

4 Cumulative Effects

4.1 Introduction

Section (102)(2)(c) of NEPA and regulations implemented by the CEQ (40 CFR Parts 1500-1508), DON NEPA regulations (32 CFR Part 775), and USMC NEPA directives (MCO P5090.2A, Chapter 12, change 2) require that the cumulative impacts of a Proposed Action be assessed. CEQ NEPA regulations define a cumulative effect as:

The impact on the environment which results from the incremental impact of the 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).

Cumulative effects can result from individually minor, but collectively significant, actions that take place over time. Accordingly, a cumulative effects analysis identifies and defines the scope of other actions and their interrelationship with the action alternatives if their effects may overlap in space and time. In order to analyze cumulative effects, a geographic region must be identified for which impacts of the Proposed Action and other past, present, and reasonably foreseeable future actions would be cumulatively recorded or experienced.

Cumulative effects analysis normally encompasses geographic boundaries beyond the immediate area of the Proposed Action (i.e., McIntosh and Long Counties, Georgia, for this DEIS) and a timeframe including past actions and reasonably foreseeable future actions, to capture these additional effects. However, the geographic scope for this analysis is unique to each affected resource area. For example, the geographic scope of cumulative impacts on resources such as land use and vegetation is localized to the two counties, whereas the geographic scope of air quality and groundwater is more regional.

Within the geographic study area for each resource area, the past, present, or future actions having the potential to contribute to cumulative effects were identified and are described below.

Land use, socioeconomics, recreation, wetlands, water resources, airspace, biological resources, cultural resources, air quality, and utilities and infrastructure were determined to be the resources susceptible to potential cumulative impacts. The Proposed Action was determined not to contribute to potential cumulative impacts to other resource areas, including transportation; noise; topography, geology, and soils; and hazardous materials and waste.

4.2 Past, Present, and Reasonably Foreseeable Future Actions

To ensure an assessment of potential cumulative effects, this analysis sought information on past, present, and reasonably foreseeable future actions, both federal and non-federal. Those actions, discussed in the following subsections, warranted consideration due to the potential for spatial or temporal overlap of their effects with those of the Proposed Action, as analyzed in Section 3.

Various sources of information were used to identify past, present, and reasonably foreseeable future actions. Public documents and Web sites, discussions with local planning officials, and first-hand knowledge from TBR staff provided the vast majority of information. Information also was gleaned from public meetings and news announcements.

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4.2.1 Past Actions

4.2.1.1 Historical DOD Use within the Region

Like other coastal states, Georgia has a long military history. Several active military installations are relatively near TBR, including Fort Stewart, Hunter Army Airfield, Kings Bay Submarine Base, NAS Jacksonville, NAS Mayport, Robbins AFB, MCAS Beaufort, and Marine Corps Recruit Depot at Parris Island. Former military installations in the area include NAS Glynco (currently used by the Federal Law Enforcement Training Center) and Harris Neck Army Airfield (in what is now the Harris Neck National Wildlife Refuge). The DOD historically owned much of the property that now comprises the acquisition areas that are under analysis in this DEIS.

4.2.1.2 Historical DOD Use within the Current TBR Boundary

Approximately 75% of the area that is proposed for acquisition (discussed in Section 2.2.1) was part of the Townsend Range Complex between 1944 and 1946. A majority of the land formerly part of the Complex is now owned by various timber companies.

In late 1940, the Army Air Corps utilized land for a bombing range to be used by the 3rd and 27th Bombardment groups at Savannah Army Air Base (later Hunter Field). By the end of 1942 Townsend Range Complex consisted of 12,851 acres. Throughout World War II, the facilities at Townsend were expanded and enhanced. In 1944, Townsend Range Complex occupied 22,633 acres and consisted of three bomb targets, a rifle range, a machine gun range, a dive bomb range, and high- and low-altitude bombing ranges. In 1944, an air-to-ground gunnery range was added on 27,218 acres that had two sets of four targets. The use and size of the bombing range were reduced after World War II and by June 30, 1946, 34,410 acres of the range had been declared excess. In 1959, the Townsend Range Complex, controlled by Hunter AFB, consisted of only 5,111 acres.

In 1966, the range was no longer needed and its closure was authorized. NAS Glynco, Georgia, then assumed control of TBR and operated it until 1972. From 1972 to 1980, TBR was inactive and in private ownership. The USMC reopened the range in 1981 and leased 3,882 acres from the Union Camp Corporation and the GA ANG began operating the range for the USMC. In the late 1980s, the USMC began to negotiate for the purchase of the property. A declaration of taking for 2,773 acres was filed in December 1991. In July 1992, an additional 2,410 acres were purchased which brought TBR to its current size of 5,183 acres (USACE 2001).

4.2.1.3 Timber History in the Region

The history of the timber industry in McIntosh and Long Counties (as well as the surrounding region) is very similar to historical timber production throughout the Southeast. The earliest timber harvesting in the area revolved around the Naval store industry, which was associated with the maintenance of pre-20th Century Navy ships. In the late 1800s and early 1900s, the timber industry utilized the “cut out and get out” technique, which involved a timber company buying one or more parcels of virgin timber, building a sawmill and production facilities, cutting all of the marketable trees in their parcel(s), milling and shipping it, and moving on to new parcels. This method systematically depleted timber resources in the area. Following World War II, the timber companies moved into fiber (paper) production with some sawtimber still produced (Money 2011d).

4.2.1.4 Development at Highway 251 and Interstate 95

Development at Highway 251 and I-95 (also referred to as Exit 49) in McIntosh County began approximately 20 years ago with an outlet mall, hotels, gas station/truck stop, and a small assortment of restaurants. An industrial park (Tidewater Industrial Complex) also is in this area (Burns 2011).

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4.2.1.5 McIntosh County Juvenile Detention Center

In approximately 1999, the Georgia Department of Juvenile Justice built a juvenile detention center in Darien, Georgia, on approximately 35 acres of land located off Highway 251. It was closed in approximately 2008 and the building is currently abandoned. There are preliminary talks about moving the Coastal Regional Commission of Georgia office to this building, but no decisions have been made (Burns 2011).

4.2.1.6 Georgia Power Electric Transmission Line

Two Georgia Power electric transmission lines are near TBR to the west and the southeast, both of which are in operation. The ROW to the west of TBR is approximately 150 feet wide. The ROW to the east is shared by an electric transmission line and a natural gas line and is approximately 200 feet wide (Figure 2-18).

4.2.1.7 Interstate 95 Expansion

From 1993 until December 2010, all 112 miles of I-95 in Georgia were expanded from four lanes to six lanes. Over the 17-year project life, the GDOT invested more than \$1 billion dollars in I-95 improvements, including \$533 million in Glynn and McIntosh Counties, which was the final stage of the project. Georgia's portion of I-95 originally opened in 1976 (Figure 1-3; Newport Business Media 2012).

4.2.1.8 CIM, LLC, Land Sale

Molpus Woodlands Group, LLC, recently purchased CIM, LLC's holdings in the northwest portion of Acquisition Area 3 (approximately 4,144 acres). Molpus also purchased CIM, LLC, landholdings outside the proposed acquisition areas; however, exact locations and acreages were unknown at the time this DEIS was prepared.

4.2.2 Present Actions

4.2.2.1 DOD Use within the Current TBR Boundary

TBR is one of four air-to-ground ranges within the USMC's inventory on the East Coast and one of seven in the United States that supports air combat/air-to-ground operations. TBR is owned by MCAS Beaufort and operated by the GA ANG under a host-tenant real estate agreement with MCAS Beaufort. The GA ANG provides daily operational control and range maintenance. TBR is the centerpiece of the Savannah CRTC and supports training for units deployed to the CRTC from throughout the United States, as well as international users. The current target area at TBR is divided into different areas to support military training operations, which are mainly committed to fixed-wing, air-to-ground, inert ordnance practice.

4.2.2.2 Cypress Natural Gas Pipeline

In 2008, the Southern Natural Gas Company constructed a 167-mile natural gas pipeline (the Cypress Pipeline) from the Elba Island liquefied natural gas import terminal in Savannah, Georgia, to northeastern Florida. Within Georgia, the Cypress Pipeline extends through the following counties: Effingham, Chatham, Bryan, Liberty, Long, McIntosh, Glynn, Camden, and Charlton. The underground pipeline traverses approximately 2 miles of Long County and 17 miles of McIntosh County (FERC 2006), including approximately 11 miles along the eastern boundary of Acquisition Area 3 (Figure 2-18).

4.2.2.3 Brigade Combat Team Cancellation at Fort Stewart, Georgia

In December 2007, the DOD announced that a new Brigade Combat Team (BCT) would form at Fort Stewart. A BCT would add approximately 3,500 soldiers to the installation and surrounding

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communities along with dependent family members and related military support. In June 2009, the DOD cancelled the addition of the 5th BCT at Fort Stewart. The direct economic impact of this decision on the region consisted of public and private sector investments made to prepare for the absorption of significant military and secondary population growth on the installation and in the community within a highly compressed timeframe (EDAW AECOM and RKG Associates 2009).

As a result of the cancellation, remediation funding was made available to governments in Liberty, Bryan, Tattnall and Long counties. In late January 2011, the City of Ludowici received \$88,871 in remediation funds from the Coastal Regional Commission/Office of Economic Adjustment. This amount was the first of three payments scheduled to be paid to the Long County where the total reimbursement will be nearly \$5 million. (Hinesville Publishing 2012)

4.2.2.4 Regional Conservation Efforts

In 2009, the Land Conservation Council (which governs the Georgia Land Conservation Program [GLCP]) awarded the GA DNR \$6 million to acquire 7,180 acres adjacent to the Altamaha River in McIntosh and Long Counties. The tract contains the state's largest and oldest cypress and tupelo trees and at least 17 rare and threatened species. It connects with other state lands to comprise an area over 83,000 acres in size. The Nature Conservancy, the USFWS, and the GA DNR's Nongame Program also contributed significant financial resources to secure the state's purchase from Rayonier Timber Company (GLCP 2009).

In 2010, just north of the previously acquired 7,180 acres, the GA DNR acquired 6,911 acres along the Altamaha River in Long County. The property is covered by high-quality hardwood forest and backwater sloughs that support 17 threatened or endangered species. This strategic acquisition helps create a 20-mile stretch of contiguous public land and buffers TBR. Key partners include The Nature Conservancy, which acquired the property from Rayonier Forest Resources; the USMC, which purchased an easement over the property; and the USFWS, which provided a grant for the state to acquire the remaining fee-title interest in the property. No state funds were used to acquire the tract (GLCP 2010).

In addition to these recent conservation efforts, the Nature Conservancy, the USMC, and GA DNR have been involved in other conservation efforts in the Lower Altamaha River Corridor. These include various easements and WMAs, including but not limited to: GDOT-managed Ballard Tract; Penholoway Swamp WMA; Altamaha WMA; Townsend WMA (which now includes the aforementioned GA DNR purchases) TNC Barrington Club Easement; and the Clayhole Swamp WMA (Figures 3-2 and 3-3).

4.2.2.5 Long County High School

Construction of a new 135,000-square-foot high school is underway in Long County. It is located on a site next to Smiley Elementary School in the Town of Ludowici, Georgia. Construction is slated to be complete in July 2013. The old high school will eventually be turned into a middle school. (Burns 2011)

4.2.2.6 Residential Rezoning Activities

In McIntosh County, there have been four recent rezoning proposals for residential use. Three are for residential developments east of I-95 (Crescent Pines and Cooper's Point [11.4 miles from TBR] could potentially total 500 to 600 homes). A rezoning request also was approved for houses on 9-acre Union Island located on the North River north of Darien (13.2 miles from TBR). Additionally, there was a rezoning proposal for a change from General Agriculture-Forestry to Single Family Residential just east of SR 251 (5.0 miles from TBR) on a 205-acre parcel for proposed construction of 400 to 500 homes. (CGRDC 2007)

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4.2.3 Reasonably Foreseeable Future Actions

4.2.3.1 Use of TBR by Other Service Branches

TBR is routinely used, and will continue to be used, by pilots from all service branches to perform realistic bombing maneuvers and other training events in a practice setting. Users include:

- MAG-31 (MCAS Beaufort);
- MAG-14 (MCAS Cherry Point);
- MAG-26 (MCAS New River);
- MAG-29 (MCAS New River);
- 165th Airlift Wing (GA ANG [Savannah International Airport]);
- 116th Air Control Wing (Robins AFB);
- 187th Fighter Wing (Alabama ANG [Dannelly Field, AL]);
- 125th Fighter Wing (Florida ANG [Jacksonville, Florida, International Airport]);
- 169th Fighter Wing (South Carolina ANG [McEntire ANG Base]);
- 15 Air Support Operations Squadron (Fort Stewart);
- 4th Fighter Wing (Seymour Johnson AFB);
- 23rd Fighter Group (Pope AFB);
- 437th Airlift Wing (Joint Base Charleston);
- 20th Fighter Wing (Shaw AFB);
- 347th Rescue Wing (Moody AFB); and
- the Air Force Operational Test and Evaluation Center (out of Melbourne, Florida). (MCAS Beaufort 2008; GA ANG 2005)

4.2.3.2 Timber Industry in Region

It is anticipated that large tracts of land in southern Georgia, including McIntosh and Long Counties, will continue to be owned and utilized for the timber industry. While parcels and landowners may shift over time, timber management and production is expected to continue to be a dominant land use in the region (Figure 3-1).

4.2.3.3 Georgia Coast Rail-Trail

The Georgia Coast Rail-Trail, a 68-mile long, multi-purpose trail extending 68 miles from Kingsland to Riceboro, is being built in segments over a number of years. The first 3.5-mile segment, at White Oak in Camden County, was opened in June 2010. The City of Woodbine had previously built a trail on a 1.5-mile stretch of the railroad bed approximately 2 miles south of the White Oak section. An additional 1.25-mile section beginning at the south end of the paved Woodbine trail was opened in June 2011. At the same time, the Woodbine trail officially became part of the Georgia Coast Rail-Trail, bringing the portion of the rail-trail open to the public to 6.25 miles, all in Camden County (Georgia Coast Rail-Trail n.d.).

The trail is being built on an existing, raised railroad bed, once owned by CSX Transportation, formerly known as Seaboard Coast Line. It will traverse the western portions of Camden, Glynn,

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McIntosh and Liberty Counties. Approximately 10 miles inland, the trail will traverse coastal marshland, which is habitat to a high diversity of native species. It will cross 43 rivers, tidal creeks, and streams, including the Crooked, Little Satilla, Satilla, and Altamaha Rivers. It will cross the Altamaha on century-old railroad trestles at Altamaha Regional Park in Glynn County (Georgia Coast Rail-Trail n.d.).

4.2.3.4 East Coast Basing of the Joint Strike Fighter

The F-35 Joint Strike Fighter (JSF) will continue the trend established by the F/A-18 squadrons to almost exclusively employ PGMs. The Secretary of the Navy approved the basing of Marine Corps F-35 aircraft when the ROD for the East Coast Basing EIS was published on December 9, 2010 (75 FR 78229). This ROD allows the replacement of legacy F/A-18A/C/D Hornet squadrons based at MCAS Beaufort (South Carolina) and AV-8B Harrier aircraft squadrons based at MCAS Cherry Point (North Carolina). The ROD allows up to 88 F-35 aircraft in three operational squadrons and two fleet replacement squadrons to be based at MCAS Beaufort (75 FR 78229). The ROD also allows for the basing of up to 128 F-35 aircraft that can equip up to eight operational squadrons at MCAS Cherry Point (DON 2010).

The primary weapons of choice for air-to-ground attack will be PGM delivered from medium altitudes and with standoff from the target greater than required for visual delivery of un-guided weapons. The primary weapon used by F-35 pilots for visual engagement of air-to-ground targets will be the 25mm gun enclosed in a pod and mounted on the center-line of the aircraft (Department of the Navy, 2010, p. ES-27). The attack profiles used by F-35 pilots for the employment of PGM are similar to those used by F/A-18 pilots due to the PGM weapon guiding to the target with mid-course corrections based on the guidance system design of the PGM. With conventional, Non-PGM weapons, the ballistic path of the weapon is set at weapons release by the pilot and based on the aircraft airspeed, altitude and dive angle (DON 2010).

The replacement of legacy F/A-18 and AV-8B aircraft at MCAS Beaufort and MCAS Cherry Point by F-35 squadrons will begin at MCAS Beaufort in 2014 and continue for many years based on the procurement schedule of the aircraft. The final F-35 Squadron on the east coast of the United States should be at MCAS Cherry Point. That squadron will be equipped with the new aircraft in the 2030s. The phased equipping of F-35 squadrons is dependent on the year-to-year funding, procurement and production of the F-35 and may increase when procurement is shifted from the current Low Rate Initial Production to procurement under Full Rate Production contracts. Likewise, the schedule may change due to year-to-year decreases in procurement funding.

During the 2020s the F-35 will completely replace the F/A-18 aircraft operating from MCAS Beaufort and using TBR daily. The number of operations at TBR will increase due to the establishment of two F-35 Fleet Replacement Squadrons at MCAS Beaufort. However, the changes of aircraft in the air will be almost imperceptible to the controllers on the ground at the range due to the continued training with PGMs using standoff delivery flight profiles.

4.2.3.5 Fort Benning Expansion

Fort Benning consists of approximately 182,000 contiguous acres, of which 169,260 (approximately 93%) are in Georgia, with the remaining 12,740 acres in Russell County, Alabama. Fort Benning is used for military training (e.g., Ranges, Drop Zones, Landing Zones, etc.), military administration, and resource management activities. Fort Benning is approximately 250 miles from TBR.

The Fort Benning expansion project proposes to acquire and use approximately 82,800 acres of training land under Fort Benning's Training Land Expansion Program to meet the training requirements. The study area for land acquisition is comprised of areas neighboring Fort Benning that are capable of supporting military training. The study area is located in Marion, Webster, Stewart, Talbot and Harris Counties in Georgia, and in Russell County, Alabama. In addition, portions of Chattahoochee County and Muscogee County, Georgia, are being considered for transportation routes to access newly acquired lands. A DEIS for the proposed expansion of Fort Benning was released in May 2011 (Fort Benning, Georgia

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2011). In October 2011, the proposed expansion was put on hold so that the Army could conduct more detailed analyses on the project.

4.2.3.6 Proposed Cellular Towers

Four cellular phone towers are being proposed in Long County; all four have been approved by the Long County Board of Commissioners. Although all four towers are expected to be located adjacent to Hwy 57, only three exact locations are known. One tower is proposed to be located within the restricted airspace, just west of Acquisition Area 3 and north of Area 1A (Figure 3-53).

4.2.3.7 Proposed Fire Station in Townsend, Georgia

A new fire station is currently proposed in Townsend, Georgia; exact details, including location and timeframe, are currently unknown. Other stations also are proposed in the region in order to meet Insurance Services Offices, Inc. (ISO) requirements.

4.2.3.8 McIntosh County Airport

The existing airport in the City of Darien (which consists of a single grass airstrip) is proposed to move to a new location (north of Darien, east of I-95, between Ridgeville and US-17) with a paved airstrip. The land for the proposed new airport already has been acquired and McIntosh County is proposing a regional penny sales tax for transportation projects (Referendum to come out in July 2012) that, if passed, would last 10 years (to start in January 2013). The land is still forested at this time. Because funding for project is uncertain, there is no construction timeframe (Burns 2011).

4.2.3.9 McIntosh County Potable Water System Improvements

The City of Darien, Georgia, is expanding its potable water distribution system. Most of the expansion will be near Exit 49 on I-95 near the Darien Outlet Mall, expanding north to the high school, and ultimately to where the new McIntosh County Airport would be. The system also will expand further into Tidewater Industrial Complex (located near the Darien Outlet Mall). However, these system expansions would not extend to TBR (Burns 2011).

4.3 Cumulative Effects Analysis

While the following subsections analyze cumulative effects to each environmental resource independently, it is important to note that these resources are intrinsically linked as part of the human environment. As such, cumulative effects to one resource may benefit or detrimentally impact other resources concurrently or over the course of time. For instance, the cumulative reduction of vegetation within a ROI may then add cumulatively to degradation of air and water quality within the same or overlapping ROIs. When applicable, the following cumulative effects discussions include a holistic analysis in order to thoroughly identify these connected effects to the overall human environment.

4.3.1 Land Use

4.3.1.1 TBR Vicinity

Based on the previously described actions, a list of past, present, and reasonably foreseeable future actions was identified that may contribute to cumulative impacts on land use. Consistent with the Georgia Coastal Comprehensive Plan, a 20-year timeframe (past and future) was used to analyze cumulative land use effects potentially resulting from the implementation of the Proposed Action and past, present, and future actions. Given the framework for land use planning in the state of Georgia, a 10-county region that includes Bulloch, Screven, Effingham, Bryan, Chatham, McIntosh, Long, Liberty, Glynn, and Camden Counties (termed the Coastal Georgia Region) was used as the ROI to evaluate potential cumulative effects to land use resources (Coastal Regional Commission of Georgia 2011a).

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Historical, existing, and future development patterns for the Coastal Georgia Region are largely driven by an abundance of surface water features and new or expanded roadways and utility systems. New development within the region is generally occurring along SR 251 and SR 99, both of which provide direct access to I-95. Land use patterns show a gradual increase in development as forestlands are being converted to more intensive uses such as residential, commercial, and industrial. The Coastal Georgia Region population in 2000 of 558,350 is projected to increase to 737,022 by 2015 (a 32% increase) and to 843,109 by 2030 (a 51% increase). Population growth in McIntosh and Long Counties exemplifies the regional trend; however, the majority of growth is occurring outside of the City of Darien and the City of Ludowici, in the more rural, unincorporated areas of each county. Regional population projections suggest that this trend will continue over the next 20 years (Georgia Institute of Technology 2006).

A determination was made regarding the significance of the cumulative impacts with respect to beneficial or detrimental effects, expressed qualitatively. The cumulative effects from urban growth and development in the vicinity of TBR would be considered significant if any such actions occurring within the portion of the ROI that is under the restricted airspace would result in a land use that is incompatible with the military mission. Cumulative land use impacts associated with the implementation of the Proposed Action were evaluated with consideration for past, present, and future growth trends within the Coastal Georgia Region.

The past, present, and reasonably foreseeable future actions that may contribute to cumulative adverse impacts to land use resources primarily relate to regional development activities in support of population growth. Transportation corridors and utility system infrastructure in the region also play a key role in determining where urban development occurs. Several counties within the Coastal Georgia Region are engaged in various planned and ongoing construction projects, including:

- **Liberty County**
 - UAS Facility (and associated features) (Department of the Army 2011).
- **Chatham County**
 - Intermodal Transit Facility (Chatham Area Transit 2011);
 - Tactical Equipment Maintenance Facility (Reed Construction Data 2012c); and
 - Several law enforcement facilities (Reed Construction Data 2012a, 2012b).
- **Bulloch County**
 - Several Georgia Southern University facilities, such as a new Biological Sciences Building and a 167-acre University Park Recreation Complex (Georgia Southern University 2012a and 2012b, respectively).
- **Glynn County**
 - New high school (Glynn County School District 2012); and
 - Reconstruction of an aircraft parking apron (GDOT 2011c).

Each of the 10 Coastal Georgia Region counties are engaged in various transportation projects, the vast majority of which are located along or adjacent to the I-95 corridor and near population centers such as Savannah and Brunswick.

Generally, Bulloch, Screven, Effingham, Bryan, Chatham, Liberty, Glynn, and Camden Counties are more developed than McIntosh and Long Counties. They contain large population centers of more than 50,000 people that are therefore classified as metropolitan areas by the GA DCA (GA DCA 2010d).

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As such, past, present, and future land use actions with the potential to contribute to cumulative effects are generally concentrated within these population centers. Although regional land use patterns and trends have the potential to contribute to cumulative effects associated with the Proposed Action, past, present, and reasonably foreseeable future actions within the more developed counties would occur at a greater distance from the site of the Proposed Action. Therefore, cumulative effects to regional land use resources would not be significant.

Planned construction projects in McIntosh and Long Counties include several proposed residential developments in McIntosh County and a new high school in Long County (refer to Section 4.2). Of these known existing or proposed developments, none are currently located close enough to TBR where aircraft altitudes would create potential for incompatible land use. However, the expanded military mission at TBR would conflict with the siting and development of a proposed cellular tower adjacent to the southwestern boundary of Acquisition Area 3. The construction of this cellular tower would be incompatible with future military activities at the range as it would extend into Restricted Area R-3007C.

Based on the land use shown in the Coastal Georgia Regional Future Development Map series (Coastal Regional Commission of Georgia 2011b), cumulative effects to land use resources within McIntosh and Long Counties would not be significant as the land area in the vicinity of the Proposed Action remains largely classified as “Rural” and “Conservation.” With the exceptions of the City of Darien in McIntosh County and the City of Ludowici in Long County, the majority of areas designated as “Developed” or “Developing” are located to the east of I-95 in McIntosh County or in the surrounding counties (Coastal Regional Commission of Georgia 2011b).

4.3.1.2 Forestland

Based on the previously described actions, a list of past, present, and reasonably foreseeable future actions was identified that may contribute to cumulative impacts on forestland. These actions were reviewed for their potential impacts on marketable forest resources with emphasis on production of wood products and the diversity of plant species and habitat diversity. Due to the pace of changes to forest systems, potential cumulative effects were analyzed for a period of 30 years in the past and 100 years in the future. Although periods over 50 years make it difficult to accurately estimate impacts, due to the proposed change in rotation age from 30 years to 80 years, a longer period of analysis is needed for the changes from the Proposed Action to be fully realized. The ROI for analysis of cumulative impacts on forest resources is McIntosh and Long Counties. The ROI was chosen based on a qualitative determination that the two-county area would be most affected by any changes in forest ownership and management. Limiting the ROI to McIntosh and Long Counties, as opposed to assessing a larger area, also would emphasize the potential cumulative ecological impacts. Determination of potential cumulative impacts on quantities and types of forest products was based on GIS data on the extent of forestland in the ROI. Section 4.3.7.1 provides additional discussion of the cumulative effects on vegetation as a natural habitat.

Since 2006, approximately 24,000 acres of forestland near the Altamaha River have been transferred to the ownership of GA DNR or have had restrictive easements placed on them for conservation purposes. The result has been the protection of unique and valuable ecological resources, which will ensure continued diversity of plant species and high-quality habitat for native plants and animals. The action also resulted in converting private land to public ownership and taking some portion of that land out of production of forest products for sale. The sale of forestland by CIM, LLC, to Molpus Woodlands Group, LLC, is not expected to result in changes in forest management that would involve conversion to non-forest uses, changes in the mix of forest products produced, changes in stand composition, and/or other changes that could result in ecological or socioeconomic impacts. It appears likely that the land will continue to be managed for forest products similar to recent management. The other past, present, and reasonably foreseeable future actions within the ROI, including the Cypress

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Pipeline and development in the vicinity of the Highway 251/I-95 intersection, together would result in the conversion of approximately 1,100 acres of forestland to non-forest uses.

All of the action alternatives are similar in nature and in the effects they would have on forest resources, but vary in the extent of their potential impacts. The Proposed Action could result in up to approximately 9,211 acres where wood products would no longer be harvested commercially. The land taken out of production of forest products represents a small portion (about 4%) of all forestland in the ROI. Considered cumulatively with the land taken out of commercial production by the other past, present, and reasonably foreseeable future actions, the Proposed Action would result in only minimal adverse impacts on commercial wood production.

Although forestland would be converted to non-forest uses and some forests would be taken out of commercial wood production, most of the land involved would continue to be managed for production of wood products. The Proposed Action could affect up to approximately 34,000 acres, or about 13% of the forestland within the ROI, by means of changes in rotation ages, trees species, and other aspect of forest management. These changes are expected to cause minor adverse impacts. The minor impacts associated with the Proposed Action, when considered in conjunction with past, present, and reasonably foreseeable actions within the ROI, would result in minor adverse impacts to forest resources. However, due to the amount of forestland in the ROI and the USMCs desire to still harvest timber from the acquired land, these impacts to marketable forest resources would not be significant.

The Proposed Action would affect plant and animal species and habitat diversity through changes in management of softwood forests from short-rotation pine plantations with limited species and habitat diversity to forests with greater diversity in the species and ages of understory plants and trees in the forest canopy. The resulting forests would provide higher quality habitat for native plants and animals than is typical under current conditions. Habitat diversity and quality would be affected by the conversion of suitable areas currently in short-rotation loblolly pine to longleaf pine forests. The Proposed Action would have positive impacts on the species diversity and habitat quality within the affected forestland, which when added to the recent conservation actions on approximately 24,000 acres of nearby forestland, would have positive cumulative impacts on species diversity and habitat quality within the ROI.

4.3.2 Socioeconomics

Based on the previously described actions, a list of past, present, and reasonably foreseeable future actions was identified that may contribute to cumulative impacts on socioeconomics. Due to the location of the Proposed Action and because the majority of potential direct and indirect socioeconomic impacts are anticipated to occur within the jurisdiction of McIntosh and Long Counties, the ROI for this cumulative effects analysis focuses on these counties.

Many of the known actions are community-related projects that are usually undertaken as a result of a projected regional growth stimulus or to address deficiencies with existing public infrastructure. Given the nature of these projects (schools, highways, utilities, airport, fire station, detention center), it is expected that the local community has or will experience socioeconomic benefits. The other known actions primarily involve land use changes (conservation efforts, rezoning, development) or are related to development or practices at U.S. military installations. These types of projects have the potential to result in both beneficial and adverse socioeconomic impacts on the local community within the ROI depending upon the extent and magnitude of the changes or practices.

4.3.2.1 Population and Housing

The primary causes of population impacts are generally from either displacement of population after changes in land use or the immigration of people from outside the ROI due to some regional stimulus. Existing data on population and housing within the ROI were acquired from the 2010 U.S.

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Census. Information on population and housing to be acquired under the Proposed Action was developed from county records and on-site investigations, and a quantitative analysis was used to determine impacts.

Of the past and present actions, urban development associated with Fort Stewart is located within the northeastern portion of Long County. Approximately 16.8% of housing units in Long County were reported vacant in 2010 (U.S. Census 2010), likely due to the recently cancelled Fort Stewart expansion of military and civilian population, when new housing units were constructed yet never occupied. In McIntosh County, four recent rezoning proposals have the potential to increase future residential immigration into the ROI. In addition, the use of TBR by other services branches may bring new military and civilian population to the area; however, at this time, there is insufficient information to know if or when that would happen. When considered in conjunction with the past, present, and foreseeable future projects identified in Section 4.2, no significant cumulative impacts to population and housing are expected to result from implementation of the Proposed Action, and the timing of the Proposed Action, along with the potential projects mentioned above, should not place unsupportable burdens on infrastructural considerations such as housing supply.

4.3.2.2 Employment and Income

A quantitative analysis was performed using existing data on employment and income within the ROI from the 2010 U.S. Census. Potential employment and economic development impacts within the ROI that would be generated from the construction and operations of the Proposed Action was calculated/measured using RIMS II multipliers issued through the Bureau of Economic Analysis under the U.S. Department of Commerce.

Of the past and present actions, military construction activities and their related operational and maintenance activities at Fort Stewart and TBR have generated jobs and contributed to local income, creating permanent and temporary direct and indirect economic impacts within the ROI. Recently completed public construction projects (highways, utilities, a detention center) within the ROI likely resulted in beneficial socioeconomic impacts on the community. The 2009 cancellation of the Fort Stewart expansion led to mostly negative direct and indirect employment and income impacts within the ROI and likely halted future investment and spending decisions within the ROI. Of the foreseeable future actions, most of the projects should help fuel and sustain the local and regional economy by providing jobs, business revenue, personal income, and fueling indirect multiplier effects within the local economy. While the cumulative effects to employment and income would not be significant, all aspects of the local economy stand to benefit from the implementation of the Proposed Action along with the known past, present, and reasonably foreseeable actions.

4.3.2.3 Taxes and Revenue

National wildlife refuges, nature preserves, and conservation lands and easements have been established in the vicinity of the Proposed Action. These lands are maintained by the federal government, states, and conservation non-governmental organizations (e.g., The Nature Conservancy) for conservation and/or recreational purposes. Ownership of these lands by federal and state governments results in removal of taxable acreage from the county tax rolls. Control of lands by conservation organizations may also have caused a reduction in the assessed value of the property. Existing data on property tax income and county revenues within the ROI were acquired from the State of Georgia Department of Audits and Accounts for use in the quantitative analysis. Information on the impacts of the Proposed Action on taxes and revenue was calculated using the acreage of private property that would be converted to nontaxable property and current county tax rates.

Previous actions within the local forestry industry, such as conversion of Rayonier, Inc., timber land and other private lands within the ROI to conservation easements, WMAs, or nature preserves may have impacted the commercial timber industry by removing harvestable lands from production, reducing the sales income and taxable commodities. Likewise, previous acquisitions for Fort Stewart and TBR

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removed the lands from the ownership of private timber companies. Of the foreseeable future actions, no projects were identified that have the potential to remove taxable acreage from the ROI. The future proposed East Coast Basing of the Joint Strike Fighter project and the proposed Fort Benning, Georgia, expansion project are located outside the ROI of this cumulative impacts analysis. With the proposed land acquisitions under each of the action alternatives, total assessed value of taxable property within the ROI would be reduced, along with associated timber sales and local tax revenues associated with the sale of timber products. When considered in conjunction with the past, present, and foreseeable future projects identified in Section 4.2 (not including projects that would be expected to have an impact on areas outside the ROI), significant cumulative socioeconomic impacts on taxes and revenue are expected.

4.3.2.4 Schools and Education

Previous actions, such as the presence of Fort Stewart military base, have affected education and school budgets and provided for Impact Aid in Long County. The proposed Fort Stewart expansion led to Long County's purchase of land for a new middle school; however, when that expansion was cancelled, the school construction was cancelled. Of the other past and current actions, no other projects within the ROI were identified that could significantly impact schools and education.

Of the foreseeable future actions reviewed, none are anticipated to affect, increase or decrease school budgets or Impact Aid. The Long County school district has recently decided to construct new and expanded school facilities. A new 135,000-square-foot high school is proposed to commence construction in 2013, to be located next to Smiley Elementary School in Ludowici; the old high school would be turned into a middle school.

The use of TBR by other service branches may bring new military and civilian population to the area, which has the potential to increase the number of federally connected children within the ROI, which may in turn affect schools and Impact Aid for either of the counties. Under each action alternative, total assessed value of taxable property within the ROI would be reduced, which would decrease county revenues from which the school budgets are partly funded and may increase Impact Aid to the Long County School Board. When considered in conjunction with the past, present, and foreseeable future projects identified in Section 4.2 (not including future projects that cannot be assessed due to lack of information), cumulative socioeconomic impacts on schools and education are expected to be less than significant. Impact determination was based on existing data on student enrollment, school revenues and expenditures, and Impact Aid within the ROI acquired from the State of Georgia Department of Education. Information on the impacts of the Proposed Action on schools and education was calculated using the acreage of private property that would be converted to nontaxable property, and therefore subject to Impact Aid thresholds and potential losses of county revenues per child enrolled within the school system.

4.3.2.5 Community Services

Methodology used to determine the cumulative impacts on community services was qualitative. Existing data on community services within the ROI were acquired from available county information and reports available on the internet. Information on the impacts of the Proposed Action on community services was developed using plans developed for this DEIS.

One of the primary causes of impacts to community services is the migration of people from outside the study area. Large increases in population can result in degraded public services on transportation, recreation, schools, emergency services, and utilities. None of the past or ongoing actions are expected to have had any measurable effect on the counties' capacities to provide routine law enforcement or fire protection. Many of the actions are community-related projects that are usually undertaken as a result of a projected regional growth stimulus or pattern, or to address deficiencies with existing public infrastructure. Given the nature of these community projects (schools, highways, utilities, airport, fire station, and detention center), it is expected that the local community within the ROI would

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experience socioeconomic benefits from these actions. No other past or ongoing projects within the ROI were identified that could potentially or significantly impact overall community services.

Of the foreseeable future actions, a new fire station is proposed in Townsend, Georgia (McIntosh County). Details are unknown; however, what has been confirmed is that a new fire station is needed to achieve insurance requirements. A new fire station would be beneficial if the TBR mutual aid agreements with the local communities are reassessed for expanded emergency aid to the federal properties (firefighting and medical support). In addition, McIntosh County is proposing to relocate the existing airport in Darien (which consists of a single grass airstrip) to a new location (north of Darien, east of I-95, between Ridgeville and US-17) with a paved airstrip. Also the McIntosh County water system is proposed to be expanded through Darien near Exit 49 on I-95 near the outlet mall and expanding north to the existing high school and the new airport locations, then further into the existing industrial park. These potential future community projects are expected to result in beneficial socioeconomic impacts on the local community within the ROI. When considered in conjunction with the past, present, and foreseeable future projects identified in Section 4.2, any cumulative socioeconomic impacts on community services would be less than significant. The timing of the Proposed Action along with the potential projects mentioned above should not place unsupportable burdens on existing utility and public services capacities.

4.3.2.6 Environmental Justice and Protection of Children

A review of the known past, present, and foreseeable future actions revealed no projects within the ROI that have previously impacted or could impact minority, low-income, or children populations disproportionately from other members of the local population. Existing data on minority, low-income, or children populations within the ROI and acquisition areas were acquired from 2010 U.S. Census. Calculation of the populations within the ROI and those affected from acquisition of land under the Proposed Action was acquired from the U.S. Census block and tracts information, and Environmental Justice and U.S. Department of Health and Human Services guidelines and thresholds. When considered in conjunction with the past, present, and foreseeable future actions, no cumulative impacts on minority, low-income, or children populations are expected.

4.3.3 Recreation

Based on the previously described actions, a list of past, present, and reasonably foreseeable future actions was identified that may contribute to cumulative impacts on recreation. Due to the nature of the Proposed Action, the analysis of cumulative impacts focuses primarily on outdoor recreational opportunities that are largely dependent on the maintenance and health of regional forest ecosystems. Therefore, the temporal boundaries for the analysis are the same as those identified for forestland (Section 4.3.1.2), i.e., 30 years in the past and 100 years in the future. The ROI for the analysis of cumulative impacts to recreational resources is the nine-county Georgia Game Management Region 7, which includes the counties of Brantley, Camden, Wayne, Glynn, McIntosh, Long, Liberty, Bryan, and Chatham. In addition to the historic DOD use of TBR and historic and current timber use in the region, the past, present and reasonably foreseeable future actions with the most potential to contribute to cumulative effects within the ROI include: (1) the acquisition of conservation lands along the Altamaha River corridor; (2) the development of the Georgia Coast Rail-Trail which traverses Camden, Glynn, McIntosh, and Liberty Counties; and (3) the increased military demand for access to and use of an expanded TBR.

Although recreation user rates for southeast Georgia are comparatively lower than those for metropolitan Atlanta and other areas in north Georgia (GA DNR 2007), demand for recreation within Georgia Game Management Region 7 would be expected to increase commensurate with regional population growth (as noted in Section 4.3.2). A determination was made on the significance of the cumulative impacts with respect to beneficial or detrimental effects, expressed qualitatively. Cumulative effects on recreation would be considered significant if demand for such resources exceeded the capacity

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of the land area to support various types of recreational activity, or if overuse jeopardized the integrity or health of such resources to support recreation. For example, increased development within the region could reduce the availability of public/private recreation lands, or recreational user trends could contribute to the deterioration or loss of such resources due to overuse. In assessing the significance of potential cumulative impacts, the probability, duration, and magnitude of the impacts were considered, as well as the value of the recreational resource.

Under the Proposed Action, limited recreational opportunities associated with hunting and fishing on privately held commercial forest properties would be displaced. More specifically, one hunting lodge and several hunting areas currently leased from commercial timber companies would be inaccessible after implementation of the Proposed Action. Therefore, the significance threshold for the consideration of cumulative recreation impacts associated with the Proposed Action focuses primarily on the quantity and quality of lands that provide public/private recreation opportunities within the Coastal Georgia Region and Game Management Region 7.

As select hunting/fishing lease agreements would be terminated with the implementation of the Proposed Action, displaced members would likely pursue equivalent opportunities within southeast Georgia. The result would be a minor increase in recreational demand as previously accessible hunting areas are closed in the interest of public safety. Access provided by the TBR public hunting program, however, would partially offset the loss of private access associated with the Proposed Action.

On a regional scale, the abundance of publicly accessible recreation lands in southeast Georgia would absorb any displaced demand for recreation and largely mitigate potential adverse cumulative effects to recreation resources. For example, the GA DNR Wildlife Resources Division manages more than 1 million acres of public hunting/fishing lands including more than 90 WMAs. Georgia WMAs support varied recreational activities, but are primarily designated to support public hunting and fishing programs. Table 4-1 summarizes WMA public access lands located within Georgia Game Management Region 7 (GA DNR 2011c).

State WMA	Jurisdiction(s)	Land Area (acres)
Altamaha	McIntosh	29,300
Griffin Ridge	Long	5,700
Townsend	Long, McIntosh	6,714
Penholoway Swamp	Wayne	4,269
Clayhole Swamp	McIntosh	5,242
Little Satilla	Wayne, Brantley, Pierce	18,920
Rayonier	Wayne, Brantley	12,600
Richmond Hill	Bryan	9,760
Paulk's Pasture	Glynn	16,800
Sansavilla	Glynn, Wayne	16,867
Richard J. Reynolds	McIntosh	7,000
Rogers	McIntosh	3,800
Sapelo Island	McIntosh	9,000
Ossabaw Island	Chatham	9,000
Total WMA Land Area (Region 7):		154,972
WMA Land Area (McIntosh, Long):		66,756

Note: The total land area available for public hunting is determined by the game species and season, and by the location of other designated uses unique to each WMA.

Key: Green denotes WMAs within McIntosh and Long Counties.

Source: GA DNR 2011.

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Game Management Region 7 has a total land area of approximately 2,636,800 acres within which there is roughly 154,972 acres of WMA lands amongst other public (e.g., National Wildlife Refuges) and private lands that provide year round or seasonal recreational opportunities. The Proposed Action could potentially impact up to approximately 34,667 acres of privately leased lands that support recreation, primarily hunting and fishing. The more urbanized counties within Game Management Region 7 – Chatham, Liberty, and Glynn – would not contain the same quantity or quality of hunting opportunities as the lesser developed counties such as McIntosh and Long. Due to the predominately rural nature of the ROI and the abundance of public recreation lands within the Coastal Georgia Region, particularly Game Management Region 7, the acreage removed from recreational use as part of the past, present, and reasonably foreseeable actions would not create significant cumulative impacts on recreation.

4.3.4 Wetlands

Based on the previously described actions, a list of past, present, and reasonably foreseeable future actions was identified that may contribute to cumulative impacts on wetlands within the Altamaha and Ogeechee Coastal watersheds. These watersheds, including the proposed acquisition areas, consist of tidal marshes and low-lying wetlands located within depressional, floodplain, and flow-way areas. To examine cumulative impacts to wetland environments within the ROI, a qualitative approach was conducted to review the historic and current extent of wetlands within the ROI, and to examine historic, present, and future actions that may have the potential to impact wetlands. In addition, actions that may seek to preserve or enhance wetland environments were reviewed.

Historically, impacts to wetlands in the region have been caused by residential, commercial and industrial developments, marina, shipping and docking facilities, silvicultural operations, construction of utility infrastructure such as electric transmission lines and natural gas pipelines, development of roads including I-95, and from past use by the DOD. Prior to the enactment of the CWA in 1972, wetlands were not afforded protection within the region and no federal or state agencies regulated impacts. Silvicultural operations and infrastructure developments in the region have historically caused minor permanent conversion impacts from forested to emergent wetlands and extensive permanent impacts to wetland environments as wetlands were cleared, filled, ditched and drained to be converted into planted timber stands or for the harvest of hardwood species. Coastal residential developments, industrial marinas, and other docking facilities have historically caused permanent impacts to tidally influenced wetlands in the watershed. Cumulative effects as a result of past, present, and reasonably foreseeable future actions (including the Proposed Action) would include short-term impacts to surface water quality, a moderate reduction in flood storage capacity and a decrease in water recharge potential, long-term impacts to tidally influenced wetlands, long-term reduction in habitat availability for wildlife, and would permanently limit recreational opportunities such as hunting and fishing in the region. Wetlands within the rural ROI are not currently stressed as a result of past, present, and reasonably foreseeable actions. Thus, cumulative effects to wetlands as a result of the Proposed Action when compounded with the aforementioned past, present, and reasonably foreseeable actions would not be significant.

Wetlands are protected under federal regulation that is intended to prevent the occurrence of significant cumulative impacts to these habitats. Should wetlands be adversely affected by an action, appropriate permits would be required. Areas within the Proposed Action and those currently owned by the DOD have maintained or would implement an INRMP and practices based on an ecosystem management approach that would serve to protect wetland environments within DOD lands. In addition, significant portions of high quality wetland environments along the Altamaha River have been placed under conservation easements or purchased by the State of Georgia and are managed as WMAs. Future conservation efforts by the State of Georgia, the Nature Conservancy, and other agencies are expected to continue, further conserving wetland habitats from potential loss or degradation.

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4.3.5 Water Resources

4.3.5.1 Surface Waters

Based on the previously described actions, a list of past, present, and reasonably foreseeable future actions was identified that may contribute to cumulative impacts on surface waters (intermittent and perennial natural streams, ditches, manmade canals, and forested sloughs) within the Altamaha and Ogeechee Coastal watersheds. To examine cumulative impacts to surface waters within the ROI, a qualitative approach was conducted to review the historic and current extent of surface waters within the ROI, and to examine historic, present, and future actions that may have the potential to impact surface waters. In addition, actions that may seek to preserve or enhance surface waters were reviewed.

Historic impacts to surface waters in the region are associated with silvicultural operations, military training activities, residential development, development of marinas, shipping and docking facilities, construction of utility infrastructure such as natural gas pipelines, and development of roads including I-95. Surface waters are protected under the CWA and NPDES; however prior to 1972, no federal or state protection was afforded to surface waters within the region. Cumulative effects to surface waters would include permanent direct impacts such as channelization of natural rivers, streams and creeks, filling of benthic environments, creation of ditches, drains, and other water control structures to regulate hydrologic regimes, and indirect impacts such as discharge of waste, sediments or other pollutants into surface waters, and the clearing of riparian vegetation.

The Proposed Action in combination with other past, present, and future actions would cumulatively affect surface water quality within the region. However, surface waters within the rural ROI are not currently stressed as a result of past, present, and reasonably foreseeable actions. Thus, cumulative effects to surface waters as a result of the Proposed Action when compounded with the aforementioned past, present, and reasonably foreseeable future actions, would not be significant.

Surface waters are protected under federal regulation that is intended to prevent the occurrence of significant cumulative impacts to these waterbodies. Within the region, significant portions of surface waters and supporting habitats along the Altamaha River have been placed under conservation easements or purchased by the State of Georgia and are managed as WMAs. Future conservation efforts by the State of Georgia, the Nature Conservancy, and other agencies are expected to continue, further conserving surface waters from potential loss or degradation. These management and conservation practices aid in the prevention of cumulative effects to surface waters.

4.3.5.2 Floodplains

Based on the previously described actions, a list of past, present, and reasonably foreseeable future actions was identified that may contribute to cumulative impacts on floodplains. FEMA-mapped 100-year floodplains within McIntosh and Long Counties were used as the geographic area for analyzing the cumulative effects. To examine cumulative impacts to floodplains within the ROI, a qualitative approach was conducted to review the historic and current extent of floodplains within the ROI, and to examine historic, present, and future actions that may have the potential to impact floodplains. In addition, actions that may seek to preserve or enhance floodplains were reviewed.

Silvicultural operations within the region have historically impacted floodplains indirectly by the creation of ditches, drains, and other water control structures developed to regulate hydrologic regimes. Historic alterations to hydrologic regimes as result of timber management changed natural flooding frequency and duration. Due to the frequency of floodplain mapping, these changes have been incorporated into the current delineations of floodplains in the region discussed in the affected environment section of this DEIS (Section 3.5.3.2).

As a result of these previous actions in conjunction with anticipated future actions (i.e., future infrastructure development), the Proposed Action would contribute to cumulative effects upon

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floodplains. Cumulative effects as a result of past, present, and reasonably foreseeable future actions (including the Proposed Action) would include moderate reduction for flood storage capacity in the region and would have the potential to cause permanent changes in the location, duration, and frequency of area flooding. These impacts would be due to development within the floodplains, filling of wetlands and other flood storage areas, and the modification of natural drainage patterns. Because of the ROI's rural nature, the minimal impacts associated with the Proposed Action when considered in conjunction with past, present, and reasonably foreseeable actions within the ROI would not significantly impact floodplains.

A large portion of floodplains within the region are located adjacent to the Altamaha River. Within the region, significant portions of lands along the Altamaha River have been placed under conservation easements or purchased by the State of Georgia and are managed as WMAs. Future conservation efforts by the State of Georgia, the Nature Conservancy, and other agencies are expected to continue, further conserving floodplains from potential loss or alteration and minimizing the potential for cumulative effects.

4.3.5.3 Groundwater

Utilizing regional trends and modeling results, the Proposed Action, along with past, present, and reasonably foreseeable future actions, were analyzed for cumulative impacts on groundwater within the Floridan aquifer system. The Floridan aquifer underlies five states and ranges over 100,000 square miles. Due to the size of the aquifer system, the ROI of this cumulative effects analysis has been narrowed to the nine-county Coastal Georgia Water Planning Region which encompasses Bryan, Bullock, Camden, Chatham, Effingham, Glynn, Liberty, Long and McIntosh Counties, Georgia. Several management plans have been developed to study the supply and demand of groundwater within the ROI and they were the basis for the following analysis.

In accordance with the Georgia Comprehensive State-wide Water Plan, the Coastal Georgia Initial Recommended Regional Water Plan (Coastal Georgia Regional Water Planning Council 2011) was developed. The Plan describes the current and projected water resource needs for the region and provides appropriate water management strategies to be employed in the Coastal Georgia Water Planning Region over the next 40 years. From 2010 to 2050, total groundwater demand is forecast to increase 16% for the coastal region from 601 mgd to 697 mgd (Coastal Georgia Regional Water Planning Council 2011). However, based on groundwater modeling results (GA EPD 2010b) sustainable yield for the Upper Floridan aquifer in the coastal region exceeds forecasted future demands.

To manage saltwater intrusion in the Upper Floridan aquifer in coastal areas of Georgia, GA EPD developed The Coastal Georgia Water and Wastewater Permitting Plan for Managing Saltwater Intrusion (GA EPD 2006). Whereas the Georgia Comprehensive State-wide Water Plan was conducted on a regional level, the Coastal Georgia Water and Wastewater Permitting Plan for Managing Saltwater Intrusion Plan was not. As such, 24 counties in the coastal area of Georgia are subject to this plan. Nineteen (19) of the 24 counties (including McIntosh and Long Counties) do not have pumping restrictions from the Upper Floridan aquifer but do have water conservation requirements. The implementation of these long-term water management plans would minimize the potential for significant adverse cumulative effects to occur as the result of the Proposed Action, and past, present, and future actions.

Implementation of the Proposed Action would contribute to the cumulative impacts of past, present, and reasonably foreseeable future actions on groundwater, including the decline of water levels, a reduction in groundwater availability, and potential saltwater intrusion. However, per the aforementioned modeling results, cumulative effects to groundwater as a result of the Proposed Action in conjunction with the other past, present, and reasonably foreseeable future actions, would not be significant. Given the long-standing rural nature of the ROI, the minimal impacts associated with the Proposed Action, when

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considered with the past, present, and reasonably foreseeable future actions within the ROI, would not contribute significant effects to groundwater.

4.3.6 Airspace

A spatial analysis was conducted, using GIS data, to identify the appropriate spatial boundaries (i.e., ROI) where cumulative impacts from past, present, and reasonably foreseeable future actions may interact with the Proposed Action. The extent of the spatial boundary was determined to be the CAC. The components of the CAC include Restricted Area R-3007, the Coastal MOA, the offshore W-Areas, and the associated MTRs. The appropriate temporal boundary for the analysis was determined by looking at the schedules of potentially interacting projects and the overlap with the Proposed Action. In assessing the significance of potential cumulative impacts, the extent of the compliance with established standards or guidelines was used where the impacts could be expressed quantitatively. Where the impacts were expressed qualitatively, the probability, duration, and magnitude of the impacts were considered.

In the future, it is reasonable to assume that TBR would become a more attractive training range for all DOD assets on the U.S. East Coast and beyond with the expanded PGM capabilities and additional target arrays associated with the Proposed Action. Therefore, this analysis further considers the potential cumulative effects to airspace if the other DOD users or assets (e.g., JSF) not currently using TBR begin training operations at TBR and thus increase airspace use in the future. Should other DOD users at some time in the future consider a proposal to increase training operations at TBR to support PGMs or other training, the NEPA documentation related to those actions would evaluate the cumulative effects (if any). In addition, the procedures for coordinating and scheduling current airspace use by the Savannah CRTC and the FAA ARTCC would continue to be an effective mechanism for managing cooperative use of the airspace.

Additional actions that may result in cumulative impacts on airspace are associated with the construction of high-voltage power lines and cellular towers within or near associated airspace. Structures such as these that protrude into the sky can create serious safety hazards for aircraft that must navigate around them. FAA regulations include setback requirements for pilots to navigate and avoid manmade structures. This further impacts the amount of navigable airspace available for flight operations and training. The modification of R-3007 would ensure the safe and orderly management of that airspace, which would protect private and military assets and prevent non-participating aircraft from entering airspace in the TBR vicinity during training operations. Future utilities construction could have significant cumulative effects on operations and airspace based on the current usage levels and these effects could be even greater with a potential increase in usage.

The expansion of the McIntosh County Airport is an additional action that could result in more commercial and recreational air traffic in the direct vicinity of TBR. This could result in increased levels and types of civilian and commercial aircraft flying into and out of the airspace. Procedures for coordinating and scheduling airspace use between the Savannah CRTC and the FAA would continue to be an effective mechanism for managing cooperative use of the airspace. As a result, only minimal impacts on aircraft operations at the public airports in the surrounding region are anticipated.

Similarly, the proposed expansion of Fort Benning, or any future expansion of a DOD installation within the region, could result in an increase in the use of airspace within the CAC. However, it is important to note that the Savannah CRTC and the FAA would continue to proactively manage regional airspace use which would keep cumulative impacts from exceeding a negligible level.

Lastly, actions by the FAA to overhaul and upgrade the entire NAS from the current ground-based system to a more modern satellite-based system would most likely result in cumulative impacts on airspace within the CAC. The Next Generation Air Transportation System (NextGen), as the new system is called, would be implemented across the United States in stages between 2012 and 2025. The primary goals of NextGen are to enhance the safety and reliability of air transportation, to improve efficiency in

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the NAS, and to reduce aviation's impact on the environment by reducing noise and pollution. (FAA 2011). The NextGen proposes to transform America's air traffic control system with more accurate GPS technology that is expected to shorten routes, save time and fuel, reduce traffic delays, increase capacity, and permit controllers to monitor and manage aircraft with greater safety margins (FAA 2011). This transformation is intended to meet future traffic loads by improving efficiency, capacity, and access, both in the sky and at the airports. The FAA's continuous roll-out of the system upgrades are outlined in the FAA (2011) NextGen Implementation Plan. The upgrades include utilizing more digital communication capabilities between the FAA and DOD to increase awareness and predictability of SUA usage. Operators would be able to more reliably plan and use flight routes that cross inactive SUA without affecting DOD mission needs (FAA 2011). The new digital information would include more real-time status and scheduling of SUA for military, security, or space operations. Overall, the actions of the FAA with the implementation of the NextGen system are anticipated to have significant positive cumulative effects on airspace within the CAC by enhancing aircraft tracking capabilities and improving communication for the safe and orderly management of that airspace. This would protect private and military assets by reducing the collision potential between military and non-participating civilian or commercial aircraft.

4.3.7 Biological Resources

4.3.7.1 Vegetation

Based on the previously described actions, a list of past, present, and reasonably foreseeable future actions was identified that may contribute to cumulative impacts on vegetation. The ROI used for the determination of cumulative effects to vegetation is limited to those areas adjacent to the proposed acquisition areas in McIntosh and Long Counties. To examine cumulative impacts to vegetation within the ROI, a qualitative approach was conducted to review the historic and current extent of vegetative habitats within the ROI, and to examine historic, present, and future actions that may have the potential to impact these habitats. In addition, actions that may seek to preserve or enhance vegetation were reviewed. This section discusses vegetation as a natural habitat; cumulative effects to forestland as a source of marketable timber are discussed in Section 4.3.1.2.

Silvicultural operations represent the major historic impacts to natural vegetative communities within the region. Prior to conversion of land into timber stands, historic vegetative communities in the region would have consisted of expansive mesic pine flatwoods and bottomland floodplain forested areas along rivers and natural drainage features. Silviculture practices have converted these systems into densely planted pine stands often consisting exclusively of one managed pine species.

As a result of these previous actions, in conjunction with anticipated future actions (i.e., continued silvicultural operations and the future construction of infrastructure), the Proposed Action would contribute to cumulative effects upon vegetation. Cumulative effects as a result of past, present, and reasonably foreseeable future actions (including the Proposed Action) would be long-term removal and degradation of natural vegetative communities. In addition, removal of vegetation leads to short-term impacts to surface water quality associated with a potential increase in soil erosion, a potential decrease in air quality, reduced habitat availability for wildlife, and a permanent limitation in recreational opportunities, such as hunting and fishing in the region. However, vegetation within the rural ROI is not currently stressed as a result of past, present, and reasonably foreseeable actions. Thus, cumulative effects to vegetation as a result of the Proposed Action when compounded with the aforementioned past, present, and reasonably foreseeable future actions would not be significant.

Upon implementation of the Proposed Action, lands within the proposed acquisition areas would be managed using an ecosystem based management plan and an INRMP would be developed. Integration of an ecosystem-based management plan would benefit vegetative communities, seek to restore natural vegetative communities, and increase habitat quality. Within the region, significant portions of lands along the Altamaha River have been placed under conservation easements or purchased by the State of

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Georgia and are managed as WMAs. Future conservation efforts by the State of Georgia, the Nature Conservancy, and other agencies are expected to continue, further conserving vegetation from potential loss. These management and conservation practices minimize the potential of cumulative effects to vegetation. Overall the past, present and reasonably foreseeable future actions are expected to lead to minor non-significant cumulative impacts.

4.3.7.2 Wildlife

Based on the previously described actions, a list of past, present, and reasonably foreseeable future actions was identified that may contribute to cumulative impacts on wildlife. The ROI used to determine cumulative effects to wildlife is limited to those areas adjacent to the proposed acquisition areas and areas with an ecological or biological connection to lands within the proposed acquisition areas in McIntosh and Long Counties. A multi-stepped qualitative approach was used to examine cumulative impacts to wildlife within the ROI. Wildlife species known to be found within the ROI were reviewed and general life history and habitat requirements of wildlife was determined. The ROI was then examined to determine the extent of suitable habitat for wildlife species within the past, present, and future.

Historically, lands within the region were composed of expansive mesic pine flatwoods and bottomland floodplain forested areas along rivers and natural drainage features which provided high quality habitat for wildlife species within the region. The Altamaha River and associated habitats within the floodplain of the Altamaha River, including sandhill environments, bluffs, and forested floodplains, have provided habitat for a multitude of wildlife species in the region. The region lies within the migratory route for many bird species and is an important area for migratory birds as a stopover and foraging location during spring and fall migrations. However, silviculture practices have converted these historic systems into densely planted pine stands, often consisting exclusively of one managed pine species, and have reduced habitat quality and availability for wildlife species in the region.

As a result of these previous actions, in conjunction with anticipated future actions (i.e., continued silvicultural operations and the future construction of infrastructure), the Proposed Action would add to these cumulative effects upon wildlife. Cumulative effects as a result of past, present, and reasonably foreseeable future actions (including the Proposed Action) result from long-term removal and degradation of habitat. Removal and degradation of habitat would cause indirect permanent impacts to wildlife from reduced habitat availability and fragmentation of habitat. Noise associated with construction activities would result in short-term displacement of wildlife. Incursion by man into previously un-influenced areas would increase urban interaction of general wildlife or nuisance species and would increase the potential for wildlife mortality. Reduced access to lands associated with the Proposed Action, would permanently limit recreational opportunities such as hunting and fishing in the region. However, wildlife within the rural ROI is not currently stressed as a result of past, present, and reasonably foreseeable actions. Thus, cumulative effects to wildlife as a result of the Proposed Action when compounded with the aforementioned past, present, and reasonably foreseeable future actions, would not be significant.

Areas within the Proposed Action and those currently owned by the DOD have maintained or would implement an INRMP and practices based on an ecosystem management approach that would serve to protect and enhance wildlife habitat within DOD lands. In addition, significant portions of high quality wildlife habitat along the Altamaha River have been placed under conservation easements or purchased by the State of Georgia and are managed as WMAs. Future conservation efforts by the State of Georgia, the Nature Conservancy, and other agencies are expected to continue, further conserving wildlife habitats from potential loss or degradation. These management and conservation practices minimize the potential of cumulative effects to wildlife.

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4.3.7.3 Threatened and Endangered Species

Based on the previously described actions, a list of past, present, and reasonably foreseeable future actions was identified that may contribute to cumulative impacts on threatened and endangered species. The ROI used to determine cumulative effects to threatened and endangered species is limited to those areas adjacent to the proposed acquisition areas in McIntosh and Long Counties and areas with an ecological or biological connection to lands within the proposed acquisition areas that have the potential to support populations of threatened and endangered species. A multi-stepped qualitative approach was used to examine cumulative impacts to threatened and endangered species within the ROI. Imperiled species known to be found within the ROI were reviewed and general life history and habitat requirements of these protected species were determined. The ROI was then examined to determine the extent of suitable habitat for threatened and endangered species within the past, present, and future.

Historically, impacts to threatened and endangered species in the region have been caused by silvicultural operations, development of roads including I-95, and from past use as DOD lands. Prior to the enactment of the ESA in 1973, neither plant nor animal species were afforded protection within the region and no federal or state agencies regulated impacts to potentially threatened or endangered species. Silvicultural operations represent the major historic impact to threatened and endangered species within the region. Habitat loss associated with the conversion of natural ecosystems to planted timber stands is a major factor attributed to the listing of threatened and endangered species within the region.

As a result of these previous actions in conjunction with anticipated future actions (i.e., continued silvicultural operations and the future construction of infrastructure), the Proposed Action would contribute to cumulative effects to threatened and endangered species. Cumulative effects as a result of past, present, and reasonably foreseeable future actions (including the Proposed Action) would be long-term impacts to threatened and endangered species from the degradation or removal of habitat. Removal of habitat leads to reduced availability of proper foraging and breeding areas for threatened and endangered species, and indirectly causes permanent or long-term fragmentation of habitat.

Impacts to threatened and endangered species on federal lands would be regulated by the USFWS through issuance of permits under the ESA. A large number of threatened and endangered species within the region occur within the waters of the Altamaha River, the Altamaha River floodplain, and sandhill and bluff ecosystems adjacent to the river. No impacts to these ecosystems would be associated with the Proposed Action and no cumulative effects to species utilizing these areas are anticipated. Significant portions of lands along the Altamaha River have been placed under conservation easements or purchased by the State of Georgia and are managed as WMAs. These areas will continue to provide habitat for threatened and endangered species in the region. Future conservation efforts by the State of Georgia, the Nature Conservancy, and other agencies are expected to continue, further conserving threatened and endangered species habitats from potential loss or degradation. These management and conservation practices minimize the potential of cumulative effects to threatened and endangered species. However, threatened and endangered species within the rural ROI are not currently stressed as a result of past, present, and reasonably foreseeable actions. Thus, cumulative effects to imperiled species as a result of the Proposed Action when compounded with the aforementioned past, present, and reasonably foreseeable future actions, would not be significant.

4.3.8 Cultural Resources

Based on the previously described actions, a list of past, present, and reasonably foreseeable future actions was identified that may contribute to cumulative impacts on known cultural resources, including those known cultural resources that are included in, or determined eligible for inclusion in, the NRHP. The ROI for the analysis of cumulative impacts on cultural resources and historic properties consists of the APE defined for the Proposed Action. The APE consists of Acquisition Areas 1A, 1B, and 3. The USMC conducted a qualitative analysis of the potential for cumulative impacts on cultural

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resources within the APE. Only those past, present, and future actions that geographically overlapped the APE for the Proposed Action were evaluated to assess their potential for impacting cultural resources within the APE. Additionally, only those past, present, and future actions that resulted, or would result, in direct or indirect impacts on cultural resources, such as projects involving ground disturbance or projects that would change the visual or auditory setting of cultural resources, were evaluated for potential cumulative impacts.

Of the past, present, and reasonably foreseeable future actions in the vicinity of TBR within McIntosh and Long Counties discussed in Section 4.2, five have the potential to combine with the Proposed Action and contribute to cumulative impacts on cultural resources and/or historic properties. These actions include: historical DOD use of the ROI; historical and current timber industry use of the ROI; the past construction and current and future operation of the Cypress Pipeline; and the past, current and future use of TBR by the DOD, including service branches other than the USMC and the GA ANG. None of the other past, present and reasonably foreseeable future actions would combine with the Proposed Action to result in significant cumulative impacts on cultural resources or historic properties.

Historical DOD use within the ROI occurred when the DOD owned or utilized property that now comprises portions of Acquisition Areas 1A, 1B, and 3, included in the analysis in this DEIS. The proposed acquisition areas were used by the timber industry before the DOD took control for World War II training purposes and resumed use when the DOD declared the land excess after the war, as discussed below. The historic DOD use of land within the ROI can reasonably be expected to have resulted in direct and indirect negative permanent impacts on cultural resources (both archaeological and historic built resources) that resulted from disturbance or destruction of resources during construction of range facilities and/or during training activities.

Timber use within the ROI began in the late 1800s and early 1900s. The historical and current timber industry use of land within the ROI can reasonably be expected to have resulted in direct and indirect negative permanent impacts on cultural resources (both archaeological and historic built resources) that resulted from disturbance or destruction of such resources during historic timber harvests (pre-World War II) and modern silvicultural techniques after World War II.

The Cypress Pipeline was recently constructed (ca. 2005) along the eastern edge of the ROI. A cultural resources survey was conducted prior to construction of the pipeline, which resulted in the identification of a number of archaeological resources (R. Christopher Goodwin & Associates, Inc. 2005, as cited in Hendryx, Arbuthnot, and Linville 2011). Sufficient archaeological investigations were conducted at these sites to recommend that two are NRHP-eligible (Sites 9MC376 and 9MC377) and two are not NRHP-eligible (Sites 9MC399 and 9MC400) (Hendryx, Arbuthnot, and Linville 2011). No direct negative impacts on these four archaeological sites have resulted or would result from the past construction and current and future operation of the Cypress Pipeline. Past construction of the Cypress Pipeline had no direct negative impacts on these archaeological resources, beyond the limited disturbance incurred during the archaeological investigations. However, identification of these resources during the pre-construction surveys for the pipeline resulted in an indirect positive impact on these archaeological resources, which are now part of the cultural resources record for the ROI and have been included in the impact analysis in this DEIS. Current and future operation of the pipeline is expected to have no direct negative impacts on cultural resources (archaeological or historic built resources).

The past and current uses of TBR can reasonably be expected to have resulted in direct and indirect negative permanent impacts on cultural resources (both archaeological and historic built resources) within TBR from the disturbance or destruction of such resources during construction of range facilities and/or during training activities. Past and current impacts are part of the existing environment for cultural resources in the ROI and future use of TBR by the DOD can reasonably be expected to have similar direct or indirect impacts on cultural resources (archaeological resources and historic built resources).

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The impacts of the Proposed Action, in conjunction with the remaining three actions discussed above (historic DOD use and both historic and current timber industry use), have the potential to result in cumulative impacts on cultural resources within the ROI. These cumulative impacts have the potential to result in new or increased direct, negative, permanent impacts on cultural resources within the ROI from resumed development and training activities in the proposed acquisition areas. However, acquisition of the ROI by the DOD would bring these areas under the protection and stewardship of the federal government, such that these potential cumulative impacts would be addressed in accordance with federal statutes, regulations and guidance for considering the protection of cultural resources, many of which were not in place until after the late 1960s. As part of this compliance, and as discussed in Section 3.9.2, cultural resources management plans would be developed for and implemented in the ROI in accordance with federal statutes, regulations, and guidance for the identification and protection of cultural resources and historic properties and would consider the results of any additional investigations or evaluations. Therefore, cumulative impacts to cultural resources as a result of implementing the Proposed Action when taken into consideration with past, present, and reasonably foreseeable actions would not be significant.

4.3.9 Air Quality

Based on the previously described actions, a list of past, present, and reasonably foreseeable future actions was identified that may contribute to cumulative impacts on air quality. Cumulative air quality effects were analyzed on a qualitative basis by examining the types of emissions associated with past, present, and reasonably foreseeable future actions and the proximity of these actions to the TBR. The Proposed Action, in combination with past, present, and reasonably foreseeable future actions, would have short-term minor and long-term moderate adverse cumulative effects on air quality. TBR is located within the Jacksonville (Florida)-Brunswick (Georgia) Interstate Air Quality Control Region (IAQCR), which encompasses 25 counties in northeastern Florida and 14 counties in southeastern Georgia, including McIntosh and Long Counties. The Jacksonville-Brunswick IAQCR encompasses a large geographic area and includes the heavily populated metropolitan area of Jacksonville, Florida, and other population centers including Tallahassee, Florida, and Brunswick, Georgia.

One of the ways the states of Georgia and Florida take into account the effects of past and present emission sources in their states is by inventorying all emissions and monitoring concentrations of criteria pollutants in the air quality control region. Each state has developed a regulatory structure designed to prevent air quality deterioration for the region. As indicated in Section 3.10.3.2, McIntosh and Long Counties, Georgia, are currently designated as “in attainment” for all criteria pollutants.

Estimated emissions from prescribed burning activities under the action alternatives would be appreciable. No specific reasonably foreseeable projects identified in Section 4.2.3 would have prescribed burning. However, it is possible that the management of lands owned or controlled by timber companies may include prescribed burning. All prescribed burning within Georgia is to be conducted in accordance with guidance established by the GFC. The GFC guidance alleviates air quality impacts by requiring that fires be set under predetermined conditions that have been chosen to reduce the drift of smoke across occupied land. Given this control structure, it is anticipated that the GFC would manage prescribed burning in order to eliminate the possibility of combined impacts of prescribed burning in adjacent areas. As discussed in Section 3.10.3, prescribed burning is recognized as an appreciable source of air emissions, however, prescribed burning allows land managers to mimic natural fire return intervals under controlled conditions where smoke management can minimize air quality impacts. The alternative is wildfires, which can be very difficult to control and may cause more severe air quality impacts. Therefore, there would be moderate adverse cumulative effects on air quality.

The action alternatives would not generate new significant emissions from stationary equipment or mobile sources. Instead there would be only small, temporary emission increases associated with

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construction activities and small increases in long-term emissions due to additional maintenance activities and associated equipment and vehicle use. Due to the small amount of emissions associated with the project vehicles and equipment, it is anticipated that the cumulative effects of the project and emissions associated with other proposed projects in proximity to TBR would not cause exceedences of air quality standards that would affect the attainment status of the area. Thus, projected cumulative effects would be less than significant.

4.3.9.1 Greenhouse Gases

The potential effects of proposed GHG emissions are by nature global and cumulative effects, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, an appreciable impact on global climate change would only occur when GHG emissions resulting from a Proposed Action combine with GHG emissions from other manmade activities on a global scale.

Currently, there are no formally adopted or published NEPA thresholds for assessing the potential significance of GHG emissions. Therefore, in the absence of a formally adopted threshold of significance for GHGs, this DEIS examines the relative increase in GHG emissions that would result from implementation of the action alternatives using the U.S. GHG inventory of 2009 (USEPA 2011b) as the baseline for current GHG emissions.

The construction and operation activities associated with the action alternatives would generate GHG emissions. Operational emissions would be due primarily to combustion emissions from prescribed burning activities. According to USEPA AP-42, Chapter 13.1 (Wildfires and Prescribed Burning), emission factors for nearly all of the fuel carbon (greater than 99.9%) from prescribed burning activities would be converted to carbon dioxide (CO₂) during the combustion process. Unlike fossil fuels, such as natural gas and fuel oil, CO₂ emitted from prescribed burning is generally not counted as a GHG because it is considered part of the short-term CO₂ cycle since it does not introduce any new carbon that did not come directly from the atmosphere (USEPA 1995). Therefore, this analysis focuses on the GHG emissions associated with construction activities (i.e., those generated by burning of fossil fuels) for each action alternative.

Table 4-2 summarizes the net change in annual GHG emissions that would result from the implementation of the action alternatives. In February 2010, the CEQ issued Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions (CEQ 2010). In this guidance, the CEQ recommends that if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of CO₂-equivalent GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public. Since the estimated GHG emissions from the Proposed Action would be considerably less than 25,000 metric tons, further evaluation of GHG emissions from project activities is not warranted. Further, these data show that the fractions of annual GHG emissions, measured in carbon dioxide equivalent (CO₂e), from the action alternatives to the GHG emissions associated with the net U.S. GHG sources in 2009 range from approximately 0.0000004% to 0.0000009% of the U.S. GHG emissions inventory. Since GHG emissions from the action alternatives would represent a minimal percentage increase compared to the baseline, they would not substantially contribute to global climate change.

Because the current global trend data shows an annual increase in GHG emissions, the DOD, the DON, and the USMC, under the direction of federal policies, are pursuing a variety of initiatives to reduce the DOD's total contributions to GHG emissions. The following paragraphs summarize some of these initiatives, including broad-based strategic programs to reduce energy consumption and shift to renewable and alternative fuels.

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Scenario/Activity	CO₂e Emissions (Metric Tons per Year)
Alternative 1 – Construction ^(a)	33
Alternative 2 – Construction ^(a)	29
Alternative 3 – Construction ^(a)	61
Alternative 4 - Construction ^(a)	39
U.S. 2009 Baseline Emissions ^(b)	6,633,200,0000
Proposed Emissions as a % of U.S. Emissions	0.0000004 to 0.0000009%

Notes:

(a) Amortized over a 25-year period.

(b) Source: USEPA 2011.

Key: CO₂e = carbon dioxide equivalent

EO 13514 (Federal Leadership in Environmental, Energy, and Economic Performance) was adopted in October 2009, and provides early strategic guidance to federal agencies in the management of GHG emissions. The early strategy directs the agencies to increase renewable energy use to achieve general GHG emission reductions. According to the provisions of EO 13514, federal agencies are required to develop a 2008 baseline for scope 1 (direct) and 2 (indirect) GHG emissions. An example of Scope 1 GHG emissions is direct emission of CO₂ from fuel combustion in a heating unit. An example of Scope 2 GHG emissions is the indirect emission of CO₂ from a distant source that produces electricity, heat, or steam purchased by an agency. Federal agencies also must develop a percentage reduction target for agency-wide reductions of Scope 1 and 2 GHG emissions by FY 2020 under EO 13514. As part of this effort, federal agencies are required to evaluate sources of GHG emissions, and develop, implement, and annually update an integrated Strategic Sustainability Performance Plan to prioritize agency actions based on performance criteria including lifecycle return on investment. The DOD has developed a Strategic Sustainability Performance Plan to help guide the USMC initiatives to reduce GHG emissions.

The Commandant of the Marine Corps' "USMC Expeditionary Energy Strategy and Implementation Plan (Bases to Battlefield)" (2011) declares the intent and provides USMC direction to implement measures to conserve energy and to reduce GHG emissions and dependence on foreign oil. The plan identifies goals to reduce energy intensity and increase the percentage of renewable electrical energy consumed, and requires base commanders to "evaluate the effectiveness of incorporating emerging technologies" including integrated photovoltaics, cool roofs, daylighting, ground source heat pumps, heat recovery ventilation, high efficiency chillers, occupancy sensors, premium efficiency motors, radiant heating, solar water heating, and variable air volume systems.

On October 16, 2009, the Secretary of the Navy, Ray Mabus, announced five energy targets for the DON and the USMC, as summarized below:

- When awarding contracts, appropriately consider energy efficiency and the energy footprint as additional factors in acquisition decisions.
- By 2012, demonstrate a Green Strike Group composed of nuclear vessels and ships powered by biofuel. By 2016, sail the Strike Group as a Great Green Fleet composed of nuclear ships, surface combatants equipped with hybrid electric alternative power systems running on biofuel, and aircraft running on biofuel.
- By 2015, cut petroleum use in its 50,000 non-tactical commercial fleet in half, by phasing in hybrid, flex fuel, and electric vehicles.

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- By 2020, produce at least half of shore-based installations' energy requirements from alternative sources. Also, 50% of all shore installations will be net zero energy consumers.
- By 2020, half of DON's total energy consumption for ships, aircraft, tanks, vehicles and shore installations will come from alternative sources.
- As part of its efforts to encourage the development of alternative fuels, on January 22, 2010, the DON and the USDA signed an MOU to encourage the development of advanced biofuels and other renewable energy systems.

Table 4-3 provides a summary of the energy conservation projects that have been implemented, are in the process of being implemented, or are planned for future implementation at MCAS Beaufort. Each of the initiatives identified in Table 4-3 are anticipated to reduce emissions of GHGs. The energy initiatives are not proposed to compensate for "ton for ton" emissions reductions to directly compensate for GHG emissions produced by the Proposed Action, but to provide an early response to EO 13514 to factor GHG management into DON proposals and impact analyses. These initiatives, and other GHG reduction programs, will provide concurrent reductions in emissions that will occur at the same time as the Proposed Action.

Location	Project
Hangar 414	Replace hydronic heaters with radiant heaters Replace lighting
Hangar 416	Replace hydronic heaters with radiant heaters Replace lighting
Hangar 418	Replace hydronic heaters with radiant heaters Replace lighting
Building 554, Officer's Club	Replace lighting Exhaust hood timers Ground coupled heat pumps Solar hot water
Building 596, Training Building Library	Lighting replacement
Building 952, Naval Air Warfare Center	Occupancy sensor for HVAC
Building 1142, Child Development Center (CDC)	Install de-superheaters on kitchen refrigeration units Install solar domestic hot water on south facing roof
Building 1242, USMC Community Services Log Cabin	Occupancy sensor for HVAC
Building 1513, Fire Station	Lighting replacement
Building 1539, LB Pool	Solar hot water
Building 1617, Morale, Welfare, and Recreation 7-Day Store	Lighting replacement
Building 1618, Fuel Dispensing Shelter	Lighting replacement
Building 1632, CDC	Solar hot water
Building 1171, Warehouse	Lighting replacement

4.3.9.2 Climate Change Adaptation

In addition to assessing the GHG emissions that would come from the action alternatives and the potential impact on global climate change, the analysis must assess how climate change might impact implementation of the action alternatives and what adaptation strategies could be developed in response. This is a global issue for DOD. As is clearly outlined in the Quadrennial Defense Review (QDR) Report of February 2010 (U.S. Department of Defense 2011), the DOD would need to adjust to the impacts of

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climate change on DOD facilities and military capabilities should such change occur. DOD already provides environmental stewardship at hundreds of installations throughout the U.S. and around the world, working diligently to meet resource efficiency and sustainability goals as set by relevant laws and executive orders. Although the U.S. has significant capacity to adapt to potential climate change, it would pose challenges for civil society and DOD alike, particularly in light of the nation's extensive coastal infrastructure. In 2008, the National Intelligence Council judged that more than 30 U.S. military installations would face elevated levels of risk from potentially rising sea levels. DOD's operational readiness hinges on continued access to land, air, and sea training and test space. Consequently, the DOD must complete a comprehensive assessment of all installations to assess the potential impacts of predicted climate change on its missions and adapt as required.

The QDR Report goes on to illustrate that DOD would work to foster efforts to assess, adapt to, and mitigate the impacts of climate change. Within the U.S., the DOD would leverage the Strategic Environmental Research and Development Program, a joint effort among DOD, the Department of Energy, and the USEPA, to develop climate change assessment tools.

In accordance with EO 13514, the CEQ issued implementing instructions for federal agency climate change adaptation planning (CEQ 2010). In turn, the DOD is currently developing more specific adaptation policy that follows the CEQ instructions and builds upon the strategic direction provided in the QDR Report. As climate science advances, the DON will regularly reevaluate climate change risks and opportunities at the bases in order to develop policies and plans to manage its effects on the operating environment, missions, and facilities. Managing the national security effects of climate change will require the DON to work collaboratively, through a whole-of-government approach, with local, state, and federal agencies.

4.3.10 Utilities and Infrastructure

Potential cumulative effects on utility systems and other infrastructure may result from the past, present, and reasonably foreseeable future actions in the vicinity of the Proposed Action. Impacts to utilities and infrastructure are generally driven by changes in development; therefore, the past, present, and reasonably foreseeable future actions identified in Section 4.3.1 (land use) also apply here. The State-defined service delivery areas for utilities are generally broken down by county; therefore, the ROI for the analysis of cumulative effects on utilities and infrastructure will be limited to McIntosh and Long Counties. The following impact analysis is quantitative based on existing capacity information. Impacts would be considered significant if the Proposed Action combined with past, present, and reasonably foreseeable future actions to exceed current utility capacity.

4.3.10.1 Potable Water, Wastewater, Stormwater, and Solid Waste

Under each of the action alternatives, cumulative impacts on the regional potable water and wastewater resources would be negligible. The permitted water capacity for McIntosh County would be adequate to support all planned development activity within the service area. As previously noted, Long County does not have a permitted water capacity, while both McIntosh and Long Counties are predominately serviced by individual wells and septic systems.

The Coastal Georgia Region contains numerous public and private solid waste facilities for the disposal of solid waste. The region has a remaining permitted capacity of approximately 22 years for municipal waste and approximately 330 years for C&D waste (Thomas & Hutton Engineering and PBS&J 2009). Therefore, implementation of the Proposed Action in conjunction with limited expected increases in solid waste disposal from other actions would not significantly affect the service of the regional solid waste facilities.

There would be no cumulative effect on stormwater infrastructure, which is currently limited to the more urbanized areas of McIntosh and Long Counties.

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4.3.10.2 Electricity/Power and Telecommunications Infrastructure

The implementation of the Proposed Action, in conjunction with the aforementioned past, present, and reasonably foreseeable future actions, would represent an increase to electricity consumption within the Coastal Georgia Region. However, the operational capacity provided by the Georgia Power Company (approximately 2,122,037 kilowatts of power [Georgia Power Company 2010]) would be more than adequate to support both existing and future regional development plans. Further, there are no known projects associated with the Southern Natural Gas pipeline or the Georgia Power electrical transmission lines that would result in cumulative effects. Therefore, the cumulative demand on the capacity of the electrical grid resulting from the Proposed Action in conjunction with the aforementioned past, present, and reasonably foreseeable actions within the ROI would not be significant.

Cumulative effects on telecommunications infrastructure can be described in two unique ways: 1) cumulative effects on the telecommunications network and infrastructure, and 2) cumulative effects from the telecommunications network and infrastructure (which are addressed in Sections 4.3.1, Land Use, and in Section 4.3.6, Airspace). With regard to cumulative effects on the network and infrastructure, the Proposed Action would have no impact. The past, present, and future actions identified within the ROI that would impact the network and infrastructure are expected to have significant positive impacts by increasing network reliability and the quality of service. Cumulative effects from the telecommunications network and infrastructure involve four proposed cell towers in Long County. One of the proposed cell towers would be located west of Acquisition Area 3 and north of Area 1A and would extend into Restricted Area R-3007C. This action could combine with other future actions to create a cumulative effect if such infrastructure were to conflict with the future operation of an expanded TBR.

4.3.10.3 Range Infrastructure

Cumulative effects associated with the site preparation/construction of facilities and related range infrastructure/instrumentation would result in land disturbance activities on TBR within each of the new target areas and along select corridors where linear infrastructure connecting to the range operations center would be required. The only past, present, and future projects that would combine with the Proposed Action involve the construction and use of the existing infrastructure/instrumentation at TBR. The nature of these projects do not cause cumulative effects on the range infrastructure itself, but rather on other resources because of their construction, use, and maintenance. These cumulative effects involve impacts such as soil erosion and compaction, tree and vegetation removal, and the creation of impervious surfaces. The cumulative effects from the construction, use, and maintenance of range infrastructure are discussed under the applicable resource sections.