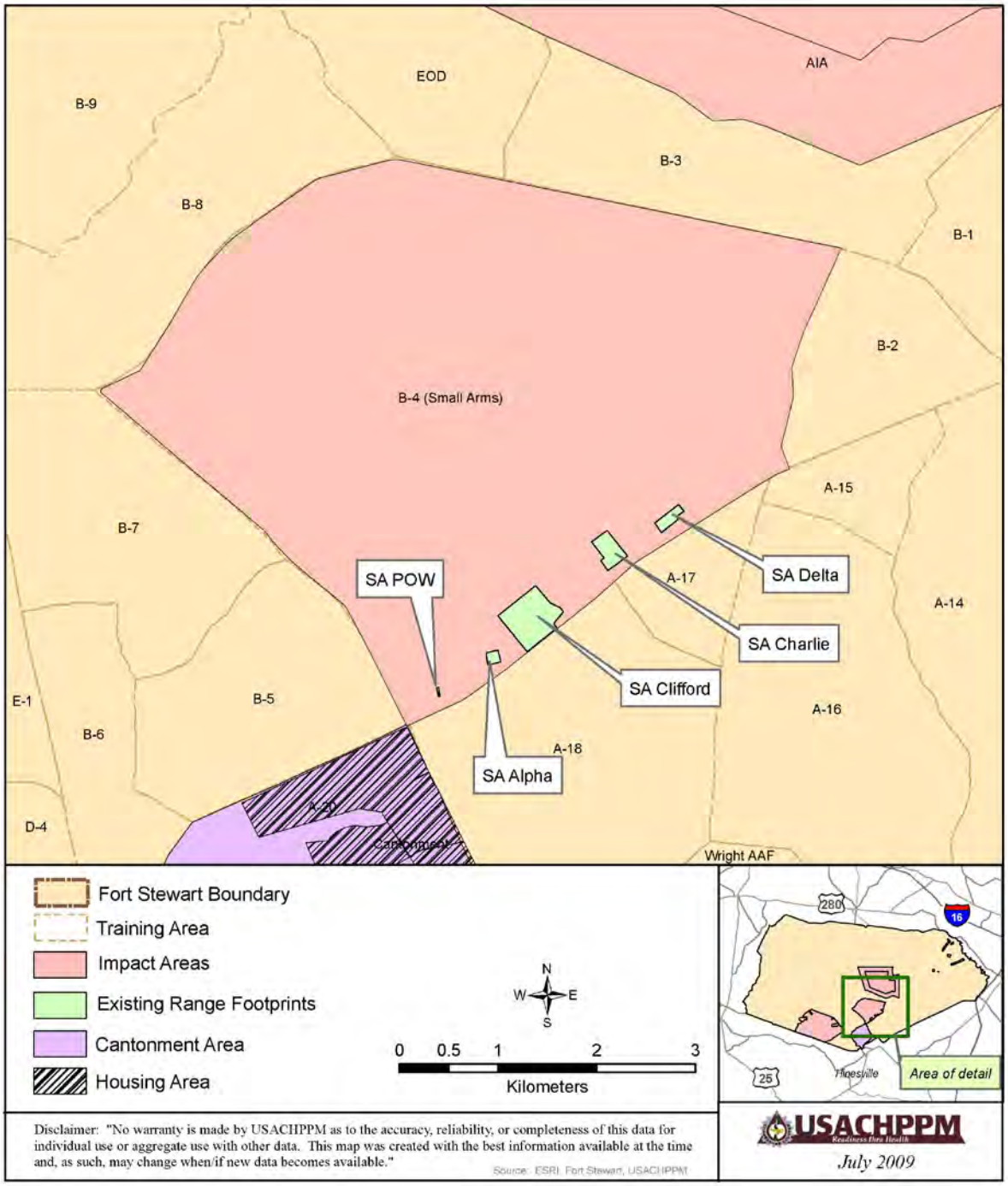

FIGURE D-4. FORT STEWART – CENTRAL AREA EXISTING RANGE LOCATIONS

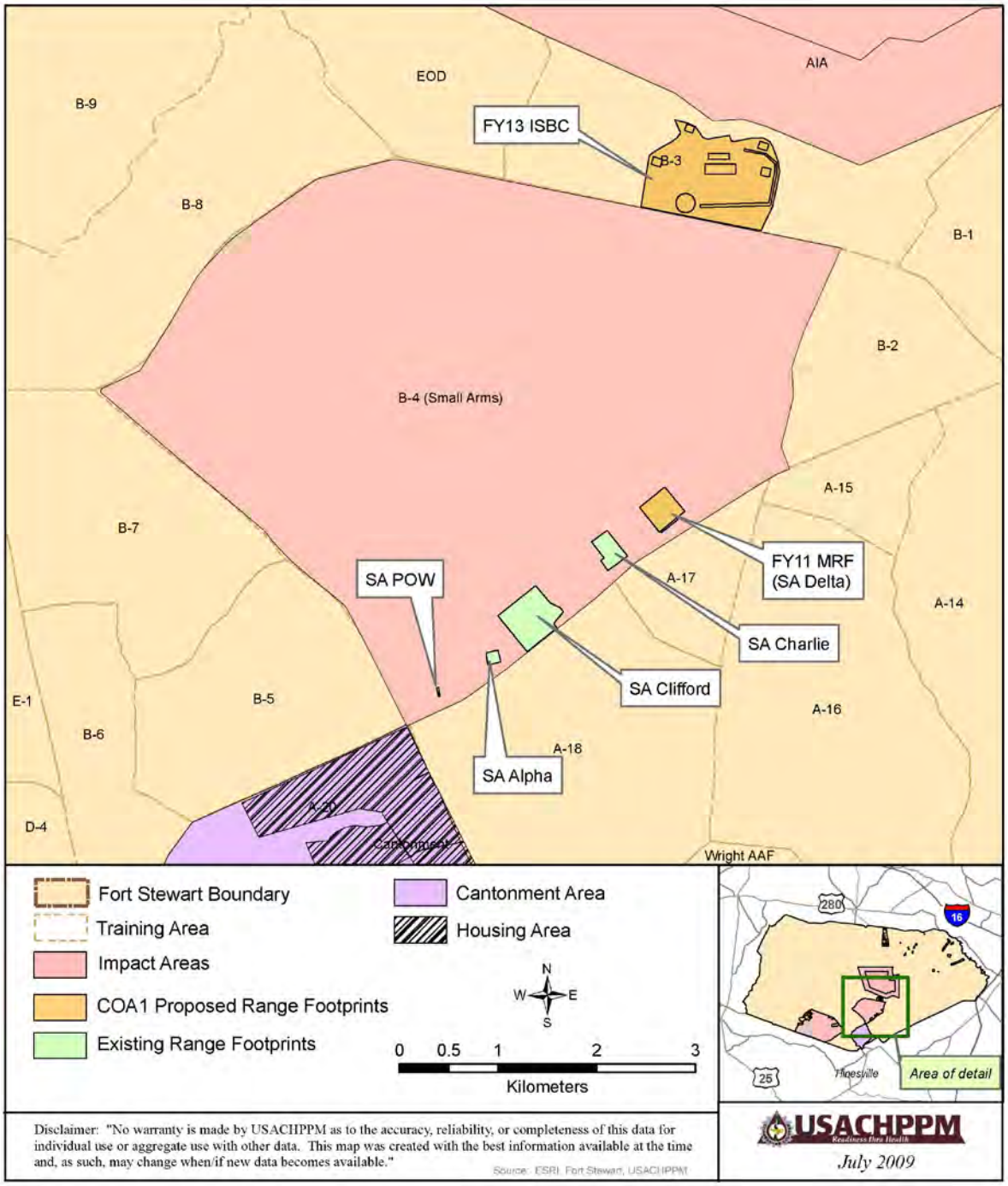

FIGURE D-5. FORT STEWART – CENTRAL AREA
PROPOSED COURSE OF ACTION 1 RANGE LOCATIONS

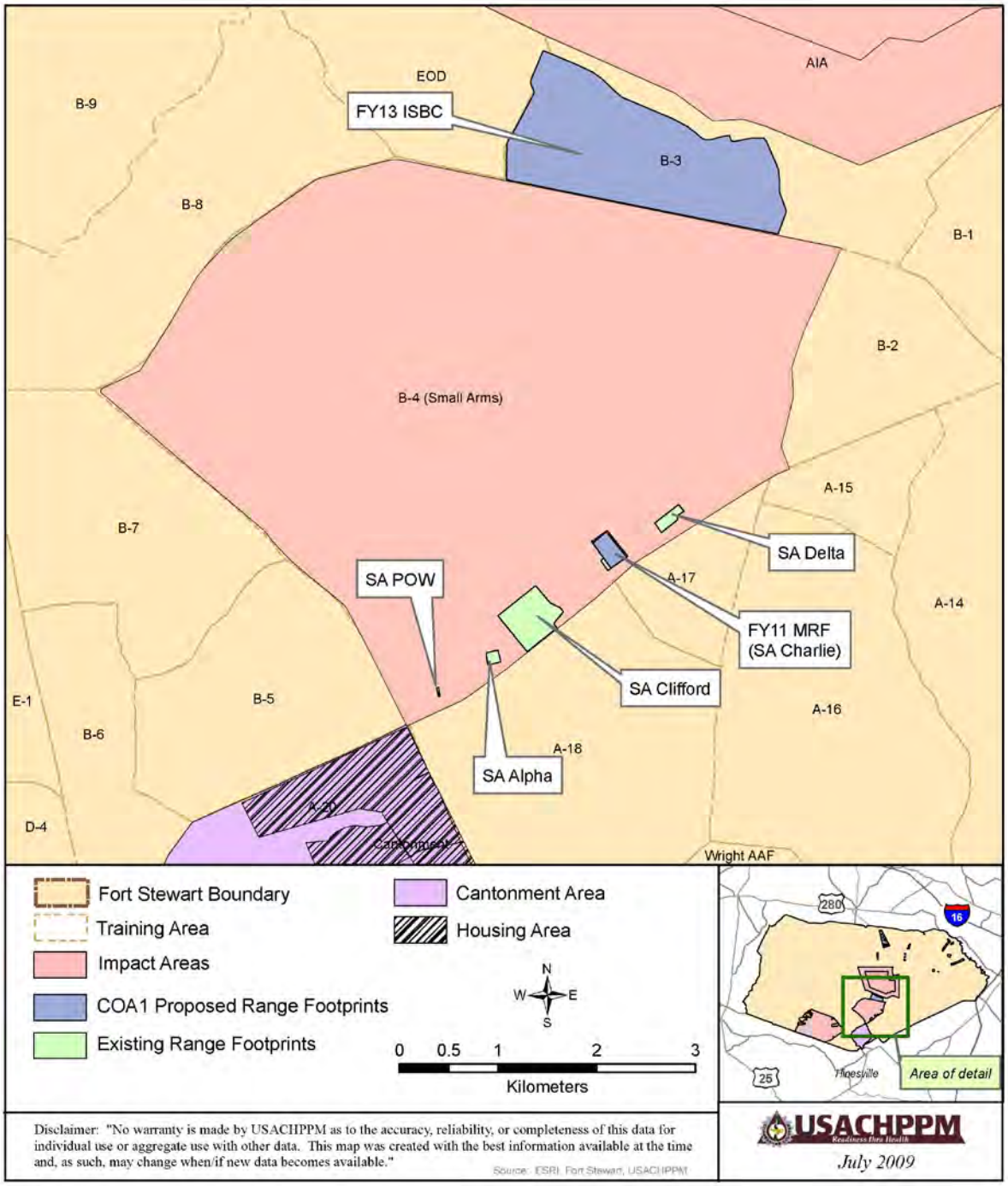

FIGURE D-6. FORT STEWART – CENTRAL AREA
PROPOSED COURSE OF ACTION 2 RANGE LOCATIONS

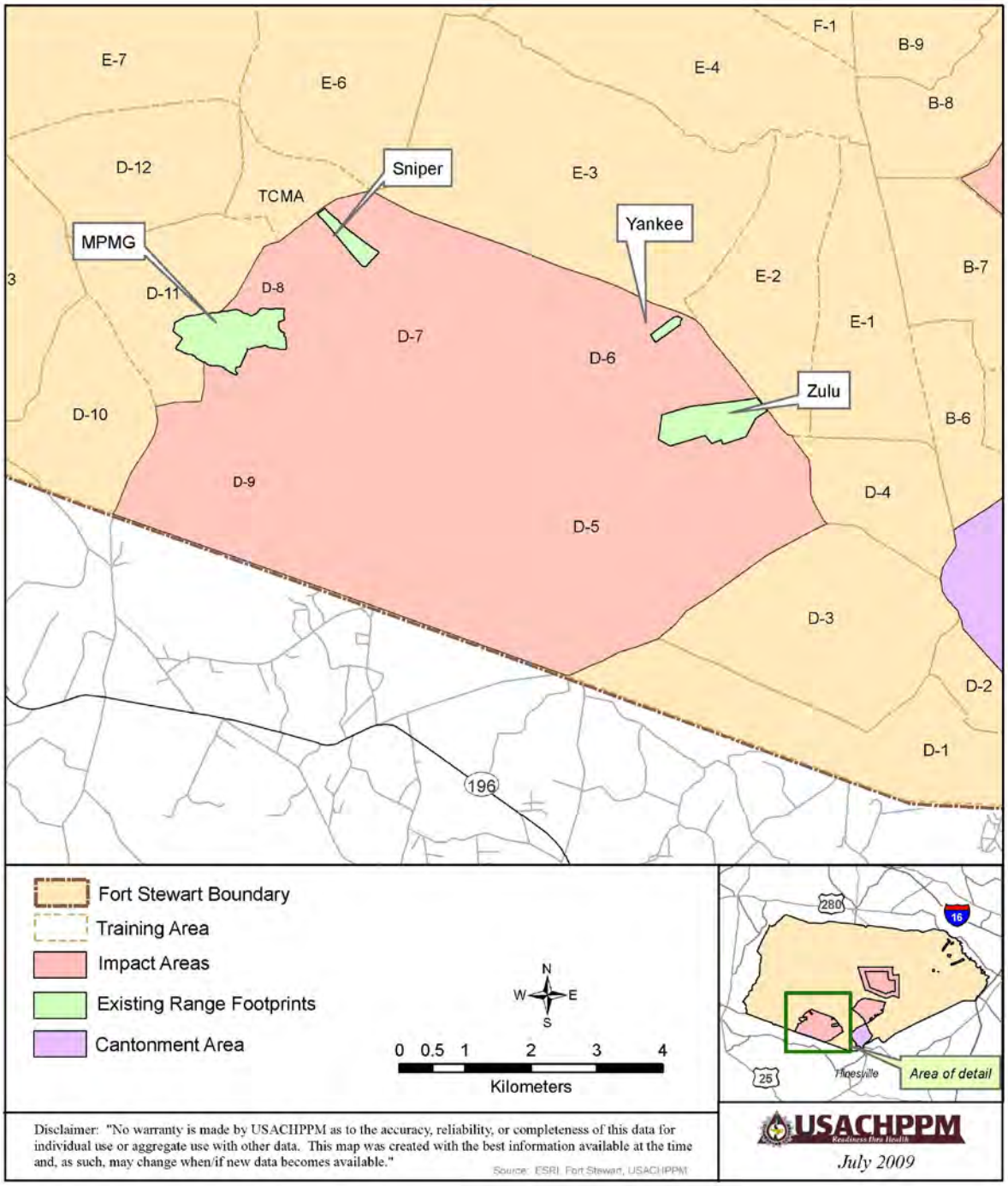

FIGURE D-7. FORT STEWART – SOUTHERN AREA EXISTING RANGE LOCATIONS

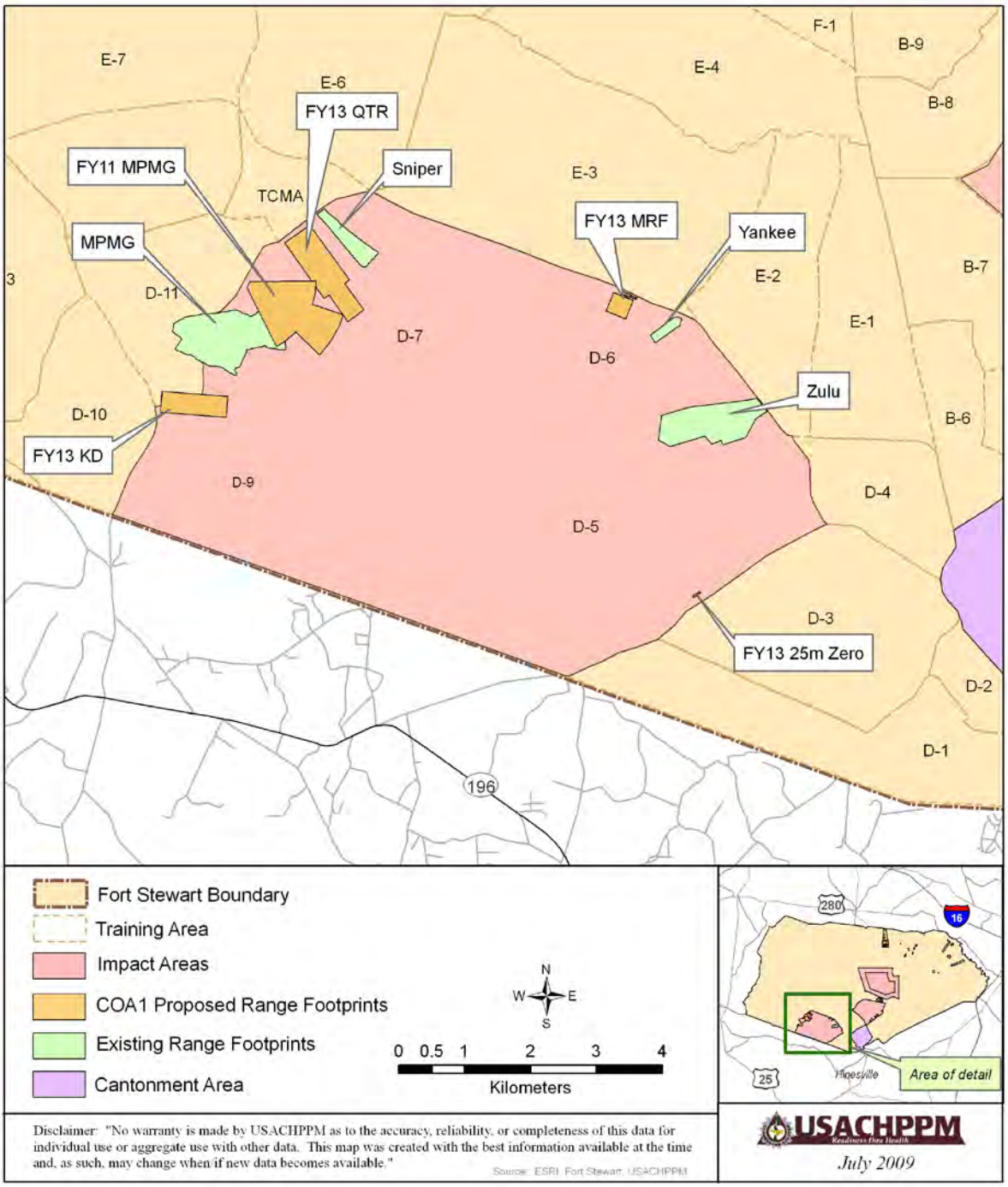

FIGURE D-8. FORT STEWART – SOUTHERN AREA
PROPOSED COURSE OF ACTION 1 RANGE LOCATIONS

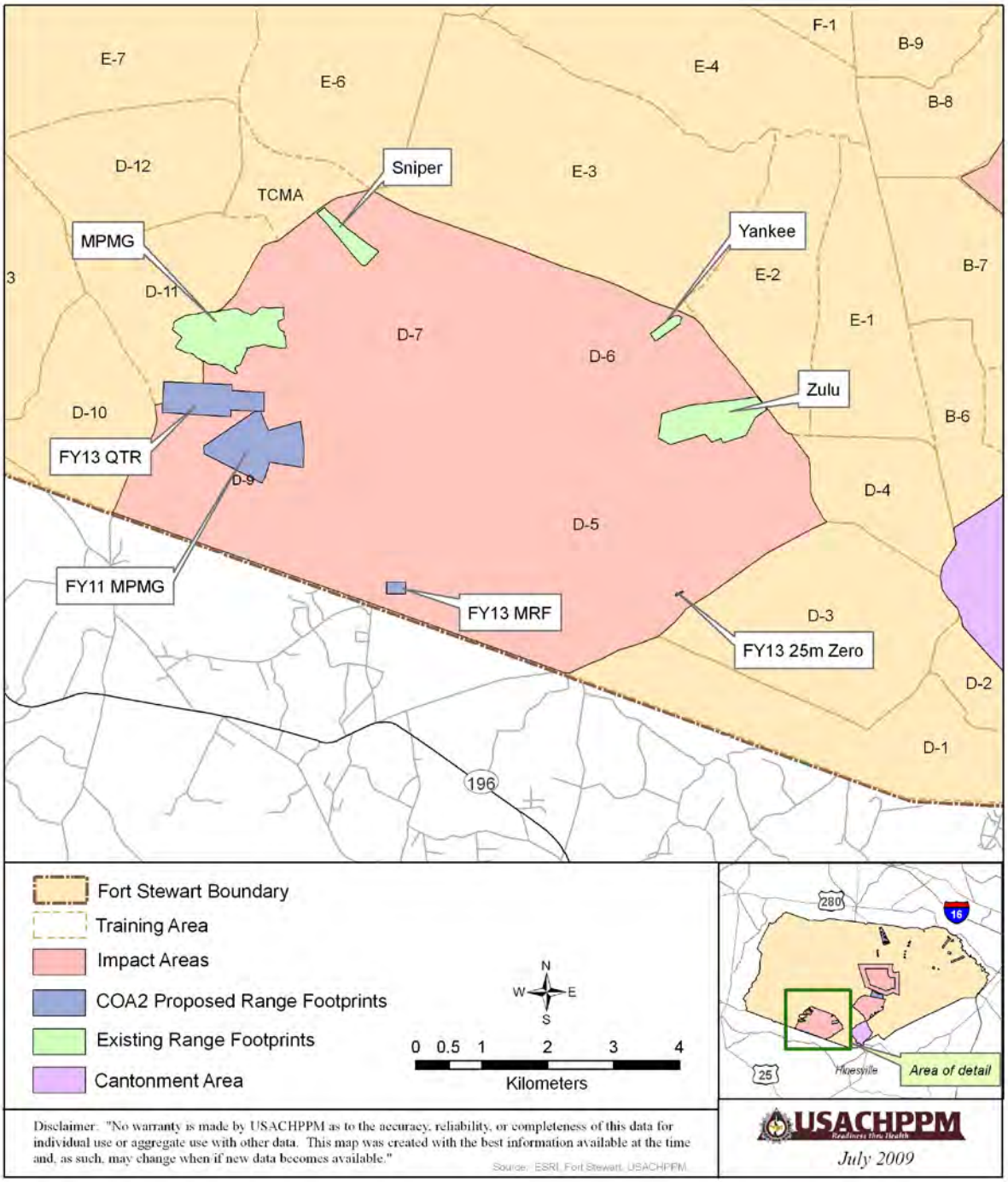

FIGURE D-9. FORT STEWART – SOUTHERN AREA
PROPOSED COURSE OF ACTION 2 RANGE LOCATIONS

APPENDIX E

SMALL CALIBER RANGE UTILIZATION

E-1. The contours show the predicted peak levels for individual rounds (metric term is PK15[met]). Since the contours are based on peak levels rather than a cumulative or average level, the size of the contours will not change if the number of rounds fired increases or decreases.

E-2. Tables E-1 – E-3 list the ranges and type of weapons utilized to develop the existing small arms noise contours.

TABLE E-1. Fort Stewart – Northern Area
Existing Operating Environment - Small Caliber Weapons Utilization.

	Existing Ranges		
	AGR 2	AGR 3	CSS LFX B1-B5
PISTOL, 9 MM	√	√	
RIFLE, 5.56 MM	√	√	√
RIFLE, 5.56 MM, BLANK	√	√	√
RIFLE, .30 CAL	√		
MACHINE GUN, 7.62 MM	√	√	√
MACHINE GUN, 7.62 MM, BLANK	√	√	
MACHINE GUN, .50 CAL	√	√	√

NOTE: All rounds are live unless stated otherwise. Blank is defined as any round that contains propellant but no bullet.

TABLE E-2. Fort Stewart – Central Area
Existing Operating Environment - Small Caliber Weapons Utilization.

	Existing Ranges					
	SA Alpha	SA Charlie	SA Clifford	SA Delta	SA POW (Pass & Permit)	Red Cloud - DMPTR
PISTOL, .38 CAL					√	
PISTOL, .357 CAL					√	
PISTOL, 9 MM	√	√	√	√	√	
PISTOL, .40 CAL	√					
PISTOL, .45 CAL					√	
TRAINER AT4, 9MM TPT	√					
TRAINER SMAW, 9MM TPT	√					
RIFLE, .22 CAL			√		√	
RIFLE, .270 CAL					√	
RIFLE, 5.56 MM	√	√	√	√		
RIFLE, 5.56 MM, BLANK		√	√	√		
RIFLE, .30 CAL						
RIFLE, .308 CAL					√	
RIFLE, .30/30 CAL					√	
RIFLE, .30-06 CAL					√	
MACHINE GUN, 7.62 MM	√	√	√			√
MACHINE GUN, 7.62 MM, BLANK			√			
MACHINE GUN, .50 CAL						√
MACHINE GUN, .50 CAL, BLANK						
SHOTGUN, 10 GAUGE					√	
SHOTGUN, 12 GAUGE	√	√	√	√	√	
SHOTGUN, 12 GAUGE, NON-LETHAL			√			
SHOTGUN, 28 GAUGE			√			
SHOTGUN, 410 GAUGE	√					

NOTE: All rounds are live unless stated otherwise. Blank is defined as any round that contains propellant but no bullet.

TABLE E-3. Fort Stewart – Southern Area
Existing Operating Environment - Small Caliber Weapons Utilization.

	Existing Ranges			
	MPMG	Sniper	Yankee	Zulu
PISTOL, 9 MM		√	√	√
TRAINER AT4, 9MM TPT			√	
TRAINER SMAW, 9MM TPT		√		
RIFLE, .22 CAL		√		
RIFLE, 5.56 MM	√	√	√	√
RIFLE, 5.56 MM, BLANK	√	√	√	√
RIFLE, .30 CAL		√		
MACHINE GUN, 7.62 MM	√	√	√	√
MACHINE GUN, 7.62 MM, BLANK		√	√	
MACHINE GUN, .50 CAL	√	√		√
MACHINE GUN, .50 CAL, BLANK	√			√
SHOTGUN, 12 GAUGE		√		

NOTE: All rounds are live unless stated otherwise. Blank is defined as any round that contains propellant but no bullet.

E-3. Tables E-4 – E-9 list the ranges and type of weapons utilized to develop the projected small arms noise contours. The projected operating environments are cumulative and therefore include the existing activity and the projected activity as appropriate.

a. The Course of Action 1 (COA1) projected operating environment includes:

(1) Projected Facilities – Northern Fort Stewart:

- Fiscal Year (FY) 14 Convoy Live Fire (CLFX)
- FY13 Fire and Movement (FM) Range
- FY11 Infantry Platoon Battle Course (IPBC)

(2) Projected Facilities – Central Fort Stewart:

- FY13 Infantry Squad Battle Course (ISBC)
- FY11 Modified Record Fire (MRF) Range

(3) Projected Facilities – Southern Fort Stewart:

- FY13 25 Meter Zero Range
- FY13 Known Distance (KD) Range
- FY13 MRF Range
- FY11 Multi-Purpose Machine Gun (MPMG) Range
- FY13 Qualification Training (QTR) Range

TABLE E-4. Fort Stewart – Northern Area
Projected Operating Environment Course of Action 1 - Small Caliber Weapons Utilization.

	Existing Ranges			Projected COA1 Ranges		
	AGR 2	AGR 3	CSS LFX B1-B5	FY14 CLFX	FY13 FM	FY11 IPBC
PISTOL, 9 MM	√	√				
RIFLE, 5.56 MM	√	√	√	√	√	√
RIFLE, 5.56 MM, BLANK	√	√	√			
RIFLE, .30 CAL	√					
MACHINE GUN, 7.62 MM	√	√	√	√	√	√
MACHINE GUN, 7.62 MM, BLANK	√	√				
MACHINE GUN, .50 CAL	√	√	√	√	√	√

NOTE: All rounds are live unless stated otherwise. Blank is defined as any round that contains propellant but no bullet.

TABLE E-5. Fort Stewart – Central Area
Projected Operating Environment Course of Action 1 - Small Caliber Weapons Utilization.

	Existing Ranges								Projected COA1 Ranges	
	SA Alpha	SA Charlie	SA Clifford	SA Delta	SA POW (Pass & Permit)	Red Cloud - DMPTR	FY11 MRF	FY13 ISBC
PISTOL, .38 CAL				√				
PISTOL, .357 CAL				√				
PISTOL, 9 MM	√	√	√	√				
PISTOL, .40 CAL	√							
PISTOL, .45 CAL				√				
TRAINER AT4, 9MM TPT	√							
TRAINER SMAW, 9MM TPT	√							
RIFLE, .22 CAL		√		√				
RIFLE, .270 CAL				√				
RIFLE, 5.56 MM	√	√	√				√	√
RIFLE, 5.56 MM, BLANK		√	√					
RIFLE, .30 CAL								
RIFLE, .308 CAL				√				
RIFLE, .30/30 CAL				√				
RIFLE, .30-06 CAL				√				
MACHINE GUN, 7.62 MM	√	√			√			√
MACHINE GUN, 7.62 MM, BLANK		√						
MACHINE GUN, .50 CAL					√			√
MACHINE GUN, .50 CAL, BLANK								
SHOTGUN, 10 GAUGE				√				
SHOTGUN, 12 GAUGE	√	√	√	√				
SHOTGUN, 12 GAUGE, NON-LETHAL		√						
SHOTGUN, 28 GAUGE		√						
SHOTGUN, 410 GAUGE	√							

NOTE: All rounds are live unless stated otherwise. Blank is defined as any round that contains propellant but no bullet.

TABLE E-6. Fort Stewart – Southern Area
Projected Operating Environment Course of Action 1 - Small Caliber Weapons Utilization.

	Existing Ranges					Projected COA1 Ranges				
	MPMG	Sniper	Yankee	Zulu		FY13 25 Meter Zero	FY13 KD	FY11 MPMG	FY13 MRF	FY13 QTR
PISTOL, 9 MM		√	√	√						
TRAINER AT4, 9MM TPT			√							
TRAINER SMAW, 9MM TPT		√								
RIFLE, .22 CAL		√								
RIFLE, 5.56 MM	√	√	√	√		√	√	√		√
RIFLE, 5.56 MM, BLANK	√	√	√	√		√				
RIFLE, .30 CAL		√								
MACHINE GUN, 7.62 MM	√	√	√	√		√	√			√
MACHINE GUN, 7.62 MM, BLANK		√	√							
MACHINE GUN, .50 CAL	√	√		√		√	√			√
MACHINE GUN, .50 CAL, BLANK	√			√						
SHOTGUN, 12 GAUGE		√								

NOTE: All rounds are live unless stated otherwise. Blank is defined as any round that contains propellant but no bullet.

b. The Course of Action 2 (COA2) projected operating environment includes:

(1) Projected Facilities – Northern Fort Stewart:

- FY14 CLFX
- FY13 FM Range
- FY11 IPBC
- FY13 KD Range

(2) Projected Facilities – Central Fort Stewart:

- FY13 ISBC
- FY11 MRF Range

(3) Projected Facilities – Southern Fort Stewart:

- FY13 25 Meter Zero Range
- FY11 MPMG Range
- FY13 MRF Range
- FY13 QTR Range

TABLE E-7. Fort Stewart – Northern Area
Projected Operating Environment Course of Action 2 - Small Caliber Weapons Utilization.

	Existing Ranges			Projected COA2 Ranges			
	AGR 2	AGR 3	CSS LFX B1-B5	FY14 CLFX	FY13 FM	FY11 IPBC	FY13 KD
PISTOL, 9 MM	√	√					
RIFLE, 5.56 MM	√	√	√	√	√	√	√
RIFLE, 5.56 MM, BLANK	√	√	√				
RIFLE, .30 CAL	√						
MACHINE GUN, 7.62 MM	√	√	√	√	√	√	√
MACHINE GUN, 7.62 MM, BLANK	√	√					
MACHINE GUN, .50 CAL	√	√	√	√	√	√	√

NOTE: All rounds are live unless stated otherwise. Blank is defined as any round that contains propellant but no bullet.

TABLE E-8. Fort Stewart – Central Area
Projected Operating Environment Course of Action 2 - Small Caliber Weapons Utilization.

	Existing Ranges							Projected COA2 Ranges	
	SA Alpha	SA Charlie	SA Clifford	SA Delta	SA POW (Pass & Permit)	Red Cloud - DMPTR		FY13 ISBC	FY11 MRF
PISTOL, .38 CAL				✓					
PISTOL, .357 CAL				✓					
PISTOL, 9 MM	✓	✓	✓	✓					
PISTOL, .40 CAL	✓								
PISTOL, .45 CAL				✓					
TRAINER AT4, 9MM TPT	✓								
TRAINER SMAW, 9MM TPT	✓								
RIFLE, .22 CAL		✓		✓					
RIFLE, .270 CAL				✓					
RIFLE, 5.56 MM	✓	✓	✓					✓	✓
RIFLE, 5.56 MM, BLANK		✓	✓						
RIFLE, .30 CAL									
RIFLE, .308 CAL				✓					
RIFLE, .30/30 CAL				✓					
RIFLE, .30-06 CAL				✓					
MACHINE GUN, 7.62 MM	✓	✓	✓		✓			✓	
MACHINE GUN, 7.62 MM, BLANK			✓						
MACHINE GUN, .50 CAL					✓			✓	
MACHINE GUN, .50 CAL, BLANK									
SHOTGUN, 10 GAUGE				✓					
SHOTGUN, 12 GAUGE	✓	✓	✓	✓					
SHOTGUN, 12 GAUGE, NON-LETHAL			✓						
SHOTGUN, 28 GAUGE			✓						
SHOTGUN, 410 GAUGE	✓								

NOTE: All rounds are live unless stated otherwise. Blank is defined as any round that contains propellant but no bullet.

TABLE E-9. Fort Stewart – Southern Area
Projected Operating Environment Course of Action 2 - Small Caliber Weapons Utilization.

	Existing Ranges					Projected COA2 Ranges			
	MPMG	Sniper	Yankee	Zulu		FY13 25 Meter Zero	FY13 MPMG	FY13 MRF	FY13 QTR
PISTOL, 9 MM		√	√	√					
TRAINER AT4, 9MM TPT			√						
TRAINER SMAW, 9MM TPT		√							
RIFLE, .22 CAL		√							
RIFLE, 5.56 MM	√	√	√	√		√	√	√	
RIFLE, 5.56 MM, BLANK	√	√	√	√					
RIFLE, .30 CAL		√							
MACHINE GUN, 7.62 MM	√	√	√	√		√		√	
MACHINE GUN, 7.62 MM, BLANK		√	√						
MACHINE GUN, .50 CAL	√	√		√		√		√	
MACHINE GUN, .50 CAL, BLANK	√			√					
SHOTGUN, 12 GAUGE		√							

NOTE: All rounds are live unless stated otherwise. Blank is defined as any round that contains propellant but no bullet.