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 Redacted

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

Figure Redacted

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 Redacted

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 Redacted

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

Figure Redacted

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 Redacted

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

Figure Redacted

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 Redacted

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 Redacted

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 Redacted

Figure 2-7: FY11 MRFR Alternative B Location.

Figure Redacted

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 Redacted

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 Redacted

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 Redacted

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

Figure Redacted

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 Redacted

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 Redacted

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 Redacted

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

Figure Redacted

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 Redacted

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 Redacted

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 Redacted

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

Figure Redacted

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 Redacted

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

Figure Redacted

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 Redacted

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

Figure Redacted

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 Redacted

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 Redacted

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 Redacted

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 Redacted

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 Redacted

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 Redacted

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 Redacted

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 Redacted

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).

Figure Redacted

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 Redacted

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 Redacted

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 Redacted

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 Redacted

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).

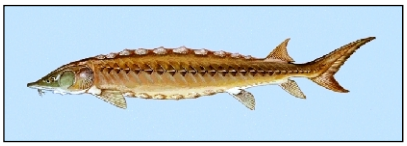
Wood storks feed in a variety of wetlands about six-10 inches deep, generally on small fish 1 to 10 inches long (USFWS, July 2001). They occasionally eat crustaceans, amphibians, reptiles, mammals, birds, and arthropods. To successfully feed themselves, wood storks need concentrated prey in relatively 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 Redacted

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 Redacted

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

Figure Redacted

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 Redacted

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 Redacted

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

Figure Redacted

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

Figure Redacted

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.

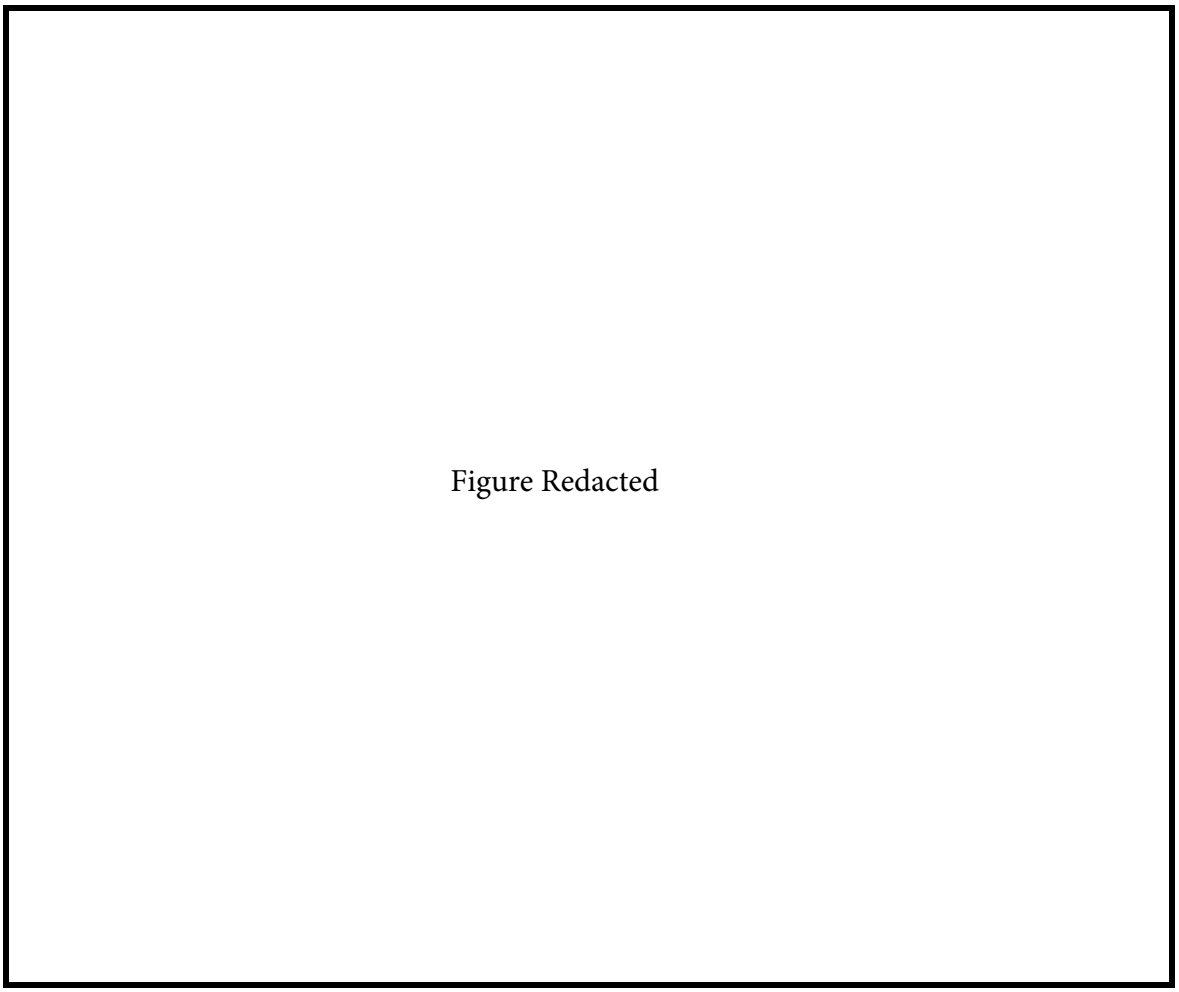


Figure 3-15: Hunter Army Airfield Corridors.

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.

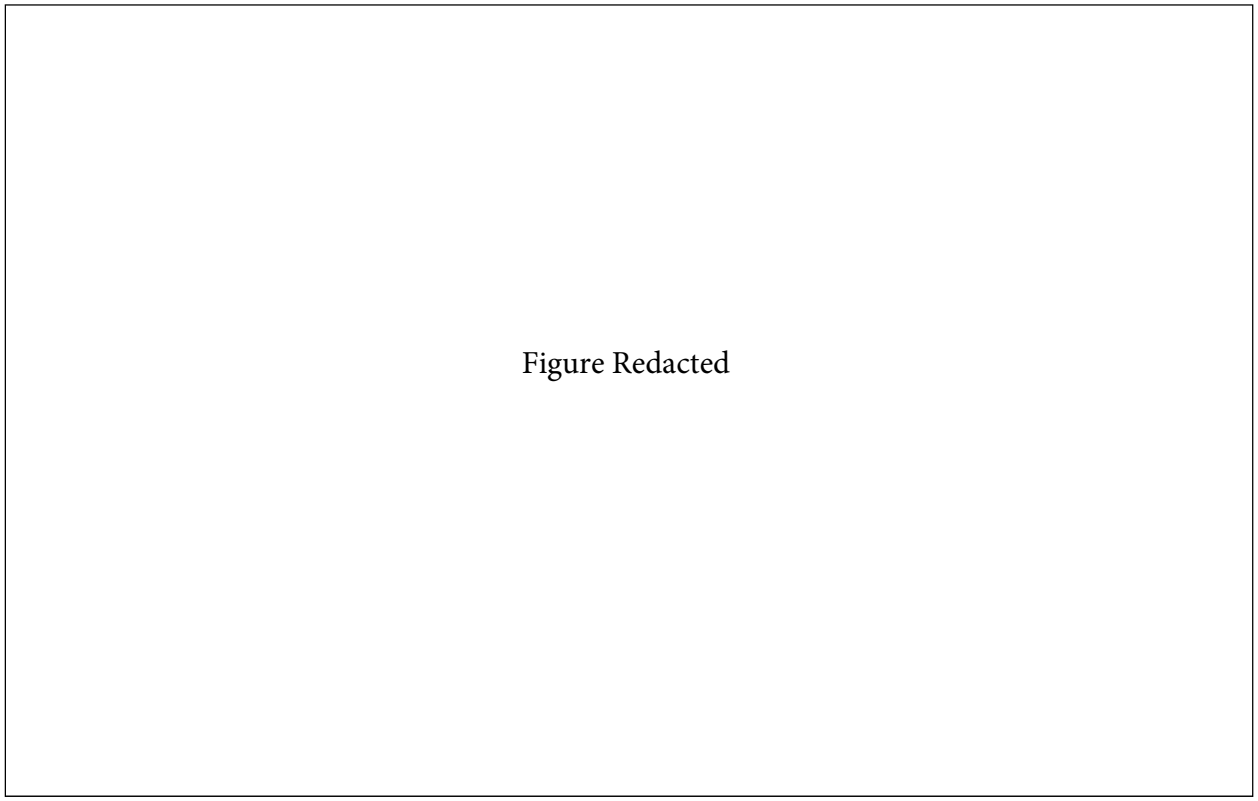


Figure 3-17: Existing Helicopter Training Routes.

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 Redacted

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 Redacted

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 Redacted

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

Figure Redacted

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.

Figure Redacted

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 Redacted

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 Redacted

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.

Figure Redacted

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 Redacted

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 Redacted

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 Redacted

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 Redacted

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

Figure Redacted

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

Figure Redacted

Figure 4-5: FY13 QTR and Wetlands Impact.

Figure Redacted

Figure 4-6: FY13 DMPTR and Wetlands Impact.

Figure Redacted

Figure 4-7: FY13 MRFR and Wetlands Impact.

Figure Redacted

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

Figure Redacted

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 Redacted

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 Redacted

Figure 4-11: FY11 MPMGR and Wetlands Impact.

Figure Redacted

Figure 4-12: FY11 IPBC and Wetlands Impact.

Figure Redacted

Figure 4-13: FY13 QTR and Wetlands Impact.

Figure Redacted

Figure 4-14: FY13 DMPTR and Wetlands Impact.

Figure Redacted

Figure 4-15: FY13 MRFR and Wetlands Impact.

Figure Redacted

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

Figure Redacted

Figure 4-17: FY13 CLFR and Wetlands Impact.

Figure Redacted

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

Figure Redacted

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 Redacted

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 Redacted

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 Acres	Wetland Acres	Wetland 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 Acres	Wetland Acres	Wetland 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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