

McEntire Joint National Guard Base



You are in the McEntire JNGB Section

This page is intended to help you find specific information about McEntire JNGB and to clarify this section's relation to the rest of the Draft EIS.

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Synopsis of Purpose and Need and Proposed Action and Alternatives
Comparison of Impacts

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Detailed Guide for Reading the Draft EIS

← The Preface provides a detailed guide for reading the Draft EIS.

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Purpose and Need for the Air Force F-35A Operational Basing

← Go to Chapter 1 to learn about the purpose and need for the Air Force F-35A Operational Basing.

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→ This section of the Draft EIS presents site-specific and resource-specific details on existing environmental conditions for McEntire JNGB. It also describes the potential environmental consequences of the proposed beddown of the F-35A at the installation.

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Mc1.0 MCENTIRE JOINT NATIONAL GUARD BASE OVERVIEW

This section presents an overview of the 169th Fighter Wing (169 FW) installation at McEntire Joint National Guard Base (JNGB); the specifics of the proposed action as it relates to both the airfield at McEntire JNGB and the associated airspace; construction and modifications required at the installation; changes to personnel; state consultation and associated permits that would be required should McEntire JNGB be selected as one of the beddown locations for the F-35A; and identified public and agency concerns with the proposal.

The 169 FW of the South Carolina Air National Guard (SCANG) is located at McEntire JNGB in Richland County, South Carolina (Figure Mc1.0-1). The base is located approximately 15 miles southeast of Columbia in Richland County. McEntire JNGB occupies 86 facilities on approximately 2,473 acres (Figure Mc1.0-2).



Figure Mc1.0-1. Location of McEntire JNGB

The 169 FW provides support for federal, state, and community interests by providing highly trained personnel and mission-ready equipment for federal contingency missions, as well as state and local emergency missions; protecting life and property; and preserving peace, order, and public safety. The 169 FW currently flies and maintains 24 F-16 aircraft in support of its mission. Being a Joint Base, McEntire JNGB also hosts 44 Army helicopters of various types.

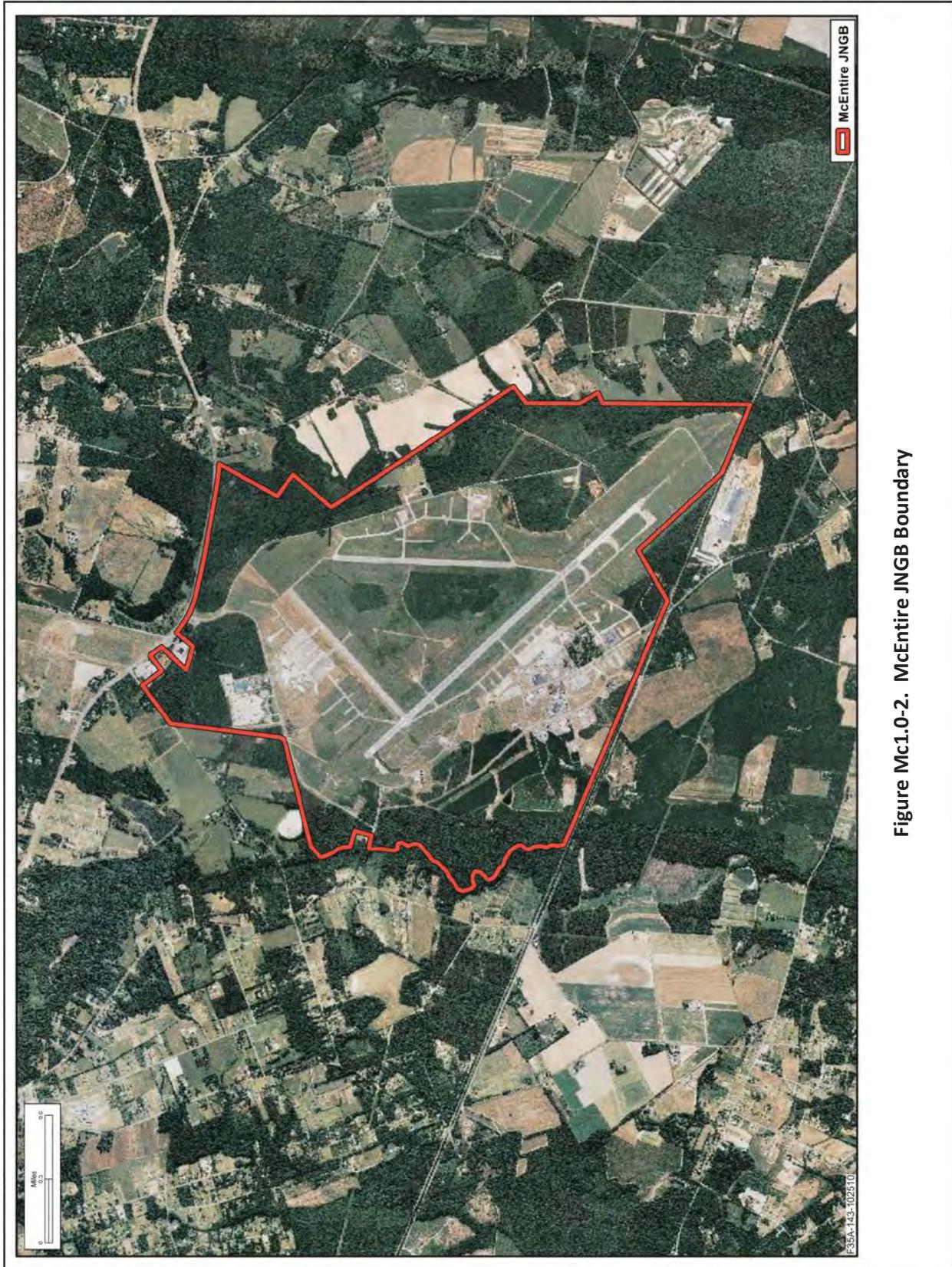


Figure Mc1.0-2. McEntire JNGB Boundary

In the sections that follow, Mc2.0 presents the base-specific description of the proposed action and the two beddown scenarios proposed at McEntire JNGB. Section Mc3.0 addresses baseline conditions and environmental consequences that could result if either of the two scenarios were implemented at McEntire JNGB. Refer to Chapter 3 for a complete and detailed definition of resources and the methodology applied to identify potential impacts. Section Mc4.0 identifies other, unrelated past, present, and reasonably foreseeable future actions in the affected environment and evaluates whether these actions would cause cumulative effects when considered along with the F-35A beddown scenario actions. This section also presents the irreversible and irretrievable resources that would be committed if either of the beddown scenarios were implemented at McEntire JNGB.

Mc2.0 MCENTIRE JNGB ALTERNATIVE (18 AND 24 AIRCRAFT SCENARIOS)

The McEntire JNGB F-35A beddown alternative includes two scenarios; the following presents the elements of these scenarios for the base in Section Mc2.1 and the airspace in Section Mc2.2.

Mc2.1 McEntire JNGB: Base

Four elements of this proposed action have the potential to affect McEntire JNGB. These four elements are: 1) transition from F-16s to F-35As, 2) operations conducted by F-35As, 3) construction and modification projects to support beddown of the F-35A, and 4) personnel changes to meet F-35A requirements. Each is explained below.

Mc2.1.1 Aircraft Transition

Under the proposed action, either 18 (Air National Guard [ANG] Scenario 1) or 24 (ANG Scenario 2) F-35A aircraft would be beddown at McEntire JNGB. Under either scenario, the beddown would be completed by 2020, with delivery of the full complement of F-35As. The F-35As would replace the 24 F-16s, and the timing of the drawdown would generally match the arrival of F-35As. Replacement under either scenario would ensure that the base operated no more than 24 total aircraft at any time.

McEntire JNGB also supports tenant units with other aircraft types including the C-130, AH-64, CH-47, OH-58, and UH-60. The airfield also receives use by various transient aircraft (visitors), including the A-10, F-15E, and C-5. At the conclusion of the beddown action, the base would support 18 or 24 F-35A aircraft; existing tenant units, operations, and airfield use by transients would remain unaffected.

Mc2.1.2 Airfield Operations

The 169 FW at McEntire JNGB is an integral component of the Combat Air Forces (CAF). The CAF deploys forces worldwide to meet threats and ensure the security of the United States (U.S.). To fulfill this rule, the 169 FW must train as it would fight.

The U.S. Air Force (Air Force) anticipates that by 2020, the total of 18 F-35A operational aircraft under ANG Scenario 1 would fly 5,486 airfield operations per year, or 24 aircraft under ANG Scenario 2 would fly 7,296 airfield operations. Compared to the baseline 12,007 F-16 airfield operations, both beddown scenarios would result in notable decreases in operations. Based on proposed requirements and deployment patterns, the F-35A operational aircraft would fly additional operations during

deployments, or at other locations for exercises or in preparation for deployments. In addition, F-35A aircraft associated with McEntire JNGB would participate in remote training exercises. Some of these missions could involve ordnance delivery training or missile firing exercises at approved ranges such as the Nevada Test and Training Range near Nellis Air Force Base (AFB), Utah Test and Training Range (UTTR), or Eglin AFB’s overwater ranges in the Gulf of Mexico.

Baseline F-16 operations comprise 39 percent of total operations (31,074) at the airfield. The 169 FW averages 240 flying days per year. Under ANG Scenario 1, the 5,486 F-35A annual airfield operations at McEntire JNGB would represent a decrease of 6,521 operations or 54 percent less than F-16 baseline levels, or 21 percent for all airfield operations (Table Mc2.1-1). If ANG Scenario 2 were implemented, 4,711 (39 percent) fewer operations than the based F-16s would be flown and a 15.2 percent decline in all operations would result. These decreases in total operations occur due to the reduction in aircraft (a change from 24 F-16s to 18 F-35As in ANG Scenario 1) and in the reduction of airfield operations per aircraft with the F-35A. The F-35As would employ generally similar departure and landing procedures as currently used by the F-16s at the base; however, the new aircraft would fly fewer closed patterns. Additionally, the Air Force anticipates the F-35A would average 260 flying days per year, thereby reducing the operations per day by 29 in ANG Scenario 1 and 22 under ANG Scenario 2.

Table Mc2.1-1. McEntire JNGB Baseline F-16 and Proposed F-35A Operations		
<i>Baseline</i>	<i>ANG Scenario 1</i>	<i>ANG Scenario 2</i>
<i>F-16s</i>	<i>18 F-35As</i>	<i>24 F-35As</i>
12,007	5,486	7,296
Net Change	-6,521	-4,711

Source: Wyle 2011.

F-35A operations would adhere to existing restrictions, avoidance procedures, and the quiet-hours program at McEntire JNGB. The F-16s currently fly 2.3 percent of their operations during environmental night (10:00 p.m. to 7:00 a.m.), with 4 percent of total airfield operations occurring during this period. While the F-35As would continue to fly after dark combat missions, the aircraft’s capabilities and expected tactics would reduce the amount of training for night flying. As such, the Air Force expects the 169 FW could accomplish the necessary training before 10:00 p.m. and would not need to fly any environmental night operations at McEntire JNGB. On rare occasions, weather contingencies or special mission training may require operation after 10:00 p.m.

Mc2.1.3 Construction

To support proposed F-35A operations, additional infrastructure and facilities would be required at McEntire JNGB (Table Mc2.1-2) under either ANG Scenario 1 or 2. A total of three infrastructure improvement projects would be implemented from 2013 to 2015 (Figure Mc2.1-1). Two projects would consist of internal modifications with no new ground disturbance while the third project would affect a small area.

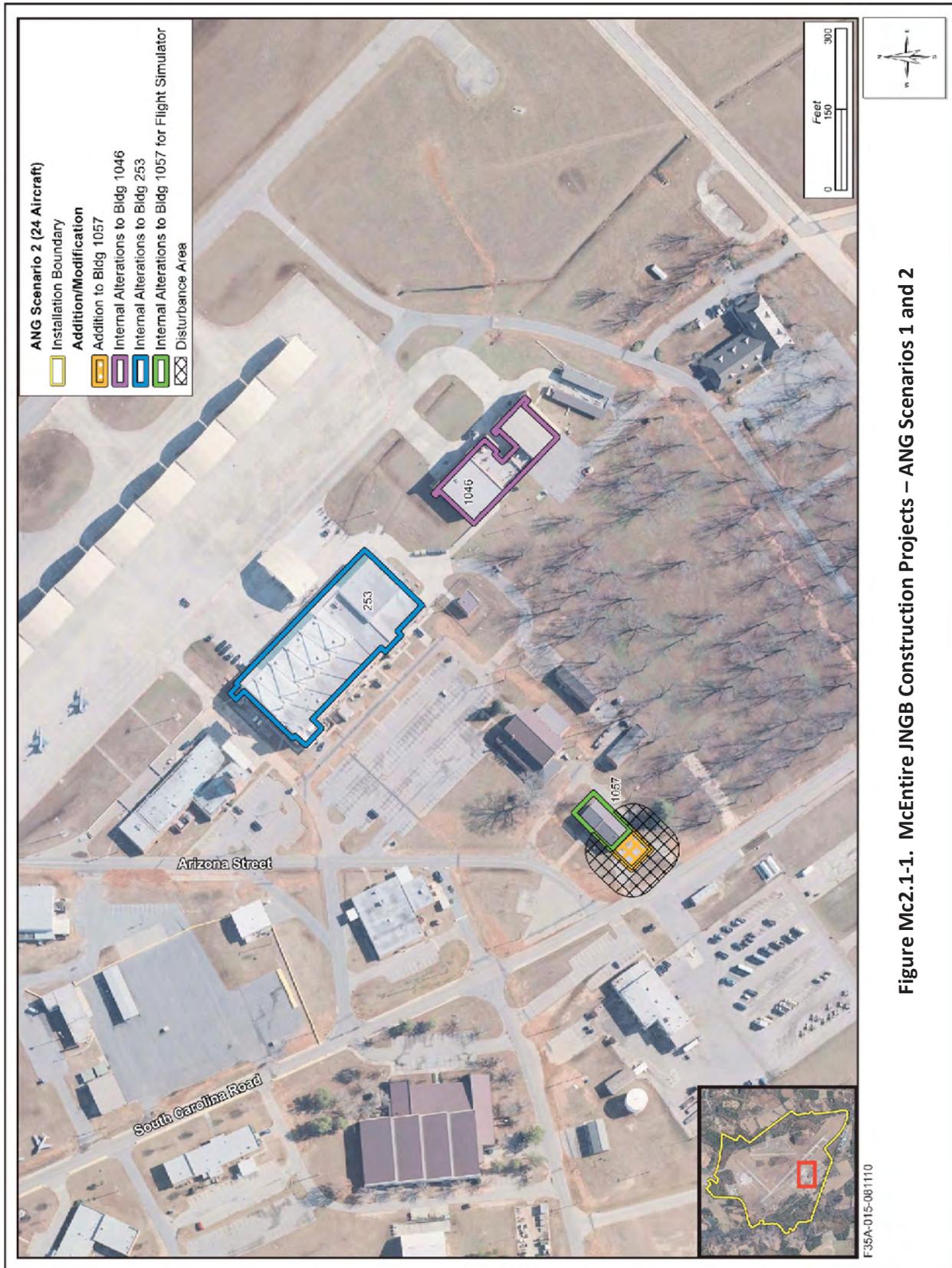


Figure Mc2.1-1. McEntire JNGB Construction Projects – ANG Scenarios 1 and 2

Table Mc2.1-2. Proposed Construction and Modifications for McEntire JNGB			
<i>Year</i>	<i>Action</i>	<i>Total Affected Area (acres)</i>	<i>New Impervious Surface (acres)</i>
2013	Provide 28/270V DC Power in Building 253 (6 Bays)	0	0
2013	Provide 28/270V DC Power in Building 1046 (1 Bay)	0	0
2015	Addition and Alteration to Building 1057 ECM Pod Shop for new 2-Bay F-35A Simulator	0.76	0.06
Total	Cost: \$1,175,000	0.76	0.06

In total, the construction, modification, repair, and infrastructure improvements would increase only one facility footprint, as all improvements would be internal with the exception of the addition to Building 1057 for a new 2-Bay F-35A Simulator. Total affected area refers to the total area covered by the facility construction footprints, plus the surrounding lands where construction-related clearing and grading would occur. For those projects with internal alterations only, the proposed construction would occur within an existing facility and therefore, no surrounding lands would be affected. The overall cost of the improvements would be expected to be approximately \$1,175,000.

Mc2.1.4 Personnel Changes

Beddown of the F-35A operational aircraft at McEntire JNGB would require sufficient and appropriately skilled personnel to operate and maintain the new aircraft and provide other necessary support services. Currently, authorized positions for the F-16s at the base total 1,554 and base authorized personnel, including Army, total 2,708. Overall, 1,183 personnel would be required to support 18 F-35A operational aircraft (ANG Scenario 1) and 1,554 personnel to support 24 operational F-35A aircraft (ANG Scenario 2). For McEntire JNGB, the F-35A personnel positions would be drawn from the equivalent positions associated with existing F-16 manpower authorizations. As such, total personnel would decrease by 371 due to a net reduction of based aircraft under ANG Scenario 1 (18 F-35As), or remain the same with the one-for-one replacement of F-35As for F-16s under ANG Scenario 2 (Table Mc2.1-3). No changes to civilian government personnel or contractors have been identified.

Table Mc2.1-3. Proposed Personnel Changes: McEntire JNGB					
	<i>Baseline</i>	<i>Proposed Scenarios</i>		<i>Per Scenario Net Change</i>	
	<i>F-16 Personnel</i>	<i>F-35A Personnel</i>		<i>ANG 1</i>	<i>ANG 2</i>
		<i>ANG 1</i>	<i>ANG 2</i>		
Total	1,554	1,183	1,554	-371	0

Mc2.2 McEntire JNGB: Training Airspace and Ranges

In Chapter 2, section 2.1.2, Table 2-7, airspace units were identified that constitute baseline conditions. However, in 2011 the Federal Aviation Administration (FAA) charted and reconfigured airspace adjacent to and surrounding Avon Park Air Force Range (APAFR). This reconfiguration (unrelated to any F-35A actions) will cause a change in how aircraft use these airspace units and, therefore, needs to be accounted for in this analysis. Under baseline conditions, McEntire JNGB F-16 aircraft used APAFR airspace sporadically and rarely, primarily for air-to-ground training. Under the no-action alternative, these aircraft will continue operating in APAFR but in a different manner than what is found under

baseline conditions. Figures Mc2.2-1 through Mc2.2-4 illustrate both the airspace unit reconfigurations followed by cross sections of their altitude structures to better illustrate where aircraft operate.

Mc2.2.1 Airspace Use

As the replacement for legacy fighter aircraft, the F-35As would conduct missions and training programs necessary to fulfill its multi-role responsibilities (refer to Chapter 2). All F-35A flight activities would take place in existing airspace, so no airspace modifications would be required. The Air Force expects the F-35A would operate in the airspace currently associated with the base somewhat differently than the legacy aircraft now using that airspace. These differences derive from enhanced capabilities and changed requirements for the F-35A.

The 169 FW uses several airspace units (Table Mc2.2-1, and Tables Mc2.2-1 and Mc2.2-2)). Airspace includes overland Military Operations Areas (MOAs), Restricted Areas, Air Traffic Control Assigned Airspace (ATCAA), as well as offshore Special Operating Area (SOA) and Warning Areas (refer to Chapter 2 for definitions). F-35A operations would, however, emphasize use of different airspace units than the F-16s. The 169 FW currently uses this airspace for over 95 percent of their operations. In addition, the 20th Fighter Wing (20 FW) from Shaw AFB also uses some of this airspace.

Bulldog, Gamecock, and Coastal Townsend support 93 percent of training operations by the F-16s from McEntire JNGB. Within these airspace units, the 169 FW accounts for about 24 percent of the activity. Poinsett and Avon Park receive much less use, contributing 4 and 2 percent, respectively, to the total operations by the 169 FW. Overwater units such as Warning Areas and the Mid-Atlantic Electronic Warfare Range (MAEWR) also receive use.

Although the F-35As would perform the F-16 missions, they represent a different aircraft with vastly different capabilities, and would fly somewhat differently. These differences include use of higher altitudes overall, combined use of existing airspace, reduced night operations, fewer supersonic events, and higher altitudes for supersonic flights.

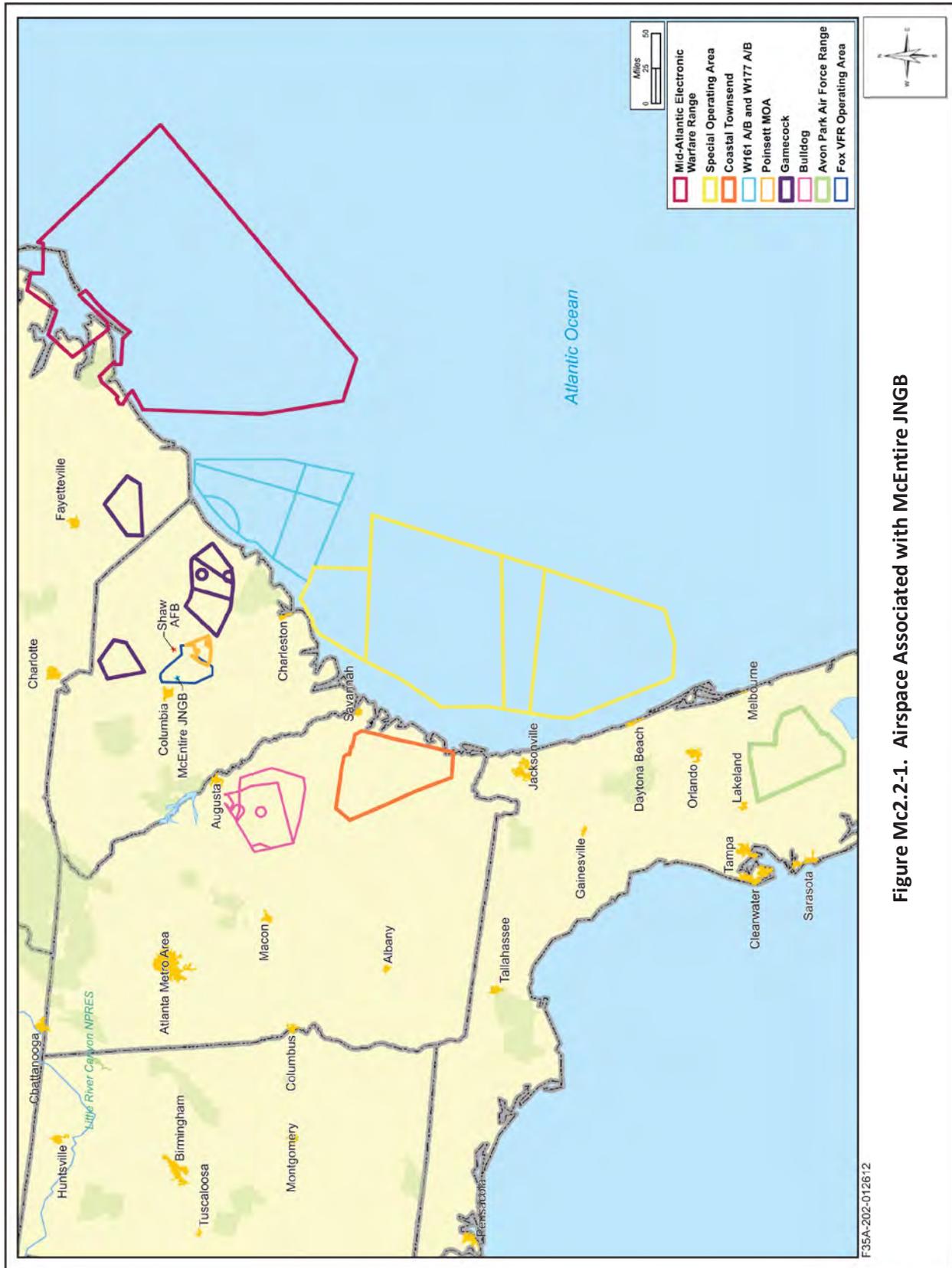


Figure Mc2.2-1. Airspace Associated with McEntire JNGB

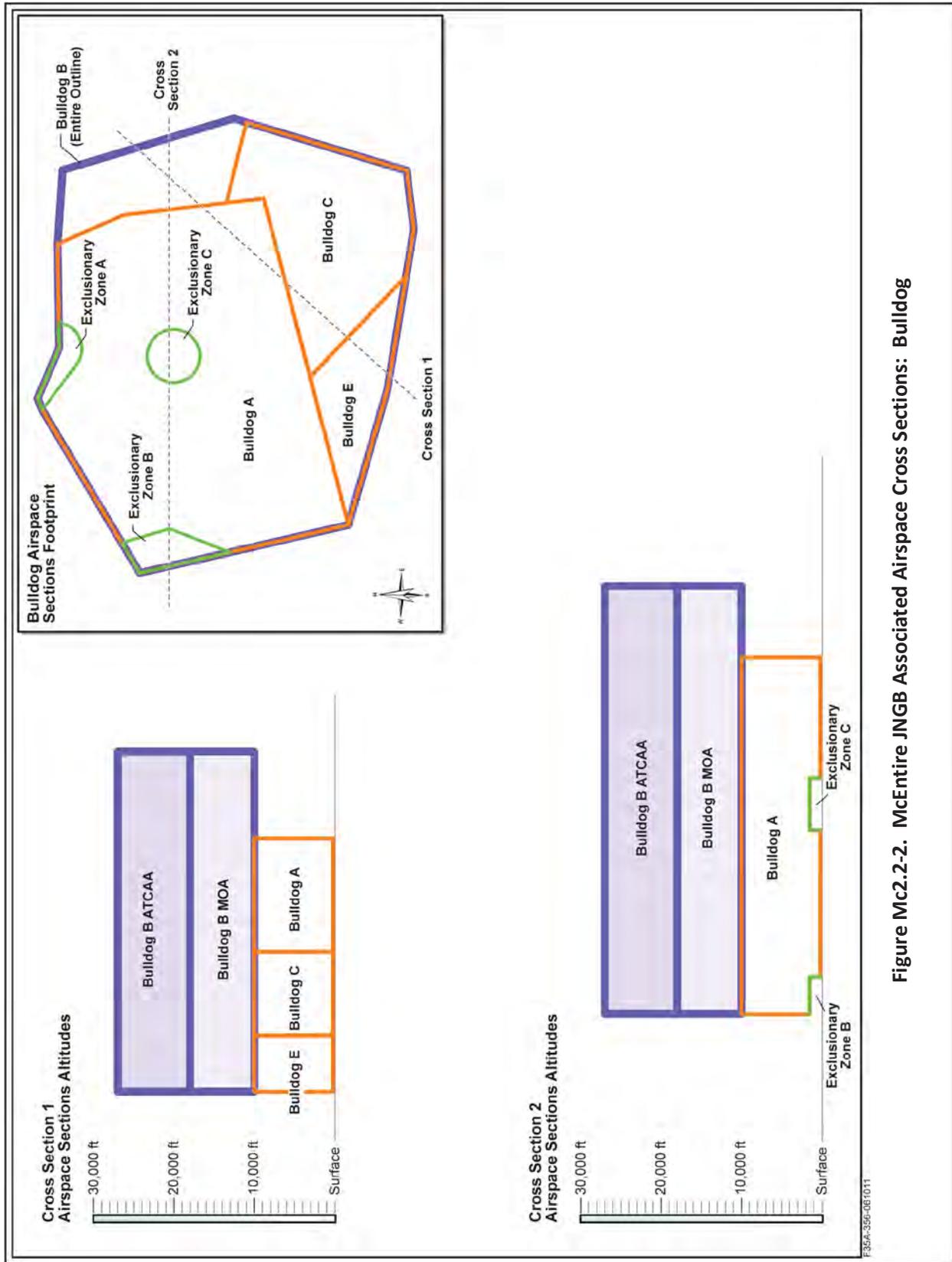
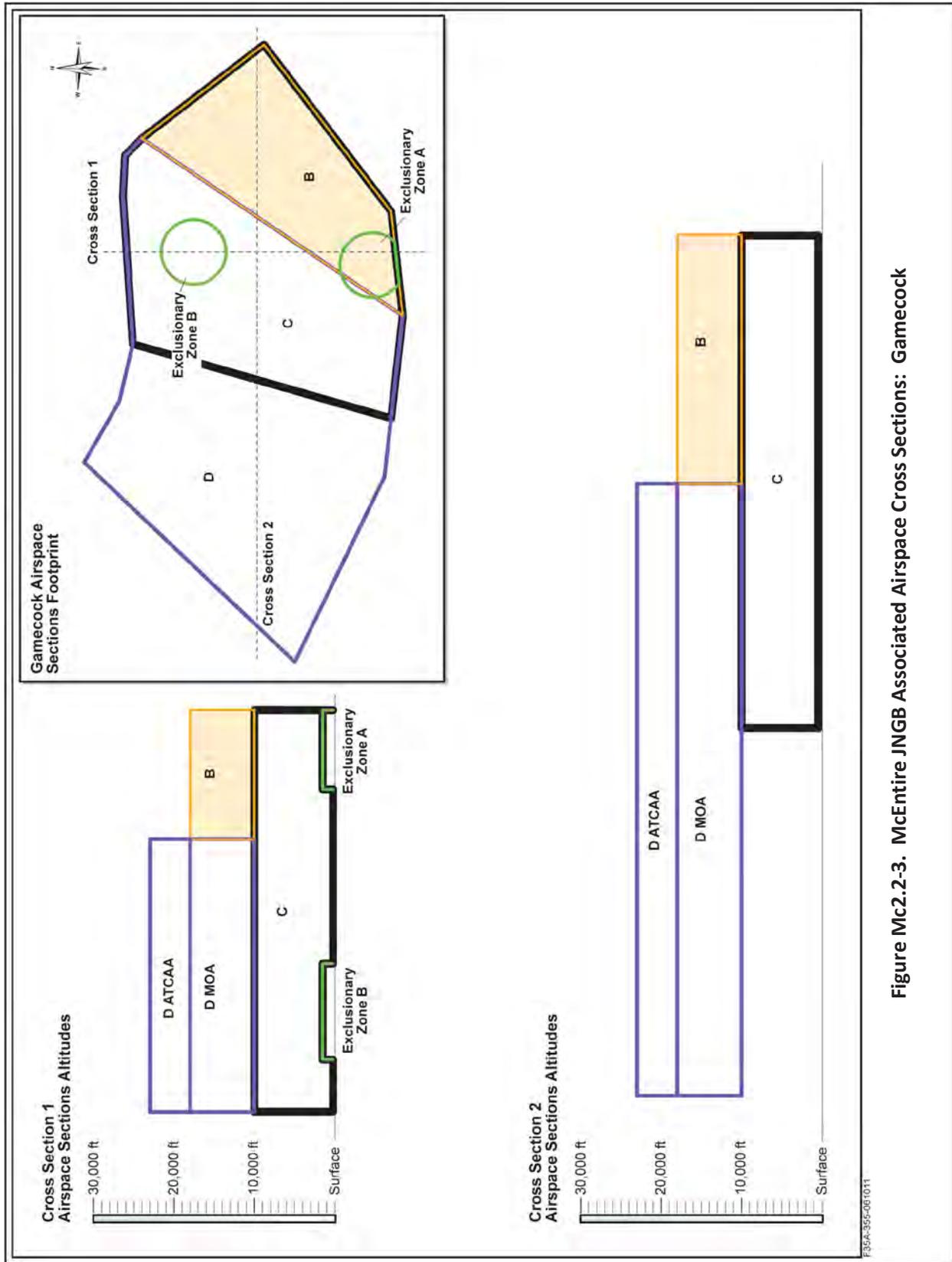


Figure Mc2.2-2. McEntire JNGB Associated Airspace Cross Sections: Bulldog



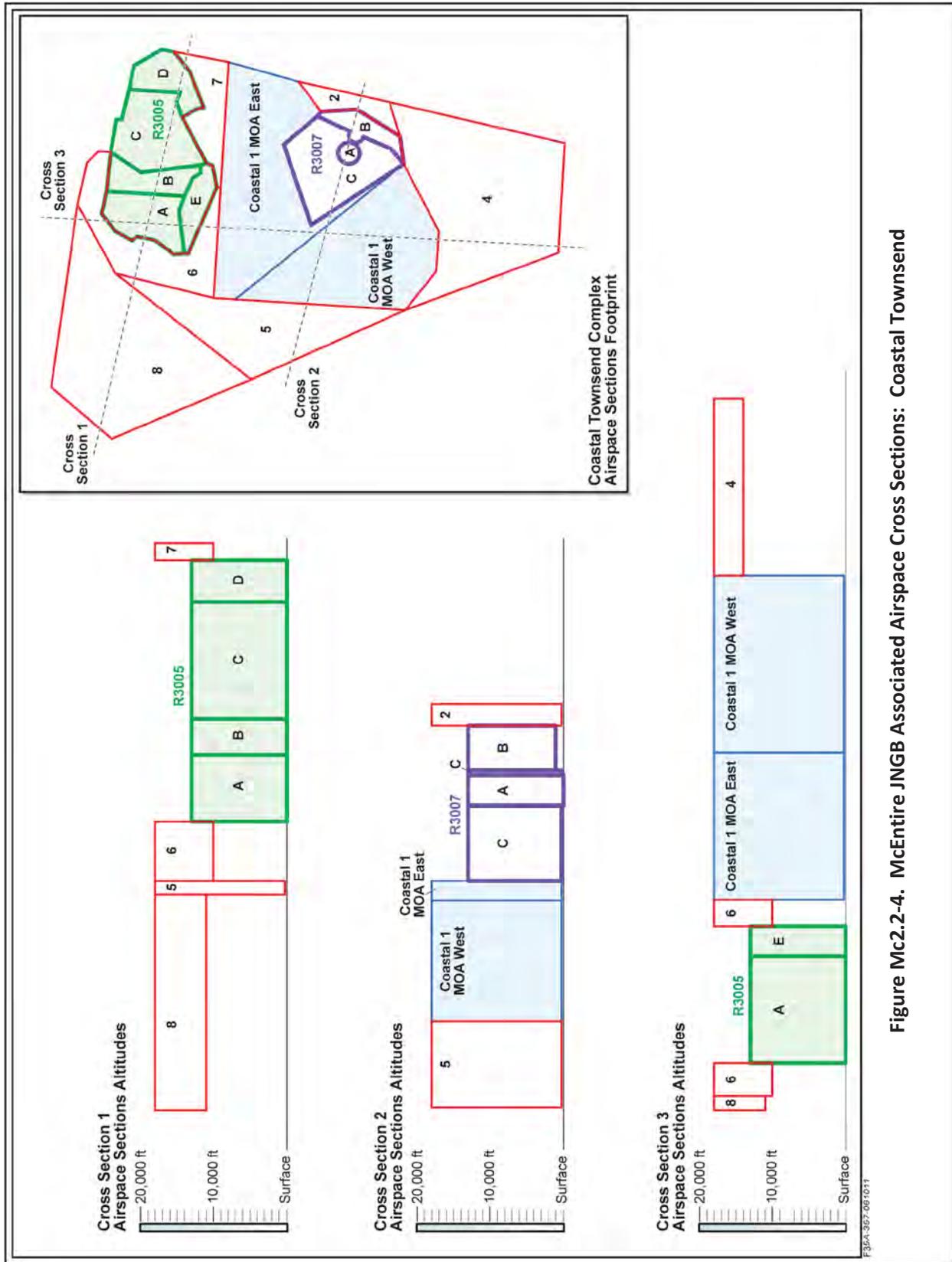


Figure Mc2.2-4. McEntire JNGB Associated Airspace Cross Sections: Coastal Townsend

Table Mc2.2-1. McEntire JNGB Training Airspace			
Training Area Name	Airspace	Floor (feet MSL unless otherwise noted)	Ceiling (feet MSL unless otherwise noted)
Avon Park Air Force Range (APAFR)	Avon MOA E	500 AGL	18,000
	Basinger MOA	500 AGL	5,000
	Marian MOA	500 AGL	5,000
	Lake Placid MOA North/East/West	7,000	18,000
	R-2901 A/C	Surface	To BNI 14,000
	R-2901 B	14,000	To BNI 18,000
	R-2901 D/E/H	1,000 AGL	To BNI 4,000
	R-2901 F	4,000	To BNI 5,000
	R-2901 G	Surface	To BNI 5,000
	R-2901 I	1,500	To BNI 4,000
	R-2901 J	18,000	23,000
	R-2901 K	23,000	31,000
	R-2901 L	31,000	40,000
	R-2901 M	4,000	To BNI 14,000
R-2901 N	4,000	To BNI 14,000	
Bulldog	Bulldog MOA A	500 AGL	10,000
	Bulldog MOA B	10,000	18,000
	Bulldog MOA D	500 AGL	17,000
	Bulldog B ATCAA	18,000	27,000
Poinsett	Poinsett MOA	300 AGL	2,500
	R-6002 A	Surface	To BNI 13,000
	R-6002 B	13,000	To BNI 18,000
	R-6002 C	18,000	23,000
W-161	W-161 A ¹	Surface	62,000
	W-161 B ¹	Surface	30,000
W-177	W-177 A ¹	Surface	50,000
	W-177 B ¹	Surface	30,000
Gamecock	Gamecock MOA A	7,000	18,000
	Gamecock MOA B	10,000	18,000
	Gamecock MOA C	100 AGL	10,000
	Gamecock MOA D	10,000	18,000
	Gamecock MOA I	100 AGL	6,000
	Gamecock D ATCAA	18,000	23,000
Fox VFR Operating Area	Swamp	Surface	5,000
	Fox VOA A	5,000	9,500
	Fox VOA B	5,000	9,500
	R-6001 A	Surface	3,200
	R-6001 B	3,200	23,000

Table Mc2.2-1. McEntire JNGB Training Airspace (con't.)

Training Area Name	Airspace	Floor (feet MSL unless otherwise noted)	Ceiling (feet MSL unless otherwise noted)
Coastal Townsend	Coastal MOA 1/2	300 AGL	18,000
	Coastal MOA 4	14,000	18,000
	Coastal MOA 5	300 AGL	18,000
	Coastal MOA 6/7	10,000	18,000
	Coastal MOA 8	11,000	18,000
	R-3005 A-E	Surface	To BNI 13,000
	R-3007 A	Surface	To BNI 13,000
	R-3007 B	1,200 AGL	To BNI 13,000
	R-3007 C	100 AGL	To BNI 13,000
	R-3007 D	13,000	25,000
MAEWR	Pamlico B	8,000	18,000
	W-122	Surface	Unlimited
	R-5306 A	Surface	To BNI 18,000
	R-5306 C	1,200	To BNI 18,000
	R-5306 D/E	Surface	To BNI 18,000
	Core MOA	3,000	18,000
	Neuse ATCAA A/B	18,000	23,000
SOA	W-134	4,500	Unlimited
	W-157 A	Surface	43,000
	W-158 A	Surface	43,000
	W-159 A	Surface	43,000
	Strike ALTRV	16,000	20,000

Source: Department of Defense (DoD) 2010, FAA charted airspace as of July 2011 (FAA 2011).

Notes: MSL = mean sea level; AGL = above ground level; BNI = but not including.

All MOAs extend to 18,000 feet MSL unless otherwise noted.

¹Supersonic flight authorized above 10,000 feet MSL.

The F-35A would fly more of the time at higher altitudes than the F-16 (Table Mc2.2-2), operating 80 percent of the time above 23,000 feet mean sea level (MSL). This would result in the F-35A aircraft conducting most of their operations in the ATCAAs and higher altitude regimes of the airspace.

Table Mc2.2-2. Baseline and Proposed Altitude Distribution

Altitude (feet)	Percentage of Use		
	F-16		F-35A
	Air-to-Ground	Multi-role	Multi-role
500 –1,000 AGL	1%	2%	2%
1,000 –5,000 AGL	3%	3%	3%
5,000 –15,000 MSL	6%	5%	5%
15,000 –23,000 MSL	60%	10%	10%
>23,000 MSL	30%	80%	80%

At the conclusion of either beddown scenario, total annual operations would decrease from baseline levels in all of the airspace units (Table Mc2.2-3). Although overall decreases would occur, the need to accommodate the F-35As different training capabilities and requirements would result in a different distribution of operations within the airspace than under baseline conditions. For Bulldog, operations would decrease by 18 percent for ANG Scenario 1 and 15 percent for ANG Scenario 2. Operations in Gamecock would decrease by 8 percent under ANG Scenario 1 and 7 percent for ANG Scenario 2.

Overall use by the F-35As in the airspace associated with McEntire JNGB would decrease by about 1,300 to 1,600 operations annually under the beddown scenarios. Due to the shift in aircraft and training, operations in Poinsett would decrease by about 2 percent, whereas operations in Coastal Townsend would decrease by 7 and 5 percent for ANG Scenarios 1 and 2. For Avon Park, McEntire JNGB F-35 operations would be scheduled, but only for limited ordnance delivery training. As noted previously (Section 3.1.3), conditions in the Warning Areas, SOA, and the MAEWR would not change measurably so they are not analyzed further.

Table Mc2.2-3. Comparison of ANG Scenarios – Airspace Operations

<i>Airspace Unit¹</i>	<i>Total Baseline²</i>	<i>Legacy Aircraft Baseline³</i>	<i>ANG Scenario</i>	<i>F-35A Operations</i>	<i>Net Change (Total)</i>	<i>Percent Change Total</i>
Bulldog	5,839	1,532	1	494	-1,038	-18%
			2	657	-857	-15%
Fox VOA	50	44	1	25	-19	-38%
			2	33	-11	-22%
Gamecock	2,848	350	1	123	-227	-8%
			2	164	-186	-7%
Coastal Townsend	3,216	438	1	198	-240	-7%
			2	263	-175	-5%
Poinsett	3,035	88	1	25	-63	-2%
			2	33	-55	-2%
APAFR	7,664	44	1	25	-19	-0%
			2	33	-11	-0%
Total⁴	22,652	2,496	1	890	-1,606	-7%
			2	1,183	-1,313	-6%

Notes: ¹Excludes W-161/177 and MAEWR per rationale with Chapter 3.

²Includes only based F-16s from McEntire JNGB.

³Includes only based aircraft from McEntire JNGB.

⁴Totals provided only as general trend of activity and not directly linked to the number of operations generated from an airfield.

Like the F-16s, the F-35A would fly approximately 30 to 90-minute-long missions, including take-off, transit to and from the training airspace, training activities, and landing. Depending upon the distance and type of training activity, the F-35A would spend between 20 to 60 minutes in the training airspace. The F-16s from the 169 FW currently fly approximately 2.8 percent of their operations during environmental night (10:00 pm to 7:00 am). As noted above, it is expected that the F-35As would not fly during this period except for contingencies and special mission training.

To train with the full capabilities of the aircraft, the F-35A would employ supersonic flight at altitudes and within airspace already authorized for such activities. Due to the F-35A’s mission and the aircraft’s capabilities, the Air Force anticipates that approximately 10 percent of the time spent in air combat training would involve supersonic flight. Supersonic flight during air combat training would be performed only in overwater Warning Areas (more than 15 nautical miles [nm] offshore) and not in overland airspace used by the 169 FW. All supersonic flight would be conducted above 15,000 feet MSL, with 90 percent occurring above 30,000 feet MSL. In comparison, the F-16s commonly conduct supersonic flight about 7.5 percent of the time in air combat maneuvers; such flights are predominantly (84 percent) performed between 10,000 and 30,000 feet MSL.

Mc2.2.2 *Ordnance Use and Defensive Countermeasures*

Most air-to-ground training would be simulated, where nothing is released from the aircraft. The primary air-to-ground ordnance carried by the F-35A is expected to be the guided bomb unit (GBU)-31 variant of the Joint Direct Attack Munition (JDAM), which uses a 2,000-pound general-purpose Mark-84 bomb. Optimal internal loads could include GBU-39 small diameter bombs and a wide variety of air-to-ground missiles, dispensers, and guided weapons. Use of JDAMs or other ordnance would be rare and would only occur at ranges authorized for its use (Avon Park and Poinsett). However, during most training missions, no missiles or bombs would be carried on the aircraft. Since the F-35A carries a cannon, occasional strafing training would occur on approved ranges and targets.

Like the F-16, the F-35A would employ flares as defensive countermeasures in training. Flares are the principal defensive mechanisms dispensed by military aircraft to avoid attack by enemy air defense systems. Because of evolving tactics, mission scenarios, and its stealth characteristics, the F-35A is expected to use fewer defensive countermeasures (i.e., flares) per training mission. However, because the F-35A is so new, this reduction in flare use cannot as yet be defined. For the purposes of this analysis, it is estimated that F-35A flare expenditure would match that of F-16s on a per operation basis for the 169 FW. Chapter 2, Section 2.1.2, provides details on the composition and characteristics of flares.

Flares would be used only in airspace units currently approved for their use. Under the proposed action at McEntire JNGB, F-35As would use up to 20,000 flares per year (in 2019 and after) in approved airspace units. The amount of flares used in each authorized airspace unit would be proportional to the number of operations conducted by the F-35As. Since all operations would decrease in the airspace for both scenarios, the annual flare use would not increase over baseline. Based on the emphasis on flight at higher altitudes for the F-35A, roughly 90 percent of flare releases would occur above 15,000 feet MSL. At this altitude, most flares would be released more than 21 times higher than the minimum altitude required (700 feet) to ensure complete consumption.

Mc2.3 *Environmental Consequences Compared to Baseline Conditions*

Analysis of baseline conditions provides a benchmark that enables decision-makers to evaluate the environmental consequences of the proposed beddown alternatives at each base. For each resource, this base-specific section uses description of existing conditions (i.e., no beddown) as the evaluation of the baseline. Changes to the baseline that are attributable to the proposed action are then examined for each resource. Thus, the change (increase or decrease) in the resource at each installation can be compared for all alternative locations.

Mc2.4 *Permits and Consultations*

McEntire JNGB operates under agreements with a series of environmental permitting agencies for such resources as air, water, and cultural resources. The following section describes the permits that are required for the proposed action.

- Facilities that discharge stormwater from certain activities (including industrial activities, construction activities, and municipal stormwater collection systems) require Clean Water Act (CWA) Section 402, National Pollutant Discharge Elimination System (NPDES) permits for those activities disturbing greater than 1 acre. In addition, federal projects with a footprint larger than 5,000 square feet must maintain predevelopment hydrology and prevent any net increase in stormwater runoff as outlined in Unified Facilities Criteria (UFC) 3-210-10, *Low Impact Development*, and consistent with the U.S. Environmental Protection Agency's (USEPAs) *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act* (December 2009).
- As applicable, McEntire JNGB will coordinate with the USEPA, Region IV and South Carolina Department of Health and Environmental Control (DHEC) regarding proposed construction near Environmental Restoration Program (ERP) sites on base.
- A formal conformity determination is required for federal actions occurring in nonattainment or maintenance areas when the total direct and indirect stationary and mobile source emissions of nonattainment pollutants or their precursors exceed *de minimis* thresholds. In addition, a formal conformity determination is required for actions defined as regionally significant (i.e., if the total emissions from a federal action exceed 10 percent of a nonattainment area's emission inventory for that pollutant).
- Personnel conducting construction and/or demolition activities will strictly adhere to all applicable occupational safety requirements during construction activities.
- If necessary, sampling for asbestos-containing material (ACM) and lead-based paint (LBP) would occur prior to demolition activities for those buildings not previously tested and materials would be handled in accordance with Air Force policy. If ACM or LBP are present, McEntire JNGB would employ appropriately trained and licensed contractors to perform the ACM and/or LBP removal work and would notify the construction contractors of the presence of ACM and/or LBP so that appropriate precautions could be taken to protect the health and safety of the workers.

State and project-specific government-to-government consultation and their status are described below.

- McEntire JNGB is consulting with the South Carolina and Georgia State Historic Preservation Offices (SHPOs) for a review of effects to resources listed in or eligible for listing in the National Register of Historic Places (NRHP) under Section 106 of the National Historic Preservation Act (NHPA).
- On November 27, 1999, the DoD promulgated its Annotated American Indian and Alaska Native Policy, which emphasizes the importance of respecting and consulting with tribal governments on a government-to-government basis. This Policy requires an assessment, through consultation, of the effect of proposed DoD actions that may have the potential to significantly affect protected tribal resources, tribal rights, and Indian lands before decisions are made by the respective services (DoD American Indian/Alaska Native Policy), as does DoD Instruction 4710.02, *Interaction with Federally Recognized Tribes* (September 14, 2006). McEntire JNGB is

conducting government-to-government consultation with potentially affected American Indian tribes under the associated airspace.

Mc2.5 Public and Agency Concerns

Scoping meetings were held February 1 through 4, 2010 in Sumter, Eastover, and Kingstree, South Carolina; and Augusta, Georgia. Because of the proximity of McEntire JNGB and Shaw AFB, public scoping meetings were advertised and attended jointly. One-hundred thirty-five people attended the four scoping meetings. All comments received at the scoping meetings for McEntire JNGB and Shaw AFB were in support of beddown of the aircraft at these locations. In terms of letters received, there were a total of 48 letters. Of these, 4 were from agencies (South Carolina SHPO, Natural Resources Conservation Service [NRCS], Georgia Department of Natural Resources [DNR], South Carolina State Budget and Control Board), 1 from an American Indian Tribe (Catawba Indian Nation), and 30 were sent from the general public, with 1 expressing general opposition to the proposal and 2 concerned about noise. The remaining 27 were all in general support of beddown of these new aircraft in South Carolina. Thirteen letters were from organizations.

One comment mentioned that noise could potentially become an issue, and another comment noted that it was important that regardless of the impacts to the area, the Air Force must keep the public well-informed.

During the scoping meetings and throughout the scoping period, people were given the opportunity to ask questions and provide comments on the F-35A beddown proposal. Some of the questions included:

- Is the noise output of the F-35A less than the F-16? (see Table Mc3.2-1)
- What would be the effect on wetlands from the use of the Poinsett Range? (see Section 3.8.2)
- How would the beddown of the F-35A aircraft affect local aviation and the local economy? (see Section Mc3.1 for aviation and Mc3.11.1.2)

Mc3.0 MCENTIRE JNGB AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Mc3.1 Airspace Management and Use

Mc3.1.1 Base

Mc3.1.1.1 Affected Environment

McEntire JNGB is located approximately 16 miles southeast of Columbia, South Carolina, and approximately 20 miles west of Shaw AFB. The 2,400-acre installation is owned by the U.S. Government and is operated by the SCANG. Currently, the 169 FW flies and maintains 24 F-16 Fighting Falcon aircraft in support of its mission for the SCANG.

A total of over 31,000 operations were conducted at McEntire JNGB under baseline conditions, including approximately 12,000 169 FW operations, and over 18,000 rotary wing operations by the Army National Guard. For many decades, aircraft based at McEntire JNGB have flown in a local airspace environment that includes eight regional or military airfields within a 30 mile area. No comments were received during the public scoping period revealing conflict with civil or commercial aviation.

Mc3.1.1.2 Environmental Consequences

Beddown of one or more F-35A operational units at McEntire JNGB would decrease airfield operations by 21 percent under beddown ANG Scenario 1, or 15 percent under ANG Scenario 2 (Table Mc3.1-1). With the F-35As, the 169 FW would be expected to average 260 annual flying days. Combined with the overall decrease in operations, this change would also reduce daily operations. This decrease in operations would not affect airspace management and use within the local air traffic environment. No changes to McEntire JNGB terminal airspace or base arrival and departure procedures would be required to accommodate the F-35A aircraft performance or airfield operations. Therefore, effects on airspace use in the local air traffic environment would be negligible.

Table Mc3.1-1. Comparison of ANG Scenarios – Airfield Operations			
<i>Aircraft</i>	<i>Baseline</i>	<i>ANG Scenario 1</i>	<i>ANG Scenario 2</i>
Based F-16	12,007	-12,007	-12,007
Based Army helicopters/other aircraft	18,485	18,485	18,485
Transients ¹	582	582	582
F-35A	-	5,486	7,296
Total	31,074	24,553	26,363
Percent Change from Baseline	-	-21%	-15%

Source: Wyle 2011.

Note: ¹Includes F-15C, KC-135, C-21, A-10, and others.

Mc3.1.2 Airspace

Mc3.1.2.1 Affected Environment

The affected environment for McEntire JNGB consists of MOAs, ATCAAs, and Restricted Areas (refer to Table Mc2.2-1 and Figure Mc2.2-1) which the F-35A would use on a continuing basis for training. Operations would continue in Warning Areas, the MAEWR, and SOA but as described previously (Section 3.1.3), these units warrant no further detailed analysis.

Federal airways, also known as Victor routes, are civil airways below 18,000 feet MSL. One Federal Airway (V70) transverses the southeastern portion of the Bulldog B MOA, and one (V437), transverses the Gamecock D MOA. There are four high-altitude jet routes overlying the Bulldog B MOA, including J40, J53, J81, and J85. Five jet routes also overlie the Gamecock D MOA: J55, J79, J121, J165, and J210.

The Bulldog MOAs overlie eastern Georgia. The coincident portions of the Bulldog A and B MOAs overlie two area civil airports. One public airport, Wrens Memorial, is geographically situated north of Bulldog A/B, but the airspace supporting operations at the airport extends into the northern portion of the MOAs. The portion of the Bulldog B MOA extending to the south and east overlies three civil airports. Several private fields underlie the Bulldog MOAs as well.

The Gamecock MOAs overlie eastern South Carolina. Gamecock A MOA overlies one civil airport. Gamecock B MOA also overlies one civil airport; Gamecock C and D MOAs overlie two civil airports. One public airport, Lake City Evans, is geographically situated north of the Gamecock D MOA, but the airspace supporting airport operations extends into the northern portion of the MOA.

Mc3.1.2.2 Environmental Consequences

Selection of McEntire JNGB for 18 or 24 of the F-35A operational aircraft would not result in impacts to airspace use and management throughout this region. The proposed action would not require any changes to the current lateral or vertical configuration of the analyzed airspace units, nor would it alter their normally scheduled times of use. Beddown of the F-35A at McEntire JNGB would result in a decrease in every airspace unit used by the 169 FW (see Table Mc2.2-3). Daily operations would also decrease.

Victor route V437 transverses Gamecock D MOA; the floor of the MOA is 10,000 feet MSL and the maximum altitude of the airway is 4,000 feet MSL. The 6,000-foot difference between the airway ceiling and the floor of the MOA would be sufficient to avoid conflicting use of the airspace (Digital Aeronautical Flight Information Files 2005). Similarly, the V70 route through the Bulldog B MOA has a maximum authorized altitude of 9,000 feet MSL while the floor of the overlying MOA floor is 10,000 feet MSL. Civil Visual Flight Rule (VFR) traffic could fly unimpeded under the floor of the MOAs although flights would be at lower altitudes that civil pilots have noted are not as smooth or as efficient as higher altitudes. FAA traffic data above, below, or through the Gamecock MOAs indicate 110 (including military aircraft) aircraft on a heavy day, or approximately 5 per hour for the 24-hour period of the traffic survey (FAA 2010).

Four jet routes overlie the Bulldog MOAs extending from 18,000 feet MSL to 45,000 feet MSL while the ceiling of the Bulldog B ATCAA extends up to 27,000 feet MSL. An FAA traffic survey revealed 45 aircraft through these MOAs over the 24-hour period, or approximately 2 per hour (FAA 2010). Five jet routes traverse the Gamecock ATCAA with its ceiling of 22,000 feet MSL, and the FAA survey revealed a total of 161 aircraft through or within the ATCAA (including military traffic) for an average of about 7 per hour (FAA 2010). The intersection of these jet routes and the ATCAAs is an existing condition that would continue to be managed and deconflicted between the 169 FW and the FAA, as they are all within positive control airspace (i.e., above 18,000 feet MSL).

In general, the proposed action would have no impacts on civil or commercial aviation throughout this region. The number of 169 FW aircraft military operations conducted in the MOAs would decrease and, therefore, would not interfere with operations at the public/private airports beneath the MOAs or on any aircraft operating under VFR through or beneath the MOAs. Close coordination of scheduling and use of these Restricted Areas, ATCAAs, and MOAs by the respective scheduling agencies would continue to ensure safe air traffic operations throughout this region. Therefore, since the proposed beddown represents a continuation of current activities with decreases in net operations, no impacts to airspace use and management would be expected.

Mc3.2 Noise

This section describes the noise environment under baseline conditions and then presents the potential impacts that could occur under the two action scenarios. For purposes of this Environmental Impact Statement (EIS), the noise environment at McEntire JNGB was modeled using NOISEMAP. The Air Force and Air National Guard use NOISEMAP to model noise exposure at and around military air bases for

operations generated by military aircraft and engine run-up activities. Noise contours generated by NOISEMAP are used in support of the Air Installation Compatible Use Zone (AICUZ) program and National Environmental Policy Act (NEPA) documentation. NOISEMAP 7 is the latest software version and includes the input component (BASEOPS), the calculation component (NMAP), and the output component (NMPlot) (Air Force Center for Engineering and the Environment [AFCEE] 2010). The military NOISEMAP-generated contours are presented here; all modeling input (e.g., specifics on engine types, power settings, flight tracks, maintenance runups, etc.) and output used for these analyses are found in Appendix B. Specific detailed information on supplemental metrics (e.g., annoyance) is also presented in Appendix B.

Both Sound Exposure Level (SEL) and Maximum Sound Level (L_{max}) metrics would apply to either beddown scenario. As shown in Table Mc3.2-1, the SEL and L_{max} noise levels reflect conditions specific to flight activity at McEntire JNGB, and would not apply to any other airfield due to differences in flight profiles, altitudes, speeds, and weather. These data indicate that the F-35A would generate generally higher noise levels than the legacy aircraft.

Table Mc3.2-1. SEL and L_{max} Comparison for McEntire JNGB

Condition	Based F-16C ¹				F-35A ²			
	SEL (dBA)	L_{max} (dBA)	Power (%NC)	Speed (kts)	SEL (dBA)	L_{max} (dBA)	Power (%NC)	Speed (kts)
Afterburner Take-off ³ (1,000 feet AGL)	117	113	95.5%	300	117	115	100%	300
Military Power Take-off ³ (1,000 feet AGL)	113	110	97%	300	117	115	100%	300
Arrival (non-break, through 1,000 feet AGL, gear down ⁴)	96	90	85%	180	99	95	40%	180
Overhead Break (downwind leg, 1,250 feet AGL, gear down)	101	94	87%	200	97	92	40%	200
Low Approach and Go (downwind leg, 1,250 feet AGL, gear down)	110	104	94%	250	97	92	40%	210
Radar Pattern (downwind leg, 1,750 feet AGL, gear up)	97	90	87%	250	86	80	30%	250

McEntire JNGB nominal elevation = 252 feet MSL; Weather: 66°F, 50% Relative Humidity; SEL = Sound Exposure Level; L_{max} = Maximum (instantaneous) Sound Level; dBA = A-weighted decibel; NC = Engine core revolutions per minute; kts = knots.

Notes:

¹Modeled F-16C with F110-PW-229 engine.

²Modeled with reference acoustic data for an F-35A (Air Force 2009).

³Power reduced from afterburner to military power prior to reaching 1,000 feet AGL.

⁴F-16C values reflect gear up conditions.

Mc3.2.1 Base

Mc3.2.1.1 Affected Environment

The data used for baseline noise conditions were derived from the 2008 AICUZ Study (South Carolina ANG 2008) noise evaluation for McEntire JNGB. Under baseline, it was determined that 31,074 airfield operations are flown annually at McEntire JNGB. This total includes 12,007 operations generated by the 169 FW F-16Cs and an additional 19,067 operations conducted by other based and transient military aircraft (refer to Table 2-2). Under baseline conditions, approximately 97.7 percent (11,727) of 169 FW operations occurred during environmental daytime hours (i.e., 7:00 a.m. and 10:00 p.m.) and 2.3

percent (280) were generated at environmental nighttime (or between 10:00 p.m. to 7:00 a.m.). A 10-decibel (dB) penalty is applied to operations occurring during environmental nighttime hours (refer to Section 3.3 for more detailed resource definition and methodology used to evaluate impacts).

Noise Exposure

Figure Mc3.2-1 shows the 65 to 85 dB contour bands, in 5-dB increments, for McEntire JNGB baseline conditions. Table Mc3.2-2 presents noise exposure within each dB Day-Night Average Sound Level (DNL) contour band for off base acreage, population, representative receptors, and households. Representative receptors include off-base places of worship, schools, child care facilities, hospitals, and residential locations potentially within areas affected by aircraft noise of 65 dB DNL or greater. According to the U.S. Census Bureau, households are defined as a house, an apartment, a mobile home, a group of rooms, or a single room occupied (or if vacant, intended for occupancy) as separate living quarters. Separate living quarters are those in which the occupants live separately from any other people in the building and that have direct access from the outside of the building or through a common hall. The occupants may be a single family, one person living alone, two or more families living together, or any other group of related or unrelated people sharing living quarters (U.S. Census Bureau 2010a).

Generally, to determine the population counts by contour band, this analysis uses the U.S. Census block population and methodology that assumes an even distribution of population within each block under the respective contour bands. In most cases, this methodology provides a good estimate of the number of people who may be exposed. However, at locations like the vicinity of McEntire JNGB where there are low or inconsistent population densities, actual houses were counted using aerial photographs and using the U.S. Census population multiplier for Richland County of 2.9 people per household. Table Mc3.2-2 presents noise exposure within each dB DNL contour band for off-base acreage, population, housing units, and representative receptors.

<i>Contour Band (dB DNL)¹</i>	<i>Acreage</i>	<i>Population</i>	<i>Households</i>	<i>Receptors²</i>
65 – 70	3,152	428	150	7
70 – 75	804	105	37	4
75 – 80	222	26	9	0
80 - 85	2	0	0	0
85+	0	0	0	0
Total	4,180	559	196	11

Source: Wyle 2011.

Notes:

¹Exclusive of upper bound for all bands.

²All noise receptors are located off-base; refer to Figure Mc3.2-1.

In total, exposure to noise levels within contour bands of 65 dB DNL and greater include an estimated 4,130 acres, 559 people, and 196 households. Affected representative receptors include five places of worship and five residential areas, four of which fall within the 70 to 75 dB DNL contour. Noise levels for all receptors equal or exceed 65 dB DNL. Table Mc3.2-3 shows baseline decibel levels for representative receptors near McEntire JNGB. No schools or hospitals lie within the affected under baseline.

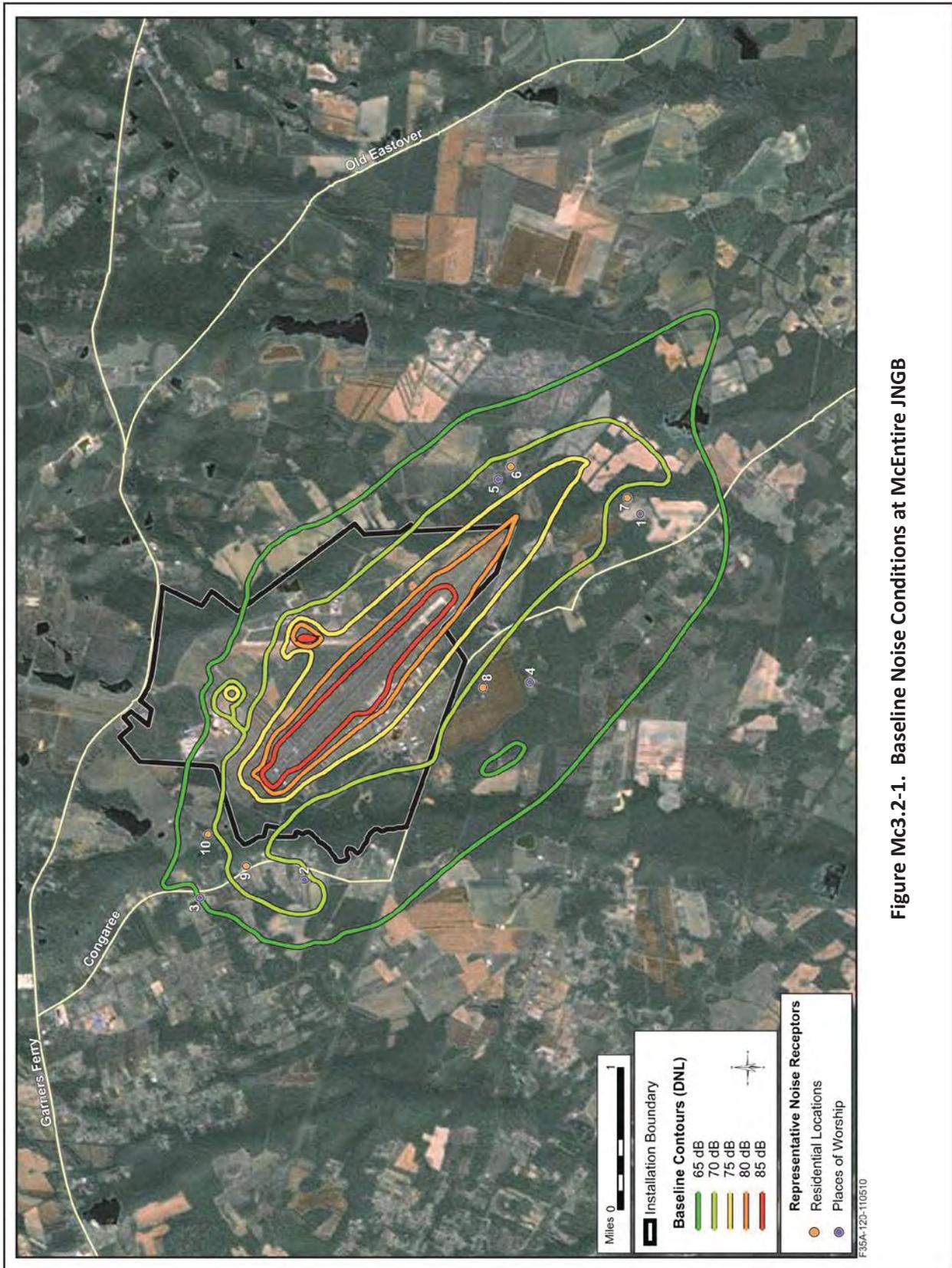


Figure Mc3.2-1. Baseline Noise Conditions at McEntire JNGB

Table Mc3.2-3. Baseline Decibel Levels at Representative Locations near McEntire JNGB

<i>Location ID Number</i>	<i>Receptor</i>	<i>Type</i>	<i>Decibel Level (dB DNL)</i>
1	Crown of Life Ministries	Worship	68
2	New Birth Tabernacle Baptist	Worship	72
3	New Light Beulah Baptist Church	Worship	65
4	St. John's Episcopal Church	Worship	68
5	St. Matthew Baptist Church	Worship	72
6	Old Congaree Road/Cornell Adams	Residential	71
7	Tally Adams Road	Residential	69
8	Gus Lane	Residential	69
9	Congaree Road/SR S-40-2561	Residential	72
10	Crossing Creek Road	Residential	68

Arrivals and departures of based F-16 aircraft from Runways 14 and 32, respectively, dominate the DNL to the northwest of the base. Based F-16 arrivals to Runway 32 and departures from Runway 14 dominate the DNL to the southeast of the base.

Speech Interference

Speech interference for normal conversation comprises another indicator of noise effects. Such interference is measured by the number of average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour subject to indoor maximum sound levels of at least 50 dB at representative locations. This measure also accounts for 15 dB or 25 dB of noise attenuation provided by buildings such as houses and schools with windows open or closed, respectively. Since modeling accounts for outdoor noise levels only, these data are represented as NA75L_{max} (windows closed) and NA65 L_{max} (windows open). NA means “number of events above,” so this analysis examines the number of annual average daily overflight events whose L_{max} would be greater than or equal to 65 dB and 75 dB. Table Mc3.2-4 presents indoor speech interference under baseline. Baseline mean speech interference events equals 2.4 with windows closed and 2.9 with windows open.

Table Mc3.2-4. Baseline Indoor Speech Interference at Representative Locations near McEntire JNGB

<i>Location ID Number</i>	<i>Receptor</i>	<i>Average Daily Indoor Events per Hour¹ Daytime (7:00 a.m. to 10:00 p.m.)</i>	
		<i>Windows Closed</i>	<i>Windows Open</i>
1	Crown of Life Ministries	2	3
2	New Birth Tabernacle Baptist	3	4
3	New Light Beulah Baptist Church	2	3
4	St. John's Episcopal Church	2	2
5	St. Matthew Baptist Church	3	3
6	Old Congaree Road/Cornell Adams	3	3
7	Tally Adams Road	2	3
8	Gus Lane	2	2
9	Congaree Road/SR S-40-2561	2	3
10	Crossing Creek Road	3	3

Source: Wyle 2011. Note: ¹Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Classroom Speech Interference

Because of the nature of activities in schools, different speech interference criteria are used. However, the affected area includes no schools within the baseline noise contours of 65 dB DNL or greater. Therefore, classroom speech interference is not an existing issue.

Sleep Disturbance

Sleep disturbance is a concern for communities exposed to nighttime noise. Sleep, or the lack of quality sleep, has the potential to affect health and concentration, although the relationship between noise levels and sleep disturbance is complex and not fully understood. To assess the potential for sleep disturbance, the analysis uses SEL as the metric and calculates the probability of being awakened at least once from overflights occurring between 10:00 p.m. and 7:00 a.m. when most people sleep. The SEL from each overflight is based on the particular type of aircraft, flight track, power setting, speed, and altitude relative to the residential receptor. The analysis also accounts for standard building attenuation of 15 dB and 25 dB with windows open and closed, respectively. When summed, the probability of being awakened for a given location is determined. Table Mc3.2-5 lists the probabilities of indoor awakening from average daily nighttime (10:00 p.m. to 7:00 a.m.) events for the same residential locations with probability, percentage awakening ranges between 2 and 5 percent for windows closed and open, respectively.

Table Mc3.2-5. Baseline Indoor Sleep Disturbance at Representative Locations near McEntire JNGB			
Location ID Number	Receptor	Average Nightly (10:00 p.m. to 7:00 a.m.) Probability of Awakening (%)¹	
		<i>Windows Closed</i>	<i>Windows Open</i>
6	Old Congaree Road/Cornell Adams	3%	5%
7	Tally Adams Road	3%	5%
8	Gus Lane	3%	5%
9	Congaree Road/SR S-40-2561	2%	5%
10	Crossing Creek Road	2%	5%

Source: Wyle 2011.

Note: ¹Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

Potential for Hearing Loss (PHL) applies to people living in high noise environments where they can experience long-term (40 years) hearing effects. The threshold for assessing PHL is exposure to noise contours greater than 80 dB DNL. Under baseline conditions there are no residential areas on or adjacent to the airfield that are exposed to contour bands of 80 dB DNL and greater, so PHL does not apply to baseline conditions.

Occupational Noise

Air Force occupational noise exposure prevention procedures such as hearing protection and monitoring are currently used and comply with all applicable Occupational Safety and Health Administration (OSHA) and Air Force occupational noise exposure regulations.

Other Noise Sources

Other generators of noise, such as general vehicle traffic, and other maintenance and landscaping activities are a common on-going occurrence at McEntire JNGB. While these sources may contribute to the overall noise environment, they would not appreciably change under any of the scenarios; therefore, these sources are not included in the noise analysis.

Mc3.2.1.2 Environmental Consequences

ANG Scenario 1

Noise Exposure

ANG Scenario 1 involves the beddown of 18 F-35As at McEntire JNGB and drawdown of 24 F-16s. Proposed F-35A flight operations would total 5,486 annually, with all airfield operations occurring during the environmental daytime hours (between 7:00 a.m. and 10:00 p.m.). About 92 percent (5,047) of these proposed operations would consist of departures and arrivals; the remaining 8 percent (439) would involve pattern work in the vicinity of the airfield. Annual flight operations, when added to the other based and transient military aircraft (19,067 airfield operations), would total 21,553, a 21 percent decrease from baseline. Figure Mc3.2-2 shows the 65 to 85 dB DNL contour bands, in 5-dB increments, under ANG Scenario 1. Baseline contours are also presented for comparison purposes.

Table Mc3.2-6 presents noise exposure in terms of estimated off-base acreage, population, households, and representative receptors. When compared to baseline conditions, ANG Scenario 1 projected noise levels would decrease impacts by 2,728 acres, 370 people, 131 households, and 6 representative receptors.

<i>Contour Band (dB DNL)¹</i>	<i>Acreage</i>	<i>Population</i>	<i>Households</i>	<i>Receptors²</i>
65 – 70	1,030/3,152	133/428	46/150	4/6
70 – 75	346/804	46/105	16/37	0/4
75 – 80	75/222	10/26	3/9	0/0
80 - 85	1/2	0/0	0/0	0/0
85+	0/0	0/0	0/0	0/0
Total	1,452/4,180	189/559	65/196	4/10

Source: Wyle 2011, U.S. Census Bureau 2000.

Notes:

¹Exclusive of upper bound for all bands.

²All noise receptors located off-base; refer to Figure Mc3.2-2.

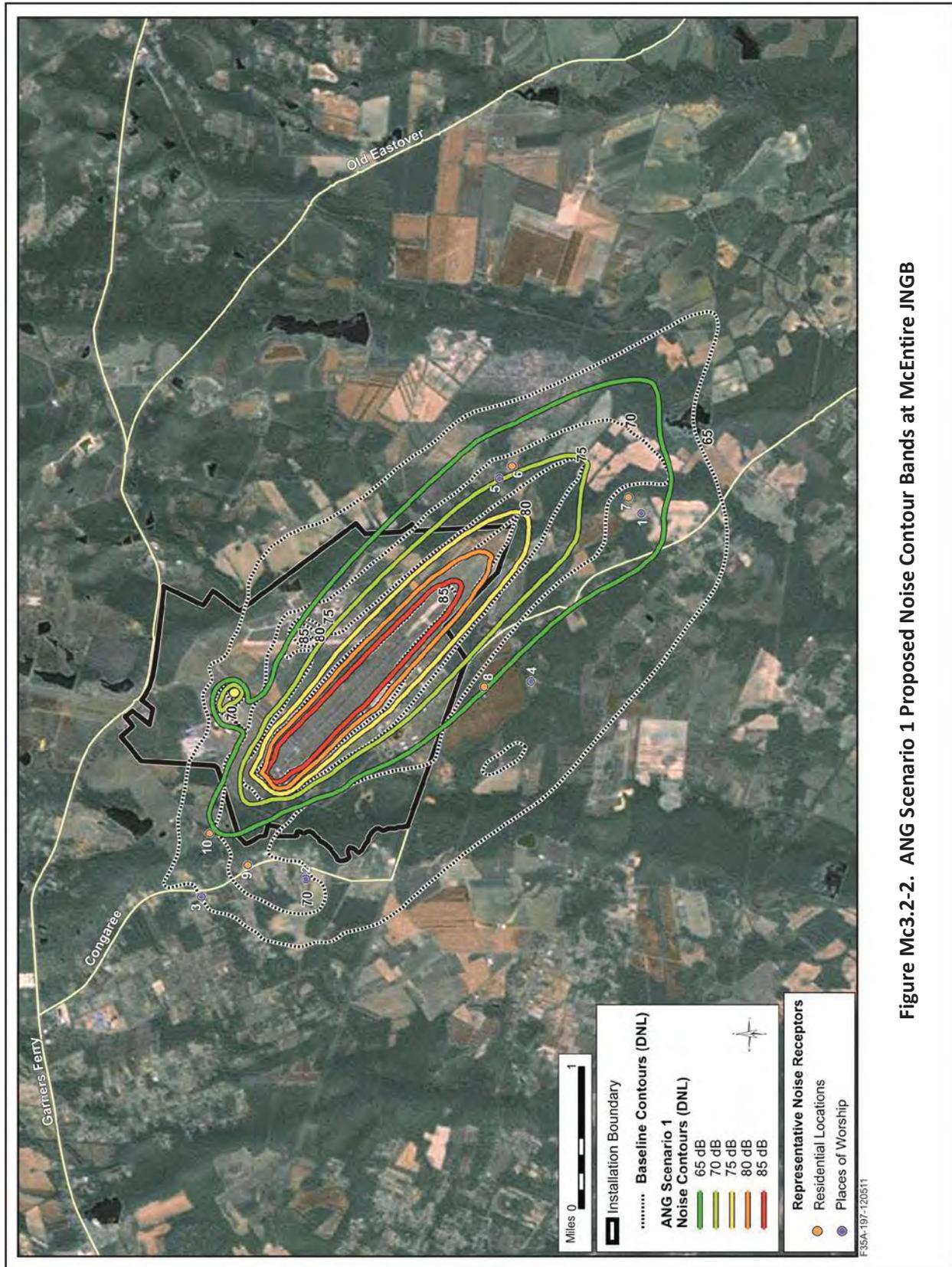


Figure Mc3.2-2. ANG Scenario 1 Proposed Noise Contour Bands at McEntire JNGB

Overall, areas within the DNL contours would decrease relative to baseline. The most noticeable off-base reduction would be south of the base, parallel with the runway, because the SEL of the F-35A would be less than the SEL for the F-16 on the downwind leg of Overhead Breaks and VFR patterns and because the F-35A would generate about 63 percent less equivalent annual flight operations¹ than the based F-16. With the elimination of 24 PAA F-16 aircraft, departures generated by 18 PAA F-35A aircraft from Runway 14 would dominate the DNL.

Decibel levels for representative receptors near McEntire JNGB are provided in table Mc.3.2-7. Under ANG Scenario 1, all 10 receptors would be exposed to lower noise levels. Five receptors currently subject to 65 dB DNL noise levels and greater would experience decreases ranging from of 1 to 3 dB to below 65 dB DNL. Noise levels decrease for all receptors experiencing 65 dB DNL and less under ANG Scenario 1.

<i>Location ID Number</i>	<i>Receptor</i>	<i>Type</i>	<i>Decibel Level (dB DNL)</i>
1	Crown of Life Ministries	Worship	66/68
2	New Birth Tabernacle Baptist	Worship	<65/72
3	New Light Beulah Baptist Church	Worship	<65/65
4	St. John's Episcopal Church	Worship	<65/68
5	St. Matthew Baptist Church	Worship	70/72
6	Old Congaree Road/Cornell Adams	Residential	69/71
7	Tally Adams Road	Residential	66/69
8	Gus Lane	Residential	65/69
9	Congaree Road/SR S-40-2561	Residential	<65/72
10	Crossing Creek Road	Residential	<65/68

Speech Interference

In terms of speech interference, Table Mc3.2-8 presents the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour for locations that generally would experience indoor maximum sound levels of at least 50 dB with windows closed and open. As noted previously, these thresholds are defined as NA75 L_{max} and NA65 L_{max} . Under this scenario, the mean number of speech interfering events across all receptors would be 1 to 2 per hour for windows open or closed, with an average decrease of 2 or less events per hour relative to baseline.

¹ Equivalent annual flight operations equal daytime (0700-2200) flight operations plus ten times the nighttime (2200-0700) flight operations.

Table Mc3.2-8. ANG Scenario 1 Indoor Speech Interference at Representative Locations at McEntire JNGB

Location ID Number	Receptor	Average Daily Indoor Events per Hour Daytime (7:00 a.m. to 10:00 p.m.) ¹			
		Windows Closed	Windows Open	Change from Baseline	
				Windows Closed	Windows Open
1	Crown of Life Ministries	1	1	-1	-2
2	New Birth Tabernacle Baptist	2	2	-1	-2
3	New Light Beulah Baptist Church	1	1	-1	-2
4	St. John's Episcopal Church	1	1	-1	-1
5	St. Matthew Baptist Church	1	1	-2	-2
6	Old Congaree Road/Cornell Adams	1	1	-2	-2
7	Tally Adams Road	1	1	-1	-2
8	Gus Lane	1	1	-1	-1
9	Congaree Road/SR S-40-2561	1	2	-1	-1
10	Crossing Creek Road	1	2	-2	-1

Source: Wyle 2011.

Note: ¹Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Classroom Speech Interference

The affected area under ANG Scenario 1 includes no schools; therefore, classroom speech interference would not be an issue if this scenario was implemented.

Sleep Disturbance

Table Mc3.2-9 lists the probabilities of indoor awakening for receptors from daily averaged nighttime (10:00 p.m. to 7:00 a.m.) events with windows closed and open. For windows closed and open, percentage awakening would range between 0 and 3 percent, or roughly a 2-percent average decrease from baseline. All residential areas would experience a decrease in probability of awakenings.

Table Mc3.2-9. ANG Scenario 1 Indoor Sleep Disturbance at Representative Locations at McEntire JNGB

Location ID Number	Receptor	Average Nightly (10:00 p.m. to 7:00 a.m.) Probability of Awakening (%) ¹			
		Windows Closed	Windows Open	Change from Baseline	
				Windows Closed	Windows Open
6	Old Congaree Road/Cornell Adams	0%	1%	-3%	-4%
7	Tally Adams Road	0%	0%	-3%	-5%
8	Gus Lane	0%	1%	-3%	-4%
9	Congaree Road/SR S-40-2561	1%	3%	-1%	-2%
10	Crossing Creek Road	0%	2%	-2%	-3%

Source: Wyle 2011.

Note: ¹Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

Under ANG Scenario 1, no residential areas adjacent to McEntire JNGB would be exposed to noise levels of 80 dB DNL and greater. The installation includes no residential areas. Therefore, no PHL impacts would occur.

Occupational Noise

ANG occupational noise exposure prevention procedures such as hearing protection and monitoring would continue to be applied under this scenario and comply with all applicable OSHA and ANG occupational noise exposure regulations.

ANG Scenario 2

Noise Exposure

ANG Scenario 2 would involve beddown of 24 F-35A aircraft at McEntire JNGB. Proposed F-35A flight operations under this scenario would total 7,296 annually, with no operations during environmental nighttime hours (between 10:00 p.m. and 7:00 a.m.). About 91 percent (6,639) of these proposed operations would consist of departures and arrivals; the remaining 9 percent (657) would involve pattern work in the vicinity of the airfield. Annual based flight operations, when added to transient military aircraft (19,067 operations), would total 26,363, a 15 percent decrease from baseline.

Figure Mc3.2-3 shows the 65 to 85 dB DNL contour bands for ANG Scenario 2. Baseline contours are also presented for comparison purposes. Table Mc3.2-10 presents the noise exposure in terms of estimated off-base acreage, population, households, and representative receptors within each 5-dB DNL contour band. When compared to baseline conditions, ANG Scenario 2 noise levels of 65 dB DNL and greater impacts would affect: 2,229 less acres, 311 fewer people, 110 less households, and 3 fewer representative receptors.

Contour Band (dB DNL)¹	Acreage	Population	Households	Receptors²
65 – 70	1,371/3,152	171/428	60/150	5/6
70 – 75	449/804	59/105	20/37	2/4
75 – 80	127/222	17/26	6/9	0/0
80 - 85	4/2	1/0	0/0	0/0
85+	0/0	0/0	0/0	0/0
Total	1,951/4,180	248/559	86/196	7/10

Source: Wyle 2011, U.S. Census Bureau 2000.

Notes:

¹Exclusive of upper bound for all bands.

²All noise receptors are located off-base; refer to Figure Mc3.2-3.

Overall, the areas within DNL contours would decrease relative to baseline. The most noticeable off-base reduction would be south of the base, parallel with the runway, because the SEL of the F-35A would be less than the SEL for the F-16 on the downwind leg of Overhead Breaks and VFR patterns and because the F-35A would generate about 63 percent less equivalent annual flight operations than the based F-16. With the elimination of 24 PAA F-16 aircraft, departures generated by 24 PAA F-35A aircraft from Runway 14 would dominate the DNL.

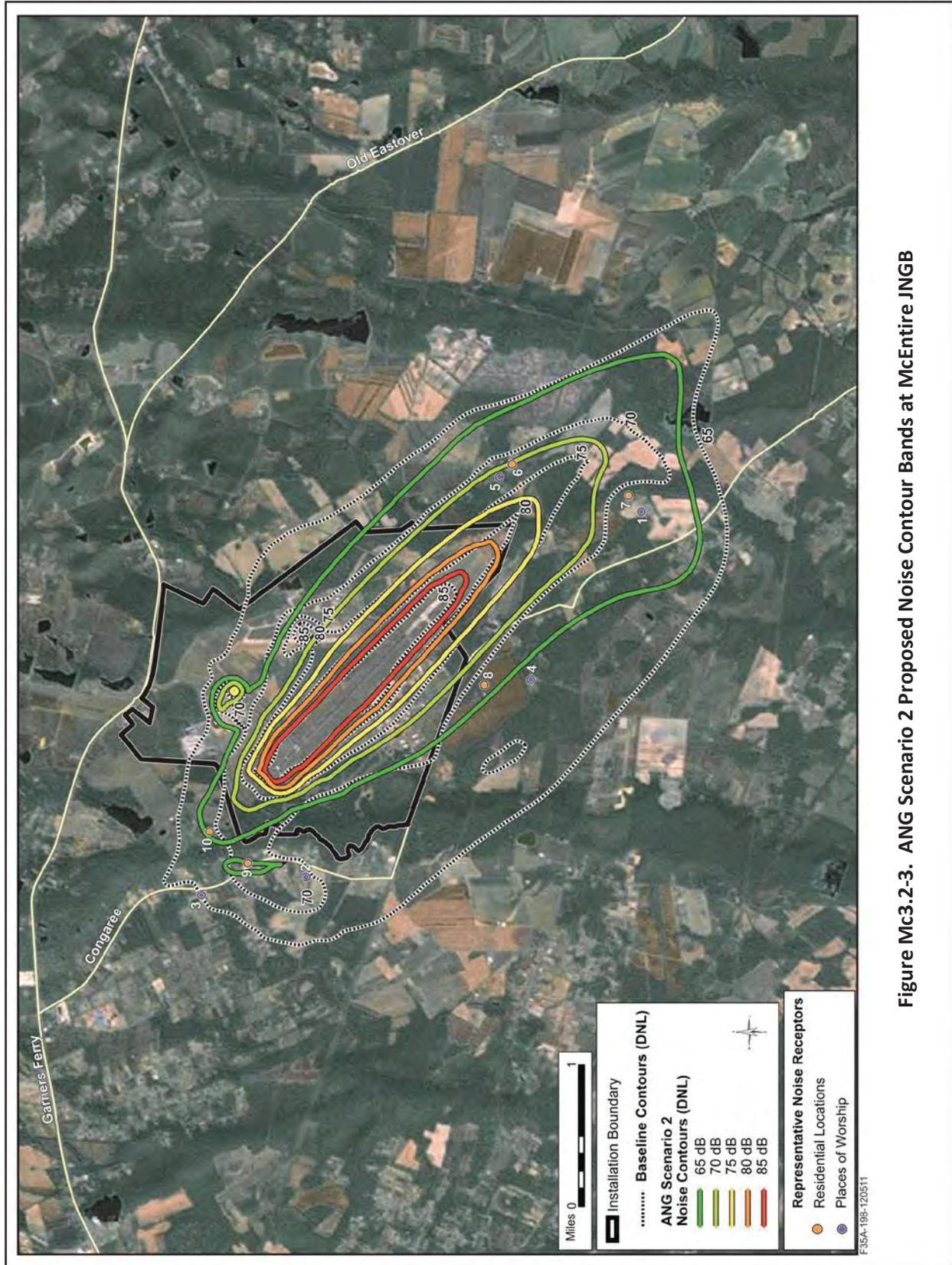


Figure Mc3.2.2-3. ANG Scenario 2 Proposed Noise Contour Bands at McEntire JNGB

Table Mc3.2-11 shows representative receptors by name, type, and decibel level under ANG Scenario 2 compared to baseline conditions. Under this scenario, no locations would experience increased noise levels, all would decrease when compared to baseline conditions. Four receptors would experience levels equal to or less than 65 dB DNL when compared to baseline conditions. The six receptors with noise levels greater than 65 dB DNL would still remain below baseline.

Location ID Number	Receptor	Type	Decibel Level (dB DNL)
1	Crown of Life Ministries	Worship	67/68
2	New Birth Tabernacle Baptist	Worship	<65/72
3	New Light Beulah Baptist Church	Worship	<65/65
4	St. John's Episcopal Church	Worship	<65/68
5	St. Matthew Baptist Church	Worship	71/72
6	Old Congaree Road/Cornell Adams	Residential	70/71
7	Tally Adams Road	Residential	67/69
8	Gus Lane	Residential	66/69
9	Congaree Road/SR S-40-2561	Residential	66/72
10	Crossing Creek Road	Residential	65/68

Speech Interference

In terms of speech interference, Table Mc3.2-12 presents the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour for receptors which generally would have indoor maximum sound levels of at least 50 dB with windows closed and open. The average number of speech interfering events across all locations would be 1 and 2 per hour, with an average decrease of 1 event per hour relative to baseline.

Location ID Number	Receptor	Average Daily Indoor Events per Hour¹ Daytime (7:00 a.m. to 10:00 p.m.)			
		Windows Closed	Windows Open	Change from Baseline	
				Windows Closed	Windows Open
1	Crown of Life Ministries	2	2	0	-1
2	New Birth Tabernacle Baptist	2	2	-1	-2
3	New Light Beulah Baptist Church	1	2	-1	-1
4	St. John's Episcopal Church	1	2	-1	-1
5	St. Matthew Baptist Church	2	2	-1	-1
6	Old Congaree Road/Cornell Adams	2	2	-1	-1
7	Tally Adams Road	2	2	0	0
8	Gus Lane	1	2	-1	-1
9	Congaree Road/SR S-40-2561	1	2	-1	-1
10	Crossing Creek Road	1	2	-2	-1

Source: Wyle 2011.

Note: ¹Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Classroom Speech Interference

The affected area under ANG Scenario 2 includes no schools; therefore, classroom speech interference would not be an issue if this scenario was implemented.

Sleep Disturbance

Table Mc3.2-13 lists the probabilities of indoor awakening events for receptors, during daily average environmental nighttime hours, with windows closed and open. Under ANG Scenario 2, percentage awakening would range between 0 and 3 percent with windows closed and opened, respectively. Overall, the probability of awakenings would decrease at every location, with decreases ranging from -1 to -5 percent.

Table Mc3.2-13. ANG Scenario 2 Indoor Sleep Disturbance at Representative Locations at McEntire JNGB					
<i>Location ID Number</i>	<i>Receptor</i>	<i>Average Nightly (10:00 p.m. to 7:00 a.m.) Probability of Awakening (%)¹</i>			
		<i>Windows Closed</i>	<i>Windows Open</i>	<i>Change from Baseline</i>	
				<i>Windows Closed</i>	<i>Windows Open</i>
6	Old Congaree Road/Cornell Adams	0%	1%	-3%	-4%
7	Tally Adams Road	0%	0%	-3%	-5%
8	Gus Lane	0%	1%	-3%	-4%
9	Congaree Road/SR S-40-2561	1%	3%	-1%	-2%
10	Crossing Creek Road	0%	2%	-2%	-3%

Source: Wyle 2011.

Note: ¹Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

Under ANG Scenario 2, no residential areas adjacent to McEntire JNGB are exposed to noise levels of 80 dB DNL and greater. The base includes no residential areas. Therefore, PHL is not an issue for this scenario.

Occupational Noise

Current ANG occupational noise exposure prevention procedures such as hearing protection and monitoring would continue to be applied under this scenario and comply with all applicable OSHA and ANG occupational noise exposure regulations.

Mc3.2.2 Airspace

This section presents noise conditions in airspace and ranges that would be used by F-35A aircraft under any of the beddown scenarios. The airspace and ranges associated with the McEntire JNGB beddown scenarios include airspace units located in South and North Carolina, Georgia, and offshore. Training activities would result from the replacement of legacy F-16C aircraft by F-35A aircraft. As noted in Table Mc3.1-1, the 169 FW would operate the F-35As within existing MOAs, overlying ATCAAs, restricted airspace, and ranges, performing similar types of combat training missions as currently conducted in these areas airspace units. The noise analysis accounts for both subsonic noise and sonic booms in airspace authorized for supersonic flight. Subsonic noise is quantified by the Onset-Rate Adjusted Day-Night Average Sound Level (L_{dnmr}); the cumulative sonic boom environment is quantified by C-weighted

Day-Night Average Sound Level (CDNL) and by the number of booms per month that would be heard on the surface (refer to Section 3.3).

In rural and open areas, the analysis of effects is vastly different compared to areas near population centers. In these areas, public concerns can include effects to wildlife, domestic animals, natural soundscapes, and outdoor recreation. Each of these effects can be difficult to assess because of limited research. Many studies have been conducted on noise impacts to animals. However, if the animal of concern has not been included in any of these studies, biological expertise is required to determine if additional research is required or a surrogate animal can be used for the assessment of impacts. See section Mc3.6 (Terrestrial Communities) for a discussion of noise impacts to wildlife.

Mc3.2.2.1 Affected Environment

Subsonic Noise

Figure Mc3.2-4 presents the baseline and projected noise levels in L_{dnmr} for each of the blocks of airspace proposed for use. For the airspace units predominantly used by the F-16s – Bulldog, Gamecock, and Coastal Townsend – noise levels range from 54 to 57 dB L_{dnmr} under baseline conditions. Poinsett, with 88 operations by F-16s, is subject to noise levels of 68 dB L_{dnmr} due to other users. At Avon Park, noise levels reach only to 51 dB L_{dnmr} .

Supersonic Noise

For McEntire JNGB, proposed supersonic activities comprise about 10 percent of total air combat training, and all of these events would occur in offshore Warning Areas.

Mc3.2.2.2 Environmental Consequences

Although slight changes in noise levels would occur within 3 of the 4 airspace units, these would continue to remain below 65 L_{dnmr} . Subsonic noise levels would imperceptibly increase in Gamecock and Bulldog under both scenarios. Similarly, for Coastal Townsend under ANG Scenario 1, noise levels would increase by only 2 dB. For ANG Scenario 2, the increase would be perceptible (3 dB). However, areas beneath these airspace units support a low population density and dispersed communities; these areas have been exposed to aircraft noise for many decades. By FAA regulation, aircraft would continue to avoid these communities by at least 2,000 feet and the F-35As would fly above 23,000 feet MSL 80 percent of the time. As such, the increased noise levels would likely result in limited annoyance and impacts to underlying populations.

All supersonic flight would continue to be conducted more than 15 nautical miles (nm) away from land. In contrast to the 169 FW F-16 aircraft, the F-35A would perform a lower frequency of supersonic events. Legacy aircraft fly 20 percent of their supersonic events between 10,000 and 30,000 feet MSL, and 80 percent above 30,000 feet MSL. F-35A would perform these events at higher altitudes, on average, with 10 percent between 15,000 and 30,000 feet MSL and 90 percent above 30,000 feet MSL. Supersonic activity conducted above 30,000 feet MSL does not produce effects noticeable on the ground, and at 15,000 to 30,000 feet MSL, the effects tend to be rare and negligible. Since the F-35As would conduct fewer total operations and supersonic events than the F-16s with almost all occurring above 30,000 feet MSL, and all would occur overwater and not over populations, these activities warrant no further detailed analysis. Section 3.1.3 provides additional rationale for this approach.

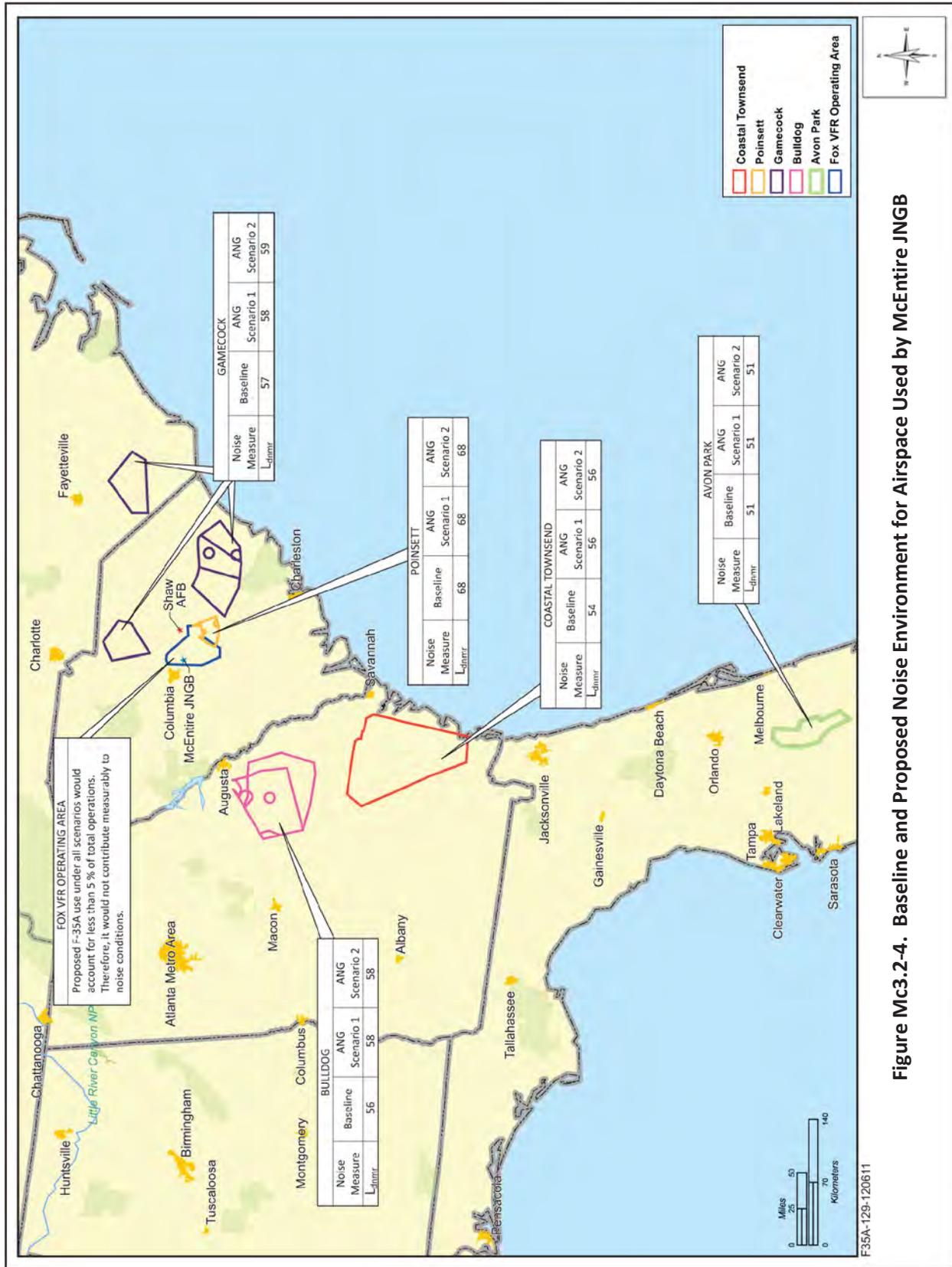


Figure Mc3.2-4. Baseline and Proposed Noise Environment for Airspace Used by McEntire JNGB

Mc3.3 Air Quality

Emissions associated with operations at McEntire JNGB include emissions of volatile organic compounds (VOCs) and nitrogen oxide (NO_x), both of which are precursors to ozone (O₃), as well as carbon monoxide (CO), sulfur dioxide (SO₂), particulate matter less than or equal to 2.5 microns in diameter (PM_{2.5}), and particulate matter less than or equal to 10 microns in diameter (PM₁₀). Emissions of lead are not addressed because the affected areas contain no significant sources of this criteria pollutant, and operations at McEntire JNGB would not result in substantial emissions of lead.

Mc3.3.1 Base

Mc3.3.1.1 Affected Environment

The affected environment varies according to pollutant. For pollutants that do not undergo a chemical reaction after being emitted from a source (i.e., direct emissions), the affected area is generally restricted to a region in the immediate vicinity of the base. These pollutants include CO, SO₂, and directly-emitted PM₁₀ and PM_{2.5}. For pollutants that undergo chemical reactions and interact within the atmosphere to form secondary pollutants, such as O₃ and its precursors NO_x and VOCs, and precursors of PM₁₀ and PM_{2.5}, the affected environment is a larger regional area. The chemical transformations and interactions that create O₃ and secondary PM₁₀ and PM_{2.5} can take hours to occur; therefore, the precursor pollutants may be emitted some distance from the impact area depending on weather conditions.

Another factor used in defining the affected environment is mixing height. Mixing height is the upper vertical limit of the volume of air in which emissions may affect air quality. Emissions released above the mixing height are typically restricted from affecting ground-level ambient air quality in the region. Emissions of pollutants released below the mixing height may affect ground-level concentrations. The USEPA default mixing height of 3,000 feet AGL has been used for McEntire JNGB (refer to Section 3.4 for further discussion of mixing height).

Regional Environment

The affected environment for base-generated emissions includes McEntire JNGB, the area surrounding the base where aircraft operate below 3,000 feet AGL, and the airspace overlying these areas and where aircraft train. McEntire JNGB is located in Richland County. The county lies within the Columbia Intrastate Air Quality Control Region (AQCR) (40 Code of Federal Regulations [CFR] 81.10), which includes Fairfield, Lexington, Newberry, and Richland Counties. Impacts of the proposed action were evaluated in the context of existing local air quality, baseline emissions at the installation and in the region, and the relative contribution of the proposed action to regional emissions.

Air quality in the Columbia Intrastate AQCR has been designated as either in "attainment," "unclassifiable/attainment," or "better than national standards" with the National Ambient Air Quality Standards (NAAQS) for all pollutants (40 CFR 81.341); therefore no conformity analysis is required. Table Mc3.3-1 summarizes the regional emissions (stationary and mobile) of criteria pollutants and precursor emissions for this AQCR.

Table Mc3.3-1. Baseline Regional Emissions (tons per year)						
	VOCs	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}
Columbia Intrastate AQCR	46,928	45,470	56,574	9,262	32,518	9,724

Source: USEPA 2008a.

Greenhouse Gases

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions occur from natural processes as well as human activities. The accumulation of GHGs in the atmosphere regulates the earth’s temperature. Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human activities. The climate change associated with this global warming is predicted to produce negative environmental, economic and social consequences across the globe.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydrofluorocarbons and perfluorocarbons) and sulfur hexafluoride. Each GHG is assigned a global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO₂, which has a value of one. For example, under the USEPA’s Mandatory Greenhouse Gas Reporting Rule, CH₄ has a GWP of 21, which means that it is considered to have a global warming effect 21 times greater than CO₂ on an equal-mass basis. Total GHG source emissions are often reported as a CO₂ equivalent (or CO₂e). The CO₂e is calculated by multiplying the emission of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs. Because of its applicability to all alternative base locations and to reduce redundancies within the EIS, a more thorough discussion of GHG is presented in Section 3.4.

Base Environment

McEntire JNGB located 10 miles east of the town of Eastover and approximately 15 miles southeast of the city of Columbia. The majority of emissions from permitted stationary sources are from combustion of fossil fuels and industrial activities. Emissions from on-road vehicles contribute the largest share to the regional emission inventory. Area source emissions include emissions from off-highway vehicles, solvent and coating use, waste disposal and recycling, and combustion of fossil fuels for industrial, commercial, and residential uses. Fugitive dust is a collective term for small airborne particles that do not originate from a specific point and is the main source of direct PM₁₀ and PM_{2.5} emissions. Fugitive dust sources include unpaved roads, agricultural cropland, and construction sites.

The South Carolina DHEC has primary jurisdiction over air quality and sources of stationary source emissions at McEntire JNGB. Stationary source emissions included in the baseline include jet engine testing (off the aircraft), fuel storage, fueling operations, heating and power production, degreasing and solvent use, coatings applications, and other miscellaneous sources. These emissions constitute only a small fraction of overall base emissions.

Although mobile sources are not considered under the Clean Air Act (CAA) Title V Operating Permit program, they are a significant component of the total installation emissions. Mobile source emissions include emissions from aircraft operations (take-offs and landings), aerospace ground equipment (AGE), and aircraft maintenance operations such as engine run-ups and trim checks. To establish baseline conditions, emissions from all based legacy aircraft being replaced, as well as AGE and maintenance operations associated with these aircraft were considered. Emissions were calculated for all flight activities below the mixing height. Commuting emissions associated with staff assigned to the legacy aircraft were also included in baseline calculations. Table Mc3.3-2 summarizes baseline emissions; these emissions were based on flight profiles and engine maintenance runups developed as part of the noise analysis (Wyle Labs 2010). This approach was taken for consistency purposes with the noise evaluation and for comparability. For aircraft, sulfur oxides were calculated based on weight percent sulfur content of JP-8, as identified in MIL-DTL-83133G (April 2010). Methane and nitrous oxide emissions were calculated based on Table C-2 of the USEPA Mandatory Greenhouse Gas Reporting Rule. AGE emissions were calculated using F-16C-associated equipment and modeled in the Air Force Conformity Applicability Model (ACAM) program (Air Force 2002). Emission factors were derived from IERA Aircraft/Auxiliary Power Units/Aerospace Ground Support Equipment, except for CO₂, which were derived from Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling--Compression-Ignition (USEPA 2002). For CH₄ and N₂O emissions, Table C-2 of the Mandatory Greenhouse Gas Reporting Rule was also used. Commuting vehicle emissions were calculated using emission factors from MOBILE 6.2.03 (2003) and USEPA Direct Emissions from Mobile Combustion Sources (USEPA 2008b). Refer to Appendix C for the concepts used in developing these emissions estimates.

Pollutants in Tons per Year						
<i>CO</i>	<i>NO_x</i>	<i>VOCs</i>	<i>SO₂</i>	<i>PM₁₀</i>	<i>PM_{2.5}</i>	<i>CO₂e¹</i>
197.62	127.10	22.64	20.16	8.10	7.60	33,685

Note: ¹Measured in metric tons per year or mT/yr.

Calculations for all criteria pollutants demonstrate that maximum potential base-wide emissions from stationary sources are less than the CAA Title V threshold (i.e., 100 tons per year of criteria pollutants, 10 tons per year of any single hazardous air pollutant, or 25 tons per year of any combination of hazardous air pollutants). Therefore, in accordance with federal and state air regulations, the base does not maintain any air permits.

Mc3.3.1.2 Environmental Consequences

Air quality impacts within the affected environment were reviewed for significance in light of federal, state, and local air pollution standards and regulations, please refer to Section 3.4 for detailed discussion of air quality resource definitions and analytical methodology for evaluating impacts. For purposes of this analysis, 250 tons per year per pollutant was used as a threshold to trigger further evaluation of potential air quality impacts. This particular threshold is used by the USEPA in their New Source Review standards as an indicator for impact analysis for listed new major stationary sources in attainment areas. Per this standard, any major new *stationary* sources that exceed 250 tons per year for any listed pollutant must conduct further analysis to demonstrate that these impacts would not cause a

substantial degradation of air quality under the Prevention of Significant Deterioration (PSD) regulations. No similar regulatory threshold is available for mobile source emissions, which are the primary sources under this proposal. Lacking any regulatory mobile source emissions thresholds, the 250-ton major stationary source was used to equitably assess and compare mobile with stationary sources.

ANG Scenario 1

ANG Scenario 1 would base 18 F-35A aircraft at McEntire JNGB by replacing the current 24 F-16 aircraft. Under ANG Scenario 1, both construction and operational activities would result in air pollutant emissions.

Construction

Under ANG Scenario 1, construction would occur in calendar year 2015. Construction emissions would be created from: 1) construction equipment combustion of fossil fuels and 2) demolition, earth-moving, and equipment operation on bare soil causing fugitive dust. Equipment use was based on best available data for proposed type of construction being undertaken (e.g., hangar, parking area, or multi-storied building) and tasks the equipment would conduct (e.g., hauling, clearing, and/or digging). This information was then used to estimate equipment combustion emissions. Proposed building and infrastructure demolition, as well as construction timeframes and disturbance footprints were used to determine fugitive dust emissions (i.e., PM).

Table Mc3.3.-3 summarizes the annual and total construction emissions associated with ANG Scenario 1. The data presented below indicate that proposed annual construction emissions would not exceed 250 tons per year for any criteria pollutant. It is not anticipated, therefore, that implementing ANG Scenario 1 construction activities would noticeably affect regional air quality.

Table Mc3.3-3. Proposed Construction Emissions under ANG Scenario 1 at McEntire JNGB						
Construction Activity	Pollutants in Tons per Year					
	<i>CO</i>	<i>NO_x</i>	<i>VOCs</i>	<i>SO_x</i>	<i>PM₁₀</i>	<i>PM_{2.5}</i>
2015						
Construction	0.05	0.12	0.01	0.01	0.18	0.02
Construction Crew privately-owned vehicles (POVs)	0.32	0.02	0.02	0.00	0.00	0.00
Total 2015	0.37	0.14	0.03	0.01	0.18	0.02
Major Source Threshold	250	250	250	250	250	250

Operations

Air quality impacts were determined by evaluating emissions associated with replacing 24 F-16 aircraft with 18 F-35A aircraft. Operational emissions sources generated under ANG Scenario 1 include both mobile and stationary sources. Mobile sources include: 1) aircraft operations with and above the airfield (includes runways, taxi areas, and overlying airspace), 2) vehicle (government-owned vehicles [GOVs] and POVs) operations, and 3) AGE used for aircraft operations. Stationary sources include (but are not limited to) emissions generated by engine shops, paint booths, and boilers. Emissions from GOVs and stationary sources were assumed to remain unchanged and therefore would not differ from baseline conditions. This assumption is justified because no new types or increases in the number of

GOVs would be needed to implement ANG Scenario 1 and no new building or facility construction would be introduced calling for new stationary sources and associated emissions.

Table Mc3.3-4 presents a summary of annual operational emissions generated under ANG Scenario 1 in comparison with baseline emissions. The analysis shows that beddown of 18 F-35A aircraft at McEntire JGNB would result in net emission decreases for all criteria pollutants when compared to baseline emissions; therefore, it is anticipated that ANG Scenario 1 would not introduce emissions which would substantially deteriorate regional air quality. No new major pollutant sources would exceed 250 tons.

Activity	Pollutants in Tons per Year						
	CO	NO _x	VOCs	SO _x	PM ₁₀	PM _{2.5}	CO ₂ e ¹
Aircraft	9.03	34.37	0.39	15.04	0.90	0.88	11,767.13
Engine Runups	0.35	0.06	0.01	0.09	0.00	0.00	62.50
AGE ²	3.86	3.44	0.21	0.97	0.31	0.30	897.54
POVs	37.79	1.80	2.31	0.04	0.10	0.10	1,912.28
Total Annual ANG Scenario 1 Emissions	53.02	39.67	2.91	16.14	1.32	1.28	14,639
Baseline Annual Emissions	197.62	127.10	22.64	20.16	8.10	7.60	33,685
Net Change	-144.60	-87.43	-19.73	-4.02	-6.77	-6.31	-19,045
Major Source Threshold	250	250	250	250	250	250	-
GHG Standard	-	-	-	-	-	-	25,000

Notes:

¹CO₂e = (CO₂ * 1) + (CH₄ * 21) + (N₂O * 310), (40 CFR 98, Subpart A, Table A-1) in metric tons per year.

²With the exception of SO_x (which the JSF program office has not determined as of this date) these data reflect F-35A specific AGE equipment.

Missions associated with replacing 24 F-16s with 18 F-35As and construction needed to support this scenario, would incrementally decrease regional emissions of CO₂e and would not introduce impacts to deteriorate regional air quality.

ANG Scenario 2

ANG Scenario 2 would base 24 F-35A aircraft at McEntire JGNB, replacing the current 24 F-16 aircraft. Under ANG Scenario 2, both construction and operational activities would result in air pollutant emissions. Construction and operational emission assumptions are the same as those presented for ANG Scenario 1.

Construction

Construction under this scenario would be the same as proposed under ANG Scenario 1. As data in Table Mc3.3-3 indicate, annual emissions would be well below the 250 tons per year major source threshold for any criteria pollutant. As a result, regional air quality impacts are not anticipated.

Operations

Air quality impacts were determined by evaluating the net change in emissions associated with replacing 24 F-16s with 24 F-35A aircraft. Sources of operational emissions are the same as those presented under ANG Scenario 1. Table Mc3.3-5 summarizes annual operational emissions proposed under ANG Scenario 2 compared to baseline conditions. Like ANG Scenario 1, stationary source emissions were assumed to remain unchanged.

Table Mc3.3-5. Proposed Annual Operational Emissions under ANG Scenario 2 at McEntire JNGB

Activity	Pollutants in Tons per Year						
	CO	NO _x	VOCs	SO _x	PM ₁₀	PM _{2.5}	CO _{2e} ¹
Aircraft	12.01	45.69	0.51	20.00	1.20	1.16	15,645.75
Engine Runups	0.46	0.08	0.01	0.12	0.00	0.00	82.99
AGE ²	5.13	4.57	0.28	1.29	0.42	0.40	1,193.87
POVs	58.96	2.66	3.43	0.06	0.15	0.15	2,715.22
Total Annual ANG Scenario 2 Emissions	76.56	53.01	4.23	21.47	1.77	1.72	19,638
Baseline Annual Emissions	197.62	127.10	22.64	20.16	8.10	7.60	33,685
Net Change	-121.06	-74.09	-18.41	1.31	-6.33	-5.88	-14,047
Major Source Threshold	250	250	250	250	250	250	-
GHG Standard	-	-	-	-	-	-	25,000

Notes:

¹CO_{2e} = (CO₂ * 1) + (CH₄ * 21) + (N₂O * 310), (40 CFR 98, Subpart A, Table A-1) in metric tons per year.

²With the exception of SO_x (which the JSF program office has not determined as of this date) these data reflect F-35A specific AGE equipment.

The analysis shows that beddown of 24 F-35A aircraft would result in emission decreases for all listed pollutants, with the exception of sulfur oxide (SO_x) which would increase by about 1.3 tons per year—well below the 250-ton threshold. ANG Scenario 2, therefore, would not introduce emissions that would noticeably affect regional air quality because no new major pollutant sources would exceed 250 tons. Emissions due to construction and operations activities would also incrementally decrease regional emissions of CO_{2e} and would not introduce impacts to deteriorate regional air quality.

Climate Change Adaptation

In addition to assessing the greenhouse gas emissions that would result from ANG Scenarios 1 and 2, and the potential, albeit negligible, impact on climate change, the analysis must also assess how climate change might impact the proposed action and mission. It must also what adaptation strategies could be developed in response. This is a global issue for DoD. As is clearly outlined in the Quadrennial Defense Review Report of February 2010, the DoD would need to adjust to the impacts of climate change on our 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 Quadrennial Defense Review 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.

For McEntire JNGB, adaptation issues requiring evaluation and consideration could revolve around temperature increases, as well as aridity and drought in the Southeast. The U.S. Global Climate Research Program report, *Global Climate Change Impacts in the U.S.* (U.S. Climate Change Program 2009) portrayed the potential impacts of predicted climate change for all regions of the U.S., including South Carolina and the Southeast. Predicted increases in average temperatures and longer, hotter summers might require the ANG to shift training and maintenance schedules to prevent excessive “wear and tear” on aircraft, equipment, and personnel. However, given the requirement for the F-35A to deploy worldwide, including Southeast Asia where plus 100°F temperatures are common, such conditions would likely fall within a manageable range for fulfilling the mission. Overall, however, these estimated changes would not pose a risk to any construction, infrastructure, or operations. While overall warmer temperatures may increase demand for air conditioning and power, no need to adapt infrastructure or facilities would arise at the base. Such climate changes could also alter habitats, including those on base.

In terms of distant Atlantic coastal areas, the report projects average sea level increases ranging from 1 to 2 feet by the year 2100 depending upon the emission scenario. McEntire JNGB lies at an elevation of about 252 feet MSL and about 100 mile miles from the Atlantic Ocean. Given these factors, even the greatest projected rise in sea level (2 feet) would not directly affect the infrastructure at McEntire JNGB.

Predictions from the report suggest that the Southeast could face droughts, scarcity of water supplies, and even wildfire. Reduced availability of freshwater is likely to occur, with implications for the base and communities in the arid region encompassing McEntire JNGB. Water is essential for maintenance and personnel, so strategies dealing with drought would need to be implemented. With drought, temperature increases, and increased potential for invasive (less fire resistant) species associated with climate change, wildfires are predicted to increase by the report. McEntire JNGB could be subject to the effects of wildfires and need to employ strategies and policies to prevent and combat them.

As climate science advances and it better determines if and how human-generated factors may affect climate, the DoD would 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 would require DoD to work collaboratively, through a whole-of-government approach, with local, state, and federal agencies.

Mc3.3.2 Airspace

It is not anticipated that flight operations in special use airspace would affect regional air quality nor substantially alter existing GHG emissions under either of the scenarios. First, all airspace units in which the aircraft would operate are in attainment; second, over 95 percent of operations would occur above 5,000 feet AGL (see Table 2-7, section 2.1.2) and thus take place above mixing height; third, as identified in Section Mc3.3.1.2 replacing F-16 legacy aircraft with F-35A aircraft would generally reduce pollutant emissions within the airfield environment for every criteria pollutant except for modest increases in SO_x; and fourth, operations within the airspace would not appreciably change than what are found under baseline conditions. Because it is not anticipated that there would be net increases of listed criteria

pollutant emissions exceeding the 250 tons of the established thresholds, proposed airspace operations under either action scenario would not substantially deteriorate regional air quality. Implementation of ANG Scenario 1 would produce GHG emissions similar to those found under baseline conditions. Under ANG Scenario 2, an overall increase in GHG emissions would be anticipated; however, it is not anticipated that these emissions would change appreciably from current GHG emissions. This is supported by the fact that the primary source of F-35A GHG emissions are generated by taxiing and idling operations at the airfield and not due to operations within training airspace.

Mc3.4 Safety

Aircraft safety addresses Aircraft Potential Zones (APZs), aircraft mishaps, Bird/Wildlife-Aircraft Strike Hazards (BASH), and fuel jettison. Ground safety, including explosive and construction safety, is not addressed within this EIS; no new weapons would be introduced with the F-35A, all construction would be compliant with antiterrorism/force protection (AT/FP) requirements, and no changes to existing ground safety procedures would occur.

APZs are established to delineate recommended surrounding land uses for the protection of people and property on the ground, as described in Chapter 3. To minimize the results of a potential accident involving aircraft operating from McEntire JNGB, APZs have been established for the airfields, based on departure and arrival routes. McEntire JNGB has a Clear Zone at each end of Runway 14/32, that encompasses an area 3,000 feet wide by 3,000 feet long, an APZ I that is 3,000 feet wide by 5,000 feet long, and an APZ II that is 3,000 feet wide by 7,000 feet long. Runway 14 APZ I and APZ II do not continue on the same heading as the runway due to the fact that arrival and departure tracks generally avoid Fort Jackson airspace (R-6001). APZ I heads north and APZ II heads northeast. The majority of aircraft arriving to Runway 14 and departing Runway 32 operate within APZ I and APZ II avoiding Fort Jackson airspace. Development around McEntire JNGB has been in accordance with APZ guidelines and growth has been compatible with airport operations.

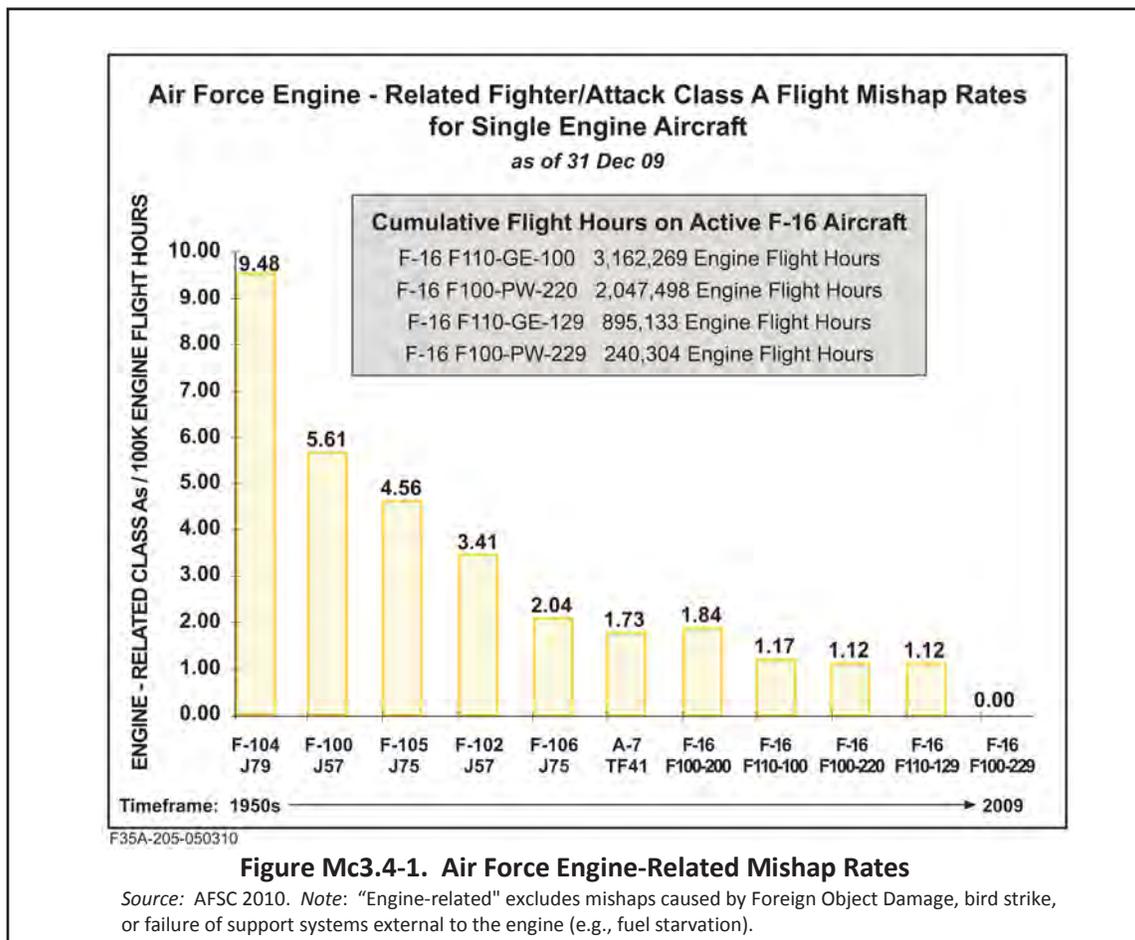
The primary concern with regard to military training aviation is the potential for aircraft mishaps (i.e., crashes) to occur. Aircraft mishaps are classified as A, B, C, or D, with Class A mishaps being the most severe, with total property damage of \$2 million or more, total aircraft loss, and a fatality and/or permanent total disability (DoD 2011). Based on historical data on mishaps at all installations, and under all conditions of flight, the military services calculate Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory. Combat losses are excluded from these mishap statistics. F-16 aircraft have flown more than 9,217,670 hours since the aircraft entered the Air Force inventory during FY 1985. Over that period, 339 Class A mishaps have occurred and 309 aircraft have been destroyed. This results in a Class A mishap rate of 3.68 per 100,000 flight-hours, and an aircraft destroyed rate of 3.35 (Air Force Safety Center [AFSC] 2009a).

Mc3.4.1 Base

Mc3.4.1.1 Affected Environment

The affected environment for safety includes the airfield at McEntire JNGB and its immediate vicinity. Aircraft flight operations from McEntire JNGB are governed by standard flight rules. Specific procedures for the installation are contained in standard operating procedures that must be followed by all aircrews operating from the installation (169 FW Instruction 13-250, *Airfield Operations and Base Flying Procedures*) to ensure flight safety. In the last 10 years, McEntire JNGB recorded no Class A mishaps (personal communication, Gendreau 2010). The last Class A mishap at McEntire JNGB was in 1984 and since that time, the 169 FW has flown over 100,000 flight hours with no mishaps (personal communication, Miller 2010).

Since the introduction of the single engine jet fighter or attack aircraft in the 1950s, technological advances have continually driven down the engine failure rate and associated aircraft mishaps (Figure Mc3.4-1) (AFSC 2010).



According to the AFSC BASH statistics, more than 50 percent of bird/wildlife strikes occur below 400 feet, and 90 percent occur at less than 2,000 feet (AFSC 2007). The Air Force BASH Team maintains a database that documents all reported bird/wildlife-aircraft strikes. Historic information for the past 37

years indicates that 43 Air Force aircraft have been destroyed and 35 fatalities have occurred from bird/wildlife-aircraft strikes (AFSC 2009b).

McEntire JNGB has an effective, on-going BASH programs through which information and assistance is freely shared between airfield users and the local air traffic controllers. BASH-related accidents within the base airfield environment have occurred infrequently, with only six minor accidents reported since 2007 (personal communication, Gendreau 2010). These data reflect total strikes experienced by all users of the airspace, not just aircraft originating from McEntire JNGB.

For use in emergency situations, certain aircraft have the capability to jettison fuel and reduce aircraft gross weight for safety of flight. When circumstances require, fuel jettisoning is permitted above 10,000 feet AGL, over unpopulated areas, and is generally overwater for applicable bases. Air Force instructions cover the fuel dumping procedures, and local operating policies define specific fuel dumping areas for each base.

Mc3.4.1.2 Environmental Consequences

The F-35A is a new aircraft and historical trends show that mishaps of all types decrease the longer an aircraft is operational as flight crews and maintenance personnel learn more about the aircraft’s capabilities and limitations. As the F-35A becomes more operationally mature, the aircraft mishap rate is expected to become comparable with a similarly sized aircraft with a similar mission. F-35A improved electronics and maintenance are expected to result in long-term Class A accident rate comparable to that of the similarly sized F-16 aircraft (3.68 lifetime) (AFSC 2009a). In order to provide a broader perspective on the potential mishap rate for a new technology like the F-35A, the following discussion refers to the mishap rates for the introduction of the F-22A (Raptor), the latest jet fighter in the DoD inventory. The F-22A was introduced in 2002, and provided the Air Force with the most current engine and stealth capabilities. This new technology is akin to the F-35A in that it is a new airframe with similar flight capabilities. With that in mind, it is possible that proposed mishap rates for the F-35A may be comparable to the historical rates of the F-22A. The Class A mishap rates for the F-22A from squadron operational status to 30 September 2009 are provided in Table Mc3.4-1.

<i>Year</i>	<i>Class A</i>		<i>Destroyed</i>		<i>Fatal</i>		<i>Hours Flown per Year</i>	<i>Cumulative Flight Hours</i>
	<i>Number of Mishaps</i>	<i>Rate¹</i>	<i>A/C</i>	<i>Rate</i>	<i>Pilot</i>	<i>All</i>		
FY02	1	869.57 ²	0	0.00	0	0	115	115
FY03	0	0.00	0	0.00	0	0	133	248
FY04	1	32.12	0	0.00	0	0	3,113	3,361
FY05	1	24.89	1	24.89	0	0	4,017	7,378
FY06	0	0.00	0	0.00	0	0	9,012	16,390
FY07	0	0.00	0	0.00	0	0	14,488	30,878
FY08	1	5.56	0	0.00	0	0	17,978	48,856
FY09	1	4.76	1	4.76	1	1	20,988	69,844
Lifetime	6	8.59	2	2.86	1	1	69,844	

Source: AFSC 2009a.

Notes: ¹Mishap rate is based on 100,000 hours of flight. ²One Class A mishap in initial year of operation with only 115 hours of flight results in abnormally high mishap rate, which is an anomaly.

Although the F-35A is a new aircraft, the single engine that powers it is a composite product of 30 years of engineering, lessons learned from previous single aircraft engines with a similar core, and tens of thousands of hours during operational use of legacy aircraft. The propulsion system design for the F-35A includes a dedicated system safety program with an acceptable risk level that was more stringent than legacy engines. The engine safety program focused on the major contributors of what previously caused the loss of an aircraft and provided redundancies in case of control system failures, and additionally, allowed for safe recovery of the aircraft even with system failures. Throughout the design and testing process, the safety initiatives took the previous best practices for single engine safety and built upon them to promote flight safety progress. Examples of design characteristics that are damage tolerant and enhance safety include a dual wall engine liner, a fan blade containment shell, and a shaft monitor for vibration, torque, and alignment.

Additionally, pilots flying the F-35A would use simulators extensively. Simulator training would include all facets of flight operations and comprehensive emergency procedures. The sophistication and fidelity of current simulators and related computer programs are commensurate with advancements made in aircraft technology. These factors should minimize risk associated with F-35A mishaps due to pilot error.

There would be a 21 percent decrease in airfield operations for ANG Scenario 1 and a 15 percent decrease with ANG Scenario 2 compared to existing conditions. Under these scenarios, the decrease in airfield use for take-offs, landings, proficiency training, and other flights would result in a commensurate decrease in the safety risk to aircrews and personnel due to the accident and mishap potential associated with aircraft operations.

The proposed decrease in airfield flight operations would technically lessen the potential for aircraft incidents. In addition, current airfield safety procedures discussed previously would continue to be implemented and additional airfield flight operations would adhere to established safety procedures.

The F-35A will have the capability to dump fuel for emergency situations and would follow procedures similar to those currently required by the legacy aircraft.

Mc3.4.2 *Airspace*

Mc3.4.2.1 *Affected Environment*

The airspace directly associated with the proposed action at McEntire JNGB includes Restricted Areas, Warning Areas, MOAs, and ATCAAs (see Figure Mc2.2-1) managed and scheduled by the 20 FW at Shaw AFB. The volume of airspace encompassed by the combination of airspace elements constitutes the affected environment for airspace safety. These training areas allow military flight operations to occur without exposing civil aviation users, military aircrews, or the general public to hazards associated with military training and operations. This analysis excludes all overwater airspace units as well as those units where projected F-35A operations would account for less than 5 percent of total operations. Further discussion of this approach is presented in Section 3.1.3. This section describes the existing safety procedures within the training airspace units and the following section evaluates changes that would occur with the introduction of the F-35A.

Aircraft flight operations in the training airspace are governed by FAA and Air Force standard rules of flight. Additionally, under the Commander 20 FW, the Operational Support Squadron and the Range Control Officer are the designated operating agencies for the airspace and range and are responsible for the overall management, control, and safety of the training assets. This includes airspace management, and scheduling and controlling all Poinsett Electronic Combat Range (ECR) assets. All users of the airspace must comply with Air Force Instruction (AFI) 13-212, *Range Planning and Operations*, Volumes 1-3 and supplements/addendums (Shaw AFB 2000). Safety records reveal no Class A mishaps of 169 FW aircraft since 2000 in the offshore Warning Areas used for training (personal communication, Gendreau 2010).

Aircrews are authorized to use self-protection (also known as decoy) flares in the Poinsett ECR, Bulldog A and B, and Gamecock B, C, and D MOAs. Flare use in the MOAs is governed by a minimum release altitude restriction of 5,000 feet MSL (approximately 4,500 AGL). Flares are not used in any of the MOAs below 5,000 feet MSL. Flares may be deployed at lower altitudes above Poinsett ECR.

Fires attributable to flares are rare for three reasons. Foremost, the altitude and other restrictions on flare use minimize the possibility for burning material to contact the ground. Second, to start a fire, burning flare material must contact vegetation that is susceptible to burning at the time. Tests by the U.S. Forest Service (USFS) on the ignition of dry grass by burning cigarettes revealed only a few ignitions despite hundreds of trials (Air Force 1997). The probability of a flare igniting vegetation would be expected to be equally minimal. Third, the amount and density of vegetation, as well as climate conditions, must be capable of supporting the continuation and spread of fire. Prescribed fire control is used at Poinsett ECR to manage habitat for the federally endangered red cockaded woodpecker. No major wildfire events have occurred at Poinsett ECR during the past 6 years (Shaw AFB 2007).

The Shaw AFB Fire Protection Flight is the initial responder to wildfires at Poinsett ECR. Mutual aid agreements have been established with the City of Sumter Fire Department and Sumter County Fire Department to facilitate a cooperative response to wildfires when needed. There also is a mutual aid agreement between Shaw AFB and the South Carolina Forestry Commission for wildfires at Poinsett ECR.

Historic information for the last 3 years for the training airspace indicates that 40 bird/wildlife-aircraft strikes have occurred (personal communication, Gendreau 2010.). None of these incidents resulted in a Class A mishap. These data reflect total strikes experienced by all users of the airspace, including those of the 169 FW.

Mc3.4.2.2 Environmental Consequences

Under the proposed action, the decrease in F-35A airspace and range training operations within the airspace (e.g., MOAs, ATCAAs, Restricted Areas, and Warning Areas) would incrementally decrease the potential for aircraft accidents or mishaps. However, current airspace safety procedures would continue to be implemented and additional flight operations would ensure adherence to established range and airspace safety procedures. Civilian and commercial air traffic would continue to be restricted from the airspace over the ranges when they are being used for military activities. The limited amount of time an aircraft is over any specific geographic location, combined with the absence or scarcity of population

under the affected airspace, minimizes the probability that an aircraft mishap would occur over a populated area. All airspace and range flight operations would continue to be conducted in accordance with procedures established in the applicable Air Force regulations and orders with the safety of its pilots and people in the surrounding communities as the primary concern. Strict control of restricted airspace, restricted access to range areas, and use of established safety procedures would minimize the potential for safety risks and ensure the separation of range operations from non-participants. These on-going safety procedures would limit the potential risk of increased range flight operations. Since there would be a decrease in airspace operations, impacts to aviation safety are considered to be negligible.

Under ANG Scenarios 1 and 2, the F-35A would operate in the same airspace environment as the current aircraft. As such, the overall potential for bird-aircraft strikes is not anticipated to be statistically different following the beddown of the F-35A. It is anticipated that BASH potential would be somewhat lessened due to the fact the F-35A attains altitude more rapidly and would spend less time at lower altitudes where species generally fly than legacy aircraft. In addition, F-35A aircrews operating in the training airspace would be required to follow applicable procedures outlined in the 169 FW BASH Plan; adherence to this program has minimized bird-aircraft strikes. When risk increases, limits are placed on low altitude flights and some types of training (e.g., multiple approaches, closed pattern work). Furthermore, special briefings are provided to pilots whenever the potential exists for greater bird-strike risks within the airspace; F-35A pilots would also be subject to these procedures.

Defensive decoy flares would be used by the F-35A aircraft, but in a manner consistent with the current regulations for Poinsett ECR. Together, McEntire JNGB and Shaw AFB legacy aircraft deployed approximately 80,000 flares annually in the airspace; the F-35A would likely deploy considerably fewer flares than legacy aircraft in keeping with its stealth capabilities. Given that flare use rarely results in fires, the likelihood of a flare causing a wildfire would not increase as a result of implementing the proposed action.

Different flare residual materials have different rates of descent and different impacts when they reach the ground. All of the MJU-61/B and M-206 residual flare materials that fall have surface area to weight ratios that would not produce any substantial impact when the residual flare material struck the ground. The largest item is the 0.975 inch × 0.975 inch × 0.5 inch plastic and spring igniter device with a weight of approximately 0.33 ounces in the MJU-61/B flare. This igniter device would strike the ground with a momentum of 0.046 pound/second, or approximately the same force as a small hailstone. The MJU-7/B has the largest piece of residual material, the safe and initiation (S&I) device, which would strike the ground with a momentum of 0.16 pound/second or approximately the same force as a large hailstone. If an igniter device were to strike an unprotected individual, it would be expected to be noticed, but not cause a bruise. An S&I device could cause a bruise. The likelihood of such a strike depends on the number of flares deployed, the area of the airspace, the population density under the airspace, and the percent of time that an individual can be expected to be outside. For example, 20,000 flares would be deployed annually within the 5,300 square-mile airspace. It is estimated that this area contains an approximate population density of 5 people per square mile, and on average, each person spends 10

percent of their time outdoors. Based on these factors, the likelihood of being struck by a flare is 0.0011 per year. This probability would vary by exact location and is calculated conservatively using the residual flare dimensions spread evenly across the areas under the airspace, and may also be applied to structures, vehicles, and livestock.

The F-16 carries a small canister of hydrazine for emergency engine restart at altitude. Hydrazine is a highly volatile propellant that contains toxic, unstable elements. The F-35A replaces the hydrazine canister with an integrated power package (basically a small jet engine) for use in emergency engine restart situations, thus eliminating the potential for hydrazine leaks.

Mc3.5 Geology, Soils, and Water

Mc3.5.1 Base

Mc3.5.1.1 Affected Environment

Geology

McEntire JNGB is located on the Atlantic coastal plain of South Carolina. This physiographic province consists of a wedge of sand, clay, and limestone sediments that overlies a basement of consolidated metamorphic and sedimentary rock. The unconsolidated sediments that compose the wedge are of late Cretaceous age; the basement rock is much older. There are no geologic faults in the vicinity of McEntire JNGB (Aucott and Speiran 1985).

Topography

As previously mentioned, the McEntire JNGB is situated in the Coastal Plain physiographic region of South Carolina. The land on McEntire JNGB is characterized by broad, flat ridge tops with narrow floodplains along streams. Some steep slopes are found on the installation along major drainages and creeks. Land elevation on McEntire JNGB varies from approximately 170 to 275 feet MSL (169 FW 2006a).

Soils

The land on McEntire JNGB is composed of 11 separate soil series; however, one soil type, Orangeburg loamy sand (0-25 percent slopes), comprises approximately 70 percent of the installation. The remaining 10 soil series found on the installation are Cantey loam (0-2 percent slopes), Coxville fine sandy loam (0-2 percent slopes), Dothan loamy sand (0-12 percent slopes), Fuguay sand (0-10 percent slopes), Goldsboro sandy loam (0-10 percent slopes), Johnston loam (0-2 percent slopes), Norfolk loamy sand (0-10 percent slopes), Persanti very fine sandy loam (0-6 percent slopes), Rains sandy loam (0-2 percent slopes), and Vaucluse loamy sand (0-25 percent slopes). All soils on McEntire JNGB have low or low to moderate erosion potential. Four soil series on the installation (Cantey, Coxville, Johnston, and Rains) are poorly drained, and the remaining seven (Dothan, Fuguay, Goldsboro, Norfolk, Orangeburg, Persanti, and Vaucluse) are well or moderately well drained (169 FW 2006).

Surface Water

The surface waters at McEntire JNGB consist of two streams and three ponds. The two streams, Cedar Creek and Dry Branch, run along the western installation boundary and eastern installation boundary, respectively. The three ponds on the base, all with a surface area of 10 acres or less, are Dry Branch Pond, Cedar Creek Pond, and Cyprus Pond (McEntire JNGB 2006) (Figure Mc3.5-1).

Groundwater

The main aquifer system in the vicinity of McEntire JNGB is the Middendorf aquifer unit. This aquifer is composed mostly of sand that is confined by layers of clay and silt. The Middendorf aquifer outcrops at the land surface in the area surrounding the fall line in South Carolina, so groundwater at McEntire JNGB can occur directly below the ground surface, or even as springs at the ground surface in areas with surface water (Aucott and Speiran 1985). See Community Facilities and Public Services Section Mc3.13 for more detailed information on capacity.

Floodplains

A portion of McEntire JNGB lies within a 100-year floodplain. The areas directly surrounding Dry Branch and Cedar Creek are both parts of the 100-year floodplain, along with the area around the intersection of Runway 14/32 (McEntire JNGB 2006a).

Mc3.5.1.2 Environmental Consequences

ANG Scenario 1

Under ANG Scenario 1, a total of 0.76 acre of land would be disturbed and a total of 0.06 acre of new impervious surface would be added to the installation from construction in areas that are currently undeveloped but have been previously disturbed. As such, geology, topography, and soils would not be adversely impacted by ANG Scenario 1. Stormwater impacts would be minimized using best management practices to prevent erosion to exposed soils during construction. There would be no impact to floodplains or to groundwater resources from ANG Scenario 1.

ANG Scenario 2

Similar to ANG Scenario 1, under ANG Scenario 2 a total of 0.76 acre of land would be disturbed and a total of 0.06 acre of new impervious surface would be added to the installation from construction in areas that are currently undeveloped, but have been previously disturbed. As such, geology, topography, and soils would not be adversely impacted by ANG Scenario 2. Stormwater impacts to surface water would be minimized using best management practices to prevent erosion to exposed soils during construction. There would be no impact to floodplains or to groundwater resources from ANG Scenario 2.

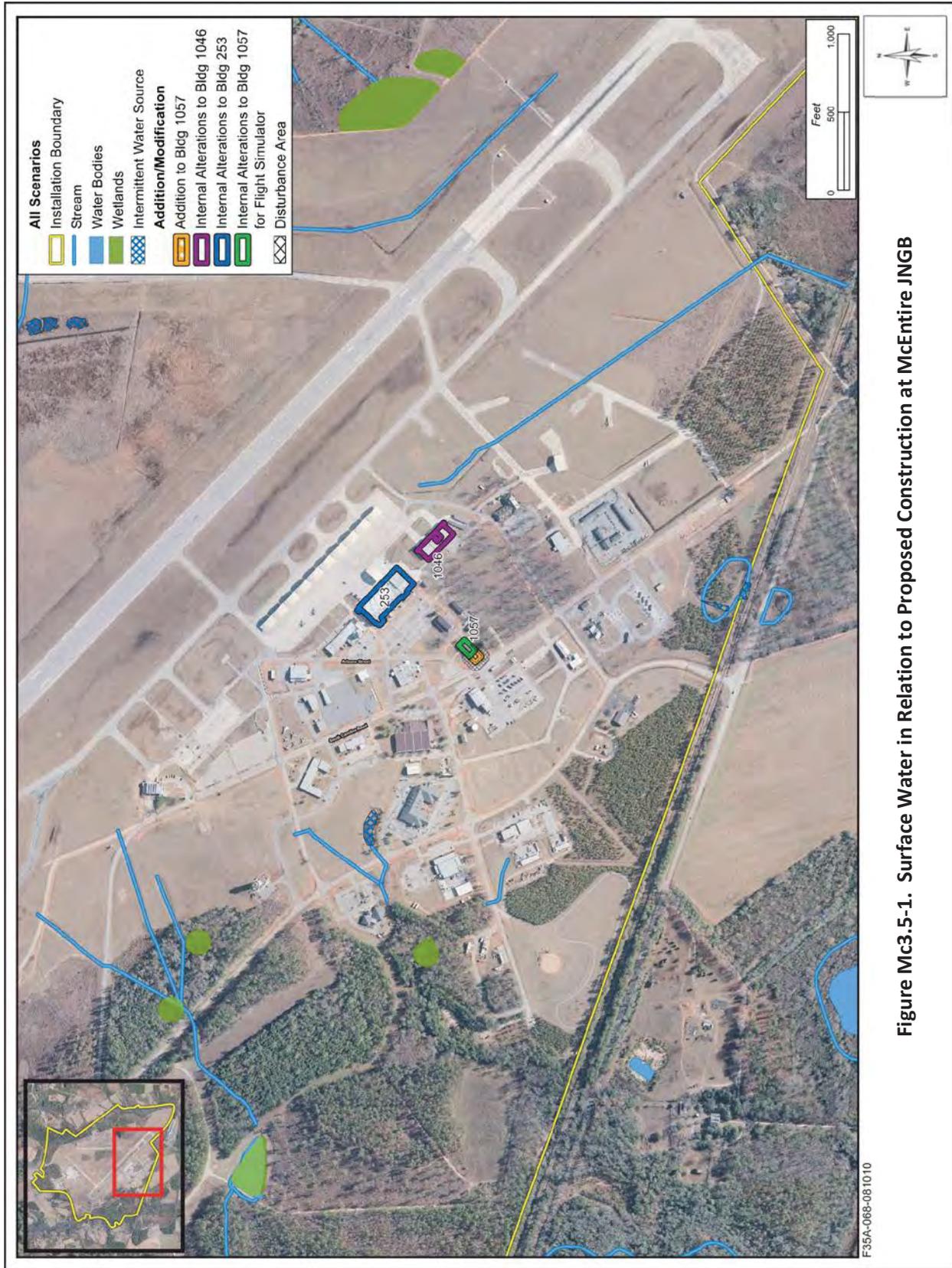


Figure Mc3.5-1. Surface Water in Relation to Proposed Construction at McEntire JNGB

Mc3.6 Terrestrial Communities (Vegetation and Wildlife)

Mc3.6.1 Base

Mc3.6.1.1 Affected Environment

Vegetation at McEntire JNGB can be divided into four primary habitat types: non-native grasslands, pecan (*Carya illinoensis*) groves, landscaped areas, and various forest types. Approximately 1,000 acres of non-native grasslands occur at McEntire JNGB, primarily around the airfield. These grasslands are composed largely of coastal Bermuda (*Cynodon dactylon*) and bahia grass (*Paspalum notatum*), and are maintained by frequent mowing. Two pecan groves totaling approximately 17 acres are also managed at McEntire JNGB. McEntire JNGB also supports approximately 950 acres of pine, pine hardwood, and hardwood forest units on the north, west and east sides of the installation.

Bird surveys conducted during the winter and spring of 2003 documented 84 bird species at McEntire JNGB. Common birds included American crow (*Corvus brachyrhynchos*), American robin (*Turdus migratorius*), blue jay (*Cyanocitta cristata*), Carolina chickadee (*Poecile carolinensis*), common grackle (*Quiscalus quiscula*), European starling (*Sturnus vulgaris*), and northern cardinal (*Cardinalis cardinalis*). Mammals that were observed at McEntire JNGB during the 2003 survey included the house mouse (*Mus musculus*), eastern harvest mouse (*Reithrodontomys humulis*), hispid cotton rat (*Sigmodon hispidus*), golden mouse (*Ochrotomys nuttalli*), cotton mouse (*Peromyscus gossypinus*), southern short-tailed shrew (*Blarina carolinensis*), eastern fox squirrel (*Sciurus niger*), eastern gray squirrel (*Sciurus carolinensis*), eastern cottontail rabbit (*Sylvilagus floridanus*), bobcat (*Lynx rufus*), mink (*Mustela vison*), opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), and white-tailed deer (*Odocoileus virginianus*).

A total of 25 amphibian and reptile species were documented at McEntire JNGB during the 2003 herptofaunal survey. However, the three most common species captured or observed included the southern toad (*Bufo terrestris*), southern leopard frog (*Rana sphenoccephala*), and American toad (*Bufo americanus*).

Mc3.6.1.2 Environmental Consequences

Implementation of the proposed action at McEntire JNGB would have relatively few direct impacts on terrestrial communities. The majority of the construction associated with the proposed action would occur within or adjacent to existing buildings. The only aspect of the proposed action with the potential to directly affect terrestrial communities is the construction of an addition to Building 1057. The addition would result in approximately 0.06 acre of new impervious surface and would be constructed along the southwest wall of the existing building in a previously disturbed and partially vegetated area. The vegetated area that would be lost consists of maintained lawn grass and provides minimal terrestrial habitat. As a result, impacts to vegetation from implementation of the proposed action would be minimal.

Airfield operations at McEntire JNGB would decrease from existing operations for both scenarios. ANG Scenario 1 would result in a decrease of 6,521 operations (54 percent), and ANG Scenario 2 would result

in a decrease of 4,711 operations (39 percent) when compared to existing F-16 operations. Total airfield operations would decrease under ANG Scenarios 1 and 2 by 21.0 and 15.2 percent, respectively. Decreased operations would result in a decreased opportunity for bird-aircraft strikes to occur. Adherence to the existing, effective BASH program would minimize the risk of bird-aircraft strikes to negligible levels (see Safety, Section Mc3.4).

Construction noise would be temporary in nature and, therefore, would have minor impacts to terrestrial species. While noise from an individual single event from the F-35A would be higher than legacy aircraft, the number of times that an individual animal would be exposed and the area that would be affected would decrease under both scenarios.

Mc3.6.2 Airspace

Mc3.6.2.1 Affected Environment

The airspace associated with McEntire JNGB covers over 9,720 square miles of land within North Carolina, South Carolina, and Georgia, as well as 56,594 square miles of Warning Areas over the Atlantic Ocean. These areas are found within the Outer Coastal Plain Mixed Province. Along the Atlantic coast, extensive coastal marshes and interior swamps are dominated by gum (*Nyssa* spp.) and cypress (*Taxodium* spp.) trees, with upland areas covered by pine forest such as longleaf pine (*Pinus palustris*), slash pine (*Pinus elliottii*), and loblolly pine (*Pinus taeda*). Evergreen-oak and magnolia forests are also common within this region (Bailey 1995).

These habitats support a variety of wildlife including mammals such as black bear (*Ursus americanus*), white-tailed deer, raccoon (*Procyon lotor*), Virginia opossum, flying squirrel (*Glaucomys volans*), and numerous species of ground-dwelling rodents. Game birds primarily include bobwhite quail (*Colinus virginianus*) and wild turkey (*Meleagris gallopavo*). Migratory bird species, reptiles, and amphibians are also diverse and numerous (Bailey 1995).

This analysis excludes all overwater airspace units as well as those units where projected F-35A operations would account for less than 5 percent of total operations. Further discussion of this approach is presented in Section 3.1.3.

Mc3.6.2.2 Environmental Consequences

No construction would occur beneath the training airspace; therefore, no impacts to vegetation would occur. Operations within the airspace would decrease from baseline between 2 and 38 percent for ANG Scenario 1, and between 2 and 22 percent for ANG Scenario 2. Section Mc3.4 (Safety) established that bird-aircraft strikes are currently rare in the airspace and would not be expected to increase under the proposed action. The F-35A would fly predominantly above 5,000 feet AGL, which is above where 95 percent of bird strikes occur. In addition, current procedures for avoiding flight operations during periods of high concentrations of migratory birds (both in time and space) would continue. Adherence to the existing, effective BASH program would minimize the risk of bird-aircraft strikes to negligible levels (see Safety, Section Mc3.4). Therefore, there would be no impacts to migratory birds.

The only identified defensive countermeasure that would be employed by F-35A during training operations is flares. Flare deployment would be equal to or less than current levels by F-16 aircraft and would be used only in airspace units current only approved for its use. In addition, current restrictions on the amount or altitude of flare use would continue to apply. Ordnance use of the JDAMs would be rare and would only occur at ranges authorized for its use (Avon Park, Poinsett). As a result, ordnance deployment associated with the proposed action would have no impact on terrestrial communities.

Overall, impacts to terrestrial wildlife from proposed changes in operations would be minimal for the following reasons: 1) The probability of an animal or nest experiencing overflights more than once per day would be low due to the random nature of flight within the airspace and the large area of land overflown. 2) The F-35A would fly at higher altitudes than legacy aircraft. The majority (95 percent) of the operations would occur above 5,000 feet AGL, and operations under 5,000 feet AGL would occur less frequently than baseline operations. 3) Supersonic flights would occur overwater under the proposed action. 4) Average noise levels in the airspace would not increase perceptibly in most airspace units, due primarily to flights being at higher altitudes (above 5,000 feet AGL) and the decrease in number of operations under both scenarios (see Section Mc3.2 for details on noise).

Mc3.7 Wetland and Freshwater Aquatic Communities

Mc3.7.1 Base

Mc3.7.1.1 Affected Environment

Approximately 174 acres of jurisdictional wetlands and 40 acres of potential wetlands have been identified on McEntire JNGB (refer to Figure Mc3.5-1). Forested wetlands are the most common type of wetlands found on McEntire JNGB, and are comprised primarily of sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), loblolly pine (*Pinus taeda*), yellow poplar (*Liriodendron tulipifera*), water tupelo (*Nyssa aquatica*), oaks (*Quercus* spp.), hickories (*Carya* spp.), willow oak (*Quercus phellos*), southern magnolia (*Magnolia grandiflora*), sassafras (*Sassafras albidum*), redbay (*Persea borbonia*), and sweetbay (*Magnolia virginiana*) (McEntire ANG 2006). Most of the forested wetlands on site are associated with the Cedar Creek and Dry Branch watersheds. Scrub-shrub comprise approximately 2 acres on McEntire JNGB and are primarily disturbed forested wetlands that are regenerating and cannot yet be classified as forested wetland habitat. Dominant species found in the scrub-shrub wetlands include sweet gum, red maple, cat greenbrier (*Smilax glauca*), nutsedge (*Cyperus* sp.), and bulrush (*Scirpus* sp.). In addition, approximately 2 acres of emergent wetlands occur on installation and are comprised primarily of cattails (*Typha* spp.), bulrush, rushes (*Juncus* spp.), nutsedge, and spike-rush (*Eleocharis* sp.) (169 FW 2006).

Mc3.7.1.2 Environmental Consequences

Approximately 174 acres of jurisdictional wetlands and 40 acres of potential wetlands are located on McEntire JNGB. However, no wetlands occur within proposed construction areas associated with either of the proposed scenarios. Therefore, construction activities under these scenarios would have no impact on wetlands.

Mc3.8 Threatened, Endangered, and Special Status Species/Communities

Mc3.8.1 Base

Mc3.8.1.1 Affected Environment

Based on surveys conducted in 1982 and 2003, there are no special status species or critical habitat present on or near McEntire JNGB. No special status communities occur on the installation.

Mc3.8.1.2 Environmental Consequences

No federally listed species or special status species have been observed on base. Total annual operations at McEntire JNGB are projected to decrease for ANG Scenarios 1 and 2 by 21 and 15.2 percent, respectively. While noise from an individual single event from the F-35A would be higher than legacy aircraft, the number of times that an individual animal would be exposed would decrease under all scenarios. As a result there will be no impacts to listed species as a result of the proposed action on the base.

Mc3.8.2 Airspace

Mc3.8.2.1 Affected Environment

This underlying land area includes habitat for several state and federally protected species. Due to the nature of the actions proposed within the airspace, plant species were excluded from extensive review and analysis because the proposed activities would not result in ground disturbance. In addition, marine species, invertebrates and fish were excluded from review and analysis as they, too, would not likely be impacted by the proposed action. Species included in the analysis of airspace currently are presented in Table Mc3.8-1 and include four reptiles, one amphibian, nine birds, and five mammals. No critical habitat is present under the airspace.

This analysis excludes all overwater airspace units as well as those units where projected F-35A operations would account for less than 5 percent of total operations. Further discussion of this approach is presented in Section 3.1.3.

Table Mc3.8-1. Threatened, Endangered, and Special-Status Species/Communities that Occur or Potentially Occur under Airspace Associated with McEntire JNGB

<i>Species</i>	<i>Status F/S</i>	<i>Areas of Occurrence</i>
Reptiles/Amphibians		
American Alligator <i>Alligator mississippiensis</i>	T/T	Found in a variety of freshwater habitats including rivers, marshes, swamps, and lakes in the Southeastern U.S.
Eastern Indigo Snake <i>Drymarchon corais couperi</i>	T/T	Found in pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, and human-altered habitats.
Flatwoods Salamander <i>Ambystoma cingulatum</i>	T/E	Occupies seasonally wet, pine flatwoods, and pine savannas in the southern U.S.
Sand Skink <i>Neoseps reynoldsi</i>	T/T	Prefers rosemary scrub.
Blue-Tailed Mole Skink <i>Eumeces egregius lividus</i>	T/T	Found in well-drained sandy uplands above 100 feet
Birds		
Piping Plover <i>Charadrius melodus</i>	T/T	Found on sandy beaches, mudflats and sandbars along rivers and lakes.
Red-cockaded Woodpecker <i>Picoides borealis</i>	E/E	Found in living, old-growth southern yellow pine. Trees that contain red heart rot (<i>Fomes pini</i>) are preferred for nest and roost cavity excavation.
Wood Stork <i>Mycteria americana</i>	E/E	Inhabit mainly tidal waters, marshes, swamps, streams and mangroves.
Roseate Tern <i>Sterna dougallii</i>	E/E	Forms colonies on offshore islands. Nest sites are sheltered by overhanging rock or vegetation.
Whooping Crane <i>Grus americana</i>	XN/SSC	Prefer flat, open palmetto prairie interspersed with shallow wetlands and lakes.
Florida Grasshopper Sparrow <i>Ammodramus savannarum floridanus</i>	E/E	Requires large areas of frequently burned dry prairie habitat, with patchy open areas sufficient for foraging.
Florida Scrub-Jay <i>Aphelocoma coerulescens</i>	T/T	Found mainly in scrub woodlands along coasts, rivers, and on some high inland ridges of peninsular Florida.
Crested Caracara <i>Caracara cheriway</i>	T/T	Their typical habitats are either comprised of dry prairie with some wetter areas or agricultural environments.
Snail Kite <i>Rostrhamus sociabilis plumbeus</i>	E/E	Prefer large open freshwater marshes and lakes.
Mammals		
West Indian Manatee <i>Trichechus manatus</i>	E/E	The West Indian manatee lives in shallow coastal waters, rivers, bays, and lakes. Restricted to tropical and subtropical waters.
Florida Panther <i>Puma concolor coryi</i>	E/E	Found in mixed swamp forests and hammock forests.
Puma <i>Puma concolor</i> (all subsp. except <i>coryi</i>)	T(SA)/-	Found in mixed swamp forests and hammock forests.
Florida bonneted bat <i>Eumops floridanus</i>	C/-	Roosts in cliff crevices, tree cavities and buildings.
Red Wolf <i>Canis rufus</i>	E/-	Found in a variety of habitats including mountains, lowland forests, and wetlands.

Source: U.S. Fish and Wildlife Service (USFWS) 2010a, b; South Carolina DNR 2010.

Notes: E= Endangered; T= Threatened; SA = Similarity of Appearance to a listed taxon; XN = Experimental Population; SSC = Species of Special Concern.

Mc3.8.1.2 Environmental Consequences

Overall, no effects are anticipated to federally listed species for the following reasons: 1) The probability of an animal or nest experiencing overflights more than once per day would be low due to the random nature of flight within the airspace and the large area of land overflown. 2) The F-35A would fly at higher altitudes than legacy aircraft. The majority (95 percent) of the operations would occur above 5,000 feet AGL, and operations under 5,000 feet AGL would occur less frequently than baseline operations. 3) Supersonic flights would occur over water under the proposed action. 4) Average noise levels in the airspace would not increase markedly, due primarily to flights being at higher altitudes (above 5,000 feet AGL) and the decrease in the number of operations under both scenarios (see Section Mc3.2 for details on noise).

Mc3.9 Cultural and Traditional Resources

Mc3.9.1 Base

Mc3.9.1.1 Affected Environment

An Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) letter was sent to the South Carolina SHPO regarding the proposed project. The South Carolina SHPO confirmed that Section 106 consultation had been initiated for the project. Section 106 consultation is summarized in Chapter 1 and Appendix B.

Archaeological Resources

Previous archaeological investigations have identified 57 archaeological sites on McEntire JNGB. Of these sites, five are eligible for listing on the NRHP and five require further evaluation to determine eligibility. Extensive subsurface disturbance from past development and other mission activities is present throughout much of the facility (169 FW 2006b).

Architectural Resources

An architectural survey was conducted at McEntire JNGB in 1997. At that time, the few structures that dated to the World War II-era and were greater than 50 years in age were found not eligible for listing in the NRHP due to loss of integrity. Cold War-era resources were evaluated under Criterion G during this inventory, and none were found to be eligible for listing in the NRHP (Peer Consultants, P.C. and DuVall and Associates, Inc. 2001).

Traditional Resources

No formal surveys for traditional cultural resources or sacred sites have been conducted; however given the disturbed nature of the installations, the presence of intact traditional culture properties is unlikely.

Mc3.9.1.2 Environmental Consequences

ANG Scenario 1

Under ANG Scenario 1, an addition would be made to Building 1057 and electrical upgrades would be made to Buildings 253 and 1046. Since Buildings 1057 and 1046 were constructed after the Cold War Era and are less than 50 years in age, they are not considered eligible for listing in the NRHP. Building 253 was built during the Cold War Era, but has not been evaluated for NRHP-eligibility under Criteria A-C. However, if this building were eligible for listing in the NRHP, the electrical upgrades planned under the proposed action would not affect the building's NRHP-eligibility. No archaeological sites eligible for listing in the NRHP or sites that are unevaluated are located near the areas proposed for additions or improvements. Therefore, there would be no adverse impacts to historic properties from the proposed action under ANG Scenario 1.

ANG Scenario 2

Construction impacts under ANG Scenario 2 are the same as under ANG Scenario 1. Therefore, there would be no adverse impacts to historic properties under ANG Scenario 2.

Mc3.9.2 Airspace

Mc3.9.2.1 Affected Environment

There are 111 NRHP-listed cultural resources located under the McEntire JNGB airspace, including private residences, businesses, courthouses, depots, and churches, plantations, battle sites, historic districts, campgrounds, schools, farms, and a bottling plant. No American Indian reservations underlie the airspace and no traditional cultural properties are known within this area.

An IICEP letter initiating government-to-government consultation was sent to Catawba Indian Nation informing them about the proposed project. The Catawba Indian Nation responded that they would like to be included in any consultation pursuant to the proposed project. A number of federally recognized tribes have historical or ancestral ties to the area that is now McEntire JNGB. They include:

- Absentee Shawnee
- Alabama-Coushatta Tribe of Texas
- Alabama Quassarte
- Catawba Indian Nation
- Cherokee Nation of Oklahoma
- Chickasaw Nation
- Coushatta Tribe of Louisiana
- The Eastern Band of Cherokee Indians
- Eastern Shawnee Tribe of Oklahoma
- Kialegee Tribal Town, Muscogee (Creek) Nation
- Poarch Creek Indians
- Seminole Tribe of Florida

- Shawnee Tribe
- Thlopthlocco Tribal Town
- Tuscarora Nation
- United Keetoowah Band of Cherokee Indians
- Seminole Nation of Oklahoma

Government-to-government consultation with these tribes is summarized in Chapter 1 and Appendix B.

The following analysis excludes all overwater airspace units as well as those units where projected F-35A operations would account for less than 5 percent of total operations. Further discussion of this approach is presented in Section 3.1.3.

Mc3.9.2.2 Environmental Consequences

There would be no adverse impacts to cultural resources due to the implementation of the proposed action under either scenario. Although a perceptible increase of 3 dB would occur in Coastal Townsend under ANG Scenario 2, this change would be a continuation of existing operations within the area and would not result in a change in setting (either visual or auditory) to any eligible or listed archaeological, architectural, or traditional cultural property. No change in noise conditions would occur in Avon Park or Poinsett. An imperceptible change of 1 to 2 dB would occur in Gamecock, Bulldog, and Coastal Townsend (under ANG Scenario 1). No additional ground disturbance would occur under the airspace due to the proposed action. Use of ordnance and defensive countermeasures would occur in areas already used for these activities. Use of the Poinsett Range would be the same as activities authorized and currently occurring there. Therefore, no adverse impacts would result to NRHP-eligible or listed archaeological resources, architectural resources, or traditional cultural properties under either scenario.

Mc3.10 Land Use

Mc3.10.1 Base

The following section describes the existing conditions and examines the extent to which the beddown of the F-35A at McEntire JNGB would be consistent with state, regional, and local conservation and development plans and zoning regulations.

In order to provide a comparable data set between proposed siting alternatives at the six locations considered for the proposed action, local zoning categories were consolidated and/or renamed. Table Mc3.10-1 provides a cross-reference between the Richland County classifications and those used in this EIS analysis.

Table Mc3.10-1. Land Use Categories	
County Land Use Classification	EIS Land Use Classification
All Residential Sub-Categories, Manufactured Home, Planned Development	Residential
Commercial, Commercial Planned Unit Development, Neighborhood Commercial, Office and Institutional	Commercial
Heavy Industrial, Light Industrial	Industrial
Public/Quasi Public	Public/Quasi Public
McEntire JNGB	Military
Rural	Open Space
No Data	Unclassified

Mc3.10.1.1 Affected Environment

McEntire JNGB area encompasses 2,344 acres of land (3.7 square miles). Land use at McEntire JNGB is divided into eight standard ANG land use categories. Safety Zones and Airfield Clearance Areas, Airfield Pavement Areas, Aircraft Operations, Maintenance Facilities are located closest to the flightline. Industrial Facilities are grouped in four areas on the station and include areas for maintenance, supply, civil engineering functions, and hazardous material storage. Command and Support Facilities, located at the intersection of Arizona Road and South Carolina Road, include operations and training, communications, security police, entry gates, dining hall, and clinic. Command and Support Facilities include the entry gates, and isolated facilities such as State Headquarters and the gymnasium. Special categories include small arms ranges munitions maintenance and storage facilities, hazardous waste storage, and fire training facilities, and are located throughout the station. Open space includes landscaping around buildings, setbacks, water areas, wooded areas, recreational areas, etc. Most of the open space is located on the periphery of the installation. The open space on the eastern and western perimeters of the installation is heavily wooded. The area around the airfield, due to safety regulations, is maintained as an open field (McEntire JNGB 2001).

At each end of Runway 14/32, McEntire JNGB has a Clear Zone that encompasses an area 3,000 feet wide by 3,000 feet long, an APZ I that is 3,000 feet wide by 5,000 feet long, and an APZ II that is 3,000 feet wide by 7,000 feet long. Runway 14 APZ I heads north and APZ II heads northeast. The operational requirements of the other runways do not require either Clear Zones or APZs.

General siting criteria have been established for land development and use at military airfields. For example, APZ's which address height restrictions, development density, and land use in and around civilian airports, are enforced to reduce the potential for aircraft-related hazards. APZs are located off each runway end and development at the McEntire JNGB is constrained by design and height restrictions including in these areas. Approximately 64 acres of Clear Zone are leased and 29 acres are under perpetual easement for areas within this zone. Areas of this Clear Zone are zoned heavy industrial and include structures. Standard Manual Land Use Coding guidelines do not recommend the placement of structures or buildings within a Clear Zone. APZ I contains single residences and one church. Single residences and public assembly (churches) areas are not compatible with APZ I. A small section of APZ I is zoned high industrial but no structures exist. Land use within APZ II consists of

undeveloped hardwood/pine and oak/pine forests, agricultural fields, and several residences. Both undeveloped and agricultural land use types are considered compatible, as are residential areas that do not exceed one to two dwelling units per acre. No incompatible land use exists within APZ II (McEntire JNGB 2009).

Baseline Aircraft Noise and Land Use Compatibility Surrounding the Installation

Land use activities most sensitive to noise typically include residential and commercial areas, public services, and areas associated with cultural and recreational uses. Noise calculations related to aircraft operations that define the area of noise impact are expressed in terms of DNL. DNL represents the average annual day community noise exposure from aircraft operations during a 24-hour period over a year. The DNL is depicted visually as a noise contour that connects points of equal value. The DoD has established noise compatibility criteria for various land uses. According to these criteria, sound levels up to 65 dB DNL are compatible with land uses such as residences, transient lodging, and medical facilities. Existing noise levels and those associated with each scenario are presented in Section Mc3.2.1 along with a discussion of potential effects on noise-sensitive receptors and nearby housing and population.

Local land use in the vicinity of McEntire JNGB encompasses the Lower Richland County Area. Towns adjacent to the installation include Eastover, approximately 8 miles east, with a population of about 800; Gadsden, approximately 6 miles south with a population of about 500; and Hopkins, about 6 miles west, with a population of about 500 (U.S. Census Bureau 2000). Columbia is located 15 miles northwest of McEntire JNGB. Fort Jackson Military Reservation is located approximately 4 miles north and Congaree National Park is located approximately 7 miles south of the installation. Although expansion has occurred eastward from Columbia over the last 25 years, currently approximately 75 percent of the land within Lower Richland County is classified as rural (Central Midlands Council of Governments 2009). In general, the area surrounding the base consists of small farms with limited industrial use within the area. Richland County developed an Airport Overlay District with the intent to restrain influences that are adverse to the property and safe conduct of aircraft operations in the vicinity of McEntire JNGB.

The base has also been involved in the development of planning studies including the Fort Jackson/McEntire Joint Land Use Study (JLUS) and the 2008 AICUZ. The JLUS was a cooperative land use planning initiative between the U.S. Army, South Carolina National Guard, Air Force, SCANG, and the surrounding cities and counties of the region. The intent of the document was to provide an on-going guide to local government and military actions to enhance compatibility around Fort Jackson/McCrary Training Center and McEntire JNGB. The study noted that lands surrounding the base were rural with scattered land use compatibility issues related to residential use west of McEntire JNGB (Central Midlands Council of Governments 2009).

The 2001 AICUZ study for McEntire JNGB was updated in 2008 in compliance with DoD Instruction 4165.57 (*Air Installations Compatible Use Zones*) and AFI 32-7063 (*Air Installation Compatible Use Zone Program*). The purpose of the document is to promote compatible land development in areas subject to aircraft noise and accident potential. The Air Force provides the AICUZ Study to local communities to assist them in preparing their local land use plans (South Carolina ANG 2008).

Based on the results of the AICUZ and the analysis of current noise levels around the base, land use incompatibilities currently exist around the McEntire JNGB airfield as a result of noise exposure. According to the AICUZ, non-conforming residences occur within the 65 dB to 75 dB contours surrounding the McEntire JNGB boundary although the area is not zoned for residential use. Overall, high noise levels are generally confined to areas within the base boundary and areas adjacent to the airfield complex (South Carolina ANG 2008).

Table Mc3.10-2 establishes that baseline land uses affected by 65 dB DNL or greater consist predominantly of agricultural lands with lesser amounts designated for industrial use. The bulk (75 percent) of off-base lands falls within the 65 to 70 dB DNL contour band. Only 2 acres lie under the 80 to 85 dB DNL contour.

Table Mc3.10-2. Off-Base Land Uses Affected by Noise Levels 65 dB DNL and Greater under Each ANG Scenario																		
Land Use Category	65-70 dB DNL			70-75 dB DNL			75-80 dB DNL			80-85 dB DNL			85+ dB DNL			Totals		
	<i>Baseline</i>	<i>Proposed</i>	<i>Acres Change</i>	<i>Baseline</i>	<i>Proposed</i>	<i>Acres Change</i>	<i>Baseline</i>	<i>Proposed</i>	<i>Acres Change</i>									
ANG Scenario 1																		
Residential	0	1	1	1	0	-1	0	0	0	0	0	0	0	0	0	1	1	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	125	88	-37	125	90	-35	94	52	-42	1	1	0	0	0	0	345	231	-114
Public/Quasi Public	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Open/Agricultural	3,018	941	-2,077	676	256	-420	128	23	-105	1	0	-1	0	0	0	3,823	1,220	-2,603
Unclassified	9	0	-9	2	0	-2	0	0	0	0	0	0	0	0	0	11	0	-11
Total	3,152	1,030	-2,122	804	346	-458	222	75	-147	2	1	-1	0	0	0	4,180	1,452	-2,728
ANG Scenario 2																		
Residential	0	1	1	1	0	-1	0	0	0	0	0	0	0	0	0	1	1	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	125	78	-47	125	93	-55	94	70	-24	1	4	3	0	0	0	345	245	-100
Public/Quasi Public	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Open/Agricultural	3,018	1,292	-1,726	676	356	-265	128	57	-71	1	0	-1	0	0	0	3,823	1,705	-2,118
Unclassified	9	0	-9	2	0	-2	0	0	0	0	0	0	0	0	0	11	0	-11
Total	3,152	1,371	-1,781	804	449	-355	222	127	-95	2	4	2	0	0	0	4,180	1,951	-2,229

Source: Wyle 2011.

Mc3.10.1.2 Environmental Consequences

Both scenarios would require additions and modifications to existing facilities. Additions would be designed to be compatible with the existing base master plan, airfield safety guidelines and planning documents. Construction projects would not affect surrounding communities since proposed development would be contained within existing military lands on the base, and no change to the existing airfield-related APZs and Clear Zones would occur. Therefore, the focus of this analysis is on the changes in off-base noise conditions. Since the most common concerns associated with land use center on effects of noise on lands designated for residential use, this land use category will be examined in detail.

The following impact analysis compares the proposed noise contours for each scenario to: 1) baseline noise contours, which show the existing noise environment, and 2) the 2008 AICUZ contours, which may be incorporated in municipal, county or regional planning activities. The comparison of the proposed contours to the baseline contours shows potential change in noise conditions and land use compatibility (Table Mc3.10-2 and Figures Mc3.10-1 and Mc3.10-2). The comparison of the proposed 65 dB DNL contour areas to the AICUZ 65 dB DNL planning area illustrates the potential for the proposed action to affect land use planning activities (Table Mc3.10-3 and Figure Mc3.10-3).

Table Mc3.10-3 Difference between AICUZ and Proposed Scenarios within the 65 dB DNL Contour (in acres)					
<i>EIS Land Use Classification</i>	<i>AICUZ</i>	<i>ANG Scenario 1</i>	<i>Net Change</i>	<i>ANG Scenario 2</i>	<i>Net Change</i>
Residential	1	1	0	1	0
Commercial	0	0	0	0	0
Industrial	325	231	-94	245	-100
Public/Quasi Public	0	0	0	0	0
Recreation	0	0	0	0	0
Open Space	3,518	1,220	-2,298	1,705	-1,813
Unclassified	13	0	-13	0	-13
Total	3,857	1,452	-2,405	2,137	-1,926

Source: Wyle 2011.

Under ANG Scenarios 1 and 2, the acres of lands designated for residential use affected by noise levels of 65 dB DNL or higher would remain the same, with no new residential land uses subject to incompatible noise level per Federal Interagency Committee on Urban Noise Standards (FICUN) (refer to Table Mc3.10-2). Impacts to noise sensitive receptors (schools, hospitals and churches) from the proposed action, are identified and discussed in detail in the noise analysis, Section Mc3.2.

ANG Scenario 1

Under ANG Scenario 1, the decrease in airfield operations would result in an overall reduction in the areas affected by noise levels equal to or greater than 65 dB DNL (refer to Figure Mc3.10-1) (see Section Mc3.2). The current 65 to 70 dB DNL contour area would decrease overall by 2,122 acres. As shown on Table Mc3.10-2, no new off-base residential areas would be affected by noise levels equal to or greater than 65 dB DNL. Industrial areas affected by noise levels equal to or greater than 65 dB DNL would decrease by 114 acres and affected open space areas would decrease by 2,603 acres (refer to Table Mc3.10-2 and Figure Mc3.10-1). ANG Scenario 1 would remain within the AICUZ planning contours except where it extends beyond the contours slightly to the south (Table Mc3.10-3 and Figure Mc3.10-2). Overall, the acreage exposed to noise levels equal to or greater than 65 dB DNL when compared to the 2007 AICUZ would decrease by 62 percent under ANG Scenario 1.

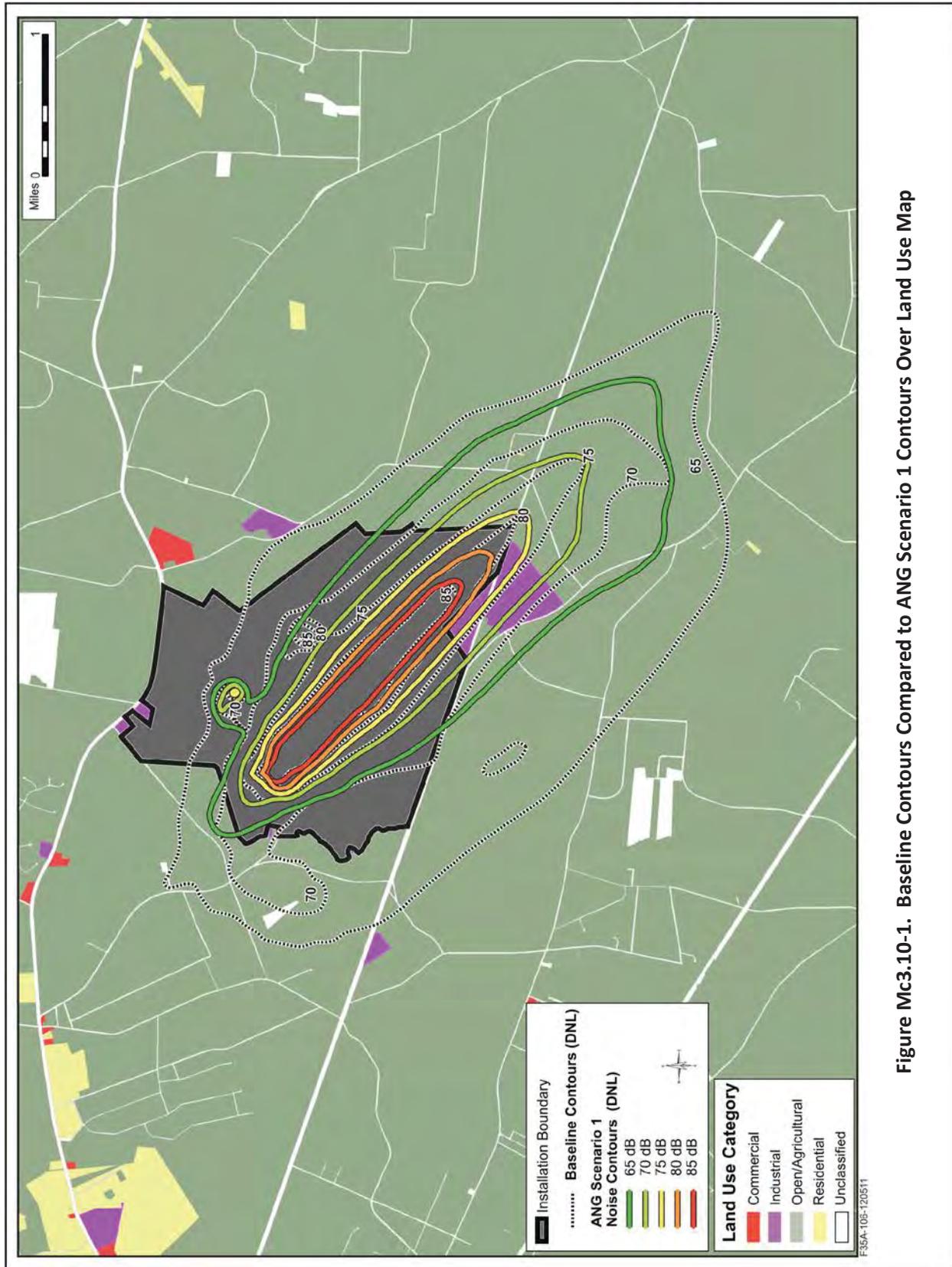


Figure Mc3.10-1. Baseline Contours Compared to ANG Scenario 1 Contours Over Land Use Map

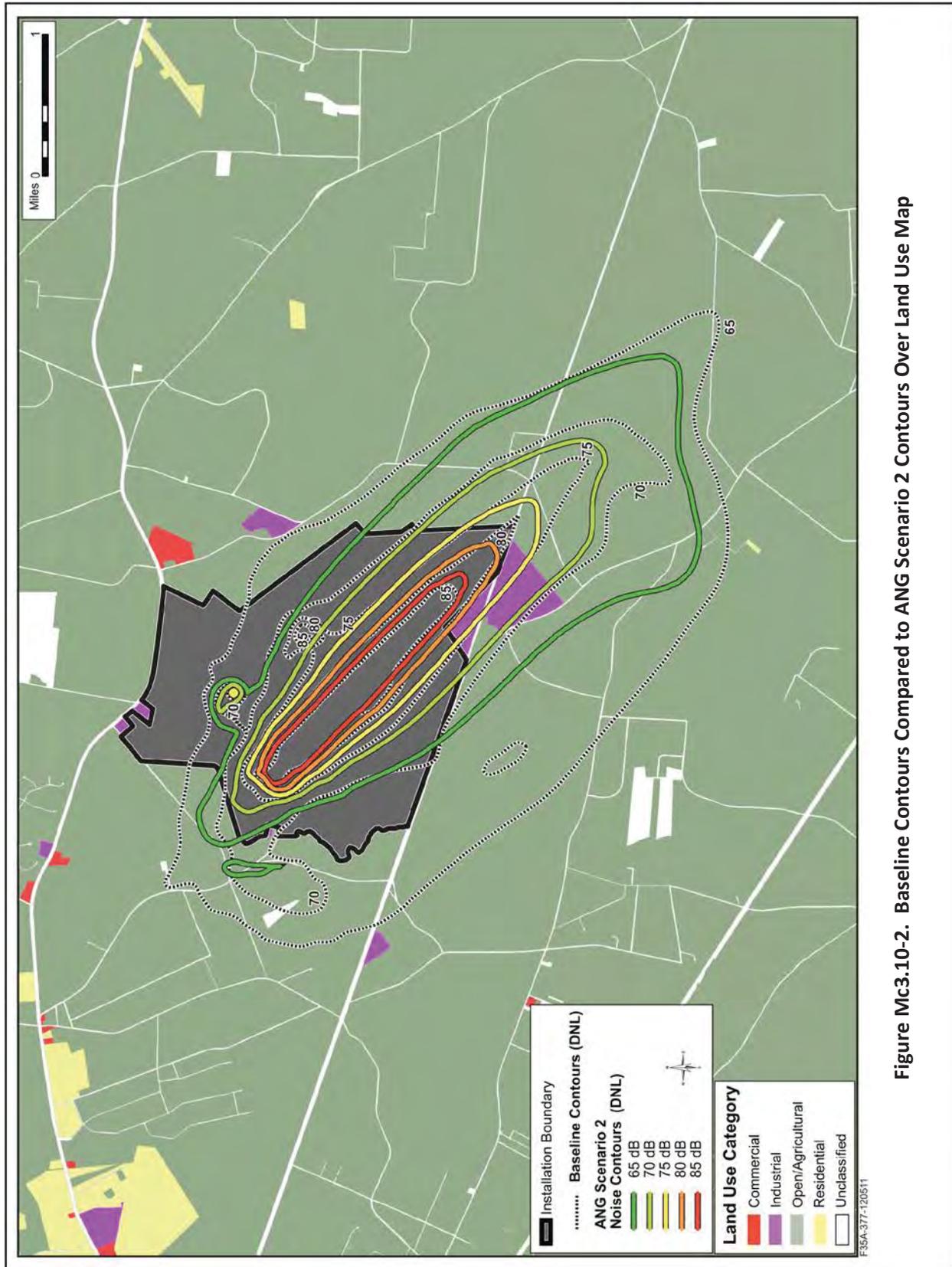


Figure Mc3.10-2. Baseline Contours Compared to ANG Scenario 2 Contours Over Land Use Map

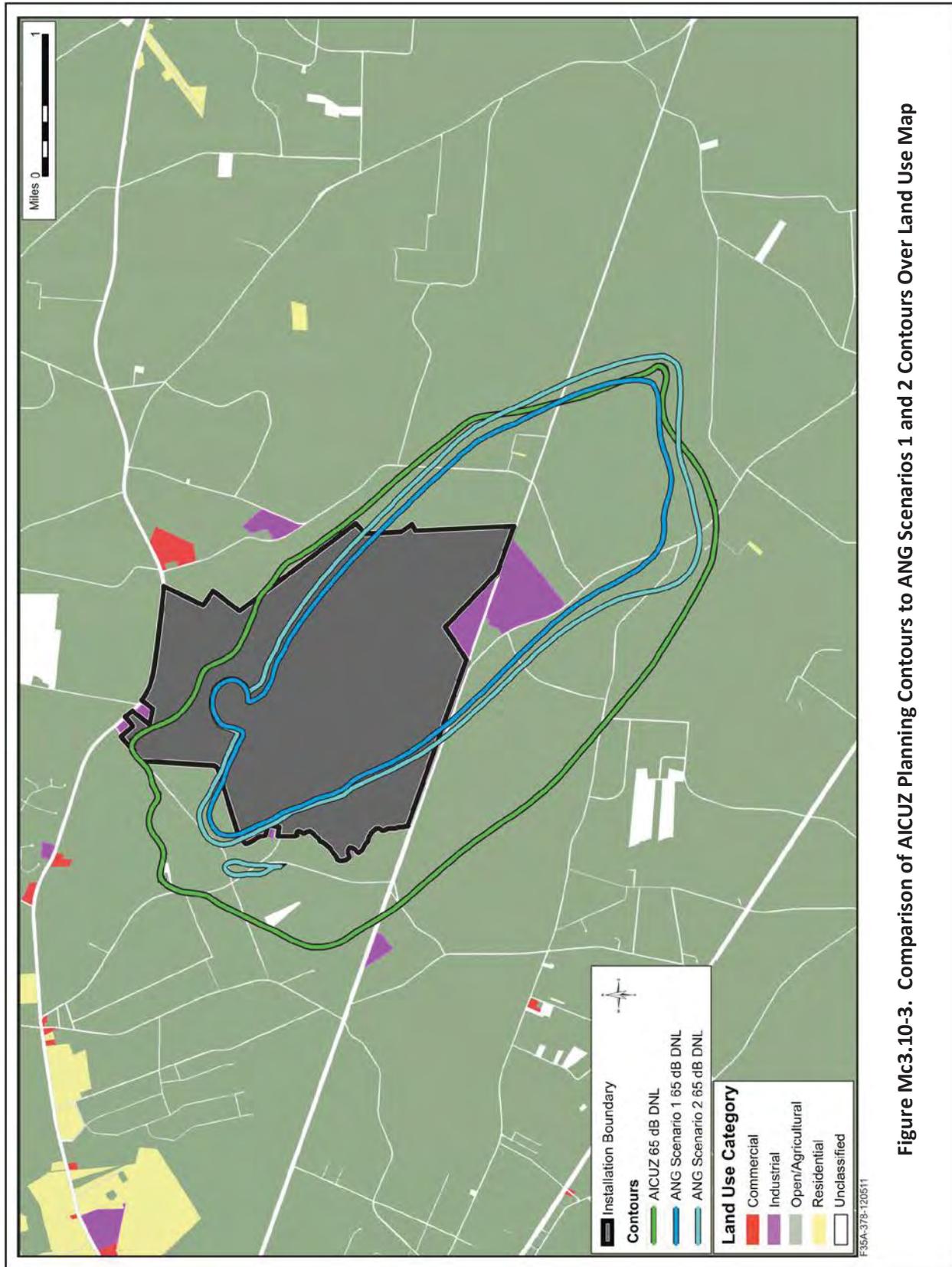


Figure Mc3.10-3. Comparison of AICUZ Planning Contours to ANG Scenarios 1 and 2 Contours Over Land Use Map

ANG Scenario 2

Under ANG Scenario 2, the decrease in airfield operations would result in an overall reduction in the areas affected by noise equal to or greater than 65 dB DNL (refer to Figure Mc3.10-3) (see Section Mc3.2, Noise). The current 65 to 70 dB DNL contour area would decrease overall by 1,781 acres. Industrial use areas affected by noise levels equal to or greater than 65 dB DNL would decrease by 100 acres and open space use areas affected by this level of noise would decrease by 2,118 acres (refer to Table Mc3.10-3 and Figure Mc3.10-4). ANG Scenario 2 would remain within the AICUZ planning contours except where it extends beyond the contours to the south (Table Mc3.10-3 and Figure Mc3.10-2). Overall, the acreage exposed to noise levels greater than 65 dB DNL when compared to the 2007 AICUZ would decrease by 50 percent.

Mc3.10.2 Airspace

Mc3.10.2.1 Affected Environment

This section summarizes land uses underlying airspace identified for training activities under the proposed action. Gamecock airspace is located over areas of South Carolina and North Carolina; Bulldog and Coastal Townsend airspace units is located over areas of Georgia; Poinsett airspace is located over areas of South Carolina; and Avon Park is located over areas of Florida. General land use patterns underlying these airspace units are characterized as rural, and include agricultural uses such as crops and forestry. Small rural communities are dispersed under the airspace. Within these towns, a variety of uses occur, including residential, commercial and public land uses. Designated special use areas have been identified under the airspace. Several special use areas are public lands with an area or management plan to protect scenic, historic, archeological, scientific, biological, recreational, or other special resource values. Table Mc3.10-4 summarizes land ownership and primary special use areas for each airspace unit.

The Gamecock airspace consists of Gamecock A, B, C, D in Georgia and I in South Carolina (see Figure Mc2.2-1). These airspaces primarily extend in altitude from a floor of 10,000 feet AGL to a ceiling of 22,000 feet MSL. Gamecock C ranges from a floor of 100 AGL to a ceiling of 10,000 feet MSL. The Gamecock airspace overlies portions of Georgetown, Marion, Horry, Williamsburg, Florence, Clarendon, Berkley, Sumter, and Calhoun counties in South Carolina. Numerous, sparsely populated communities are scattered throughout the counties under these airspace units. County and city comprehensive plans establish requirements and guidelines applicable to the private lands in the respective jurisdictions. The City of Columbia lies approximately 50 miles outside the western edge of Gamecock.

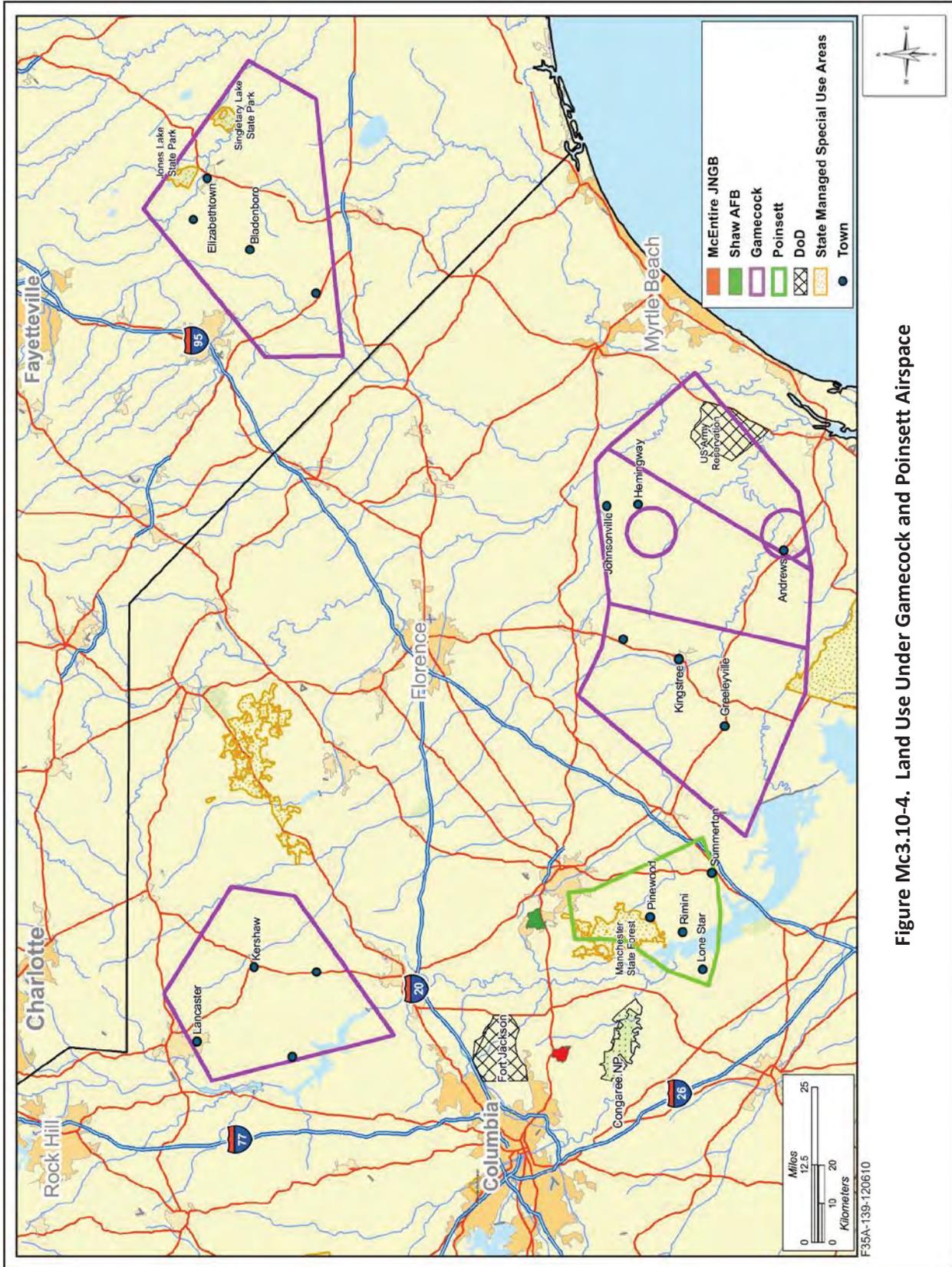


Figure Mc3.10-4. Land Use Under Gamecock and Poinsett Airspace

Table Mc3.10-4. Land Ownership and Special Use Areas under Training Airspace		
<i>Land Owner</i>	<i>Acres</i>	<i>Special Use Areas</i>
Gamecock		
USFS	3,413	Francis Marion National Forest
USFWS	2,051	Waccamaw NWR
State of North Carolina	26,053	Jones Lake State Park, Singletary Lake State Park, Bladen Lakes State Forest, Lumber River State Park, NC Natural Heritage Program Lands
State of South Carolina	5,251	Forty Acre Rock Heritage Preserve, Bennett's Bay Heritage Preserve, Scenic Black River
DoD	29,374	U.S. Army Reservation
Private	1,669,922	NC Natural Heritage Program Lands
Total	1,736,064	-
Poinsett		
State of South Carolina	23,016	Manchester State Forest (Includes Poinsett Electronic Combat Range [DoD])
Private	145,774	-
Total	168,790	-
Bulldog		
DoD	3,349	Fort Gordon Garrison
USFWS	223	Savannah NWR, Piedmont NWR
State of Georgia	14,233	Magnolia Springs State Park, George L. Smith State Park, Di-Lane WMA, The Ohoopsee Dunes Natural Area, Big Dukes Pond Natural Area, Yuchee WMA
Private	1,471,144	-
Total	1,488,949	-
Coastal Townsend (with R-3005)		
DoD	281,588	Fort Steward Military Reserve, Townsend Range
DoJ	456	Federal Law Enforcement Training Center
State of Georgia	105,092	Savannah NWR, Big Hammond WMA, Big Hammock NA, Little Satilla WMA, Paulks Pasture WMA, Griffen Ridge WMA, Penholoway Swamp WMA, Altamaha WMA, Clayhold Swamp WMA, Sansavilla WMA, Moody Forest NA, Altamaha-Rayonier NA, Gordonia Alatomaha State Park, Jerico River NA, Little Hogan Island NA, Richmond Hill WMA, Townsend WMA
Private	1,680,700	-
Total	2,067,836	-
Avon Park Air Force Range (APAFR)		
DoD	106,875	Avon Park Air Force Bombing Range
USFWS	17,297	Lake Wales Ridge NWR
State of Florida	129,618	Kissimmee Prairie Preserve SP, Lake Wales Ridge SF, Lake Kissimmee SP
Total	352,790	-

Special use areas include a portion of the Waccamaw National Wildlife Refuge (NWR) beneath the eastern corner of the Gamecock airspace in South Carolina (refer to Figure Mc3.10-4). The Waccamaw NWR was designated in 1997 to protect and manage important bottomland hardwood forest and associated fish and wildlife along the Waccamaw, Great Pee Dee, and Little Pee Dee rivers (USFWS 2010). The refuge provides recreational opportunities such as hunting, fishing, and wildlife observation. Black River runs through much of the area under the Gamecock airspace. The Black River is a designated Scenic River in South Carolina. The Scenic Rivers' goal is to protect "unique or outstanding scenic, recreational, geologic, botanical, fish, wildlife, historic or cultural values" (South Carolina DNR 2009). Portions of Lake Marion and the Santee River occur under the southern extreme of Gamecock D. Lake Marion, the largest lake in South Carolina, and the Santee River provide many recreational opportunities for tourists and local residents, among them fishing being the most popular on these water bodies.

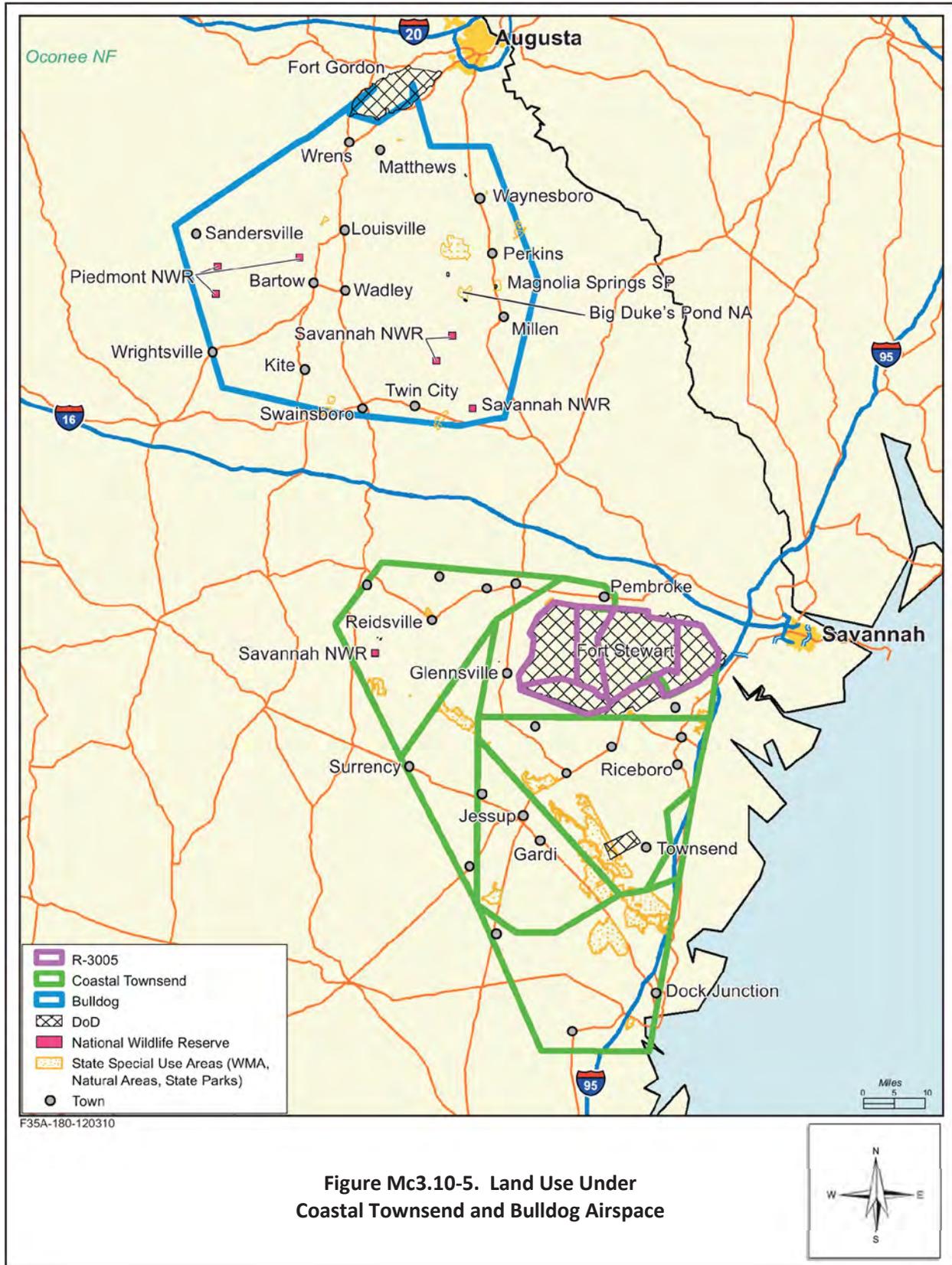
Poinsett is located within Sumter County. The area has several state-controlled parklands including Manchester State Forest (refer to Figure Mc3.10-4). The Poinsett ECR is situated in the center of Manchester State Forest.

Bulldog ranges in altitude from 500 feet AGL to 27,000 feet MSL, and extends over portions of Washington, Jefferson, Johnson, Glascock, Burke, Jenkins, and Emanuel counties in Georgia. Several small, rural communities are dispersed throughout the area under the airspace. The land under the airspace is predominantly privately owned. City and county comprehensive plans establish requirements and guidelines applicable to private lands in each respective jurisdiction. Agriculture is the primary land use in the area. The City of Augusta, located approximately 25 miles outside the northeastern border of Bulldog B, is the largest city adjacent to the airspace.

Special use areas under Bulldog include Magnolia Springs State Park in Millen County and George L. Smith State Park in Emanuel County (Figure Mc3.10-5). The parks offer camping, hiking, fishing, swimming, picnicking, and boating opportunities. Di-Lane Wildlife Management Area near Waynesboro is managed by the Georgia DNR for public hunting opportunities. The Ogeechee River flows southeast under much of Bulldog. The Ohoopsee River and Little Ohoopsee River originate in Washington County and flow under the southwestern portion of Bulldog. These rivers provide numerous recreational opportunities (Georgia River Network 2010). The Ohoopsee Dunes Natural Area is in Emanuel County, near the City of Swainsboro.

The Coastal Townsend airspace is located over Georgia, west and southwest of Savannah. The areas under the airspace lie within the counties of Liberty, Bryan, Long, McIntosh, Wayne, Glynn, Tattnall, Toombs, Brantley, and Peirce. The largest town under the airspace is Hinesville, with an approximate population of 30,400 people. The Fort Stewart Military Reservation also lies under the airspace (refer to Figure Mc3.10-5).

The Avon Park airspace extends over Osceola, Polk, Okeechobee, DeSoto, Highlands, and Hardee counties in central Florida. Towns under the airspace include Bartow, Frostproof, Sebring-Avon Park, and Placid Lakes. The largest city under the airspace is Bartow, with an approximate population of 15,340. Areas surrounding the towns include commercial, dispersed residential and agricultural uses. The area under the airspace includes numerous lakes and marsh areas used for recreation. Special use areas under the airspace include Lake Wales Ridge National Wildlife Refuge, Kissimmee Prairie Preserve State Park, a portion of Lake Kissimmee State Park, and Lake Wales Ridge State Forest. The Avon Park Air Force Range is underneath the Avon Park complex, which includes military use, hunting, camping, and wildlife habitat management.



Mc3.10.2.2 Environmental Consequences

Under both scenarios, the proposed action would not result in changes to the types of land use and land status under the airspace units. Land use and land management beneath the airspace units would not be impacted by overhead training activities. Standard flight rules require all pilots to avoid direct overflight of populated areas by 1,000 feet and structures by 500 feet. Furthermore, the FAA and DoD have identified and published avoidance criteria for specific aviation-related or noise sensitive areas. Individual overflights occur at various altitudes and are dispersed and transitory in nature. Under ANG Scenarios 1 and 2, the number of overflights would decrease and generally occur at higher altitudes. Changes in noise levels would not change general land use patterns, land ownership, or affect management of lands or special use land areas beneath the airspace. No portion of the proposed action would alter the structure, size, or operation of DoD lands, nor would the acquisition of new non-DoD lands be required. Because Warning Areas are overwater, proposed F-35A use would have no effect on land use.

ANG Scenario 1

Under ANG Scenario 1, operations in all McEntire JNGB airspace units would decrease by an average of 7 percent. Bulldog and Coastal Townsend, with the most operations, would see decreases of 18 and 8 percent, respectively.

None of the airspace units would experience a perceptible change in noise under Scenario 1. Bulldog and Coastal Townsend would be subject to 2 dB increases, whereas noise at Avon Park and Gamecock would increase by 1 dB and no change would occur at seldom used Poinsett. This relative lack of change would not influence underlying land uses or plans. The probability of overflight of a specific point more than once per day would be low due to the dispersed nature of flight within the airspace and the large area of land overflown. Given the increased altitude of the new aircraft and minimal increases in L_{dnmr} noise levels, the proposed action would not result in any perceptible changes in noise to areas located underneath the airspace utilized by McEntire JNGB.

ANG Scenario 2

Under ANG Scenario 2, operations in all McEntire JNGB airspace units would decrease by an average of 6 percent. Bulldog and Coastal Townsend, with the most operations, would decrease from 15 and 7 percent, respectively. This would represent a reduction of less than 1 operation per flying day. The other airspace units would experience daily totals of 2 overflights or fewer. Noise level of the Poinsett MOA would remain unchanged from baseline. Imperceptible increases in noise levels of 1 to 2 dB would occur in Gamecock, Bulldog, and Avon Park, so no impacts to land use or notable increase in annoyance would be expected. With a 3 dB increase, Coastal Townsend would experience a perceptible change from 54 to 57 dB L_{dnmr} . However, special use lands only comprise approximately 6 percent of the total area underneath the airspace and 57 dB L_{dnmr} is less than the noise level of a normal conversation. Therefore, there would be no impact to the special use areas underneath Coastal Townsend. As in ANG Scenario 1, the probability of recurring overflight of any point remains low.

Mc3.11 Socioeconomics

National economic trends of the last decade are mirrored in those at the state, county, and municipal levels with the most significant trends associated with population, unemployment rates, and the housing market. Populations, and consequently labor forces, have steadily risen over the past decade in most of the areas associated with the six alternative locations. Following the recession of 2008, national unemployment rates rose sharply and continue to remain high, although the level of unemployment varies regionally and locally. The housing market experienced a sharp rise in the first half of the decade, where housing prices, the number of building permits, and the number of construction jobs rose. The housing “bubble” burst around 2006, during which a steep decline in the afore-mentioned ensued. All of these factors apply to the socioeconomic conditions described below which reflect the best available data comparable among the various locations.

Mc3.11.1 Base

Mc3.11.1.1 Affected Environment

Employment and Earnings

Information regarding employment and earnings is presented for Richland County. Comparisons are also presented for the state of South Carolina. Data are from the U.S. Census Bureau and the U.S. Bureau of Economic Analysis.

In Richland County, the total civilian labor force increased from 160,969 in 2000 to 194,673 in 2010, an increase of approximately 21 percent. The largest contributions to employment in 2010 were made by educational services, health care, and social assistance (26 percent); retail trade (11 percent); professional services (10 percent); and arts, entertainment, recreation, accommodation, and food services (10 percent).

Non-farm earnings in Richland County totaled 13.3 billion in 2009. The major contributions were from government and government enterprises (33 percent), health care (10 percent), and finance and insurance (9 percent) (U.S. Bureau of Economic Analysis 2010).

In South Carolina, the total civilian labor force increased by 13.5 percent from 2000 to 2010. The largest employment sectors in 2010 were educational services, health care, and social assistance (22 percent); manufacturing (13 percent); and retail trade (12 percent). In South Carolina, non-farm earnings totaled over \$99.9 billion in 2009, with the major contributions made by government and government enterprises (24 percent), manufacturing (14 percent), and health care (9 percent) (U.S. Bureau of Economic Analysis 2010).

The number of authorized personnel levels at McEntire JNGB was 1,497 in 2009. This included 391 full-time military, 75 full-time civilians, and 1,031 traditional guardsmen (personal communication, Armstrong 2010). Traditional guardsmen are “part-time” employees who generally hold full-time jobs outside the ANG and train at least one weekend per month and two weeks per year with the ANG.

Population

Information describing population is presented for Richland County, the City of Columbia, and the town of Eastover. Comparisons are also presented with conditions for the state of South Carolina. Demographic data are from the U.S. Census Bureau 2000 Census and the 2008-2010 American Community Survey 3-Year Estimates.

Richland County grew by 20 percent from 2000, reaching 384,504 in 2010. The City of Columbia grew by 11 percent to 129,272 in 2010. The Town of Eastover's 2000 population was 830; in 2010 it was 813, a decrease of about 2 percent. By comparison, the population of South Carolina increased by 16 percent during the same period, reaching 4,625,364 in 2010 (U.S. Census Bureau 2010a, 2010b).

Housing

There is no military housing on McEntire JNGB. Detailed information of Richland County was derived from U.S. Census Bureau 2008-2010 American Community Survey 3-Year Estimates and from the CenStats Databases, the most comprehensive sources of information describing the current housing stock in detail.

Richland County had 161,725 total housing units in 2010, of which approximately 55 percent were owner-occupied. The vacancy rate for the county was approximately 10 percent (U.S. Census Bureau 2010b). Over the period 2000-2010, the annual average number of building permits issued for residential housing units was 3,037. The number of units permitted on an annual basis varied from a high of 4,324 in 2005 to a low of 1,274 in 2010. The majority of these permits (about 79 percent) were for single-family homes (U.S. Census Bureau 2010c).

Mc3.11.1.2 Environmental Consequences

ANG Scenario 1

Employment and Earnings

ANG Scenario 1 would result in a decrease of 371 military personnel: approximately 109 full-time and 262 part-time traditional guardsmen. The proposed positions would represent approximately 28 percent of the existing full-time positions and 25 percent of the part-time positions.

Traditional guardsmen generally hold full-time jobs outside the ANG and train at least one weekend per month and two additional weeks per year with the ANG. Therefore, it is not expected that any part-time traditional guardsmen would relocate from the area due to ANG Scenario 1. Although unlikely, if all 109 full-time personnel relocated from the area, this would represent less than one percent of the Richland County labor force.

The decrease in full-time positions would result in an annual decrease in salaries of approximately \$4.5 million. Salaries paid to part-time traditional guardsmen would result in an annual decrease of approximately \$910,000. Total lost salaries would result in less than one percent of total non-farm earnings in Richland County.

Based on best available data, the combined expenditures for proposed construction and modification projects for this beddown scenario would be \$1.175 million between 2013 and 2015 (refer to Section Mc2.1.3 for more information). The increase in construction spending would result in additional demand for construction and secondary jobs. Given the size of the local economy, however, the regional labor force would be expected to absorb the increased demand for direct construction jobs, as well as any associated secondary jobs. No in-migration to the area would occur as a result of construction spending.

The long-term loss of the direct military and associated secondary positions would result in a minor increase in the regional unemployment rate as laid-off employees seek new positions. These effects would be partially offset in the short-term by the gain of jobs as a result of construction expenditures.

Federal, state, and local taxes would decline slightly as a result of the loss in military personnel, but would increase due to construction activities. Overall, the impacts would be minor.

Population

ANG Scenario 1 would result in a decrease of 109 full-time and 262 part-time military positions. Under a conservative scenario, the full-time employees would relocate from the region. Combined with their approximately 148 family members, this would represent less than 1 percent of the Richland County population. Therefore, ANG Scenario 1 would not result in any changes to short- or long-term regional population trends.

Housing

ANG Scenario 1 would result in the loss of 109 full-time and 262 part-time positions. A conservative scenario would result in 109 housing units put up for sale at the same time as full-time personnel relocate from the area. This would represent less than 1 percent of the owner-occupied and renter-occupied units, individually. However, it is unlikely that all military personnel would relocate at the same time since this beddown scenario would be phased over 4 years. Further, not all the military personnel who would relocate own homes. Therefore, any short-term impacts would be minor.

ANG Scenario 2

Employment and Earnings

Under ANG Scenario 2 there would be no net change in the number of military personnel. Therefore, there would be no change to military payrolls or any subsequent impacts to regional employment or income.

Based on best available data, the combined expenditures for proposed construction and modification projects for this beddown scenario would be \$1.175 million between 2013 and 2015 (refer to Section Mc2.1.3 for more information). The increase in construction spending would result in additional demand for construction and secondary jobs. Given the size of the local economy, however, the regional labor force would be expected to absorb the increased demand for direct construction jobs, as

well as any associated secondary jobs. No in-migration to the area would be expected as a result of construction spending.

Additional taxes would accrue to federal, state, and local governments as a result of the increase in construction activities. These impacts, while beneficial, would be minor.

Population

Under ANG Scenario 2, there would be no net change in military personnel. No regional in-migration would be associated with construction spending. Therefore, there would be no project-related change to regional population.

Housing

Under ANG Scenario 2, there would be no net change in military personnel or regional in-migration. Therefore, there would be no project-related change to the regional housing market.

Mc3.12 Environmental Justice/Protection of Children

Mc3.12.1 Base

Mc3.12.1.1 Affected Environment

Executive Order (EO) 12898, *Environmental Justice*, requires analysis of the potential for federal action to cause disproportionate health and environmental impacts on minority and low-income populations. In accordance with Air Force guidance on Environmental Justice analysis (Air Force 1997), the analysis only needs to be applied to adverse environmental impacts. Based on this guidance, areas with noise levels exceeding 65 dB DNL around airfields or with perceptible changes in noise levels in the airspace would be analyzed. Other resource areas such as air quality and hazardous waste and materials would not have an adverse impact due to the proposed action.

Minority and Low-Income Populations

McEntire JNGB is located approximately 16 miles southeast of Columbia in Richland County, South Carolina. Table Mc3.12-1 displays the total population, total minority population, percentage minority, total low-income population, and low-income percentages for the affected areas in the vicinity of McEntire JNGB. This information was derived from the 2000 U.S. Census of Population, which is the latest source of information at the required level of detail; comparable data are not yet available from the 2010 Census. Based on the data, 33 percent of the population of the state of South Carolina is composed of minorities and 14 percent are low-income populations. This indicates that there is a larger proportion of minority and low-income populations in the county when compared to the state.

Table Mc3.12-1. Total Minority and Low-Income Population within the Vicinity of McEntire JNGB							
<i>Geographic Area</i>	<i>Total Population</i>	<i>Minority Population</i>	<i>Percent Minority</i>	<i>Low-Income Population</i>	<i>Percent Low-Income¹</i>	<i>Children Under Age 18</i>	<i>Percent Children</i>
Sumter County	104,646	52,184	50%	16,451	16%	29,430	28%
South Carolina	4,012,012	1,316,452	33%	547,869	14%	1,009,641	25%

Source: U.S. Census Bureau 2000.

Note: ¹The percentage of low-income persons is calculated as a percentage of all persons for whom the Bureau of the Census determines poverty status, which is generally a lower number than the total population because it excludes institutionalized persons, person in military group quarters and college dormitories, and unrelated individuals under 15 years old.

Table Mc3.12-2 displays the total population, total minority population, percentage minority, total low-income population, and low-income percentages for the affected areas in the vicinity of McEntire JNGB with baseline noise greater than 65 dB DNL. The percentage of minority and low-income populations affected by noise greater than 65 dB DNL under baseline conditions exceeds the state average by about 41 and 1 percent, respectively. As such, this area already manifests disproportionate impacts to these populations.

Table Mc3.12-2. Total Baseline Minority and Low-Income Population Affected by Noise Greater than 65 dB DNL at McEntire JNGB					
<i>Noise Contour</i>	<i>Total Population</i>	<i>Minority Population</i>	<i>Percent Minority</i>	<i>Low-Income Population</i>	<i>Percent Low-Income¹</i>
65 – 70	428	321	75%	64	15%
70 – 75	105	74	71%	15	14%
75 – 80	26	19	73%	4	15%
80 – 85	0	0	0	0	0
85+	0	0	0	0	0
Total	559	414	74%	83	15%

Source: U.S. Census Bureau 2000.

Note: ¹The percentage of low-income persons is calculated as a percentage of all persons for whom the Bureau of the Census determines poverty status, which is generally a lower number than the total population because it excludes institutionalized persons, person in military group quarters and college dormitories, and unrelated individuals under 15 years old.

Protection of Children

In 2000, the number of children under the age of 18 living in Sumter County was 29,430 (28.1 percent) (see Table Mc3.12-1). Currently, there are no schools exposed to aircraft noise levels of 65 DNL or above in the vicinity of McEntire JNGB (Richland County School District One 2010).

Mc3.12.1.2 Environmental Consequences

For each scenario, noise levels of 65 dB DNL or greater were identified (see Section Mc3.2, Noise). The affected population under these areas was determined using 2000 Census Bureau census block data to calculate the total affected area in each block in order to obtain an estimate of the population under each contour.

Table Mc3.12-3 provides the proposed total population that would be affected for each of the scenarios by noise levels of 65 dB DNL or greater. The proposed increase across scenarios would be in proportion to the number of operational squadrons for each of the scenarios.

<i>Noise Contour</i>	<i>Baseline</i>	<i>ANG Scenario 1</i>	<i>ANG Scenario 2</i>
65 – 70	428	133	171
70 – 75	105	46	59
75 – 80	26	10	17
80 – 85	0	0	1
85+	0	0	0
Total	559	189	248

Source: U.S. Census Bureau 2000.

ANG Scenario 1

Minority and Low-Income Populations

Table Mc3.12-4 displays the total population, total minority population, percentage minority, total low-income population, and low-income percentages for the affected areas in the vicinity of McEntire JNGB with noise levels greater than 65 dB DNL under ANG Scenario 1. The total population affected by noise levels 65 dB DNL and greater would decrease from baseline by 66 percent under ANG Scenario 1. There would be a 1 percent increase in the total number of minority populations affected by noise levels 65 dB DNL and greater. The proportion of low-income individuals affected by these noise levels greater than 65 dB DNL and greater would also increase by 1 percent.

<i>Noise Contour</i>	<i>Total Population</i>	<i>Minority Population</i>	<i>Percent Minority</i>	<i>Low-Income Population</i>	<i>Percent Low-Income¹</i>
65 – 70	133	101	76	22	17
70 – 75	46	34	74	7	15
75 – 80	10	7	70	1	10
80 – 85	0	0	0	0	0
85+	0	0	0	0	0
Total	189	142	75%	30	16%

Source: U.S. Census Bureau 2000.

Note: ¹The percentage of low-income persons is calculated as a percentage of all persons for whom the Bureau of the Census determines poverty status, which is generally a lower number than the total population because it excludes institutionalized persons, person in military group quarters and college dormitories, and unrelated individuals under 15 years old.

The percentages of minority and low-income populations affected by noise levels greater than 65 dB DNL would exceed the state average; however, the total actual number of people exposed to noise levels of 65 dB DNL and greater would decrease substantially when compared to baseline conditions. Therefore, the impact is not considered to be adverse or disproportionate.

Protection of Children

Currently, there are no schools exposed to aircraft noise levels of 65 DNL or above in the vicinity of McEntire JNGB (Richland County School District One 2010). Under ANG Scenario 1, no schools would be exposed to aircraft noise greater than 65 dB DNL.

ANG Scenario 2

Minority and Low-Income Populations

Table Mc3.12-5 displays the total population, total minority population, percentage minority, total low-income population, and low-income percentages for the affected areas in the vicinity of McEntire JNGB with noise greater than 65 dB DNL under ANG Scenario 2. The total population affected by noise levels equal to and greater than 65 dB DNL would decrease from baseline by 56 percent under ANG Scenario 2. However, 74 percent of minority and 15 percent of low-income populations would proportionally be affected by noise levels 65 dB DNL and greater.

<i>Noise Contour</i>	<i>Total Population</i>	<i>Minority Population</i>	<i>Percent Minority</i>	<i>Low-Income Population</i>	<i>Percent Low-Income¹</i>
65 – 70	171	129	75	27	16
70 – 75	59	44	75	9	15
75 – 80	17	11	65	2	12
80 – 85	1	0	0	0	0
85+	0	0	0	0	0
Total	248	184	74%	38	15%

Source: U.S. Census Bureau 2000.

Note: ¹The percentage of low-income persons is calculated as a percentage of all persons for whom the Bureau of the Census determines poverty status, which is generally a lower number than the total population because it excludes institutionalized persons, person in military group quarters and college dormitories, and unrelated individuals under 15 years old.

The percentages of minority and low-income populations affected by noise levels greater than 65 dB DNL would exceed the state average; however, the number of people exposed to noise levels of 65 dB DNL and greater would actually decrease when compared to baseline conditions. Therefore, the impact is not considered to be adverse or disproportionate.

Protection of Children

Currently, there are no schools exposed to aircraft noise levels of 65 DNL or above in the vicinity of McEntire JNGB (Richland County School District One 2010). Under ANG Scenario 2, no schools would be exposed to aircraft noise greater than 65 dB DNL.

Mc3.12.2 Airspace

No analysis was conducted for the Warning Areas and areas with less than 5 percent of the operations. See Section 3.1.3 for a further discussion of this approach.

Mc3.12.2.1 Affected Environment

The airspace units overlie lands in South Carolina and Georgia. In general, land underlying these airspace units is rural with small rural communities dispersed under the airspace. However, much of the land under the airspace, especially for Poinsett and Avon Park, consists of military ranges where the public and residences are excluded. Baseline noise levels for all airspace units except Poinsett are below the 65 dB DNL threshold. Although subject to noise levels of 68 dB DNL, half of the area underlying Poinsett consists of a range with no population. The other half includes areas of sparse population with

two small communities or hamlets. Since available data for minorities and low-income populations does not conform to the specific geographic boundaries of Poinsett, three counties overlapping the area (Calhoun, Clarendon, and Sumter) formed the communities of comparison and the nearest population center (Sumter) provided the data for the affected area. Minority population in the counties averaged 48 percent, with one reaching 50.1 percent; low-income population averaged 20.2 percent with a high of 24 percent. In comparison, the town of Sumter includes 50 percent minority and 21 percent low-income population. Based on these data, minorities and low-income populations are not disproportionately affected by noise in this area.

Protection of Children

Children live in some areas under the McEntire JNGB airspace; however, noise levels for all but the non-range portion of Poinsett airspace are sufficiently low that thresholds affecting the health or safety of children are not reached. For the small communities under this airspace, the proportion of youth under 18 falls below the U.S. and South Carolina averages, thereby precluding any disproportionate effects.

Mc3.12.2.2 Environmental Consequences

No disproportionate impacts related to environmental justice are anticipated, nor would there be any increased health or safety risks to children. Section Mc3.2 discusses noise levels within the training airspace. Noise levels would increase imperceptibly (less than 2 dB) from baseline with both scenarios at every airspace unit except for Poinsett. However, average noise levels in all airspace except Poinsett would remain well below 65 dB L_{dnmr} . Noise levels in the Poinsett airspace would remain unchanged at 68 dB DNL. Since no disproportionate impacts to minority or low-income populations result under baseline conditions, none would occur with implementation of either scenario. In addition, the higher altitudes and reduced operations flown by the F-35As would ameliorate impacts (if any) to children. As presented in Section Mc3.3, emissions from aircraft operations were evaluated for operations below 3,000 feet MSL. Training in the airspace would occur above 5,000 feet MSL; therefore, no air quality impacts to minority or low-income populations or youth populations would occur. Airspace and ground safety is discussed in Section Mc3.4.

Mc3.13 Community Facilities and Public Services

Mc3.13.1 Base

Mc3.13.1.1 Affected Environment

Potable Water

The City of Columbia provides drinking water to over 375,000 people in Richland and Lexington counties, including McEntire JNGB. The Broad River Diversion Canal and Lake Murray provide potable water at an average of 60 million gallons per day (mgd) (City of Columbia Water Works 2009). During FY 2009, approximately 8.8 million gallons of water were consumed by the ANG (not including Army National Guard) at McEntire JNGB (169 FW 2010).

Wastewater Treatment

McEntire JNGB generates wastewater from sanitary, stormwater, and industrial processes, including oil/water separator discharge. Wastewater generated by the McEntire JNGB is collected in pipelines throughout the installation and treated at Building 220, an on-site wastewater treatment plant (169 FW 2009a). As outlined in the McEntire JNGB Spill Prevention and Response Plan (2006), all wastewater effluent is monitored for contaminants and the condition of the effluent is determined before it is released in accordance with existing permits issued by the South Carolina DHEC and other regulatory entities.

Electric Power and Natural Gas

South Carolina Electric and Gas Company and Tri-County Electric Power Cooperative supply electrical power and natural gas to McEntire JNGB. Currently, the installation uses 13,548 thousand cubic feet of natural gas and 7,302.44 kilowatt-hours (7.3 megawatt-hours) of electricity annually (personal communication, Hudson 2010).

Solid Waste Management

Solid waste generated at McEntire JNGB is managed in accordance with the McEntire Solid Waste Management Plan (169 FW 2003) and guidelines specified in AFI 32-7042, *Waste Management* (2009). This AFI incorporates, by reference, the federal standard for solid waste regulations contained within 40 CFR, Subtitle D, *Non-hazardous Waste*, and other applicable federal regulations, AFIs, and DoD Directives. In general, AFI 32-7042 establishes the requirement for installations to have a solid waste management program that incorporates the following: a solid waste management plan, procedures for handling, storage, collection, recycling, and disposal of solid waste; recordkeeping and reporting; and pollution prevention.

Solid waste generated at the installation in the form of municipal, office, nonhazardous industrial wastes, and construction debris is collected by Allied Waste weekly and taken to the Northeast Landfill off-base (personal communication, Hudson 2010). Recyclables and yard waste are collected and recycled in accordance with procedures outlined in the Solid Waste Management Plan (169 FW 2003). Currently, 25,200 pounds of white paper, 4,800 pounds of scrap metal, and 6,400 gallons of used oil are recycled per year (personal communication, Woods 2010). Source reduction and recycling are encouraged at the installation before ultimate disposal at a landfill.

Schools

There are no housing or schools located on McEntire JNGB and school-age dependents associated with McEntire JNGB attend public schools within the Richland County School System. The county is divided into districts and the districts are organized into several clusters; the base is located within District One's Lower Richland High Cluster. This cluster includes six elementary schools, two middle schools, and one high school for a total enrollment of approximately 5,748 students (169 FW 2006b).

Mc3.13.1.2 Environmental Consequences

Under ANG Scenario 1, the population at McEntire JNGB would decline from 1,554 personnel to 1,183. The decline of 371 personnel under this scenario represents a 24 percent decrease in personnel. As such, potable water, electricity, and natural gas consumption; wastewater and solid waste generation; and the number of school-aged children would be expected to decrease at McEntire JNGB and within the surrounding community. Under ANG Scenario 2, there would be no change in the number of personnel and dependents stationed at McEntire JNGB. As a result, potable water, electricity, and natural gas consumption; wastewater and solid waste generation; and the number of school-aged children would remain similar to that under current conditions and, therefore, these resources are not addressed further within this section.

In addition, with the exception of a 0.06 acre addition to Building 1057 for a flight simulator facility, there are no new construction projects or additions to existing facilities proposed under either scenario; however, the internal alterations and the flight simulator addition to be constructed under both scenarios could generate minor construction and demolition debris requiring landfill disposal. Compliance with the McEntire Solid Waste Management Plan and establishment of waste reduction and recycling programs would help to minimize the increase in overall solid waste generation as a result of the scenarios.

Mc3.14 Ground Traffic and Transportation

Mc3.14.1 Base

Mc3.14.1.1 Affected Environment

Regional and Local Circulation

McEntire JNGB is located in Richland County, South Carolina approximately 16 miles southeast of the City of Columbia and 20 miles west of Shaw AFB. The nearest interstate highway is Interstate 77, which is roughly 10 miles west of the base and borders the eastern edge of Columbia. Interstate 77 is a major carrier of traffic in the area with an average daily traffic (ADT) of 112,500 (South Carolina Department of Transportation [DOT] 2008). U.S. Highway 76/378 provides direct access to McEntire JNGB from the east and west. State Route (SR) 769 (Congaree Road) provides access to the base from the west and south. In the vicinity of McEntire JNGB, U.S. Highway 76/378 and SR 769 have ADT volumes of 16,000 and 2,400, respectively (South Carolina DOT 2008).

The main entrance to the base, Sumter Gate, is located along the northern boundary of the base, at the turnoff for South Carolina Road from U.S. Highway 76/378. This gate is open from 6 a.m. to midnight every day. There are currently acceleration and deceleration lanes present along east- and west-bound U.S. Highway 76/378 at the turnoff for South Carolina Road to aid in the entrance and exit of vehicles (169 FW 2006c). A second entrance, Church Gate, is located along the base's western boundary, connecting South Carolina Road with SR 769. Church Gate is open during the peak morning and evening travel hours and provides more direct access to the ANG facilities in the southwest portion of the base (169 FW 2006c). A third entrance, Morrell Gate, is located at the southern end of the base, at the

intersection of South Carolina Road and SR 769. This gate is only open during peak travel times and Unit Training Assembly (UTA) weekends (169 FW 2006c).

Circulation at McEntire JNGB

The primary roads within McEntire JNGB are South Carolina Road and North Carolina Road. South Carolina Road is a two-lane road that connects with all three of the entrance gates and provides access to the Army National Guard facilities and ANG complexes along the west side of the base (169 FW 2006c). The majority of circulation within the base occurs on this road. North Carolina Road splits from South Carolina Road at Sumter Gate and traverses the east side of the base. This road is paved from Sumter Gate to Dry Branch Lake, where it transitions into a minor dirt road that loops around the southern end of the base (169 FW 2006c). All other roads within McEntire JNGB are minor roads that provide direct access to buildings and facilities.

The base supports 1,497 authorized personnel. Of those personnel, 395 are full-time military personnel, 71 are civilian contractors, and the remaining 1,031 personnel are part-time accessing the base once a month during UTA weekends. During the week, base population primarily consists of full-time personnel. No known traffic counts or studies have been performed for the on-base road network.

Most buildings on the base have associated parking lots, the largest being those at the maintenance hangar and Squadron Operations (169 FW 2006c). During the week there is sufficient parking for personnel vehicles (the base has approximately 550 privately owned vehicle parking spaces). On UTA weekends, overflow parking occurs in the grass/dirt lots at the southwest corner of the Mississippi Road/Oregon Road intersection and the northeast corner of the Swamp Fox Road/Arizona Road intersection.

Mc3.14.1.2 Environmental Consequences

Construction activities would begin between 2013 and 2015 under both scenarios 1 and 2 and would take approximately 1 year to complete. Construction traffic could temporarily result in minor increases in the use of on-base roadways during construction activities. However, construction under both scenarios at McEntire JNGB would consist primarily of internal alterations (with the exception of an addition to Building 1057 for the F-35A Flight Simulator Facility) and, therefore, would be minimal and short-term.

ANG Scenario 1

Under ANG Scenario 1, on-base personnel would decrease by 371 personnel, from 1,554 to 1,183, potentially reducing up to 371 vehicle trips to and from the base during morning and evening peak periods. The proposed decrease in personnel and associated travel demand would decrease peak period travel demand by 24 percent. Therefore, this scenario would reduce ground traffic within the base and adjacent roadway network.

ANG Scenario 2

Under ANG Scenario 2, on-base employment would remain at the current level of 1,554 personnel. There would be no change in travel demand for the base and conditions would remain similar to that under current conditions.

Mc3.15 Hazardous Materials and Waste

Mc3.15.1 Base

Mc3.15.1.1 Affected Environment

Hazardous Materials

Hazardous materials are used at McEntire JNGB by activities associated with aircraft maintenance, AGE maintenance, ground vehicle maintenance, fire department training, and petroleum, oil, and lubricants (POL) management and distribution. Types of hazardous substances found on the installation include paints, oil, fuel, solvents, antifreeze, hydraulic fluid, grease lubes, batteries, and oil and fuel filters (169 FW 2009b). In addition, a hydrazine facility is operated at Building 245 for the servicing of aircraft hydrazine systems (Ensafe 2009).

Hazardous materials on McEntire JNGB are controlled through the Hazardous Materials Pharmacy Program (HAZMART) pollution prevention process (169 FW 2007). This process provides a centralized point of contact and management of the acquisition, use, handling, and disposition of hazardous materials and offers support for the turn-in, recovery, reuse, recycling, or disposal of hazardous wastes. The HAZMART process includes review and approval by qualified personnel to ensure users are aware of exposure and safety risks (Ensafe 2009).

The McEntire JNGB Oil and Hazardous Substances Spill Prevention and Response Plan (Ensafe 2009) addresses on-base storage locations and proper handling procedures of all hazardous materials to minimize potential spills and releases at the point of use. The plan further outlines activities to be undertaken to minimize the adverse effects in the incidence of a spill, including notification, containment, decontamination, and cleanup of spilled materials. The Quick Reference Spill Response Plan (Red Plan; Ensaf 2005) is attached to the plan.

Hazardous Waste

McEntire JNGB is regulated as a small quantity hazardous waste generator under Resource Conservation and Recovery Act (RCRA). Hazardous wastes are managed in accordance with the McEntire JNGB Hazardous Waste Management Plan (169 FW 2007). Hazardous wastes are initially stored at one of the 29 waste accumulation points near work locations. Industrial shop personnel transport these wastes to the onsite Central Accumulation Point storage facility where the wastes can be stored for up to 180 to 270 days before they are transferred to a USEPA-permitted disposal facility. McEntire JNGB recycles POL products, POL-contaminated materials and liquids, oil filters, hydraulic fluid, excess solder (lead, selenium, and silver), aerosol cans, and lead-acid batteries.

Toxic Substances

Regulated toxic substances typically associated with buildings and facilities include asbestos, LBP, and poly-chlorinated biphenyls (PCBs). Prior to any renovation or demolition activities, all buildings are screened for ACM. Depending on the date the building was constructed, buildings are also screened for LBP as needed. Although certain materials may be screened for PCB contamination prior to disposal, McEntire ANG has no known PCB materials onsite and is considered "PCB Free" (169 FW 2007).

Environmental Restoration Program

Although historically there were 12 ERP sites identified at McEntire JNGB (Sites 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12), all except for Site 3 are now closed with No Further Action Required, no restrictions, and no anticipated risk to human health or the environment (169 FW 2009c). Site 3 is the old sanitary landfill, which is located in open space north of Congaree Road and south of Arizona Road.

McEntire JNGB has completed Phase I of a Comprehensive Site Evaluation for the Military Munitions Response Program (MMRP). There are eight potential MMRP sites that will require further investigation to determine the extent of contamination and remediation actions, if necessary (U.S. Army Corps of Engineers [USACE] 2010).

Mc3.15.1.2 Environmental Consequences

Hazardous Materials

Training activities and other functions are expected to be similar between the F-35A aircraft and legacy aircraft. The F-35A was designed to reduce the quantities and types of hazardous materials needed for maintenance of the aircraft. The major differences between the F-35A and legacy aircraft would be the omission of hydrazine, cadmium fasteners, chrome plating, copper-beryllium bushings, and the use of a non-chromium primer instead of primers containing cadmium and hexavalent chromium currently used (personal communication, Luker 2010; Fetter 2008).

Under both scenarios, the elimination of the hazardous substances discussed above would reduce the overall amount of hazardous materials used, thus reducing the overall potential impacts to the environment. Since the use of the aircraft is expected to decrease over the current operation rate, there would be a decreased need for aircraft maintenance and servicing operations.

Procedures for hazardous material management established for McEntire JNGB would continue to be followed in future operations associated with the proposed action and as required during all construction and renovation activities.

Hazardous Waste

The types of hazardous waste streams generated by F-35A operations are expected to be less than for legacy aircraft because operations involving hydrazine, cadmium and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced for the F-35A (personal communication, Luker 2010; Fetter 2008). As with hazardous materials, the waste streams that are targeted for omission

or substitution as aircraft are transitioned to the F-35A would decrease over the amount currently generated by maintaining legacy aircraft.

The exact amounts of hazardous waste that would be generated under each scenario are unknown; however, under both scenarios McEntire JNGB would continue to operate within its small-quantity generator hazardous waste permit conditions. Established hazardous waste procedures would continue to be followed during future squadron operations and all construction and renovation that may occur in association with the proposed action.

Toxic Substances

Any structures proposed for upgrade or retrofit would be inspected for ACM and LBP according to established McEntire JNGB procedures. Of the three buildings selected for renovation activities, only Building 253 contains ACM and LBP (personal communication, Dotson 2010). The status of Building 1057 is still unknown at this time; therefore, Building 1057 would require ACM and LBP inspection prior to any reconstruction activities. All ACM would be properly removed and disposed of prior to or during demolition in accordance with 40 CFR 61.40 through 157 and established McEntire JNGB procedures. All LBP would also be managed and disposed of in accordance with the Toxic Substance Control Act (TSCA), OSHA regulations, South Carolina requirements (regarding site work practices for buildings with LBP), and established McEntire JNGB procedures.

Environmental Restoration Program

Although Sites 4, 6, 8, 10 are located within proximity to the industrial section and aircraft services area of the installation, neither upgrades to existing facilities nor future operations would affect the previous ERP locations (169 FW 2009c).

Although all eight MRP sites are located in the industrial area of the installation, only the 2.77-in Rocket Maintenance Facility potential MRP Site, adjacent to Building 1046, is within proximity to any areas proposed for construction or renovation. If ground-disturbing activities become necessary to implement the proposed action at Building 1046, a detailed study of the potential impacts on this MRP Site would need to be assessed and mitigation measures implemented, as necessary.

Mc4.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Mc4.1 Cumulative Effects

In this section, an effort has been made to identify past and present actions in the region and those reasonably foreseeable actions that are in the planning phase at this time. Actions that have a potential to interact with the proposed action are included in this cumulative analysis. This approach enables decision-makers to have the most current information available so that they can evaluate the environmental consequences of the beddown of the F-35A aircraft at McEntire JNGB and training in associated airspace.

McEntire JNGB is an active military installation that undergoes changes in missions and training requirements in response to defense policies, current threats, and tactical and technological advances. The installation, like any other major institution (e.g., university, industrial complex), requires new construction, facility improvements, infrastructure upgrades, and maintenance and repairs. In addition, tenant organizations may occupy portions of the installation, conduct aircraft operations, and maintain facilities. All of these factors (i.e., mission changes, facility improvements, and tenant use) will continue to occur before, during, and after the proposed action is implemented, regardless of which alternative is selected.

Past and Present Actions Relevant to the Proposed Action

McEntire JNGB has been a military installation since 1946. During this time, it has grown, been developed, and supported numerous kinds of aircraft. In 2003, Shaw AFB concluded an Environmental Assessment (EA) for the use of chaff and flares as defensive countermeasures for training in Bulldog A and B MOAs and Bulldog B ATCAA, and Gamecock B, C, and D MOAs and Gamecock D ATCAA (Air Force 2003). Three F-16 squadrons from Shaw AFB's 20 FW and one squadron from McEntire ANG's 169 FW currently use these airspace units for training with defensive chaff and flares. Environmental analysis resulted in a Finding of No Significant Impact.

Other past actions include implementation of the Base Realignment and Closure (BRAC) Commission Final Recommendations for the 169 FW in 2006 at McEntire JNGB. A series of demolition and construction projects were implemented to correct current space deficiencies, enhance efficiency, and achieve compliance with DoD AT/FP requirements. Some airfield-related alterations were made to bring the installation into compliance with UFC 3-260-01, which specifies minimum airfield setbacks to meet runway clearance requirements to eliminate potential hazards for moving aircraft.

Incremental Impacts of the Proposed Action with Reasonably Foreseeable Future Actions

During the timeframe (2013 to 2015) for F-35A facility construction, McEntire JNGB has proposed a number of actions that are independent of the proposed action and would be implemented irrespective of a decision on the proposed F-35A beddown. These projects could have cumulative impacts on resources within the region of influence and will be discussed in the cumulative impacts section. These projects, planned for 2011 to 2015 include those listed in Table Mc4.1-1. Other on-going maintenance and repair activities are also likely to occur at the installation during this period.

Table Mc4.1-1. Current and Reasonably Foreseeable Actions at McEntire JNGB			
<i>Project Name/Description</i>	<i>Approximate Facility Footprint (acres)</i>	<i>New Impervious Surface (acres)</i>	<i>Anticipated Year for Implementation</i>
ANG Portion for Joint Forces Headquarters (TAG) Building	4.04	5	2010
Waste Water Treatment Facility Modernization and Tie-in (Health and Safety)	5	0	2014
Joint Deployment Processing Facility/Reserve Center	0.69	0	2014
Replace Operations and Training Complex	0.62	2	2011
Add/Alter Munitions Maintenance and Storage	0.23	0	2014
Weapons Load Crew Training Hangar	0.19	0	2014
Widen Taxiway	2.75	2.75	2014
Construct Addition to Weapons Services Facility	0.08	0	2014
Construct Addition to Security Forces Squadron	0.10	0	2014
Replace Fire Crash/Rescue Station	0.67	1	2014
Construct Combat Arms Training and Maintenance/FATS Facility	0.07	0.05	2014
TFI-Construct Addition to Squadron	0.07	0	2009
Repair/Construct Vehicle Maintenance Complex	0.25	0	2009
Construct Taxiway	1.24	1.24	2010
Maintain/Construct Base Roads	11.36	11.36	2011
Construct Magazine Storage	0.15	0.05	2011
Add/Alter Base Communication Facility, Building 258	0.07	0.41	2012
Relocate Base Entry Gatehouse	0.01	0.21	2012
Construct Commercial Vehicle Entry	0.05	0.41	2012
Construct Pavements and Grounds Facility	0.18	0.09	2012
ADAL CES, Building 1071	0.03	0.12	2013
Demolish Building 183	0.03	0	2013
Demolish Building 694	0.01	0	2013
Demolish Oil Water Separators	0.25	0	2011
Demolish Building 280	0.02	0	2013
Demolish Building 323 (CATM Classroom)	0.02	0	2011
Demolish Buildings 200, 201, 963	0.25	0	2013
Demolish Building 157	0.18	0	2014
Demolish Buildings 1078, 1079, and 225	0.12	0	2012
Indoor Range	0.12	0	2015
North Overrun	4.13	3.51	2015
Overrun Barriers	0.02	1	2015
Construct Ground Fuels Station	1	1	2014
Construct Hot Cargo Pad	5	5	2015
Total	39	36.2	-

Source: Personal communication, Fleischer 2010.

In addition to construction projects on the installation, there are two possible proposals that could interact with the beddown of the F-35A at McEntire JNGB: the Airspace Training Initiative and the F-35A Operational Beddown at Shaw AFB.

- The Airspace Training Initiative would: 1) raise the ceiling of Poinsett MOA; 2) expand Bulldog A to the east to underlie and match the boundaries of existing Bulldog B; 3) develop electronic training transmitter sites; 4) continue training chaff and flare use in existing airspace and extend use into new airspace; and 5) implement deconfliction methods (airspace scheduling and avoidance areas).

- Since McEntire JNGB and Shaw AFB are within close proximity to one another, they use the same airspace. Beddown of the F-35A at both locations could alter use of the airspace and increase noise levels.

Analysis of Cumulative Effects

The following analysis considers how the impacts of these other actions might affect or be affected by those resulting from the proposed action at McEntire JNGB and whether such a relationship would result in potentially additive impacts not identified when the proposed action is considered alone. Past implementation of force structure changes at McEntire JNGB are integrated into baseline conditions and analyzed under the no-action alternative. Additionally, all aircraft operations are incorporated and analyzed in the relevant resource categories for the proposed F-35A beddown. As such, the analysis of impacts in this section also addresses the cumulative effects of these past and present Air Force actions.

Although some of these actions are undergoing separate environmental analyses, none of the future on-base actions described in Table Mc4.1-1 would be expected to result in more than negligible impacts individually or cumulatively. All actions affect very specific, circumscribed areas, and the magnitude of the actions is minimal. Short-duration, temporary increases in localized noise and air emissions from construction and related vehicles, as well as a minor but temporary increase in on-base traffic would be expected. These effects would generally overlap with those from F-35A proposed construction.

However, the two sets of construction activities would be geographically separated on the installation and localized. Given that the proposed F-35A construction would likewise have a minimal effect on noise, air quality, and traffic, the combined impacts of these actions would remain well below the threshold of significance for all resources.

Airspace Training Initiative

One reasonably foreseeable action described above, the Airspace Training Initiative, has the potential to have a cumulative impact on the environment if the changes to the MOAs and ATCAAs under that proposal were approved. Subsonic noise levels under the Airspace Training Initiative would range from less than 45 to 53 dB DNL. If the MOAs were connected and ceilings raised in some areas, the F-35A aircraft from McEntire JNGB could have the opportunity to conduct more training over land. However, there is no proposal for the F-35A to use this proposed airspace at this time, and therefore, there would be no cumulative impact. Should it be determined that the F-35A needed to use this expanded airspace at some point in the future, additional separate environmental analysis would be required. However, it is expected that training in this area would be limited and impacts to the environment would be negligible.

F-35A Operational Beddown at Both McEntire JNGB and Shaw AFB

It is possible that under the F-35A beddown, both McEntire JNGB and Shaw AFB would receive up to 24 and 72 F-35A aircraft, respectively. Although operations in the airspace would be combined from both installations (+7,406 F-35A operations), operations would be less than the baseline number of operations in the airspace (22,652 operations) because of the combined reduction in operations due to

the replacement of legacy aircraft (-11,428 operations). With the implementation of both actions, airspace operations would be reduced by 4,022 operations, or 18 percent.

In addition, the F-35A aircraft from both installations would fly primarily at high altitudes (over 23,000 feet MSL) and increases to subsonic noise levels in most areas for the F-35A beddown at McEntire alone would be imperceptible. For the airspace units that would be used by both installations, cumulative subsonic noise levels would range from 54 dB L_{dnmr} at APAFR to 71 dB L_{dnmr} in Poinsett. Under the maximum beddown scenarios from each installation, these cumulative noise levels would increase by 3 to 9 dB. For the lands and people under Bulldog, Gamecock, and Coastal Townsend, these increases would be substantial and would likely cause annoyance in people underlying the airspace. Minorities and low-income populations would not be disproportionately affected by noise in the areas under Poinsett or Coastal Townsend. Since small, dispersed minority and low income populations with proportions above the state average exist under Gamecock and noise levels would increase 9 dB to 66 L_{dnmr} , the potential exists for disproportionate impacts to minority and low-income populations under the Gamecock airspace. Coordination with affected communities and jurisdictions on potential avoidance procedures could provide some reduction in impacts for selected locations but would not tend to reduce noise to quiet levels. Neither installation would fly supersonic operations in these airspace units.

Table Mc4.1-2. Cumulative Subsonic Noise Levels from F-35A Beddowns at McEntire JNGB and Shaw AFB

<i>Airspace Unit</i>	<i>Baseline (L_{dnmr})</i>	<i>Proposed F-35A Operational Beddown at McEntire JNGB (Scenario 2)</i>	<i>Proposed F-35A Operational Beddown at Shaw AFB (Scenario 3)</i>	<i>Cumulative Noise Levels (L_{dnmr}) F-35A McEntire JNGB + F-35A Shaw AFB</i>	<i>Change from Baseline (dB)</i>
Bulldog	56	58	63	64	+8
Gamecock	57	59	65	66	+9
Coastal Townsend	58	61	64	66	+8
Poinsett	68	68	68	71	+3
APAFR	51	51	51	54	+3

Mc4.2 Irreversible and Irrecoverable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irreversible effects at McEntire JNGB are associated with construction impacts.

For the McEntire JNGB, most resource commitments are neither irreversible nor irretrievable. Most impacts are short-term and temporary, such as air emissions from construction, or longer lasting, but negligible (e.g., air emissions from mobile sources).

Under the proposed action, renovation of some facilities would occur and would consume limited amounts of material typically associated with interior renovations (wiring, insulation, windows, drywall). An undetermined amount of energy to conduct renovation and operation of these facilities would be

expended and irreversibly lost. Renovation would generate minimal construction debris that would consume landfill space.

These activities would occur only in existing facilities and would not adversely impact wetlands or terrestrial communities. Irretrievable resource commitments are, therefore, confined to buildings associated with renovation.

Training operations would involve consumption of nonrenewable resources, such as gasoline used in vehicles and jet fuel used in aircraft. Use of training ordnance would involve commitment of chemicals and other materials. None of these activities would be expected to substantively affect environmental resources.