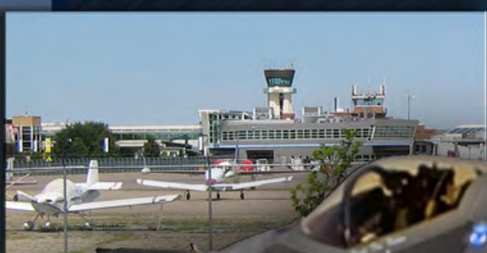
Final
United States Air Force F-35A Operational Basing Environmental Impact Statement



Volume I

September 2013

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Final

United States Air Force
F-35A Operational Basing
Environmental Impact Statement (EIS)

Volume I
Chapters 1-9

September 2013

Cover Sheet

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR UNITED STATES AIR FORCE F-35A OPERATIONAL BASING

a. **Responsible Agency:** United States (U.S.) Air Force

b. **Proposed Action:** The Air Force proposes to beddown new F-35A aircraft at one or more locations throughout the contiguous U.S. from 2015 through 2020. Alternative locations for beddowns consist of Burlington Air Guard Station (AGS), Vermont; Hill Air Force Base (AFB), Utah; Jacksonville AGS, Florida; McEntire Joint National Guard Base (JNGB), South Carolina; Mountain Home AFB, Idaho; and Shaw AFB, South Carolina. The proposal includes three beddown scenarios at the Air National Guard/Air Force Reserve locations, with 18 or 24 F-35A aircraft replacing the existing complement of aging fighter attack aircraft. Three beddown scenarios (24, 48, or 72 F-35As) apply to the active duty bases. At Burlington AGS, Hill AFB, Jacksonville AGS, McEntire JNGB, and Shaw AFB, the F-35As would replace current fighter attack aircraft, irrespective of the scenario. No aircraft would be replaced at Mountain Home AFB; the existing based aircraft would remain. The Air Force identified Hill AFB and Burlington AGS as the preferred alternatives for the initial operational beddown. The no-action alternative would result in no F-35A beddown at any of these locations at this time.

c. **Inquiries:** For further information on this EIS, contact Mr. Nicholas Germanos, F-35A Operational Basing Environmental Impact Statement (EIS) Project Manager, HQ ACC/A7PS, 129 Andrews Street, Suite 332, Langley AFB, VA 23665-2769. Telephone inquiries may be made to HQ ACC Public Affairs at (757) 764-5007.

d. **Designation:** Final EIS

e. **Abstract:** This Final EIS was prepared in accordance with National Environmental Policy Act (NEPA) of 1969, 42 United States Code §§ 4321-4374, as implemented by the Council on Environmental Quality (CEQ) regulations, 40 Code of Federal Regulations (CFR) §§ 1500-1508, and Air Force implementing regulation 32 CFR 989. As presented in the Final EIS, analysis established that no substantial adverse impacts to most resource categories would result from implementing any of the alternatives and associated scenarios. Beddown of the F-35A would change noise conditions and the type of land uses affected by aircraft noise at all alternative locations. At Burlington AGS and Mountain Home AFB, noise levels of 65 dB DNL or greater would affect a larger area than currently found under baseline conditions under any alternative scenario. At Hill AFB, the area affected by noise levels of 65 dB DNL or greater would decrease under ACC Scenarios 1 and 2, but increase slightly under ACC Scenario 3. For Jacksonville AGS and McEntire JNGB, the affected areas would decrease substantially in both scenarios. For Shaw AFB, the affected area for 65 dB DNL and greater noise levels would decrease in ACC Scenario 1, but increase in the other two scenarios. Effects on land uses in the vicinity of the bases vary depending upon location and scenario; with the exception of Burlington AGS and ACC Scenario 3 at Hill AFB, effects on residential lands would decrease or remain the same. Construction costs at the alternative locations under all scenarios would range from $0.4M to $51.9M. Changes to personnel would vary by base and scenario, with Shaw AFB subject to the greatest decrease in personnel and Mountain Home AFB receiving the greatest increase. Air emissions would remain consistent with federal and state standards; no conformity issues would arise from implementing any scenario at any of the bases. The F-35As would fly and train in existing airspace, but at higher altitudes than the current fighter attack aircraft. While subsonic and supersonic noise levels in the airspace would change under the different scenarios at the six alternative locations, no substantial adverse impacts to land uses, populations, or natural resources would result. Use of ordnance and defensive countermeasures, such as flares, would remain consistent with baseline conditions and all restrictions on use would continue.

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PREFACE

This Preface provides an overview of the Department of Defense (DoD) Joint Strike Fighter (JSF) program. Since it addresses a broad DoD program, and may appear in other environmental documents concerning the JSF, it is not specific to this particular Environmental Impact Statement (EIS).

Department of Defense Joint Strike Fighter Program

Development and deployment of the JSF represents one of the priority defense programs for the United States (U.S.). This multi-decade program commenced in the early 1990s to provide the premier strike fighter aircraft to the Marine Corps, Navy, and Air Force, as well as international partners over the next several decades. For all of the services, the DoD established and is implementing the JSF program.

Efforts by individual services to develop replacement aircraft began in the late 1980s. By 1993, the DoD merged these efforts under one common JSF program dedicated to responding to the high cost of tactical aviation, answering the need to deploy fewer types of aircraft to reduce acquisition and operating costs, and meeting projections of the future threat scenarios and enemy capabilities. Out of this initial step emerged the JSF aircraft, which was designated the F-35 Lightning II. This aircraft was developed as the “next generation” multi-role strike fighter and designed to replace legacy (i.e., older) aircraft for the Air Force, Marine Corps, and Navy, and several international partners. In 1996, the DoD awarded, and Congress approved, competitive contracts to develop JSF prototypes. Lockheed-Martin won this competition, and in 2001 awarded the contract to develop the JSF for deployment to the U.S. services and international partners.

As many of the services’ legacy aircraft approach the limits of their service life, attrition and maintenance requirements reduce the number of available operational aircraft. The result is an increase in the tasking for the remaining operational aircraft and an acceleration of the attrition rates and maintenance costs. The JSF’s advanced airframe, autonomic logistics, avionics, propulsion systems, stealth, and firepower offer the most affordable, lethal, supportable, and survivable fighter aircraft for the battlefield of the future. The JSF was developed as a single program with the platform to be manufactured in three variants, in order to meet the unique mission requirements of each of the services. The conventional take-off and landing variant, or the F-35A, for the Air Force will replace existing, fighter attack aircraft and is designed to operate from U.S. Air Force and allied bases, Auxiliary Landing Fields (ALF), and expeditionary airfields. The short take-off and vertical landing variant, or the F-35B, for the Marine Corps will replace the AV-8B and F/A-18A/B/C/D aircraft. It is designed to operate from amphibious assault general purpose and multi-purpose type ships, alternative landing fields, and conventional aircraft carriers. The F-35C carrier variant will replace the F/A-18A/B/C/D for the Navy and is designed to operate from conventional carriers. By combining the capabilities of several existing Air Force, Marine Corps, and Navy legacy fighter aircraft into one platform, the JSF program implements the Congressional directives to reduce tactical aviation costs, deploy fewer types of aircraft, and match fighter aircraft capabilities to real world threats. Under Congressional and administrative direction, the DoD is committed to deploying the JSF variants to the Air Force, Marine Corps, and Navy. In turn, the services are implementing both joint and service-specific basing and training programs.

Program Environmental Analysis Overview

These basing and training programs represent federal actions requiring analysis under the National Environmental Policy Act (NEPA). While JSF development and manufacture comprises an overall program, each service would operate a unique F-35 variant with different mission requirements, training regimes, basing locations, impacts, and transition schedules. Moreover, the different services operate under their own command organizations and structures that influence the fielding and siting of the aircraft, as such, each service is preparing its own NEPA documentation for basing and operating their variant of the F-35 aircraft. Importantly, the services are sharing information through a JSF Joint Program Office. The following highlights the currently available information on the NEPA efforts associated with the development and deployment of the F-35 for all the services.

Joint Actions

- *Final EIS for the Implementation of the Base Realignment and Closure (BRAC) 2005 Decisions and Related Actions at Eglin Air Force Base (AFB), FL*: Completed in 2009 and addressed establishment of an Initial Joint Training Site for all F-35 variants.
- *Supplemental EIS to the Final EIS for the Implementation of the BRAC 2005 Decisions and Related Actions at Eglin AFB, FL*: Currently in preparation and expected to be released in late 2013.
- *Environmental Assessment (EA) for the F-35 JSF Initial Operational Test and Evaluation (OT&E) at Edwards AFB, CA*: Completed in 2009 and addressed joint Initial OT&E from 2010 through 2014.
- *EA/Overseas EA for Joint Strike Fighter System Development and Demonstration Developmental Test Program:* Completed in 2007 and analyzed the impacts of the developmental test and evaluation program phase of the JSF program at five test locations.

Air Force Actions

- *EIS for F-35A Force Development Evaluation Program and a Weapons School at Nellis AFB, NV*: Record of Decision (ROD) signed in 2011; addressed Air Force specific testing and training programs.
- *EIS for F-35A Operational Beddown*: Revised Draft published May 2013 and addressed comments received on the Draft EIS. It included revisions emanating from new information received between publication of the Draft and the Revised Draft EIS.
- *EIS for F-35A Training Beddown*: the EIS addressed basing and operations of F-35A initial pilot training; ROD signed in 2012.

Marine Corps Actions

- *EA for Temporary Basing of an Interim Pilot Training Center for F-35B, Marine Corps Air Station (MCAS) Yuma*: Completed in 2009 and addresses temporary basing of a Pilot Training Center from 2010 to 2013.
- *EIS for Basing the F-35B JSF on the West Coast*: Final EIS completed and ROD signed in 2010; addresses basing of F-35B aircraft at MCAS Miramar, California and MCAS Yuma, Arizona.
- *EIS for Basing the F-35B JSF on the East Coast*: Final EIS completed and ROD signed in 2010; and addresses basing of F-35B aircraft at MCAS Cherry Point, North Carolina and MCAS Beaufort, South Carolina.

Navy Actions

- *EIS for West Coast Basing of Navy F-35C Aircraft*: Published in February 2013, the Draft EIS addressed basing of operational wings of Navy F-35C in the western U.S.

Chapter 1

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1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

The F-35A Lightning II is the next-generation, multi-role fighter aircraft for the United States (U.S.) Air Force (Air Force) and replaces the Air Force's F-16 and A-10 fighter attack aircraft. These fighter aircraft face two challenges in the 21st century. First, other nations continuously improve their aerial warfare capability by developing and deploying newer, faster, more maneuverable aircraft while also increasing their aircraft mission system technology and air-to-air weapons capability. Second, other nations have developed and are deploying sophisticated air defenses built around surface-to-air weapons which can target conventional aircraft more accurately and at much greater distances than in the past.

The F-35A is intended to be the Air Force's premier air-to-ground strike fighter aircraft through the next several decades. The F-35A specifications require it to be more effective than existing F-16 and A-10 fighter attack aircraft in air-to-ground combat, suppression/destruction of enemy air defenses, reconnaissance, air-to-air combat, and have better range while requiring less logistics support.

The proposed action evaluated in this Environmental Impact Statement (EIS) addresses the beddown and operation of F-35A aircraft for the Combat Air Forces (CAF) which include Air Combat Command (ACC), Air National Guard (ANG), and Air Force Reserve Command (AFRC). ACC is the primary provider of combat airpower to the U.S.'s warfighting commands. To support global implementation of national security strategy, ACC operates fighter, bomber, reconnaissance, battle-management, and electronic-combat aircraft. It also provides command, control, communications, and intelligence systems, and conducts global information operations. In this role, ACC organizes, trains, equips, and maintains combat-ready forces for rapid deployment and employment while ensuring strategic air defense forces are ready to meet the challenges of peacetime air sovereignty and wartime air defense. The ANG and AFRC also fulfill these same roles, although on a lesser scale. The proposed action considers the beddown of F-35A aircraft and replacing/displacing fighter aircraft at Hill Air Force Base (AFB), Shaw AFB, Burlington Air Guard Station (AGS), McEntire Joint National Guard Base (JNGB), and Jacksonville AGS (Figure 1-1). At Mountain Home AFB, the proposed action would add F-35A aircraft to an existing air-to-ground tactical fighter unit.

This EIS addresses these six alternative locations for the beddown of the number of F-35A operational aircraft projected to be delivered from 2015 through 2020. In July 2010, the Air Force identified Burlington AGS and Hill AFB as the preferred alternative locations for this initial operational beddown action. For alternative beddown locations not selected for the 2015 through 2020 aircraft delivery, the Air Force anticipates reconsidering them at a later date and addressing them in appropriate environmental documentation at that time.

Figure 1-1. Alternative Basing Locations

1.2 Background

The Air Force strategy to modernize the aging aircraft inventory with an almost all-stealth fighter force by 2025 began with the F-22A[1] Raptor in the early 1990s. In 1994, the U.S. Congress and Department of Defense (DoD) determined that the F-35 would be developed to replace Air Force F-16 and A-10 fighter attack aircraft (Congressional Research Service 2006).

Development and deployment of the F-35 Lightning II represents one of the priority defense programs for the U.S. This multi-decade program was initiated in the early 1990s to provide the premier strike fighter aircraft to the Air Force, Marine Corps, and Navy, as well as international partners, for the next several decades. The DoD established and is implementing the F-35 program for all of the services.

[1]In the first portion of the F-22 program, prior to operational beddowns, the Air Force designated the aircraft as an F-22. This designation correlated with the major role anticipated for the new aircraft—air superiority emphasizing air-to-air combat. In the National Environmental Policy Act (NEPA) documentation (Air Force 1999) for the Force Development Evaluation (FDE) program and Weapons School (WS) beddown, the F-22 designator was used. Subsequent testing, development, and deployment resulted in further evolution of the aircraft's capabilities and missions, particularly air-to-ground operations. As such, the Air Force redesignated the aircraft as the F/A-22. The aircraft designation was the F/A-22 for a short time before being renamed F-22A in December 2005. Within this EIS, the Raptor will be termed the F-22A unless referencing specific documentation pre-dating that designation.

Efforts by individual services to develop replacement aircraft began in the late 1980s. By 1993, the DoD merged these efforts under one common Joint Strike Fighter (JSF) program dedicated to responding to the high cost of tactical aviation, answering the need to deploy fewer types of aircraft to reduce acquisition and operating costs, and meeting projections of the future threat scenarios and enemy capabilities. Out of this initial step emerged the JSF aircraft, developed as the "next generation" multi-role fighter and designed to replace F-16 and A-10 aircraft for the U.S. Air Force and other fighter aircraft for the Marine Corps and U.S. Navy. The F-35 is a supersonic, single-seat, single-engine aircraft capable of performing and surviving lethal strike warfare missions. There are three variations of the F-35: F-35A, Conventional Take-Off and Landing (CTOL); F-35B, Short Take-Off, Vertical Landing (STOVL); and F-35C, Carrier Variant (CV). The common F-35 airframe also addresses allied air forces operational needs.

1.2.1 F-35A Development and Deployment Program

The Air Force must prepare F-35A pilots to accomplish its combat missions. In preparation, the F-35A weapons system must be fully tested, tactics must be developed and documented, and this information must be taught to pilots and support personnel. The Air Force uses a standard process for weapons system acquisition, production, testing, and deployment. Several steps occur during the process:

- Statement of Operational Need
- Congressional Funding
- Concept Demonstration
- Systems Development and Demonstration
- Production
- Acceptance Testing
- Initial Operational Testing and Evaluation (OT&E)
- Force Development Evaluation (FDE)
- Weapons School (WS)
- Beddowns of Operational Units

The requirement that led to the F-35A was identified through the process described in Air Force Instruction (AFI) 10-601, *Mission Needs and Operational Requirements Guidance and Procedures*. During the 1980s, the Air Force assessed its tactical capabilities against projected threats and determined that a multi-role aircraft deficiency would emerge in the foreseeable future. Such a deficiency could jeopardize the U.S. ability to ensure that its forces have the freedom of action to conduct operations against opposing forces. In 1993, the DoD created the Joint Advanced Strike Technology (JAST) program to conduct a major tactical aviation review. The JAST determined that a JSF would best meet the long-term mission needs of Air Force, Marine Corps, Navy, and allied air forces. Fiscal legislation from Congress in 1995 supported F-35 development and manufacture. Beginning in 1996, concept demonstration began and demonstrator aircraft from Boeing and Lockheed-Martin were flown starting in 2000. In 2001, Lockheed-Martin won the design competition and was awarded the contract to develop the JSF (designated the F-35 Lightning II). Since then, testing of F-35 aircraft has continued at Edwards AFB, California.

Over the past 10 years, the F-35A program has progressed through the systems development and demonstration phase. The overall F-35A OT&E program ensures that the F-35A meets mandatory operational capabilities; the Air Force began the F-35A OT&E program at Edwards AFB, California and FDE program and WS at Nellis AFB, Nevada in early 2013. Under the FDE program, the aircraft and its systems are repeatedly tested and evaluated to ensure continued fulfillment of operational requirements. FDE also explores the use of new flight techniques, evaluates tactics for aircraft performance, supports pilot development, and identifies advanced F-35A training programs. By testing capabilities of the F-35A in tactical situations, including air-to-ground, air-to-air, and electronic combat operations, FDE provides unique input on tactics to the WS and operational units. F-35A OT&E, FDE, and WS programs will be performed throughout the life of the aircraft in the Air Force inventory.

The F-35A development and deployment program requires locations for beddown of operational aircraft. The ultimate goal of the F-35A development and deployment program is to provide Air Force operational units with experienced pilots, experienced maintenance and other personnel, a proven aircraft, and the tactics and operational guidance to achieve full operational mission requirements.

Through the systematic process outlined above, the Air Force must ensure that:

- the F-35A receives thorough, intensive testing and evaluation for its effective and safe operation;
- the FDE program and WS continue to refine the capabilities of the F-35A and improve tactics employed in the F-35A for as long as the aircraft remains part of the Air Force inventory; and
- environmental documentation, developed in accordance with the National Environmental Policy Act (NEPA), the Clean Air Act (CAA), and other applicable environmental laws and regulations have been or will be prepared for each major action, including future basing of operational F-35As.

1.2.2 Aircraft Characteristics of the F-35A

Under the proposed action, the Air Force designated the F-35A to replace existing but aging fighter attack aircraft at one or more bases. In that regard, these new aircraft would fulfill the wide range of roles and missions currently conducted by legacy fighter attack aircraft, including Attack Operations/Air Interdiction, Offensive Counter Air, Close Air Support (CAS), Strategic Attack, Suppression of Enemy Air Defenses, Destruction of Enemy Air Defenses, and Defensive Counter Air. Additional F-35A missions would include Armed Reconnaissance, Forward Air Controller (airborne), and Combat Search and Rescue. As such, the Air Force variant (i.e., CTOL) of the F-35A embodies critical combat capabilities to fulfill multiple mission roles and epitomizes the characteristics needed for these roles, offering a unique combination of capabilities.

- **Stealth** – Design features and radar-absorbent composite materials make the F-35A harder to detect than conventional aircraft of similar size.

- **Range and Supersonic Speed** – The F-35A offers an equivalent or greater combat radius than our current legacy strike fighter fleet. Supersonic speeds, lower observability, and internal munitions bay make Air Force pilots less vulnerable to enemy aircraft and ground-based threats.
- **Sensor Integration to Support Precision Munitions** – New F-35A computer systems, improved multi-spectral sensor technology, and networked sharing of information permit Air Force pilots to detect enemy threats and deliver precision munitions at substantially greater distances than supported by current fighter attack aircraft.
- **Comprehensive Combat Information Systems** – Highly sophisticated avionics systems, including a helmet mounted display, are integrated throughout the F-35A to provide the pilot information from many sources and produce a clear, easily understood picture of the combat situation.
- **Reduced Maintenance Costs** – Computerized self-tests of all systems, improved maintenance, and other autonomic logistics information system components reduce both maintenance time and costs.

The F-35A combines internal weapon bays and expanded fuel capacity to permit low visibility penetration of enemy air defenses.

The F-35A, a single-seat, all-weather fighter, receives its power from one F135 Pratt and Whitney jet engine capable of supplying approximately 40,000 pounds of thrust and speed up to Mach 1.5. The aircraft is capable of employing air-to-ground, air-to-air, and guided weapons from an internal weapons bay or external weapons stations. It also has a four barrel version of the GAU-12/U, 25-millimeter (mm) cannon for close air support missions, effective against lightly-armored and "thin-skinned" vehicles. It also employs defensive countermeasures such as flares.

The aircraft measures approximately 51 feet long, 35 feet across the wings, and 15 feet tall. Internal fuel capacity is over 18,000 pounds, providing an unrefueled range of 1,200 miles without external tanks. There are two internal weapons bays with four stations: two stations can carry up to 2,000 pounds of air-to-ground bombs and two other stations for smaller weapons (including but not limited to air-to-air missiles and/or bombs). The suite of ordnance the F-35A can employ includes, but is not limited to: AIM-9X, AIM-120, AIM-132 ASRAAM missiles; AGM-158 Joint Air to Surface Stand-off Missiles; Joint Direct Attack Munitions (JDAM); Small Diameter Bombs; and other guided bombs. When low observability is not required, external pylons can be loaded with ordnance, yielding a weapons payload of more than 18,000 pounds. While a majority of the training missions do not include ordnance employment, when they do, the F-35As would carry both inert and live weapons. The use of these weapons and ordnance would only take place at ranges already approved (through applicable Air Force and FAA airspace regulatory and appropriate levels of environment review) for such use.

The F-35A contains an integrated core processor that combines information from all the aircraft's sensors into a single, coordinated view of the battlefield. Among these sensors is an active, electronically scanned array radar with a synthetic aperture radar mapping mode to provide pilots with far more precise search and targeting capabilities than exist in F-15 and F-16 fighters. The aircraft is also equipped with an infrared search and tracking system for air-to-air combat while advanced air-to-ground combat features include an electro-optical targeting system with a forward-looking infrared imager, a targeting laser, a laser spot tracker, and a closed circuit digital television camera. With software capable of analyzing the information these sensors provide, the F-35A uses an automatic target recognition and classification system to identify specific targets. A speech recognition system that detects a pilot's spoken commands and operates various systems without the need of pressing buttons or flipping switches represents another capability of the F-35A.

1.3 Purpose of F-35A Operational Beddown

The overall mission of the Air Force is defense of the U.S. and fulfillment of directives of the President and Secretary of Defense. The U.S. and international partners require fully operational, mission-ready F-35 aircraft. Pilots and their F-35A fighters need to provide a high-threat, multi-role war fighting capability. To meet these requirements, the Air Force must develop and operate combat and support aircraft and train personnel needed for the job. The purpose of the proposed action is to efficiently and effectively maintain combat capability and mission readiness as the Air Force faces deployments across a spectrum of conflicts while also providing for homeland defense. Beddown and operation of the F-35A at one or more of the alternative locations would represent a major step toward this goal. Slated to purchase and deploy F-35As over the next several decades, the Air Force must ensure this initial beddown provides a solid start to the program. Additionally, this beddown action and associated training will assure availability of combat-ready pilots in the most advanced fighter aircraft in the world.

1.4 Need for F-35A Operational Beddown

Three factors drive the need to beddown and operate the F-35A. *First*, existing and anticipated enemy air defense systems have reached levels of effectiveness sufficient to pose a significant threat to current fighter attack aircraft. In addition, worldwide prevalence of sophisticated air-to-air and surface-to-air missiles continues to grow, increasing the number of threats to which existing Air Force fighter attack aircraft are vulnerable. Implementation of the proposed beddown would provide the CAF with an aircraft capable of defeating or avoiding such threats.

Second, the CAF needs to efficiently and effectively maintain combat capability and mission readiness. However, it faces increased difficulty in maintaining an aging fighter attack aircraft inventory. These fighter aircraft need to be replaced as a result of attrition, decreasing service life, and the lack of manufacturing additional fighter aircraft. Therefore, the CAF must replace the aging fighter attack aircraft and integrate operational F-35A squadrons into the existing Air Force structure.

Third, the F-35A must support CAF core competencies of air and space superiority, global attack, precision engagement, and agile combat support. In order for the CAF to organize, equip, train, and support F-35A aircraft to meet a full range of military operations, it needs to beddown the F-35A at existing locations offering compatible base infrastructure and providing ready access to existing airspace suitable for the F-35A. Beddown and operation of the F-35A at such locations form a critical priority for the Air Force.

1.5 Public Involvement

Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] §§ 1500-1508), and the Air Force's implementing regulations (32 CFR § 989), require the Air Force to consider potential environmental consequences of its proposed action early and concurrent with the initial project planning stages. An EIS documents the detailed study of these potential environmental consequences of the proposed action and cumulative impacts. When preparing an EIS, the Air Force is required to invite review from other federal, state, and local agencies and from the public. Stages of the environmental review process are provided below:

- **Notice of Intent (NOI)** – A notice that announces the Air Force's intent to prepare an EIS is published in the *Federal Register* and local newspapers in the area of the proposed action. The NOI formally initiates the public scoping process.
- **Scoping** – This is an early and open process for determining the scope of issues and identifying the significant issues related to the proposed action. Federal, state, and local agencies, and members of the public are encouraged to provide input. Informational meetings are held to provide an opportunity for members of the public to become informed of and to comment on the issues that need to be addressed in the EIS.
- **Draft EIS** – This draft document analyzes the environmental consequences of the proposed action. It includes a description of the proposed action, the purpose and need for the proposed action, alternatives for implementing the proposed action, the existing environmental conditions where the proposed action would take place, and the environmental consequences of the proposed action. The Draft EIS is supported by detailed technical studies, including noise, air quality, and socioeconomic analyses.
- **Draft EIS Notice of Availability (NOA) and Notice of Public Meeting** – On April 13, 2012, a formal notice in the *Federal Register* (U.S. Environmental Protection Agency [USEPA] FR Vol. 77, No. 72) announced that the Draft EIS was available for review by the public and federal, state, and local agencies. On April 13, the Air Force also announced the Draft EIS NOA as well as the dates, times, and locations of the public meetings in local newspapers; similar advertisements of meeting dates and times were again placed in the newspapers about a week before the meetings.
- **Public Comment Period** – Federal, state, and local agencies and members of the public were invited to provide comments on the Draft EIS over a 45-day period, or by June 1, 2012 (later extended to June 20, 2012). Oral comments made at public meetings were recorded by a stenographer and throughout the 64-day review period, written comments were also accepted. Both written and oral comments were considered equally.
    - *Revised Draft EIS* – Per 32 CFR § 989.19(3)(e) the Air Force determined that it would seek additional public comments on a Revised Draft EIS. This version included responses to

comments; information supplementing, improving, or modifying the analyses; and factual and typographical corrections. The public had 45 days to review and comment.

- **Final EIS** - The Final EIS documents the comments received on the Revised Draft EIS and includes a response to all relevant comments. This version of the document may include modifying alternatives; supplementing, improving, or modifying the analyses; as well as factual and typographical corrections.
- **Final EIS NOA** – Again, a formal notice will run in the *Federal Register* by the USEPA and advertisements are run in local newspapers to announce that the Final EIS is available for public review. This is then followed by a 30-day waiting period.
- **Record of Decision (ROD)** – A formal decision taken by the Assistant Secretary of the Air Force, or his/her designee, is published in the *Federal Register.* A notice of the ROD availability is also announced in local newspapers.

1.5.1 Scoping Process

In accordance with NEPA, CEQ Regulations, and the Air Force Environmental Impact Analysis Process (EIAP), the Air Force prepared this EIS to assess potential environmental consequences of the beddown and operation of F-35A aircraft for the CAF. As part of the EIAP, public involvement is integral in developing a comprehensive EIS. Specifically, NEPA, CEQ Regulations, and the EIAP require a process called “scoping” to involve the public early in the assessment process, as well as to solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed and the methods by which potential impacts are evaluated.

Scoping for this EIS began with publication of the NOI in the *Federal Register* on December 30, 2009 (Appendix A) and extended to March 1, 2010. Within this scoping period, from January 19, 2010 through February 19, 2010, the Air Force conducted a total of 20 public scoping meetings in potentially affected areas of Florida, Georgia, Idaho, Nevada, New Hampshire, New York, South Carolina, Utah, and Vermont.

In January 2010, the Air Force initiated informal consultation with the U.S. Fish and Wildlife Service (USFWS) regional offices and the State Historic Preservation Offices (SHPOs) of their intent to undertake the EIS as well as notifying them of the initiation of informal consultation (refer to Appendix B in the Draft EIS). Prior to the scoping meetings, the Air Force initiated direct contact with possibly interested and affected government agencies, government representatives, elected officials, and parties in the states potentially affected through distribution of 374 Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) letters (Appendix A). The letters announced the beginning of the scoping process and included maps of the proposed beddown locations, a list of scoping meeting dates and locations, and the scoping flier. The Air Force published advertisements in 23 local newspapers a week prior to the scoping meetings. Each advertisement provided scoping meeting dates and locations applicable to that area.

At these open-house style meetings, 593 people attended with 120 written comments submitted. Additional community members were present that declined to sign in. During the scoping period, the

Air Force received 11 agency responses to early coordination, 1 Native American Tribe replied to the government-to-government consultation request, and 443 letters were posted from members of the public, agencies, elected officials, and organizations in locations potentially affected by the proposed action. In Idaho, 173 mayors signed multiple resolutions in support of the action and 4,057 "form letter" postcards were received from Idaho residents in support of basing the F-35A at Mountain Home AFB.

1.5.2 Draft EIS Public Comment Period

The public comment period began on April 13, 2012 with the Draft EIS NOA published in the *Federal Register*. The Draft EIS was circulated for review and comment to government agencies, local organizations, American Indian tribes, interested private citizens, and public libraries. Copies of the Draft EIS were delivered by April 13, 2012 to 35 libraries and the document was posted on the Air Force website at www.accplanning.org for viewing electronically. As was mentioned above, on the same day as the NOA appeared in the *Federal Register*, the Air Force also announced the Draft EIS NOA as well as the dates, times, and locations of the public meetings in over 20 local newspapers. This same advertisement ran again about a week prior to each of the meetings.

Public meetings were held in 16 communities across the country and commenced on April 30, 2012 and ended on May 17, 2012. However, an additional meeting was requested and held on June 5, 2012 and the comment review period was extended another 19 days to June 20, 2012. Over 770 people attended the meetings. During the 64-day comment period, a total of 934 written comments were received, of which 913 (or 98 percent) were associated with the Burlington AGS alternative. Further detail of comments received is provided in each of the base-specific chapters at section XX2.5.2 (i.e., BR2.5.2, HL2.5.2, JX2.5.2, Mc2.5.2, MH2.5.2, and SH2.5.2). All comments (written and oral) were reviewed and reflected, as appropriate, in this Revised Draft EIS; refer to Appendix E in Volume II for comments and responses.

Burlington AGS: Burlington AGS: The majority of written comments (over 900) were from citizens in Vermont and Maine who were not supportive of the basing action at Burlington International Airport. Commenters primarily focused on noise and its potential impacts on property values, economic stability, and human health in Winooski and South Burlington. Comments received from Maine residents believed this proposal was connected to the action proposed by the Massachusetts Air National Guard to lower the floor of the Condor Military Operations Area (MOA) and were concerned about F-35A aircraft flying at this lower altitude and the resulting noise levels. As presented in BR2.2.1, no airspace modifications are proposed and the F-35As would operate in the upper altitudes within this MOA and not at the lower ones proposed by the Massachusetts Air National Guard. There were also numerous commenters from Burlington, Vermont who supported basing F-35As at this location.

Hill AFB: Two comments were associated with the Hill AFB alternative; both were in support of basing the F-35As at Hill AFB. No other issues were identified.

Jacksonville AGS: Five comments were associated with the Jacksonville ANG alternative. All supported basing F-35As at Jacksonville International Airport. No other issues were identified.

McEntire JNGB: Four comments associated with the McEntire JNGB alternative were received. All expressed their support to base F-35As at McEntire JNGB. No other issues were identified.

Mountain Home AFB: Seven comments were received associated with this alternative. Five expressed their support for F-35As at the base. However, the two other comments noted that the action would increase both noise and air pollution in the region and the United States Fish and Wildlife Service expressed their concern of how sonic booms would impact sage grouse.

Shaw AFB: Several comments were received associated with the Shaw AFB alternative; all expressed their support. No other issues were identified.

1.5.3 Revised Draft EIS Comment Period

The 45-day public comment period for the Revised Draft EIS began on May 31, 2013 when the NOA was published in the *Federal Register* (Appendix A). The Revised Draft EIS was circulated for review and comment to government agencies, local organizations, American Indian tribes, interested private citizens, and public libraries. Copies of the Revised Draft EIS were delivered by May 31, 2013 to 35 libraries and the entire two-volume document was posted on the Air Force website at www.accplanning.org for viewing electronically. On the same day (or as soon as possible given publication deadlines) as the NOA appeared in the *Federal Register*, the Air Force announced the availability of the Revised Draft EIS NOA in over 20 local newspapers.

There were 11,172 comments received in letter, note, email, and postcard format during the 45-day public comment period. Of these, 823 were in letter, handwritten note, and email format and 10,349 were post card format. In addition, a petition signed by 2,460 people was received supporting the basing action at Burlington AGS. All comments were reviewed and the Final EIS reflects any changes resulting from comments. In Volume II, Appendix E, there is a description of how comments were evaluated, categorized, and responded to, as well as an alphabetical list of commenters, the comment number associated with it, and the response numbers to substantive issues identified and associated with the EIS and NEPA process.

Burlington AGS: The majority of comments were from citizens in Vermont expressing either their support of or opposition to the basing action at Burlington AGS. There were 809 letters, handwritten notes, and emails received: 644 were in opposition to the basing action and 165 were in favor of it. Of the 10,349 postcards received, 9,655 were in support of basing F-35A aircraft at the Burlington AGS and about 694 were in opposition. As was mentioned above, a petition in support of the basing action was signed by 2,460 people. Information on comments that is more detailed is provided in Section BR2.5.3.

Hill AFB: Of the 823 comments, two were received in response to the basing action at Hill AFB: one that expressed support and one that was in opposition to basing F-35As at Hill AFB.

No general public comments were received associated with the four other basing alternatives.

1.5.4 Government-to-Government Consultation

In an ongoing effort to identify traditional cultural resources, as well as satisfy the requirements of various laws, regulations, and Executive Orders (EO), the Air Force is consulting with American Indian Tribes according to the Presidential *Memorandum on Government-to-Government Relations with Native American Tribal Governments*, EO 13175, and DoD Policy on Native American and Native Alaskan Consultation. In January 2010, the Air Force initiated informal government-to-government consultation with Native American Indian Tribes by notifying them of Air Force intent to undertake the EIS as well as initiating informal consultation (refer to Appendix B in the Draft EIS). In January 2011, August 2012, April 2013, and July 2013, federally recognized tribes with potential interest in the proposed action at the six locations were sent letters requesting if they had any concerns or further information for incorporation into the EIS. Copies of all letters and responses are included in Appendix B. Refer to Chapter 4, base-specific sections XX2.4 for detailed information on the completion of government-to-government consultations.

1.6 Lead and Cooperating Agencies

The Air Force is the proponent for the F-35A beddown and is the lead agency for the preparation of the EIS. Both the Department of the Navy (DoN) and the Federal Aviation Administration (FAA) are cooperating agencies. As defined in 40 CFR § 1508.5, a cooperating agency…

> *means any Federal agency other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major Federal action significantly affecting the quality of the human environment.*

The FAA has overall responsibility for the National Airspace System, including runways and facilities at Burlington and Jacksonville International Airports (IAPs) associated with Burlington AGS and Jacksonville AGS. As the agency with special expertise for safe and efficient use of these airfields, the FAA is participating in the preparation of the Draft EIS. The DoN has responsibility for managing and scheduling considerable training airspace across the nation proposed for use by Air Force F-35As, especially overwater Warning Areas off the East Coast. Also, the DoN intends to base and operate F-35B/C aircraft at locations across the country, so it offers special expertise. For these reasons, the DoN is a cooperating agency. Appendix B presents the relevant correspondence exchanged between the Air Force and cooperating agencies.

1.7 Organization of the EIS

This EIS is designed to be reader-friendly and consists of three parts: a separate *Executive Summary*, *Volume I*, and *Volume II*. The *Executive Summary* is a “stand-alone” document providing a synopsis of all relevant portions of the entire EIS. In summary fashion, it presents the purpose and need, describes the beddown proposal along with the alternatives, outlines the public involvement process, and provides a summary of potential environmental impacts related to each action alternative and the no-action alternative.

Volume I is the heart of the EIS presenting all of the details of the affected environment and the analysis of impacts. This volume consists of five major components (as described below) following the prefatory elements such as the required cover sheet abstract and table of contents.

Chapter 1 (here) presents the purpose and need for the F-35A Operational Beddown. It explains the background of and need for the beddown as well as the features of the F-35A as a superior replacement for F-15 and F-16 aircraft. It also discusses the public involvement and scoping process.

Chapter 2 describes the proposed action and alternatives, including a detailed discussion of the alternatives identification process. It also addresses alternatives considered but not carried forward and provides a comparative summary of the effects of the proposed action (and beddown scenarios) at each alternative location relative to the various environmental resources.

Chapter 3 presents definitions of the resources and outlines the methodology used in the analysis. This chapter also describes the approach used to assess cumulative impacts from past, ongoing, and reasonably foreseeable future actions.

Chapter 4 details the base-specific actions necessary to beddown the operational F-35A aircraft. The chapter is divided into six sections, one for each of the alternative beddown locations. Each base-specific section describes baseline conditions for the affected area and environmental impacts for the different beddown scenarios. For each base-specific section, the EIS also assesses cumulative impacts.

Chapter 5 contains references cited in the EIS; persons or agencies contacted during the course of preparing this EIS are cited as personal communications and listed in this section. **Chapter 6** lists the preparers and contributors and **Chapter 7** provides an index of topics covered in this EIS. **Chapter 8** consists of a glossary of commonly used terms and a list of acronyms and abbreviations. **Chapter 9** contains mailing lists for all persons receiving copies of the Final EIS, including those agencies, organizations, and individuals requesting the document as a result of scoping and hearing meetings.

Volume II contains appendices covering public involvement, consultation, noise and aircraft operations, as well as air quality emissions calculations. These appendices complement and expand upon the information provided in the body of the EIS in Volume I. All comments received during the Revised Draft comment period and responses to comments are found in Volume II as well.

Description of the Proposed Action and Alternatives

Chapter 2

How to Use This Document

Our goal is to give you a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the no-action alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement, or EIS, is shown below.

EXECUTIVE SUMMARY

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

OVERALL PROPOSAL VOLUME I

PREFACE
Detailed Guide for Reading the Final EIS

CHAPTER 1
Purpose and Need for the Air Force F-35A Operational Beddown

CHAPTER 2
- Overview of the Proposed Action and Alternatives
- Alternative Identification Process
- Summary Comparison of the Proposed Action and Alternatives

CHAPTER 3
Resource Definition and Methodology

INFORMATION SPECIFIC TO EACH BASE VOLUME I

CHAPTER 4
Six Base-Specific Sections

Burlington AGS	Hill AFB	Jacksonville AGS	McEntire JNGB	Mountain Home AFB	Shaw AFB
Section BR1.0 Proposed Action Overview	**Section HL1.0** Proposed Action Overview	**Section JX1.0** Proposed Action Overview	**Section Mc1.0** Proposed Action Overview	**Section MH1.0** Proposed Action Overview	**Section SH1.0** Proposed Action Overview
Section BR2.0 Base-Specific Project Details	**Section HL2.0** Base-Specific Project Details	**Section JX2.0** Base-Specific Project Details	**Section Mc2.0** Base-Specific Project Details	**Section MH2.0** Base-Specific Project Details	**Section SH2.0** Base-Specific Project Details
Section BR3.0 Affected Environment and Environmental Consequences	**Section HL3.0** Affected Environment and Environmental Consequences	**Section JX3.0** Affected Environment and Environmental Consequences	**Section Mc3.0** Affected Environment and Environmental Consequences	**Section MH3.0** Affected Environment and Environmental Consequences	**Section SH3.0** Affected Environment and Environmental Consequences
Section BR4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section HL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section JX4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section Mc4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section SH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

OVERALL PROPOSAL VOLUMES I & II

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CHAPTER 9
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Appendices: Volume II

Appendix A – Public Involvement
Appendix B – Consultation
Appendix C – Noise Modeling and Airspace Operations
Appendix D – Air Quality
Appendix E – Revised Draft EIS Public Comments and Responses

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The Air Force proposes to establish the initial beddown for F-35A operational aircraft at one or more ACC, ANG, or AFRC installations over a period of approximately 5 years. ACC, ANG, and AFRC units form the CAF that defend the sovereign airspace of the U.S., as well as deploy worldwide, meeting national defense requirements. The beddown scenarios consist of 18 or 24 F-35A aircraft at ANG or AFRC installations, and 24, 48, or 72 F-35A aircraft at ACC bases.[1] In addition, F-16 and F-15 fighter aircraft at the bases would be replaced (except at Mountain Home AFB). The proposed action also includes basing of personnel needed to operate and maintain the F-35A, and construction and/or modification of facilities on the bases to support F-35A operational aircraft. F-35A aircraft would conduct training flights from the base and in existing airspace associated with each proposed location. No new airspace would be established as part of the proposed action.

The Air Force has identified six alternative locations for initial basing of the operational F-35A aircraft: Burlington AGS, Vermont; Hill AFB, Utah; Jacksonville AGS, Florida; McEntire JNGB, South Carolina; Mountain Home AFB, Idaho; and Shaw AFB, South Carolina. Each of these six alternative locations meets the beddown and operational requirements presented later in this chapter. For the purposes of this EIS, *ANG units* are those based at Burlington AGS, Jacksonville AGS, and McEntire JNGB; *ACC units* are those based at Hill AFB, Mountain Home AFB, and Shaw AFB. Mountain Home AFB and Shaw AFB are under the command of ACC. Hill AFB is commanded by Air Force Materiel Command (AFMC), but the 388th Fighter Wing (388 FW) is an ACC asset and a tenant unit. Hill AFB also supports an AFRC unit (419th Fighter Wing [419 FW]). Since the 388 FW comprises the primary unit, Hill AFB is designated an ACC base for purposes of this EIS.

This chapter presents the elements common to the proposed action at the six alternative locations. The specifics of the proposal relative to each of the six alternative locations are presented in Chapter 4. The methodology used to identify the proposed action and alternatives analyzed in this EIS, and the alternatives considered but not carried forward for analysis, are explained in Section 2.2.1. This chapter also discusses the no-action alternative, as required under CEQ regulations (40 CFR § 1502.14[d]).

[1]Basing scenarios are referenced according to their affiliation (ANG or ACC) and number of aircraft. For the ANG locations, ANG Scenario 1 would base 18 F-35As and ANG Scenario 2 would involve 24 F-35A aircraft. At the ACC bases, the basing scenarios are designated as follows: ACC Scenario 1 (24 aircraft); ACC Scenario 2 (48 aircraft); and ACC Scenario 3 (72 aircraft).

OVERVIEW OF F-35A OPERATIONAL AIRCRAFT BEDDOWN PROPOSAL

The proposed F-35A beddown would involve implementing several related elements at one or more of the six alternative locations. The following elements would occur at a base and in its associated training airspace.

Elements Affecting the Base

- Beddown of F-35A aircraft and replacement of existing F-16 and F-15 fighter aircraft (except at Mountain Home AFB) at one or more ACC base or ANG installation
- Conduct airfield operations for training and deployment
- Construct or modify facilities and infrastructure necessary to support F-35A aircraft
- Implement personnel changes (increases or decreases) at the base to conform to F-35A requirements

Elements Affecting Airspace

- Conduct F-35A activities in existing Restricted Areas, Military Operations Areas (MOAs), Air Traffic Control Assigned Airspace (ATCAAs), and overwater Warning Areas, emphasizing fighter aircraft requirements, to include supersonic flight where authorized
- Employ defensive countermeasures, such as flares, in airspace authorized for their use
- Accomplish limited employment of ordnance at ranges approved for such use

2.1 Elements of the Proposed Action Common to All Beddown Alternatives

There are seven elements of the proposed action common to all beddown alternatives: four occurring at the base and three occurring in training airspace. For the bases, the four common action elements include beddown of F-35As and replacement of existing F-16 and F-15 aircraft (except at Mountain Home AFB), F-35A airfield operations, construction, and personnel changes. In the bases' associated training airspace, the common action elements would be airspace use and employment of defensive countermeasures. Also, under airspace with approved ranges, the F-35A would accomplish ordnance delivery training.

2.1.1 Action Elements Affecting the Base

Basing of the F-35A Operational Aircraft

The Air Force proposes to beddown F-35A operational aircraft at one or more of the six alternative locations. For each ANG unit, two beddown scenarios apply: a total of 18 (ANG Scenario 1) or 24 (ANG Scenario 2) F-35A operational aircraft would be beddown at Burlington AGS, Jacksonville AGS, and/or McEntire JNGB. For the ACC units, three beddown scenarios are considered: Hill AFB, Mountain Home AFB, and/or Shaw AFB would be beddown in increments of 24 (ACC Scenario 1), 48 (ACC Scenario 2), and 72 (ACC Scenario 3) F-35A operational aircraft (Table 2-1). The beddown process would occur in phases associated with manufacture and delivery of F-35A operational aircraft. Delivery of the first F-35As to a base could be as early as 2015 and the last is scheduled to be completed by 2020, when the full complement of F-35A aircraft could be beddown at a location depending upon the scenario implemented. Construction activities would precede the arrival of the first aircraft, in some cases by about 2 years.

Table 2-1. Baseline and Proposed Aircraft Beddown

Base	*Aircraft Drawdown*		*F-35A Beddown Scenarios*					Total	Net Change in Aircraft
	Based F-16	*Based F-15C*	*ANG 1*	*ANG 2*	*ACC 1*	*ACC 2*	*ACC 3*		
Burlington AGS	18	N/A	18					18	0
				24				24	+6
Hill AFB	48	N/A			24			24	-24
						48		48	0
							72	72	+24
Jacksonville AGS	N/A	18	18					18	0
				24				24	+6
McEntire JNGB	24	N/A	18					18	-6
				24				24	0
Mountain Home AFB[1]	N/A	N/A			24			80	+24
						48		104	+48
							72	128	+72
Shaw AFB	72	N/A			24			24	-48
						48		48	-24
							72	72	0

Note:
[1]No drawdown of existing aircraft would occur. The 56 based F-15Es/SGs would remain and operate after any F-35A beddown.

With the exception of Mountain Home AFB, the Air Force would remove (or drawdown) the current fighter aircraft (F-16s or F-15s) as the F-35As arrive at the base. For example, if Hill AFB receives only 24 F-35As under ACC Scenario 1, all 48 F-16s would be removed for a net decrease of 24 aircraft by completion of the action. The timing of the drawdown differs for each of the alternative bases, but the transition would be complete with beddown of the full complement of F-35As. The F-16 and F-15 fighter aircraft would be either reassigned or retired by the Air Force and replaced by F-35As. No other based aircraft currently at the alternative locations would be affected.

Current fighter aircraft would be eliminated at the selected beddown location(s). Only Mountain Home AFB, if selected, would retain its inventory of aircraft.

At Mountain Home AFB, the total aircraft inventory would increase as a result of the F-35A beddown. Mountain Home AFB currently supports 42 F-15E aircraft (plus 14 F-15SG Republic of Singapore Air Force [RSAF] aircraft); none of these aircraft would be eliminated. Air Force plans do not include replacement of the F-15E aircraft with F-35As, so beddown of the F-35As under any Mountain Home AFB scenario would be additive in terms of based aircraft.

Airfield Operations

To provide the training needed to ensure combat readiness, F-35A aircrews would conduct operations in two types of areas: 1) an airfield associated with a base and 2) training ranges and airspace. This EIS uses three terms to describe different components of aircraft flying activities: *sortie, operation,* and *event.* Each has a distinct meaning and commonly applies to a specific set of activities in a particular airspace environment or unit. These terms also provide a means to quantify activities for the purposes of analysis. A *sortie* consists of a single military aircraft from a take-off through a landing and includes a flying mission. For this EIS, the term *sortie* is commonly used when summarizing an amount of flight activity from a base. However, the term receives rare use since it provides limited analytic and descriptive value. A sortie can include more than one *operation.* The term *operation* can apply to both airfield and airspace activities, and represents the primary analytical and descriptive quantifier of aircraft flight activities presented in this EIS. At an airfield, an operation comprises one action such as a landing, take-off, or closed-pattern. For airspace and ranges, an operation comprises the use of one airspace unit (e.g., MOA, ATCAA) by one aircraft. Each time a single aircraft flies in a different airspace unit, one operation is counted for the unit. Thus, different bases could support the same number of sorties for the same aircraft type, but generate different numbers of operations in the airspace due to the configuration of airspace units. As a subset of operations, the term *event* is used to define specific training elements (e.g., supersonic flight or ordnance delivery). More than one event may be performed during the use of an airspace unit. During a single sortie, an aircraft could fly in several airspace units, conducting a number of operations and events. For these reasons, the number of operations and events may exceed total sorties and are not additive to one another.

Differences would occur between the amount of flying performed by ANG or AFRC units and ACC units. The Air Force anticipates that each ACC F-35A would fly about 37 operations per month, or 444 operations per year. Thus, a total of 72 F-35As at an ACC base would account for an estimated 32,001 operations per year. Each ANG F-35A aircraft would fly approximately 25 operations per month, or about 304 operations per year. A total of 24 F-35As at an ANG installation would fly an estimated 7,296 operations per year. Differences between the ACC and ANG F-35A operational rates result from the nature of staffing the ANG units and the generally greater experience level of ANG pilots. ANG pilots typically have more flight time, on average, per unit when compared to pilots in ACC units. These differences in rates would also translate to differences in operations at the airfields.

Each of the alternative locations already supports a considerable number of airfield operations (Table 2-2) and reflects conditions as of December 2010. Using information from previous Air Installations Compatibility Use Zones (AICUZ) studies, airfield management logs, recent environmental documentation, and interviews with airfield managers and pilots, the baseline operations provide a benchmark against which proposed activities can be assessed. For all bases, these data include operations by other based or transient military aircraft. For example, Hill AFB supports depot maintenance for many types of Air Force aircraft and Mountain Home AFB supports 56 F-15E/SG aircraft. At the joint-use airfields of Burlington AGS and Jacksonville AGS, civilian and commercial air traffic comprise the bulk of operations. None of these other operations would change as a result of beddown of the F-35A.

Table 2-2. Baseline and Proposed Annual Airfield Operations					
	Total Baseline Operations	*Proposed Number of F-35As*			
		18 F-35As[1]	*24 F-35As*[2]	*48 F-35As*[3]	*72 F-35As*
Burlington AGS and International Airport					
Based F-16	8,099	0	0		
Proposed F-35A	0	5,486	7,296		
Other Aircraft	104,125	104,125	104,125		
Total Airfield Operations	112,224	109,611	111,421		
Percent Change	N/A	-2.3%	-0.7%		
Hill AFB[4]					
Based F-16 (388 and 419 FWs)	34,032		0	0	0
Proposed F-35A	N/A		10,667	21,334	32,001[5]
Other Aircraft	12,601		12,601	12,601	12,601
Total Airfield Operations	46,633		23,268	33,935	44,602
Percent Change	N/A		-50.1%	-27.2%	-4.4%
Jacksonville AGS and International Airport					
Based F-15C	7,223	0	0		
Proposed F-35A	N/A	5,486	7,296[5]		
Other Aircraft	120,884	120,884	120,884		
Total Airfield Operations	128,107	126,370	128,180		
Percent Change	N/A	-1.4%	+0.06%		
McEntire JNGB[6]					
Based F-16	12,007	0	0		
Proposed F-35A	N/A	5,486	7,296[5]		
Other Aircraft	19,067	19,067	19,067		
Total Airfield Operations	31,074	24,553	26,363		
Percent Change	N/A	-21.0%	-15.2%		
Mountain Home AFB[7]					
Based F-15E/F-15SG	28,766		28,766	28,766	28,766
Proposed F-35A	N/A		10,667	21,334	32,001[5]
Other Aircraft	3,846		3,846	3,846	3,846
Total Airfield Operations	32,612		43,279	53,946	64,613
Percent Change	N/A		+32.7%	+65.4%	+98.1%
Shaw AFB					
Based F-16	45,094		0	0	0
Proposed F-35A	N/A		10,667	21,334	32,001[5]
Other Aircraft	3,450		3,450	3,450	3,450
Total Airfield Operations	48,544		14,117	24,784	35,451
Percent Change	N/A		-70.9%	-48.9%	-27.1%

Source: Wyle 2010.

Notes:

[1]18 F-35As would comprise ANG Scenario 1 for ANG units only.

[2]24 F-35As would comprise ANG Scenario 2 for ANG units and ACC Scenario 1 for ACC bases.

[3]48 F-35As would comprise ACC Scenario 2 for ACC bases only.

[4]Per direction of the Secretary of Defense, 24 F-16 aircraft were retired from Hill AFB in 2010 (ACC 2010).

[5]Due to rounding, operations numbers may differ slightly from those presented in the foregoing discussion.

[6]ANG units do not generate the same number of airfield operations as found at active-duty bases; therefore, operations under the 24 aircraft scenarios differ for ACC and ANG bases.

[7]At Mountain Home AFB, all existing F-15E aircraft would remain and continue to operate under the proposed action.

Beddown of the F-35As would alter total operations at the six locations. For all beddown scenarios at Shaw AFB and McEntire JNGB, and for ACC Scenarios 1 and 2 at Hill AFB, operations at the airfields would decrease substantially, primarily due to reductions in pattern work by the F-35As when compared to existing F-16 fighter aircraft. At Hill AFB and Shaw AFB, F-16 aircraft represent the dominant users. Under ACC Scenario 3 at Hill AFB, operations would still decrease, but only by approximately 4 percent. For both ANG Scenarios at Burlington AGS, minor reductions would occur; for the ANG Scenarios at Jacksonville AGS, the beddown would result in a negligible decrease in operations under ANG Scenario 1 and a negligible increase under ANG Scenario 2. At both AGSs, civil/commercial flight operations would continue to dominate at the airfield; F-15 (Jacksonville AGS) and F-16 (Burlington AGS) aircraft at these locations perform only 6 to 7 percent of total operations. Mountain Home AFB represents the anomaly under the proposed action, with substantial increases in total operations under all ACC basing scenarios. Unlike the other locations where based fighter aircraft would be replaced, the F-35As and their operations would be added to existing F-15E/SG aircraft and operations at Mountain Home AFB.

Current fighter aircraft operations, which include departures, pattern work, and landings, are unique at each of the six bases and reflect the nature of base-specific training requirements, safety considerations, course rules, noise reduction practices, and other factors. As noted previously, the F-35As would conduct a lesser proportion of pattern work per total operations. The F-35A would adhere to identified restrictions, avoidance procedures, and quiet-hours programs.

All F-35A units would have pilot proficiency requirements defined by the F-35A Ready Aircrew Program (RAP) currently under development. However, the way in which ANG and AFRC units operate varies from that of the ACC units. Due to the differences between the assigned military personnel and command structure, ANG units employ a combination of full-time, part-time, and state-funded positions. ACC bases have mostly full-time military positions. Therefore, the operational tempo and schedule is different at each base. For example, ANG units and the Hill AFB AFRC unit (419 FW) fly one weekend a month, whereas the ACC active-duty units do not.

Combat missions can involve flying after dark, so currently-based F-16 and F-15 fighter aircraft and the F-35As need to train under such conditions. For the purposes of meeting this requirement, 1 hour after sunset is generally considered to be dark, so the hours of flight activity vary from season to season and among the different locations. As shown in Table 2-3, the fighter aircraft being replaced fly between 0 and 2.3 percent of the time during "environmental night" (after 10:00 p.m. and before 7:00 a.m.). At Mountain Home AFB, the based fighter aircraft fly 16.7 percent during environmental night. Environmental night receives special consideration for analysis because it represents a period when the effects of noise on people are accentuated (see Appendix C). In contrast to the current fighter aircraft, the capabilities and expected tactics of the F-35A diminishes the need to fly at night. None of the ANG units would schedule F-35A flights during environmental

Day-Night Average Sound Level (DNL) is a noise metric combining the levels and duration of noise events, and the number of events over an extended time period. It is a cumulative average, computed over a given time period like a year, to represent total noise exposure. DNL also accounts for more intrusive nighttime noise, adding a 10-decibel (dB) penalty for sounds between 10:00 p.m. and 7:00 a.m.

night, although contingencies such as weather or special combat mission training may result in rare unplanned operations during this period. These units could achieve all required "after dark" operations prior to 10:00 p.m. For the ACC units, F-35A flight activity during environmental night would occur 0.6 percent of the time. With the exception of Hill AFB, the proportion of operations at ACC bases during environmental night would decrease; at Hill AFB the F-35As would fly only 0.1 percent more operations during environmental night. Under ACC Scenarios 1 and 2, actual operations at Hill AFB during environmental night would remain below baseline levels. For ACC Scenario 3, only 22 more annual operations would occur during environmental night than under baseline. Despite negligible operations during environmental night by the F-35As, the current fighter aircraft at Mountain Home AFB would continue to fly about 12 percent of their operations during environmental night.

Table 2-3. Comparison of Baseline and Projected Night Operations

Location	***Percent Operations After 10:00 p.m.***		
	Aircraft Proposed for Replacement	*Total Operations (all aircraft)*	*Projected F-35A*
Burlington AGS	0.0%	12.0%	0.0%
Hill AFB	0.5%	0.4%	0.6%
Jacksonville AGS	1.2%	12.0%	0.0%
McEntire JNGB	2.3%	4.0%	0.0%
Mountain Home AFB	12.0%	10.5%	0.6%
Shaw AFB	1.7%	1.8%	0.6%

Construction and Modification of Facilities

To accommodate the F-35A beddown, each base must provide the necessary facilities and infrastructure needed to support F-35A operations. Examples of some basic F-35A facility and infrastructure requirements necessary to support the beddown of F-35A aircraft include:

- Squadron operations/maintenance facilities
- Hangars
- Simulator facilities
- Base communications infrastructure
- Electrical system upgrades
- Other base support facilities, such as an engine repair shop and aircraft parking aprons, which vary from base to base

While they all offer the basic necessary facilities for the operational beddown, none of the six alternative locations has all of the required infrastructure and facilities. Construction of new facilities and/or modification of existing facilities would be necessary at each beddown location, although the nature and magnitude of these efforts would differ among the six locations. Table 2-4 presents an overview of the amount of construction and modification needed at each base, including total estimated costs and affected acres. Details on construction and modification projects are presented in each base-specific section.

Table 2-4. Comparison of Proposed Construction and Modification Among Alternative Locations

Alternative	*Beddown Scenario*	*Number of F-35A Aircraft*	*Construction Footprint (acres)*	*Total Affected Area[1] (acres)*	*Total Estimated Costs (millions)*
Burlington AGS	ANG Scenario 1	18	0	0[2]	2.40[3]
	ANG Scenario 2	24	0	0[2]	2.40[3]
Hill AFB	ACC Scenario 1	24	0.30	3.50	18.10
	ACC Scenario 2	48	0.50	4.27	30.40
	ACC Scenario 3	72	0.68	5.25	40.80
Jacksonville AGS	ANG Scenario 1	18	0	0[2]	0.40[2]
	ANG Scenario 2	24	0	0[2]	0.40[2]
McEntire JNGB	ANG Scenario 1	18	0.41	0.76	1.2
	ANG Scenario 2	24	0.41	0.76	1.2
Mountain Home AFB	ACC Scenario 1	24	0.83	3.17	16.90
	ACC Scenario 2	48	2.63	8.98	36.30
	ACC Scenario 3	72	3.46	11.39	51.90
Shaw AFB	ACC Scenario 1	24	2.61	5.48	22.20[4]
	ACC Scenario 2	48	2.61	5.48	22.30[4]
	ACC Scenario 3	72	2.61	5.48	22.40[4]

Notes:
[1]Total affected area comprises the facility footprint to be constructed plus surrounding area disturbed by grading, clearing, and related activities.
[2]There could be negligible surface disturbance for utility extensions and/or upgrades.
[3]This cost represents only internal modifications to existing facilities.
[4]Costs per scenario vary due to differences in internal modifications.

As suggested by its designation, the construction footprint represents the area covered by the footprint of the proposed facilities and consists of the designed limits of the structure, facility, apron, road, access, and/or parking lot. To account for construction grading and clearing, equipment lay down space, landscaping, modifications to final designs, and associated disturbance, this analysis also includes disturbance areas in addition to the construction footprints. These disturbance or impact areas, encompass 20 feet adjacent to each linear feature (such as roads, utility extensions, etc.) to 50 feet around the construction footprint for all other structures, facilities, or parking lot areas. Infrastructure upgrades, such as connecting existing facilities to upgraded power systems, could also add to the total affected areas on the installations.

Proposed improvements on the bases for individual projects would range from internal modifications affecting no new acreage to external additions affecting less than 0.1 acre and construction of new facilities covering more than 2 acres. Overall, construction and modification of facilities and infrastructure would be limited at any alternative location under all scenarios. At four of the six alternative locations, construction and modification would be the same for each beddown scenario at the location. Construction and modifications would precede basing of the F-35A aircraft and could extend through 2019 at some locations.

Personnel Changes

Beddown for the F-35A operational aircraft would also require sufficient and appropriate personnel to operate and maintain the aircraft and to provide necessary support services. Personnel discussed in this EIS included:

- All personnel authorizations in ACC, ANG, and AFRC units directly related to flying and maintaining the aircraft;
- Associated Base Operating Support (BOS) personnel authorizations (military, civilian, contractor) performing functions such as security or administration at ACC bases;
- Other ANG unit personnel authorizations associated with the ANG units; and
- Total base personnel to provide an overall context for changes resulting from the F-35A beddown.

For the ACC bases, 24 F-35A aircraft would require 532 military personnel authorizations (51 officers and 481 enlisted) and 53 BOS personnel authorizations for a total of 585; 48 aircraft would require 1,064 military personnel authorizations (102 officers and 962 enlisted) and 106 BOS personnel authorizations for total of 1,170; and 72 F-35As would need 1,596 military personnel authorizations (153 officers and 1,443 enlisted) plus 159 BOS personnel authorizations to operate and maintain the aircraft for a total of 1,755 (Table 2-5). At Hill AFB and Shaw AFB, all authorized positions (not specific people) directly associated with the existing F-16 squadrons would be eliminated and F-35A unit positions would replace them according to the beddown scenario. For example, implementing ACC Scenario 1 (24 aircraft) at Hill AFB would eliminate the 1,742 total positions associated with existing F-16 aircraft squadrons and add 585 positions for the F-35As, resulting in a net decrease of 1,157 personnel positions. Since Hill AFB supports a large depot function, this decrease would represent a 3-percent reduction in total base personnel authorizations. At Shaw AFB, the overall decreases in personnel authorizations would be greater under all beddown scenarios, ranging from reductions of 2 to 15 percent of total base personnel authorizations. Mountain Home AFB would not replace any aircraft, so beddown of the F-35A would add aircraft and personnel positions to current totals. For the ANG locations with existing fighter aircraft squadrons, the F-35A personnel positions would be drawn from the equivalent positions associated with existing manpower authorizations. As such, the manpower authorizations for the F-35A aircraft would represent a combination of reassigned existing positions and new F-35A positions. If a scenario involves an increase in based aircraft, an associated increase in military personnel would result. Conversely, a decrease in based aircraft would produce a decrease in military authorizations. The Air Force expects that changes in personnel authorizations needed for the F-35A would occur coincident with the arrival of the F-35A aircraft during the procurement process.

Table 2-5. Summary of Personnel Changes by Alternative Location

Alternative Location	Baseline Personnel			Proposed Authorized Personnel Per Beddown Scenario							% Change to Total Authorized Personnel at Base
	Total Authorized Personnel at Base	Authorized[1] Personnel	% of Total Authorized Based Personnel Positions	F-35A Beddown Scenarios					Change to Fighter Unit Personnel Positions	% Change to Authorized Fighter Unit Personnel Positions	
				ANG 1	ANG 2	ACC 1	ACC 2	ACC 3			
Burlington AGS	1,130	1,130	100%	1,130					0	0%	0%
					1,396				266	24%	24%
Hill AFB	21,835[2]	1,742[1,2]	8%			585			-1,157	-66%	-5%
							1,170		-572	-33%	-3%
								1,755	13	<1%	<1%
Jacksonville AGS	1,035	1,035	100%	1,035					0	0%	0%
					1,284				249	24%	24%
McEntire JNGB	2,708[3,4]	1,554[4]	57%	1,183					-371	-24%	-24%
					1,554				0	0%	0%
Mountain Home AFB	4,491	1,581[1,5]	35%			585			585	37%	13%
							1,170		1,170	74%	26%
								1,755	1,755	111%	39%
Shaw AFB	8,822[6]	1,905[1]	22%			585			-1,320	-69%	-15%
							1,170		-735	-39%	-8%
								1,755	-150	-8%	-2%

Notes:
[1]Includes Air Force BOS at Air Force bases only (10 percent).
[2]Includes 419 FW AFRC personnel (192 full time, 280 part time).
[3]Includes Army personnel (1,154).
[4]Includes Air Force (Active Associate) personnel (147).
[5]Includes personnel for 56 Authorized F-15 aircraft (42 Air Force, 14 RSAF).
[6]Includes Army personnel (1,530).

2.1.2 Action Elements Affecting Training Airspace

Airspace Use

Definition of the precise nature and sequence of training activities for the F-35A remains in development by the Air Force. Available information from the RAP indicates that to fulfill its multiple roles in replacing the missions of F-16 and F-15 fighter aircraft, the F-35A must conduct training to ensure combat readiness for five major types of missions (Table 2-6). Each of these five major missions requires the necessary airspace and range assets to permit realistic training. The necessary airspace units consist of MOAs, ATCAAs, Restricted Areas, and Warning Areas. F-35A aircraft would not use military training routes, either to access the special use airspace or conduct training. Due to their predominantly higher altitude missions, advanced electronics, and speed, the F-35As would use MOAs, ATCAAs, Restricted Areas, and Warning Areas. Figure 2-1 depicts and describes the characteristics of these different types of airspace.

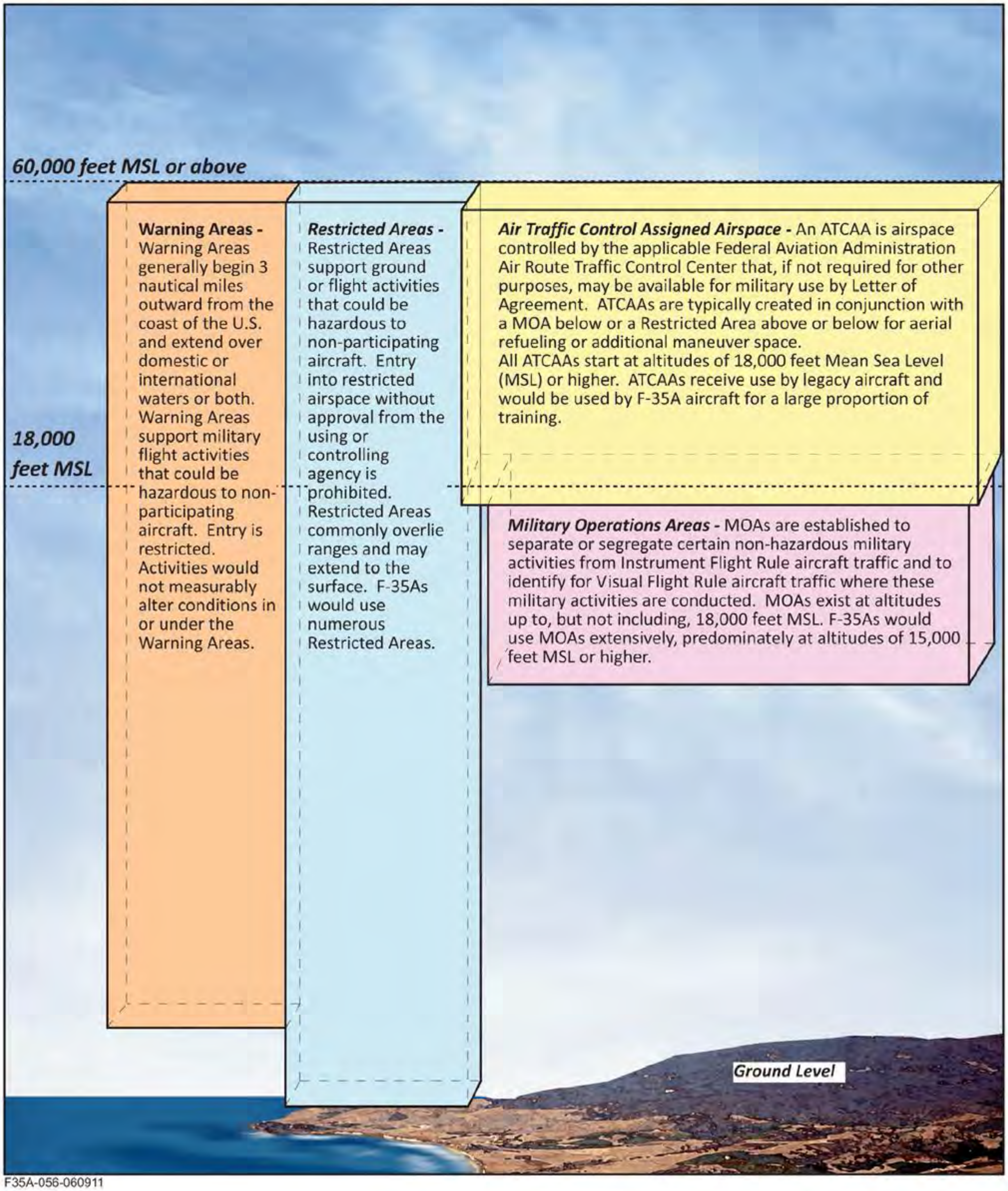

Figure 2-1. Types of Training Airspace

Because the F-35A program remains in development, a syllabus for training is evolving and undergoing refinement. The program recognizes that combat pilots will need to conduct the range of training activities in appropriate airspace units as shown in Table 2-6. While the Air Force developed both estimated minimum dimensions and a recommended set of dimensions (Air Force 2012), training for the F-35A would adapt to existing airspace structures. Adaptation, where needed, could include use of airspace units in combination or sequencing events within a sortie to fit the airspace. Such adaptation would vary among the locations due to differences in the structure and configuration of the airspace.

Table 2-6. Projected F-35A Training Activities

Major Mission	*Training Activities*	*Airspace Type*
Basic Fighter Maneuvers	G-force awareness, maneuverability, break turns, high angle of attack maneuvering, acceleration maneuvering, gun tracking, offensive and defensive positioning, air refueling, stall recovery	MOAs, ATCAAs, and Warning Areas
Surface Attack Tactics (SAT)	Single to multiple aircraft attacking a wide range of ground targets using different ingress and egress methods, delivery tactics, ordnance types, angles of attack, and combat scenarios	MOAs and Restricted Areas (over weapons delivery ranges)
Air Combat Maneuvers	Multi-aircraft formations and tactics, systems check, G-force awareness, 2 vs. 4 and 4 vs. 6 aircraft intercepts, combat air patrol, defense of airspace sector from composite force attack, intercept and destroy bomber aircraft, avoid adversary fighters, supersonic engagement	MOAs, ATCAAs, Warning Areas, and Restricted Areas (over weapons delivery ranges)
Close Air Support	Air support for ground-based offensive and defensive operations, work with Joint Terminal Attack Controllers, use SAT and Basic Surface Attack (BSA) components	MOAs and Restricted Areas (over weapons delivery ranges)
Air Combat Tactics	Multi-aircraft and multi-adversary defense and combat air patrol, defense of airspace sector from composite force attack, intercept and destroy bomber aircraft, avoid adversary fighters, strike-force rendezvous and protection, supersonic engagement	MOA, ATCAAs, and Warning Areas

Source: Adapted from Air Force 2012

Therefore, F-35As would use only existing or currently assessed airspace and ranges. By adapting the training activities to the airspace associated with the locations, no F-35A-specific changes to airspace structure or size; nor are any changes to range target configurations and types required to accommodate F-35A training and operations. Since identification of alternative basing locations, some airspace changes have occurred that are unrelated to selection of the location for F-35 operations. Furthermore, if in the future the Air Force chooses to make any F-35A-specific airspace or range modifications, these actions will undergo the appropriate level of environmental analysis prior to implementation. In general, F-35As from Hill AFB and Mountain Home AFB would operate in MOAs, ATCAAs, and Restricted Areas above ranges. In contrast, the other basing alternatives would involve operations in all four types of airspace, including overwater Warning Areas. Another type of airspace used by F-16 and F-15 aircraft and proposed for use by F-35As consists of an Altitude Reservation (ALTRV). An ALTRV is generally a temporary reservation of airspace for a specific flight plan. For example, an ALTRV can be requested from the FAA to accommodate aircraft flying from one airspace unit to another separated unit. An ALTRV can be temporary, lasting only for the duration of the specified aircraft movement or a long-term use ALTRV can be defined through written agreement with the FAA that specifies its location, altitudes, and times of use. Airspace associated with Hill AFB and Jacksonville AGS supports long-term ALTRVs.

Table 2-7 identifies airspace units associated with each alternative location where F-35A operations could be accommodated and were analyzed in this EIS. The airspace structure for each location represents conditions under the no-action alternative, where operations by the based F-15 or F-16 aircraft would occur. In accordance with 40 CFR §1502.14(d), this EIS evaluates the proposed action in comparison to the no-action alternative. All currently, FAA-chartered airspace units (as of March 2013) were used as a basis for the no action alternative and have completed:

1. Environmental documentation in conformance with NEPA, CEQ Regulations, and 32 CFR 989 for any airspace modification;
2. A Record of Decision (ROD), Finding of No Significant Impact, or Categorical Exclusion (as appropriate) for the airspace modifications; and
3. Coordination with the FAA and the airspace charted in the Aeronautical Navigation Charts.

To simplify discussion of the numerous airspace units associated with alternative locations, many are subsumed under a single unofficial designation. This approach is taken because these units are typically scheduled at the same time due to their proximity to each other. For example, Burlington AGS operates in the Viper Complex which includes numerous MOAs, ATCAAs, and Restricted Areas. This EIS, therefore, uses the combined designations both analytically and descriptively in lieu of presenting the constituent airspace units. Individual units are only identified in those instances where greater specificity enhances description or analysis. Further details on airspace units associated with each alternative location are presented in Chapter 4, Section 2.2 for each installation.

Table 2-7. Summary of Existing Airspace Units Proposed for Use by F-35As

Burlington AGS	***Airspace Unit***
Viper Complex	Adirondack A/B/C/D MOA/ATCAA
	Carthage East/West MOA/ATCAA
	Cranberry MOA
	Lowville MOA/ATCAA
	Tupper East/Central/South/West MOA
	R-5201
	R-5202 B
	Canton ATCAA
	Potsdam ATCAA
Condor Scotty	Condor MOA 1&2
	Scotty A/B/C ATCAA
Yankee Laser	Yankee MOA 1&2
	Laser North/East/West ATCAA
Warning Areas	W-102
	W-105 A/B
Hill AFB	***Airspace Unit***
North Range (Utah Test and Training Range [UTTR])	R-6404 A/B/C/D
Lucin	Lucin MOA A/B/C
	Lucin ALTRV
Sevier	Sevier MOA A/B/C/D
White Elk/Currie Tippet	White Elk MOA
	Currie Tippet ATCAA
South Range (UTTR)	Gandy MOA/ATCAA
	R-6402 A/B
	R-6405
	R-6406 A/B
	R-6407
Jacksonville AGS	***Airspace Unit***
Palatka Pinecastle	Palatka MOA 1/2
	R-2910
Coastal Townsend	Coastal MOA 1-7
	R-3007 A/B/C/D
Avon Park Air Force Range (APAFR)	Avon MOA E
	Basinger MOA
	Marian MOA
	Lake Placid MOA
	R-2901 A--N
Special Operating Area (SOA)	W-134
	W-157 A
	W-158 A
	W-159 A
	Strike Out ALTRV

Table 2-7. Summary of Existing Airspace Units Proposed for Use by F-35As (cont.)

McEntire JNGB	***Airspace Unit***
Bulldog	Bulldog MOA A/B/C/D/E
	Bulldog B ATCAA
Poinsett	Poinsett MOA
	R-6002 A/B/C
W-161/177	W-161 A/B
	W-177 A/B
Gamecock	Gamecock MOA A/B/C/D/I
	Gamecock D ATCAA
Fox Visual Flight Rule Operating Area (VOA)	R-6001 A/B
	Swamp
	Fox VOA A/B
Coastal Townsend	Coastal MOAs 1/2/4-8
	R-3005 A/B/C/D/E
	R-3007 A/B/C/D
Mid Atlantic Electronic Warfare Range (MAEWR)	W-122
	R-5306 A/B/C/D/E
	Pamlico MOA
APAFR	Avon MOA E
	Basinger MOA
	Marian MOA
	Lake Placid MOA
	R-2901 A- N
SOA	W-134
	W-157 A
	W-158 A
	W-159 A
	Strike ALTRV
Mountain Home AFB	***Airspace Unit***
Jarbidge North	Jarbidge MOA/ATCAA North
	R-3202
	R-3204 A/B/C
Jarbidge South	Jarbidge MOA/ATCAA South
Owyhee North	Owyhee MOA/ATCAA North
Owyhee South	Owyhee MOA/ATCAA South
Paradise North	Paradise MOA/ATCAA North
Paradise South	Paradise MOA/ATCAA South
Saddle	Saddle MOA/ATCAA A/B

Table 2-7. Summary of Existing Airspace Units Proposed for Use by F-35As (cont.)	
Shaw AFB	***Airspace Unit***
Bulldog	Bulldog MOA A/B/C/D/E
	Bulldog B ATCAA
Poinsett	Poinsett MOA
	R-6002 A/B/C
W-161/177	W-161 A/B
	W-177 A/B
Gamecock	Gamecock MOA A/B/C/D/I
	Gamecock D ATCAA
Coastal Townsend	Coastal MOAs 1/2/4-8
	R-3007 A/B/C/D
MAEWR	W-122
	R-5306 A/C/D/E
	Core MOA
	Hatteras MOA F
	Neuse ATCAA
SOA	W-134
	W-157 A
	W-158 A
	W-159 A
APAFR	Avon MOA E
	Basinger MOA
	Marian MOA
	Lake Placid MOA
	R-2901 A-N
Dare County	R-5314 A-F/H/J
	Phelps MOA A/B/C

Table 2-8 summarizes proposed airspace operations that would be conducted at completion of the final beddown for each alternative location. These proposed operations are also compared to operations applicable under the no-action alternative. Operations occurring in FAA newly charted, reconfigured, and/or changed airspace units are identified and defined within Chapter 4, Section 2.2 of each specific base and station. Although differences in numbers of aircraft, training activities, and configuration of airspace units preclude direct and precise comparison among alternative locations, these data reflect basic trends of usage. Moreover, the data demonstrate the difference between no-action and the scenarios. Base-specific sections in Chapter 4 provide greater detail on the frequency and nature of airspace operations.

Table 2-8. Summary of No Action and Projected Airspace Operations by Scenario

Alternative Location	*Total No Action Operations*[1]	*Scenario*	*Projected F-35A Operations*[2]	*Projected Total Operations*	*Change in Total Operations*	*Percent Change in Total Operations*
Burlington AGS[2]	2,895	ANG 1	2,223	2,705	-190	-7%
		ANG 2	2,956	3,438	+543	+19%
Hill AFB	21,520	ACC 1	5,248	8,332	-13,188	-61%
		ACC 2	10,496	11,024	-7,940	-37%
		ACC 3	15,743	18,827	-2,693	-13%
Jacksonville AGS[3]	14,545	ANG 1	2,470	15,168	+623	+4%
		ANG 2	3,284	15,982	+1,437	+10%
McEntire JNGB[3]	22,652	ANG 1	890	21,046	-1,606	-7%
		ANG 2	1,193	21,339	-1,313	-6%
Mountain Home AFB	33,400	ACC 1	4,317	37,717	+4,317	+13%
		ACC 2	8,643	42,043	+8,643	+26%
		ACC 3	12,963	46,363	+12,963	+39%
Shaw AFB[3]	22,602	ACC 1	2,074	15,744	-6,858	-30%
		ACC 2	4,149	17,819	-4,783	-21%
		ACC 3	6,223	19,893	-2,709	-12%

Notes:
[1]Includes operations by all aircraft types.
[2]Although the training regime would be the same at any location, different numbers of operations apply to the airspace associated with each alternative location since the structure of the airspace units for each differs. For example, a training sortie in Burlington AGS airspace might generate two operations because of the airspace structure, whereas the same type of sortie in Hill AFB airspace might generate four operations due to a different structure.
[3]Per rationale in Chapter 3, excludes operations in overwater Warning Areas and SOAs.

Variation in the number of operations among the six locations would result from the differences in the number, size, arrangement, and proximity of the airspace units to a base. These differences also reflect adaptation of training activities to existing airspace. Detailed operations data are provided in individual location discussions in Chapter 4.

An operation is the use of one airspace unit by one aircraft. If an F-35A flies through two MOAs, it would generate two operations.

The F-35A would share training airspace with many other users. Representative types of other aircraft using the airspace include the Navy F-18 and E-3; Marine Corps AV-8B; and Air Force F-15E, F-15C, F-22A, A-10, F-16, E-3, C-130, and helicopters. These other users would continue operations after the beddown of the F-35As. Other aircraft would account for varying amounts of total activity in the airspace, depending upon the base.

For the five bases where the F-35A would replace F-15 or F-16 fighter aircraft, operations would decrease 6 to 61 percent under 9 of 12 scenarios. Increases between 4 and 39 percent would apply to the remaining four scenarios associated with the five bases. For Mountain Home AFB, operations would increase for all scenarios since they would be additive to baseline activities without replacement of any aircraft. While these summary data provide information on trends per scenario for each location, it cannot be used for precise comparative purposes among the alternative locations due to the way in which the differences in their airspace structures affect “counting” of operations.

The F-16 and F-15 fighter aircraft use all of the types of airspace to conduct needed training, and the F-35A would also use these same types of airspace. Although F-35As would perform missions similar to the aircraft they are replacing, they have distinctive capabilities and would fly somewhat differently. The following highlights some of the expected differences in the F-35A operational capabilities relative to fighter attack aircraft they are replacing:

- More effective in air-to-air engagements;
- More effective in prosecuting missions against fixed and mobile targets;
- More effective in non-traditional intelligence surveillance reconnaissance and suppression of enemy air defenses and destruction of enemy air defenses missions;
- Self-sufficient or part of multisystem and multiservice combat operations;
- Able to rapidly transition between air-to-ground and air-to-air missions while still airborne; and
- Reduced detection with low-observable technologies and tactics.

Due to these capabilities and the breadth of the F-35A mission requirements, several changes in the operational use of existing airspace and ranges would occur under any of the alternatives. These changes are detailed below.

Use of Higher Altitudes

The F-35A would use the full, authorized capabilities of the airspace units available for training, operating (where permitted) from 500 feet above ground level (AGL) up to 60,000 feet mean sea level (MSL)[2] to fulfill its multi-role requirements. However, the F-35A would conduct training in the airspace at higher altitudes than the F-16 aircraft, operating at 15,000 feet MSL or higher 90 percent of the time (Table 2-9). Due to its capabilities and expected tactics, the F-35A would rarely (5 percent or less) fly below 5,000 feet AGL, and would consistently operate (80 percent) from 23,000 feet MSL to above 30,000 feet MSL. Actual flight altitudes would depend upon the lower and upper limits of specific airspace units. Some airspace units may not offer sufficient vertical spans to permit all the training activities required by the F-35A. Due to such limitations, the F-35As would need to use existing airspace that accommodates the training in different proportions than F-16 and F-15 aircraft. Nevertheless, F35A operations would emphasize higher altitudes than flown by aircraft it is replacing.

[2]MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to the average sea level. The elevation of a mountain, for example, is marked by its highest point and is typically illustrated as a small circle on a topographic map with the MSL height shown in either feet or meters or both. Because aircraft fly across vast landscapes, where points above the ground can and do vary, MSL is used is denote the “plain” on which the floors and ceilings of special use airspace are established and the altitude at which aircraft must operate within that special use airspace.

Table 2-9. Current Fighter Aircraft and Proposed F-35A Altitude Distribution in the Airspace

Altitude (feet)	*Percentage of Use*										
	All Bases	*Burlington AGS*		*Hill AFB*		*Jacksonville AGS*	*McEntire JNGB*		*Mountain Home AFB*	*Shaw AFB*	
	F-35A	F-16		F-16		F-15C	F-16		F-15E	F-16	
	Multi-role	Air-to-Ground	Air-to-Air	Air-to-Ground	Air-to-Air	Air-to-Air	Air-to-Ground	Air-to-Air	Air-to-Ground	Air-to-Ground	Air-to-Air
500 – 1,000 AGL	2%	20%	5%	15%	5%	0.25%	5%	5%	15%	5%	5%
1,000 – 5,000 AGL	3%	20%	10%	15%	10%	8.75%	5%	10%	15%	5%	10%
5,000 AGL – 15,000 MSL	5%	30%	15%	25%	15%	36%	20%	15%	23%	20%	15%
15,000 – 23,000 MSL	10%	20%	40%	30%	40%	45%	50%	40%	23%	50%	40%
+23,000 MSL	80%	10%	30%	15%	30%	10%	20%	30%	24%	20%	30%

In comparison to the F-35A, the F-16 and F-15E fighter attack aircraft generally operate at lower altitudes a greater proportion of the time. Altitude distribution varies according to mission type. For air-to-ground missions, current fighter aircraft emphasize operations below 23,000 feet MSL (70 to 90 percent) with 10 to 40 percent conducted from 5,000 feet AGL to 1,000 feet AGL. In an air-to-air role, the fighters operate much more between 5,000 feet AGL and 23,000 feet MSL than the F-35A. While these data represent generalized altitude distributions for F-16 and F-15 fighter aircraft (not specific to a single airspace unit), they clearly establish the differences in altitude use between the F-35As and current fighter aircraft.

Regardless of the proposed altitude distribution and percent use indicated in Table 2-9, F-35 aircraft would adhere to all FAA charted floors and ceilings of airspace units. For example, if a MOA has a charted floor of 7,000 feet AGL, then F-35A aircraft would remain at or above that level. When flying, F-35A pilots will continue to comply with FAA avoidance regulations (14 CFR Part 91.119) and any base-specific avoidance procedures that current fighter pilots employ. For instance, aircraft must avoid congested areas of a city, town, or settlement or any open-air assembly of people by 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft and outside of congested areas, persons, vessels, vehicles, or structures must be avoided by 500 feet.

Combined Use of Existing Airspace

Due to its capabilities, the F-35A would need larger expanses of airspace in which to accomplish its training. As such, to conduct its training missions, the F-35A would use airspace units in combination rather than singly. For example, an F-35A pilot may schedule and use two MOAs and their overlying ATCAAs for one training activity. Although F-16 and F-15 fighter aircraft also use combined airspace units, the F-35A would drive a need for more consistent use and incorporation of more existing airspace. Again, the need for sufficient size would require changes in use patterns of existing airspace units when compared to the F-16 and F-15 aircraft. Different bases would combine some airspace units into different groupings, depending upon training needs and access to specific units. Details on such changes and the combined use of airspace units are presented in the descriptions of the individual alternative locations in Chapter 4.

Night Operations

As noted for airfield operations, F-35A pilots would need to train after dark since combat can occur 24 hours a day. Under many circumstances, these after-dark operations are and can be completed before environmental night (10:00 p.m. to 7:00 a.m.). The fighter aircraft being replaced fly between 0 and 2.3 percent of the time during environmental night (refer to Table 2-3). At Mountain Home AFB, the current fighter aircraft would continue to fly about 12 percent during environmental night. In contrast, the F-35As at ACC bases would fly 0.6 percent of the time after 10:00 p.m. F-35As at ANG installations would not fly at all during environmental night, but would complete after-dark training before 10:00 p.m. Contingencies such as weather or special combat mission training may result in rare unplanned operations during environmental night.

Supersonic Flight

To train with the full capabilities of the aircraft, the F-35A would employ supersonic flight. All supersonic flight would occur at altitudes and within airspace already authorized (i.e., approved and charted by the FAA) for such activities. Due to the F-35A mission and the aircraft's capabilities, the Air Force anticipates that approximately 10 percent of the time spent in air-to-air combat training would involve supersonic flight. On average, F-16s perform supersonic flight during about 16 percent of their missions, with the duration of this activity lasting between 1 and 2 minutes. Similarly, the Jacksonville AGS F-15Cs tend to perform a higher frequency of supersonic flight than the F-35As, especially since the F-15C's primary mission is air-to-air. However, this frequency for the F-15Cs varies relative to the specific training mission and available authorized airspace. The F-35A would fly at supersonic speeds during air-to-air combat training, for a maximum of 2 to 3 minutes. Use of supersonic speeds would enable the F-35A to "close on" (fly toward) and set up to fire a missile more rapidly than an adversary aircraft with less supersonic capability. After simulated weapon employment, the F-35A could use its speed to evade adversary missiles and aircraft. Supersonic flight is projected to be conducted above 15,000 feet MSL, with 90 percent occurring above 30,000 feet MSL (Table 2-10). On occasion, the F-35A aircraft may conduct supersonic flight below 15,000 feet MSL to accommodate mission and training needs, but, as stated earlier, only in airspace authorized and approved for supersonic flights. For the overwater airspace, supersonic operations must be conducted at least 15 nautical miles (nm) from shore.

Table 2-10. Average Altitude Profiles for Supersonic Flight

Altitude (feet)	*F-16 and F-15 Fighter Aircraft*	*Projected F-35A*
5,000 AGL – 10,000 MSL	0%	0%
10,000 – 15,000 MSL	8%	0%
15,000 – 30,000 MSL	12%	10%
+30,000 MSL	80%	90%

Source: Personal Communication, Meyer 2010.

Mission Duration

Like the F-16 and F-15 aircraft, the F-35A would fly, on average, 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 (like F-16 and F-15 fighter aircraft) would spend between 20 to 60 minutes in the training airspace. On occasion during an exercise, the F-35A may spend up to 90 minutes in one or more airspace units.

Defensive Countermeasures

Flares are the principal defensive countermeasure dispensed by military aircraft to evade attack by enemy air defense systems. Although the F-35A's stealth features significantly reduce its detectability, pilots must train to employ defensive countermeasures. Flares dispensed from aircraft provide high-temperature heat sources that mislead heat-sensitive or heat-seeking targeting systems. Flares provide an infrared countermeasure to counter homing, heat seeking surface-to-air and air-to-air missiles. Flares are used only in approved airspace at altitudes designated for the airspace. Flares burn out in approximately 500 feet, so altitude restrictions in special use airspace are established to ensure flare burnout before it reaches the ground or water.

Flare deployment in authorized airspace associated with the six alternative locations is governed by a series of regulations based on safety and environmental considerations and limitations. These regulations establish procedures governing the use of flares over ranges, other government-owned and controlled lands, and nongovernment-owned or controlled areas. All areas used for flare deployment must be analyzed through appropriate NEPA documentation. ACC has set standard minimum-release altitudes (ACC Supplement to AFI 11-214) for flares over government-owned and controlled lands. These standards, which vary from 400 to 900 feet AGL according to aircraft type, are designed to allow the flares to burn out completely at least 100 feet above the ground. For F-16 and F-15 fighter aircraft, the minimum release altitude for flares is 700 feet AGL. Minimum release altitudes for the F-35As would be the same. Over nongovernment-controlled lands, flare release is restricted to a minimum of 2,000 feet AGL and above for all aircraft (and would be the same for F-35As). More restrictive altitude restrictions are followed for specific airspace units in response to local considerations, including wildfire threat levels. Flares can also be dispensed in the offshore Warning Areas without altitude restrictions.

Defensive flares are made of magnesium that, when ignited, burn for a short period (less than 5 seconds) at approximately 2,000 degrees Fahrenheit (°F). The burn temperature is hotter than the F-35A exhaust, so the flare attracts and decoys heat-seeking weapons and sensors targeted on the aircraft. Pilots must train regularly with defensive flares under simulated threat conditions to ensure flare deployment in extremely high stress combat conditions. While specific flares have not yet been determined for F-35A use, flares currently approved for use by F-16 and F-15 aircraft in training airspace are the M-206, Mobile Jettison Unit (MJU)-7/B (or the MJU-10/B flare with the same Safe and Initiation [S&I] residual piece as in the MJU-7/B), and the MJU-61/B. Table 2-11 describes all three flares. If the Air Force determines that F-35A pilots need to employ flares in training airspace not yet approved for such operations, then appropriate NEPA documentation would be undertaken prior to their use.

Table 2-11. Residual Material Deposited on the Ground Following Deployment of One Flare				
Material	**Disposition**	***Flare Type***		
		MJU-61/B	**M-206**	**MJU-7/B**
Flare Case	Aluminum, remains in aircraft	1 inch x 1 inch x 8 inch	1 inch x 1 inch x 8 inch	2 inches x 1 inch x 8 inch
Flare Insert	Burns when deployed	Magnesium, Teflon	Magnesium, Teflon	Magnesium, Teflon
End Cap/Pad	Deposited on the ground	One 1 inch x 1 inch x 1/8 inch plastic or nylon; one same sized silicone foam pad	One 1 inch x 1 inch x 1/8 inch plastic or nylon; one same sized silicone foam pad	One 2 inch x 1 inch x 1/8 inch plastic or nylon; one same sized silicone foam pad
Piston	Deposited on the ground	One 1 inch x 1 inch x 1/2 inch nylon/plastic	One 1 inch x 1 inch x 1/2 inch nylon/plastic	One 2 inch x 1 inch x 1/2 inch nylon/plastic
Flare/Body Wrapping	Deposited on the ground	One up to 2 inch x 17 inch piece of graphite fabric stiff duct-tape type material	One up to 2 inch x 17 inch piece of graphite fabric stiff duct-tape type material	One up to 3 inch x 17 inch piece of graphite fabric stiff duct-tape type material
Initiator or S&I Device	Deposited on the ground	One 1 inch x 1 inch x 1/2 inch plastic/spring device	None	One 2 inch x 1 inch x 1/2 inch plastic/spring device

The MJU-61/B flare is the same size as the M-206 flare. Each flare is approximately 1.0 inch x 1.0 inch x 8.1 inches long. The difference is that the MJU 61/B flare has an igniter device which allows the hot gasses propelling the flare from the aluminum cartridge to ignite the flare magnesium pellet as the flare exits the cartridge. The M-206 initiates flare ignition while the flare magnesium pellet is still in the aluminum cartridge. After a flare is deployed, residual materials fall to the ground. The MJU-7/B flare is approximately 2.0 inches x 1.0 inch x 8.1 inches long and includes a S&I device which permits the flare to ignite as it exits the cartridge. As shown in Table 2–11, residual materials can be deposited on the ground following deployment of each MJU-61/B, M-206, and MJU-7/B flare.

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 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 a strike would depend upon the number of flares deployed, the areal extent of the airspace, the population density under the airspace, and the proportion of time a person would be expected to be outside. If 32,000 flares were deployed annually within a representative airspace unit overlying 8,900 square miles of land with a western rural population density of 1 person per square mile, and the population is outside an average of 10 percent of the time, the potential for a strike has been calculated as 1 in 681,000,000 in a given year. Most areas under airspace authorized for flare use associated with the six alternatives support low population densities and would, therefore, be subject to miniscule risk of a strike. Other flare residual pieces would not fall with a momentum which could result in a bruise. On extremely rare occasions (estimated at approximately 0.01 percent of flares dispensed), a flare may not ignite and would fall to the earth as a dud flare. If such a rare occasion occurs and a dud flare is found, it should not be moved, the location should be identified, and the Air Force base public affairs office contacted and provided with the dud flare location.

Use of these defensive countermeasures varies among the airspace for the six alternative locations, and records defining the amount of use are not complete or comparable. This is due to the fact that F-16 and F-15 aircraft do not dispense flares on every sortie and F-35As can be expected to use fewer flares overall due to their expected flight regime. Although F-35A missions and training would retain similarities with those of the fighter aircraft it is replacing, tactics and training events are evolving and continue to develop. Based on these expectations, overall flare use would either increase or decrease in authorized training airspace associated with alternative locations roughly in proportion to net changes in operations (refer to Table 2-8). Flare use by the F-35A would conform to existing altitude and seasonal restrictions to ensure fire safety. These restrictions would continue to minimize the potential for fires, so the impacts of flare use would not exceed the negligible impacts already occurring. Based on the emphasis on flight at higher altitudes for the F-35A, roughly 90 percent of F-35A flares released throughout the authorized airspace units would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires.

Ordnance Use

The F-35A has the requirement and capability to perform air-to-ground missions. For the F-35A operational aircraft, air-to-ground training would represent about 60 percent of the training program, with the air superiority mission accounting for the remaining 40 percent. Most air-to-ground training would be simulated, where nothing is released from the aircraft. The F-35As use high-fidelity avionics and embedded training systems to simulate ordnance delivery on a target. This type of training could be conducted in any of the airspace units meeting the airspace training event requirements for floor, ceiling, and size.

Air-to-ground training would also include occasional ordnance delivery. Actual ordnance delivery training would occur during the times when F-35A aircraft would operate in restricted airspace over approved ranges. Each of the alternative locations offers such a range and include Fort Drum Range/ R-5201 (Burlington AGS), North and South UTTR/R-6402/6404/6405/6405/6406 (Hill AFB), Pinecastle/ R-2910, Avon Park/R-2901, and Townsend Range/R-3007 (Jacksonville AGS, McEntire JNGB, and Shaw AFB), Poinsett Range/R-6002 (McEntire JNGB and Shaw AFB), and Saylor Creek Range/R-3202 and Juniper Butte Range/R-3204 (Mountain Home AFB).

The F-35A is capable of carrying and employing several types of ordnance. As the Air Force currently envisions, the following describes the types of ordnance that could be employed by the F-35A; however, ordnance types change over the years and how they are employed in training evolves as well. Currently, the F-35A is expected to use the GBU-31 variant of the Joint Direct Attack Munitions (JDAM), which is a 2,000-pound general-purpose Mark-84 bomb, for air-to-ground ordnance delivery. JDAMs are guided to the target by an attached Global Positioning System (GPS) receiver. These weapons, commonly released between 20,000 and 40,000 feet MSL, require no laser guidance. The Air Force expects no changes in the numbers of JDAMs employed by F-35As when compared to the fighter aircraft it is replacing, and they would continue to be employed on ranges already approved for such use: Fort Drum, UTTR, Avon Park, and Saylor Creek Range. Optional internal loads include a wide variety of air-to-ground ordnance: small diameter bombs, missiles, dispensers, and guided weapons. In addition, because the F-35A carries an internal four-barrel cannon, occasional tactical strafing training would be needed. Strafing involves flying towards and firing at a prescribed strafing target for a short burst of time; however, with a capacity of only 180 rounds, strafing by the F-35A would be limited. As is the case for air-to-air and air-to-ground ordnance training, strafing activities must follow specific safety procedures and be employed only on approved ranges and targets.

2.2 Alternative Identification Process

2.2.1 Alternative Identification Process Methodology

The Air Force undertook the following process to identify potential locations for basing the F-35A. On August 31, 2009, the Deputy Assistant Secretary of the Air Force for Installations tasked a group of senior representatives from the Air Force Secretariat, Air Staff, and selected major commands such as ACC and AFMC, to identify potential candidate bases. This group was instructed by the Strategic Basing Executive Steering Group to use the following planning conventions to identify beddown locations:

1. *Identify the number of F-35 aircraft scheduled to be delivered between fiscal years (FY) 2013 and 2017*. This time period corresponds to the DoD Future Years Defense Program, which is the program and financial plan approved by the Secretary of Defense, and provides a basis for Air Force planning. Planning beyond this time period was considered speculative since the availability of resources to fund facilities and aircraft could not be reliably determined.
2. *Identify the number of F-35A aircraft to be allocated to training and to operations based on the current national strategic considerations*. As an Air Force-wide program, manufacture of the F-35A needs to meet demands for both operational and training aircraft.
3. *Determine the number of bases minimally needed to support receipt of these aircraft for training and operations*. Senior Air Force representatives made this determination by dividing the aircraft allocated to training and operations by the number of squadrons needed to create four different basing configurations:
    - Three squadrons of 24 (72 total) primary assigned F-35A aircraft for training;
    - Three squadrons of 24 (72 total) primary assigned F-35A aircraft for operations;
    - One squadron of 24 primary assigned F-35A aircraft for training; and
    - One squadron of 24 primary assigned F-35A aircraft for operations.

    These configurations formed the objective unit aircraft allotments for active duty (72, 48, or 24 F-35As) and the AFRC (18 or 24 F-35As). For the ANG, 18 or 24 primary assigned F-35As represented the aircraft allotment. Primary assigned aircraft consist of those assigned to meet the primary aircraft authorization and reflect the number of aircraft flown by a unit in performance of its mission.

4. *Create rank-ordered lists of Air Force installations for each of the configurations based on each installation's capacity to successfully support basing of the F-35A aircraft*. Four major objective criteria were used in this assessment: mission, capacity, environmental, and cost. The mission criterion evaluated weather at the locations based on the number of days with visibility of 3 miles or greater at 3,000 feet AGL and the capability of the airspace to meet flying requirements. The capacity criterion assessed facility capacity (squadron operations, aircraft maintenance units, and simulator bays; maintenance bays, corrosion control, and munitions storage; and fitness centers, child development centers, dormitories, and medical care facilities), as well as the base's runway length and configuration, and available ramp space. The environmental criterion considered a base's CAA attainment status, whether the local community has adopted zoning or other land use controls to preserve the base's flying operations, incompatible development in the clear zone and/or Accident Potential Zones (APZs), and incompatible development within noise contours above 65 decibels (dB) DNL. The final criterion determined the base's construction cost factor obtained from the DoD Facilities Pricing Guide, June 2007, as updated by the draft June 2009, Office of the Secretary of Defense Pricing Guide.
5. *Using each of the four configurations (e.g., one squadron or three squadrons, training or operations), start at the top of that configuration's rank-ordered list and apply each pertinent military judgment factor to meet the minimal need for beddown installations*. The military judgment factors consisted of qualitative operational considerations apart from those discussed above to identify installations appropriate for beddown of the F-35A aircraft. These military judgment factors included:
   - Plans and Guidance
   - Global Posture
   - Building Partnerships
   - Total Force
   - Beddown Timing
   - Force Structure
   - Training Requirements and Efficiencies
   - Logistics Supportability
   - Resources and Budgeting
6. *Consider additional bases beyond the minimal need to ensure a sufficient range of reasonable alternatives is considered in the environmental analysis*. Such consideration employed the conventions and criteria described above.

7. *Reach consensus on the reasons why a given base should or should not be considered as a candidate.* This process involved additional review of the information defined for the bases on the rank-ordered lists.
8. *Ensure that no base appears both on the training and operations potential candidate lists.* Definition of candidate installations recognized the inherent conflicts and capacity issues associated with beddown of both training and operations squadrons at a single base.

2.2.2 Results of the Alternative Identification Process

The planning considerations used to identify candidate bases employed the best current (as of August 2009) estimates for the timeframe of the process; the actual number and configuration of aircraft eventually based will be determined by national security factors extant at the time of delivery and will be consistent with the results of this EIS. This process resulted in the following conclusions.

1. *A total of 273 F-35A aircraft are planned to be delivered between FY 2015 and FY 2020*. Of this total, 12 aircraft are slated for Edwards AFB for OT&E based on prior decisions. The Air Force also intends to beddown 14 aircraft at Nellis AFB for FDE and the WS.
2. *For the defined time period, the Air Force would receive 124 primary assigned F-35A aircraft for operations*. As described below, these 124 F-35As need to be allocated in accordance with national defense priorities.
3. *The process identified a minimal need for eight installations for beddown of operational F-35As, including:*
   - Three bases in the U.S. or its territories to support the configuration with three active-duty squadrons of 24 F-35As;
   - One base in the Pacific theater and one base in the European theater each with the configuration consisting of one active-duty squadron of 24 assigned aircraft; and
   - Three ANG or AFRC installations operating a single squadron configuration with 18 or 24 F-35As.

   The Air Force derived the minimally needed number of installations by prioritizing the order of assignment based on national strategic operational plans and other guidance. As a result, the first priority consisted of an active-duty base in the U.S. or its territories to receive the three-squadron, 24-aircraft configuration. Next in the sequence, one 24-aircraft squadron would go to a base in the European theater, followed by beddown of one 24-aircraft squadron in the Pacific theater. Lastly, beddown of a single squadron at an ANG installation would occur to support the homeland defense mission.
4. *Based on the rank-ordered lists for each configuration and the application of military judgment factors, the Air Force identified candidate installations for beddown of the configurations of the squadrons.* The Air Force used the planning conventions described above to define candidate alternatives for the active-duty and ANG squadrons in the U.S. but not those in the Pacific and European theaters. Those overseas beddowns comprise separate and distinct actions from the proposed beddown assessed in this EIS. Installations identified as alternatives include:

Three Squadron Configuration	One Squadron Configuration
o Hill AFB	o Burlington AGS
o Mountain Home AFB	o Jacksonville AGS
o Shaw AFB	o McEntire JNGB

The proximity of two candidate bases to each other presents the opportunity to exploit logistic and operational synergies arising from analyzing the bases as a pair for the operational mission. The salient characteristics of such a potential are the selection of one base as a candidate for a training or operation mission and the presence of a nearby second base with the same (training or operations) current mission which would not otherwise be precluded from consideration for incompatible use. At this time, Shaw AFB and McEntire JNGB were carried forward as a candidate pair because Shaw AFB was selected as a candidate for an F-35A operational mission and McEntire JNGB's current use is compatible with an F-35A operational mission. Subsequently, the Air Force determined to examine each as an alternative. While presented as stand-alone alternatives in this EIS, the Air Force may either select Shaw/McEntire for a synergistic basing configuration (e.g., the sharing of a single flight simulator facility) or as stand-alone options. The potential environmental impacts on either location associated with a synergistic configuration would be less than those portrayed in the two stand-alone alternatives.

While this process determined the number of bases carried forward for detailed analysis to meet projected Air Force operational requirements, the actual number of aircraft assigned and bases used will be determined in light of national strategic considerations and F-35A aircraft availability as of this EIS' completion.

2.2.3 Alternatives Considered But Not Carried Forward

During the alternatives identification process, the Air Force examined hundreds of locations for basing. All but six were eliminated and not carried forward for further detailed analysis in this EIS but could be considered for future F-35A basing actions. The approach used to derive the rankings of bases weighted mission criterion more heavily relative to the other three criteria of capacity, environmental, and cost. This weighting emphasized the pre-eminent importance of mission accomplishment and the relative difficulties associated with modifying or adding airspace and the inability to improve weather conditions. However, this weighting produced an artificially high ranking for several installations which would not be suitable for basing the F-35A aircraft for the foreseeable future. Additionally, some installations have conflicting current and projected missions or lack fundamental infrastructure that similarly precludes them from consideration for beddown of the F-35A aircraft for the foreseeable future. Those installations consisted of:

- **Edwards AFB** – Current and projected Air Force test missions are incompatible with F-35A training or operations mission.
- **Luke Auxiliary One Airfield** – Existing infrastructure only supports limited numbers of F-16 landings.
- **March Air Reserve Base** – Current and future civil air traffic volume within the FAA Los Angeles Center's sectors precludes its use for a beddown.
- **Nellis AFB** – Current and projected Air Force missions at Nellis AFB, which include the Weapons Integration Center supporting the F-35A, are incompatible with additional F-35A training or operations missions.

- **Phoenix Sky Harbor International Airport** – Current and future civil air traffic volume and the presence of a commercial airline hub preclude its use for a beddown.
- **Tonopah Auxiliary Airfield** – On-going and projected DoD missions are incompatible with F-35A training or operations missions.

2.2.4 Proposed Action and Alternatives Carried Forward for Detailed Analysis

A total of six beddown locations are carried forward for further detailed analysis. Three are ACC bases and three are ANG locations. To provide a context for the proposed action and beddown alternatives, the following presents a brief description of each base and its missions.

Burlington AGS, Vermont – Located in northern Vermont, Burlington AGS currently flies and maintains 18 F-16 aircraft supporting the general purpose mission of the 158th Fighter Wing (158 FW). Covering 280 acres, the installation is part of a joint use airfield shared with the Burlington IAP Authority. The airfield has an 8,320-foot runway. The 158 FW conducts training operations in the Viper Complex, Condor Scotty, and Yankee Laser Airspace, and, to a lesser degree, in the overwater Warning Areas where supersonic flight is permitted at least 15 nm offshore.

Hill AFB, Utah – Situated near the Great Salt Lake and the UTTR, Hill AFB supports two operational squadrons of F-16s (48 aircraft), as well as a mix of other aircraft including C-130s. Although the F-16 units are under ACC, Hill AFB is an AFMC base focused on depot maintenance. With boundaries encompassing 6,698 acres, the base features a 13,508-foot runway. Facilities for the 388 FW (ACC) and 419 FW (AFRC), as well as the depot repair facility are located within the airfield. Adjacent UTTR offers extensive training airspace and ranges capable of accommodating all F-35A training, including ordnance delivery and supersonic flight within a defined supersonic operating area.

Jacksonville AGS, Florida – Jacksonville AGS, located near the Atlantic coast of Florida, is the home of the 125th Fighter Wing (125 FW) which flies a total of 18 F-15C aircraft. The installation is a joint use airfield shared with the Jacksonville IAP Authority that offers a 10,000-foot runway, a 7,700-foot secondary runway, hangar, and simulator facilities. Training airspace consists of Palatka, Pinecastle, Coastal Townsend, and to a lesser degree, Avon Park. In addition, the 125 FW uses an overwater SOA that permits supersonic flight and flare use.

McEntire JNGB, South Carolina – McEntire JNGB, located southeast of Columbia, South Carolina, is home to the 169th Fighter Wing (169 FW). The 169 FW flies and maintains 24 F-16 aircraft in support of its mission for the South Carolina ANG. McEntire JNGB provides facilities and infrastructure to support F-35As and covers 2,400 acres with a 9,000-foot runway. The wing uses a variety of airspace and ranges for training including Bulldog, Poinsett Range, Gamecock, Coastal Townsend, Avon Park, Fox VOA, MAEWR, and Warning Areas. Flares are allowed in all MOAs above 5,000 feet MSL. The overwater Warning Areas allow unrestricted supersonic flight (15 nm offshore) and use of flares.

Mountain Home AFB, Idaho – Mountain Home AFB, in Idaho, is an ACC base and the home of the 366th Fighter Wing (366 FW) that supports two squadrons of F-15Es (42 aircraft). The 366 FW has an operational mission for rapid deployment to conflicts and trouble spots around the world, as well as being the foreign military pilot training location for the Republic of Singapore F-15SGs (14 aircraft). Mountain Home AFB, which covers about 6,844 acres, offers a single 13,500-foot runway and the necessary facilities to support the F-35As. The base's associated training airspace consists of MOAs, Restricted Areas, and ATCAAs south and west of the base. The Owyhee and Jarbidge MOA/ATCAAs are authorized for supersonic flight above 10,000 feet MSL (except over the Duck Valley Indian Reservation) and also allow flare use with seasonal and altitude restrictions. Supersonic flight is also authorized above 30,000 feet MSL in the ATCAAs above the Paradise MOAs.

Shaw AFB, South Carolina – Shaw AFB is an ACC base and home to the 20th Fighter Wing (20 FW) which flies and maintains 72 F-16 aircraft. Shaw AFB provides parallel runways, one 8,000 feet long and one over 10,000 feet long. The base's associated airspace, shared in part with McEntire JNGB, includes MOA complexes (Bulldog, Gamecock, Coastal Townsend), Restricted Areas (Poinsett and Avon Park), and overwater Warning Areas. Flares are authorized in the MOAs above 5,000 feet MSL and in the Warning Areas, which also permit supersonic flight at least 15 nm offshore.

2.2.5 No-Action Alternative

Analysis of the no-action alternative provides a benchmark, enabling decision-makers to compare the magnitude of the environmental effects of the proposed action or alternatives. Section 1502.14(d) of CEQ regulations implementing NEPA requires an EIS to analyze the no-action alternative. No action means that an action would not take place, and the resulting environmental effects from taking no action are compared with the effects of allowing the proposed activity to go forward. No action for this EIS reflects the *status quo*, where no F-35A operational aircraft beddown would occur at any of these bases at this time. No F-35A operational aircraft would be based, no F-35A personnel changes or construction would be performed, and no training activities by F-35A operational aircraft would be conducted in the airspace. Taking no action could negatively affect the overall DoD JSF Program for integrating the F-35A into the Air Force inventory and delay the fielding of the F-35A for operations and deployment. Delaying beddown actions could also increase the cost of the overall program.

At each alternative location, there are on-going and currently planned activities and programs that would continue, whether or not the location is chosen for beddown of the F-35A operational aircraft. These activities have been approved by the Air Force and supported by existing NEPA documentation. As such, they are considered part of the no-action alternative. Examples of these include modifications to airspace associated with Hill AFB, Jacksonville AGS, and Mountain Home AFB which are discussed in the chapters dedicated to those locations.

2.2.6 Preferred and Environmentally Preferable Alternatives

The Air Force selected Hill AFB and Burlington AGS as the preferred alternative locations. At these locations, the Air Force would replace existing F-16 aircraft (48 at Hill AFB; 18 at Burlington AGS) with 24, 48, or 72 F-35As at Hill AFB and 18 or 24 F-35As at Burlington AGS. It would also implement construction and/or modification to facilities and changes to personnel as well as operations at the airfields and in training airspace. The Air Force determined that these alternative locations best fulfill its mission responsibilities as presented in the purpose and need.

CEQ regulations also require that an environmentally preferable alternative be identified. For ACC basing alternative locations, the environmentally preferred alternative is Hill AFB ACC Scenario 1 (see Table 2-12 for comparison of impacts). Under Hill AFB ACC Scenario 1 (24 total F-35A aircraft) the total number of acres, population, households, and receptors exposed to noise levels 65 decibels (dB) Day-Night Average Noise Levels (DNL) and greater would decrease the most when compared to any of the scenarios at the three ACC basing locations. In addition, under Hill AFB Scenario 1, no other impacts for any resource categories would exceed those identified for no action.

The environmentally preferred alternative for ANG basing locations is McEntire ANG Scenario 1 (18 total F-35A aircraft). This ANG scenario represents the greatest decrease in the amount of acres, population, households, and receptors exposed to noise levels 65 dB DNL and greater when compared to either its baseline or no-action alternative. This is also true when you compare McEntire ANG Scenario 1 among the other two ANG basing locations and their associated scenarios.

2.3 Comparison of Environmental Consequences Among Alternatives

Comparing and differentiating among alternatives comprises a fundamental premise of NEPA. For the basing alternatives and scenarios identified for this proposed action, summaries and comparisons of consequences are presented below in Table 2-12.

Table 2-12. Comparative Summary of Environmental Consequences						
	Burlington AGS ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-16s***	***Hill AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 48 F-16s***	***Jacksonville AGS*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-15Cs***	***McEntire JNGB*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 24 F-16s***	***Mountain Home AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace None;*** ***Based F-15E/F-15SGs Remain***	***Shaw AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 72 F-16s***
Location in EIS:	**BR3.1**	**HL3.1**	**JX3.1**	**Mc3.1**	**MH3.1**	**SH3.1**
Airspace Management and Use	**Base** • No adverse impacts to airspace management and use within the local air traffic environment. • 2.3 percent decrease in total annual airfield operations under Scenario 1 and 0.7 percent decrease under Scenario 2. **Airspace:** • No change to current configuration of airspace under either scenario. • 7 percent decrease in total operations under Scenario 1 and 19 percent increase under Scenario 2. • No adverse impacts on airspace use and management.	**Base** • No adverse impacts to airspace management and use within the local air traffic environment. • 50 percent decrease in total annual airfield operations under Scenario 1; 27.2 percent decrease under Scenario 2; and 4.4 percent decrease under Scenario 3. **Airspace:** • No change to current configuration of airspace under any scenarios. • 61 percent decrease in total operations under Scenario 1; 37 percent decrease under Scenario 2; and 13 percent decrease for Scenario 3. • No adverse impacts on airspace use and management.	**Base:** • No adverse impacts to airspace management and use within the local air traffic environment. • 1.4 percent decrease in total annual operations under Scenario 1 and 0.06 percent increase under Scenario 2. **Airspace:** • No change to current configuration of airspace under any scenarios. • 4 percent increase in total operations under Scenario 1 and 10 percent increase under Scenario 2. • No adverse impacts on airspace use and management.	**Base:** • No adverse impacts to airspace management and use within the local air traffic environment. • 21 percent decrease in total annual airfield operations under Scenario 1 and 15.2 percent decrease under Scenario 2. **Airspace:** • No change to current configuration of airspace under any scenarios. • 7 percent decrease in total operations under Scenario 1 and 6 percent decrease under Scenario 2. • No adverse impacts on airspace use and management.	**Base:** • No adverse impacts to airspace management and use within the local air traffic environment. • 32.7 percent increase in total annual airfield operations under Scenario 1; 65.4 percent increase under Scenario 2; and 98.1 percent increase under Scenario 3. **Airspace:** • No change to current configuration of airspace under any scenarios. • 13 percent increase in total operations under Scenario 1; 26 percent increase under Scenario 2; and 39 percent increase under Scenario 3. • No adverse impacts on airspace use and management.	**Base:** • No adverse impacts to airspace management and use within the local air traffic environment. • 70.9 percent decrease in total annual airfield operations under Scenario 1; 48.9 percent decrease under Scenario 2; and 27.1 percent decrease under Scenario 3. **Airspace:** • No change to current configuration of airspace under any scenarios. • 30 percent decrease in total operations under Scenario 1; 21 percent increase under Scenario 2; and 12 percent decrease under Scenario 3. • No adverse impacts on airspace use and management.

Table 2-12. Comparative Summary of Environmental Consequences (con't)						
	Burlington AGS ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-16s***	***Hill AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 48 F-16s***	***Jacksonville AGS*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-15Cs***	***McEntire JNGB*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 24 F-16s***	***Mountain Home AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace None;*** ***Based F-15E/F-15SGs Remain***	***Shaw AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 72 F-16s***
Location in EIS:	**BR3.2**	**HL3.2**	**JX3.2**	**Mc3.2**	**MH3.2**	**SH3.2**
Noise	Base: • ***Scenario 1***: **Affected by 65 dB DNL or greater:** Acres: +289 Population: +2,061 Households: +997 Representative Receptors: +5 • ***Scenario 2***: **Affected by 65 dB DNL or greater:** Acres: +672 Population: +3,117 Households: +1,444 Representative Receptors: +6 Airspace: • **Subsonic:** Perceptible increase in 2 airspace units. • **Supersonic:** Supersonic events would not affect populations, communities, special land uses, or other resources.	Base: • ***Scenario 1***: **Affected by 65 dB DNL or greater:** Acres: -1,166 Population: -3,765 Households: -1,380 Representative Receptors: -9 • ***Scenario 2***: **Affected by 65 dB DNL or greater:** Acres: -491 Population: -1,247 Households: -465 Representative Receptors: -2 • ***Scenario 3***: **Affected by 65 dB DNL or greater:** Acres: +183 Population: +1,326 Households: +466 Representative Receptors: No change Airspace: • **Subsonic:** Perceptible increase in 3 airspace units. • **Supersonic:** Sonic booms per month decrease by 194, 161, and 141 in Scenarios 1, 2, and 3, respectively.	Base: • ***Scenario 1***: **Affected by 65 dB DNL or greater:** Acres: -1,512 Population: -138 Households: -43 Representative Receptors: -2 • ***Scenario 2***: **Affected by 65 dB DNL or greater:** Acres: -1,057 Population: -98 Households: -31 Representative Receptors: -2 Airspace: • **Subsonic:** Perceptible increase in 1 airspace unit. • **Supersonic:** Supersonic events would not affect populations, communities, special land uses, or other resources.	Base: • ***Scenario 1***: **Affected by 65 dB DNL or greater:** Acres: -2,728 Population: -468 Households: -176 Representative Receptors: -6 • ***Scenario 2***: **Affected by 65 dB DNL or greater:** Acres: -2,229 Population: -392 Households: -147 Representative Receptors: -4 Airspace: • **Subsonic:** Perceptible increase in 1 airspace unit. • **Supersonic:** Supersonic events would not affect populations, communities, special land uses, or other resources.	Base: • ***Scenario 1***: **Affected by 65 dB DNL or greater:** Acres: +1,005 Population: 0 Households: 0 Representative Receptors: +1 • ***Scenario 2***: **Affected by 65 dB DNL or greater:** Acres: +2,086 Population: 0 Households: 0 Representative Receptors: +1 • ***Scenario 3***: **Affected by 65 dB DNL or greater:** Acres: +3,455 Population: 0 Households: 0 Representative Receptors: +1 Airspace: • **Subsonic:** No perceptible increases in airspace units. • **Supersonic:** Sonic booms per month increase by 9, 15, and 22 for Owyhee North under Scenarios 1, 2, and 3. Sonic booms increase by 7, 13, and 22 for Jarbidge North in Scenarios 1, 2, and 3, respectively.	Base: • ***Scenario 1***: **Affected by 65 dB DNL or greater:** Acres: -2,097 Population: -2,165 Households: -730 Representative Receptors: -9 • ***Scenario 2***: **Affected by 65 dB DNL or greater:** Acres: +608 Population: -1,002 Households: -338 Representative Receptors: -3 • ***Scenario 3***: **Affected by 65 dB DNL or greater:** Acres: +3,151 Population: -24 Households: -2 Representative Receptors: +3 Airspace: • **Subsonic:** Perceptible increase in 3 airspace units. • **Supersonic:** Supersonic events would not affect populations, communities, special land uses, or other resources.

Table 2-12. Comparative Summary of Environmental Consequences (con't)

	Burlington AGS ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-16s***	***Hill AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 48 F-16s***	***Jacksonville AGS*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-15Cs***	***McEntire JNGB*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 24 F-16s***	***Mountain Home AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace None;*** ***Based F-15E/F-15SGs Remain***	***Shaw AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 72 F-16s***
Location in EIS:	**BR3.3**	**HL3.3**	**JX3.3**	**Mc3.3**	**MH3.3**	**SH3.3**
Air Quality	**Base:** • Under both scenarios, emissions would not be introduced that would exceed threshold levels or would substantially deteriorate regional air quality. • Area is in attainment for all criteria pollutants; no conformity determination required. • Regional emissions of CO_2e would incrementally decrease under Scenario 1 and increase under Scenario 2. **Airspace:** • Under both scenarios, emissions within the training airspace would be negligible because over 95 percent of the operations would occur well above the mixing height.	**Base:** • For all scenarios, emissions would not reach or exceed established *de minimis* thresholds for criteria pollutants currently in nonattainment or maintenance; therefore, no conformity determination required. • Regional emissions of CO_2e with construction and operations activities from all three scenarios would decrease. **Airspace:** • Under all scenarios, emissions within the training airspace would be negligible because over 95 percent of the operations would occur well above the mixing height.	**Base:** • Under Scenarios 1 and 2, emissions would decrease when compared to baseline conditions. Scenarios 1 and 2 would not introduce emissions that would substantially deteriorate regional air quality. • Area is in attainment for all criteria pollutants; no conformity determination required. • Regional emissions of CO_2e with construction and operations activities from all three scenarios would decrease. **Airspace:** • Under both scenarios, emissions within the training airspace would be negligible because over 95 percent of the operations would occur well above the mixing height.	**Base:** • Under both scenarios, emissions would decrease and would not introduce emissions that would exceed threshold levels or would substantially deteriorate regional air quality. • Area is in attainment for all criteria pollutants; no conformity determination required. • Regional emissions CO_2e would incrementally decrease under both scenarios. **Airspace:** • Under both scenarios, emissions within the training airspace would be negligible because over 95 percent of the operations would occur well above the mixing height.	**Base:** • Under all scenarios, emissions would increase when compared to baseline conditions; however, these emissions would not exceed threshold levels and would not degrade regional air quality. • Area is in attainment for all criteria pollutants; no conformity determination required. • Regional emissions of CO_2e would incrementally increase under all scenarios. **Airspace:** • Under all scenarios, emissions within the training airspace would be negligible because over 95 percent of the operations would occur well above the mixing height.	**Base:** • Under Scenarios 1 and 2, emissions would decrease when compared to baseline conditions. • For Scenario 3, all emissions except for SO_x would decrease; however, these emissions would not exceed threshold levels and would not degrade regional air quality. • Area is in attainment for all criteria pollutants; no conformity determination required. • Regional emissions of CO_2 and other GHGs would incrementally decrease under all scenarios. **Airspace:** • Under all scenarios, emissions within the training airspace would be negligible because over 95 percent of the operations would occur well above the mixing height.

Table 2-12. Comparative Summary of Environmental Consequences (con't)						
	Burlington AGS ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-16s***	***Hill AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 48 F-16s***	***Jacksonville AGS*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-15Cs***	***McEntire JNGB*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 24 F-16s***	***Mountain Home AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace None;*** ***Based F-15E/F-15SGs Remain***	***Shaw AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 72 F-16s***
Location in EIS:	**BR3.4**	**HL3.4**	**JX3.4**	**Mc3.4**	**MH3.4**	**SH3.4**
Safety	**Base:** • Total annual airfield operations for based fighter aircraft would decrease by 2.3 percent and 0.7 percent under Scenarios 1 and 2, respectively, with commensurate decrease in mishap potential. **Airspace:** • All current fire risk management procedures would remain unaffected due to the F-35A basing. • No increase in flare use. • Probability of flare debris strike negligible (0.0021/year). • Potential decrease of bird/wildlife-aircraft strike hazards and aircraft mishaps below baseline levels.	**Base:** • Total annual airfield operations for based fighter aircraft would decrease by 50.1, 27.2, and 4.4 percent under Scenarios 1, 2, and 3, respectively, with commensurate decrease in mishap potential. **Airspace:** • All current fire risk management procedures would remain unaffected due to the F-35A basing. • No increase in flare use. • Probability of flare debris strike negligible (0.00044/year). • Potential decrease of bird/wildlife-aircraft strike hazards and aircraft mishaps below baseline levels.	**Base:** • Total annual airfield operations for based fighter aircraft would decrease by 1.4 percent under Scenario 1 and increase 0.06 percent for Scenario 2, with relatively no change. **Airspace:** • All current fire risk management procedures would remain unaffected due to the F-35A basing. • No increase in flare use. • Probability of flare debris strike is zero. • No anticipated changes to bird/wildlife-aircraft strike hazards and aircraft mishaps below baseline levels.	**Base:** • Total annual airfield operations for based fighter aircraft would decrease by 21.0 and 15.2 percent under Scenarios 1 and 2, respectively, with commensurate decrease in mishap potential. **Airspace:** • All current fire risk management procedures would remain unaffected due to the F-35A basing. • No increase in flare use. • Probability of flare debris strike negligible (0.0011/year). • Potential decrease of bird/wildlife-aircraft strike hazards and aircraft mishaps below baseline levels.	**Base:** • Total airfield operations would increase by 32.7, 65.4, and 98.1 percent under Scenarios 1, 2, and 3, respectively, with a commensurate increase in the safety risk to aircrews and personnel due to the increased accident and mishap potential. **Airspace:** • All current fire risk management procedures would remain unaffected due to the F-35A basing. • Because no replacement of aircraft, minor increase in use of flares with additional aircraft. • Probability of flare debris strike negligible (0.00035/year). • Potential increase to bird/wildlife-aircraft strike hazards and aircraft mishaps below baseline levels.	**Base:** • Total annual airfield operations for based fighter aircraft would decrease by 70.9, 48.9, and 27.1 percent under Scenarios 1, 2, and 3, respectively, with commensurate decrease in mishap potential. **Airspace:** • All current fire risk management procedures would remain unaffected due to the F-35A basing. • No increase in flare use. • Probability of flare debris strike negligible (0.0016/year). • Potential decrease of bird/wildlife-aircraft strike hazards and aircraft mishaps below baseline levels.

Table 2-12. Comparative Summary of Environmental Consequences (con't)						
	Burlington AGS ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-16s***	***Hill AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 48 F-16s***	***Jacksonville AGS*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-15Cs***	***McEntire JNGB*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 24 F-16s***	***Mountain Home AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace None;*** ***Based F-15E/F-15SGs Remain***	***Shaw AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 72 F-16s***
Location in EIS:	**BR3.5**	**HL3.5**	**JX3.5**	**Mc3.5**	**MH3.5**	**SH3.5**
Geology, Soils, and Water	**Base:** • Under Scenarios 1 and 2, there would be negligible surface disturbance and no increase in impervious surfaces. • For all scenarios, construction would take place internally within existing facilities and geology, topography, soils, surface water, groundwater, and floodplains would not be adversely impacted. **Airspace:** • Not Applicable.	**Base:** • Scenario 1: total surface disturbance – 3.50 acres, total new impervious surfaces – 0.3 acres; Scenario 2: total surface disturbance – 4.27 acres, total new impervious surfaces – 0.5 acres; Scenario 3: total surface disturbance – 5.25 acres, total new impervious surfaces – 0.68 acres. • Construction would occur on areas of the base that have been previously disturbed. • No adverse impacts to geology, topography, soils, surface water, groundwater, and floodplains. **Airspace:** • Not Applicable.	**Base:** • Under Scenarios 1 and 2, there would be negligible surface disturbance and no increase in impervious surfaces. • Stormwater impacts to surface water would be minimized with best management practices. • No adverse impacts to geology, topography, soils, surface water, groundwater, and floodplains. **Airspace:** • Not Applicable.	**Base:** • Under both scenarios 0.76 acres would be disturbed and 0.06 acre of new impervious surface would be added. • Stormwater impacts to surface water would be minimized with best management practices. • No adverse impacts to geology, topography, soils, surface water, groundwater, and floodplains. **Airspace:** • Not Applicable.	**Base:** • Scenario 1: total surface disturbance – 3.17 acres, total new impervious surfaces – 0.83 acres; Scenario 2: total surface disturbance – 8.98 acres, total new impervious surfaces – 2.63 acres; Scenario 3: total surface disturbance – 11.39 acres, total new impervious surfaces – 2.81 acres • Stormwater impacts to surface water would be managed with best management practices. • No adverse impacts to geology, topography, soils, surface water, groundwater, and floodplains. **Airspace:** • Not Applicable.	**Base:** • Under all scenarios there would be 5.48 acres of surface disturbance and 2.61 acres of new impervious surfaces. • Stormwater impacts to surface water would be managed with best management practices. • No adverse impacts to geology, topography, soils, surface water, groundwater, and floodplains. **Airspace:** • Not Applicable.

Table 2-12. Comparative Summary of Environmental Consequences (con't)

	Burlington AGS ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-16s***	***Hill AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 48 F-16s***	***Jacksonville AGS*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-15Cs***	***McEntire JNGB*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 24 F-16s***	***Mountain Home AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace None; Based F-15E/F-15SGs Remain***	***Shaw AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 72 F-16s***
Location in EIS:	**BR3.6**	**HL3.6**	**JX3.6**	**Mc3.6**	**MH3.6**	**SH3.6**
Terrestrial Communities	**Base:** • No loss of vegetation or terrestrial habitat under either scenario. • Decreased operations would result in a decreased opportunity for bird/wildlife-aircraft strikes to occur. **Airspace:** • Subsonic impacts to wildlife from changes in airspace operations would be minimal under both scenarios. • No supersonic operations below 30,000 feet MSL over land.	**Base:** • No impacts to terrestrial vegetation or wildlife from construction under all scenarios. • Decreased operations would result in a decreased opportunity for bird/wildlife- aircraft strikes to occur. **Airspace:** • Impacts to wildlife from changes in subsonic and supersonic operations would be minimal under all scenarios.	**Base:** • Impacts to vegetation would be minor. • Decreased operations would result in a decreased opportunity for bird/wildlife-aircraft strikes under Scenario 1 and could negligibly increase under Scenario 2. **Airspace:** • Subsonic impacts to wildlife would be minimal. • No supersonic operations below 30,000 feet MSL over land.	**Base:** • Impacts to vegetation would be minor. • Decreased operations would result in a decreased opportunity for bird/wildlife-aircraft strikes. **Airspace:** • Subsonic impacts to wildlife would be minimal. • No supersonic operations below 30,000 feet MSL over land.	**Base:** • No impacts to terrestrial vegetation. • Follow BASH plan to reduce possibility of bird/wildlife-aircraft strikes. **Airspace:** • Impacts to wildlife from changes in subsonic and supersonic operations would be minimal under all scenarios.	**Base:** • Impacts to vegetation would be minor. • Decreased operations would result in a decreased opportunity for bird/wildlife-aircraft strikes. **Airspace:** • Subsonic impacts to wildlife would be minimal. • No supersonic operations below 30,000 feet MSL over land.
Location in EIS:	**BR3.7**	**HL3.7**	**JX3.7**	**Mc3.7**	**MH3.7**	**SH3.7**
Wetlands/ Freshwater Aquatic Communities	**Base:** • No impacts to wetlands and other freshwater communities on the installation under all scenarios. **Airspace:** • Not applicable.	**Base:** • No wetlands have been identified on Hill AFB, and the few small ponds that occur are not located within the vicinity of the proposed project footprints under all scenarios. **Airspace:** • Not applicable.	**Base:** • No wetlands or freshwater aquatic communities occur within proposed construction areas under all scenarios. **Airspace:** • Not applicable.	**Base:** • No wetlands or freshwater aquatic communities occur within proposed construction areas under all scenarios. **Airspace:** • Not applicable.	**Base:** • No wetlands occur within any areas designated for proposed construction projects under all scenarios. **Airspace:** • Not applicable.	**Base:** • No wetlands or freshwater aquatic communities occur within proposed construction areas under all scenarios. **Airspace:** • Not applicable.

Table 2-12. Comparative Summary of Environmental Consequences (con't)						
	Burlington AGS ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-16s***	***Hill AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 48 F-16s***	***Jacksonville AGS*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-15Cs***	***McEntire JNGB*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 24 F-16s***	***Mountain Home AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace None;*** ***Based F-15E/F-15SGs Remain***	***Shaw AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 72 F-16s***
Location in EIS:	**BR3.8**	**HL3.8**	**JX3.8**	**Mc3.8**	**MH3.8**	**SH3.8**
Threatened, Endangered, and Special Status Species/ Communities	**Base:** • No impacts to threatened and endangered species or special status communities due to construction activity. **Airspace:** • Under either scenario, impacts to listed threatened, endangered, or special status species would be minimal due to changes in airspace operations.	**Base:** • No federally listed species or special status species have been observed on base. **Airspace:** • Under any of the scenarios, impacts to the yellow-billed cuckoo and the greater sage-grouse would be minimal due to the proposed changes in subsonic and supersonic operations.	**Base:** • Location of construction would not occur within protected habitat or affect protected species. **Airspace:** • Under either scenario, impacts to listed threatened, endangered, or special status species would be minimal due to changes in airspace operations.	**Base:** • No federally listed species or special status species have been observed on base. **Airspace:** • Under either scenario, impacts to listed threatened, endangered, or special status species would be minimal due to changes in airspace operations.	**Base:** • No federally listed threatened or endangered species have been observed on base. • Noise from proposed construction and operations is not expected to affect the burrowing owl and long-billed curlew. **Airspace:** • Under any of the scenarios, impacts to the yellow-billed cuckoo, Columbia spotted frog, and the greater sage-grouse would be minimal due to changes in airspace operations.	**Base:** • Location of construction would not occur within protected habitat or affect protected species. **Airspace:** • Under any of the scenarios, impacts to listed threatened, endangered, or special status species would be minimal due to changes in airspace operations.

Table 2-12. Comparative Summary of Environmental Consequences (con't)

	Burlington AGS ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-16s***	***Hill AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 48 F-16s***	***Jacksonville AGS*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-15Cs***	***McEntire JNGB*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 24 F-16s***	***Mountain Home AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace None;*** ***Based F-15E/F-15SGs Remain***	***Shaw AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 72 F-16s***
Location in EIS:	**BR3.9**	**HL3.9**	**JX3.9**	**Mc3.9**	**MH3.9**	**SH3.9**
Cultural and Traditional Resources	**Base:** • No impacts to archaeological, architectural, or traditional historic properties under either scenario. **Airspace:** • No adverse impacts in the APE would result to NRHP-eligible or potentially eligible properties. **Consultations:** **American Indian** • Government-to-government initiated in January 2010. Nine American Indian Tribes consulted, five never replied to numerous attempts of contact and four concurred with the Air Force determination of no adverse effects. **SHPOs** • No NRHP-eligible or potentially eligible properties affected. • Maine, New York, and Vermont SHPOs concurred with Air Force determination of no adverse effects in the APE.	**Base:** • No impacts to archaeological, architectural, or traditional historic properties under all scenarios. • Building 5 is eligible for listing on the NRHP; alterations and upgrades under Scenarios 2 and 3 would not affect the building's eligibility. **Airspace:** • No adverse impacts in the APE would result to NRHP-eligible or potentially eligible properties. **Consultations:** **American Indian** • Government-to-government consultation letters sent in January 2010. The Hopi Nation concurred with no effect determination. The Goshute requested further information, met with Hill AFB, and concurred that there were no adverse effects posed by this action. No other responses received as of publication of this version of the EIS. **SHPOs** • No NRHP-eligible or potentially eligible properties affected. No adverse effects in the APE. • Concurrence of no effect within the APE was received from both the Utah and Nevada SHPOs.	**Base:** • No impacts to archaeological, architectural, or traditional historic properties under either scenario. **Airspace:** • No adverse impacts in the APE would result to NRHP-eligible or potentially eligible properties. **Consultations:** **American Indian** • Government-to-government consultation letters sent in January 2010; no negative responses received as of publication of this version of the EIS. **SHPOs** • Florida SHPO concurred that there would be no adverse effects to NRHP-eligible or potentially eligible properties in the APE.	**Base:** • No impacts to archaeological or traditional historic properties under either scenario. • Building 243 was not evaluated for NRHP-eligibility but proposed electrical upgrades would not likely effect the building's NHPA eligibility. **Airspace:** • No adverse impacts in the APE would result to NRHP-eligible or potentially eligible properties. **Consultations:** **American Indian** • Government-to-government consultation letters sent in October 2012; no negative responses received as of publication of this version of the EIS. **SHPOs** • No NRHP-eligible or potentially eligible properties affected. No adverse effects in the APE. • Concurrence of no effect within the APE was received from both the Georgia and South Carolina SHPOs.	**Base:** • No impacts to archaeological, architectural, or traditional historic properties under all scenarios in the APE. • Under Scenarios 2 and 3, Building 211 and four hangars are eligible for listing on the NRHP; alterations and upgrades would not alter the characteristics that make them NRHP-eligible. **Airspace:** • No adverse impacts in the APE would result to NRHP-eligible or potentially eligible properties. **Consultations:** **American Indian** • Government-to-government consultation letters sent in October 2012; no responses received as of publication of this version of the EIS. **SHPOs** • No NRHP-eligible or potentially eligible properties affected. No adverse effects in the APE. • Concurrence of no effect within the APE was received from the Idaho, Nevada, and Oregon SHPOs.	**Base:** • No impacts to archaeological, architectural, or traditional historic properties under all scenarios in the APE. **Airspace:** • No adverse impacts in the APE would result to NRHP-eligible or potentially eligible properties. **Consultations:** **American Indian** • Government-to-government consultation letters sent in October 2012; no negative responses received as of publication of this version of the EIS. **SHPOs** • No NRHP-eligible or potentially eligible properties affected. No adverse effects in the APE. • Concurrence of no effect within the APE was received from both the Georgia and South Carolina SHPOs.

Table 2-12. Comparative Summary of Environmental Consequences (con't)

	Burlington AGS ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-16s***	***Hill AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 48 F-16s***	***Jacksonville AGS*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-15Cs***	***McEntire JNGB*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 24 F-16s***	***Mountain Home AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace None;*** ***Based F-15E/F-15SGs Remain***	***Shaw AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 72 F-16s***
Location in EIS:	**BR3.10**	**HL3.10**	**JX3.10**	**Mc3.10**	**MH3.10**	**SH3.10**
Land Use	**Base:** • No change to the existing airfield-related APZs and Clear Zones. • Land area affected by noise levels equal to or greater than 65 dB DNL: *Scenario 1* Overall: Increase 14 percent Residential: Increase 52 percent *Scenario 2* Overall: Increase 34 percent Residential: Increase 80 percent **Airspace:** • No change to general land use patterns, land ownership. No change to management of lands or special use land areas beneath the airspace. • No impairment to special use land management areas such as national/state parks and forests, national/ state wildlife refuges, historic trails, or wilderness areas. • No impact to community land uses.	**Base:** • No change to the existing airfield-related APZs and Clear Zones. • Land area affected by noise levels equal to or greater than 65 dB DNL: *Scenario 1* Overall: Decrease 50 percent Residential: Decrease 56 percent *Scenario 2* Overall: Decrease 21 percent Residential: Decrease 24 percent *Scenario 3* Overall: Increase 8 percent Residential: Increase 7 percent **Airspace:** • No change to general land use patterns, land ownership. No change to management of lands or special use land areas beneath the airspace. • No impairment to special use land management areas such as national/state parks and forests, national/ state wildlife refuges, historic trails, or wilderness areas. • No impact to community land uses.	**Base:** • No change to the existing airfield-related APZs and Clear Zones. • Land area affected by noise levels equal to or greater than 65 dB DNL: *Scenario 1* Overall: Decrease 47 percent Residential: Decrease 92 percent *Scenario 2* Overall: Decrease 33 percent Residential: Decrease 71 percent **Airspace:** • No change to general land use patterns, land ownership. No change to management of lands or special use land areas beneath the airspace. • No impact to community land uses.	**Base:** • No change to the existing airfield-related APZs and Clear Zones. • Land area affected by noise levels equal to or greater than 65 dB DNL: *Scenario 1* Overall: Decrease 62 percent Residential: No change *Scenario 2* Overall: Decrease 49 percent Residential: Decrease 100 percent **Airspace:** • No change to general land use patterns, land ownership. No change to management of lands or special use land areas beneath the airspace. • No impact to community land uses.	**Base:** • No change to the existing airfield-related APZs and Clear Zones. • Land area affected by noise levels equal to or greater than 65 dB DNL: *Scenario 1* Overall: Increase 7 percent Residential: No change *Scenario 2* Overall: Increase 15 percent Residential: No change *Scenario 3* Overall: Increase 25 percent Residential: No change **Airspace:** • No change to general land use patterns, land ownership. No change to management of lands or special use land areas beneath the airspace. • No impairment to Wilderness Areas, WSAs, or WSRs. • No impact to community land uses.	**Base:** • No change to the existing airfield-related APZs and Clear Zones. • Land area affected by noise levels equal to or greater than 65 dB DNL: *Scenario 1* Overall: Decrease 41 percent Residential: Decrease 86 percent *Scenario 2* Overall: Increase 12 percent Residential: Decrease 53 percent *Scenario 3* Overall: Increase 62 percent Residential: Decrease 4 percent **Airspace:** • No change to general land use patterns land ownership. No change to management of lands or special use land areas beneath the airspace. • No impact to community land uses.

Table 2-12. Comparative Summary of Environmental Consequences (con't)						
	Burlington AGS *ANG Scenario 1 = 18 F-35As* *ANG Scenario 2 = 24 F-35As* *Replace 18 F-16s*	***Hill AFB*** *ACC Scenario 1 = 24 F-35As* *ACC Scenario 2 = 48 F-35As* *ACC Scenario 3 = 72 F-35As* *Replace 48 F-16s*	***Jacksonville AGS*** *ANG Scenario 1 = 18 F-35As* *ANG Scenario 2 = 24 F-35As* *Replace 18 F-15Cs*	***McEntire JNGB*** *ANG Scenario 1 = 18 F-35As* *ANG Scenario 2 = 24 F-35As* *Replace 24 F-16s*	***Mountain Home AFB*** *ACC Scenario 1 = 24 F-35As* *ACC Scenario 2 = 48 F-35As* *ACC Scenario 3 = 72 F-35As* *Replace None;* *Based F-15E/F-15SGs Remain*	***Shaw AFB*** *ACC Scenario 1 = 24 F-35As* *ACC Scenario 2 = 48 F-35As* *ACC Scenario 3 = 72 F-35As* *Replace 72 F-16s*
Location in EIS:	**BR3.11**	**HL3.11**	**JX3.11**	**Mc3.11**	**MH3.11**	**SH3.11**
Socioeconomics	**Base:** • Scenario 1 – no net change in military personnel numbers. No change to military payrolls; no impacts to regional employment, income, or regional housing market. • Scenario 2 – increase of 266 military personnel; annual increase in salaries of approximately $3.4 million. • Scenarios 1 and 2 – $2.4 million in expenditures for proposed construction and modification. **Airspace:** • Not applicable.	**Base:** • Scenario 1 – decrease of 1,157 military personnel; annual decrease of $25.9 million in salaries. • Scenario 2 – decrease of 572 military personnel; annual decrease of approximately $12.9 million in salaries. • Scenario 3 – increase of 13 military personnel; annual increase of approximately $0.3 million in salaries. • Scenario 1 –$18.1 million, Scenario 2 –$30.4 million, and Scenario 3 –$40.8 million in proposed construction expenditures. **Airspace:** • Not applicable.	**Base:** • Scenario 1 – no net change in military personnel numbers. No change to military payrolls; no impacts to regional employment, income, or regional housing market. • Scenario 2 – increase of 249 military personnel; annual increase of approximately $3.4 million in salaries. • Scenarios 1 and 2—$0.4 million in proposed modification expenditures. **Airspace:** • Not applicable.	**Base:** • Scenario 1 – decrease of 371 military personnel; decrease of approximately $4.5 million in salaries. • Scenario 2 – no net change in military personnel numbers. No change to military payrolls; no impacts to regional employment, income, or regional housing market. **Airspace:** • Not applicable.	**Base:** • Scenario 1 – increase of 585 military personnel; annual increase of approximately $22.7 million in salaries. Estimated increase of 240 jobs; estimated $10.8 million in labor income. • Scenario 2 – increase of 1,170 military personnel; annual increase of approximately $45.3 million in salaries. Estimated increase of 479 jobs; estimated $21.6 million in labor income. • Scenario 3–increase of 1,755 military personnel; annual increase of approximately $68.0 million in salaries. • Scenario 1 –$16.9 million, Scenario 2 –$36.4 million, and Scenario 3 –$51.5 million in proposed construction expenditures. **Airspace:** • Not applicable.	**Base:** • Scenario 1 – decrease of 1,320 military personnel; annual decrease of approximately $50.0 million in salaries. • Scenario 2 – decrease of 735 military personnel; annual decrease of approximately $27.1 million in salaries. • Scenario 3–decrease of 150 military personnel; annual decrease of approximately $4.3 million in salaries. • Scenario 1–$22.2 million, Scenario 2–$22.3 million, and Scenario 3–$22.5 million in proposed construction expenditures. **Airspace:** • Not applicable.

Table 2-12. Comparative Summary of Environmental Consequences (con't)						
	Burlington AGS ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-16s***	***Hill AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 48 F-16s***	***Jacksonville AGS*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-15Cs***	***McEntire JNGB*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 24 F-16s***	***Mountain Home AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace None;*** ***Based F-15E/F-15SGs Remain***	***Shaw AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 72 F-16s***
Location in EIS:	**BR3.12**	**HL3.12**	**JX3.12**	**Mc3.12**	**MH3.12**	**SH3.12**
Environmental Justice/ Protection of Children	**Base:** • For both scenarios, continued disproportionate effects on low-income individuals would occur. • Under both scenarios, effects on minority populations would decrease relative to proportions around the base, but would remain disproportionate compared to county and state levels. **Airspace:** • No disproportionate impacts related to environmental justice are anticipated, nor would there be any adverse or special health or safety risks to children.	**Base:** • Under Scenarios 1 or 2, no disproportionate effects on minority and low income individuals would occur. • For Scenario 3, slight disproportionate effects on low-income would result, but would still be less than baseline levels. **Airspace:** • No disproportionate impacts related to environmental justice are anticipated, nor would there be any adverse or special health or safety risks to children.	**Base:** • For both scenarios, no disproportionate effects on minority populations and low income individuals would occur. **Airspace:** • No disproportionate impacts related to environmental justice are anticipated, nor would there be any adverse or special health or safety risks to children.	**Base:** • For both scenarios, continued disproportionate effects on minority and low-income individuals would occur. **Airspace:** • When compared to baseline proportional distribution of minority and low-income populations across Richland County, there would be no disproportionate impacts; nor would there be any adverse or special health or safety risks to children.	**Base:** • For all scenarios, no disproportionate effects on minority and low income individuals would occur. **Airspace:** • No disproportionate impacts related to environmental justice are anticipated, nor would there be any adverse or special health or safety risks to children.	**Base:** • For all scenarios, continued disproportionate effects on minority and low-income individuals would occur. **Airspace:** • When compared to baseline proportional distribution of minority and low-income populations across the City of Sumter and Sumter County, there would be no disproportionate impacts; nor would there be any adverse or special health or safety risks to children. • Disproportionate impacts related to environmental justice are anticipated on lands under Gamecock airspace.

Table 2-12. Comparative Summary of Environmental Consequences (con't)						
	Burlington AGS ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-16s***	***Hill AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 48 F-16s***	***Jacksonville AGS*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-15Cs***	***McEntire JNGB*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 24 F-16s***	***Mountain Home AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace None;*** ***Based F-15E/F-15SGs Remain***	***Shaw AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 72 F-16s***
Location in EIS:	**BR3.13**	**HL3.13**	**JX3.13**	**Mc3.13**	**MH3.13**	**SH3.13**
Community Facilities and Public Services	**Base:** • Under Scenario 1, there would be no impacts to community facilities and services. • Under Scenario 2, there would be an increase in demand for potable water, electricity, and natural gas; wastewater and solid waste generation; and education services. **Airspace:** • Not applicable.	**Base:** • For all scenarios, demand for potable water, electricity, and natural gas; wastewater and solid waste generation; and education services would decrease or remain similar to that under baseline conditions. **Airspace:** • Not applicable.	**Base:** • Scenario 1 would result in no change in demand for community facilities and services. • Scenario 2 would result in a 24 percent increase in demand for potable water, electricity, and natural gas; wastewater and solid waste generation; and education services. **Airspace:** • Not applicable.	**Base:** • Under Scenarios 1 and 2, there would be a 24 percent overall decrease and no change, respectively, in the demand for potable water, electricity, and natural gas; wastewater and solid waste generation; and education services. **Airspace:** • Not applicable.	**Base:** • Adequate capacity to accommodate additional growth under all scenarios for potable water, electricity, and natural gas; wastewater and solid waste generation; and education services. **Airspace:** • Not applicable.	**Base:** • Under Scenarios 1, 2, and 3, there would be a decrease in demand for potable water, electricity, and natural gas; wastewater and solid waste generation; and education services **Airspace:** • Not applicable.

Table 2-12. Comparative Summary of Environmental Consequences (con't)						
	Burlington AGS ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-16s***	***Hill AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 48 F-16s***	***Jacksonville AGS*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 18 F-15Cs***	***McEntire JNGB*** ***ANG Scenario 1 = 18 F-35As*** ***ANG Scenario 2 = 24 F-35As*** ***Replace 24 F-16s***	***Mountain Home AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace None;*** ***Based F-15E/F-15SGs Remain***	***Shaw AFB*** ***ACC Scenario 1 = 24 F-35As*** ***ACC Scenario 2 = 48 F-35As*** ***ACC Scenario 3 = 72 F-35As*** ***Replace 72 F-16s***
Location in EIS:	**BR3.14**	**HL3.14**	**JX3.14**	**Mc3.14**	**MH3.14**	**SH3.14**
Ground Traffic and Transportation	**Base:** • Construction traffic could result in negligible short term increases in the use of on-base roadways. • Under Scenario 1, no change in travel demand for the base. • Under Scenario 2, increases in peak period travel demand by 24 percent. • Under Scenario 2, increase in traffic volume would exceed primary Level of Service threshold by 12.2 percent but would not exceed the secondary threshold for capacity. **Airspace:** • Not applicable.	**Base:** • Construction traffic could result in minor short term increases in the use of on-base roadways. • Under Scenarios 1 and 2, vehicle trips to and from the base during morning and evening peak periods would decrease. • No change under Scenario 3. **Airspace:** • Not applicable.	**Base:** • Construction traffic could result in negligible short term increases in the use of some on-base roadways under both scenarios. • Scenario 1 would result in no change in travel demand for the base. • Under Scenario 2, increase in traffic volume would exceed primary Level of Service threshold by 12.2 percent but would not exceed the secondary threshold for capacity. **Airspace:** • Not applicable.	**Base:** • Construction traffic could result in minor short term increases in the use of on-base roadways under both scenarios. • Scenario 1 would reduce peak period travel demand by 24 percent. • Scenario 2 would result in no change in travel demand for the base. **Airspace:** • Not applicable.	**Base:** • Construction traffic could result in minor short term increases in the use of on-base roadways under all scenarios. • Under Scenario 1, increases in traffic volume would exceed primary Level of Service threshold by 1.2 percent but would not exceed the secondary threshold for capacity. • Under Scenario 2, increases in traffic volume would exceed primary Level of Service threshold by 14.2 percent but would not exceed the secondary threshold for capacity. • Under Scenario 3, increases in traffic volume would exceed primary Level of Service threshold by 27.2 percent and would exceed the secondary threshold for capacity by 12.3 percent. **Airspace:** • Not applicable.	**Base:** • Construction traffic could result in minor short term increases in the use of on-base roadways under all scenarios. • Scenario 1 would reduce peak period travel demand by 15 percent. • Scenario 2 would reduce peak period travel demand by 8 percent. • Scenario 3 would decrease peak period travel demand by 2 percent. **Airspace:** • Not applicable.

Table 2-12. Comparative Summary of Environmental Consequences (con't)						
	Burlington AGS *ANG Scenario 1 = 18 F-35As* *ANG Scenario 2 = 24 F-35As* *Replace 18 F-16s*	***Hill AFB*** *ACC Scenario 1 = 24 F-35As* *ACC Scenario 2 = 48 F-35As* *ACC Scenario 3 = 72 F-35As* *Replace 48 F-16s*	***Jacksonville AGS*** *ANG Scenario 1 = 18 F-35As* *ANG Scenario 2 = 24 F-35As* *Replace 18 F-15Cs*	***McEntire JNGB*** *ANG Scenario 1 = 18 F-35As* *ANG Scenario 2 = 24 F-35As* *Replace 24 F-16s*	***Mountain Home AFB*** *ACC Scenario 1 = 24 F-35As* *ACC Scenario 2 = 48 F-35As* *ACC Scenario 3 = 72 F-35As* *Replace None;* *Based F-15E/F-15SGs Remain*	***Shaw AFB*** *ACC Scenario 1 = 24 F-35As* *ACC Scenario 2 = 48 F-35As* *ACC Scenario 3 = 72 F-35As* *Replace 72 F-16s*
Location in EIS:	**BR3.15**	**HL3.15**	**JX3.15**	**Mc3.15**	**MH3.15**	**SH3.15**
Hazardous Materials and Waste	**Base:** • Quantities and types of hazardous materials needed for maintenance would be less than those currently generated by maintaining F-16 and F-15 aircraft. • Operations involving hydrazine, cadmium, and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced for the F-35A. • Any structures proposed for upgrade or retrofit would be inspected for ACM and LBP according to established procedures. • Neither upgrades to existing facilities nor future operations are expected to affect known ERP locations. **Airspace:** • Not applicable.	**Base:** • Quantities and types of hazardous materials needed for maintenance would be less than those currently generated by maintaining F-16 and F-15 aircraft. • Operations involving hydrazine, cadmium, and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced for the F-35A. • Any structures proposed for upgrade or retrofit would be inspected for ACM and LBP according to established procedures. • Neither upgrades to existing facilities nor future operations are expected to affect known ERP locations. **Airspace:** • Not applicable.	**Base:** • Quantities and types of hazardous materials needed for maintenance would be less than those currently generated by maintaining F-16 and F-15 aircraft. • Operations involving cadmium, and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced for the F-35A. • Any structures proposed for upgrade or retrofit would be inspected for ACM and LBP according to established procedures. • Neither upgrades to existing facilities nor future operations are expected to affect known ERP locations. **Airspace:** • Not applicable.	**Base:** • Quantities and types of hazardous materials needed for maintenance would be less than those currently generated by maintaining F-16 and F-15 aircraft. • Operations involving hydrazine, cadmium, and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced for the F-35A. • Any structures proposed for upgrade or retrofit would be inspected for ACM and LBP according to established procedures. • Neither upgrades to existing facilities nor future operations are expected to affect known ERP locations. **Airspace:** • Not applicable.	**Base:** • Aircraft maintenance activities would increase and, therefore, use of hazardous material quantities would also rise. • The overall waste streams are expected to increase over the amounts currently generated due to the overall increase of number of aircraft. • Any structures proposed for upgrade or retrofit would be inspected for ACM and LBP according to established procedures. • Neither upgrades to existing facilities nor future operations are expected to affect active ERP locations. **Airspace:** • Not applicable.	**Base:** • Quantities and types of hazardous materials needed for maintenance would be less than those currently generated by maintaining F-16 and F-15 aircraft. • Operations involving hydrazine, cadmium, and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced for the F-35A. • Any structures proposed for upgrade or retrofit would be inspected for ACM and LBP according to established procedures. • Neither upgrades to existing facilities nor future operations are expected to affect known ERP locations. **Airspace:** • Not applicable.

2.4 Differences Between the Draft EIS and Final EIS

Following the Draft EIS, a Revised Draft EIS was published which included factual corrections, additional and/or supplemental information, and improvements or modifications to the analyses presented in the Draft EIS. The re-analysis included noise impacts to low-income and minority populations based on updated census data (not available when the 2012 Draft EIS was published) in the noise sections for each base (XX3.2) and environmental justice/protection of children (XX3.12) sections; inserting documents incorporated by reference below at Section 2.5 and in base-specific sections XX2.7; adding a mitigation measures at Section 2.6 below and in each base section at XX2.8; correcting typographical and grammatical errors, as needed; correcting mapping and labeling mistakes in text and figures throughout; inserting new or revised information, where applicable; and including responses to comments received during the Draft EIS public review period in Volume II, Appendix E.

In this Final EIS, several changes were made and include the following:

- In Chapter 3, Section 3.5, Figure 3-2 was revised to correctly portray the DoD clear zone as a square and Table 3-5 was added with F-16 and F-15 historic mishap data.
- Where applicable, Section XX2.4 (for each basing location) and Appendix B were updated to reflect current status of agency and government-to-government consultations.
- Section BR2.5.2 was revised to clarify the type and number of comments received in response to the Draft EIS and Section BR2.5.3 was added to summarize comments received following Revised Draft EIS publication.
- Included an additional school in the noise assessment associated with Burlington AGS (Section BR3.2).
- Throughout the document, corrected typographical and grammatical errors in the text.
- Responded to comments on the Revised Draft EIS in Volume II, updated Appendix E.

2.5 Documents Incorporated by Reference

In accordance with CEQ regulations for implementing NEPA and with the intent of reducing the size of this document, the following material relevant to the proposed action at the alternative locations and basing scenarios is incorporated by reference and identified according to the alternative location and topic. These documents are part of the administrative record and are available upon request from the Air Combat Command NEPA Program Manager or via the Internet at: http://www.accplanning.org.

2.5.1 Burlington AGS

Sustainable Ranges Report to Congress, Department of Defense (DoD 2012). Report published in April 2012. A report to Congress on the sustainability of all DoD ranges describing the training requirements and the existing range resources to meet these requirements.

Atlantic Fleet Active Sonar Training (Navy 2012). Draft Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS). Published in May 2012. Documentation for aircraft and naval operations in all East Coast overwater Warning Areas are evaluated.

Modification of Condor 1 and Condor 2 Military Operations Areas (MOA) Draft EIS (Air National Guard 2009). Published in August 2009 (no Final EIS has been published). EIS proposing to lower and modify Condor 1 and 2 MOAs and includes descriptions of aircraft operations. To date, no Final EIS or record of decision has been published.

Modification and Establishment of Restricted Areas and Other Special Use Airspace, Adirondack Airspace Complex, Fort Drum, NY (Federal Register 2008). FAA Notification on September 26, 2008 in the Federal Register establishing Adirondack Airspace Complex consisting of the elements of the Viper Complex: Adirondack A/B/C/D, Carthage East/West, Cranberry, Lowville, and Tupper East/West MOAs; Restricted Airspace R-5201 and R-5202 B; and overlying ATCAAs.

Proposed New York Air National Guard Adirondack Range Airspace Modifications Final EA and Finding of No Significant Impact (Air National Guard 2004). Published in September 2004. Document presenting modifications of the airspace and operations therein.

2.5.2 Hill AFB

Sustainable Ranges Report to Congress, Department of Defense (DoD 2012). Report published in April 2012. A report to Congress on the sustainability of all DoD ranges describing the training requirements and the existing range resources to meet these requirements.

Proposed White Elk Military Operations Area Final EIS (Air Force 2011a). Published in April 2011. Document presenting modifications to airspace associated with Utah Test and Training Range (UTTR) and aircraft operations. Airspace includes the Restricted Airspace: R-6402A/B, R-6404A/B/C/D, R-6406A/B, Lucin A/B/C MOAs, Sevier A/B/C MOAs, Gandy MOA, Gandy Air Traffic Control Assigned Airspace (ATCAA), and Currie/Tippet ATCAA. Ranges include UTTR North and South.

F-35 Follow-On Development Evaluation and Weapons School Beddown (Air Force 2011b). Final EIS published April 2011. Documentation presenting aircraft operations in MOAs/ATCAAs/ Restricted Airspace and air-to-ground range activities within Nevada Test and Training Range (NTTR).

Provide Additional Capabilities at the UTTR EA (Air Force 2007a). Published in April 2007. Documentation of aircraft operations in UTTR associated airspace and range activities.

Proposed Multiple Target TS-5, UTTR-South Final EA (Air Force 2000a). Published in February 2000. Documentation associated with UTTR range activities.

Cruise Missile Test Operations at the Utah Test and Training Range Final EA (Air Force 2000b). Published in September 2000. Documentation associated with UTTR range activities.

Renewal of the Nellis Air Force Range Land Withdrawal Legislative Final EIS (Air Force 1999a). Published in March 1999. Documentation presenting aircraft operations in MOAs/ATCAAs/Restricted Airspace, air-to-ground range activities, range maintenance, and ground-based operations.

Noise and Supersonic Effects at the Utah Test and Training Final EA (Air Force 1999b). Published in November 1999. Documentation associated with aircraft operations in UTTR associated airspace.

2.5.3 Jacksonville AGS, McEntire JNGB, and Shaw AFB

Proposed Modernization and Expansion of Townsend Bombing Range (TBR) (USMC 2013). Final EIS published in March 2013. Documentation to expand TBR to accommodate weapons drop zones for multiple weapon systems at the range and in associated restricted airspace and MOAs. Airspace includes the Coastal 1/2 MOAs, Restricted Airspace R-3007A/B/C/D, and overlying ATCAAs.

Sustainable Ranges Report to Congress, Department of Defense (DoD 2012). April 2012. A report to Congress on the sustainability of all DoD ranges describing the training requirements and the existing range resources to meet these requirements.

Atlantic Fleet Active Sonar Training (Navy 2012). EIS/OEIS published in May 2012. Documentation for aircraft and naval operations in all East Coast overwater Warning Areas are evaluated.

Renewal Authorization to Use Pinecastle Range, Ocala National Forest (Navy 2010). Final Supplemental EIS and Record of Decision. June and October 2010, respectively. Documentation presenting aircraft operations and range activities within the Pinecastle Bombing Range.

U.S. Marine Corps East Coast F-35B Basing (USMC 2010). Final EIS and Record of Decision published in October and December 2010, respectively. Documentation addressing F-35B operations (as well as existing aircraft) in overland and overwater airspace as well as at ranges in Georgia, North Carolina, and South Carolina. Airspace includes overwater Warning Areas off the coasts of Virginia, North/South Carolina, Georgia, and Florida; Coastal 1/2/4/5 and Core MOAs; Restricted Airspace R-3007A/B/C/D, and R-3606A; and overlying ATCAAs. Operations at the Dare County and Townsend Bombing Ranges were also evaluated.

Airspace Training Initiative Final EIS (Air Force 2010). Published in June 2010. Documentation associated with airspace operations in the Bull Dog, Gamecock, Poinsett Military Operations Areas, Poinsett Range, and associated restricted airspace. Includes introduction of ground-based electronic threat emitters and chaff and flare deployment.

Navy Cherry Point Range Complex Final EIS/OEIS (Navy 2009a). Record of Decision signed June 2009. Documentation for aircraft and naval operations in overwater Warning Areas adjacent to North Carolina.

Jacksonville Range Complex Final EIS/OEIS (Navy 2009b). Record of Decision signed June 2009. Documentation for aircraft and naval operations in overwater Warning Areas adjacent to the east coasts of Florida, Georgia, as well as South and North Carolina.

Navy Undersea Warfare Training Range (Navy 2009c). Record of Decision signed July 2009. Documentation for aircraft and naval operations in overwater Warning Areas adjacent to the east coasts of Florida, Georgia, as well as South and North Carolina.

Proposed Navy Air-to-Ground Training at Avon Park Air Force Range, FL Final EIS (Navy 2006). Record of Decision signed in August 2006. Documentation associated with aircraft operations, airspace (Avon North/South/East/Hi/Ultra Hi, Basinger, Lake Placid, and Marian MOAs; Restricted Airspace R-2901A/B/C/D/E/F/G/H/I; and overlying ATCAAs), and range activities at Avon Park Air Force Range.

Modifications to Gamecock Alpha Military Operations Area EA (Air Force 2006). Finding of No Significant Impacts signed June 2006. Documentation for airspace modification to Gamecock MOAs and airspace operations.

Shaw AFB Chaff and Flare Final EA (Air Force 2003). Published in December 2003. Evaluation of impacts associated with chaff and flare deployment in the Bulldog and Gamecock MOAs.

2.5.4 Mountain Home AFB

Sustainable Ranges Report to Congress, Department of Defense (DoD 2012). Report published in April 2012. A report to Congress on the sustainability of all DoD ranges describing the training requirements and the existing range resources to meet these requirements.

F-35A Training Basing Final EIS (Air Force 2012a). Published in January 2012. Documentation for all airspace (Jarbidge North/South, Owyhee North/South, Paradise North/South, and Saddle A/B MOAs, Restricted Airspace R-3202 and R-3204A/B; and overlying ATCAAs) and Juniper Butte and Saylor Creek Ranges activities that proposed for use by the F-35A training units.

Proposed Royal Saudi Air Force F-15SA Beddown Final EA (Air Force 2012b). Published August 2012. Documentation of additional aircraft operations in the airspace and at the ranges. Documentation for all airspace (Jarbidge North/South, Owyhee North/South, Paradise North/South, and Saddle A/B MOAs; Restricted Airspace R-3202 and R-3204A/B; and overlying ATCAAs) and Juniper Butte and Saylor Creek Ranges activities that proposed for use by the Royal Saudi Air Force.

Republic of Singapore Air Force F-15SG Beddown Final EA (Air Force 2007b). Published in March 2007. Documentation for all airspace (Jarbidge North/South, Owyhee North/South, Paradise North/South, and Saddle A/B MOAs; Restricted Airspace R-3202 and R-3204A/B; and overlying ATCAAs) and Juniper Butte and Saylor Creek Ranges activities that proposed for use by the Royal Saudi Air Force.

Enhanced Training in Idaho Final EIS (Air Force 1998a). Published in January 1998. Documentation establishing the 12,000-acre Juniper Butte Tactical Training Range, no-drop targets, and electronic emitter sites as well as modifications to overlying airspace throughout out southwest Idaho.

2.6 Mitigation Measures

Mitigation measures avoid, minimize, remediate, or compensate for environmental impact. The CEQ regulations (40 CFR 1508.20) define mitigation to include:

1. **Avoiding** the impact altogether by not taking a certain action or parts of an action;
2. **Minimizing** impacts by limiting the degree or magnitude of the action and its implementation;
3. **Rectifying** the impact by repairing, rehabilitating, or restoring the affected environment;
4. **Reducing or eliminating** the impact over time by preservation and maintenance operations during the lifetime of the action; or
5. **Compensating** for the impact by replacing or providing substitute resources or environments.

Avoiding, minimizing, or reducing potential impacts has been a priority guiding the development of F-35A basing alternatives and aircraft number scenarios. Mitigation measures are built or designed into the proposed action and alternatives; applied to construction, operation, or maintenance involved in the action; or implemented as compensatory measures. For instance, under the Burlington AGS basing scenarios, the Air Force's proposal incorporated mitigation measures for aircraft flight at and around Burlington IAP. These include restrictions outlined in the Burlington Noise Compatibility Program Update where F-35As would maintain quiet hours, keep within the specified arrival and departure routes and procedures, as well as ensure that single F-35A flights are flown out of the airport as opposed to simultaneous (or formation) takeoffs. Specific mitigation measures (where applicable) are presented in each of the base specific discussions at XX2.8. Following publication of the ROD, a mitigation plan will be prepared in accordance with 32 CFR 989.22(d). The mitigation plan will address specific mitigations identified and agreed to during the environmental process.

2.6.1 Measures Adopted to Reduce the Potential for Environmental Impacts

The following describes general mitigation and management measures incorporated into the overall design of the F-35A operations beddown proposal regardless of the location alternative or basing scenario. These measures include continuation of on-going operational restrictions and avoidance measures and are summarized below, and listed according to specific resources.

- Continue close coordination with the FAA Air Route Traffic Control Centers (ARTCC), Air Traffic Control (ATC), and other FAA entities to minimize conflicts with civil and commercial aviation.
- Avoid, using standard procedures, airports and airfields underlying military airspace as prescribed in Chapters 3 (Airspace), 4 (Air Traffic Control), 5 (Air Traffic Procedures), 6 (Emergency Procedures), and 7 (Safety of Flight) of the FAA Aeronautical Information Manual (available at: http://www.faa.gov/atpubs).
- Continue to adhere to all existing FAA (14 CFR Part 91.119) and local avoidance procedures (available through Notice to Airmen [https://pilotweb.nas.faa.gov/PilotWeb/], Flight Information Program Charts [https://www.aviation.dla.mil/rmf/programs_flip.htm], and for each airport via the Internet at: http://www.airnav.com/airport), flight restrictions, scheduling adjustments, and other practices designed to reduce aircraft noise and overflights.
- Utilize advanced simulators for training to the extent practicable.

- Avoid, to the extent practicable:
  - identified seasonally sensitive American Indian ceremonies or other seasonal activities;
  - low-altitude (below 5,000 feet AGL) overflights of identified seasonally sensitive ranching and recreation activities; and
  - low-altitude overflights (below 5,000 feet AGL) on holidays.
- Prepare a follow-up to the analysis in this EIS with a subsequent noise evaluation at the selected base(s) to validate the operational profiles and noise levels, and address those results through the AICUZ program. Once the F-35A is operating at the selected base(s), the pilots will have either consistently flown the operational profiles defined in this EIS or modified them to accommodate the unique qualities of the F-35A. At that time, the Air Force proposes to acquire actual F-35A acoustical data to validate the proposed impacts in an appropriate noise study under AICUZ. Furthermore, the Air Force commits to working with the affected communities per the AICUZ guidelines.
- Sequence construction activities to limit the soil exposure for long periods of time.
- Employ fugitive dust control and soil retention practices including:
  - Use water trucks or sprinkler systems to keep all areas of vehicle movement damp enough to prevent dust from leaving the construction area.
  - Minimize traffic speeds on all unpaved roads.
  - Install gravel pads at construction area access points to prevent tracking of soil onto paved roads.
  - Provide temporary wind fencing around sites being graded or cleared.
  - Suspend all soil disturbance activities when winds exceed 25 miles per hour or when visible dust plumes emanate from the site.
  - Cover truck loads that haul dirt, sand, or gravel.
  - After completion of clearing, grading, earthmoving, or excavation, treat the disturbed areas by watering, re-vegetation, or by spreading non-toxic soil binders until they are paved or otherwise developed to prevent dust generation.
  - Designate personnel to monitor the dust control program and to order increased watering, as necessary, to prevent the transport of dust off-site. Store chemicals, cements, solvents, paints, or other potential water pollutants in locations where they cannot cause runoff pollution.
- Employ, where feasible, construction equipment emission control measures, including:
  - Maintain equipment according to manufacturer specifications.
  - Restrict idling of equipment and trucks to a maximum of five minutes at any location.
  - Employ diesel oxidation catalysts and/or catalyzed diesel particulate traps.
  - Use electricity from power poles rather than temporary diesel- or gasoline-powered generators.
  - Provide temporary traffic control, such as a flag person, during all phases of construction to maintain smooth traffic flow.

  - Keep construction equipment and equipment staging areas away from sensitive receptor areas (such as day care centers).
  - Re-route construction trucks away from congested streets or sensitive receptor areas.
  - Use construction equipment with engines that meet USEPA Tier 3 and 4 nonroad standards.
  - Use alternatively-fueled construction equipment, such as compressed natural gas, liquefied natural gas, or electric.
- Incorporate Leadership in Energy and Environmental Design and sustainable development concepts into construction projects to achieve optimum resource efficiency, sustainability, and energy conservation.
- Develop F-35A- and location-specific emergency fuel dumping procedures based on current F-15 procedures.
- Manage on-site stormwater to prevent discharges into nearby surface waters through site planning with low-impact design principles and engineered storm water retention ponds (or swales).
- Update, as needed, Storm Water Pollution Prevention Plans (SWPPPs).
- Avoid spreading invasive nonnative species; preclude vehicles from driving in areas with known invasive nonnative species problems.
- Perform any repairs, maintenance, and use of construction equipment (i.e., cement mixers) in designated "staging areas" designed to contain any chemicals, solvents, or toxins from entering surface waters.
- Incorporate into the design and construction of paved surface areas a slope sufficient enough to direct potential runoff away from wetland areas.
- Conduct Section 106 consultation at Hill AFB to ensure minimization of effects to Building 5.
- Conduct government-to-government consultation with American Indian tribes for Hill AFB and Mountain Home AFB to minimize impacts from noise.
- Continue and enhance recycling and reuse programs to accommodate waste generated by the F-35A beddown.
- Continue to work with Burlington IAP and City of South Burlington to support purchase and relocation through the Part 150 process and to assess noise abatement measures.
- Continue to follow established procedures for managing hazardous materials and wastes.

2.6.2 Unavoidable Impacts

Certain F-35A beddown activities are projected to result in disturbance and/or noise within areas not previously or recently subjected to these effects. Some of these noise effects could be considered adverse or annoying to potentially affected individuals.

Resource Definition and Methodology

Chapter 3

How to Use This Document

Our goal is to give you a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the no-action alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement, or EIS, is shown below.

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

OVERALL PROPOSAL VOLUME I

PREFACE
Detailed Guide for Reading the Final EIS

CHAPTER 1
Purpose and Need for the Air Force F-35A Operational Beddown

CHAPTER 2
- Overview of the Proposed Action and Alternatives
- Alternative Identification Process
- Summary Comparison of the Proposed Action and Alternatives

CHAPTER 3
Resource Definition and Methodology

INFORMATION SPECIFIC TO EACH BASE VOLUME I

CHAPTER 4
Six Base-Specific Sections

Burlington AGS	Hill AFB	Jacksonville AGS	McEntire JNGB	Mountain Home AFB	Shaw AFB
Section BR1.0 Proposed Action Overview	**Section HL1.0** Proposed Action Overview	**Section JX1.0** Proposed Action Overview	**Section Mc1.0** Proposed Action Overview	**Section MH1.0** Proposed Action Overview	**Section SH1.0** Proposed Action Overview
Section BR2.0 Base-Specific Project Details	**Section HL2.0** Base-Specific Project Details	**Section JX2.0** Base-Specific Project Details	**Section Mc2.0** Base-Specific Project Details	**Section MH2.0** Base-Specific Project Details	**Section SH2.0** Base-Specific Project Details
Section BR3.0 Affected Environment and Environmental Consequences	**Section HL3.0** Affected Environment and Environmental Consequences	**Section JX3.0** Affected Environment and Environmental Consequences	**Section Mc3.0** Affected Environment and Environmental Consequences	**Section MH3.0** Affected Environment and Environmental Consequences	**Section SH3.0** Affected Environment and Environmental Consequences
Section BR4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section HL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section JX4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section Mc4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section SH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

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Appendix C – Noise Modeling and Airspace Operations
Appendix D – Air Quality
Appendix E – Revised Draft EIS Public Comments and Responses

3.0 RESOURCE DEFINITION AND METHODOLOGY

3.1 Introduction

3.1.1 Analytical Approach

NEPA requires focused analysis of the areas and resources potentially affected by an action or alternative. It also provides that a NEPA document should consider, but not analyze in detail, those areas or resources *not* potentially affected by the proposal. Therefore, a NEPA document should not be encyclopedic; rather, it should be succinct and to the point. Both description and analysis in an EIS should provide sufficient detail and depth to ensure that the agency (i.e., Air Force) took a critical look at all resources potentially impacted by an action. NEPA also requires a comparative analysis that allows decision-makers and the public to differentiate among the alternatives.

CEQ regulations (40 CFR §§ 1500-1508) require an EIS to discuss impacts in proportion to their potential magnitude and to present only enough discussion of peripheral issues as necessary to demonstrate why more study is not warranted. The analysis in this EIS considers the baseline conditions of the affected environment and compares those to conditions that might occur should the Air Force implement any of the action alternatives or no-action alternative.

The proposed action includes components potentially affecting Burlington AGS, Hill AFB, Jacksonville AGS, McEntire JNGB, Mountain Home AFB, and/or Shaw AFB as well as their surrounding environs. Existing training airspace and ranges proposed for use by F-35A aircraft also form part of the affected environment. Only certain components of the proposed action have the potential to affect resources in the airspace or at the ranges. For example, the aircraft transition and personnel changes would not generate any impacts in the airspace. While this EIS considers all resource topics for each discrete geographic area and its relationship to each component of the proposed action, it emphasizes those resources affected by the proposed action and only briefly mentions those not so affected.

3.1.2 Definition of No-Action Conditions[1]

Conditions under the no-action alternative provide a benchmark against which an agency measures the potential impacts of the proposed action and alternatives. Differences in the conditions between no action and the proposed action and alternatives reflect the magnitude of impacts relative to the various resources analyzed. As such, the NEPA document must define no-action conditions and timing of the action.

Establishing no-action conditions is based on three factors: 1) the timing of the various components of the proposed action; 2) the timing of other scheduled and approved actions; and 3) continuity with previous NEPA documentation. As defined in Chapter 2, the different components of the proposed action (e.g., aircraft transition, construction, operations, and personnel changes) would start at different times for the alternative locations. Beddown for the F-35A would be accomplished over a 5-year period,

[1] Throughout this document the terms “no-action” and “baseline” are used interchangeably.

2015 through 2020. Delivery of the first F-35As could be as early as 2015 and is scheduled to be completed by the end of 2020, when the full complement of F-35A aircraft could be at the selected base(s). Construction would begin in sufficient time to prepare for the arrival of the first aircraft. Therefore, since the proposed action would not begin at any location until a ROD is signed (estimated 2013), the baseline/no-action employed for this EIS consists of the conditions reasonably foreseeable at that time. Such conditions would include actions already authorized but exclude those not yet authorized but may be under analysis in separate NEPA documentation. For example, modifications to training airspace associated with Mountain Home AFB have been assessed under NEPA and approved by the FAA. During the environmental impact analysis process for this F-35A beddown, these airspace modifications affected the distribution of operations by existing aircraft at the base and influenced associated environmental conditions. The Revised Draft EIS incorporated these modifications and analyzed their potential environmental effects on the reasonable assumption the proposals would be charted by the FAA. Since that time, FAA has implemented the modifications and the existing aircraft are using the reconfigured airspace irrespective of any decisions about basing the F-35A. Therefore, no-action conditions must reflect expected patterns and distribution in the changed airspace.

All analysis, especially airspace operations, safety, noise, and air quality, reflects the inventory and operations of aircraft existing at or authorized by 2011. As noted previously, the respective inventories of F-16 aircraft represents no-action conditions at Burlington AGS, Hill AFB, McEntire JNGB, and Shaw AFB; at Jacksonville AGS, F-15Cs comprise the no-action aircraft, whereas F-15E/F-15SG aircraft reflect no-action conditions at Mountain Home AFB. Discussion of particular assumptions and methodologies defining the no action for relevant resources is presented, as necessary, within each base section in Chapter 4.

3.1.3 Scope of Analysis

Scope of analysis for this EIS refers to both the geographic and analytical extent addressed herein. Geographically, the scope centers on two distinct areas for each alternative location, the base and the airspace. For a base, the general geographic scope includes the area within the boundaries of the military facility as well as lands and communities surrounding that facility. However, this scope varies per resource due to the nature of the resource and the extent affected by direct and indirect impacts. For example, the geographic scope for noise and land use encompasses all areas under the noise contours of 65 dB DNL or greater. In contrast, the effects to socioeconomics commonly extend well beyond these contours to include entire counties associated with an installation. In another example, effects to hazardous materials and waste would, under normal circumstances, remain confined within the boundaries of the installation. At the most basic level, the geographic scope for the airspace includes those areas underlying the horizontal limits of the airspace.

In accordance with NEPA, detailed analysis should focus on those areas and resources where the proposed action or alternatives have the potential to alter conditions negatively or positively. Conversely, areas where such impacts would not occur do not warrant detailed analysis. For the areas under the airspace, the sources of potential direct or indirect impacts consist of aircraft overflights and associated noise. Review of the number of no action and proposed operations, altitudes flown by the current fighter aircraft and the F-35A, underlying resources, and expected changes to the noise environment, led to further refinement of the scope for detailed analysis of the airspace. For Hill AFB and Mountain Home AFB, the scope of analysis encompassed all area under the defined airspace units associated with those bases (refer to Table 2-7). However, the scope for Burlington AGS, Jacksonville AGS, McEntire JNGB, and Shaw AFB required refinement to exclude the overwater Warning Areas, SOAs, and minimally used other airspace units from further detailed analysis. For the Warning Areas (W-102, W-105, W-122, W-134, W-157A, W-158A, W-159A, W-161, W-177 and associated Strike Out ALTRV), the factors supporting their exclusion from further analysis include: 1) all overlie the ocean, extending several miles away from the shore; 2) no communities or populations underlie the airspace; 3) previous analysis of Warning Areas, in general, and several of these specific Warning Areas (W-122, W-134, W-157A, W-158A, and W-177) (Air Force 2001) demonstrated that operations generate low noise levels of 45 dB DNL or less[2]; 4) proposed operations in the Warning Areas would decrease below no-action levels with the removal of F-16 and F-15 aircraft; 5) the F-35As would fly at much higher average altitudes than current fighter aircraft (refer to Table 2-9); 6) supersonic flight events would occur 15 nm offshore and commonly at altitudes above 30,000 feet MSL; and 7) noise levels with F-35A operations would remain at 45 dB DNL or lower. For these reasons, the proposed action at any of the alternative locations would have no effect on marine mammals.

The same factors apply to the SOA which consists of Warning Areas and Strike Out ALTRV. Although the MAEWR includes restricted airspace (R-5306) and MOAs (Pamlico or Hatteras) that overlie land, W-122 comprises the more than 95 percent of the airspace. Under both no action and proposed conditions, use of these Restricted Areas and MOAs by F-16, F-15, or F-35A aircraft would be minimal (10 to 20 operations per year). As such, the SOA warrants exclusion from further detailed analysis.

Three other sets of airspace units, Avon Park, Dare County, and the Fox VOA, would receive a negligible proportion of their total use (less than 1 percent to 4.2 percent) from the F-35As. With elimination of operations by existing fighter aircraft, total operations would also decrease. For these reasons, the proposed action would not measurably alter noise and other related conditions in these airspace units and they require no further detailed analysis in this EIS.

3.1.4 Organization of this Chapter

Since the affected area consists of six distinct locations – Burlington AGS, Hill AFB, Jacksonville AGS, McEntire JNGB, Mountain Home AFB, and Shaw AFB, and their associated airspace and ranges – this EIS presents descriptions of baseline conditions and potential impacts for the alternative locations under each scenario in the Chapter 3 subsections of each location: BR3, HL3, JX3, Mc3, MH3, and SH3. However, the basic background, definition of the resource, and analytical approach for the resources would remain the same for all six locations. Therefore, to prevent redundancy, the EIS captures all that

[2]Noise levels of 45 dB DNL or less are considered indistinguishable from ambient outdoor noise levels. Surface ocean noise levels under calm conditions and without other noise generating sources, are approximately 45 dB (Discovery of Sound in the Sea [DOSITS] 2010). Winds and associated changes in waves produce higher noise levels.

information in this chapter. For each resource area, this chapter describes the definition of the resource, and analytical methodology used for assessing impacts. Resources discussed in the following section include:

- Airspace Management and Use
- Noise
- Air Quality
- Safety
- Geology, Soils, and Water
- Terrestrial Communities (Wildlife and Vegetation)
- Wetlands and Freshwater Aquatic Communities
- Threatened, Endangered, and Special Status Species/Communities
- Cultural and Traditional Resources
- Land Use
- Socioeconomics
- Environmental Justice/Protection of Children
- Community Facilities and Public Services
- Ground Traffic and Transportation
- Hazardous Materials and Waste

3.2 Airspace Management and Use

3.2.1 Definition of Resource

The airspace management and use section addresses the airfields at the bases, surrounding airspace, civilian airfields, military airspace, and other components of the National Airspace System. Issues associated with the proposed action focus on the management and use of that system.

Airspace management is defined as the direction, control, and handling of flight operations in the "navigable airspace" that overlies the geopolitical borders of the U.S. and its territories. "Navigable airspace" is airspace above the minimum altitudes of flight prescribed by regulations under U.S. Code (USC) Title 49, Subtitle VII, Part A, and includes airspace needed to ensure safety in the take-off and landing of aircraft (49 USC § 40102). Congress has charged the FAA with responsibility for managing airspace as well as developing plans and policy for the use of the navigable airspace and assigning by regulation or order the use of the airspace necessary to ensure the safety of aircraft and its efficient use (49 USC § 40103[b]; FAA Order JO7400.2G 2008). SUA, which is identified for military and other governmental activities, is charted and published by the National Aeronautical Charting Office in accordance with FAA Order JO7400.2G and other applicable regulations and orders. Management of this resource considers how airspace is designated, used, and administered to best accommodate the individual and common needs of military, commercial, and general aviation. The FAA considers multiple and sometimes competing demands for aviation airspace in relation to airport operations, Federal Airways, Jet Routes, military flight training activities, and other special needs to determine how the National Airspace System can best be structured to address all user requirements. Specific rules and regulations concerning airspace designation and management are listed in FAA Order JO7400.2G.

There are two categories of airspace or airspace areas, regulatory and non-regulatory. Within these two categories, there are four types of airspace, Controlled, Special Use, Other, and Uncontrolled airspace. *Controlled airspace* is airspace of defined dimensions within which air traffic control service is provided to Instrument Flight Rule flights and to Visual Flight Rule flights in accordance with the airspace classification (FAA 2008). Controlled airspace is categorized into five separate classes: Classes A through E (Figure 3-1). These classes identify airspace that is controlled, airspace supporting airport operations, and designated airways affording *en route* transit from place-to-place. The classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace. *Uncontrolled airspace* is designated Class G airspace.

SUA is airspace of defined dimensions wherein activities must be confined because of their nature, or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. The types of SUA are Prohibited Areas, Restricted Areas, MOAs, Warning Areas, Alert Areas, and Controlled Firing Areas.

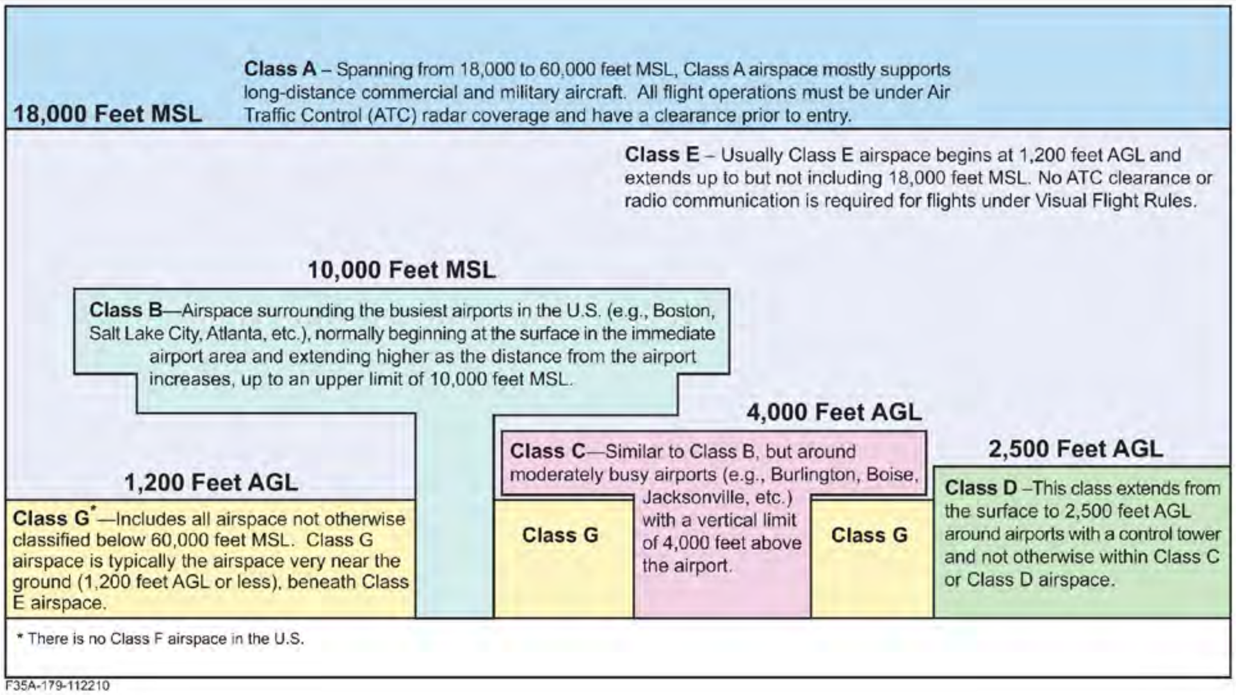

Figure 3-1. Cross Section of Airspace Classes and their Relationships

Other airspace areas includes advisory areas, temporary flight limitations, areas designated for parachute jump operations, Military Training Routes (MTRs), Aerial Refueling Tracks, National Security Areas, and ATCAAs. When not required for other needs, an ATCAA can extend the vertical boundary of training airspace (e.g., a MOA) as authorized for military use by the controlling ARTCC.

When flying, pilots comply with FAA avoidance regulations (Section 91.119). Aircraft must avoid congested areas of a city, town, or settlement or any open-air assembly of people by 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft. Outside congested areas, aircraft must avoid persons, vessels, vehicles, or structures by 500 feet.

3.2.2 Analysis Methodology

Management of military training ranges and airspace focuses on ensuring safe, effective, and efficient operations, while balancing the military's need to accomplish realistic training and testing with the need to minimize potential impacts of such activities on the environment and surrounding communities.

Analysis in this EIS considered these competing factors as a means to assess the nature and magnitude of impacts.

This EIS describes the existing operations at Burlington AGS, Hill AFB, Jacksonville AGS, McEntire JNGB, Mountain Home AFB, and Shaw AFB and in the associated airspace the F-35A would use in proposed operational training. Further, the EIS evaluates changes that could occur with the introduction of the new aircraft. The most up-to-date data were used for this latest generation of advanced fighter aircraft; however, there are limitations to the extent of data since this aircraft is new to the fleet and still in the manufacturing and testing phase of the program.

The assessment of airfield and airspace use and management discusses how the no-action and action alternatives would affect civil, commercial, and military air traffic within the airspace of each alternative airfield, and training airspace proposed for use by the F-35A. Since no modifications or additions are proposed for the current airspace structure the impact analysis focuses on changes in use that would result from the addition or loss of annual airfield and airspace operations with the arrival of the F-35A and departure of current fighter aircraft at all but one base (i.e., Mountain Home AFB).

Impacts on air traffic were assessed with respect to the potential for disruption of air traffic patterns and systems, and changes in existing levels of air traffic safety. Factors used to assess the impacts of the proposed beddown on air traffic include consideration of an alternative's potential to result in an increased number of flights such that they could not be accommodated within established operational procedures and flight patterns; a requirement for an airspace modification; or an increase in air traffic that might increase collision potential between military and non-participating civilian operations. In addition, the analysis evaluated the potential for conflicts with civil aviation and underlying airfields.

3.3 Noise

3.3.1 Definition of Resource

Many components of the proposed beddown action may generate noise and warrant analysis within this EIS. The predominant noise sources consist of aircraft operations, both at and around the installations, as well as in the airspace and on ranges. Other components such as construction, aircraft ground support equipment for maintenance purposes, and vehicle traffic would produce noise, but such noise would be transitory and contribute negligibly to the overall noise environment.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water, and are sensed by the human ear. Sound is all around us. Noise is generally described as unwanted sound. Unwanted sound can be based on objective effects (such as hearing loss or damage to structures) or subjective judgments (community annoyance). Noise analysis thus requires assessing a combination of physical measurement of sound, physical and physiological effects, plus psycho- and socio-acoustic effects. The response of different individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of the noise, its appropriateness in the setting, the time of day, the type of activity during which the noise occurs, and the sensitivity of the individual. Noise may also affect wildlife through disruption of nesting, foraging, migration, and other life-cycle activities. Appendix C presents further detail on noise effects, metrics, modeling, and related information.

Noise and sound are expressed in logarithmic units of dB. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions (refer to Appendix C). Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 to 140 dB are felt as pain (Berglund and Lindvall 1995). The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. On average, a person perceives a doubling (or halving) of the sound's loudness when there is a 10-dB change in sound level.

All sounds have a spectral content, which means their magnitude or level changes with frequency, where frequency is measured in cycles per second or hertz (Hz). To mimic the human ear's non-linear sensitivity and perception of different frequencies of sound, the spectral content is weighted. For example, environmental noise measurements usually employ an "A-weighted" scale that filters out very low and very high frequencies in order to replicate human sensitivity. It is common to add the "A" to the measurement unit in order to identify that the measurement has been made with this filtering process (dBA). In this document, the dB unit refers to A-weighted sound levels. "C-weighting" is typically applied to impulsive sounds such as a sonic boom or ordnance detonation and is denoted by the units "dBC."

In accordance with DoD guidelines and standard practice for environmental impact analysis documents, the noise analysis herein utilizes the following (A-weighted) noise descriptors or metrics: Maximum Sound Level (L_{max}), Sound Exposure Level (SEL), DNL, and Onset-Rate Adjusted Day-Night Average Sound Level (L_{dnmr}).

3.3.2 Noise Metrics

Maximum Sound Level

The highest A-weighted integrated sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight) is called the maximum A-weighted sound level or L_{max}. During an aircraft overflight, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance. L_{max} defines the maximum sound level occurring for a fraction of a second. For aircraft noise, the "fraction of a second" over which the maximum level is defined is generally 1/8 second, and is denoted as "fast" response (American National Standards Institute 1988). Slowly varying or steady sounds are generally measured over a period of 1 second, denoted "slow" response. In this EIS, L_{max} is one metric used in the analysis of speech interference, and each base-specific section includes a comparison of L_{max} for F-16, F-15, and F-35A aircraft.

Sound Exposure Level

SEL is a composite metric that represents both the intensity of a sound and its duration. Individual time-varying noise events (e.g., aircraft overflights) have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. SEL provides a measure of total sound exposure of the entire acoustic event, but it does not directly represent the sound level heard at any given time. During an aircraft flyover, SEL captures the total sound energy from the beginning of the acoustic event to the point when the receiver no longer hears the sound. It then condenses that energy into a 1-second period of time and the metric represents the total sound exposure received. SEL represents the best metric to compare noise levels from overflights. Each base-specific section (Chapter 4) includes a comparison of SELs for F-16, F-15, and F-35A aircraft. For sound from aircraft overflights, which typically lasts more than 1 second, the SEL is usually greater than the L_{max} because an individual overflight takes seconds and the L_{max} occurs instantaneously. Analysis of speech interference and sleep disturbance employs the SEL metric.

Day-Night Average Sound Level

The DNL noise metric is the energy-averaged sound level measured over a 24-hour period, with a 10 dB penalty assigned to noise events occurring between 10:00 p.m. and 7:00 a.m. (environmental night). DNL values are obtained by averaging the SEL values for a given 24-hour period, with louder values receiving emphasis. DNL is the preferred noise metric of the U.S. Department of Housing and Urban Development, FAA, USEPA, and DoD. Studies of community annoyance in response to numerous types of environmental noise show that DNL correlates well with impact assessments; there is a consistent relationship between DNL and the level of annoyance (refer to Appendix C).

Most people are exposed to sound levels of 50 to 65 dB DNL or higher on a daily basis. Research has indicated that about 87 percent of the population is not highly annoyed by outdoor sound levels below 65 dB DNL (Federal Interagency Committee on Urban Noise [FICUN] 1980). Therefore, the 65 dB DNL noise level is typically used to help determine compatibility of military aircraft operations with local land use, particularly for land use associated with airfields.

Onset-Rate Adjusted Day-Night Average Sound Level

Subsonic noise levels associated with the types of military airspace proposed for use by the F-35A are characterized by the Onset-Rate Adjusted Day-Night Average Sound Level, or L_{dnmr}. This metric is a derivation of DNL, but it accounts for the nature of operations in airspace. Whereas aircraft operations at airfields tend to be continuous or patterned, operations in airspace are sporadic and dispersed. L_{dnmr} also accounts for the specific effects of low-altitude and high-speed operations that can occur in airspace such as MOAs or Restricted Areas. Because military jet aircraft can exhibit a rate of increase in sound level (onset rate) of up to 150 dB per second, the L_{dnmr} metric is adjusted to account for the startle effect with addition of up to 11 dB to the normal SEL. Unlike the use of DNL around airfields, the FICUN compatibility standards do not readily apply to land use under military airspace. Rather, the analysis considers both the L_{dnmr} generated by the proposed operations and the degree of change in L_{dnmr} from baseline to proposed noise conditions. As noted previously, an L_{dnmr} of 45dB or less is low and considered indistinguishable from ambient outdoor noise levels. The implications of higher L_{dnmr} depend upon the underlying land uses and the degree of change in noise levels. For example, a 3 dB change in

L_{dnmr} begins to be perceptible to the human ear and a 10 dB change is perceived as a doubling or halving of the sound.

C-Weighted DNL (CDNL)

Supersonic noise is described using C-weighted DNL, or CDNL. This metric captures the impulsive characteristics of supersonic noise in a day-night average. In addition, the analysis considers changes in the number of booms per month as a measure of effects. Peak overpressures measured in pounds per square foot (psf) provides a measure of potential impacts from sonic booms.

3.3.3 Supplemental Noise Analyses

To fully characterize the potential effects of noise from aircraft operations, this EIS includes supplemental noise analyses. All of these supplemental analyses apply to the airfield environs. Appendix C provides further detail on these supplemental analyses.

Speech Interference

Speech interference comprises one supplemental indicator of noise effects. Such interference is measured by the numbers 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 L_{max} 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.

A special case of speech interference deals with classroom interference at schools. When considering intermittent noise caused by aircraft overflights, guidelines for classroom interference indicate that an appropriate criterion is a limit on indoor background equivalent noise levels of 35 to 40 dB (equivalent noise level [L_{eq}]) and a limit on single events of 50 dB L_{max}. The 50 dB L_{max} for single events equates to an outdoor L_{max} of 65 dB and 75 dB for windows open and closed, respectively. Thus the number of annual average daily events whose L_{max} would be greater than or equal to 65 dB and 75 dB serve as the measure of potential classroom effects and are presented as NA65 L_{max} and NA75L_{max} for windows open and closed, respectively, on a per-hour basis. Because classrooms are in use during the day predominantly, these criteria are applied for aircraft operations occurring between 8:00 a.m. and 4:00 p.m. rather than between 7:00 a.m. and 10:00 p.m. for standard speech interference.

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.

Potential for Hearing Loss (PHL)

Noise-related hearing loss risk has been studied extensively. Findings of studies and resulting policies and regulations are discussed briefly below and in more detail in Appendix C. As per DoD policy memorandum (2009) populations exposed to noise greater than 80 dB DNL are at the greatest risk of PHL (Undersecretary of Defense for Acquisition Technology and Logistics 2009). The DoD policy directs that hearing loss risk should be assessed using the methodology described in USEPA Report No. 550/9-82-105, Guidelines for Noise Impact Analysis (USEPA 1982). USEPA's Guidelines for Noise Impact Analysis quantify hearing loss risk in terms of Noise-Induced Permanent Threshold Shift (NIPTS), a quantity that defines the permanent change in the threshold level below which a sound cannot be heard. NIPTS is stated in terms of the average threshold shift at several frequencies that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with exposure lasting 8 hours per day for 5 days per week.

The actual value of NIPTS for any given person depends on that individual's physical sensitivity to noise—over a 40-year working lifetime, some people will experience more loss of hearing than others. The actual noise exposure for any person living in an area subject to 80 dB DNL or greater is determined by the time that person is outdoors and directly exposed to the noise. For example, noise exposure within an 80 dB noise contour near an airfield would be affected by whether a person were at home during the daytime hours when most flying occurs. Many people would be inside their homes and would, therefore, be exposed to lower noise levels due to noise attenuation provided by the house structure. For the purpose of this analysis, residents were assumed to be fully exposed to the DNL level of noise calculated for their residence location. The analysis examined the number of people affected by 80 dB DNL or greater in 1 dB increments.

Workplace Noise

In 1972, the National Institute for Occupational Safety and Health (NIOSH) published a criteria document with a recommended exposure limit of 85 dB as an 8-hour time-weighted average. This exposure limit was reevaluated in 1998 when NIOSH made recommendations that went beyond conserving hearing by focusing on the prevention of occupational hearing loss (NIOSH 1998). Following the reevaluation using a new risk assessment technique, NIOSH published another criteria document in 1998 which reaffirmed the 85 dB recommended exposure limit (NIOSH 1998). Active-duty and reserve components of the Air Force (including the ANG), as well as civilian employees and contracted personnel working on Air Force bases and Air Guard stations must comply with Occupational Safety and Health Administration (OSHA) regulations (29 CFR § 1910.95 *Occupational Noise Exposure*), DoD Instruction 6055.12, *Hearing Conservation Program*; Air Force Occupational Safety and Health (AFOSH) Standard 48-20 (June 2006), and *Occupational Noise and Hearing Conservation Program* (including material derived from the International Standards Organization 1999.2 *Acoustics-Determination of Occupational Noise Exposure* *and Estimation of Noise Induced Impairment*). Per AFOSH Standard 48-20, the Hearing Conservation Program is designed to protect workers from the harmful effects of hazardous noise by identifying all areas where workers are exposed to hazardous noise. The following are main components of the program:

1. Identify noise hazardous areas or sources and ensure these areas are clearly marked.
2. Use engineering controls as the primary means of eliminating personnel exposure to potentially hazardous noise. All practical design approaches to reduce noise levels to below hazardous levels by engineering principles shall be explored. Priorities for noise control resources shall be assigned based on the applicable risk assessment code. Where engineering controls are undertaken, the design objective shall be to reduce steady-state levels to below 85 dBA, regardless of personnel exposure time, and to reduce impulse noise levels to below 140 dB peak sound pressure level.
3. Ensure workers with an occupational exposure to hazardous noise complete an initial/reference audiogram within 30 days from the date of the workers' initial exposure to hazardous noise.
4. Ensure new equipment being considered for purchase has the lowest sound emission levels that are technologically and economically possible and compatible with performance and environmental requirements. 42 USC § 4914, *Public Health and Welfare, Noise Control, Development of Low-Noise Emission Products*, applies.
5. Education and training regarding potentially noise hazardous areas and sources, use and care of hearing protective devices, the effects of noise on hearing, and the Hearing Conservation Program.

3.3.4 Types of Military Aircraft Noise

Military aircraft generate two types of sound. One is "subsonic" noise, which is continuous sound generated by the aircraft's engines and also by air flowing over the aircraft itself. Subsonic noise occurs at the airfields and in the airspace. The other type is supersonic noise consisting of sonic booms. Sonic booms are transient, impulsive sounds generated during supersonic flight. Supersonic flight must occur only within authorized airspace. These two types of noise differ in terms of characteristics.

Subsonic Aircraft Noise

Subsonic noise from an individual aircraft is a time-varying continuous sound. It is first audible as the aircraft approaches, increases to a maximum when the aircraft is near its closest point, and then diminishes as it departs. The noise depends on the speed and power setting of the aircraft and its flight track. Noise levels from flight operations exceeding ambient noise typically occur beneath main approach and departure corridors, in local air traffic patterns around the airfield, and in areas immediately adjacent to aircraft parking ramps and staging areas. As aircraft in flight gain altitude, their noise contribution drops to lower decibel levels, often becoming indistinguishable from ambient noise.

Supersonic Aircraft Noise

Aircraft in supersonic flight (i.e., exceeding the speed of sound [Mach 1]) cause sonic booms. A sonic boom is characterized by a rapid increase in pressure, followed by a decrease before a second rapid return to normal atmospheric levels. This change occurs very quickly, usually within a few tenths of a second. It is usually perceived as a "bang-bang" sound. The amplitude of a sonic boom is measured by its peak overpressure, in pounds per square foot. The amplitude depends on the aircraft's size, weight, geometry, Mach number, and flight altitude. Altitude is usually the biggest single factor. Maneuvers (turns, dives, etc.) also affect the amplitude of particular booms.

Not all supersonic flights cause sonic booms that are heard at ground level. As altitude increases, air temperature and sound speed decrease. These layers of sound speed change, causing booms to be turned upward as they travel toward the ground. Depending on the altitude of the aircraft and the Mach number, many sonic booms can be bent upward such that they never reach the ground. This phenomenon, referred to as "cutoff," also acts to limit the width (area covered) of the sonic booms that do reach the ground. The overpressures of booms that reach the ground are well below those that would begin to cause physical injury to humans or animals (see Appendix C). They can, however, be annoying, and can cause startle reaction in humans and animals. On occasion, sonic booms can cause physical damage (e.g., to a window) if the overpressure is of sufficient magnitude. The condition of the structure is a major factor when damage occurs, the probability of which, tends to be low. For example, the probability of a 1 pound per square foot boom (average pressure in airspace) cracking plaster or breaking a window falls in the range of one in ten thousand to one in ten million.

Sonic booms from air combat training activity typically have an elliptical pattern. Aircraft usually set-up at positions up to 100 nm apart, then proceed toward each other for an engagement. Aircraft can become supersonic at various times during an engagement exercise. Supersonic events can occur as the aircraft accelerate toward each other, during dives in the engagement itself, and during disengagement. Maneuvers take place within a generally elliptical region aligned with the setup points. The long-term average (CDNL and numbers of booms) sonic boom patterns also tend to be elliptical.

3.3.5 Analysis Methodology

It is important to note that all of the noise models draw from a database of actual aircraft noise measurements and sonic booms. These models are most appropriate for comparing "before-and-after" noise impacts, which would result from proposed changes or alternative actions, when the calculations are made in a consistent manner. The models allow noise predictions without the need for actual implementation or noise monitoring for the proposed action and alternatives.

Airfield Noise Modeling

Noise at the airfields was modeled using two software programs: 1) NOISEMAP and 2) Integrated Noise Model (INM). The Air Force and ANG use NOISEMAP 7 to model noise exposure at and around military air bases for operations generated by military aircraft and engine run-up activities, as well as any other aircraft. Noise contours generated by NOISEMAP are used in support of the AICUZ program and NEPA documentation. For airfield environments, input data include average daily airfield flight operations, runway/pad usage, flight tracks and their utilization, flight profiles, run-up operations and profiles. Flight tracks are the paths aircraft take over the ground. Flight profiles describe the operating state of the aircraft (e.g., altitude, power setting, and speed) at points along each flight track. The most up-to-date flight profiles (using the Karnes 3 profiles) and airfield course rules were used in the noise modeling.

INM is used by the FAA to evaluate aircraft noise generated at and around civilian airports such as Burlington IAP and Jacksonville IAP. In the U.S., INM is typically used for Federal Aviation Regulation Part 150 noise compatibility planning purposes and for FAA Orders 5050.4B (2006) and 105D.1E (2006); INM7.0b is the most recent release of INM (FAA 2010). Since INM applies only to the joint-use airfields at Burlington AGS and Jacksonville AGS, it did not provide for consistency and comparison among all six alternative locations. For modeling purposes, the civilian/commercial noise levels generated under INM were combined logarithmically with the military aircraft noise calculated by NOISEMAP for Burlington IAP and Jacksonville IAP.

The noise analysis applied an annual average of 260 days for F-35A operations at both the Air Force Bases and three Air National Guard Stations. Noise impacts were assessed around the airfields or airports for areas affected by 65 dB DNL or greater in terms of acreage, population, representative receptors, and households. 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 affected within a contour band (e.g., 65 to 70 dB DNL), this analysis used U.S. Census block group population and a methodology that assumes an even distribution of population within each block under the respective contour bands. In most cases, this methodology provides a reasonable estimate of the number of people who may be exposed. However, for the locations in the vicinity of the bases characterized by low or inconsistent population densities, actual houses were also counted using aerial photographs and using the U.S. Census population multiplier (people per household) for the specific affected county. Otherwise, the U.S. Census block method would yield substantially overestimated populations. Acreage reported herein excludes the base and airport properties since they are directly associated with aircraft operations. Representative receptors include on- and off-base schools, day care locations, places of worship, hospitals, and residential areas derived from Google Earth satellite imagery and verified by base personnel. Residential areas were defined, where feasible, by the centroid of the intersection of the 65 dB DNL or greater noise contours and U.S. Census block groups.

Airspace Subsonic Aircraft Noise Modeling

Subsonic flight activity for the airspace and ranges considers the following factors in the noise analysis: flight operations, flight durations, flight areas and/or tracks, flight profiles, and climatological data. Modeled flight operations are summarized in each alternative's section. The MR_NMAP computer model was used to calculate L_{dnmr} values for average daily aircraft subsonic flight operations during the busiest month for each modeled airspace unit. For the defined airspace units, single L_{dnmr} noise levels were calculated from the MR_NMAP program. Grouping of airspace units used and scheduled together consistently were assessed as one area. This EIS presents tabulated levels for both baseline and proposed operations.

For airspace environments where noise levels are calculated to be less than 45 dB, the noise levels are stated as "<45." This annotation is used because in calculating time-averaged sound levels, the reliability of the results varies at lower levels. This arises from the increasing variability of individual aircraft sound levels at the longer distances (greater than a mile versus less than a mile) due to atmospheric effects on sound propagation and the presence of other ambient sources of noise. Time-average outdoor sound levels less than 45 dB are substantially less than any currently accepted guidelines for aircraft noise compatibility. As discussed under land use, most of the guidelines for the acceptability of aircraft noise are on the order of 65 dB and greater.

Airspace Supersonic Aircraft Noise Modeling

Modeling of supersonic flight activity considers the following factors: airspace geometry, flight operations, flight durations, flight areas, flight profiles (altitude distribution, maneuver characteristics) and atmospheric effects. The BooMap96 computer model, model defined by Plotkin *et al.* 1992 and Frampton *et al.* 1993, was used to calculate CDNL for average daily aircraft supersonic flight operations during the busiest month for each applicable area. This EIS shows single tabulated CDNL levels in applicable airspace and defines the number of booms per month.

3.4 Air Quality

3.4.1 Definition of Resource

3.4.1.1 Criteria Pollutants

Air quality is defined by ambient air concentrations of specific pollutants determined by the USEPA to be of concern with respect to the health and welfare of the general public. Six major pollutants of concern, called "criteria pollutants," are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), total suspended particulate matter less than or equal to 10 (PM_{10}) and 2.5 ($PM_{2.5}$) microns in diameter, and lead (Pb). The USEPA has established National Ambient Air Quality Standards (NAAQS) for these pollutants. Areas that violate a federal air quality standard are designated as non-attainment areas.

Ambient air quality refers to the atmospheric concentration of a specific compound (amount of pollutants in a specified volume of air) that occurs at a particular geographic location. The ambient air quality levels measured at a particular location are determined by the interactions of emissions, meteorology, and chemistry. Emission considerations include the types, amounts, and locations of pollutants emitted into the atmosphere. Meteorological considerations include wind and precipitation patterns affecting the distribution, dilution, and removal of pollutant emissions. Chemical reactions can transform pollutant emissions into other chemical substances. Ambient air quality data are generally reported as a mass per unit volume (e.g., micrograms per cubic meter [$\mu g/m^3$] of air) or as a volume fraction (e.g., parts per million [ppm] by volume).

Pollutant emissions typically refer to the amount of pollutants or pollutant precursors introduced into the atmosphere by a source or group of sources. Pollutant emissions contribute to the ambient air concentrations of criteria pollutants, either by directly affecting the pollutant concentrations measured in the ambient air or by interacting in the atmosphere to form criteria pollutants. Primary pollutants, such as CO, SO_2, Pb, and some particulates, are emitted directly into the atmosphere from emission sources.

Secondary pollutants, such as O_3, NO_2, and some particulates, are formed through atmospheric chemical reactions that are influenced by meteorology, ultraviolet light, and other atmospheric processes. PM_{10} and $PM_{2.5}$ are generated as primary pollutants by various mechanical processes (for example, abrasion, erosion, mixing, or atomization) or combustion processes. However, PM_{10} and $PM_{2.5}$ can also be formed as secondary pollutants through chemical reactions or by gaseous pollutants condensing into fine aerosols. In general, emissions that are considered "precursors" to secondary pollutants in the atmosphere (such as reactive organic gases [ROG] and oxides of nitrogen [NO_x], which are considered precursors for O_3), are the pollutants for which emissions are evaluated to control their level in the ambient air.

Existing air quality at a given location can be described by the concentrations of various pollutants in the atmosphere. Pollutants are defined as two general types: 1) "criteria" pollutants and 2) toxic compounds. Criteria pollutants have national and/or state ambient air quality standards. The USEPA establishes the NAAQS. The NAAQS represent maximum acceptable concentrations that generally may not be exceeded more than once per year, except the annual standards, which may never be exceeded. The NAAQS are shown in Table 3-1. Further, states may define State Ambient Air Quality Standards which may be more restrictive than the NAAQS.

Table 3-1. National Ambient Air Quality Standards

Pollutant	*Averaging Time*	*National Standards*[1]	
		Primary[2,3]	*Secondary*[2,4]
O_3	8-hour	0.075 ppm ($147\ \mu g/m^3$)	Same as primary
CO	8-hour	9 ppm ($10\ mg/m^3$)	—
	1-hour	35 ppm ($40\ mg/m^3$)	—
NO_2	Annual	0.053 ppb ($100\ \mu g/m^3$)	Same as primary
	1-hour	0.100 ppb ($188\ \mu g/m^3$)	—

Table 3-1. National Ambient Air Quality Standards			
Pollutant	***Averaging Time***	***National Standards***[1]	
		Primary[2,3]	*Secondary*[2,4]
SO_2	3-hour	—	0.5 ppm (1,300 μg/m^3)
	1-hour	0.075 ppb (105 μg/m^3)	—
PM_{10}	24-hour	150 μg/m^3	Same as primary
$PM_{2.5}$	Annual	15 μg/m^3	
	24-hour	35 μg/m^3	
Pb	Rolling 3-month period	0.15 μg/m^3	Same as primary
	30-day average	—	—

Source: USEPA 2010.
Notes:
[1]Standards other than the 24-hour PM_{10}, 24-hour $PM_{2.5}$, and those based on annual averages are not to be exceeded more than once a year. The 8-hour ozone national standard has replaced the 1-hour ozone national standard. New 1-hour SO_2 standard was effective August 1, 2010; annual and 24-hour standards revoked at that time.
[2]Concentrations are expressed first in units in which they were promulgated. Equivalent units given in parenthesis.
[3]Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than 3 years after that state's implementation plan is approved by the USEPA.
[4]Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

3.4.1.2 Conformity Rule

The USEPA designates an area as in attainment when it complies with the NAAQS. Areas that violate these ambient air quality standards are designated as nonattainment areas. Areas that have improved air quality from nonattainment to attainment are designated as attainment/maintenance areas. Areas that lack monitoring data to demonstrate attainment or nonattainment status are designated as unclassified and are treated as attainment areas for regulatory purposes. Varying levels of nonattainment have been established for O_3, CO, and PM_{10} to indicate the severity of the air quality problem (i.e., the classifications run from moderate to serious for CO and PM_{10} and from marginal to extreme for O_3). Hill AFB is the only base to which this conformity rule applies. It is located in an area of nonattainment and maintenance for several criteria pollutants. See base-specific Hill AFB chapter, Section 3.3 for application of this conformity rule.

When an area is designated in nonattainment and/or in maintenance, the CAA Section 176(c), General Conformity Rule, is applied. The intent of this rule is to ensure that federal actions do not adversely affect the timely attainment of air quality standards in areas of nonattainment or maintenance. Because Hill AFB is the only alternative location found within an area designated in nonattainment and/or maintenance, the Air Force evaluated: 1) whether a conformity determination is required, and, if it is, 2) a conformity determination will be done to evaluate whether the action conforms to the Utah State Implementation Plans for pollutants in nonattainment and/or maintenance. The General Conformity Rule consists of three major parts: applicability, analysis, and procedure.

Applicability

Nonattainment and Maintenance Areas

This applies to federal actions occurring in geographic regions designated as nonattainment for criteria pollutants or areas designated as maintenance areas. A nonattainment area consists of a region that fails to meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard (i.e., NAAQS) for the pollutant (refer to Table 3-1). A maintenance area represents a re-designated nonattainment area that has achieved attainment of the national primary ambient air quality standard.

De Minimis Emissions Levels

Threshold (or *de minimis*) levels of emissions are established to focus conformity requirements on those federal actions with the potential to produce significant air quality impacts. With the exception of lead, the *de minimis* levels are based on the CAA Amendments (CAAA) major stationary source definitions for criteria pollutants (and precursor criteria pollutants) and vary by the severity of the nonattainment area. USEPA's implementing regulation requires a conformity applicability analysis for nonattainment or maintenance area criteria pollutants to identify whether the annual total of direct and indirect emissions equals or exceeds the annual *de minimis* levels. Tables 3-2 and 3-3 list the *de minimis* levels by criteria pollutant, applicable to federal actions in nonattainment and maintenance areas, respectively.

Table 3-2. *De Minimis* Levels for Criteria Pollutants in Nonattainment Areas by Designation

Pollutant	*Designation*	*Tons/Year*
O_3*	Serious Nonattainment	50
	Severe Nonattainment	25
	Extreme Nonattainment	10
	Other nonattainment areas outside of ozone transport region	100
	Marginal/Moderate nonattainment areas inside ozone transport region	50 (VOCs)/100 (NO_x)
CO	All nonattainment areas	100
SO_2**	All nonattainment areas	100
Pb	All nonattainment areas	25
NO_2	All nonattainment areas	100
PM	Moderate Nonattainment (PM_{10})	100
	Serious Nonattainment (PM_{10})	70
	Nonattainment ($PM_{2.5}$)	100

Source: 40 CFR § 51.853.
Notes:
* Includes precursors: volatile organic compounds (VOCs) or NO_x.
**Sulfur dioxide is often reported as sulfur oxides (SO_x).

Table 3-3. *De Minimis* Levels for Criteria Pollutants in Maintenance Areas by Designation

Pollutant	*Designation*	*Tons/Year*
Ozone (NO_x)	All maintenance areas	100
Ozone (VOCs)	Maintenance areas inside of an ozone transport region	50
	Maintenance areas outside of an ozone transport region	100
CO	All maintenance areas	100

Table 3-3. *De Minimis* Levels for Criteria Pollutants in Maintenance Areas by Designation		
Pollutant	***Designation***	***Tons/Year***
SO_2	All maintenance areas	100
Pb	All maintenance areas	25
NO_2	All maintenance areas	100
PM_{10} and $PM_{2.5}$	All maintenance areas	100

Source: 40 CFR § 51.853.

Exemptions and Presumptions

The final rule contains exemptions from the General Conformity process. Certain federal actions are deemed by the USEPA to conform because of the thorough air quality analysis required to comply with other statutory requirements. Examples of these actions include those subject to the New Source Review program and remedial activities under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Other federal actions that are exempt from the conformity process include those actions that would result in no increase in emissions, or an increase in emissions that is clearly *de minimis*.

Examples include continuing or recurring activities, routine maintenance and repair, administrative and planning actions, land transfers, and routine movement of mobile assets. A federal agency can establish its own presumptions of conformity through separate rulemaking actions. Section 176(c) of the CAAA does not specifically exempt any activity, thus a separate analysis would need to show that the activity presumed to conform has no impacts to air quality. Based on this analysis, a federal agency can document that certain types of future actions would be *de minimis*.

Analysis

A conformity analysis for the federal action examines impacts of both direct and indirect emissions from mobile and stationary sources. Indirect emissions are those caused by the federal action but may occur later in time and/or may be farther removed in distance from the action itself but are still reasonably foreseeable, and the federal agency can control and will maintain control over the indirect action due to a continuing program responsibility of the federal agency. Reasonably foreseeable emissions are projected future indirect emissions that are identified at the time the conformity determination is made and the location of such emissions is known and the emissions are quantifiable, as described and documented by the federal agency based on its own information and after reviewing any information presented to the federal agency.

The conformity determination procedure is detailed in 40 CFR § 93.158-159. The analysis is based upon the latest planning assumptions, emission estimation techniques, applicable air quality models, databases, and other requirements of the USEPA, and on the total of direct and indirect emissions from the action(s). Finally, a formal general conformity determination must provide for mitigation measures and undertake a thorough public notification process. Exempt actions are not required to go through this process.

Procedural Requirements

General Conformity Rule procedural requirements allow for public review of the federal agency's conformity determination. Although the conformity determination is a federal responsibility, state and local air agencies are provided notification and their expertise is consulted. The federal agency must provide a 30-day notice of the federal action and draft conformity determination to the appropriate USEPA Region, and state regulating entity, and local air control agencies. The federal agency must also make the determination available to the public for review and comment (40 CFR § 93.156).

3.4.1.3 Greenhouse Gas Emissions

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions are generated by both natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature. The U.S. Global Change Research Program reports in *Global Climate Change Impacts in the United States* (Federal Advisory Committee 2009) that:

> Observations show that warming of the climate is unequivocal. The global warming observed over the past 50 years is due primarily to human-induced emissions of heat-trapping gases. These emissions come mainly from the burning of fossil fuels (coal, oil, and gas), with important contributions from the clearing of forests, agricultural practices, and other activities.
>
> Warming over this century is projected to be considerably greater than over the last century. The global average temperature since 1900 has risen by about 1.5^{o}F. By 2100, it is projected to rise another 2 to 11.5^{o}F. The U.S. average temperature has risen by a comparable amount and is very likely to rise more than the global average over this century, with some variation from place to place. Several factors will determine future temperature increases. Increases at the lower end of this range are more likely if global heat trapping gas emissions are cut substantially. If emissions continue to rise at or near current rates, temperature increases are more likely to be near the upper end of the range. Volcanic eruptions or other natural variations could temporarily counteract some of the human-induced warming, slowing the rise in global temperature; however, these effects would only last a few years.
>
> Reducing emissions of carbon dioxide would lessen warming over this century and beyond. Sizable early cuts in emissions would significantly reduce the pace and the overall amount of climate change. Earlier cuts in emissions would have a greater effect in reducing climate change than comparable reductions made later. In addition, reducing emissions of some shorter-lived heat-trapping gases, such as methane, and some types of particles, such as soot, would begin to reduce warming within weeks to decades.
>
> Climate-related changes have already been observed globally and in the United States. These include increases in air and water temperatures, reduced frost days, increased frequency and intensity of heavy downpours, a rise in sea level, and reduced snow cover, glaciers, permafrost, and sea ice. Longer ice-free periods on lakes and rivers, lengthening of the growing season, and increased water vapor in the atmosphere, have also been observed. Over the past 30 years, temperatures have risen faster in winter than in any

> other season, with average winter temperatures in the Midwest and northern Great Plains increasing more than 7°F. Some of the changes have been faster than previous assessments had suggested.
>
> These climate-related changes are expected to continue while new ones develop. Likely future changes for the United States and surrounding coastal waters include more intense hurricanes with related increases in wind, rain, and storm surges (but not necessarily an increase in the number of these storms that make landfall), as well as drier conditions in the Southwest and Caribbean. These changes will affect human health, water supply, agriculture, coastal areas, and many other aspects of society and the natural environment.

To minimize GHG impacts, federal agencies and installations will be required to comply with federal climate change policy including EO 13423 (signed January 2007), *Strengthening Federal Environmental, Energy, and Transportation Management*, which instructs federal agencies to conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically, and fiscally sound, integrated, continuously improving, efficient, and sustainable manner. EO 13423 also directs federal agencies to implement sustainable practices for energy efficiency and reductions in GHGs, and for the use of renewable energy. The Federal Energy Policy Act requires federal agencies to increase the use of renewable sources by 3 percent between 2007 and 2009, 5 percent between 2010 and 2012, and by 7.5 percent for 2013 and beyond.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (signed October 2009), provides early strategic guidance to federal agencies in the management of GHG emissions. The early strategy directs agencies to increase renewable energy use to achieve general GHG emission reductions. According to provisions in this EO, federal agencies are required to develop a 2008 baseline for scope 1 emissions (which are direct GHG source emissions that are owned or controlled by the agency) and scope 2 emissions (or those emitted indirectly from electricity, steam, or heat purchased by the agency) by FY 2010. The agencies then need to develop a percentage reduction target for agency-wide scope 1 and 2 GHG emissions by FY 2020. As part of this effort, federal agencies need to evaluate sources of GHG emissions, and develop, implement, and annually update an integrated Strategic Sustainability Performance Plan which prioritizes agency actions based on lifecycle return on investment. The intent is to evaluate GHG emissions on a lifecycle basis and to identify feasibility of sustainability strategies on that basis.

In response to these orders, DoD announced (January 2010) that it will reduce its 2008 GHG scope 1 and 2 emissions from non-combat activities by 34 percent. In June 2010, DoD also committed to reducing scope 3 emissions by 13.5 percent. Per EO 13514, the Air Force will also initiate a comprehensive inventory of GHG emissions, including such emissions associated with FY 2010 operations, by early January 2011, and annually thereafter. The inventory includes all scope 1 and 2 emissions and all measurable scope 3 emissions. While combat and combat support systems are not subject to EO 13514, the Air Force intends to include emissions from aircraft operations, tactical and highway vehicles, and non-road engines and equipment.

While not directly affecting the proposed action, the USEPA has recently promulgated several final regulations involving GHGs either under the authority of the CAA, or as directed by Congress, a summary is provided below:

USEPA promulgated an endangerment finding involving motor vehicle tailpipe GHG emissions (*Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act*, 74 *Federal Register* 66496). For the finding, USEPA determined that GHGs threaten the public health and welfare of the American people and that GHG emissions from on-road vehicles contribute to that threat.

Precipitated by the endangerment finding, USEPA and the Department of Transportation's National Highway Traffic Safety Administration finalized a joint rule to establish a national program consisting of new standards that apply to the manufacturers of model year 2012 through 2016 light-duty vehicles that will reduce GHG emissions and improve fuel economy (*Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards*, 75 *Federal Register* 25324 [2010]).

As a result of the light-duty vehicle rule, USEPA believed that a tailoring rule for Prevention of Significant Deterioration (PSD) and Title V permitting was necessary. The tailoring rule established PSD thresholds for major stationary sources of GHGs (*Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule,* 75 *Federal Register* 31514). The rule establishes two initial phases in steps. Step 1 begins on January 2, 2011, and covers only sources and modifications that would otherwise undergo PSD or Title V permitting based on emissions of non-GHG pollutants. No additional PSD permitting actions or Title V permitting will be necessary solely due to GHG emissions during this period. Sources with Title V permits must address GHG requirements when they apply for, renew, or revise their permits. Step 2 begins on July 1, 2011, and covers new large sources of GHG emissions that have the potential to emit 100,000 tons per year (tpy) equivalent carbon dioxide (CO_2e) or more. GHG emission sources that equal or exceed the 100,000 tpy CO_2e threshold will be required to obtain a Title V permit if they do not already have one.

3.4.2 Analysis Methodology

The potential effects of GHG emissions from the Proposed Action are by nature global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the project alternatives were quantified to the extent feasible in this EIS for information and comparison purposes.

The proposed action alternatives would include facility construction and/or modification activities at all of the proposed installations. Factors needed to derive construction source emission rates were obtained from *Compilation of Air Pollution Emission Factors, AP-42,* Volume I (USEPA 1995), *EMFAC2007 Model* for on-road vehicles, and *OFFROAD2007 Model* for off-road construction equipment (California

Air Resources Board [CARB] 2007). The analysis estimates that construction equipment equates to an average fleet during the year 2010. The analysis also reduced PM_{10} emissions from earth-moving activities by 75 percent from uncontrolled levels by implementing BMPs for fugitive dust control. These practices include wetting soils, covering soil conveyances, and/or early paving of roads to minimize dust generation.

Operational emissions associated with the proposed action would include emissions associated with aircraft operations and associated personnel increases. Air quality impacts associated with F-35A beddown alternatives were assessed by comparing the net emissions associated with F-35A operations with emissions associated with existing operations for the F-16 aircraft at Burlington AGS, Hill AFB, and McEntire JNGB, and Shaw AFB; F-15C aircraft at Jacksonville AGS; and the F-15E/F-15SG aircraft at Mountain Home AFB. Emissions evaluated for both the baseline and the proposed action include: 1) F-35A aircraft operations; 2) privately-owned vehicles (POVs) associated with the basing of personnel at the installations; and 3) aerospace ground equipment (AGE) operations. It was assumed that the proposed action would result in no net change in use of government-owned vehicles (GOVs), construction (outside of the construction activities associated with the proposed action), or stationary sources.

Defining an affected environment for air quality requires knowledge of 1) the type of emissions, 2) location(s) of the sources of emissions (for stationary sources) and the horizontal and vertical extent of emissions from mobile sources such as aircraft or automobiles, 3) emission rates of the pollutant sources, 4) the proximity of existing emission sources to those sources associated with the proposed action, and 5) local and regional climate conditions. The affected environment for emissions varies from less than a mile to over 30 miles, depending on the pollutant. The affected area for emissions of inert pollutants (pollutants other than O_3, its precursors, or NO_2) is generally limited to a few miles downwind of the source, while O_3 and NO_2 generally extend much farther downwind.

An affected area for air quality also has a vertical dimension since the emissions occur in a volume of air. This vertical dimension depends upon climatic conditions. The upper vertical limits of the affected area equate to the mixing height for emissions, which varies by region based on daily temperature changes, amount of sunlight, winds, and other climatic factors. Emissions released above the mixing height become so widely dispersed before reaching ground level that any potential ground-level effects would not be measurable.

The quality of air between ground level and 3,000 feet AGL is of most concern to human health. Below 3,000 feet AGL there is less mixing of the atmosphere, so airflow stagnates and emissions are not as easily dispersed into the upper atmosphere. Pollutants emitted above this mixing height become diluted in the large volume of air before they are slowly transported to ground level. These emissions have little or no effect on ambient air quality and are excluded from analysis. Per USEPA guidance (USEPA 420-R-92-009, 1992), unless otherwise stipulated within a state's implementation plan, a mixing height of 3,000 feet AGL was assumed.

The methodology for estimating aircraft emissions involves evaluating the type of activity, the number of hours of operation, the type of engine, and the mode of operation for each type of aircraft. Emissions occurring above the mixing height were considered to be above the atmospheric inversion layer and would not impact the local air quality. Mobile source emissions include aircraft operations (take-offs and landings), AGE, and maintenance aircraft operations performed with the engines still mounted on the aircraft (engine run-ups and trim checks). Emissions from aircraft take-offs and landings, as well as other flight operations at the bases, considered all based and transient aircraft. Aircraft emissions were calculated based on the following inputs:

- Flight profiles and operations totals for each installation were generated by operations personnel as part of this EIS.
- F-16 and F-15 aircraft operation data (power, fuel usage, emission factors) for Air Force IERA Air Emissions Inventory Guidance Document for Mobile Sources at Air Force installations (December 2003).
- Idle/taxi times of 15 minutes applied to all current fighter aircraft based on McEntire JNGB operations (Meyer 2010).
- SO_2 emissions for F-16, F-15, and F-35 aircraft calculated based on maximum weight percent sulfur content of JP-8, as identified in MIL-DTL-83133G (April 2010).
- CO_2, NO_2, and CH_4, emissions for F-16, F-15, and F-35A aircraft are based on emission factor data from the USEPA Mandatory Greenhouse Gas Reporting Rule.
- For F-35A aircraft, FFR (fuel consumption), emission factors, and T3 (temperature) factors calculated using ITAR-FOUO-FFR-T3-EI determination.xls and T3 Card Deck F135 September 2009 (SAIC undated).
- For F-35A aircraft, idle/taxi times of 20.24 and 25.17 minutes, respectively, based on TIM Template in ITAR-FOUO-FFR-T3-EI determiniation.xls (SAIC undated).

Data used to calculate operations emissions were obtained from the Joint Strike Fighter Program Office in charge of design and development of the F-35 aircraft (personal communication, Hawkins 2010). Engine time in modes, taxi time, approach, and departure parameters from F-35 test aircraft were used to estimate emissions. Use of test aircraft emissions is justified because no operational aircraft are available for measurement (i.e., aircraft have not been flown under operational conditions, rather just in test and development modes). Therefore, per CEQ 1502.22, air quality impacts were evaluated based upon existing data and using research methods accepted in the scientific community. Emissions generated by F-35-specific AGE were also used to evaluate aircraft maintenance operations.

Ground vehicles associated with the proposed action were calculated based on estimates of personnel that would be associated with the proposed action at the bases. Emission factors were obtained from the USEPA's MOBILE6 model.

3.4.3 Hazardous Air Pollutants

In addition to the ambient air quality standards for criteria pollutants, national standards exist for hazardous air pollutants (HAPs) which are regulated under Section 112(b) of the 1990 CAAA. The

National Emission Standards for Hazardous Air Pollutants (NESHAPs) regulate 188 HAPs based on available control technologies (USEPA 2010).

Some HAPs are associated with diesel and gasoline exhaust. Since these HAPs are emitted from mobile sources, they are called Mobile Source Air Toxics, which include benzene, aldehydes, 1,3-butadiene, and a class of compounds known as polycyclic aromatic hydrocarbons. The USEPA recently promulgated new regulations to reduce the amount of benzene in gasoline and reduce exhaust emissions from passenger vehicles operated at cold temperatures (under 75°F). The reduction in benzene content, from 1 percent to 0.62 percent required implementation by 2011. The USEPA is also requiring new standards to reduce non-methane hydrocarbon exhaust emissions from new gasoline-fueled passenger vehicles. Non-methane hydrocarbons include many mobile source air toxics, such as benzene. The new standards require a maximum non-methane hydrocarbon emission rate of 0.3 grams/mile for vehicles weighing 6,000 pounds or less and 0.5 grams/mile for vehicles above 6,000 pounds (which include trucks up to 8,500 pounds and passenger vehicles up to 10,000 pounds). The standards phase in between 2010 and 2013 for the lighter vehicles, and between 2012 and 2015 for heavier vehicles.

During the F-35A scoping period, several commentors expressed concern regarding HAPs generated by the F-35A. In particular, they were concerned about benzene. Benzene is a major component of gasoline and increased levels are primarily found at fueling stations, and in air emissions from manufacturing plants and hazardous waste sites. According to the Toxicological Profile for Benzene (U.S. Department of Health and Human Services [USDHHS] 2007):

> Benzene is ubiquitous in the atmosphere. It has been identified in air samples of both rural and urban environments and in indoor air. Although a large volume of benzene is released to the environment, environmental levels are low because of efficient removal and degradation processes.
>
> Benzene is released to the environment by both natural and industrial sources. Emissions of benzene to the atmosphere result from gasoline vapors, auto exhaust, chemical production and user facilities, tobacco smoke as well as vapors from products such as glues, paints, furniture was, and detergents. USEPA's estimate of nationwide benzene atmospheric emissions from various sources was 34,000 metric tons/year. Benzene is released to air, water, and soil from motor vehicle and industrial exhaust, industrial discharges, landfill leachate, and gasoline leaks from underground storage tanks.
>
> USEPA has set 5 parts per billion (ppb) as the maximum permissible level of benzene in drinking water. The OSHA regulates levels of benzene in the workplace. The maximum allowable amount of benzene in workroom air during an 8-hour workday, 40-hour workweek is 1 part per million (ppm). Because benzene can cause cancer, NIOSH recommends that all workers wear special breathing equipment when they are likely to be exposed to benzene at levels exceeding the recommended (8-hour) exposure limit of 0.1 ppm.

According to conclusions drawn from Select Source Materials and Annotated Bibliography on the Topic of HAPs Associated with Aircraft, Airports, and Aviation (FAA 2003), the FAA concluded that:

- Neither aircraft nor airports meet the definitions of the source types that are regulated under Section 112 (*Hazardous Air Pollutants*) of the CAA.
- Emissions from aircraft engines are currently regulated under Section 231 (*Aircraft Emission Standards*) of the federal CAA. Although HAPs are not directly regulated, they are indirectly controlled as elements of total unburned hydrocarbons and particulate matter.
- Airports are characterized under the USEPA National Air Toxics Program as an example of complex facilities that produce aggregates of emissions, including HAPs, from multiple sources.

In addition, the FAA report noted that the most remarkable observations recorded during the testing of aircraft exhaust were: 1) the extremely low concentration of HAPs found in aircraft exhaust considering the amounts of fuel burned, the amounts of energy (or thrust) generated, and the amounts of other products of combustion produced; 2) the type and amounts of HAP emissions are strongly influenced by the engine load, varying by an order-of-magnitude (or more) from taxi/idle to full take-off thrust; and 3) that averaging HAP emission factors from different aircraft and for different operating conditions is not considered appropriate, as there is potential for great variation. For this reason, available aircraft engine emission factors for HAPs may also not be representative of untested aircraft or the aircraft fleet as a whole (FAA 2003).

For this EIS, therefore, HAPs were not evaluated further in the document. This is justified because aircraft emissions of HAPs are unlikely to reach levels considered adverse below the mixing height and would not create health risks to humans living adjacent to airfields or underneath airspace in which these aircraft operate. Further, USEPA regulations protect drinking water and OSHA standards address employee exposure within the workplace. Existing Air Force regulations and permits require them to follow these USEPA and Occupational Safety and Health Administration (OSHA) standards.

3.5 Safety

3.5.1 Definition of Resource

The Air Force practices Operational Risk Management as outlined in AFI 90-901 *Operational Risk Management* (Air Force 2000). Requirements outlined in these documents provide for a process to maintain readiness in peacetime and achieve success in combat while safeguarding people and resources. The safety analysis contained in the following sections addresses issues related to the health and well-being of both military personnel and civilians living on or in the vicinity of Burlington AGS, Hill AFB, Jacksonville AGS, McEntire JNGB, Mountain Home AFB, and Shaw AFB, and their associated training airspace. Specifically, this section provides information on hazards associated with aviation safety (APZs or Runway Protection Zones [RPZs], aircraft mishaps, and Bird/Wildlife-Aircraft Strike Hazard [BASH]). The primary safety concern with regard to military training flights is the potential for aircraft mishaps (i.e., crashes) to occur, which could be caused by mid-air collisions with other aircraft or objects, weather difficulties, mechanical failures, pilot error, or BASH. In the training airspace, potential flare debris from F-35A operations represents a topic worthy of discussion, although the possible impacts are negligible at most.

APZs are established at military airfields to delineate recommended surrounding land uses for the protection of people and property on the ground and apply to the military airfields at Hill AFB, McEntire JNGB, Mountain Home AFB, and Shaw AFB. APZs define the areas in the vicinity of a military airfield that would have the highest potential to be affected if an aircraft mishap were to occur. AICUZ guidelines identify three types of APZs for airfields based on aircraft mishap patterns: the Clear Zone, APZ I, and APZ II (Figure 3-2). The standard Clear Zone is a square area that is 3,000 feet wide and extends 3,000 feet from the end of a runway, and has the highest probability of a mishap. APZ I, which typically extends 5,000 feet from the end of the Clear Zone, has a lower mishap probability; and APZ II, which typically extends 7,000 feet from the end of APZ I, has the lowest mishap probability of the three zones (Air Force 1999). To reflect different departure and arrival patterns, both the shape and size of APZs can be modified if needed (e.g., a curving APZ).

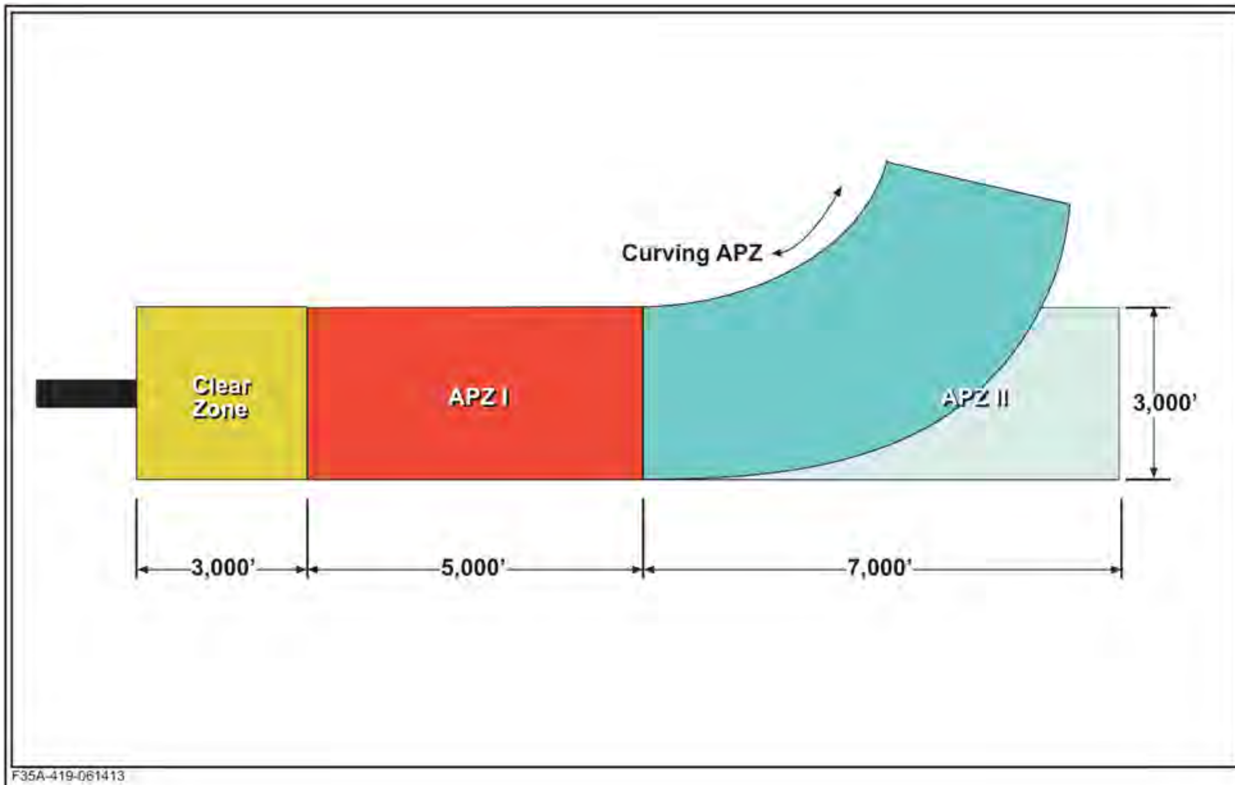

Figure 3-2. Accident Potential Zones

Source: Air Force 1999.

For Burlington IAP and Jacksonville IAP, runway protection zones are used because they are civilian airports. The RPZs are trapezoidal zones extending outward from the ends of active runways at commercial airports and delineate those areas recognized as having the greatest risk of aircraft mishaps, most of which occur during take-off or landing. Development restrictions within RPZs are intended to discourage incompatible land use activities from being established in these areas. The RPZ dimension for a particular runway end is a function of the type of aircraft and minimum approach visibility associated with that runway end. For most commercial airports (e.g., Burlington IAP and Jacksonville IAP) with large aircraft, the departure RPZ begins 200 feet from the end of the runway and continues out to 1,700 feet, with a width beginning at 500 feet and expanding as the distance from the runway increases to 1,010 feet wide (FAA 2009). The approach RPZ begins 200 feet before the runway threshold and extends out 1,700 feet in a reverse of the departure RPZ (Figure 3-3) (FAA 2009).

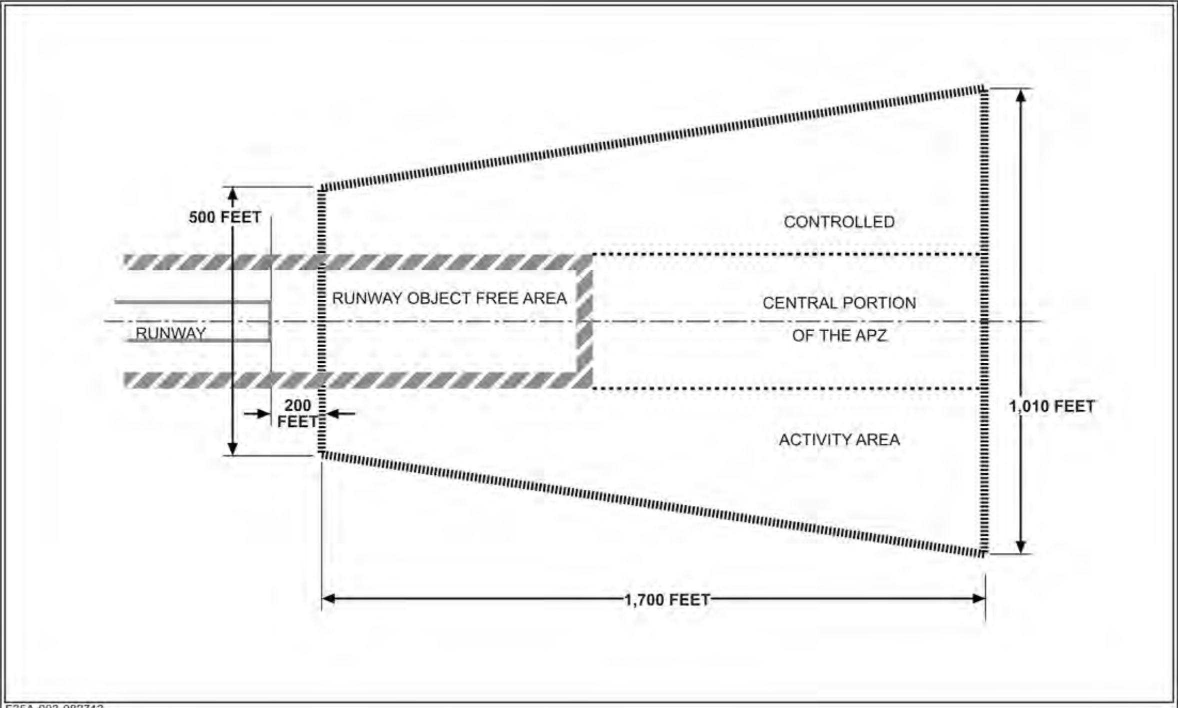

Figure 3-3. Runway Protection Zones

Source: FAA 2009.

Aircraft mishaps are classified as A, B, C, or D (Table 3-4). Class A mishaps are the most severe with total property damage of $2 million or more or a fatality and/or permanent total disability. Comparison of Class A mishap rates for various aircraft types, as calculated per 100,000 flying hours, provide the basis for evaluating risks among different aircraft and levels of operations. Each base-specific safety section analyzes existing and projected Class A mishap potentials based on flying hours and aircraft types.

Table 3-4. Aircraft Class Mishaps

Mishap Class	*Total Property Damage*	*Fatality/Injury*
A	$2,000,000 or more and/or aircraft destroyed	Fatality or permanent total disability
B	$500,000 or more but less than $2,000,000	Permanent partial disability or three or more persons hospitalized as inpatients
C	$50,000 or more but less than $500,000	Nonfatal injury resulting in loss of one or more days from work beyond day/shift when injury occurred
D	$20,000 or more but less than $50,000	Recordable injury or illness not otherwise classified as A, B, or C

Source: DoD 2011.

Worldwide historic mishap data for F-16s and F-15s are presented in Table 3-5. Data from FY72 to the present represent both aircrafts' full incorporation into the fleet. Since 1972 the average historical mishap rate for every 100,000 flying hours was 3.55 for the F-16s and 2.38 for the F-15s. In the past 5 years, Class A mishap rates for both aircraft have decreased; for the F-16s the average was 1.59 and for the F-15s it was 1.74 (Air Force Safety Center 2013).

Table 3-5. Historic Class A Flight Mishaps for Relevant DoD Aircraft

Year	*F-16 Models*			*F-15 Models*		
	Class A Mishaps	Flight Hours	Mishap Rate	Class A Mishaps	Flight Hours	Mishap Rate
CY 72	-	-	-	0	25	0
CY 73	-	-	-	0	826	0
CY 74	-	-	-	0	2,110	0
CY 75	1	161	621.12	1	4,541	22.02
CY 76	1	226	442.48	0	17,803	0
CY 77	0	856	0	6	42,369	14.16
CY 78	0	1,402	0	8	59,023	11.59
CY 79	2	6,577	30.64	5	96,959	5.16
CY 80	5	26,903	18.65	5	109,309	4.57
CY 81	5	55,423	8.85	5	132,291	3.78
CY 82	17	107,343	15.83	3	153,369	1.96
CY 83	11	150,728	7.3	4	169,431	2.36
CY 84	10	199,761	5.01	3	175,515	1.71
CY 85	10	219,647	4.55	5	185,324	2.7
CY 86	11	254,481	4.32	7	198,095	3.51
FY 87	8	288,560	3.43	3	154,821	1.34
FY 88	23	338,039	6.8	1	201,099	0.5
FY 89	14	385,179	3.63	5	214,592	2.33
FY 90	13	408,078	3.19	7	227,617	3.08
FY 91	21	461,451	4.55	3	276,393	1.45
FY 92	18	445,201	4.04	5	220,866	2.36
FY 93	19	433,349	4.38	3	217,539	1.38
FY 94	16	400,474	4.0	4	210,231	1.9
FY 95	10	386,429	2.59	4	296,641	1.34
FY 96	9	374,517	2.4	5	290,751	2.49
FY 97	11	367,038	3.0	3	192,073	1.56
FY 98	14	360,245	3.85	3	188,295	1.29
FY 99	19	352,275	5.11	8	189,105	4.23
FY 00	9	343,095	2.62	4	179,372	2.23
FY 01	13	337,315	3.85	2	183,706	1.85
FY 02	7	368,707	1.9	5	194,947	2.57
FY 03	11	355,557	3.89	4	193,611	2.07
FY 04	2	343,138	0.58	3	189,596	1.58
FY 05	5	324,231	1.54	3	169,158	1.77
FY 06	9	327,575	2.74	1	168,854	0.59
FY 07	10	304,038	3.29	6	159,542	3.76
FY 08	3	285,503	1.95	4	143,964	2.78
FY 09	3	257,209	1.17	2	143,806	1.39
FY 10	3	246,029	1.22	1	124,357	0.8
FY 11	5	225,079	2.22	1	100,849	0.59
FY 12	4	207,158	1.38	3	95,445	3.14
Total	**351**	**9,854,537**	**3.55**	**145**	**6,104,087**	**2.38**

Note: *Differences with 100,000 flying hour average due to rounding. *Source*: Air Force Safety Center 2013.

BASH and the dangers it presents form another safety concern for aircraft operations. BASH constitutes a safety concern because of the potential for damage to aircraft or injury to aircrews or local populations if an aircraft crash should occur in a populated area. Aircraft can encounter birds at nearly all altitudes up to 30,000 feet MSL; however, most birds fly close to the ground. According to the Air Force Safety Center (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 AGL (AFSC 2007). Of these strikes, approximately 67 percent occur in the airfield environment (AFSC 2007). Waterfowl present the greatest BASH potential due to their congregational flight patterns and because, when migrating, they can be encountered at altitudes up to 20,000 feet AGL. Raptors also present a substantial hazard due to their size and soaring flight patterns. In general, the threat of bird/wildlife-aircraft strikes increases during March and April and from August through November due to migratory activities. The Air Force BASH program was established to minimize the risk for collisions of birds/wildlife and aircraft and the subsequent loss of life and property. In accordance with AFI 91-202, *U.S. Air Force Mishap Prevention Program* (Air Force 1998), requires each flying unit in the Air Force (including the AFRC and ANG) to develop a BASH plan to reduce hazardous bird/wildlife activity relative to airport flight operations. The intent of each plan is to reduce BASH issues at airfields by creating an integrated hazard abatement program through awareness, avoidance, monitoring, and actively controlling bird and animal population movements. Some of the procedures outlined in the plan include monitoring the airfield for bird and other wildlife activity, issuing bird hazard warnings, initiating bird/wildlife avoidance procedures when potentially hazardous bird/wildlife activities are reported, and submitting BASH reports for all incidents.

Section 2.1.2 includes a detailed discussion of potential risks from flare debris falling to the ground under authorized training airspace. These risks are assessed for each alternative, and expressed in terms of estimated probabilities of debris striking a person.

3.5.2 Analysis Methodology

Development and basing of the F-35A includes a robust safety clearance program conducted by test pilots in multiple phases at the Lockheed Martin aircraft test facility and several developmental test bases. Modeling, simulation, and ground tests reduce the uncertainties of flight testing, and the flight-test program includes more than 30 aircraft dedicated to ensuring flight safety and reducing risks associated with new technologies. The F-35A will meet all DoD and FAA flight clearance standards prior to production. In addition, there is a post-production safety approval process and a DoD acceptance process required by the Air Force.

At publication of this EIS, there have not been enough flight hours to accurately depict the specific safety record for this new aircraft. Therefore, the analysis used similar fighter aircraft safety records. Mishaps analysis was based on that fighter aircraft to draw operational history. For APZs/RPZs and BASH, a comparative safety analysis was performed using the existing conditions and calculating the expected changes as a result of implementing the proposed action. This evaluation also considered whether new construction could be an obstruction to air navigation but no obstruction issues were identified.

The assessment of safety examines how the no-action alternative and proposed action would affect safety at each alternative airfield location and within the associated training airspace. Since no modifications or additions are proposed for the current airspace structure, the impact analysis focuses on changes in airspace use that would result from the addition or loss of annual airfield and airspace operations with the arrival of the F-35A and departure of F-16 or F-15 aircraft.

Impacts on air traffic safety were assessed with respect to the potential for disruption of air traffic pattern and systems, and changes in existing levels of air traffic safety. Factors used to assess the impacts on air traffic included an alternative's potential to result in: increased numbers of flights such that they could not be accommodated within established operational procedures and flight patterns; need for an airspace modification; or increased air traffic that might increase collision potential between military and non-participating civilian operations.

Probabilities of flare debris striking a person on the ground under training airspace authorized for flare use considered the number of flares dispensed annually, the area under the airspace (square miles), population densities, and average time outdoors where strikes could occur. These estimates accounted for different airspace configurations, restrictions on flare use, and number of flares dispensed at the six alternative locations.

Public safety impacts are considered relative to whether the general public is endangered as a result of proposed Air Force activities. For each training activity or group of similar activities, an estimate of risk to the general public was formulated, based on Air Force safety procedures. Existing AFI and regulations provide operational and safety procedures for all normal Air Force aerial events. Several factors were considered in evaluating the effects of Air Force proposed activities on public safety. These factors include proximity to the public, access control, scheduling, public notification of events, frequency of events, duration of events, safety procedures, operational control of training events, and safety history.

3.6 Geology, Soils, and Water

3.6.1 Definition of Resource

Soils refer to unconsolidated earthen materials overlying bedrock or other parent material. Soil structure, elasticity, strength, shrink-swell potential, liquefaction potential, and its potential to erode all determine the ability of the ground to support structures and facilities. General hydrology, water quality, and flooding are also discussed in this section. Hydrology for this EIS considers surface water, groundwater, and floodplains. Water quality describes the chemical and physical composition of water as affected by natural conditions and human activities. Impacts to these fundamental resources can also influence other issues such as biological resources, environmental justice, land use, socioeconomics, and even air quality. Analysis of the water supply and consumption is presented under Community Facilities and Public Services, Section 3.14 of this chapter.

Water quality is regulated under the Clean Water Act (CWA) of 1972 that sets standards for contaminants and impurities to protect public water supplies and ensure water bodies support aquatic life. In addition, states may also impose contaminant standards more stringent than those established by the USEPA. Contaminants range from priority pollutants such as mercury or selenium to non-priority pollutants like oil and grease. All federal actions need to evaluate their potential effects on water quality standards.

Stormwater runoff is precipitation that falls onto surfaces, such as roofs, streets, the ground, etc., and is not absorbed or retained by that surface but flows off, collecting volume and energy. Stormwater runoff management addresses measures to reduce flow energy and pollutants in stormwater and to control discharge from point and non-point sources. Point source pollution is produced by a single, identifiable source. Non-point source pollution affects surface water and groundwater resources as a result of pollution from diffuse sources.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* mandates a 2 percent annual reduction in potable, industrial, landscaping, and agricultural water intensity by FY 2020. In addition, EO 13514 requires that all new construction comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings*. This includes employing design and construction strategies that reduce stormwater runoff. Furthermore, Section 438 of the Energy Independence and Security Act of 2007 requires that any development or redevelopment project involving a federal facility with a footprint exceeding 5,000 square feet shall use site planning, design, construction, and maintenance strategies to maintain or restore the predevelopment hydrology of the property with regard to temperature, rate, volume, and duration of flow. Compliance with this requirement can be met through the implementation of Low Impact Development technologies.

Floodplains are low, relatively flat areas adjoining inland and coastal waters. EO 11988, *Floodplain Management*, sets forth the responsibilities of federal agencies for reducing the risk of flood loss or damage to personal property, minimizing the impacts of flood loss, and restoring the natural and beneficial functions of floodplains. The EO specifies that, in situations where alternatives are impractical, the agency must minimize potential harm to/within the floodplain and take appropriate steps to notify the public. This order was issued in furtherance of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Floodplains typically are described as areas likely to be inundated by a specific magnitude of flooding. For example, a flood that has a 1 percent chance of occurring in any given year is considered a 100-year flood.

3.6.2 Analysis Methodology

The protection of unique geological features, minimization of soil erosion, and siting of facilities away from potential geological hazards are considered when evaluating the potential impacts of an action. Generally, impacts can be avoided or minimized if proper construction techniques, erosion control measures, and structural engineering components are incorporated into project design. This section also analyzes changes in hydrologic and water quality parameters resulting from the implementation of any of the action alternatives. The following criteria were used to determine impact analysis to water resources:

- **The CWA of 1972, as amended (33 USC §§ 1251, *et seq.*)** – is the primary federal law that protects the waters of the United States, including navigable waters and territorial seas. The primary objective of the CWA is to restore and maintain the integrity of the nation's waters. The Department of the Army, acting through the U.S. Army Corps of Engineers (USACE), has authority to permit the discharge of dredged or fill material into waters of the U.S. under section 404 of the CWA. The USACE broadly defines jurisdictional waters to include traditional navigable waters, interstate waters, tributaries of traditional navigable waters and interstate waters, and adjacent wetlands. The Secretary of the Army is responsible for issuing Section 404 permits prior to discharging dredged or fill material into navigable waters. Anyone proposing to discharge dredged or fill material to navigable water is required to obtain not only a Section 404 permit from the USACE but also a Water Quality Certification under CWA Section 401, verifying that the project activities will comply with water quality standards.

- **Safe Drinking Water Act of 1974 (as amended in 1986 and 1996; 42 USC § 300 *et seq.*)** – Congress originally passed the act to protect public health by regulating the nation's public drinking water supply. The amended law includes numerous requirements to protect drinking water and its sources.
- **Section 10 of the Rivers and Harbors Act of 1899 (as amended; 33 USC § 403)** – requires a permit from the USACE for the construction of any structure in or over any navigable water of the U.S., the excavation/dredging or deposition of material in these waters or any obstruction or alteration in a navigable water. Structures include any pier, wharf, bulkhead, etc.

No construction or ground disturbance would occur below the airspace proposed for use under any of the action alternatives; as a result there would be no impacts to soils and water on land under the airspace. Therefore, this EIS will discuss only potential soils and water impacts at the bases where construction activities would occur, and will not discuss areas underneath any of the training airspace associated with the alternative basing locations.

3.7 Terrestrial Communities (Wildlife and Vegetation)

3.7.1 Definition of Resource

Wildlife includes all animal species, i.e., insects and other invertebrates, fish, amphibians, reptiles, birds, and mammals, focusing on the species and habitat features of greatest importance or interest. Vegetation includes terrestrial plant communities and constituent plant species. Identification of these species and communities provided within each base-specific section. Discussion of impacts to wetlands and aquatic communities is presented in Section 3.8 and special status plant and wildlife species are in Section 3.9.

Migratory birds are of particular concern as they are protected by the Migratory Bird Treaty Act (MBTA) and are afforded special consideration on federal installations under EO 13186, *Migratory Bird Conservation*. All activities associated with the installations are conducted in compliance with the MBTA and EO 13186. The MBTA affirms and implements the U.S. commitment to international conventions for the protection of shared migratory bird resources, and prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale purchase or barter, any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit. EO 13186 directs federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat.

3.7.2 Analysis Methodology

Analysis of impacts focuses on whether and how proposed activities and changes in airfield operations at the bases and in the associated airspace and ranges could affect terrestrial communities. Potential impacts from the F-35As at the bases, and associated training ranges and airspace include temporary and permanent impacts associated with the construction and use of facilities, disturbance to wildlife from noise and visual effects associated with aircraft overflight, and ground impacts associated with the use of munitions or countermeasures.

Direct impacts to vegetation were calculated based on the proposed construction footprint as well as a surrounding 50-foot impact area for construction activities and infrastructure improvements such as buildings, and a 20-foot impact area for roadways and other linear features. No new infrastructure or direct removal of plant communities is proposed within the buffer; however, because temporary construction-related impacts, operational impacts, and other indirect impacts can spill over into the buffer area, this analysis conservatively estimated that all resources within the buffer area would have at least some potential to be degraded by ongoing activity associated with the proposed action.

3.8 Wetlands and Freshwater Aquatic Communities

3.8.1 Definition of Resource

Freshwater aquatic communities include surface water bodies such as ponds, creeks, streams, and waters subject to the ebb and flow of the tides. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands serve as the transition between terrestrial habitats and aquatic habitats, and are defined by the USACE as areas characterized by a prevalence of vegetation adapted to saturated soil conditions (USACE 1987). Wetlands can be associated with groundwater or surface water.

Section 404 of the CWA established a program to regulate the discharge of dredged or fill material into waters of the U.S., including wetlands. Activities such as infrastructure development are regulated under this program and a permit is required before any dredged or fill material can be discharged into wetlands or waters of the U.S. (USEPA Undated). The USEPA and USACE use the 1987 USACE Wetlands Delineation Manual to identify wetlands for the CWA Section 404 permit program. The USACE administers and enforces Section 404 provisions and conducts or verifies jurisdictional determinations. The U.S. Fish and Wildlife Service (USFWS) evaluates impacts on fish and wildlife for all new federal projects.

The USFWS classification scheme serves as the national standard for wetland classification. Wetlands are broadly classified into five systems that are further classified by subsystems and classes based on substrate material and flooding regime, or vegetation:

1. **Marine System** – Open ocean overlying the continental shelf including high energy shorelines such as beaches and rocky headlands.

2. **Estuarine System** – Deep water and wetland areas that are usually semi-enclosed with an opening to the ocean and in which there is some mixing of fresh and sea water.
3. **Riverine System** – Freshwater rivers and their tributaries along with most associated wetlands.
4. **Lacustrine System** – Open freshwater wetlands situated in topographic depressions with less than 30 percent vegetative cover and greater than 20 acres in size.
5. **Palustrine System** – All non-tidal freshwater wetlands dominated by trees, shrubs, and persistent emergent vegetation.

EO 11990 requires federal agencies to avoid impacts to wetlands whenever there is a practicable alternative. In making the determination whether a practicable alternative exists, an agency should account for economic, environmental, and other pertinent factors.

3.8.2 Analysis Methodology

Analysis of impacts focuses on whether and how proposed construction activities at the bases could affect wetlands and aquatic communities. No new construction or ground disturbance would occur below the airspace or on the ranges. Ordnance delivery against targets would be limited and confined to existing authorized targets already subject to disturbance. Use of flares would also continue to adhere to restrictions. As a result, the Air Force anticipates no new or additional impacts to wetlands and freshwater aquatic communities on land under the airspace or on the ranges. Therefore, analysis of these resources focuses potential impacts at the bases where construction would occur.

3.9 Threatened, Endangered, and Special Status Species/Communities

3.9.1 Definition of Resource

This analysis focuses on species that are important to the function of the ecosystem, are of special societal importance, or are protected under federal or state law or statute. Special Status Species are defined as: 1) federally listed plant and animal species and their habitats that are protected under the Endangered Species Act; and 2) other special status species, including state-listed species that are not federally listed, and other species of special concern identified by state and federal agencies. No effects to marine mammals would occur (see Section 3.3).

3.9.2 Analysis Methodology

The focus of the analysis is on the federally- and state-listed or candidate threatened and endangered species. Other species of conservation concern are addressed, but are not analyzed to the same level of detail as the species listed by the USFWS as threatened or endangered. Potential impacts from the F-35As at the bases and associated training ranges and airspace to threatened, endangered, and special status species/communities include potential habitat loss, and temporary and permanent impacts associated with the construction and use of facilities and ground impacts associated with the use of munitions or countermeasures.

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 new ground disturbance. With the exception of the airspace associated with Mountain Home AFB where the F-35A beddown would add to existing use, ordnance delivery and flare use would not exceed baseline levels and would occur in locations already used and authorized for those purposes. In addition, invertebrates and fish were excluded from review and analysis as they, too, would not likely be impacted by the proposed action and alternatives.

3.10 Cultural and Traditional Resources

3.10.1 Definition of Resource

Cultural resources are historic and traditional cultural properties that reflect our heritage and are considered important to a culture, a subculture, or a community for scientific, traditional, religious, or any other reason. Federal regulations define historic properties to include prehistoric and historic sites, buildings, structures, districts, or objects in or eligible for inclusion on the National Register of Historic Places (NRHP), as well as artifacts, records, and remains related to such properties (National Historic Preservation Act [NHPA], as amended [16 USC 470 *et seq.*]). Additionally, cultural resources are protected under the Archaeological Resource Protection Act (ARPA) (16 USC 470aa-470mm; Public Law 96-95 and amendments), the Native American Graves Protection and Repatriation Act (NAGPRA) (Public Law 101-601; 25 USC 3001-3013), and the American Indian Religious Freedom Act (Public Law 95-341; 42 USC 1996 and 1996a). Compliance with Section 106 of the NHPA, which directs federal agencies to take into account the effect of a federal undertaking on a historic property, is outlined in the Advisory Council on Historic Preservation's regulations, "Protection of Historic Properties" (36 CFR § 800). The NHPA and associated Section 106 compliance also includes guidance for American Indian consultation regarding cultural significance of potential religious and sacred artifacts (16 USC 470a [a][6][A] and [B]).

Properties are considered to be eligible for listing on the NRHP if they are deemed important in American history, architecture, archaeology, engineering, and culture. A traditional cultural property (TCP) is defined as one that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that are rooted in that community's history, and are important in maintaining the continuing cultural identity of the community.

Nominations to the NRHP are presented by the State Historic Preservation Officer (SHPO) of the state in which the property is located, by the Federal Preservation Officer for properties under federal ownership or control, or by the Tribal Preservation Officer if the property is on tribal lands (NHPA 1966; 80 Stat. 915, 16 USC 470 *et seq.*, as amended). The properties must possess integrity of location, design, setting, materials, workmanship, feeling, or association, and meet at least one of four criteria: a) are associated with events that have made a significant contribution to the broad patterns of history; b) are associated with the lives of persons significant in the past; c) embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or d) have yielded, or may be likely to yield, information important in prehistory and history. In addition, Criterion Consideration G states "a property achieving significance within the last 50 years is eligible if it is of exceptional importance" (NPS 2002).

3.10.2 Analysis Methodology

Procedures for assessing adverse effects to cultural resources are discussed in regulations for 36 CFR § 800 of the NHPA. An action results in adverse effects to a cultural resource eligible to the NRHP when it alters the resource characteristics that qualify it for inclusion in the register. Adverse effects are most often a result of physical destruction, damage, or alteration of a resource; alteration of the character of the surrounding environment that contributes to the resource's eligibility; introduction of visual, audible, or atmospheric intrusions out of character with the resource or its setting; and neglect of the resource resulting in its deterioration or destruction; or transfer, lease, or sale of the property. In the case of the proposed action and alternatives, potential effects to cultural resources could result from ground-disturbing activities associated with construction or demolition of significant structures, modification of significant structures, increased noise levels and vibrations, and visual intrusions from overflights.

For this EIS, impacts to cultural resources are evaluated for the Area of Potential Effects (APE). The APE of an undertaking is defined at 36 CFR § 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." The APE for the installations consists of all areas of ground disturbance associated with proposed construction or remodeling activities. As the viewshed of the historic buildings has been altered over time by construction of military structures, indirect visual impacts to these structures would be minimal. Impacts to ground disturbance at existing ranges is also not analyzed, as these areas are already disturbed and have existing plans for avoiding impacts to NRHP listed or eligible resources. Therefore, the analysis focused on direct impacts due to construction and renovation. The impact analysis also examined the significance of the structure itself and whether the modification affects the characteristics that make the structure eligible for listing in the NRHP.

For airspace actions, only those cultural resources that would reasonably be affected by visual (overflights) and noise intrusions are considered. These include architectural resources; archaeological resources with standing structures, such as historic ranches, ghost towns, American Indian settlements; and traditional cultural properties. Prehistoric and historic archaeological sites lacking standing structures are not included as they are generally ground surface or even subsurface deposits that would not be affected by the proposed action. Some prehistoric archaeological sites could contain natural structures such as rock shelters or caves. These structures often house petroglyphs or pictographs, which are etched or painted onto the rock surfaces. However, studies have found that these types of natural formations are not affected any more by noise vibrations, such as sonic booms, than by natural erosion, wind, or seismic activity (Battis 1983).

For areas under the airspace, cultural resources with standing structures that are listed on or eligible for listing on the NRHP or State Registers or were listed as known ghost towns were considered. The Air Force recognizes that hundreds of other cultural resources, some documented and some not yet discovered, exist under the airspace. However, aircraft operations are most likely to affect historic structures and districts where setting is an important criterion for significance and where noise vibrations from sonic booms could adversely impact those types of resources. These resources are ones typically found on the NRHP or State Register. Conversely, if NRHP-listed properties are not affected by the project elements, then non-listed resources are unlikely to be affected.

In an on-going effort to identify traditional cultural properties, the Air Force is in the process of consulting with American Indian tribes according to the Presidential Memorandum on Government-to-Government Relations with Native American Tribal Governments, EO 13084, 13075, and DoD Policy on Indian and Native Alaskan Consultation. The Air Force initiated American Indian consultation in accordance with DoD Instruction 4710.02 (and other applicable regulations), *DoD Interactions with Federally-Recognized Tribes*, September 16, 2006, which implements the DoD American Indian and Alaska Native Policy, assigns responsibilities, and provides procedures for DoD interaction with federally-recognized tribes. Letters initiating informal government-to-government consultation were sent in January 2010 to tribes and individuals with properties of religious and cultural significance potentially affected by the proposed action and invited tribes to participate in scoping meetings (see Appendix B of the Draft EIS). The Air Force sent additional letters to and communicated with tribes throughout the multi-year NEPA process, and if requested, set up face-to-face meetings to address tribal concerns.

3.11 Land Use

3.11.1 Definition of Resource

Land use describes how land is developed and used, typically in terms of the types of activities allowed. The attributes of land use examined in this EIS include land ownership and status, general land use patterns, land management plans, and special use areas. For the base and environs, management plans and zoning regulations determine the type and extent of allowable land use in specific areas to limit conflicting land uses and protect specially designated or environmentally sensitive areas. Land use categories can include residential; commercial; manufacturing; transportation, communication, and utilities; recreation; institutional; mining and extraction; and agriculture and forestry. On military installations, land use tends to be generally divided into various operational and support functions.

For the areas under the airspace, analysis of land use considers the same basic topics as noted above. However, the land use categories also include special use areas, parks and recreation areas, and communities. Less emphasis is placed on ordinances, with broader land use plans being the focus. Areas under the airspace include federal, state, and local government lands as well as private lands. No land use discussion of the overwater Warning Areas is presented (see Section 3.1.3). For the ranges, most lands have been withdrawn for military purposes with public use either prohibited or restricted. In the West, other federal agencies such as the U.S. Forest Service (USFS) or Bureau of Land Management (BLM) have management responsibilities for lands under many of the MOAs/ATCAAs. In the East, state land management agencies and private landholders are more common. Land uses are frequently regulated by management plans, policies, ordinance, and regulations that determine the types of uses that are allowable or protect specially designated or environmentally sensitive uses. Special land use management areas are identified by agencies as being worthy of more rigorous management. These areas can include Wilderness Areas, Wild and Scenic Rivers, National or State Parks, and wildlife refuges.

Land Use Compatibility Guidelines

In June 1980, an *ad hoc* FICUN published guidelines (FICUN 1980) relating DNL to compatible land uses. This committee was composed of representatives from DoD, Transportation, and Housing and Urban Development; USEPA: and the Veterans Administration. Since the issuance of these guidelines, federal agencies have generally adopted these guidelines for noise analyses.

Following the lead of the committee, the DoD and FAA adopted the concept of land-use compatibility as the accepted measure of aircraft noise effect. Air Force guidelines are reprinted in Table C-4 (Appendix C), along with the explanatory notes included in the regulation. These guidelines are not mandatory (note the footnote "*" in the table), rather they are recommendations to provide the best means for determining noise impact for communities adjacent to bases. For commercial airports, the FAA has adopted similar guidelines (as set forth in the Federal Aviation Regulations [FAR] Part 150) and these are presented in Table C-5 (Appendix C). Again, these are recommendations only; it is up to the city/county zoning and planning entities to determine what land uses are compatible and how they will deal with incompatibilities (e.g., what type of development is allowed, instituting residential buyouts, or whether noise attenuation efforts will be done in residential units).

These land use compatibility guidelines provide a gauge for assessing impacts around busy airfields like those considered for beddown of the F-35A. Other than residential lands and schools, hospitals, and churches, other types of land uses are compatible with noise levels of 65 to 70 dB DNL. As noise levels increase, fewer land use remain compatible. In general, residential land uses normally are not compatible with outdoor DNL values above 65 dB, and the extent of residential land area and populations exposed to DNL of 65 dB and higher provide the best means for assessing the noise impacts of the proposed action. For effects on schools, churches, and hospitals, refer to Section 3.3, Noise.

Areas under the airspace include federal, state, and local government lands as well as private lands. Sensitive land use areas, such as Wilderness Areas, Wildlife Refuges, State and National Parks, are of particular interest in this analysis. Federal and state geo-databases were used to identify land ownership, management, and special use areas in the vicinity of airspace. Federal lands are administered by agencies, including the BLM, the USFS, the USFWS, and the NPS. This analysis used geographic information systems to calculate the location and acreage of each land management area located under the airspace. Management areas, special use areas, and their respective acreages are reported in both tabular and map formats. Recreational activities were considered within the context of special use areas and were not analyzed specifically. Noise compatibility analysis of special use areas would include all activities within the areas, including recreation.

3.11.2 Analysis Methodology

After describing the existing conditions, the analysis examines the extent to which the beddown alternatives would be consistent with state, regional, and local conservation and development plans and zoning regulations. Changes in land use from new construction are analyzed to determine compatibility with existing and planned uses. In addition, the analysis assesses changes in aircraft noise levels around the bases and in the airspace as a result of the proposed action and alternatives. When compared to baseline conditions, land use plans, and land use regulations, the magnitude of the change represents the level of impacts. Compatibility standards such as those established by the U.S. Department of Housing and Urban Development and AICUZ program provide the means to evaluate impacts.

Changes to ownership or status commonly represent the types of impacts evaluated for lands underlying training airspace. Since no portion of the proposed action would alter the structure, size, or operation of DoD range lands, and acquisition of new non-DoD lands would not be required, alteration of ownership would not pose an issue. Similarly, the proposed action would not generate changes to the status or use of underlying lands, or plans and policies implemented for their management. Therefore, the only source of potential effects to land use would result from changes to noise from overflights that could be perceived as incompatible with current uses, particularly recreation and wilderness aesthetics. Lacking a quantitative or regulatory standard for such impacts, this analysis considers the degree of change and overall noise levels in defining potential impacts to underlying uses and activities.

Assessment of land use compatibility considered the overall level of subsonic and supersonic noise, as well as the degree of change. Noise is reported as the amount of perceptible change in noise levels; the frequency of overflights, especially those at lower altitudes; perceived sensitivities of land uses; and where appropriate, the change in numbers of sonic booms.

3.12 Socioeconomics

3.12.1 Definition of Resource

Socioeconomics describes the basic attributes and resources associated with the human environment, particularly population and economic activity. Economic activity typically encompasses employment, personal income, and industrial growth. The affected area for socioeconomics is defined as the area in which the principal effects arising from implementation of the proposed action or alternatives are likely to occur. The proposed action has the potential to cause socioeconomic impacts to the communities around the bases through construction and changes or relocation of personnel. For example, the affected area for Hill AFB consists of two communities, Davis and Weber counties. For Mountain Home AFB the affected area includes Ada, Elmore, and Owyhee counties, and socioeconomic data for the state of Idaho is also provided as a general comparison. The affected area around Shaw AFB includes Sumter County and socioeconomic data for the state of South Carolina is provided as a general comparison. Burlington AGS socioeconomics are closely tied to the community of Chittenden County and data for the state of Vermont is provided for comparison. The affected area surrounding Jacksonville AGS encompasses Duval County and comparisons are provided for the state of Florida. For McEntire JNGB, the affected area includes the county of Richland, and comparisons are provided for South Carolina. The term in-migration is used throughout the text and describes the movement of people into a region or community, especially as part of a large-scale and continuing movement of population.

3.12.2 Analysis Methodology

Data presented have been collected from a variety of sources including U.S. Census Bureau 2010 Census, Bureau of Economic Analysis, Departments of Labor, and the Air Force. Results are presented for the most recent year where comparable data were available throughout the affected environment.

The information collected to describe the baseline conditions for the alternative basing locations was used as the basis for evaluation of project impacts. The IMPLAN (IMpact Analysis for PLANning) model, a federally-recognized economic modeling program, was used to analyze impacts from each of the action alternatives. The IMPLAN model is based on information derived from federal agency databases. IMPLAN uses regional industrial spending and trading pattern data to estimate the change in expenditures and employment within the local and state economy resulting from a change in each base's expenditure of dollars as a result of each action alternative.

Since no aspect of the proposed action or no-action alternative would affect socioeconomics at the ranges or under the airspace, the analysis does not address it further.

3.13 Environmental Justice/Protection of Children

3.13.1 Definition of Resource

In 1994, EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (Environmental Justice)*, was issued to focus the attention of federal agencies on human health and environmental conditions in minority and low-income populations. This EO was also established to ensure that, if there were disproportionately high and adverse human health or environmental effects of federal actions on these populations, those effects would be identified and addressed. Environmental justice is achieved if minority and low-income communities are not subjected to disproportionately high or adverse environmental effects. The environmental justice analysis addresses the characteristics of race, ethnicity, and poverty status for populations residing in areas potentially affected by implementation of the proposed action.

The analysis of environmental justice focuses on changes in airfield noise levels affecting the bases and adjacent communities created by the proposed action. A threshold of 65 dB DNL has been established for environmental justice impacts. As such, areas subject to noise levels of 65 dB DNL or greater were analyzed. These areas included all the bases and immediate environs. However, only four airspace units are subject to noise levels at or above this threshold and warranted analysis: Poinsett and Gamecock used by McEntire JNGB and Shaw AFB, and Jarbidge North and Owyhee North associated with Mountain Home AFB. Other areas under the airspace did not warrant analysis since either no population exists or noise levels would remain well below the threshold for considering impacts.

Protection of Children

In EO 13045 (1997), *Protection of Children from Environmental Health Risks and Safety Risks* (*Protection of Children*) focuses on identifying and addressing issues that affect the protection of children. Children may suffer disproportionately more environmental health and safety risks than adults because of various factors such as: children's neurological, digestive, immunological, and other bodily systems are still developing; children eat more food, drink more fluids, and breath more air in proportion to their body weight than adults; children's behavior patterns may make them more susceptible to accidents because they are less able to protect themselves; and children's size and weight may diminish their protection from standard safety features.

3.13.2 Analysis Methodology

For purposes of the EIS analysis, data presented have been collected from a variety of sources including U.S. Census Bureau 2010 Census, American Community Survey, Bureau of Economic Analysis, Departments of Labor, and the Air Force. For equal comparison of low-income and minority population impacts the 2006 to 2010 American Community Survey data were used. These are the only set of data that the Census Bureau now generates to obtain the level of specificity required for this analysis. The 2010 Census did not go to that level of detail for all six locations (as was found in the 2000 Census). The communities of comparison are the same as described in the socioeconomics section, with the exception of Mountain Home AFB, which also includes the city of Mountain Home; and Hill AFB, which also includes the city of Ogden within its communities of comparison. Minority and low-income populations are defined as:

- **Minority Populations** – All persons identified by the Census of Population and Housing to be of Hispanic or Latino origin, regardless of race, plus non-Hispanic persons who are Black or African American, American Indian and Alaskan Native, Asian, Native Hawaiian and Other Pacific Islander, Some Other (i.e., non-white) Race, or Two or More Races. For purposes of the EIS analysis, the minority population is calculated by subtracting the number of persons who are White Alone from the total population.
- **Low-Income Populations** – All persons that fall within the statistical poverty thresholds published by the U. S. Census Bureau in the Current Population Survey are considered to be low-income. For the purposes of this analysis, low-income populations are defined as a person living below the poverty level of $11,139, as reported in the 2010 Census. The Census Bureau determines poverty status based on 48 thresholds that take into account family size and the presence of individual members 18 years or older. If the total income for an individual or family falls below the relevant poverty threshold, then that person or family is classified as being below the poverty level.

Children are defined as persons under the age of 18 years as identified by the 2010 Census of Population and Housing. The number of children is calculated by subtracting the number of persons 18 years and over from the total population.

3.14 Community Facilities and Public Services

3.14.1 Definition of Resource

Community facilities and public services include on- and off-base potable water systems, wastewater treatment systems, electric and natural gas utilities, solid waste management, and public schools. This section describes and evaluates the range of community facilities and public services associated with the bases and surrounding communities.

3.14.2 Analysis Methodology

The affected area for community facilities and public services is defined as the area in which the principal effects arising from implementation of the proposed action are likely to occur. This area can vary in scope according to the type of utility or community service being analyzed, from localized to regional impacts.

Impacts are assessed with respect to the potential for disruption or exceeding capacity of utility systems or degradation of existing levels of service. Utility system effects may include disruption, degradation, or improvement of existing levels of service or potential change in demand for energy or potable water. Should base personnel and associated dependents decrease from baseline or remain similar to that under the no-action alternative, then use of community facilities and public services would also be expected to decrease and therefore, were not addressed for further study. In circumstances where personnel are expected to increase, multipliers were used for each utility to assess how the increase in personnel would potentially impact the surrounding community. The multipliers are published by the U.S. Geological Survey (USGS) and the U.S. Department of Energy and represent the average per capita use or per household use. Each of the multipliers is stated in the community facilities and public services sections upon use.

3.15 Ground Traffic and Transportation

3.15.1 Definition of Resource

Ground traffic and transportation refer to roadway and street systems, the movement of vehicles on roadway networks, and mass transit. Roadway operating conditions and the adequacy of existing roadway systems to accommodate vehicle use are often described in terms of average daily traffic (ADT) volumes and Level of Service (LOS) ratings. LOS is a term used to qualitatively describe the operating conditions of a roadway based on factors such as speed, travel time, maneuverability, delay, and safety. The LOS is designated with a letter, A to F, with A representing the best operating conditions and F the worst. Generally, roadways or intersections with LOS values from A to D are considered functional, whereas E and F are considered to have degraded functionality. There are many methods available to calculate the LOS for various types of roadways and intersections. The Transportation Research Board's 2000 *Highway Capacity Manual* contains guidelines and procedures for computing capacity and LOS methods for freeways, multilane highways, signalized intersections, and unsignalized intersections across the U.S was used for this analysis.

3.15.2 Analysis Methodology

The ground traffic and transportation analysis assesses potential impacts to LOS for each base as a result of changes in personnel associated with each alternative location and scenario. Based on the *Highway Capacity Manual* (Transportation Research Board 2000), the LOS ratios used applied to primarily signalized intersections, as these are typical types of roadways within and surrounding military installations. The degree of effect on LOS thresholds for signalized intersections forms the basis of assessing the magnitude of impacts; the greater the increase in traffic, the more potential impact to LOS. The analysis of potential impacts are based on the fact that the lower the existing LOS value is for roadways around a given facility, then the increase in traffic volume required to exceed existing LOS thresholds is also smaller. For instance, a mid-range LOS A for a signalized intersection (volume-to-capacity [V/C] ratio of 0.35) would require an increase in traffic volume of roughly 86 percent to drop to a mid-range LOS B (V/C ratio of 0.65); whereas, a mid-range LOS B would require an increase in traffic volume of roughly 15 percent to decrease to a mid-range LOS C (V/C ratio of 0.75). It should be noted that LOS D is considered to be an acceptable LOS. For LOS E and F, the capacity of the roadway, lane, or intersection is exceeded and the traffic is considered unacceptable.

A signalized intersection LOS is defined in terms of the average total vehicle delay of all movements through an intersection. Vehicle delay is a method of quantifying several intangible factors, including driver discomfort, frustration, and lost travel time. Specifically, LOS criteria are stated in terms of average delay per vehicle during a specified time period. Vehicle delay is a complex measure based on many variables, including signal phasing (i.e., progression of movements through the intersection), signal cycle length, and traffic volumes with respect to intersection capacity. LOS criteria for signalized intersections are presented in Table 3-6.

Table 3-6. Level of Service Criteria for Signalized Intersections

LOS	*Average Control Delay (seconds/vehicle)*	*V/C Ratio*	*General Description*
A	≤ 10	< 0.60	Free Flow
B	> 10 – 20	0.60 to 0.69	Stable Flow (slight delays)
C	> 20 – 35	0.70 to 0.79	Stable flow (acceptable delays)
D	> 35 – 55	0.80 to 0.89	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	> 55 – 80	0.90 to 0.99	Unstable flow (intolerable delay)
F	> 80	≥ 1.00	Forced flow (jammed)

Source: Transportation Research Board 2000.

Impacts to ground traffic and transportation are assessed with respect to the potential for disruption to or improvement of current circulation patterns, deterioration or improvement of existing levels of service on roadways, and changes in existing levels of transportation.

An 11.8 percent increase in traffic volume at a signalized intersection is required to degrade a mid-range LOS D (V/C ratio of 0.85) to a mid-range E (V/C ratio of 0.95). An 11.8 percent increase in traffic volume that degrades LOS D to E is smaller than all higher LOS increment shifts; any increase in volume that does not fully degrade LOS D to E will not degrade A to B, B to C, or C to D. Therefore, an 11.8 percent increase in road, lane, or intersection traffic volume will be a primary criterion indicating the threshold of concern for roadway capacity.

A secondary criterion will be used that is derived from potential traffic volume increases resulting in the degradation of LOS C to E, or two full levels. Such a decline would be associated with a 26.7 percent increase in traffic volume. This secondary criterion will be used to indicate the threshold for roadway capacity.

The assumptions in this analysis are that one morning (a.m. peak hour) and one afternoon (p.m. peak hour) vehicle trip is generated for each new employee, and that the distribution of new traffic to the roadway networks will be proportional to the existing conditions. In addition, it is conservatively assumed that each person will drive one car each day to and from the installation, not taking into consideration carpooling or other forms of alternative transportation, personnel away from the base, or those personnel that live on-base (where applicable) and, therefore, would not access the base during peak hours or add to off-base traffic.

3.16 Hazardous Materials and Waste

3.16.1 Definition of Resource

This EIS analyzes impacts related to hazardous materials, toxic substances, hazardous waste, and contaminated sites. Specifically, this EIS analyzes the potential for hazardous materials to be introduced to the respective installations during the course of site development and construction activities; for toxic and hazardous wastes to be generated as a result of construction and demolition activities; and for encounter with contaminated media during the course of site preparation and construction/demolition activities.

This EIS also analyzes impacts related to the continuing use of hazardous materials and generation of hazardous wastes during F-35A aircraft operations and maintenance. Operational changes (increases/decreases in flying time) would affect the amount of hazardous materials used and stored at the bases, as well as the amount of hazardous waste generated. The number of operations is expected to vary across bases and basing scenarios; however, flight training times (standard 60 to 90 minutes) are not expected to change. Maintenance activities and schedules could change resulting in a change in the use of hazardous or toxic substances or generation of hazardous wastes at each respective base compared to existing conditions.

Hazardous Materials and Waste

Hazardous materials are chemical substances that pose a substantial hazard to human health or the environment. Hazardous materials include hazardous substances, extremely hazardous substances, hazardous chemicals, and toxic chemicals. In general, these materials pose hazards because of their quantity, concentration, physical, chemical, or infectious characteristics. The Resource Conservation and Recovery Act (RCRA) (42 USC 6903[5]) defines a hazardous waste as a solid waste, or combination of solid waste, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may: 1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or 2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Hazardous substances are defined and regulated under the laws administered by OSHA, USEPA, and U.S. DOT. Each of these agencies incorporates hazardous substance terminology in accordance with its unique Congressional mandate: OSHA regulations categorize substances in terms of their impacts on employee and workplace health and safety; U.S. DOT regulations categorize substances in terms of their safety in transportation; and USEPA regulations categorize substances in terms of protection of the environment and the public health.

With regard to environmental impacts, hazardous substances are regulated under several federal programs administered by the USEPA, including Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Emergency Planning and Community Right-to-Know Act, Toxic Substances Control Act (TSCA), and RCRA. DoD installations are required to comply with these laws along with other applicable federal, state, and DoD regulations, as well as with relevant EOs.

In regulations promulgated under RCRA, the USEPA defines hazardous waste as a solid waste that is not excluded from regulation as a hazardous waste under 40 CFR § 261.4(b) and exhibits any of the characteristics (ignitability, corrosivity, reactivity, toxicity) described in 40 CFR § 261; or is listed in 40 CFR § 261 Subpart D; or is a mixture containing one or more listed hazardous wastes. Hazardous wastes may take the form of solid, liquid, contained gaseous, semi-solid wastes (e.g., sludges), or any combination of wastes that pose a substantial present or potential hazard to human health or the environment and have been discarded or abandoned. For the purposes of this EIS, hazardous wastes include solid wastes that are regulated as hazardous based on either direct listing by USEPA or characteristics (ignitability, reactivity, corrosivity, and toxicity), as well as those contaminants present in environmental media (e.g., soil or groundwater).

Military munitions used for their intended purposes on ranges or collected for further evaluation and recycling are not considered waste per the Military Munitions Rule (40 CFR § 266.202). The Military Munitions Rule amended portions of RCRA (40 CFR §§ 260 through 170) and defines when conventional and chemical military munitions become solid waste potentially subject to RCRA. Specifically, the use of flares is ongoing at most bases analyzed in this EIS and would continue with the implementation of the proposed action (see Section 2.2 for further discussion of Defensive Countermeasure Operations). Since the munition would be used for its intended training purpose and most flare residual material or debris does not constitute a hazardous waste, any residual material that falls to the ground would not be considered a solid waste and thus not a hazardous waste.

Activities at all the bases analyzed in this EIS require the use and storage of a variety of hazardous materials and wastes, including flammable and combustible liquids, acids, corrosives, caustics, compressed gases, solvents, paints, paint thinners, and various other petroleum, oils, and lubricants (POLs). All of the bases have procedures in place for purchase, receiving, use, reuse, recycle, and final disposal of hazardous materials used on the installations. Specific details of the programs and procedures relating to hazardous materials and wastes at each location are provided in each base's respective section of this EIS.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, requires the promotion of pollution prevention and elimination of waste by reducing and minimizing the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed. Additionally, 95 percent of all new contracts require the use of products that are non-toxic or less-toxic.

The F-35 Program includes an Air System Lifecycle Plan for each aircraft that also focuses on hazardous materials reduction and elimination initiatives (Fetter 2008). In the design phase for the F-35, Lockheed Martin Aeronautics has substituted materials and processes where a more environmentally preferable alternative is available. The F-35 program continues to seek material substitutions that focus on sustainability and decreasing the lifecycle expense of materials and materials handling for the aircraft.

Some of the materials substitutions that have been implemented in the development of the F-35 include reducing or eliminating the use of many heavy metals and other environmentally sensitive materials that were expensive to handle and dispose (Fetter 2008; personal communication, Luker 2010). The F-35 has implemented the use of titanium or stainless steel fasteners instead of traditional, cadmium-plated screws and rivets. A new Integrated Power Package has replaced a dangerous and toxic hydrazine system that is used in F-16 aircraft to restart stalled engines at altitude. The landing gear and other high wear surfaces of traditional aircraft was chrome-plated, an expensive, high-maintenance, slow, and environmentally risky process. The F-35 instead uses a high velocity, oxygenated fuel technology that uses a powder to coat the parts, improving the function, and extending the lifespan of F-35 actuators, wear surfaces, and landing gear—without the use of chrome plating. Primers have been developed that do not require the use of traditional cadmium and hexavalent chromium-based material. Copper-Beryllium bushings were formerly used in high-load actuators, such as the tail and landing gear, and new materials are being designed and substituted where feasible. Finally, a new detection device will alert maintenance teams to corrosion issues in the aircraft, and thereby, reduce stripping and repainting of the aircraft to an as-needed procedure.

Another potential difference between the current fighter aircraft and the F-35A is with respect to the fuel loading capabilities. For example, the F-35A internal fuel load is roughly twice that of an F-16, with no significant fuel efficiency increase over the older model (Headquarters ACC/A5BA 2010, Global Security 2006). Although this increase in fuel capacity may translate into the potential need for additional onsite fuel storage, reductions in operations (except at Mountain Home AFB) with similar training flight times would not be expected to significantly change actual fuel use at the bases.

Toxic Substances

The promulgation of TSCA (40 CFR §§ 700-766) represented an effort by the federal government to address those chemical substances and mixtures for which it was recognized that the manufacture, processing, distribution, use, or disposal may present unreasonable risk of personal injury or health of the environment, and to effectively regulate these substances and mixtures in interstate commerce. The TSCA Chemical Substances Inventory lists information on more than 62,000 chemicals and substances. Toxic chemical substances regulated by USEPA under TSCA include asbestos and lead, which for the purposes of this EIS, are evaluated in the most common forms found in buildings, namely asbestos-containing materials (ACM) and lead-based paint (LBP). TSCA also establishes management obligations for the cleanup of polychlorinated biphenyls (PCBs).

ACMs have been classified as a hazardous air pollutant by the USEPA in accordance with Section 112 of the CAA. Surveys would be conducted for ACMs, as required by 40 CFR § 61.145, during the design phase of the project and prior to demolition or renovation of any structure. Any located ACM would be characterized, managed, transported, and disposed according to applicable state and federal requirements for protecting human health and safety and the environment.

LBP may also be present in buildings or other facilities that would be modified or demolished as part of each alternative. Similar to ACMs, surveys would be conducted on structures to be modified or demolished for LBP during the design phase of the project and prior to structure demolition or renovation. LBP sampling would be conducted on the structures to be removed and analyzed in accordance with USEPA approved Toxicity Characteristic Leaching Procedure methodology. Based on this federal testing methodology, the paint would be considered hazardous if lead is detected at concentrations greater than 5 micrograms per liter. If LBP were detected at hazardous concentrations, these materials would be removed. LBP would be characterized, managed, transported, and disposed according to applicable state and federal requirements for protecting human health and safety and the environment.

Beginning in the 1920s, PCBs had many common household uses, including applications in electrical transformers, as coolants in refrigeration machinery, and in oil and hydraulic fluids. PCBs are toxic and have been classified as a persistent organic pollutant, acting as carcinogens that do not break down easily in the environment. Thus, the manufacture and use of PCBs in the U.S. was banned by Congress in 1979 and cleanup actions are regulated through TSCA (USEPA 2009). Most bases considered in this EIS are designated “PCB-Free.”

Contaminated Sites

Potential hazardous waste contamination areas are being investigated as part of the Defense Environmental Restoration Program (DERP). DoD developed the DERP to identify, investigate, and remediate potentially hazardous material disposal sites on DoD property prior to 1984. As part of DERP, DoD created the Environmental Restoration Program (ERP) and the Military Munitions Response Program (MMRP). These programs were instituted to satisfy the requirements of CERCLA and RCRA for former and current hazardous waste sites.

Hazards associated with historic ranges include military waste munitions that were improperly disposed and unexploded munitions rounds. The MMRP is designed to clean up discarded military munitions, unexploded ordnance, and their chemical residues at closed historic ranges and munitions disposal sites. The MMRP is modeled after the ERP and is implemented using the process developed for cleanup under CERCLA legislation. This program also addresses the unique explosive safety hazards associated with munitions and explosives and human health risks posed by munition constituents at locations not designated as operational ranges.

3.16.2 Analysis Methodology

A comparative analysis of existing and proposed hazardous materials and waste management practices was performed to evaluate impacts. For each base and alternative, the analyses include impacts due to proposed construction activities as well as the proposed operational activities for the F-35A. The analysis considers the magnitude of anticipated increases in hazardous waste generation considering historic levels, existing management practices, and storage capacity. For ERP sites, the methodology compares the proximity of the proposed construction actions to ERP sites and considers construction activities and operational uses of the facilities to determine the impacts to the ERP sites.

3.17 Cumulative Effects and Irreversible and Irretrievable Commitment of Resources

3.17.1 Cumulative Impacts/Effects Definition

CEQ regulations implementing the NEPA require that the cumulative impacts of a proposed action be assessed. A cumulative impact is defined as the following:

> *"…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR § 1508.7)*

CEQ's guidance for considering cumulative effects states that the NEPA documents "should compare the cumulative effects of multiple actions with appropriate national, regional, state, or community goals to determine whether the total effect is significant" (CEQ 1997). The first step in assessing cumulative effects, therefore, involves identifying and defining the scope of other actions and determining their interrelationship with the proposed action. The scope must consider whether other projects coincide with the location and timetable of the proposed action and other actions. Past, present, and reasonably foreseeable future actions at each installation were examined, including both military actions in the region as well as other federal and non-federal actions to determine if they interact with the proposed action. After examining these actions, the analysis determined the nature of the interaction. An analysis of how the impacts of the defined actions might affect or be affected by those resulting from the proposed action for each of the environmental resources discussed in this EIS are provided for each installation.

3.17.2 Cumulative Impacts Analysis Methodology

To ensure a rigorous assessment of potential cumulative impacts, this analysis sought information on military actions, other federal actions, and non-federal actions at each installation. Public documents prepared by federal, state, and local governments formed the primary source for defining actions. Scoping also provided an opportunity to gain insight into such actions. Documents used to define these other actions included notices of intent, EISs, and Environmental Assessments, management and land use plans, ordinances, other NEPA studies, and economic and demographic projections.

For each installation, information on actions was gathered from base planners, environmental managers, and operations staff. Community representatives and state and federal land managers provided information on actions outside the bases in the surrounding areas. For the ranges and airspace, primary sources of information consisted of the managing and scheduling entities, as well as federal and state agencies with lands underlying MOAs and ATCAAs.

3.17.3 Irreversible and Irretrievable Commitment of Resources

Primary irreversible effects result from permanent use of a nonrenewable resource (e.g., minerals or energy). Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the proposed action (e.g., disturbance of a cultural site) or consumption of renewable resources that are not permanently lost (e.g., old growth forests). Secondary impacts could result from environmental accidents, such as fires. Natural resources include minerals, energy, land, water, forestry, and biota. Non-renewable resources are those resources that cannot be replenished by natural means, including oil, natural gas, and iron ore. Military training necessarily involves consumption of nonrenewable resources, such as jet fuel for the aircraft.

Renewable natural resources are those resources that can be replenished by natural means, including water, lumber, and soil. The proposed action would involve irretrievable commitments of two types of resources, depending on the alternative selected: 1) general industrial resources including capital, labor, fuels, and construction materials; and 2) project-specific resources such as wetlands and other sensitive habitats, and land uses at the project site(s).

Introduction to Base-Specific Sections

Chapter 4

How to Use This Document

Our goal is to give you a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the no-action alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement, or EIS, is shown below.

EXECUTIVE SUMMARY

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

OVERALL PROPOSAL VOLUME I

PREFACE
Detailed Guide for Reading the Final EIS

CHAPTER 1
Purpose and Need for the Air Force F-35A Operational Beddown

CHAPTER 2
- Overview of the Proposed Action and Alternatives
- Alternative Identification Process
- Summary Comparison of the Proposed Action and Alternatives

CHAPTER 3
Resource Definition and Methodology

INFORMATION SPECIFIC TO EACH BASE VOLUME I

CHAPTER 4
Six Base-Specific Sections

Burlington AGS	Hill AFB	Jacksonville AGS	McEntire JNGB	Mountain Home AFB	Shaw AFB
Section BR1.0 Proposed Action Overview	**Section HL1.0** Proposed Action Overview	**Section JX1.0** Proposed Action Overview	**Section Mc1.0** Proposed Action Overview	**Section MH1.0** Proposed Action Overview	**Section SH1.0** Proposed Action Overview
Section BR2.0 Base-Specific Project Details	**Section HL2.0** Base-Specific Project Details	**Section JX2.0** Base-Specific Project Details	**Section Mc2.0** Base-Specific Project Details	**Section MH2.0** Base-Specific Project Details	**Section SH2.0** Base-Specific Project Details
Section BR3.0 Affected Environment and Environmental Consequences	**Section HL3.0** Affected Environment and Environmental Consequences	**Section JX3.0** Affected Environment and Environmental Consequences	**Section Mc3.0** Affected Environment and Environmental Consequences	**Section MH3.0** Affected Environment and Environmental Consequences	**Section SH3.0** Affected Environment and Environmental Consequences
Section BR4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section HL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section JX4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section Mc4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section SH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

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4.0 INTRODUCTION TO BASE-SPECIFIC SECTIONS

The information in Chapter 4 forms the basis for the environmental comparative analysis presented in the tables at the end of the separate Executive Summary and Section 2.3 of this volume. The goal in producing this EIS has been to prepare as concise a document as possible that addresses the base-specific concerns of individuals and agencies, while meeting the comparative needs of the Air Force decisionmakers.

The Air Force evaluated and compared operational, economic, and environmental factors to determine whether to make a basing decision at this time and, if such a decision is made, where the initial F-35A aircraft is to be located. During scoping, it became apparent that public and agencies were interested not so much in comparing the potential environmental consequences among bases as in determining what a basing decision would mean for their specific location. Individuals participating in scoping at each location expressed different interests and concerns, and concerns at one location were not necessarily relevant to another location.

Chapter 4 addresses those interests and concerns in six location-specific sections. Each of these sections essentially comprises a sub-chapter dedicated to an individual alternative location. For the reader's ease, all portions of these sub-chapters are labeled with a unique identifier: Burlington AGS = BR, Hill AFB = HL, Jacksonville AGS = JX, McEntire JNGB = Mc, Mountain Home AFB = MH and Shaw AFB = SH. In each base-specific section, there is a detailed description of the particular facilities required for an F-35A beddown decision at that base. The description in Section 2 for each base includes the number of aircraft involved, buildings needed, amount of area disturbed, personnel changes, flight operations, and airspace use. Within Section 3 for each base, the affected environment discussion is immediately followed by potential environmental consequences. This compares the potential consequences with the baseline, or no action, conditions. Lastly, cumulative effects of the proposed action at each location are examined.

Parallel environmental resource sections for each base permit rapid comparisons among the bases. For example, HL3.10, which addresses land use for Hill AFB and its environs, can be compared with land use at Jacksonville AGS by turning to JX3.10.

The proposed action includes four elements affecting the base and three elements affecting the airspace. Table 4-1 defines the resources associated with each affected area, base or airspace. As this table reveals, not all resources affected by the proposed action at the base would be affected under the airspace. In accordance with National Environmental Policy Act (NEPA) and Council on Environmental Quality (CEQ) Regulations, this EIS emphasizes those resources affected by the proposed action and excludes discussion of resources not affected. This approach also applies to differentiating between the base and the airspace. For example, construction and personnel changes would affect socioeconomics at the base and in its environs, but no elements of the action would result in socioeconomic effects on lands under the airspace.

Table 4-1. Resources Analyzed in the EIS			
Section	***Resource***	***Base***	***Airspace***
3.1	Airspace Management and Use	Yes	Yes
3.2	Noise (Subsonic and Supersonic)	Yes	Yes
3.3	Air Quality	Yes	Yes
3.4	Safety	Yes	Yes
3.5	Geology, Soils, and Water	Yes	No
3.6	Terrestrial Communities	Yes	Yes
3.7	Wetlands and Freshwater Aquatic Communities	Yes	No
3.8	Threatened, Endangered, and Special Status Species/ Communities	Yes	Yes
3.9	Cultural and Traditional Resources	Yes	Yes
3.10	Land Use	Yes	Yes
3.11	Socioeconomics	Yes	No
3.12	Environmental Justice/Protection of Children	Yes	Yes
3.13	Community Facilities and Public Services	Yes	No
3.14	Ground Traffic and Transportation	Yes	No
3.15	Hazardous Materials and Waste	Yes	No

Burlington Air Guard Station

How to Use This Document

Our goal is to give you a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the no-action alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement, or EIS, is shown below.

EXECUTIVE SUMMARY

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

OVERALL PROPOSAL VOLUME I

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Detailed Guide for Reading the Final EIS

CHAPTER 1
Purpose and Need for the Air Force F-35A Operational Beddown

CHAPTER 2
- Overview of the Proposed Action and Alternatives
- Alternative Identification Process
- Summary Comparison of the Proposed Action and Alternatives

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Six Base-Specific Sections

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BR1.0 BURLINGTON AIR GUARD STATION OVERVIEW

This section presents an overview of the 158th Fighter Wing (158 FW) installation at Burlington Air Guard Station (AGS); the specifics of the proposed action as it relates to both the airfield and the associated airspace; construction and modifications required at the installation; changes to personnel; state consultation and associated permits that would be required should Burlington AGS be selected as one of the beddown locations for the F-35A; and identified public and agency concerns with the proposal.

The 158 FW of the Vermont Air National Guard (VTANG) is located at Burlington International Airport (IAP) in South Burlington, Vermont. The City of South Burlington is located in Chittenden County, approximately 4 miles east of Lake Champlain in northwest Vermont (Figure BR1.0-1). Burlington IAP is located within the South Burlington city limits, 3 miles east of the City of Burlington's central business district. The 158 FW occupies 280 acres of land on the eastern side of the airport, and owns and maintains 44 buildings in support of their mission (Figure BR1.0-2).

Figure BR1.0-1. Location of Burlington AGS

The 158 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 158 FW currently flies and maintains 18 F-16 aircraft in support of its mission and is composed of the Fighter Wing Staff, Mission Support Group, Operations Group, Maintenance Group, and Medical Group.

In the sections that follow, BR2.0 presents the base-specific description of the proposed action and the two beddown scenarios proposed at Burlington AGS. Section BR3.0 addresses baseline conditions and

Figure BR1.0-2. Burlington International Airport Boundary environmental consequences that could result if either of the two scenarios were implemented at Burlington AGS. Refer to Chapter 3 for a complete and detailed definition of resources and the methodology applied to identify potential impacts. Section BR4.0 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 Burlington AGS.

BR2.0 BURLINGTON AGS ALTERNATIVE (18 AND 24 AIRCRAFT SCENARIOS)

The Burlington AGS F-35A beddown alternative includes two scenarios; the following presents the elements of these scenarios for the base in Section BR2.1 and the airspace in Section BR2.2.

BR2.1 Burlington AGS: Base

Four elements of this proposed action have the potential to affect Burlington AGS and Burlington IAP: 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.

BR2.1.1 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 Burlington AGS no sooner than 2015. Under either scenario, the F-35A beddown would be completed in 2020, when the full complement of 18 or 24 F-35As would be at the installation. The F-35As would replace the existing 18 F-16s. Under ANG Scenario 1, drawdown of the F-16s would match beddown of the F-35As on a one-for-one basis. The replacement process for ANG Scenario 2 would ensure that the installation operated no more than 24 total aircraft at any time.

BR2.1.2 Airfield Operations

The 158 FW at Burlington AGS is an integral component of the Combat Air Forces (CAF). The CAF defends the homeland of the United States (U.S.) as well as deploys forces worldwide to meet threats and ensure the security of the U.S. To fulfill this role, the 158 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 from the airfield. ANG Scenario 2 would generate 7,296 airfield 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 the Burlington AGS could participate in remote training exercises. Some of these missions could involve ordnance delivery training or missile firing exercises (within the scope of existing National Environmental Policy Act [NEPA] documentation) 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.

Under ANG Scenario 1 and ANG Scenario 2, respectively, the 5,486 or 7,296 F-35A airfield operations conducted at Burlington AGS would represent a decrease of 2,613 or 803 annual airfield operations compared to current F-16 baseline levels (Table BR2.1-1). All airfield operations at Burlington IAP currently total 112,224, with 93 percent consisting of civil and commercial aviation. Under ANG Scenario 1, total Burlington IAP airfield operations would decrease by 2.3 percent, with a 0.7 percent decrease under ANG Scenario 2. Given the abundant total operations at Burlington IAP, such decreases would not be noticeable or different from year-to-year variations.

Table BR2.1-1. Burlington AGS Baseline F-16 and Proposed F-35A Annual Airfield Operations

Baseline	***ANG Scenario 1***	***ANG Scenario 2***
F-16s	*18 F-35As*	*24 F-35As*
8,099	5,486	7,296
Net Change	**-2,613**	**-803**

Source: Wyle 2011.

The F-35As would employ similar departure and landing procedures as currently used by the F-16s at the installation. However, the new aircraft would conduct a lesser proportion of closed patterns per total operations. Due to differences in performance, the flight profiles and tracks for the F-35A also would vary somewhat from those used by F-16s. Currently, the 158 FW averages 228 flying days per year (out of 260 possible days); however, for the purposes of this analysis and to compare the alternatives on an equal basis, the total number of possible flying days has been assumed to be 260, including both Saturday and Sunday (on Guard weekends). The number of average training days is a standard planning factor and maintains consistency between reserve and active-duty squadrons.

F-35A operations would adhere to existing Federal Aviation Administration (FAA) restrictions (per 49 USC Section 40103(b); FAA Order JO 7400.2J), avoidance procedures, and the quiet-hours program established by Burlington IAP for their Part 150. F-35As would operate similarly as the F-16s. Currently, F-16 operations primarily begin at 7:00 a.m. and conclude by 10:00 p.m. on weekdays and on Guard weekends, except when weather contingencies or special exercises result in rare operations after 10:00 p.m. Any after-dark training is obtained before 10:00 p.m. and would be the same with the F-35A.

BR2.1.3 Construction

To support proposed F-35A operations, additional infrastructure and facilities would be required at Burlington AGS (Table BR2.1-2) under either ANG Scenario 1 or 2. A total of five internal infrastructure improvement projects would be implemented in 2016 (Figure BR2.1-1).

Figure BR2.1-1. Burlington AGS Construction Projects – ANG Scenarios 1 and 2 (18 or 24 F-35As)

Table BR2.1-2. Proposed Construction and Modifications for Burlington AGS			
Year	***Action***	***Total Affected Area (acres)***[1]	***New Impervious Surface (acres)***
2016	Internal Renovation to Building 120 for F-35A Simulator	0	0
2016	Provide 270DC, 28DC Power in Aircraft Shelter Parking Areas (Buildings 130, 131, 132, 150, 360)	0	0
2016	Provide Secure/Classified Upgrades in Rooms 004/004A, Building 140	0	0
2016	Provide a Secure Parts Storage Area for ALIS, Building 70 Warehouse	0	0
2016	Design	0	0
Total	**Cost: $4,690,000**	**0**	**0**

Note: [1]All construction consists of internal modifications only; consequently, there are no associated affected areas or new impervious surface as a result of the proposed construction.

It is expected that these improvements would occur in 2016. In total, infrastructure improvements would not increase any facility footprint as all improvements are projected to be internal; the overall cost of the improvements would be close to $4.7 million. Because the proposed construction would occur within existing facilities, there would be no surrounding lands that would be affected by the construction activities (i.e., impact areas).

BR2.1.4 Personnel Changes

Beddown of F-35A operational aircraft at Burlington AGS would require sufficient and appropriately skilled military personnel to operate and maintain the new aircraft and to provide other necessary support services. It is expected that with appropriate training, the existing staffing and level of support at Burlington (1,130 personnel) would be sufficient for beddown of 18 aircraft; however, an additional 266 persons (1,396 total) would be required to support the 6 more F-35A aircraft proposed under ANG Scenario 2 (Table BR2.1-3). In general, it is expected that this 24 percent increase in staffing at Burlington AGS would be through local recruiting and there would be limited relocation of personnel from other Department of Defense (DoD) locations to support this effort. No changes to civilian government personnel or contractors have been identified.

Table BR2.1-3. Proposed Military Personnel Changes: Burlington AGS					
	Baseline	***Proposed Scenario***		***Per Scenario Net Change***	
	F-16 Personnel	*F-35A Personnel*			
		ANG 1	ANG 2	ANG 1	ANG 2
Total	**1,130**	**1,130**	**1,396**	**0**	**+266**

BR2.2 Training Airspace and Ranges

In Chapter 2, section 2.1.2, Table 2-7, airspace units were identified that constitute baseline conditions. These would also represent conditions found under the no-action alternative as there have been no FAA changes to charted airspace used by the 158 FW. Neither the basing action nor alternative scenarios will require changes in special use airspace attributes, volume, or proximity; nor will changes be needed in the type and number of ordnance employed at the ranges.

BR2.2.1 Airspace Use

As the replacement for F-16 aircraft, the F-35A would conduct missions and training programs necessary to fulfill its multi-role responsibilities. All F-35A flight activities would occur in existing airspace. No airspace modifications would be required. The Air Force expects that the F-35A would operate in the airspace used by the 158 FW, but in a somewhat different manner than at present. The 158 FW uses overland Military Operations Areas (MOAs), Restricted Areas, and Air Traffic Control Assigned Airspace (ATCAAs), as well as two overwater Warning Areas (Figure BR2.2-1, and Figures BR2.2-2 through BR2.2-3 and Table BR2.2-1). To support realistic training, the 158 FW combines adjacent airspace units and schedules them together, designating them Viper Complex, Condor Scotty, and Yankee Laser. The F-35As would adapt the training activities to use the same combinations of airspace. As established in Section 3.1.3, operations and conditions in the Warning Areas would not change measurably, so they received no further detailed analysis.

Table BR2.2-1. Burlington AGS Training Airspace

Airspace		*Floor (feet MSL unless otherwise noted)**	*Ceiling (feet MSL unless otherwise noted)**
Viper Complex	Adirondack MOA A	6,000	18,000
	Adirondack ATCAA A	18,000	50,000
	Adirondack MOA B	2,500	18,000
	Adirondack ATCAA B	18,000	50,000
	Adirondack MOA C	100 AGL	18,000
	Adirondack ATCAA C	18,000	50,000
	Adirondack MOA D	5,000	18,000
	Adirondack ATCAA D	18,000	50,000
	Adirondack ATCAA D Shelf	23,000	50,000
	Carthage East MOA	100 AGL	18,000
	Carthage East ATCAA	18,000	50,000
	Carthage West MOA	6,000	18,000
	Carthage West ATCAA	18,000	50,000
	Cranberry MOA	500 AGL	To BNI 6,000
	Lowville MOA	100 AGL	18,000
	Tupper ATCAA	18,000	50,000
	Tupper East MOA	10,000	18,000
	Tupper Central/South	8,000	18,000
	Tupper West MOA	6,000	18,000
	R-5201 (Fort Drum)	Surface	23,000
	R-5202 B	6,000	29,000
	Canton ATCAA	18,000	50,000
	Potsdam ATCAA	18,000	50,000
Condor Scotty	Condor MOA 1/2[1]	7,000	18,000
	Scotty A ATCAA	18,000	60,000
	Scotty B ATCAA	18,000	60,000
	Scotty C ATCAA	18,000	60,000
Yankee Laser	Yankee MOA 1	9,000	18,000
	Laser North ATCAA	18,000	60,000
	Laser East ATCAA	18,000	60,000
	Laser West ATCAA	18,000	60,000

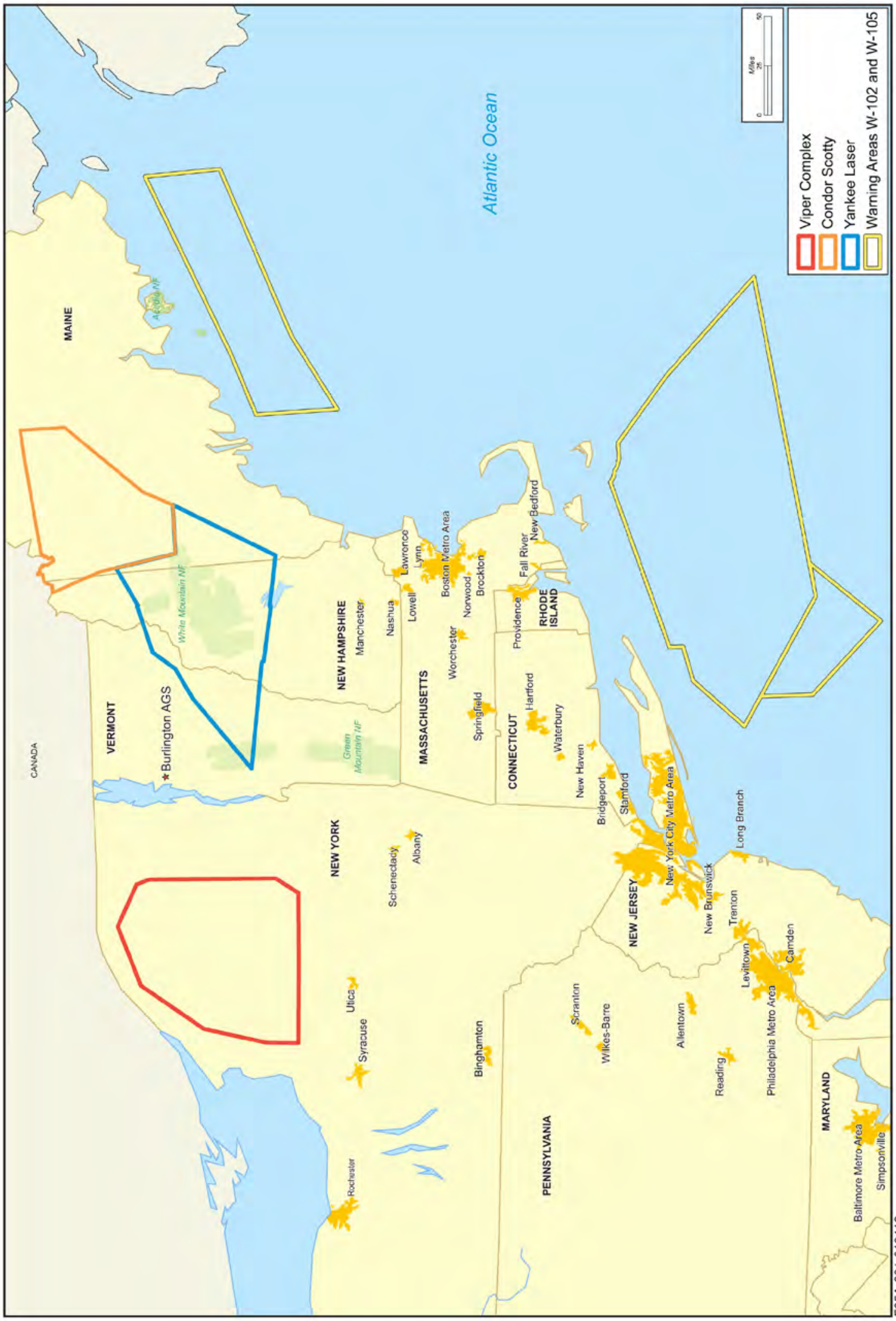


Figure BR2.2-1. Airspace Associated with Burlington AGS

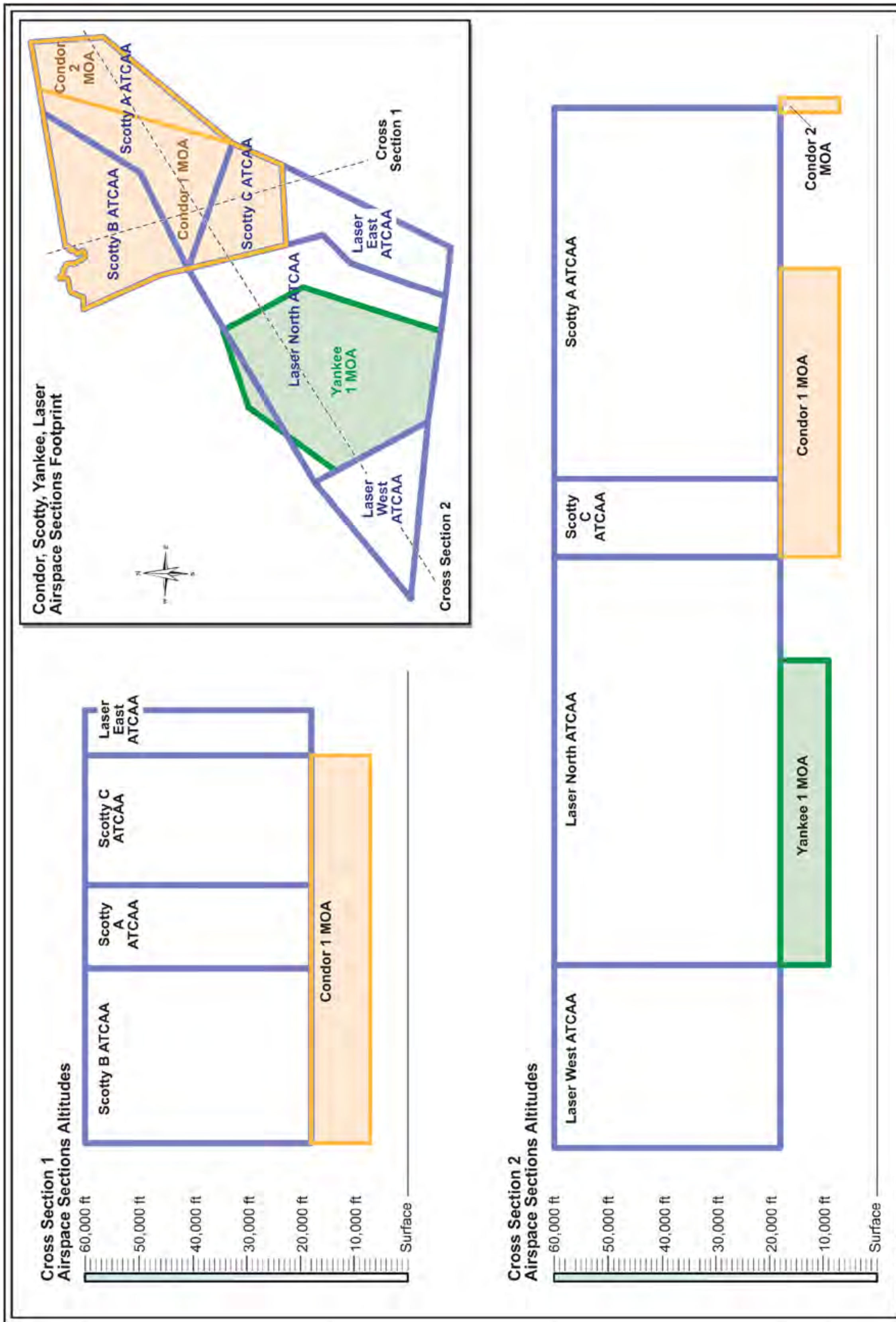


Figure BR2.2-2. Burlington AGS Associated Airspace Cross Sections: Viper Complex

Table BR2.2-1. Burlington AGS Training Airspace (con't)			
Airspace		***Floor (feet MSL unless otherwise noted)***	***Ceiling (feet MSL unless otherwise noted)***
Warning Areas[2]	W-102 Low	Surface	17,000
	W-102 High	17,000	60,000
	W-105A	Surface	50,000
	W-105B	Surface	18,000

Sources: FAA 2008, FAA 2003.
Legend: MSL = mean sea level; AGL = above ground level; BNI = but not including all MOAs extend to 18,000 feet MSL unless otherwise noted.
Notes: *MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to the average sea level. The elevation of a mountain, for example, is marked by its highest point and is typically illustrated as a small circle on a topographic map with the MSL height shown in either feet or meters or both. Because aircraft fly across vast landscapes, where points above the ground can and do vary, MSL is used is denote the "plain" on which the floors and ceilings of special use airspace are established and the altitude at which aircraft must operate within that special use airspace.
[1]Regardless of any future potential changes to the floor of Condor MOA, Burlington AGS has agreed to maintain operations at or above 7,000 ft AGL.
[2]Supersonic flight authorized above 10,000 feet MSL.

The airspace is also used by aircraft from the Navy (F-18) and other Air Force (A-10, F-16) units. The 158 FW F-16s account for about 83 percent of total operations in the Viper Complex. Both Condor Scotty and Yankee Laser support many different users, but the F-16s from the 158 FW account for 83 percent of the use in these units as well.

Although the F-35As would perform the missions of the F-16 aircraft, they represent a different aircraft with vastly different capabilities, and would fly somewhat differently (Table BR2.2-2). These differences include the use of higher altitudes overall, combined use of existing airspace, reduced night operations, fewer supersonic events, and higher altitudes for supersonic flights. Regardless of the altitude structure and percent use indicated in Table BR2.2-2, F-35A aircraft (as do existing military aircraft) would adhere to all established floors and ceilings of airspace units. For example, the floor of the Condor Scotty Complex lies at 7,000 feet MSL, so the F-35A would not fly below that altitude in the airspace. Rather, pilots would adapt training to this and other airspace units like the Viper Complex with lower floors.

Table BR2.2-2. Baseline and Proposed Altitude Distribution			
Altitude (feet)	***Percentage of Use***		
	F-35A	*F-16*	
	Multi-role	Air-to-Ground	Air-to-Air
500 –1,000 AGL	2%	20%	5%
1,000 –5,000 AGL	3%	20%	10%
5,000 –15,000 MSL	5%	30%	15%
15,000 –23,000 MSL	10%	20%	40%
>23,000 MSL	80%	10%	30%

The F-35A would fly more of the time at higher altitudes than the F-16. The F-16s from the 158 FW generally operate 70 to 100 percent of the time below 23,000 feet MSL, depending on mission type. In contrast, the F-35A would operate 80 percent of the time above 23,000 feet MSL, with 30 percent of the flight time above 30,000 feet MSL. This would result in the F-35A conducting most of their operations in ATCAAs.

By 2018, total annual operations would decrease 7 percent from baseline levels under ANG Scenario 1 (Table BR2.2-3). Under ANG Scenario 2, a 19 percent increase in operations would result. In the most heavily used airspace units like Viper Complex, F-35A operations would account for 82 percent of total operations under ANG Scenario 1 and 86 percent under ANG Scenario 2. Similar proportions would apply to Condor Scotty and Yankee Laser. Overall, the level of use by the F-35As would not vary significantly from baseline.

Table BR2.2-3. Comparison of ANG Scenarios – Airspace Operations

Airspace Unit[1]	*Total Baseline*[2]	*F-16 Baseline*	*ANG Scenario*	*F-35A Operations*	*Net Change (Total)*	*Percent Change Total*
Viper Complex	1,931	1,609	1	1,482	-127	-7%
			2	1,971	+362	+19%
Condor Scotty	241	201	1	185	-16	-7%
			2	246	+45	+19%
Yankee Laser	723	603	1	556	-47	-7%
			2	739	+136	+19%
Total[3]	**2,895**	**2,413**	**1**	**2,223**	**-190**	**-7%**
			2	**2,956**	**+543**	**+19%**

Notes:
[1]Excludes W-102 and W-105 per rationale in Chapter 3.
[2]Baseline and no-action are the same for this alternative location.
[3]Totals provided only as a 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. On occasion during an exercise, the F-35A may spend up to 90 minutes in one or more airspace unit. No operations would occur during environmental night (10:00 p.m. to 7:00 a.m.), except under rare 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 the Warning Areas (more than 15 nautical miles [nm] offshore) and not in the overland airspace used by the 158 FW.

BR2.2.2 Ordnance Use and Defensive Countermeasures

Most air-to-ground training would be simulated, where nothing is released from the aircraft, and target scoring is done electronically. As was discussed in Chapter 2, section 2.1.2, however, the F-35A (like the F-16) is capable of carrying and employing several types of air-to-air and air-to-ground ordnance (including strafing) and pilots would need training in their use. As the Air Force currently envisions, the type and number of ordnance would not differ from that currently employed by the F-16s. F-35A pilots would only use ranges and airspace authorized (i.e., approved and analyzed by DoD [ranges] and charted by the FAA [airspace]) for the type of ordnance being employed and within the number already approved at a range and/or target. If in the future the Air Force identifies weapons systems that are either new or could exceed currently approved levels, appropriate NEPA documentation would need to occur prior to their employment (see section BR2.7 for documents incorporated by reference associated with ranges).

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 the F-35A's stealth characteristics, evolving tactics, and mission scenarios, it is expected to use fewer defensive countermeasures 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 expenditures would match or be less than that of F-16s on a per operation basis for the 158 FW. Chapter 2, section 2.1.2, provides details on the composition and characteristics of flares.

Flares would be used only in areas currently approved for such use. Current restrictions on the amount or altitude of flare use would also apply. At Burlington AGS, F-35As would use up to 15,500 flares per year (in 2019 and after). Annual flare use would not increase over baseline, even though operations would increase slightly under ANG Scenario 2. Based on the emphasis on flight at higher altitudes, roughly 90 percent of F-35A 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.

BR2.3 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.

BR2.4 Permits, Agency Consultations, and Government-to-Government Consultation

Burlington AGS operates under agreements with a series of environmental permitting agencies for such resources as air, water, and cultural resources.

Permitting. The following section describes the permits that are required to implement either of the two scenarios at this basing alternative location.

- 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 Pollution 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 (USEPA's) *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects* *under Section 438 of the EISA* (December 2009). All proposed construction is internal to existing structures and would not increase impervious surfaces, disturb the ground surface, or modify the exteriors of existing facilities; therefore these requirements would not be applicable.

- Vermont requires a new or amended state stormwater discharge permit under certain conditions, including stormwater discharge from new development, or expansion of an existing impervious surface over the area covered under an existing stormwater permit. All proposed construction is internal to existing structures and would not increase impervious surfaces, disturb the ground surface, or modify the exteriors of existing facilities; therefore these requirements would not be applicable. As applicable, Burlington AGS will coordinate with the USEPA, Region I and Vermont Department of Environmental Conservation (DEC) regarding proposed construction near Environmental Restoration Program (ERP) sites on Burlington AGS; however, given that all construction is internal to existing facilities, coordination with these entities would not be required.
- A conformity applicability 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. Because Burlington AGS is an attainment zone for all criteria pollutants, a conformity determination is not necessary.
- Personnel conducting construction and/or demolition activities will strictly adhere to all applicable occupational safety requirements during construction activities.
- Sampling for asbestos-containing materials (ACM) and lead-based paint (LBP) would occur prior to demolition activities for those buildings not previously tested; all materials would be handled in accordance with Air Force policy. If ACM or LBP is present, Burlington AGS 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.

Consultation. In January 2010, initial informal consultation was initiated with the Maine, New Hampshire, New York, and Vermont State Historic Preservation Offices (SHPOs); however, no responses were received. In August 2012, Section 106 consultation was re-initiated by Burlington AGS and letters sent to the four SHPOs requesting concurrence with the Air Force determination of no adverse impacts to the Area of Potential Effect (APE). Maine, New Hampshire (verbally), and New York SHPOs indicated they concurred with the Air Force determination (see Appendix B). The Vermont SHPO conditionally concurred in April 2013, verbally stating they would withhold final determination until evaluation of the next version of the EIS. In July 2013, resulting from a review of the Revised Draft EIS, the Vermont SHPO concurred with the Air Force determination of no adverse effects within the APE (see Appendix B).

Government-to-Government. In November 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).

In January 2010, government-to-government informal consultation letters were sent to numerous federally-recognized American Indian Tribes requesting whether they had any issues or concerns with the Air Force proposal. By December 2010, the Stockbridge-Munsee and St. Regis Mohawk Tribal Historic Preservation Officers, as well as the Oneida Nation Historic Resources Specialist responded that they had no further questions or comments on the proposal. In January 2011, the Seneca Tribal Archaeologist indicated no comments on the proposal and the Penobscot Nation expressed that they wished to continue being informed. The Penobscot Nation was sent the Draft EIS in March 2012 for review; however, no further response was received.

Further consultation letters, in August 2012, were sent to nine federally-recognized American Indian Tribes (St. Regis Band of Mohawk Indians, Passamaquoddy—Pleasant Point Reservations and Indian Township Reservations, Aroostook Band of Micmacs, Houlton Band of Maliseet Indians, Cayuga Nation of Indians, Onondaga Nation, Tonawanda Band of Senecas, and Tuscarora Nation) requesting concurrence with the Air Force determination of no adverse impacts. Of these nine, only the St. Regis Band of Mohawk Indians replied that they have no further concerns. While the Air Force made several attempts in April and July 2013 requesting feedback, no further correspondence was received from the other eight American Indian Tribes (see Appendix B for specifics on consultation). As such, the Air Force has made the determination that there would be no adverse effects to the APE and therefore, according to 36 CFR 800.4(d)(1) *No historic properties affected*: "If the agency official finds that either there are no historic properties present or there are historic properties present but the undertaking will have no effect upon them as defined in § 800.16(i), the agency official shall provide documentation of this finding, as set forth in § 800.11(d), to the SHPO/THPO. The agency official shall notify all consulting parties, including Indian tribes and Native Hawaiian organizations, and make the documentation available for public inspection prior to approving the undertaking. (i) If the SHPO/THPO, or the Council if it has entered the Section 106 process, does not object within 30 days of receipt of an adequately documented finding, the agency official's responsibilities under Section 106 are fulfilled."

BR2.5 Public and Agency Concerns

BR2.5.1 Scoping

Scoping meetings were held January 25 through 28, 2010, in Winooski, Vermont; Watertown, New York; and Littleton, New Hampshire. Forty-nine people attended the three scoping meetings. In addition to the scoping meetings, informational meetings were held at a subsequent South Burlington City Council Meeting, a special session in Winooski, and two sessions on-base. The written comments received from the public and agencies prior to close of the scoping period included 124 letters (3 agencies, 3 elected officials, 116 general public, and 2 organizations).

Most comments received at the meetings were in support of the F-35A beddown at Burlington AGS. The primary issue was concern about noise generated from the airport. In Watertown, New York, there were discussions concerning what type of F-35A operations would occur in the Adirondack MOA.

The general tenor, however, of comments received through the mail expressed concerns regarding noise (94 of the total 124). Of the 92 comment letters received from the general public, 65 letters were concerned about noise in general; however, 25 were troubled by how the noise would impact property values and 2 had issues with how noise would affect wildlife. Two organizations also submitted comments to voice their concern about noise.

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:

- What type of F-35A operations would occur in the Adirondack MOA? (see Section BR2.2.1)
- Will the F-35A aircraft fly supersonic over Vermont? (see Section BR2.2.1)
- Is there enough airspace for the F-35A to fly? (see Chapter 2.2.4)
- Is the noise output of the F-35A greater than the F-16? (see Table BR3.2-1)
- Will noise from the F-35A cause hearing loss? (see Section BR3.2.1.2)
- Will there be an increase in night operations because of the F-35A's multi-role capabilities? (see Section BR2.1.2)
- Will noise increase with the arrival of the F-35A? (see Section BR3.2.1)
- Will air pollution increase with the F-35A aircraft? (see Section BR3.3.1.2)
- Will the F-35A aircraft crash more often than other aircraft? (see Section BR3.4.1.2)
- How will noise from the F-35A affect wildlife? (see Section BR3.6.2.2 and BR3.8.2.2)
- How will noise from the F-35A affect recreation areas? (see Section BR3.10.1.2 and BR3.10.2.2)
- How will noise from the F-35A affect property values and the economy? (see Appendix C)
- How will noise from the F-35A affect tourism? (see Chapter 3.11.1)

BR2.5.2 Draft EIS Public Comment Period

Official notification of the F-35A Operational Basing Draft EIS public comment period began with the Notice of Availability (NOA) announcement on April 13, 2012 in the *Federal Register*. This marked the start of the 45-day review period which would end on June 1, 2012. During the week of May 14, 2012, hearings were held in South Burlington, Vermont; Littleton, New Hampshire; and Watertown, New York (the same three locations in which scoping meetings were held earlier in the NEPA process). At the request of Maine's congressional delegation; however, the Air Force held a fourth hearing in Farmington, Maine on June 5, 2012. As a result, the public comment period was extended 19 more days (to June 20, 2012) and a notice placed in the *Federal Register* on May 23, 2012 announcing this extension.

At the four hearings, 524 people attended (450 at the South Burlington hearing) and there were 93 oral and 118 written comments received. The majority of the oral and written comments expressed general opposition for the basing action in Burlington. As was mentioned in Chapter 1, during the 64-day comment period, 934 written comments were received, of which 915 (or 98 percent) were associated with the Burlington AGS alternative.

The Burlington AGS comments included four petitions. Each was counted as one comment; however, they may have contained several issues and these were addressed in the response to comments. Two petitions were in support of basing the F-35A in Burlington and signed by 1,675 people and two other petitions, signed by 35 people, expressed opposition to the basing action. Hundreds of form letters were received both in support of and in opposition to the proposal to base F-35A aircraft at Burlington International Airport. Of the total 1,126 comments received both at the hearings and during the 64-day public comment period: 73 percent were in opposition to the Burlington AGS basing action, 25 percent expressed their general support for the Burlington basing alternative; and 2 percent were of no opinion. For those in opposition, issues centered on how increased noise levels in South Burlington and Winooski would affect: the Part 150 buyout now being conducted by the FAA and Burlington International Airport; property values and economic vitality of adjacent towns/cities; quality of life; and human health.

For those in support, the majority stated that the economic benefits of having the Air National Guard in Burlington were important to the community's well-being.

The Vermont SHPO voiced their concern about how noise would affect National Registered listed historic structures. The United States Fish and Wildlife Service (USFWS) noted that they were concerned about noise effects on wildlife, as well as on recreational activities, and specifically noted the Umbagog National Wildlife Refuge (NWR) and the Silvio O. Conte NWR, Pondicherry Division.

BR2.5.3 Revised Draft EIS Public Comment Period

During the 45-day comment period, a total of 11,158 comments were received in letter, email, handwritten note, and postcard format. Of the total 823 letters, handwritten notes, and emails received, 809 were from citizens in support of or opposition to the Burlington AGS basing alternative. Table BR2.5-1 provides a breakdown of the comments.

Table BR2.5-1. Summary of Revised Draft EIS Comments

Comment Format	*Total*	*Support*	*Opposition*
Email	615 (77%)	120 (20%)	495 (80%)
Letters/Handwritten Notes	142 (16%)	28 (20%)	114 (80%)
Form-letters	52 (7%)	17 (33%)	35 (67%)
Subtotal	*809*	*165 (20%)*	*644 (80%)*
Postcards	10,349	9,655 (93%)	694 (7%)
TOTAL	**11,158**	**9,820 (88%)**	**1,338 (12%)**
Petition	2,460	2,460 (100%)	-

The primary concerns identified in emails, letters, and handwritten notes of those opposed to the basing action included noise effects to children, loss of property value, increased safety risks from aircraft mishaps, and overall negative impact to the quality of life for the surrounding communities. For those in support of the basing alternative in Burlington, they cite that the continued presence and employment of Guardsmen/women and their annual income are very important to the surrounding communities' economy; and that because there would be fewer operations (under either basing scenario) than currently being done by the F-16s, there would not be any undue burdens place on the communities.

As mentioned above 9,655 pre-printed, postage provided, postcards were received from supporters of the basing action at Burlington AGS. In response to many comments asking whether taxpayer dollars paid for them, the Air Force would like to clarify that the postcards were sent under the auspices of local interests (unaffiliated with the Air Force) and included the following statement:

> *I concur with the Air Force's assessment that Vermont is the preferred location for the F-35. From the Draft EIS I understand that the F-35 will create sound similar to the F-16, there will be 2,613 fewer operations per year and there will be no adverse health effects on citizens.*

Further clarification is required on this statement. First, with regard to F-35As generating sound levels similar to the F-16, please refer to Table BR3.2-1 where SEL and L_{max} noise levels are presented for F-16s and F-35s conducting similar operations within the airfield environment. In all instances the F-35 generates noise levels greater than the F-16s. Second, the postcard states that there would be 2,613 fewer operations per year; however, this is only the case under ANG Scenario 1. Under ANG Scenario 2, there would be 803 fewer operations. Third, while it is not anticipated there would be adverse health effects, the noise evaluation does indicate that when compared to baseline conditions both basing scenarios would affect more acres, people, and housing units that are exposed to noise levels exceeding 65 dB DNL and greater. There would also be continued disproportionate impacts to low-income and minority populations exposed to noise levels exceeding 65 dB DNL.

The opposing comment postcards were either individually written (469) or crossed out the text in the support postcards (105) and inserted their own language.

Numerous meetings (both in support of and opposition to), outside the purview of the Air Force, have been held in Burlington since the 2010 announcement of the proposal to base F-35s at Burlington AGS. However, from specific requests of the public to make this known, in July 2013 meetings were held by both the City Councils of South Burlington and Winooski. At the South Burlington City Council meeting, 55 individuals spoke expressing their opposition to the basing action and 23 voiced their support. At the Winooski City Council meeting, there were 67 people who expressed their opposition and 2 who were in support.

All comments were evaluated and in Volume II, Appendix E, there is a description of how comments were evaluated, categorized, and responded to, as well as an alphabetical list of commenters, the comment number associated with it, and the response numbers to substantive issues identified and associated with the EIS and NEPA process. Please note that everyone who sent a comment (be it letter, email, handwritten note, or postcard) is listed and recognized as commenting (*note to reviewers, the over 10,349 people who sent in postcards in support of the proposal are still being input into the database and therefore the complete list is not included herein)*. However, in order to minimize the document size only the letters, emails, handwritten notes, and postcards with notes were scanned and substantive comments bracketed, categorized, and specifically received responses. According to CEQ, if a number of comments are identical or very similar, agencies may group the comments and prepare a single answer for each group (CEQ 1981).

BR2.6 Differences Between the Revised Draft EIS and the Final EIS

Following the Draft EIS, a Revised Draft EIS was published which included factual corrections, additional and/or supplemental information, and improvements or modifications to the analyses presented in the Draft EIS. The re-analysis included noise impacts to low-income and minority populations based on updated census data (not available when the 2012 Draft EIS was published) in the noise section (BR3.2) and environmental justice/protection of children (BR3.12); inserting documents incorporated by reference (BR2.7); adding mitigation measures (BR2.8); correcting typographical and grammatical errors, as needed; correcting mapping and labeling mistakes in text and figures throughout; inserting new or revised information, where applicable; and including responses to comments received during the Draft EIS public review period in Volume II, Appendix E.

In this Final EIS, several changes were made and include the following:

- In Chapter 3, Section 3.5, Figure 3-2 was revised to correctly portray the DoD clear zone as a square and Table 3-5 was added with F-16 and F-15 historic mishap data.
- Where applicable, Section BR2.4 and Appendix B were updated to reflect current status of agency and government-to-government consultations.
- Section BR2.5.2 was revised to clarify the type and number of comments received in response to the Draft EIS and Section BR2.5.3 was added to summarize comments received following Revised Draft EIS publication.
- Included an additional school in the noise assessment associated with Burlington AGS (Section BR3.2).
- Throughout the document, corrected typographical and grammatical errors in the text.
- Responded to Revised Draft EIS comments in Volume II, updated Appendix E.

BR2.7 Documents Incorporated by Reference

In accordance with CEQ regulations for implementing NEPA and with the intent of reducing the size of this document, the following material relevant to the proposed action at the alternative locations and basing scenarios is incorporated by reference and identified according to the alternative location. These documents are part of the administrative record and are available upon request.

Sustainable Ranges Report to Congress, Department of Defense (DoD 2012). Report published in April 2012. A report to Congress on the sustainability of all DoD ranges describing the training requirements and the existing range resources to meet these requirements.

Atlantic Fleet Active Sonar Training (Navy 2012). Draft Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS). Published in May 2012. Documentation for aircraft and naval operations in all East Coast overwater Warning Areas are evaluated.

Modification of Condor 1 and Condor 2 Military Operations Areas (MOA) Draft EIS (Air National Guard 2009). Published in August 2009 (no Final EIS has been published). EIS proposing to lower and modify Condor 1 and 2 MOAs and includes descriptions of aircraft operations. To date, no Final EIS or record of decision has been published.

Modification and Establishment of Restricted Areas and Other Special Use Airspace, Adirondack Airspace Complex, Fort Drum, NY (Federal Register 2008). FAA Notification on September 26, 2008 in the Federal Register establishing Adirondack Airspace Complex consisting of the elements of the Viper Complex: Adirondack A/B/C/D, Carthage East/West, Cranberry, Lowville, and Tupper East/West MOAs; Restricted Airspace R-5201 and R-5202 B; and overlying ATCAAs.

Proposed New York Air National Guard Adirondack Range Airspace Modifications Final EA and Finding of No Significant Impact (Air National Guard 2004). Published in September 2004. Document presenting modifications of the airspace and operations therein.

BR2.8 Mitigation Measures

Refer to Chapter 2, section 2.6.1 for a description of measures being adopted. Based on the analyses and public comment, the identified mitigation measures (already employed in the noise modeling) include flight restrictions to minimize noise impacts to the adjacent community. The Burlington AGS would continue to undertake the voluntary restrictions outlined in the Burlington Noise Compatibility Program Update (BTV NCP 2008). The F-35As would maintain the quiet hours, keep within the specified arrival and departure routes and procedures, as well as ensure that single F-35A flights are flown out of the airport as opposed to simultaneous (or formation) takeoffs. The current limitations to C-5 and helicopter training operations would continue unchanged (BTV NCP 2008).

While the Air Force and Air National Guard have no plans to acquire or demolish residences as part of the F-35A beddown, the City of Burlington has indicated that they are considering updating the Part 150 Noise Exposure map and Noise Compatibility Program to include F-35A operations. The update would not affect current participants in the Airport's existing voluntary land acquisition program. The City has indicated they anticipate that a new Noise Compatibility program would need to be developed that may include many facets to address noise, including, home purchase, sound insulation, and land based noise mitigation measures. This is an action that is taking place under the aegis of the FAA and the City of Burlington under the Noise Compatibility Program. The Burlington AGS would continue to undertake the voluntary restrictions prescribed in the Aircraft Operations Measures (Nos. 5, 6, and 7) outlined in the Burlington International Airport, Part 150 Record of Approval (June 2008).

No other extra-ordinary mitigation measures are required beyond those prescribed under existing federal and state laws, regulations, and permit requirements to minimize, avoid, or reduce impacts.

BR3.0 BURLINGTON AGS AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

BR3.1 Airspace Management and Use

BR3.1.1 Base

BR3.1.1.1 Affected Environment

Burlington IAP, a joint use airport owned by the City of Burlington, is located within the city limits of South Burlington, 3 miles east of the City of Burlington's central business district. The VTANG 158 FW occupies 280 acres of land on the eastern side of the airport. Currently, the 158 FW flies and maintains 18 F-16 aircraft in support of the VTANG's general purpose and Homeland Defense mission.

Aircraft operating at Burlington IAP use airspace immediately surrounding the field, within a 30-nm local area, and in a region supporting seven regional airports and numerous private fields—Plattsburgh, New York being the largest of the seven airports. The FAA operates the Burlington Approach Control and provides air traffic control services within this airspace for arriving and departing aircraft. The 158 FW averages 228 flying days per year with 365 flying days for civilian and commercial aircraft at Burlington IAP. A total of over 112,000 annual operations were conducted at Burlington IAP under baseline conditions, including over 8,000 F-16 operations by the 158 FW and just over 104,000 civilian, commercial, and military transient operations. Aircraft based at the Burlington AGS have flown in this airspace environment for many decades. No comments were received during the public scoping period revealing conflicts with civil or commercial aviation.

BR3.1.1.2 Environmental Consequences

Beddown of F-35A operational units under ANG Scenarios 1 or 2 would not affect airspace management and use within the local air traffic environment. Eventual replacement of F-16 aircraft at Burlington AGS by the F-35A would result in just over a 2 percent decrease in operations from baseline conditions under ANG Scenario 1, and a less than 1 percent decrease under ANG Scenario 2 (Table BR3.1-1). The 158 FW would be expected to fly no more than 260 days per year after the beddown. No changes to the Burlington terminal airspace or 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 BR3.1-1. Comparison of ANG Scenarios – Airfield Operations

Burlington ANG Scenario	*Baseline*	*ANG Scenario 1*	*ANG Scenario 2*
Based F-16	8,099	0	0
Based other than F-16	468	468	468
Transients[1]	6,264	6,264	6,264
F-35A	-	5,486	7,296
Civilian	97,393	97,393	97,393
Total	**112,224**	**109,611**	**111,421**
Percent Change from Baseline	**-**	**-2.3%**	**-0.7%**

Source: Wyle 2011.
Note: [1]Transients include KC-135R, C-130, and C-9A.

BR3.1.2 Airspace

BR3.1.2.1 Affected Environment

Burlington AGS F-16s train in several MOAs that are combined into a western group (Adirondack, Carthage, Lowville, Tupper, known as Viper Complex), an eastern group (Condor and Yankee, and two ATCAAs, as well as Laser and Scotty), and overwater Warning Areas (Table BR2.2-1 and Figure BR2.2-1). In total, the F-16s fly 1,931 annual operations in the Viper Complex, or about 7 operations per day (refer to Table BR2.2-3). In Condor Scotty, F-16s fly 241 operations, and 723 in Yankee Laser; these equate to about 1 and 3 flights per flying day, respectively. Operations occur in the Warning Areas, but as detailed in Section 3.1.3, the proposed beddown would not measurably alter conditions in these units.

Due to its location near the Canadian border, few federal airways traverse the airspace used by the 158 FW. Federal airways, also known as Victor routes, are civil airways below 18,000 feet MSL; only one civil airway, V196, traverses the western MOA area, while only one, V104, traverses the eastern Yankee 1 and Condor 1 MOAs. Two high-altitude jet routes (above 18,000 feet MSL) traverse through the western area ATCAAs: J29 and J595.

There are eight civilian airfields located under the Condor 1 and 2 MOAs, eight under the Yankee 1 and 2 MOAs, and one each under Cranberry, Tupper, and Lowville MOAs, as well as several private fields. Additionally, lakes in the region are frequented by float plane operators.

As noted in Chapter 2, Section 2.1.2, F-35A aircraft would not use military training routes, either to access the special use airspace or conduct training. Due to their predominantly higher altitude missions, advanced electronics, and speed, the F-35As would use MOAs, ATCAAs, Restricted Areas, and Warning Areas.

BR3.1.2.2 Environmental Consequences

Selection of Burlington AGS for 18 or 24 F-35A operational aircraft would not result in impacts to airspace use and management throughout this region. This proposed action would not require any changes to the current lateral or vertical configuration of the MOAs, ATCAAs, or Warning Areas, nor would it alter their normally scheduled times of use. Based on the standard planning average of 260 flight training days per year, there would be a net decrease in daily average operations from 11 to 9 under ANG Scenario 1 (refer to Table BR2.2-3). ANG Scenario 2 would result in near status quo operations with about 11 operations per day.

Civil and commercial traffic on V196 (which goes under the Complex) would not be impacted by the decrease of F-35A training aircraft within the Viper Complex. The ATCAA traffic would be in Class A airspace (above 18,000 feet MSL), and V196 is a low route below this altitude. FAA data from a heavy traffic flow day (a mid-summer Thursday) indicate a total of 70 aircraft flew in the entire Adirondack MOA for the 24-hour period analyzed, or approximately three per hour (FAA 2010b). The east-west V104 airway and Visual Flight Rule (VFR) traffic in the Yankee and Condor MOAs are lightly travelled due to the location far north of major flyways and would not be impacted by a decrease in operations. FAA data indicate 20 aircraft in the MOAs on the day analyzed (FAA 2010b). While traffic on the high altitude route J595 transits the western airspace region, they are also within positive control airspace (over 18,000 feet MSL) and do not fly through 158 FW MOA training airspace.

There are currently two separate methods for civilian pilots to obtain near real-time information regarding the scheduling of airspace units used by the 158 FW. Eastern Air Defense Sector (EADS) can be reached by telephone at (800) 223-5612, and provides date, time, altitudes, unit, and aircraft type scheduled in the surrounding Special Use Airspace (SUA). Radio equipped pilots can also call Airborne Frequency 122.55 for updated information on SUA operations.

Close coordination of scheduling and use of the MOAs, ATCAAs, and Restricted Areas by the EADS Operations Control Center and the Airspace Scheduling Office, with Boston Air Route Traffic Control Center would continue to ensure safe air traffic operations throughout this region. Therefore, civil airports and other air traffic traveling near these airspace units are not in conflict with military flight activities. In addition, the F-35A would conduct a greater percentage of training at higher altitudes than the F-16. Therefore, since the proposed beddown represents a continuation of current activities with decreases in operations, no impacts to airspace use and management would be expected.

BR3.2 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 Burlington IAP was modeled using two software programs: 1) NOISEMAP and 2) Integrated Noise Model (INM). The Air Force and ANG 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 Zones (AICUZ) program and 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. Specific detailed information on supplemental metrics (e.g., annoyance) is also presented.

The second program, INM, applies to Burlington AGS because it jointly operates out of the Burlington IAP. The FAA uses INM to evaluate aircraft noise generated at and around civilian airports. As detailed in Section 3.3.5, INM was not used as a primary model since it precludes comparison and consistency across all six alternative locations. For modeling purposes, the civilian/commercial aircraft noise levels generated under INM were combined logarithmically with military aircraft noise calculated by NOISEMAP for Burlington IAP. See Section 3.3.5 and Appendix C for more information regarding noise modeling.

Both Sound Exposure Level (SEL) and Maximum Sound Level (L_{max}) metrics would apply to either beddown scenario. As shown in Table BR3.2-1, the SEL and L_{max} noise levels reflect conditions specific to flight activity at Burlington AGS, 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 F-16 aircraft it is replacing except in afterburner take-off.

Table BR3.2-1. SEL and L_{max} Comparison for Burlington AGS*

Condition	*Based F-16C[1, 2]*				*F-35A[2, 3]*			
	SEL (dBA)	*L_{max} (dBA)*	*Power (%NC)*	*Speed (kts)*	*SEL (dBA)*	*L_{max} (dBA)*	*Power (%ETR)*	*Speed (kts)*
Afterburner Assisted Take-off[4] (1,000 feet AGL)	**101**	**94**	95%	300	**118**	**115**	*100%*	*300*
Military Power Take-off (1,000 feet AGL)	**101**	**94**	95%	255	**118**	**115**	*100%*	*300*
Holddown on Departure (2,000 feet AGL)	**N/A**	**N/A**	N/A	N/A	**88**	**83**	*40%*	*300*
Arrival (non-break, through 1,000 feet AGL, gear down)[5]	**82**	**73**	84%	140	**99**	**95**	*40%*	*180*
Overhead Break (downwind leg, 2,000 feet AGL, gear down)	**N/A**	**N/A**	N/A	N/A	**93**	**87**	*40%*	*200*
Low Approach and Go (downwind leg, 1,500 feet AGL, gear down)	**75**	**66**	84%	200	**95**	**91**	*40%*	*210*

Note: *Refer to Appendix C, Table C-1 (L_{max}) and Table C-2 (SEL) for noise generated for arrivals and take-offs for F-16s and F-35s at varying altitudes. Burlington AGS nominal elevation = 335 feet MSL; Weather: 66°F, 67% Relative Humidity; and SEL = Sound Exposure Level; L_{max} = Maximum (instantaneous) Sound Level; dBA = A-weighted decibel; NC = Engine core revolutions per minute; kts = knots; ETR = Engine thrust request.
Notes: All numbers are rounded.
[1]Modeled F-16C with F110-GE-100 engine.
[2]90 percent of all F-16 departures utilize afterburners, whereas only 5 percent of F-35 departures would utilize afterburner.
[3]Modeled with reference acoustic data for an F-35A (Air Force 2009).
[4]Power reduced from afterburner to military power prior to reaching 1,000 feet AGL (past airport fence line).
[5]F-16C values reflect gear up conditions.

BR3.2.1 Base

BR3.2.1.1 Affected Environment

The data used for baseline civil and commercial aircraft noise conditions were derived from the updated Burlington IAP Part 150 study (HMMH 2006); baseline F-16 data were provided by Burlington AGS in 2010 and were based on actual F-16 operations. Under baseline, 112,224 airfield operations are flown annually at Burlington IAP. This total includes 8,099 operations generated by the 158 FW and an additional 104,125 operations conducted predominantly by civilian and commercial aircraft (refer to Table 2-2). Under baseline conditions, 158 FW operations occur during environmental daytime hours (i.e., 7:00 a.m. and 10:00 p.m.). However, commercial and civilian aircraft conduct 33 percent or 34,653 operations during environmental night. Operations occurring during environmental nighttime hours (i.e., 10:00 p.m. and 7:00 a.m.) are assessed a 10 decibel (dB) penalty (refer to Section 3.3 for more detailed resource definition and methodology used to evaluate impacts). As was stated earlier, F-35As would operate similarly as the F-16s, with operations primarily beginning at 7:00 a.m. and concluding by 10:00 p.m. on weekdays and on Guard weekends. The only exception would be when weather contingencies or special exercises result in rare operations after 10:00 p.m. Any after-dark training would be obtained before 10:00 p.m.

Noise Exposure

Figure BR3.2-1 shows the 65 to 85 dB DNL contour bands, in 5-dB increments, for Burlington IAP baseline conditions. Table BR3.2-2 presents noise exposure within each dB Day-Night Average Sound Level (DNL) contour band for off-installation acreage, population, representative receptors, and households. Representative receptors include off-installation (i.e., beyond limits of Burlington IAP) places of worship, schools, child care facilities, hospitals, and residential locations potentially with areas affected by aircraft noise of 65 dB DNL and 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 2010b). Generally, to determine the population counts by contour band, this analysis uses U.S. Census block groups (from the American Community Survey, 5-year estimates) and assumes an even distribution of population within each block group under the respective contour band (U.S. Census Bureau 2010b). Adopting this methodology gives a good estimate (i.e., more conservative) of the number of people who may be exposed to noise levels within the noise contour band. Acreage reported here excludes the entire Burlington IAP since it is directly associated with aircraft operations, and does not include any receptors or residential areas. Households in the 80 dB DNL noise contour bands and greater were identified through aerial photography (Google Earth February 2013). Affected populations were estimated using the U.S. Census population multiplier for Chittenden County of 2.37 people per household.

Table BR3.2-2. Off-Airport Noise Exposure within Baseline Contours at Burlington IAP

Contour Band (DNL dB)[1]	*Acreage*	*Population*	*Households*[2]	*Receptors*[3]
65 – 70	1,248	2,808	1,219	7
70 – 75	483	1,211	505	2
75 – 80	187	574	238	2
80 – 85	45	9	4	0
85+	0	0	0	0
Total	**1,963**	**4,602**	**1,966**	**11**

Source: Wyle 2011, U.S. Census Bureau 2010b.
Note:
[1]Exclusive of upper bound for all bands.
[2]Household estimates may be more if city/town tax roles were applied; however, to maintain equal analysis among all six alternative locations census block groups were used.
[3]All noise receptors are located off-base; refer to Figure BR3.2-1.

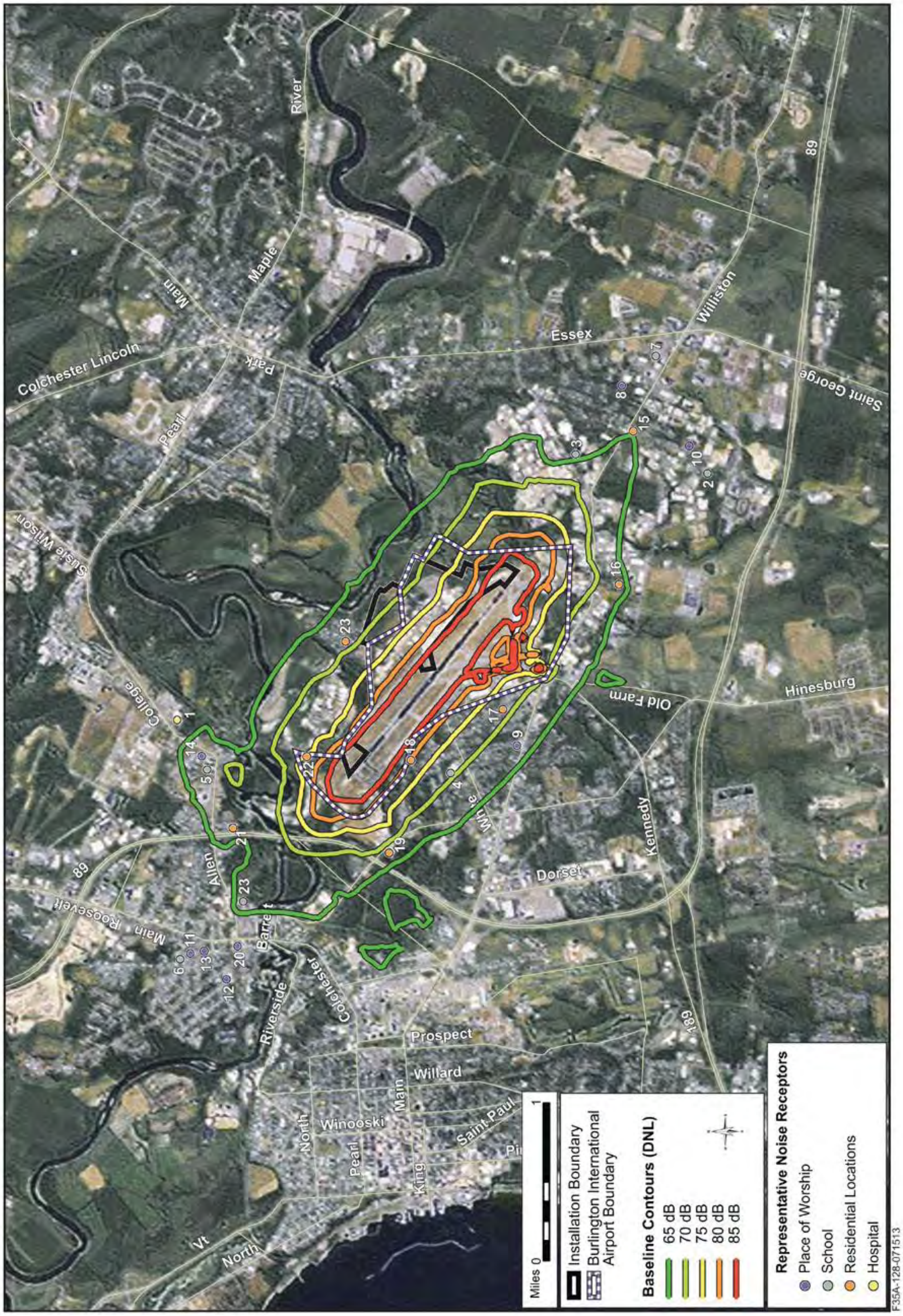


Figure BR3.2-1. Baseline Noise Conditions at Burlington AGS

In total, exposure to noise levels within contour bands of 65 dB DNL and greater include an estimated 1,963 acres; 4,602 people, and 1,966 households. A total of 11 representative receptors are subject to noise levels of 65 dB DNL or higher. Departures of based F-16 aircraft from Runways 15 and 33 dominate the DNL contours to the southeast and northwest of the station/airport, respectively. The contribution of civilian aircraft is negligible compared to the military aircraft contribution.

Table BR3.2-3 lists the DNL for 23 representative receptors around Burlington IAP under baseline conditions. Eleven receptors are exposed to noise less than 65 dB DNL, including one hospital, four schools, five places of worship, and one residential area. Eight sites lie within the 65 to 69 dB DNL contour band. Two sites (#4 and 17) are exposed to DNL between 70 and 74 dB, and two sites (#18 and 22) are exposed to DNL between 75 and 80 dB. All 12 representative receptors affected by 65 dB DNL or more are considered existing incompatible land uses per the AICUZ guidelines.

Table BR3.2-3. Baseline Decibel Levels at Representative Locations near Burlington IAP

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
1	Fletcher Allen Healthcare-Fanny Campus	Hospital	<65
2	Bellwether School and Family Center	School	<65
3	Center For Science Education	School	<65
4	Chamberlin School	School	70
5	Saint Michael College	School	68
6	St. Francis Xavier School	School	<65
7	Vermont Technical College	School	<65
23*	Community College of Vermont	School	65
8	Calvary Chapel	Worship	<65
9	Community Lutheran Church	Worship	66
10	Maranatha Christian Church	Worship	<65
11	Sisters of Providence	Worship	<65
12	Valley Baptist Fellowship	Worship	<65
13	Winooski United Methodist Church	Worship	<65
14	Chapel of St. Michael	Worship	67
15	Williston Road at S Brownell Road	Residential	65
16	Shunpike Road	Residential	67
17	Patrick Street	Residential	71
18	Airport Parkway/Kirby Road	Residential	79
19	Valley Ridge Road	Residential	68
20	Main Street/E Spring Street	Residential	<65
21	Roland Court	Residential	67
22	Shamrock Road	Residential	75

Source: Wyle 2011, 2013.
Note: *Community College of Vermont added in response to public comment.

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 BR3.2-4 presents indoor speech interference under baseline conditions. Mean speech interference events with windows closed and open are 2.1 and 4.7, respectively.

Table BR3.2-4. Baseline Indoor Speech Interference at Representative Locations near Burlington IAP

Location ID Number	*Receptor*	*Average Daily Indoor Events per Hour[1] Daytime (7:00 a.m. to 10:00 p.m.)*	
		Windows Closed	*Windows Open*
1	Fletcher Allen Healthcare-Fanny Campus	1	3
8	Calvary Chapel	2	4
9	Community Lutheran Church	1	2
10	Maranatha Christian Church	2	4
11	Sisters of Providence	4	6
12	Valley Baptist Fellowship	2	5
13	Winooski United Methodist Church	2	6
14	Chapel of St. Michael	1	3
15	Williston Road at S Brownell Road	5	6
16	Shunpike Road	1	3
17	Patrick Street	1	5
18	Airport Parkway/Kirby Road	3	10
19	Valley Ridge Road	2	4
20	Main Street/E Spring Street	4	6
21	Roland Court	2	4
22	Shamrock Road	3	8

Source: Wyle 2011.
Note: [1]Assumed 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. For schools, two additional classroom criteria are applied to determine if aircraft noise may inhibit classroom learning. When considering intermittent noise caused by aircraft overflights, guidelines for classroom interference indicate that an appropriate criterion is a limit on indoor background equivalent noise levels of 35 to 40 dB (equivalent noise level [L_{eq}]) and a limit on single events of 50 dB L_{max}. The 50 dB L_{max} for single events equates to outdoor L_{max} of 65 dB and 75 dB for windows open and closed, respectively. Thus the number of annual average daily events whose L_{max} would be greater than or equal to 65 dB and 75 dB serve as the measure of potential classroom effects and are presented as NA65 L_{max} and NA75L_{max} for windows open and closed, respectively, on a per-hour basis. Because classrooms are in use during the day predominantly, these criteria are applied for aircraft operations occurring between 8:00 a.m. and 4:00 p.m. rather than between 7:00 a.m. and 10:00 p.m. for standard speech interference. Table BR3.2-5 presents the baseline classroom levels for the seven school receptors. All of the schools exceed the outdoor equivalent noise level of 60 dB L_{eq} over an 8-hour period.

Table BR3.2-5. Baseline Classroom Speech Interference for Schools near Burlington IAP				
Location ID Number	*Receptor*	*Outdoor Equivalent Noise Level (L_{eq})*	*Number of Events Above a Maximum Outdoor Noise Level of 75 dB (NA75L_{max})*[1]	
			Windows Closed	*Windows Open*
2	Bellwether School and Family Center	61	8	19
3	Center For Science Education	67	17	44
4	Chamberlin School	74	5	25
5	Saint Michael College	71	3	16
6	St. Francis Xavier School	64	26	47
7	Vermont Technical College	61	12	40
23	Community College of Vermont	68	40	49

Source: Wyle 2011, 2013.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

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 BR3.2-6 lists the probabilities of indoor awakening from average daily nighttime (10:00 p.m. to 7:00 a.m.) events for the same representative residential locations for these locations, the probability of awakening ranges between 3 percent with windows closed at Shunpike Road to 41 percent windows open at Airport Parkway/Kirby road. However, under baseline conditions, no 158 FW operations occur between 10:00 p.m. and 7:00 a.m., so current sleep disturbance events at representative locations occur solely as a result of civilian or commercial operations occurring at Burlington IAP.

Table BR3.2-6. Baseline Indoor Sleep Disturbance at Representative Locations near Burlington IAP			
Location ID Number	*Receptor*	*Average Nightly (10:00 p.m. to 7:00 a.m.) Probability of Awakening (%)*[1]	
		Windows Closed	*Windows Open*
15	Williston Road at S Brownell Road	9%	18%
16	Shunpike Road	3%	18%
17	Patrick Street	17%	37%
18	Airport Parkway/Kirby Road	24%	41%
19	Valley Ridge Road	4%	18%
20	Main Street/E Spring Street	8%	16%
21	Roland Court	4%	14%
22	Shamrock Road	13%	32%

Source: Wyle 2011.
Note: [1]Assumed 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 levels greater than 80 dB DNL. The effect of PHL is denoted by the number of people subject to Noise Induced Potential Hearing Loss (NIPTS) within 1-dB increments above 80 dB DNL (i.e., 80 to 81 dB). Refer to Section 3.3 and Appendix C for detailed information on PHL.

Under baseline conditions, portions of residential areas adjacent to Burlington IAP are exposed to noise levels of 80 dB DNL and greater. To determine potential PHL impacts, the analysis used up-to-date aerial photos to count the number of residences within areas subject to 80 dB DNL and greater. After overlaying 1-dB increment contours, the total affected population per 1-dB contour was calculated using the area's average household size of 2.37 persons (U.S. Census Bureau 2010b). This analysis established that the average NIPTS is estimated as 3.0 dB and 3.5 dB for approximately 26 residents (Table BR3.2-7). These assessments assume continuous exposure for 15 hours per day for 40 days or more.

Table BR3.2-7. Baseline PHL Estimates at Burlington AGS

Contour Band (dB DNL)	*Baseline Residential Population*	*Average NIPTS (dB)[1]*
80 – 81	2	3.0
81 – 82	7	3.5

Source: Wyle 2011 and National Academy of Sciences 1977.
Note: [1]Rounded to the nearest 0.5 dB.

Operational 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 Burlington IAP. While these sources may contribute to the overall noise environment, they would not appreciably change under either of the scenarios; therefore, these sources are not included in the noise analyses.

BR3.2.1.2 Environmental Consequences

ANG Scenario 1

Noise Exposure

ANG Scenario 1 involves the beddown of 18 F-35As at Burlington IAP and drawdown of 18 F-16s. Proposed F-35A flight operations would total 5,486 annually, all during the environmental daytime hours (between 7:00 a.m. and 10:00 p.m.). About 82 percent of these proposed operations would consist of departures and arrivals; the remaining 18 percent would involve pattern work in the vicinity of the airport. Annual F-35A operations, when added to commercial and civilian aircraft (104,125 operations) would total 109,611, a 2 percent decrease from baseline.

Figure BR3.2-2 shows the 65 to 85 dB DNL contour bands, in 5 dB increments, under Burlington AGS ANG Scenario 1; baseline contours are also presented for comparison purposes. Table BR3.2-8 presents noise exposure in terms of estimated acreage, population, households, and representative receptors (i.e., residential areas). When compared to baseline conditions, ANG Scenario 1 noise levels of 65 dB DNL and greater would affect 289 more acres, 2,061 more people, and 997 more households; the number of representative receptors affected by 65 dB DNL and greater would increase by five.

Table BR3.2-8. Off-Airport Noise Exposure under ANG Scenario 1 for Burlington AGS Proposed/Baseline

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*[2]	*Receptors*[3]
65 – 70	1,280/1,248	4,330/2,808	1,893/1,219	12/7
70 – 75	671/483	1,740/1,211	810/505	3/2
75 – 80	250/187	586/574	257/238	1/2
80 – 85	51/45	7/9	3/4	0/0
85+	0/0	0/0	0/0	0/0
Total	**2,252/1,963**	**6,663/4,602**	**2,963/1,966**	**16/11**

Source: Wyle 2011, U.S. Census Bureau 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]Household estimates may be more if city/town tax roles were applied; however, to maintain equal analysis among all six alternative locations census block groups were used.
[3]All noise receptors are located off-base; refer to Figure BR3.2-2.

Decibel levels for representative locations of representative receptors near Burlington AGS are provided in Table BR3.2-9. Under ANG Scenario 1, of the 23 total representative receptors, 10 would experience increases of noise levels in the 65 to 80 dB DNL noise contour bands when compared to baseline conditions. These include three schools (#3, 6, and 23), three places of worship (#8, 11, and 13), and four residential areas (#15, 18, 19, and 21).

The 18 F-35A aircraft under ANG Scenario 1 would generate approximately 33 percent less annual airfield operations than the based F-16s. The effect of the reduction in flight operations would be offset by the F-35A producing a single-event departure SELs 7 to 17 dB greater than the F-16s at Burlington AGS. With the 18 F-16 aircraft eliminated, based F-35A departures from Runways 15 and 33 would dominate the DNL exposure southeast and northwest of the station/airport, respectively. The contribution of civilian aircraft would be negligible compared to the military aircraft contribution.

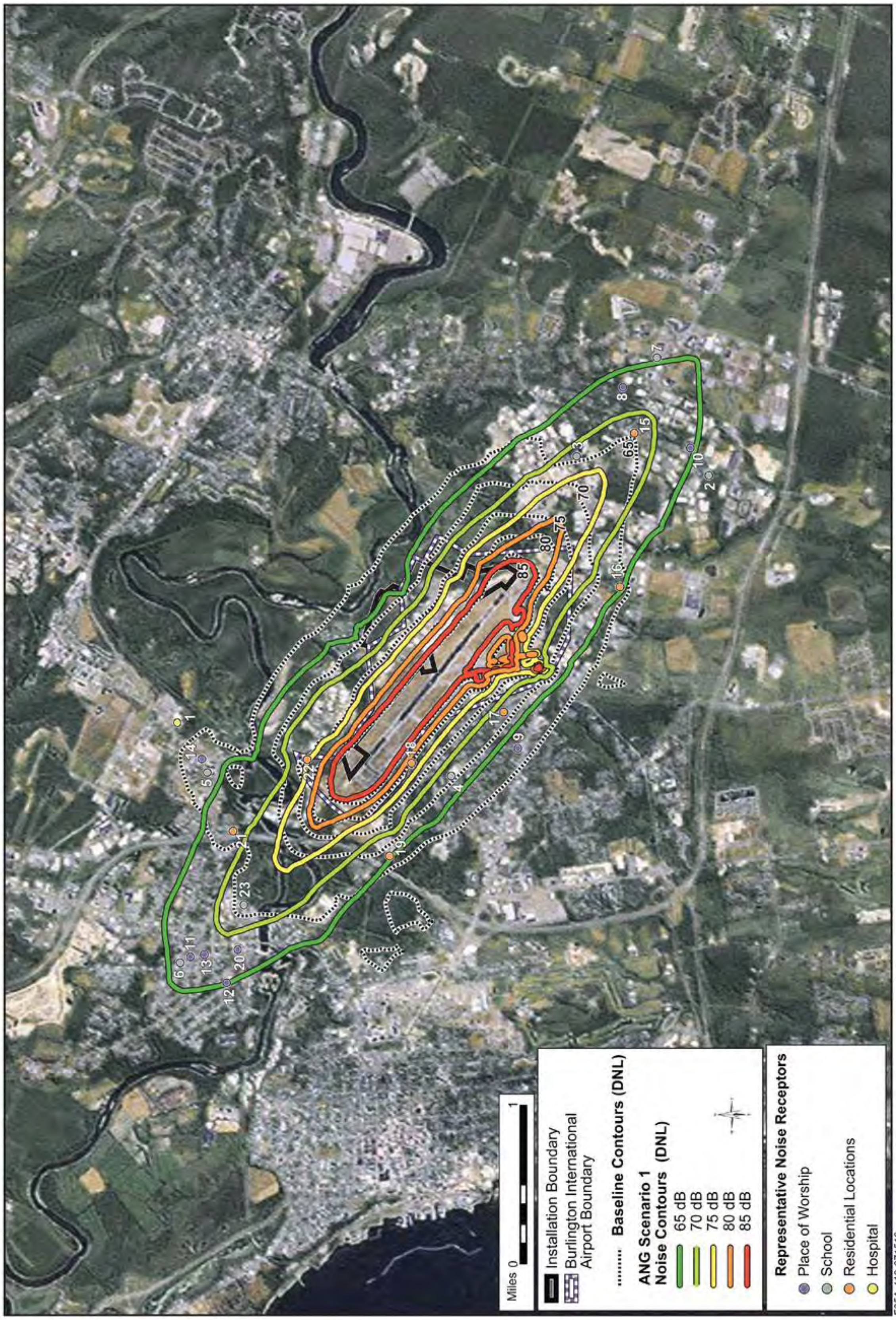


Figure BR3.2-2. ANG Scenario 1 Proposed Noise Contour Bands at Burlington AGS

Table BR3.2-9. Decibel Levels under ANG Scenario 1 at Representative Locations near Burlington IAP			
Location ID Number	***Receptor***	***Type***	***Decibel Level (dB DNL) Proposed/Baseline***
1	Fletcher Allen Healthcare-Fanny Campus	Hospital	<65/<65
2	Bellwether School and Family Center	School	<65/<65
3	Center For Science Education	School	71/<65
4	Chamberlin School	School	67/70
5	Saint Michael College	School	65/68
6	St. Francis Xavier School	School	67/<65
7	Vermont Technical College	School	<65/<65
23	Community College of Vermont	School	72/65
8	Calvary Chapel	Worship	65/<65
9	Community Lutheran Church	Worship	<65/66
10	Maranatha Christian Church	Worship	<65/<65
11	Sisters of Providence	Worship	68/<65
12	Valley Baptist Fellowship	Worship	<65/<65
13	Winooski United Methodist Church	Worship	67/<65
14	Chapel of St. Michael	Worship	65/67
15	Williston Road at S Brownell Road	Residential	72/65
16	Shunpike Road	Residential	66/67
17	Patrick Street	Residential	67/71
18	Airport Parkway/Kirby Road	Residential	78/79
19	Valley Ridge Road	Residential	69/68
20	Main Street/E Spring Street	Residential	68/<65
21	Roland Court	Residential	69/67
22	Shamrock Road	Residential	75/75

Source: Wyle 2011, 2013 and U.S. Census Bureau 2010b.

Speech Interference

In terms of speech interference, Table BR3.2-10 enumerates the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour for receptors that generally would experience indoor maximum sound levels of at least 50 dB with windows closed and open. Under this scenario, the number of representative receptors experiencing speech interference events with windows closed would decrease by one event per hour at two locations; all the other receptors would experience no changes in the number of events when compared to baseline. With windows open, two representative receptors would experience an increase of one event per hour (#9 and 17); six would experience one less event per hour; and the others would experience no change from baseline conditions.

Table BR3.2-10. ANG Scenario 1 Indoor Speech Interference at Representative Locations at Burlington AGS					
Location ID Number	Receptor	Average Daily Indoor Events per Hour[1] Daytime (7:00 a.m. to 10:00 p.m.)			
		Windows Closed	Windows Open	Change from Baseline	
				Windows Closed	Windows Open
1	Fletcher Allen Healthcare-Fanny Campus	1	2	0	-1
8	Calvary Chapel	2	4	0	0
9	Community Lutheran Church	1	3	0	+1
10	Maranatha Christian Church	2	4	0	0
11	Sisters of Providence	3	5	-1	-1
12	Valley Baptist Fellowship	2	5	0	0
13	Winooski United Methodist Church	2	5	0	-1
14	Chapel of St. Michael	1	3	0	0
15	Williston Road at S Brownell Road	4	5	-1	-1
16	Shunpike Road	1	3	0	0
17	Patrick Street	1	6	0	+1
18	Airport Parkway/Kirby Road	3	10	0	0
19	Valley Ridge Road	2	4	0	0
20	Main Street/E Spring Street	4	5	0	-1
21	Roland Court	2	4	0	0
22	Shamrock Road	3	7	0	-1

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Classroom Speech Interference

Table BR3.2-11 presents the potential speech interference impacts for classrooms under ANG Scenario 1. Outdoor equivalent noise level (L_{eq}) noise levels would increase at all schools. All seven schools remain exposed to noise levels greater than 60 dB L_{eq}. The number of speech interfering events with windows closed would remain unchanged from baseline for six schools (#2, 3, 4, 6, 7, and 23), and increase by one at Saint Michael College. In terms of windows open, events per hour would increase by one at one school (#2) and decrease by one at another (#7); all others would remain unchanged from baseline conditions.

Table BR3.2-11. ANG Scenario 1 Classroom Speech Interference for Schools near Burlington IAP				
Location ID Number	Receptor	Outdoor Equivalent Noise Level (L_{eq})	Number of Events Above a Maximum Outdoor Noise Level of 75 dB ($NA75L_{max}$)[1]	
			Windows Closed	Windows Open
2	Bellwether School and Family Center	64	8	20
3	Center For Science Education	74	17	44
4	Chamberlin School	70	5	25
5	Saint Michael College	69	4	16
6	St. Francis Xavier School	70	26	47
7	Vermont Technical College	67	12	39
23	Community College of Vermont	75	40	49

Source: Wyle 2011, 2013 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Sleep Disturbance

Table BR3.2-12 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 remain the same as baseline because there would be no planned F-35A nighttime operations under this scenario. All awakenings would be the result of commercial or civil aviation operations at Burlington IAP.

Table BR3.2-12. ANG Scenario 1 Indoor Sleep Disturbance at Representative Locations at Burlington AGS

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
15	Williston Road at S Brownell Road	9%	18%	0	0
16	Shunpike Road	3%	18%	0	0
17	Patrick Street	17%	37%	0	0
18	Airport Parkway/Kirby Road	24%	41%	0	0
19	Valley Ridge Road	4%	18%	0	0
20	Main Street/E Spring Street	8%	16%	0	0
21	Roland Court	4%	14%	0	0
22	Shamrock Road	13%	32%	0	0

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

Under ANG Scenario 1, portions of the residential population adjacent to Burlington IAP would be exposed to noise levels of 80 dB DNL and greater. The analyses established that average NIPTS for approximately 7 of the residential population is estimated as 3.0 dB and 3.5 dB (Table BR3.2-13). There would be five more of the residential population exposed in the 80 to 81 dB DNL band and seven fewer of the residential population impacted in the 81 to 82 dB DNL band.

Table BR3.2-13. ANG Scenario 1 PHL Estimates at Burlington AGS

Contour Band (dB DNL)	*Baseline Residential Population*	*Proposed Residential Population*	*Average NIPTS (dB)[1]*	*10th Percentile NIPTS (dB)[1]*
80 – 81	2	7	3.0	7
81 – 82	7	0	3.5	8

Source: Wyle 2011 and National Academy of Sciences 1977.
Note: [1]Rounded to the nearest 0.5 dB.

Occupational Noise

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

ANG Scenario 2

Noise Exposure

ANG Scenario 2 would involve beddown of 24 F-35A aircraft at Burlington IAP and drawdown of 18 F-16s. Proposed F-35A flight operations would total 7,296 annually, with all occurring during environmental daytime hours (between 7:00 a.m. and 10:00 p.m.). About 81 percent of these proposed operations would consist of departures and arrivals; the remaining 19 percent would involve pattern work in the vicinity of the airport. Annual F-35A flight operations generated by the 158 FW, when added to commercial and civilian aircraft (104,125 total operations), would total approximately 111,421, a 0.7 percent decrease from baseline.

Figure BR3.2-3 shows the 65 to 85 dB DNL contour bands for Burlington AGS ANG Scenario 2. Baseline contours are also presented for comparison purposes. Table BR3.2-14 presents noise exposure in terms of estimated off-airport acreage, population, households, and representative receptors within each 5-dB contour band. When compared to baseline conditions, ANG Scenario 2 noise levels would affect: 672 additional acres, 3,117 more people; and 1,444 more households. Six more receptors would be newly exposed to 65 dB DNL and greater.

Table BR3.2-14. Off-Airport Noise Exposure under ANG Scenario 2 for Burlington AGS Proposed/Baseline

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*[2]	*Receptors*[3]
65 – 70	1,438/1,248	4,593/2,808	1,975/1,219	13/7
70 – 75	790/483	2,356/1,211	1,090/505	2/2
75 – 80	318/187	756/574	339/238	2/2
80 – 85	89/45	14/9	6/4	0/0
85+	0/0	0/0	0/0	0/0
Total	**2,635/1,963**	**7,719/4,602**	**3,410/1,966**	**17/11**

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]Household estimates may be more if city/town tax roles were applied; however, to maintain equal analysis among all six alternative locations census block groups were used.
[3]All noise receptors are located off-base; refer to Figure BR3.2-3.

The 24 F-35A aircraft under ANG Scenario 2 would generate approximately 10 percent less annual flight operations than the based F-16s. The effect of the reduction in flight operations would be offset by the F-35A producing a single-event departure SELs 17 dB greater than the F-16s at Burlington AGS. With the 18 F-16 aircraft eliminated, based F-35A departures from Runways 15 and 33 would dominate the DNL exposure southeast and northwest of the station/airport, respectively. The contribution of civilian aircraft would be negligible compared to the military aircraft contribution.

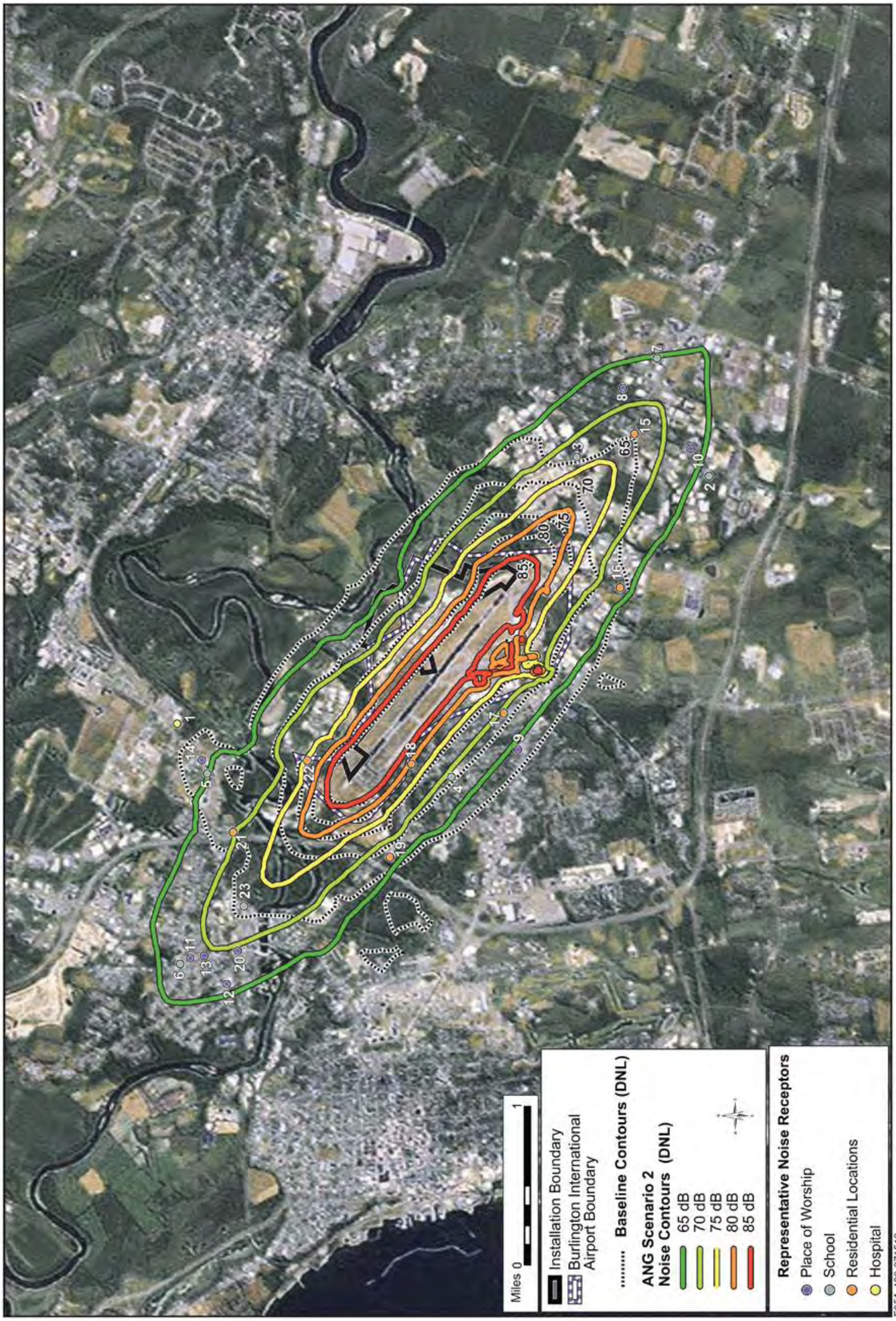


Figure BR3.2-3. ANG Scenario 2 Proposed Noise Contour Bands at Burlington AGS

Table BR3.2-15 shows the representative receptors by name, type, and dB level compared to baseline conditions. Under this scenario, 14 locations would experience increased noise levels (four schools, five places of worship, and five residential areas), five would be subject to decreases in noise, and two would remain unchanged. A total of two locations would remain below 65 dB DNL.

Table BR3.2-15. Decibel Levels under ANG Scenario 2 at Representative Locations near Burlington IAP

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL) Proposed/Baseline*
1	Fletcher Allen Healthcare-Fanny Campus	Hospital	<65/<65
2	Bellwether School and Family Center	School	<65/<65
3	Center For Science Education	School	72/<65
4	Chamberlin School	School	68/70
5	Saint Michael College	School	66/68
6	St. Francis Xavier School	School	68/<65
7	Vermont Technical College	School	65/<65
23	Community College of Vermont	School	73/65
8	Calvary Chapel	Worship	66/<65
9	Community Lutheran Church	Worship	<65/66
10	Maranatha Christian Church	Worship	65/<65
11	Sisters of Providence	Worship	69/<65
12	Valley Baptist Fellowship	Worship	65/<65
13	Winooski United Methodist Church	Worship	69/<65
14	Chapel of St. Michael	Worship	66/67
15	Williston Road at S Brownell Road	Residential	73/65
16	Shunpike Road	Residential	67/67
17	Patrick Street	Residential	68/71
18	Airport Parkway/Kirby Road	Residential	79/79
19	Valley Ridge Road	Residential	70/68
20	Main Street/E Spring Street	Residential	69/<65
21	Roland Court	Residential	70/67
22	Shamrock Road	Residential	76/75

Source: Wyle 2011, 2013 and U.S. Census Bureau 2010b.

Speech Interference

In terms of speech interference, Table BR3.2-16 presents the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour for representative receptor which generally would have indoor maximum sound levels of at least 50 dB with windows closed and open. Under ANG Scenario 2, 6 out of the 16 representative receptors would experience an increase of 1 speech interfering events per hour with windows closed; the other 10 would experience events consistent with baseline levels. When window are open, 5 receptors would experience 1 event more per hour when compared to baseline, the other 11 would remain unchanged.

Table BR3.2-16. ANG Scenario 2 Indoor Speech Interference at Representative Locations at Burlington AGS					
Location ID Number	***Receptor***	***Average Daily Indoor Events per Hour[1] Daytime (7:00 a.m. to 10:00 p.m.)***			
		Windows Closed	*Windows Open*	*Change from Baseline*	
				Windows Closed	Windows Open
1	Fletcher Allen Healthcare-Fanny Campus	2	3	+1	0
8	Calvary Chapel	2	4	0	0
9	Community Lutheran Church	1	3	0	+1
10	Maranatha Christian Church	3	4	+1	0
11	Sisters of Providence	4	6	0	0
12	Valley Baptist Fellowship	2	5	0	0
13	Winooski United Methodist Church	3	6	+1	0
14	Chapel of St. Michael	2	3	+1	0
15	Williston Road at S Brownell Road	5	6	0	0
16	Shunpike Road	2	4	+1	+1
17	Patrick Street	1	6	+1	+1
18	Airport Parkway/Kirby Road	4	10	0	0
19	Valley Ridge Road	2	5	+1	+1
20	Main Street/E Spring Street	4	6	0	0
21	Roland Court	2	5	+1	+1
22	Shamrock Road	3	8	0	0

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Classroom Speech Interference

Table BR3.2-17 presents the potential speech interference impacts for classrooms at the school receptors under ANG Scenario 2. Relative to baseline conditions, L_{eq} noise levels would increase at all seven schools. Speech interference events, with windows open, would increase by no more than one event per hour at three receptors (#3, 4, and 7); the other receptors would experience speech-interfering events consistent with baseline conditions. When windows are closed, three receptors (#2, 4, and 5) would experience a one event per hour increase when compared to baseline.

Table BR3.2-17. ANG Scenario 2 Classroom Speech Interference for Schools near Burlington IAP				
Location ID Number	***Receptor***	***Outdoor Equivalent Noise Level (L_{eq})***	***Number of Events Above a Maximum Outdoor Noise Level of 75 dB (NA75L_{max})[1]***	
			Windows Closed	*Windows Open*
2	Bellwether School and Family Center	65	9	20
3	Center For Science Education	75	17	45
4	Chamberlin School	71	6	26
5	Saint Michael College	70	4	16
6	St. Francis Xavier School	71	26	47
7	Vermont Technical College	68	12	40
23	Community College of Vermont	76	40	49

Source: Wyle 2011, 2013 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Sleep Disturbance

Table BR3.2-18 lists the probabilities of indoor awakening events for receptors, during daily average environmental nighttime hours, with windows closed and open. Under ANG Scenario 2, the probability of awakening would remain the same as under baseline conditions because there would be no planned F-35A nighttime operations under this scenario. All awakenings would be the result of commercial or civil aviation at Burlington IAP.

Table BR3.2-18. ANG Scenario 2 Indoor Sleep Disturbance at Representative Locations at Burlington AGS

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
15	Williston Road at S Brownell Road	9%	18%	0	0
16	Shunpike Road	3%	18%	0	0
17	Patrick Street	17%	37%	0	0
18	Airport Parkway/Kirby Road	24%	41%	0	0
19	Valley Ridge Road	4%	18%	0	0
20	Main Street/E Spring Street	8%	16%	0	0
21	Roland Court	4%	14%	0	0
22	Shamrock Road	13%	32%	0	0

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

Under ANG Scenario 2, portions of the residential population adjacent to the airport would be exposed to noise levels of 80 dB DNL and greater. The analyses established that average NIPTS for approximately 14 of the residential population would be 3.0 dB to 4.0 dB (Table BR3.2-19). Compared to baseline, 4 more of the residential population would be exposed in the 80 to 83 dB DNL contour bands

Table BR3.2-19. ANG Scenario 2 PHL Estimates at Burlington AGS

Contour Band (dB DNL)	*Baseline Residential Population*	*Proposed Residential Population*	*Average NIPTS (dB)*[1]	*10th Percentile NIPTS (dB)*[1]
80 – 81	2	5	3.0	7
81 – 82	7	7	3.5	8
82 – 83	0	2	4.0	9

Source: Wyle 2011 and National Academy of Sciences 1977
Note: [1]Rounded to the nearest 0.5 dB.

Occupational Noise

Air Force occupational noise exposure prevention procedures such as hearing protection and monitoring would continue to be implemented under this scenario. These procedures would assure compliance with all applicable OSHA and Air Force occupational noise exposure regulations.

BR3.2.2 Airspace

This section presents noise conditions in the airspace and ranges that would be used by F-35A aircraft under any of the Burlington AGS beddown scenarios. The airspace and ranges associated with the Burlington AGS beddown scenarios include airspace units throughout Vermont, New Hampshire, Maine, and New York. Training activities would result from the replacement of F-16 aircraft by F-35A aircraft. As noted in Table 2.2-1, the 158 FW would operate the F-35As within existing MOAs, overlying ATCAAs, or restricted airspace and ranges, performing similar types of combat training missions in Yankee Laser, Condor Scotty, and Viper West Complex airspace blocks. 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 wildland 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 BR3.6 (Terrestrial Communities) for a discussion of noise impacts to wildlife.

BR3.2.2.1 Affected Environment

Subsonic Noise

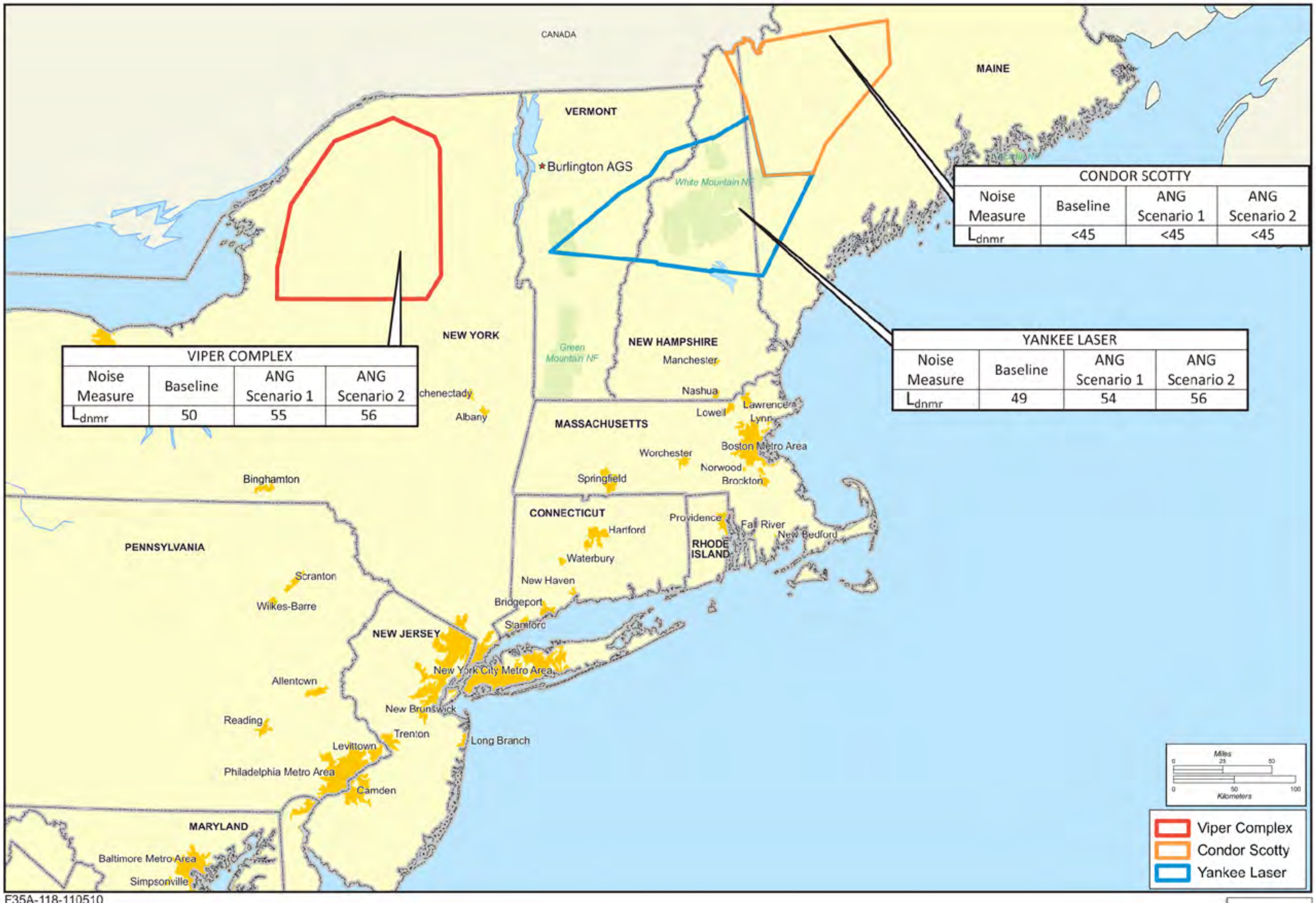
Figure BR3.2-4 presents the baseline noise levels in L_{dnmr} for each of the blocks of airspace proposed for use. As the figure shows, in the Viper Complex (where 83 percent of the 158 FW operations occur) noise levels average about 50 dB L_{dnmr}. In the Yankee Laser, noise levels are 49 L_{dnmr} and in the Condor Scotty, noise levels are less than 45 dB L_{dnmr}.

Supersonic Noise

All supersonic flight is conducted more than 15 nautical miles (nm) away from land in the overwater Warning Areas. All supersonic events would be conducted above 15,000 feet MSL with 90 percent occurring above 30,000 feet MSL. Since supersonic flight occurs in the Warning Areas, no detailed analysis was performed per Section 3.1.3.

BR3.2.2.2 Environmental Consequences

Figure BR3.2-4 presents the proposed noise levels in L_{dnmr} for each of the blocks of airspace proposed for use under the two scenarios. Although perceptible changes in noise levels would occur within two of the three airspace units, overall noise levels would continue to remain below 65 L_{dnmr}. In the third block,



VIPER COMPLEX

Noise Measure	Baseline	ANG Scenario 1	ANG Scenario 2
L_{dnmr}	50	55	56

CONDOR SCOTTY

Noise Measure	Baseline	ANG Scenario 1	ANG Scenario 2
L_{dnmr}	<45	<45	<45

YANKEE LASER

Noise Measure	Baseline	ANG Scenario 1	ANG Scenario 2
L_{dnmr}	49	54	56

Figure BR3.2-4. Baseline and Proposed Noise Environment for Airspace Used by Burlington AGS

Condor Scotty, noise levels would remain very low (less than 45 L_{dnmr}). Under both scenarios, there would be perceptible changes in noise for the Viper Complex and Yankee Laser with increases of 5 to 6 dB and 6 to 7 dB, respectively. These increases partially result from the different flight characteristics of the F-35A compared to the F-16 aircraft, as well as a change in use of the airspace. The areas beneath these airspace units support a relatively low population density with a few small communities. These areas have been exposed to aircraft noise for decades. By standard FAA flight rules, all pilots would continue to avoid direct overflight of populated areas by 1,000 feet and structures by 500 feet. With the 5 to 7 dB increase in subsonic noise, the number of complaints received by the installation and level of annoyance experienced by underlying communities and residents would likely increase.

BR3.3 Air Quality

Emissions associated with operations at Burlington AGS include emissions of volatile organic compounds (VOCs) and nitrogen oxides (NO_x), both of which are precursors to ozone (O_3), as well as carbon monoxide (CO), sulfur dioxide (SO_2), 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 (PM_{10}). Emissions of lead are not addressed because the affected areas contain no significant sources of this criteria pollutant, and operations at Burlington AGS would not result in substantial emissions of lead.

BR3.3.1 Base

BR3.3.1.1 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, SO_2, and directly-emitted PM_{10} and $PM_{2.5}$. For pollutants that undergo chemical reactions and interact within the atmosphere to form secondary pollutants, such as O_3 and its precursors NO_x and VOCs, and precursors of PM_{10} and $PM_{2.5}$, the affected environment is a larger regional area. The chemical transformations and interactions that create O_3 and secondary PM_{10} 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 Burlington AGS (refer to Section 3.4 for further discussion of mixing height).

Regional Environment

The affected environment for base-generated emissions includes the Burlington AGS, the area surrounding the station where aircraft operate below 3,000 feet AGL (i.e., Burlington IAP), and the airspace overlying these areas. Burlington AGS is located within Chittenden County. This county, along with six others in Vermont and seven in New York fall within the greater Champlain Valley Air Quality Control Region (AQCR) (40 Code of Federal Regulations [CFR] 81.48). Impacts of the proposed action can be evaluated in the context of existing local air quality, baseline emissions for the installation and in the region, and relative contribution of the proposed action to regional emissions.

The state of Vermont has adopted the National Ambient Air Quality Standards (NAAQS) and no separate state standards exist; therefore, regional air quality is measured in comparison to these standards. Air quality in the Champlain Valley AQCR has been designated as either in "attainment," "unclassifiable/attainment", or "better than national standards" with the NAAQS for all pollutants (40 CFR 81.346); therefore, no conformity analysis is required. Table BR3.3-1 summarizes the regional emissions (stationary and mobile) of criteria pollutants and precursor emissions for this AQCR.

Table BR3.3-1. Baseline Regional Emissions (2002) (tons per year)

	VOCs	*NO_x*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
Champlain Valley AQCR	74,554	32,415	383,146	12,899	58,000	12,710

Source: USEPA 2008.

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. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the No-Action Alternative and the Proposed Action alternatives have been quantified to the extent feasible in this EIS for information and comparison purposes only.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). 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 CO_2, which has a value of one. For example, under the USEPA's Mandatory Greenhouse Gas Reporting Rule, CH_4 has a GWP of 21, which means that it is considered to have a global warming effect 21 times greater than CO_2 on an equal-mass basis. Total GHG source emissions are often reported as a CO_2 equivalent (CO_2e). The CO_2e 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

Burlington AGS is located at Burlington IAP, 3 miles east of the central business district of Burlington, Vermont's largest city. The AGS is located in a developed area, with numerous air emission sources. 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 PM_{10} and $PM_{2.5}$ emissions. Fugitive dust sources include unpaved roads, agricultural cropland, and construction sites.

The Vermont Department of Environmental Conservation has primary jurisdiction over air quality and sources of stationary source emissions at Burlington AGS. Stationary source emissions included in the baseline are jet engine testing (off the aircraft), fuel storage, fueling operations, heating and power production, degreasing and solvent use, coatings applications, and other miscellaneous sources. Actual emissions from these sources total less than 10 tons per year; therefore, the Burlington AGS has applied for, and received an Operating Permit Opt-Out (#OP-95-023, 1995) from the state of Vermont. This opt-out is based on the determination that the installation is exempt from minor source permitting requirements as long as the actual emissions (in the aggregate for all pollutants, excluding emissions from insignificant activities) are less than 10 tons per year.

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 F-16 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 F-16 aircraft were also included in baseline calculations. Table BR3.3-2 summarizes baseline emissions; these emissions were based on flight profiles and engine maintenance runups developed as part of the noise analysis (Wyle Labs 2011). 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 CO_2, which were derived from Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling—Compression-Ignition. For CH_4 and N_2O 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. Refer to Appendix D for the concepts used in developing these emission estimates.

Table BR3.3-2. Baseline Emissions for Burlington AGS (2008)						
Pollutants in Tons per Year						
CO	*NO_x*	*VOCs*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
153.80	48.42	19.11	8.37	8.55	7.80	18,225

Source: 158 FW 2009a.
Note: [1]Measured in metric tons per year or mT/yr.

BR3.3.1.2 Environmental Consequences

Air quality impacts within the affected environment were reviewed relative to 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 beddown 18 F-35A aircraft at Burlington AGS by replacing the current 18 F-16 aircraft. Under ANG Scenario 1, only operational activities would result in air pollutant emissions.

Construction

Under ANG Scenario 1, no new construction would be required; only 4,700 square feet of interior renovations within one building would be needed. Therefore, the only construction-related air quality impacts anticipated would be minor amounts of emissions generated on a temporary basis by trucks transferring materials to and from the one building being renovated. As a result, no thresholds would be exceeded and there would be no air quality impacts generated by construction activities.

Operations

Air quality impacts were determined by evaluating the net change in emissions associated with replacing 18 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 within and above the airfield (including runways, taxi areas, and overlying airspace), 2) vehicle (government-owned vehicle [GOV] and privately-owned vehicle [POV]) operations, and 3) AGE associated with 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 BR3.3-3 presents a summary of annual operational emissions generated under ANG Scenario 1 compared to baseline emissions. As indicated below, beddown of 18 F-35A aircraft at Burlington would generally result in emission decreases when compared to baseline conditions. However, there would be a minor annual increase of 10.67 tons per year in sulfur oxides (SO_x) when compared to baseline conditions. The close to 11-ton quantity would fall well below the 250-ton established threshold. In conclusion, ANG Scenario 1 would not introduce emissions that would noticeably affect regional air quality because no new major pollutant sources would exceed 250 tons. Emissions associated with replacing 18 F-16s with 18 F-35As would incrementally decrease regional emissions of CO_2e.

Table BR3.3-3. Proposed Annual Operational Emissions under ANG Scenario 1 at Burlington AGS

Activity	***Pollutants in Tons per Year***						
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
Aircraft	13.11	33.52	0.43	17.93	1.18	1.18	12,354
Engine Runups	0.40	0.09	0.01	0.11	0.01	0.01	76.25
AGE[2]	3.86	3.44	0.21	0.97	0.31	0.30	897
POVs	52.62	1.91	2.35	0.04	0.10	0.10	1,880
Total Annual ANG Scenario 1 Emissions	**69.98**	**38.96**	**3.00**	**19.04**	**1.60**	**1.59**	**15,207**
Baseline Annual Emissions	153.80	48.42	19.11	8.37	8.55	7.80	18,225
Net Change	***-83.82***	***-9.47***	***-16.11***	***10.67***	***-6.95***	***-6.21***	***-3,018***
Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**-**

Notes:
[1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR 98, Subpart A, Table A-1) in metric tons per year.
[2]With 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.

ANG Scenario 2

ANG Scenario 2 would beddown 24 F-35A aircraft at Burlington AGS, replacing the current 18 F-16 aircraft. As with ANG Scenario 1, operations would form the primary source of air emissions.

Construction

Only minor interior renovations to one building would occur under ANG Scenario 2. Emissions would be negligible and brief. No impacts, therefore, to regional air quality would result from construction activities.

Operations

Air quality impacts were determined by evaluating emissions associated with replacing 18 F-16 aircraft with 24 F-35A aircraft. Sources of operational emissions are the same as those presented under ANG Scenario 1. Table BR3.3-4 summarizes annual operational emissions projected under ANG Scenario 2 compared to baseline emissions. Like ANG Scenario 1, stationary source emissions were assumed to remain unchanged.

Table BR3.3-4. Proposed Annual Operational Emissions under ANG Scenario 2 at Burlington AGS							
Activity	***Pollutants in Tons per Year***						
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
Aircraft	17.49	45.13	0.57	24.02	1.58	1.58	16,556
Engine Runups	0.53	0.13	0.01	0.15	0.01	0.01	104
AGE[2]	5.13	4.57	0.28	1.29	0.42	0.40	1,194
POVs	65.97	2.40	2.95	0.05	0.13	0.13	2,357
Total Annual ANG Scenario 2 Emissions	**89.12**	**52.23**	**3.82**	**25.51**	**2.13**	**2.12**	**20,211**
Baseline Annual Emissions	153.80	48.42	19.11	8.37	8.55	7.80	18,225
Net Change	***-64.68***	***3.80***	***-15.29***	***17.14***	***-6.42***	***-5.68***	***1,986***
Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**-**

Notes:

[1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR 98, Subpart A, Table A-1) in metric tons per year.

[2]With 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 indicates that beddown of 24 F-35A aircraft would result in emissions decreases over baseline conditions for all criteria pollutants except for SO_x. As was the case for ANG Scenario 1, while there is net emissions growth in one listed pollutant, the 17.14-ton increase in tons per year would not exceed the 250-tons established 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. For GHG, emissions associated with ANG Scenario 2 would incrementally increase relative to baseline CO_2e emissions.

Climate Change Adaptation

In addition to assessing the greenhouse gas emissions that would result from the 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. Then it must identify 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 U.S. 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 Burlington AGS, adaptation issues requiring evaluation and consideration could revolve around changes in winter and summer temperatures, as well as drought and air quality conditions. 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 the Northeast. 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 southwest Asia where plus 100°F temperatures are common, such conditions would likely fall within a manageable range for fulfilling the mission. Conversely, shorter winters resulting from the same predicted climate change would reduce currently existing issues with cold weather maintenance and operations. It could also reduce the number of days affected by "unflyable" weather. Such climate changes could alter habitats, including those on base. Overall, however, these estimated changes would not pose a risk to any construction, infrastructure, or activities at Burlington IAP. While overall warmer temperatures may increase demand for air conditioning and power, no need to adapt infrastructure or facilities would arise at the base.

At an elevation of 355 feet MSL and hundreds of miles from the ocean, Burlington AGS would be immune to the impacts of estimated sea level changes of 1 to 2 feet affecting coastal areas by 2100.

Predictions from the report suggest that the Northeast could face droughts and scarcity of water supplies. Reduced availability of freshwater is likely to occur, with implications for the base and communities in the Northeast. Water is essential for maintenance and personnel, so strategies dealing with drought would need to be implemented.

With increase heat, air emissions could increase, particularly ozone. These conditions would not only create potential health risks for all the population, including the ANG personnel, they would also result in application of more stringent regulatory standards in terms of emissions. The amount and manner of aircraft operations and maintenance would possibly need to be modified to address such standards.

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.

BR3.3.2 Airspace

It is not anticipated that flight operations in special use airspace would affect regional air quality nor significantly 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 2-9) and thus take place above mixing height; third, as identified in Section BR3.3.1.2, replacing F-16 aircraft with F-35A aircraft would generally reduce pollutant emissions within the airfield environment for every criteria pollutant except for minor increases in SO_x and NO_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 established thresholds, projected airspace operations under any 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.

BR3.4 Safety

Aircraft safety addresses Runway Protection Zones (RPZs), aircraft mishaps, Bird/Wildlife-Aircraft Strike Hazards (BASH), and fuel dumping. 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 and force protection (AT/FP) requirements, and no changes to existing ground safety procedures would occur. The affected environment includes the airfield and airspace in which AGS aircraft operate.

RPZs are rectangular zones extending outward from the ends of active runways at commercial airports and delineate those areas recognized as having the greatest risk of aircraft mishaps, most of which occur during take-off or landing. Development restrictions associated with RPZs are intended to preclude incompatible land use activities from being established in these areas (see Chapter 3, Section 3.5.1 for specific RPZ discussion and Section 3.11.1 for land use compatibilities).

The City of Burlington, Vermont utilizes the FAA's airport land-use compatibility guidelines, and as such, the RPZs have allowed development to be 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 9,854,537 hours since the aircraft entered the Air Force inventory in FY 1985. Over that period, 351 Class A mishaps have occurred and 317 aircraft have been destroyed. This results in a Class A mishap rate of 3.55 per 100,000 flight-hours, and an aircraft destroyed rate of 3.2 (Air Force Safety Center [AFSC] 2013a).

BR3.4.1 Base

BR3.4.1.1 Affected Environment

The affected environment for safety includes the airfield at Burlington IAP and its immediate vicinity. Aircraft flight operations from Burlington AGS are governed by standard flight rules. Specific safety requirements are contained in standard operating procedures that must be followed by all aircrews operating from the airfield (Air Force Instruction [AFI] 11-2F-16V3, *F-16 Operations Procedures*, 158 FW Supplement, 2009b) to ensure flight safety. The last Class A mishap of a 158 FW aircraft at the Burlington airfield was in 1965 when an F-89 aircraft had an emergency and attempted to land in a cornfield in the vicinity of Taft's Corner (approximately 1 to 2 miles south of the airfield). The aircraft landed mostly intact but the pilot and radar navigator were unable to exit the wreckage and were killed in the post-crash fire. The only Vermont ANG F-16 Class A mishap was the attempted flameout landing at Cape May airport in New Jersey in August 1993. The pilot ejected safely but was unable to stop the aircraft on the runway and it was destroyed after departing the prepared surface (personal communication, Moultroup 2010).

Since introduction of the single jet engine fighter or attack aircraft in the 1950s, technological advances have continually driven down the engine failure rate and associated aircraft mishaps (Figure BR3.4-1) (AFSC 2010).

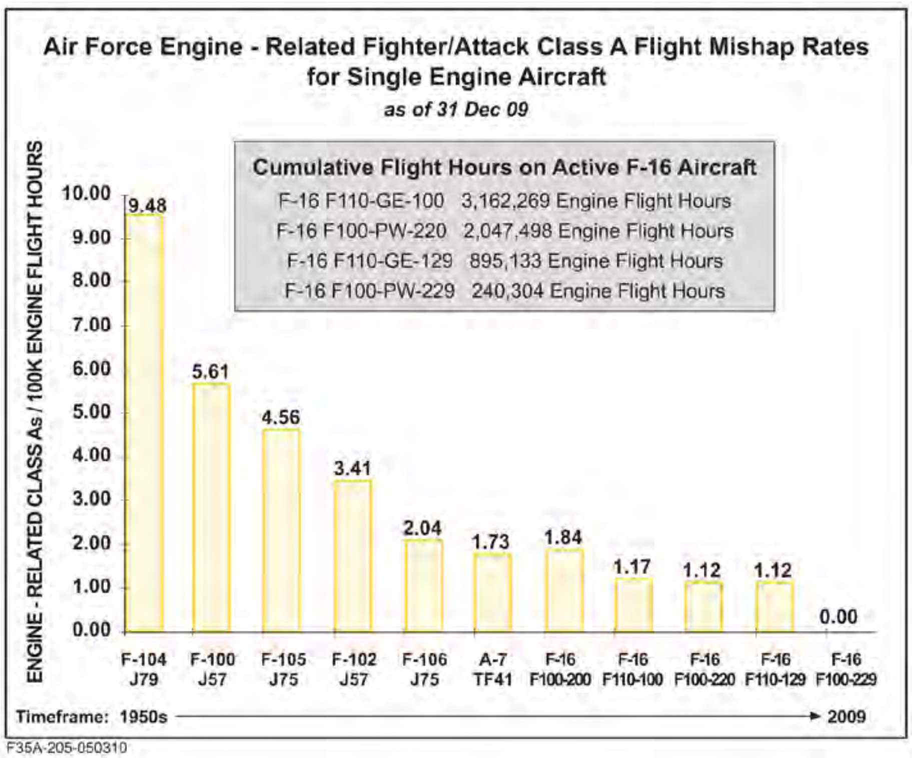


Figure BR3.4-1. Air Force Engine-Related Mishap Rates

Source: AFSC 2010.

Note: "Engine-related" excludes mishaps caused by foreign object damage, BASH, or failure of support systems external to the engine (e.g., fuel starvation).

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 AGL (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).

The 158 FW of the VTANG has an effective, on-going BASH program through which information and assistance is freely shared between airfield users, the Burlington IAP staff, and the local air traffic controllers. Serious BASH-related accidents within the immediate Burlington AGS area are rare and have never resulted in Class A mishaps (personal communication, Moultroup 2010). The Air Force BASH database has recorded 27 bird/wildlife-aircraft strikes at the airfield for the period 1987 to 2006 (158 FW 2007). Most of the reported strikes involved small passerines such as larks, doves, swallows, and robins, although one strike was also recorded with a coyote. The 158 FW has recently recorded three minor BASH incidents in 2007, two in 2008, and one in 2009 (personal communication, Moultroup 2010).

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

BR3.4.1.2 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, whose lifetime mishap rate was 3.55 and was 1.59 in the past 5 years (refer to Table 3-5 for annual mishap rates since the introduction of the F-16 into the Air Force inventory) (AFSC 2009a, 2013).

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 projected mishap rates for the F-35A may be comparable to the historic rates of the F-22A. The Class A mishap rates for the F-22A from squadron operational status to 30 September 2012 are provided in Table BR3.4-1.

Table BR3.4-1. F-22A Class A Flight Mishap History

Year	Class A		Destroyed		Fatal		Hours Flown per Year	Cumulative Flight Hours
	Number of Mishaps	Rate[1]	A/C	Rate	Pilot	All		
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

Table BR3.4-1. F-22A Class A Flight Mishap History								
Year	*Class A*		*Destroyed*		*Fatal*		Hours Flown per Year	Cumulative Flight Hours
	Number of Mishaps	*Rate*[1]	*A/C*	*Rate*	*Pilot*	*All*		
FY09	1	4.76	1	4.76	1	1	20,988	69,844
FY10	0	0	0	0	0	0	24,675	94,519
FY11	1	6.54	1	6.54	1	1	15,289	109,808
FY12	3	11.32	0	0	0	0	26,507	136,315
Lifetime	**10**	**7.34**	**3**	**2.20**	**2**	**2**	**-**	**136,315**

Source: AFSC 2013b.
Note: [1]Mishap rate is based on 100,000 hours of flight.
[2]One 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 F-16 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 F-16 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, safety initiatives took 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 includes all facets of flight operations and comprehensive emergency procedures. The sophistication and fidelity of current simulators and related computer programs are commensurate with the advancements made in aircraft technology. These factors should minimize risk associated with mishaps due to pilot error.

There would be a decrease of 2.3 percent in total Burlington IAP airfield operations for ANG Scenario 1 and a 0.7 percent decrease under ANG Scenario 2, compared to existing conditions. Under these scenarios, the decrease in take-offs, landings, proficiency training, and other flights would result in a commensurate decrease in the safety risk to aircrews and personnel.

The proposed decrease in airfield flight operations would technically lessen the potential for aircraft incidents; however, it is statistically insignificant. 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 jettison fuel for emergency situations. The FAA sets requirements for when and how fuel dumping may occur. This instruction stipulates that fuel can only be dumped above a minimum altitude of 2,000 feet to improve its evaporation, and that a dumping aircraft must be separated from other air traffic by at least 5 miles. Air traffic controllers are also instructed to direct planes dumping fuel away from populated areas and over large bodies of water as much as possible. The same guidelines apply to military aircraft; air bases only permit fuel dumping in a specified area (FAA

2010c). In 2001, the USEPA National Vehicle and Fuel Emissions Laboratory concluded, “Since fuel dumping is a rare event, and the fuel would likely be dispersed over a very large area, we believe its impact to the environment would not be serious” (USEPA 2001).

BR3.4.2 Airspace

BR3.4.2.1 Affected Environment

The airspace directly associated with the proposed action as it relates to the 158 FW at Burlington IAP includes Restricted Areas, MOAs, and ATCAAs (refer to Figure BR2.2-1). 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 Chapter 3, Section 3.1.3. The volume of airspace encompassed by the combination of airspace elements constitutes the affected environment for airspace management. Frequently used training airspace includes numerous MOAs/ATCAAs and the Fort Drum Range (R-5201). 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 section describes the existing operations 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 Burlington AGS associated training airspace are scheduled through the EADS Operations Control Center and the Airspace Scheduling Office. These operations are governed by FAA and Air Force standard rules of flight, and a Letter of Agreement with Boston Air Route Traffic Control Center (FAA 2008). 158 FW aircrew training activities must also comply with AFI 13-212, *Range Planning and Operations*, and local supplements/addendums.

158 FW aircrews are authorized to use self-protection (also known as decoy) flares in all local training areas (158 FW 2009b). 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. Vegetation under the associated training range and airspace units used by the 158 FW is generally verdant and not highly combustible, and flare use has not been identified as a wildfire problem. Additionally, when fire danger is high, flare deployment is curtailed.

BASH-related accidents within training airspace units used by the 158 FW are uncommon since most recorded strikes at are lower altitudes, and have never resulted in a Class A mishap (personal communication, Moultroup 2010). These data reflect total strikes experienced by all users of the airspace, not just aircraft from Burlington AGS.

BR3.4.2.2 Environmental Consequences

Under the proposed action, the decrease in F-35A airspace and range training operations the Burlington AGS training airspace (e.g., MOAs, Warning Areas) under ANG Scenario 1 and increase under ANG Scenario 2 would incrementally decrease/increase (respectively) 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 operations at the Fort Drum Range (R-5201), 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 F-16 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 F-16 aircraft. In addition, F-35A aircrews operating in the Burlington AGS associated training airspace would be required to follow applicable procedures outlined in the 158 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 each range. Burlington AGS F-16 aircraft deployed approximately 15,000 flares annually (personal communication, Caputo 2010); the F-35A would likely deploy considerably fewer 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 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, within the Burlington AGS training airspace, 15,000 flares would be deployed annually within the 10,700 square-mile airspace. It is estimated that these areas contain a population density of 10 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 0.0021 per year. This probability would vary by exact location and is calculated conservatively using flare residual dimensions spread evenly across the area under the airspace, and may also by 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.

BR3.5 Geology, Soils, and Water

BR3.5.1 Base

BR3.5.1.1 Affected Environment

Geology

Burlington AGS lies in the Champlain Valley physiographic region of Vermont (Doolan 1996). Specifically, the installation is situated on the Hinesburg synclinorium, which is located east of the Hinesburg-Oak Hill thrust fault. Glacial activity in the past shaped the subsurface geology of the area. The installation is situated above a layer of unconsolidated marine sands that is underlain by lacustrine clays and/or glacial till. The bedrock in the area is part of the Bascom Formation and is composed of marble. There are no geologic faults in the vicinity of Burlington AGS (158 FW 2006).

Topography

Elevations on Burlington AGS range from 320 feet above MSL in the southwestern portion of the installation to 260 feet above MSL in the former Shelburne Shipyard property, which is on the northern portion of the base. The topography of the installation generally slopes down from the southwest toward the northeast (158 FW 2006).

Soils

The land on Burlington AGS and the former Shelburne Shipyard property is composed of nine different soil types. The soil types are Windsor loamy sand, Adams loamy sand, Muck and peat, Agawam fine sandy loam, Hartland very fine sandy loam, Munson silt loam, Raynham silt loam, Winooski very fine sandy loam, and Scantic silt loam. The Muck, Munson, Raynham, and Scantic series are all poorly drained. The Windsor, Adams, Agawam, Hartland, and Winooski series are all moderately well drained to excessively drained (158 FW 2006). All soils have a moderate erosion potential except for Winooski, Hartland, Raynham, and Munson, which have a high erosion potential (Natural Resources Conservation Service [NRCS] 2010).

Surface Water

No permanent surface waters exist on Burlington AGS. There are several intermittent streams found mostly on the eastern edge of the installation. There are also several stormwater drainage swales located throughout the installation. Surface water from the eastern portion of the installation drains into Muddy Brook, which flows into Allen Brook and then the Winooski River. Surface water from the former Shelburne Shipyard property flows directly into the Winooski River (158 FW 2006).

Groundwater

There are three aquifer systems in the vicinity of Burlington AGS. Groundwater from these aquifers is generally not used as a source of potable water because of the proximity of Lake Champlain, which is the area's source for potable water. The shallow and deep overburden aquifers in the area are found from 3.5 to 71 feet below the ground surface and contain some contamination from ERP sites on the installation (see Hazardous Waste and Materials Section BR3.15). The bedrock aquifer is located 20 to 200 feet below the ground surface and is unconfined (158 FW 2006). See Community Facilities and Public Services Section BR3.13 for more detailed information on capacity.

Floodplain*s*

Per Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps for the City of South Burlington, Vermont (Chittenden County Panel No. 5001950006B and 5011950008B), the majority of the VTANG installation is located within an area designated as Zone C, indicating areas of minimal flooding. The 100-year floodplains in the vicinity of the installation are located to the north along the Winooski River and to the east along Muddy Brook, approximately 0.3 mile and 0.25 mile from the industrialized area of the installation, respectively (FEMA 1981).

BR3.5.1.2 Environmental Consequences

ANG Scenario 1

Under ANG Scenario 1, all construction would take place internally in existing facilities, and surrounding lands would not be impacted by any construction-related clearing and grading. As such, geology, topography, soils, surface water, groundwater, and floodplains would not be adversely impacted under ANG Scenario 1.

ANG Scenario 2

Under ANG Scenario 2, all construction would take place internally in existing facilities, and surrounding lands would not be impacted by any construction-related clearing and grading. As such, geology, topography, soils, surface water, groundwater, and floodplains would not be adversely impacted under ANG Scenario 2.

BR3.6 Terrestrial Communities (Vegetation and Wildlife)

BR3.6.1 Base

BR3.6.1.1 Affected Environment

The majority of the vegetation within Burlington AGS is associated with managed landscaped areas limited primarily to mowed areas and scattered ornamental trees. The recently acquired property on the northern portion of the installation consists primarily of a mowed open field that has been disturbed (plowed) by farming activities in the past. In addition there is a small forested area located along the northern boundary of the acquired property and along the eastern boundary of the installation. These forested areas consist primarily of red maple (*Acer rubrum*), silver maple (*Acer saccharinum*), paper birch (*Betula papyrifera*), and northern red oak (*Quercus rubra*) (O'Brien 2005).

Burlington AGS, including the previously acquired property, and adjacent Burlington IAP provide very limited wildlife habitat. Because the installation has been disturbed and the majority of the area is covered with manicured, non-native grasses, wildlife species found on the installation are mostly limited to those that have adapted to high levels of human activity and disturbance. Common mammal species found in the region include New England cottontail (*Silvylagus transitionalis*), eastern chipmunk (*Tamias striatus*), gray squirrel (*Sciurus carolinenis*), red squirrel (*Tamiasciurus hudsonicus*), raccoon (*Procyon lotor*), white-tailed deer (*Odocoileus virginianus*), woodchuck (*Marmota monax*), striped skunk (*Mephits mephitis*), red fox (*Vulpes vulpes*), coyote (*Canis latrans*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and numerous rodent and bat species (158 FW 2010a).

Common bird species include blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynochos*), black-capped chickadee (*Parus atricapillus*), tree swallow (*Tachycineta bicolor*), pileated woodpecker (*Dryocopus pileatus*), common flicker (*Colaptes auratus*), gray catbird (*Dumetella carolinensis*), American robin (*Turdus migratorius*), European starling (*Sturnus vulgaris*), American goldfinch (*Cardueli tristis*), eastern wild turkey (*Meleagris gallopavo*), and white-throated sparrow (*Zonotrichia albicollis*) (158 FW 2010a).

Reptiles and amphibians commonly found in the region include painted turtle (*Chrysemys picta*), garter snake (*Thamnophis sirtalis*), black rat snake (*Elaphe obsoleta*), American toad (*Bufo americanus*), northern spring peeper (*Hyla crucifer*), green frog (*Rana clamitans*), red spotted newt (*Notophthalmus viridescens*), northern two-lined salamander (*Eurycea bislineata*), and northern dusky salamander (*Desmognathus fuscus*) (158 FW 2010a).

BR3.6.1.2 Environmental Consequences

Implementation of the proposed action at Burlington AGS would have relatively few direct impacts on terrestrial communities. All construction associated with the proposed action would occur within existing buildings and no clearing of land is anticipated. As a result there would be no loss of vegetation or terrestrial habitat.

Annual operations at Burlington AGS are projected to decrease slightly from current F-16 operations under both scenarios. Airfield operations for ANG Scenario 1 would decrease by 2,613 (2.3 percent), while military operations for ANG Scenario 2 would decrease by 803 (0.7 percent). Decreased operations (e.g. sorties) 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, including those for migratory birds to negligible levels (see Safety Section BR3.4).

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 F-16 aircraft, the number of times that an individual animal would be exposed and the area that would be affected would decrease under each scenario.

BR3.6.2 Airspace

BR3.6.2.1 Affected Environment

The airspace associated with Burlington AGS covers 15,791 square miles of land within New York, Vermont, and Maine. It is found primarily within the Adirondack-New England Mixed Forest-Coniferous Forest-Alpine Meadow Province. This region is a transition zone between the boreal spruce-fir forest to the north and the deciduous forest to the south. Valleys contain hardwood forests dominated primarily by sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), and American beech (*Fagus grandifolia*). Low mountain slopes support a mixed forest of spruce (*Picea* spp.), fir (*Abies* spp.), maple (*Acer* spp.), beech, and birch (*Betula* spp.). In addition, portions of the airspace within New York fall within the Larentian Mixed Forest Province. This region is similar with mixed stands of pine species and a few deciduous species such as yellow birch, sugar maple, and American beech (Bailey 1995).

Wildlife within these habitats include mammals such as short tailed weasel (*Mustela erminea*), snowshoe hare (*Lepus americanus*), black bear (*Ursus americanus*), striped skunk (*Mephitis mephitis*), chipmunk (*Tamias striatus*), badger (*Taxidea taxus*), striped ground squirrel (*Xerus erthropus*), beaver (*Castor canadensis*), and muskrat (*Ondatra zibethicus*). Common bird species include white-throated sparrow (*Zonotrichia albicollis*), dark-eyed junco (*Junco hyemalis*), and yellow-bellied sapsucker (*Sphyrapicus varius*) (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.

BR3.6.2.2 Environmental Consequences

No construction would occur beneath the training airspace, therefore, no impacts to vegetation would occur. Operations within the overall airspace complex would decrease from baseline by 7 percent for ANG Scenario 1 and increase by 19 percent for ANG Scenario 2. Decreased operations would result in a decreased opportunity for bird-aircraft strikes to occur. 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 strikes occur. In addition, current procedures for avoiding flight operations during periods of high concentrations of migratory birds (both in space and time) would continue. Adherence to the existing, effective BASH program would minimize the risk of bird-aircraft strikes to negligible levels (see Safety Section BR3.4). 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 conducted by F-16 aircraft and be used only in airspace units currently approved for its use. In addition, current restrictions on the amount or altitude of flare use would continue to apply. Ordnance delivery would only occur in ranges authorized for use. JDAMs would occur at the Fort Drum Range or at more remote ranges. As a result, ordnance employment associated with the proposed action would have no impact on terrestrial communities.

Overall, impacts to terrestrial wildlife from proposed changes in airspace 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 F-16 aircraft, the majority (95 percent) of the operations would occur above 5,000 feet AGL (operations under 5,000 feet AGL would occur less frequently than baseline operations), and under ANG Scenario 2, overflights below 5,000 feet AGL for the entire airspace would occur approximately once every 2 days compared to more than one per day under baseline conditions; 3) supersonic flights would not occur over land; and 4) noise levels would increase by 6 dB L_{dnmr} in the Viper Complex and by 7 dB L_{dnmr} in Yankee Laser, although they would not exceed 56 dB L_{dnmr}. As this area is currently used by F-16 aircraft, wildlife should be habituated to the noise.

BR3.7 Wetlands and Freshwater Aquatic Communities

BR3.7.1 Base

BR3.7.1.1 Affected Environment

Wetlands

An estimated 2.5 acres of wetlands exist within Burlington AGS are classified as Class Two by Vermont Department of Environmental Conservation. Class Two wetlands are are considered significant and may merit protection under Vermont Wetland Rules. These wetlands occur just north of National Guard Avenue on the western portion of the newly acquired property, and just south of the National Guard Avenue west of Building 70. These wetlands are primarily forested with dominant species including red maple, American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), sensitive fern (*Onoclea sensibilis*), jewelweed (*Impatiens capensis*), and marsh marigold (*Caltha palustris*). A few smaller areas are dominated by cattails (*Typha* spp.), reed canary grass (*Phalaris arundinacea*), horsetails (*Equisetum* spp.), sensitive fern, and jewelweed. These wetlands provide flood storage, water quality, wildlife habitat, and open space and aesthetics (O’Brien 2005).

BR3.7.1.2 Environmental Consequences

Proposed construction at Burlington AGS would be confined to the installation's existing footprint. Construction associated with the proposed action would consist of internal alterations of existing structures on the installation. Therefore there would be no impacts to wetlands and other freshwater communities on the installation.

BR3.8 Threatened, Endangered, and Special Status Species/Communities

BR3.8.1 Base

BR3.8.1.1 Affected Environment

No federally listed or proposed threatened or endangered species have been documented on the Burlington AGS (USFWS 2008). However, the bald eagle (*Haliaeetus leucocephalus*), which is federally protected under the Bald and Golden Eagle Protection Act, and the Indiana bat (*Myotis sodalis*), a federally and state listed endangered species, both have the potential to occur on the installation (U.S. Department of Agriculture [USDA] 2010).

Bald eagles have been documented in Chittenden County within the Lake Champlain wetlands and along the Winooski and Lamoille Rivers (USDA 2010). Its habitat includes rivers, lakes, estuaries, reservoirs, some seacoasts, and it requires perching areas and large trees for nesting sites (USFWS 2010).

The Indiana bat has been documented in Chittenden County approximately 14.5 miles south of Burlington IAP (USDA 2010) and there is a potential for its occurrence within the undeveloped area of the airport. Estimates of their mean home range are estimated at approximately 205 acres (USFWS 2007). In the summer, roosting sites for Indiana bats are commonly found adjacent to agricultural areas, including riparian and wetland areas. Indiana bats forage in a variety of forest types, including floodplain, riparian, lowland, and upland forests (USFWS 2007). They usually roost under exfoliating bark (e.g., hickories) and occasionally in narrow cracks within trees.

There are no special status communities known to occur on Burlington IAP.

BR3.8.1.2 Environmental Consequences

Impacts to potentially occurring threatened, endangered, or special status species on Burlington AGS would be similar to those described within the terrestrial section (Section BR3.6). Construction associated with the proposed action would consist of internal alterations of existing structures on the installation. Therefore, no effects are anticipated to threatened and endangered species or special status communities on the installation due to construction activity.

Total annual airfield operations at Burlington IAP are projected to decrease by 2.3 and 0.7 percent for ANG Scenarios 1 and 2, respectively. While noise from an individual single event from the F-35A would be higher than F-16 aircraft, the number of times that an individual animal would be exposed would decrease with all scenarios.

BR3.8.2 Airspace

BR3.8.2.1 Affected Environment

As shown in Section BR3.6, this airspace associated with Burlington AGS is located within Maine, New York, New Hampshire, and Vermont.

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, 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 BR3.8-1 and include one reptile, two birds, and two mammals. No critical habitat occurs under the airspace.

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

Table BR3.8-1. Threatened, Endangered, and Special-Status Species/Communities That Occur or Potentially Occur under Airspace Associated with Burlington AGS

Species	*Status F/S*	*Areas of Occurrence*
Reptiles/Amphibians		
Bog Turtle *Clemmys muhlenbergii*	T/E	Occur in saturated, usually spring-fed wetlands such as bogs, fens, wet meadows, sedge marshes, and alder, tamarack, or spruce swamps.
Birds		
Roseate Tern *Sterna dougallii dougallii*	E/E	Observed foraging in near shore surf. Nest in open sandy beaches isolated from human activity.
Piping Plover *Charadrius melodus*	T/-	Lives the majority of its life on open sandy beaches or rocky shores, often in high, dry sections away from water.
Mammals		
Indiana Bat *Myotis sodalis*	E/E	Hibernate in winter in caves or similar enclosures. Summer they roost under the peeling bark of dead and dying trees.
Canada Lynx *Lynx canadensis*	T/T	Found in mature forests with dense undergrowth but can also be found in more open forests, rocky areas or tundra.

BR3.8.2.2 Environmental Consequences

Impacts to potentially occurring threatened, endangered, or special status species underlying Burlington AGS airspace would be similar to those described within the terrestrial section (Section BR3.6). The analysis presented in Section BR3.6.2 for more common wildlife species underlying Burlington AGS training airspace would also apply to threatened and endangered species. Under the proposed action for Burlington AGS, the total annual number of operations by F-35As in the associated airspace would decrease by 7 percent for ANG Scenario 1, and increase by 19 percent for ANG Scenario 2. The F-35As would also fly at higher altitudes than F-16 aircraft.

Overall, no effects are anticipated to federally listed species due to 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 F-16 aircraft with the majority (95 percent) of operations occurring above 5,000 feet AGL. 3) Operations under 5,000 feet AGL would occur less frequently than what is found under baseline conditions. 4) Noise levels would increase by 6 dB L_{dnmr} in the Viper Complex and by 7 dB L_{dnmr} in Yankee Laser, although they would not exceed 56 dB L_{dnmr}. As this area is currently used by F-16 aircraft, wildlife should be habituated to the noise. 5) Supersonic flight would not occur over land, but a minimum of 15 nm offshore.

BR3.9 Cultural and Traditional Resources

Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) letters were sent to the following agencies informing them about the proposed project and initiating Section 106 consultation: New Hampshire Division of Historical Resources, Parks, Recreation, and Historic Agency of New York, and the Vermont Division for Historic Preservation. The New Hampshire Division of Historic Resources responded that there were no known historic resources that would be affected by the project. The Vermont Division for Historic Preservation responded that the survey reports for previous cultural resources surveys conducted at the Burlington AGS should be reviewed as part of the current undertaking. Section 106 consultation for this project is summarized in Chapter 1 and Appendix B.

BR3.9.1 Base

BR3.9.1.1 Affected Environment

As defined in Chapter 3, section 3.10.2, the APE for Burlington AGS consists of all areas of ground disturbance associated with proposed construction or remodeling activities. Aircraft operations and the areas affected by noise levels 65 dB DNL and greater also fall under the APE and are evaluated for their potential to affect historic structures and districts where noise vibrations could adversely impact those types of resources. For airspace operational effects, only those cultural resources that would reasonably be affected by visual (overflights) and noise intrusions are considered. These include architectural resources; archaeological resources with standing structures, such as historic ranches, ghost towns, American Indian settlements; and traditional cultural properties. Prehistoric and historic archaeological sites lacking standing structures are not included as they are generally ground surface or even subsurface deposits that would not be affected by implementing the basing alternatives.

Archaeological Resources

A comprehensive cultural resources survey of the Burlington AGS installation was completed in September and October 2007 (Air National Guard Readiness Center 2008). The assessment concluded that extensive subsurface disturbance from past development and other mission activities were present throughout much of the facility. One prehistoric archaeological site (VT-CH-1035) was recorded during the survey (ANG Readiness Center 2008). Formal testing to evaluate the site's eligibility for listing was conducted and the site was considered eligible for listing on the NRHP. Additional surveys in 2008 (Crock 2008, Hudgell *et al.* 2008, 158 FW 2009c) at the installation and on property acquired by the

Burlington AGS recorded three archaeological sites also considered eligible for listing in the NRHP. Two other archaeological sites on the installation, one prehistoric and one historic, have not been evaluated.

Architectural Resources

A comprehensive architectural assessment of the Burlington AGS facility was completed in July 2007 for all buildings constructed prior to 1990. The assessment did not recommend any buildings, structures, or objects located at the installation as eligible for listing in the NRHP (ANG Readiness Center 2008). However, by letter dated April 27, 2009, the Vermont SHPO did not concur with the Vermont Air National Guard's recommendation that Building 130 was not eligible for the NRHP (Vermont Division for Historic Preservation 2009). Subsequently, the 158 FW requested a formal determination from the Keeper of the National Register for Building 130 and on August 30, 2010 the Keeper of the National Register determined that Building 130 was not eligible for listing in the NRHP. No NRHP-listed resources were identified within areas currently affected by noise levels 65 dB DNL and greater outside of installation boundaries.

Traditional Resources

No traditional cultural properties have been identified in the area. However, as part of the government-to-government consultation process for a recent EIS at the Burlington AGS (158 FW 2010a), the 158 FW and the National Guard Bureau contacted federally recognized tribes asking for government-to-government consultation and concerns or information on affects to cultural resources within the proposed EIS project area. These tribes included the Aroostook Band of Micmacs, the Houlton Band of Maliseet Indians, the Passamaquoddy Tribe of Pleasant Point Reservations, the Passamaquoddy Tribe of Indian Township Reservation, and the Penobscot Indian Nation. As part of the proposed action, letters initiating government-to-government consultation and asking for issues of concern were sent to the five aforementioned tribes as well as tribes under the airspace include the Stockbridge-Munsee Community – Band of Mohican Indians, the St. Regis Band of Mohawk Indians, the Seneca Nation, the Cayuga Nation of Indians, the Oneida Indian Nation, the Onondaga Nation, the Tonawanda Band of Senecas, and the Tuscarora Nation. All of these tribes reside in Maine, Wisconsin, or New York, as Vermont does not have any federally-recognized tribes. The Penobscot Indian Nation expressed interest in the project and asked to be kept informed.

BR3.9.1.2 Environmental Consequences

ANG Scenario 1

Under ANG Scenario 1, eight buildings would be renovated or updated. As discussed previously, no buildings at the Burlington AGS facility are eligible for listing in the NRHP. No ground disturbance would take place near the NRHP-eligible archaeological sites that are located on the Burlington AGS facility. Therefore, no historic properties would be impacted by ANG Scenario 1. Outside of installation boundaries, NRHP-listed resources were identified within areas potentially affected by noise levels 65 dB DNL and greater. Under ANG Scenario 1, two NRHP-listed sites would be exposed to noise levels 65 dB DNL and greater: a portion of the Winooski Falls Mill District and a portion of the Winooski Falls Mill

Historic District (boundary increase). No Tribes identified properties of religious or cultural significance in the APE.

ANG Scenario 2

Construction impacts under ANG Scenario 2 are the same as under ANG Scenario 1. No historic properties would be impacted by ANG Scenario 2. Outside of the installation boundaries, NRHP-listed resources potentially affected by noise levels 65 dB DNL and greater would be the same two found under ANG Scenario 1: a portion of both the Winooski Falls Mill District and Winooski Falls Mill Historic District. No Tribes identified properties of religious or cultural significance in the APE.

BR3.9.2 Airspace

BR3.9.2.1 Affected Environment

A total of 413 NRHP-listed cultural resources are located under the Burlington AGS airspace. These resources include historic residential districts, private residences, hotels, post offices, municipal buildings, churches, bridges, mills, and coastal lighthouses. No traditional cultural properties are known under the airspace. However, the Penobscot Nation holds two parcels of federal Indian Reservation lands underlying the Condor MOAs: the Alder Stream and Carrabassett Valley properties (158 FW 2009c). Reservations near, but not under, the airspace include the Oneida in New York and the Penobscot in Maine.

A letter initiating government-to-government consultation was sent to the following tribes informing them about the proposed project in January 2010: Aroostook Band of Micmacs, the Houlton Band of Maliseet Indians, the Passamaquoddy Tribe of Pleasant Point Reservations, the Passamaquoddy Tribe of Indian Township Reservation, and the Penobscot Indian Nation. None of the tribes responded to this initial letter. Additional consultation letters were sent to and numerous attempts to contact federally-recognized American Indian Tribes were made by email and phone calls from the summer 2010 to the summer 2013 (see Appendix B of the Draft and Revised Draft EISes) with only limited success. Tribes that are not federally recognized in Vermont were also contacted but no responses were received. These Tribes included the Clan of the Hawk, St. Francis/Sokoki Abenaki, Band of the Missisquoi Abenaki, Koasek Traditional Band of the Abenaki, and the Cowasuck Band of the Pennacook-Abenaki People.

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.

BR3.9.2.2 Environmental Consequences

There would be no adverse impacts to cultural resources due to the implementation of either ANG Scenario 1 or ANG Scenario 2 of the proposed action. Aircraft operations in the airspace would decrease by 7 percent under ANG Scenario 1 and increase by 19 percent under ANG Scenario 2. Noise levels would increase by a maximum of 7 dB in the airspace, but would not exceed 56 dB L_{dnmr}, still a very low level.

Visual intrusions under the proposed action would be minimal and would not represent an increase over baseline conditions sufficient to cause adverse impacts to the settings of cultural resources. Due to the high altitude of the overflights, small size of the aircraft, and the high speeds, the aircraft would not be readily visible to observers on the ground. Indeed, at an altitude of 8,000 feet AGL, an F-35A would appear about 0.07 inches in size.

Use of ordnance and defensive countermeasures would occur in areas already used for these activities. No additional ground disturbance would occur under the airspace due to the proposed action. Flares deployed from the aircraft would not pose a visual intrusion either for the following reasons: flares are small in size and burn only for a few seconds and the high relative altitude of the flights would make them virtually undetectable to people on the ground. Overall, flares are unlikely to adversely effect cultural resources. Therefore, the introduction of material to archaeological sites or standing structures from the use of flares would not have an adverse effect on these resources.

Proposed use of the airspace would be similar to ongoing training operations. Given the current use of the airspace and the nature of the proposed future use of the project area, there would be no adverse impact to NRHP-eligible or listed archaeological resources, architectural resources, or traditional cultural properties. Therefore, under all scenarios, no effect to historic properties is expected from the proposed action.

BR3.10 Land Use

BR3.10.1 Base

The following section describes the existing conditions and examines the extent to which the beddown of the F-35A at Burlington AGS 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, some Burlington County land use categories were consolidated or renamed. Table BR3.10-1 provides a cross-reference between Chittenden County classifications and those used in the impact analysis.

Table BR3.10-1. Land Use Categories

County Land Use Classification	*EIS Land Use Classification*
Residential	Residential
Sales or Services	Commercial
Manufacturing, Transportation and Utilities, Construction, Mining and Extraction	Industrial
Institutional, Public, and Semipublic Facilities	Public/Quasi Public
Recreation	Recreational
Military	Military/Airport
Agriculture and Forestry	Open Space
No Data	Unclassified

BR3.10.1.1 Affected Environment

The Burlington AGS is collocated with the Burlington IAP, which is owned and operated by the City of Burlington. Both the AGS and the civilian airport lie entirely within the City of South Burlington, Vermont. The installation occupies approximately 280 acres of land on the eastern side of the airfield. The installation is bordered by airport property to the south and west, National Guard Avenue to the north and east, and undeveloped woodlands to the south and east.

Historical and proposed land use development within the boundaries of the Burlington AGS is presented in the VTANG Master Plan (158 FW 1995). This plan establishes goals, policies, and criteria that drive decisions regarding timing, placement, and priority of identified development needs. A major goal of the plan is to improve operational efficiency and functionality pursuant to the mission of the 158 FW. Land use at the Burlington AGS is divided into eight categories defined by the ANG Land Use Classification System: Aircraft Maintenance, Aircraft Operations, Airfield Pavements, Command and Support, Industrial, Open Space, Safety Zone, and Special Categories.

General siting criteria have been established for land development and use at commercial and military airfields. For example, RPZs, which address height restrictions, development density, and land use in and around civilian airports, are enforced to reduce the potential for aircraft-related hazards. Future development at the Burlington AGS is constrained by design and height restrictions including: an object-free zone above adjacent to each runway and the inner approach to the runway, an RPZ, an existing Clear Zone at the ends of the runways, height restrictions within airspace required for aircraft operations, and a building restriction line. Current land uses within the RPZs are industrial, commercial, and open space.

Existing Aircraft Noise and Land Use Compatibility Surrounding the Installation

The land use surrounding the installation and airport property is locally characterized as mixed rural, agricultural, residential, commercial, and light industrial (City of Burlington 2008). Land use activities most sensitive to noise typically include residential and commercial areas, public services, and areas associated with cultural and recreational uses. Noise measurements related to aircraft operations that define the area of noise impact are expressed in terms of DNL. The DNL represents the average annual day community noise exposure from aircraft operations during a 24-hour period over a year (refer to Chapter 3 for more details on DNL). DNL also considers an additional weighting for nighttime operations. 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.

The FAA Part 150-Noise Compatibility Program documents noise exposure in the airport environs and establishes programs to minimize noise-related land use incompatibilities. The City of Burlington submitted a Part 150-Noise Compatibility Program Update for Burlington IAP to the FAA to obtain approval for programs to reduce or eliminate incompatibilities between land use and aircraft noise (City of Burlington 2008).

The airport's previous Noise Compatibility Program, approved September 1990, recommended acquisition of residential property within the 70 DNL contour. The 2008 Noise Compatibility Program Update added a new measure to allow for land acquisition within the 65 DNL contour. The document included two principal elements: 1) Noise Exposure Maps (NEM), including a 2006 Existing Condition

Map and a 2011 Forecast Condition Map, and 2) the Noise Compatibility Program. The FAA's 2008 approval of the Noise Compatibility Program update serves as a prerequisite for funding of implementation actions by the Burlington IAP (FAA 2008). The Airport currently has FAA funding to acquire residential properties within the 65 DNL contour shown in the 2011 Forecast Condition Map.

The baseline contours depicting current noise levels equal to or greater than 65 dB DNL extend over the cities of South Burlington, Burlington, and Winooski, Vermont. Land uses, surrounding the installation and Burlington IAP currently exposed to noise levels equal or greater than 65 dB DNL consist of industrial, commercial, residential, public, and open space (Table BR3.10-2). Some residential areas (371 acres) currently are subject to incompatible noise levels per Federal Interagency Committee on Urban Noise (FICUN) Standards. Noise sensitive receptors (schools, hospitals, and churches) potentially affected by the proposed action are discussed in detail in the noise analysis, Section BR3.2.

Table BR3.10-2. Off-Base Land Uses Affected by Noise Levels 65 dB DNL and Greater under all ANG Scenarios

Land Use Category	*65-70 dB DNL*			*70-75 dB DNL*			*75-80 dB DNL*			*80-85 dB DNL*			*85+ dB DNL*			*Totals*		
	Baseline	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*
ANG Scenario 1																		
Residential	238	388	150	89	148	59	40	26	-14	4	2	-2	0	0	0	371	564	193
Commercial	116	178	62	54	55	1	17	36	19	3	5	2	0	0	0	190	274	84
Industrial	175	289	114	127	173	46	54	96	42	18	23	5	0	0	0	374	581	207
Public/Quasi Public	120	84	-36	21	9	-12	1	2	1	0	0	0	0	0	0	142	95	-47
Recreational	76	22	-54	5	81	76	0	5	5	0	0	0	0	0	0	81	108	27
Open/Agricultural	436	244	-192	161	169	8	68	78	10	19	21	2	0	0	0	684	512	-172
Unclassified	87	75	-12	26	36	10	7	7	0	1	0	-1	0	0	0	121	118	-3
Total	**1,248**	**1,280**	**32**	**483**	**671**	**188**	**187**	**250**	**63**	**45**	**51**	**6**	**0**	**0**	**0**	**1,963**	**2,252**	**289**
ANG Scenario 2																		
Residential	238	428	190	89	193	104	40	42	2	4	4	0	0	0	0	371	667	296
Commercial	116	212	96	54	70	16	17	36	19	3	10	7	0	0	0	190	328	138
Industrial	175	287	112	127	200	73	54	117	63	18	36	18	0	0	0	374	640	266
Public/Quasi Public	120	112	-8	21	18	-3	1	1	0	0	1	1	0	0	0	142	132	-10
Recreational	76	23	-53	5	74	69	0	18	18	0	0	0	0	0	0	81	115	34
Open/Agricultural	436	302	-134	161	185	24	68	95	27	19	37	18	0	0	0	684	619	-65
Unclassified	87	74	-13	26	50	24	7	9	2	1	1	0	0	0	0	121	134	13
Total	**1,248**	**1,438**	**190**	**483**	**790**	**307**	**187**	**318**	**131**	**45**	**89**	**44**	**0**	**0**	**0**	**1,963**	**2,635**	**672**

Source: Wyle 2011, U.S. Census 2010d.

BR3.10.1.2 Environmental Consequences

No external facility construction would be required under either scenario. New constructions projects would not affect surrounding communities since proposed construction would be internal to existing facilities and no changes to the existing airfield-related RPZs and Clear Zones would occur (Section BR3.4). 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 land use analysis compares the proposed noise contours for each scenario to: 1) baseline noise contours, which show the existing noise environment, and 2) Part 150 2011 Forecast Condition Map contours, used by the City of Burlington for planning purposes. The comparison of the proposed contours to the baseline contours shows potential change in noise conditions and land use compatibility (Table BR3.10-2 and Figures BR3.10-1 and BR3.10-2) under both scenarios. The comparison of the proposed 65 dB DNL contour areas to the Part 150 65 dB DNL planning area illustrates the potential for the proposed action to affect land use planning activities (Table BR3.10-3 and Figure BR3.10-3) under both scenarios.

Table BR3.10-3. Difference between Part 150 Noise Exposure Maps 65 dB DNL and Proposed Scenarios 65 dB DNL (in acres)

EIS Land Use Classification	*Part 150*	*ANG Scenario 1*	*Net Change*	*ANG Scenario 2*	*Net Change*
Residential	103	564	461	667	564
Commercial	79	274	195	328	249
Industrial	1,411	581	-830	640	-771
Public/Quasi Public	7	95	88	132	125
Recreational	30	108	78	115	85
Open Space	194	512	318	619	425
Unclassified	32	118	86	134	102
Total	**1,856**	**2,252**	**396**	**2,635**	**779**

Source: FAA 2008, Wyle 2011, and U.S. Census Bureau 2010d.

BR3.10.2 Airspace

BR3.10.2.1 Affected Environment

The proposed action would include flight training in Condor Scotty in Maine and New Hampshire, Yankee Laser in New Hampshire and Vermont, and Viper Complex in New York. The analysis excludes all overwater airspace units as well as those units where the 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.

Condor Scotty occupies a trapezoidal area that covers approximately 4,022 square miles in southwestern Maine and northeastern New Hampshire (Figure BR3.10-4). The floor of the airspace is 7,000 feet MSL and the ceiling is 18,000 feet MSL. These lands fall under four general types of ownership: federal, Penobscot Indian Nation, state ownership, and private holdings (Table BR3.10-4). Management plans that apply to areas under the Condor Scotty include: the White Mountain National Forest Land and Resource Management Plan (Forest Plan), the Appalachian National Scenic Trail Strategic Plan, and Maine and New Hampshire statewide planning documents (104 FW 2009).

Federal land includes land managed by the National Park Service (NPS), USFS, USFWS, and the DoD (refer to Table BR3.10-4). The Appalachian National Scenic Trail is a continuous, marked, 75-year-old footpath that traverses the Appalachian Mountain chain from central Maine to northern Georgia, for a distance of 2,175 miles. Under Condor Scotty, the Appalachian National Scenic Trail traverses the ridgelines of the White Mountains, Mahoosuc Range, and Western Main Mountains over a distance of approximately 144 miles.

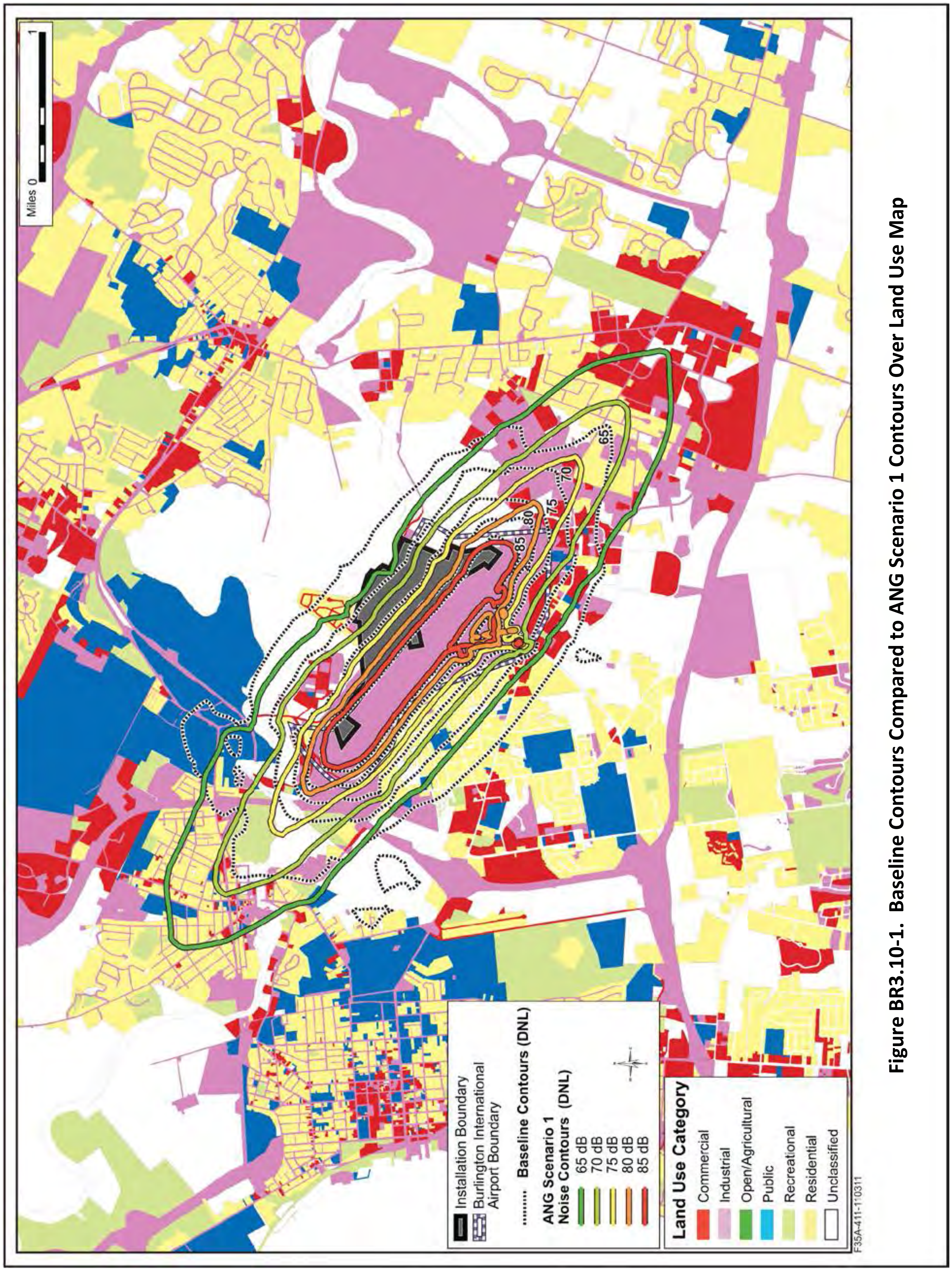


Figure BR3.10-1. Baseline Contours Compared to ANG Scenario 1 Contours Over Land Use Map

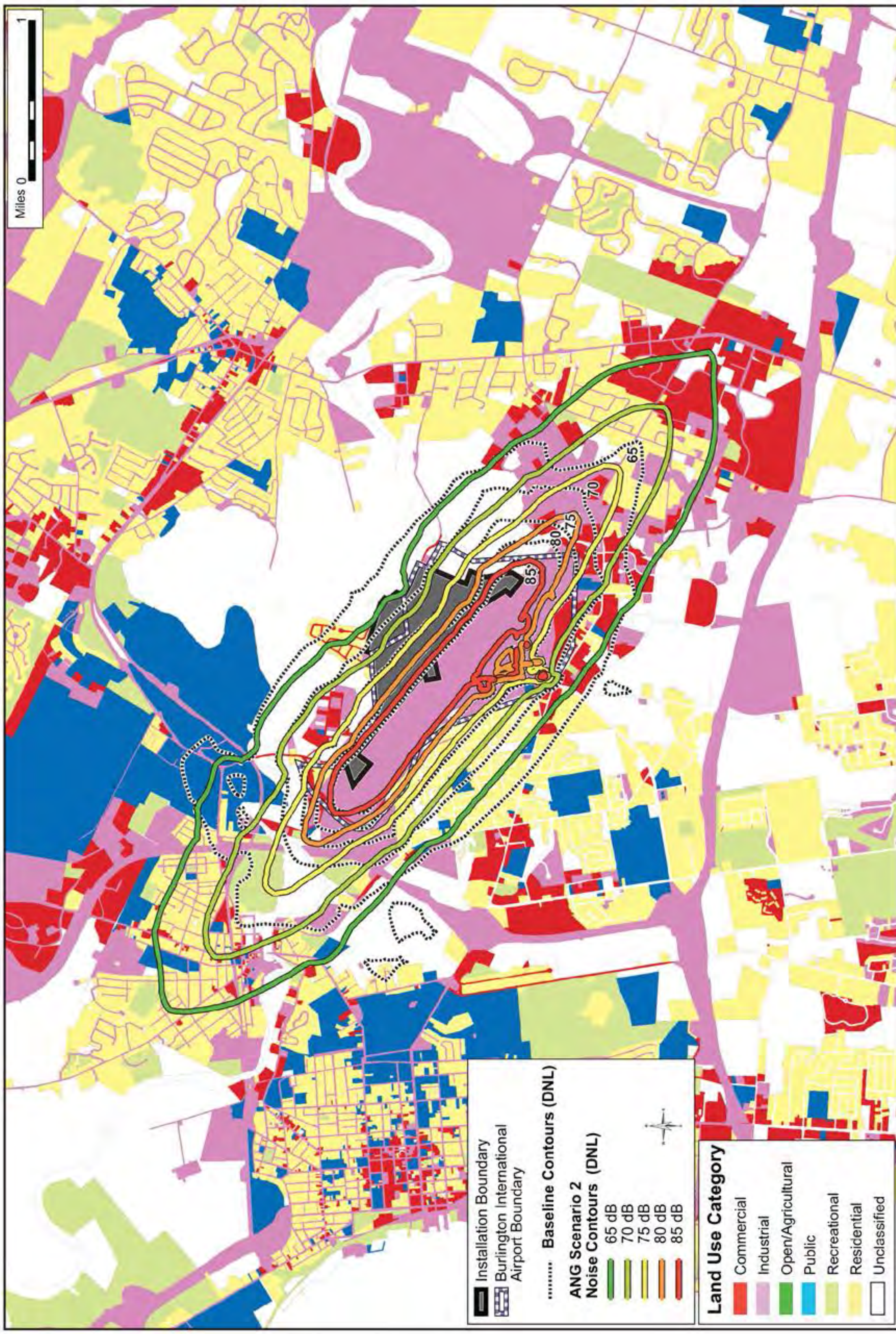


Figure BR3.10-2. Baseline Contours Compared to ANG Scenario 2 Contours Over Land Use Map

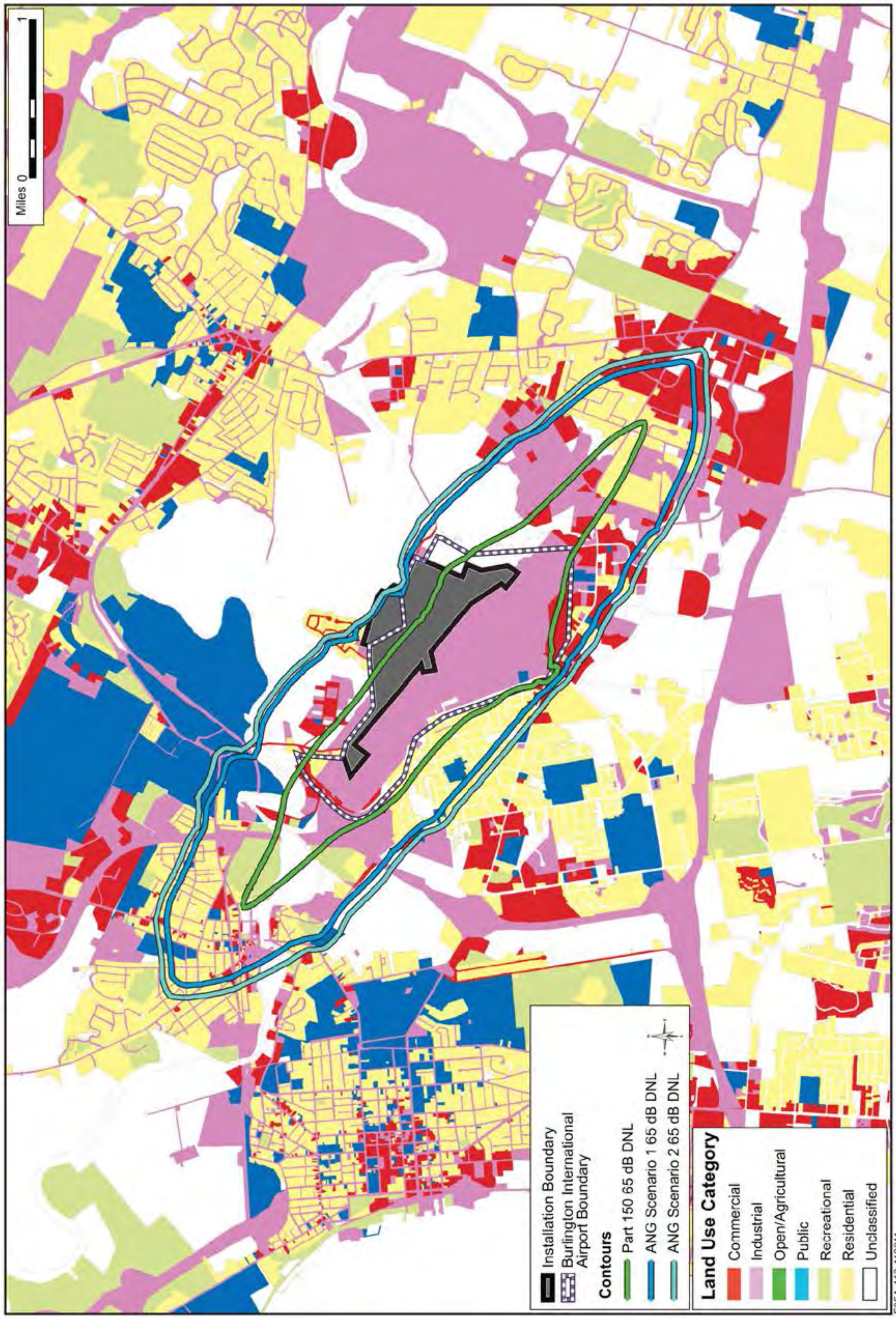


Figure BR3.10-3. Comparison of Part 150 Noise Study Contours To ANG Scenarios 1 and 2 Over Land Use Map

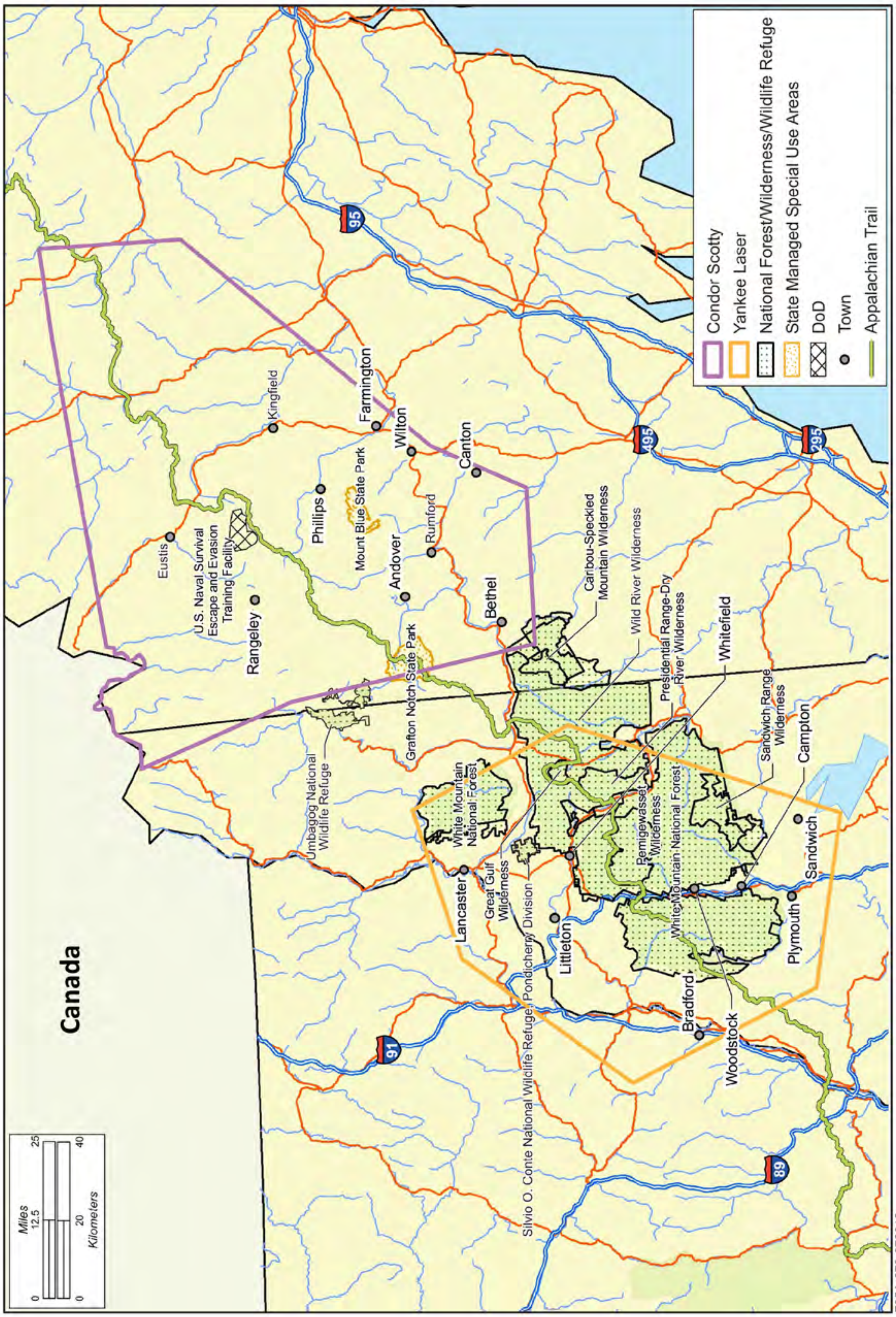


Figure BR3.10-4. Land Use under Condor Scotty and Yankee Laser Airspace

Table BR3.10-4. Land Ownership and Primary Special Use Areas under Training Airspace		
Land Owner	*Acres*	*Special Use Areas*
Condor Scotty		
Federal	19,303	Umbagog National Wildlife Refuge, Appalachian National Scenic Trail, White Mountain National Forest
DoD	11,785	-
State of New Hampshire	40,417	Connecticut Lakes State Forest, Connecticut Lakes Nature Preserve, Connecticut Lakes Wildlife Management Area, Norton Pool Preserve
State of Maine	154,037	Mount Blue State Park, Rangeley Lake State Park, Grafton Notch State Park
Unidentified	2,357,281	-
Total	**2,582,823**	**-**
Yankee Laser		
Federal	621,509	The White Mountain National Forest, Silvio O. Conte National Wildlife Refuge-Pondicherry Division, Pemigewasset Wilderness, Presidential Range-Dry River Wilderness, Great Gulf Wilderness, Sandwich Wilderness, Wild River Wilderness
State of Vermont	16,582	-
State of New Hampshire	28,372	-
Local Government Conservation Lands (Vermont)	3,008	-
Local Government Conservation Lands (New Hampshire)	24,707	-
Unidentified	935,638	-
Total	**1,629,816**	**-**
Viper Complex		
DoD	104,611	Fort Drum
State of New York	2,474,375	Adirondack State Park, Higley Flow State Park, Whetstone Gulf State Park, Yellow Lake State Multiple Use Area, Little John State Wildlife Management Area, Tug Hill State Wildlife Management Areas
Unidentified	1,015,315	-
Total	**3,594,301**	**-**

The White Mountain National Forest encompasses approximately 800,000 acres of land, of which approximately 1,260 acres are under Condor Scotty (refer to Figure BR3.10-4). The Forest supports a variety of back country recreation opportunities such as hiking, camping, and snowmobiling and also supports timber harvest (104 FW 2009).

Umbagog National Wildlife Refuge was established in 1992 and is managed by USFWS. It encompasses more than 21,650 acres in Maine and New Hampshire, of which approximately 785 acres, all in Maine, lie under the Condor Scotty (refer to Figure BR3.10-4) (Umbagog 2009). Elevations under the airspace range from 1,300 to 1,600 feet MSL and are characterized by extensive wetland complexes (104 FW 2009). The Refuge is managed under their Comprehensive Conservation Plan (Umbagog 2009).

The Penobscot Nation occupies two parcels of American Indian Reservation lands under the Condor Scotty: the 23,445-acre Alder Stream land in northern Franklin County, and the approximately 20,000-acre Carrabassett Valley land in central Franklin County. The Alder Stream land is held in trust by the federal government, while the Carrabassett Valley land was purchased by the Penobscot Nation in 1981 as part of the Maine Indian Land Claims Act (104 FW 2009).

Condor Scotty extends over more than 190,000 acres (6.6 percent) of land owned or managed by the States of Maine and New Hampshire. These lands are managed for multiple uses including recreation, wildlife, and timber production. In Maine, Mount Blue State Park and Rangeley Lake State Park, managed by the Maine Bureau of Parks and Lands are located completely under Condor Scotty, and Grafton Notch State Park is almost entirely under Condor Scotty. The Maine Bureau of Parks and Lands also manages various public reserve lands under the airspace, a number of preserves and other properties used for recreation, forestry, and open space (Maine Department of Conservation 2004).

The Forest Legacy Program is a partnership between the State of Maine and the USFS to protect environmentally sensitive lands, including the High Peaks Region under the Condor Scotty (104 FW 2009).

Numerous, sparsely populated communities are scattered under Condor Scotty throughout Franklin, Oxford, Somerset, and Piscataquis Counties in Maine, and Coos County in New Hampshire. These small towns, including Bethel, Andover, Canton, Wilton, Farmington, Phillips, and Kingfield, range in population from less than 100 to more than 7,000.

Yankee Laser is located in Vermont and New Hampshire (refer to Figure BR3.10-4). Land use patterns under the Yankee Laser in New Hampshire are similar to Condor Scotty, primarily rural lands with scattered communities throughout. The White Mountain National Forest comprises a large portion of the land under the Yankee Laser and includes the Pemigewasset, Great Gulf Wilderness, Presidential Range-Dry River, Wild River, and Sandwich Wilderness areas. Small towns dispersed under the airspace include Lancaster, Littleton, Bradford, Woodstock, Plymouth, Sandwich, Campton, and Whitefield.

The Viper Complex is located in northern New York and mostly covers agricultural, open space and rural community land uses (Figure BR3.10-5). Small towns dispersed under the airspace include Lyons Falls, Woodgate, Indian Lake, Tupper Lake, Brighton, Fine, Russell, Fowler, Carthage, Gouverneur, Philadelphia, and Lowville. Higley Flow State Park, Whetstone Gulf State Park, and Yellow Lake State Multiple Use Area are located under the airspace. Several other state Wildlife Management Areas are also located under the airspace, including Little John State Wildlife Management Area, Tug Hill State Wildlife Management Area. Fort Drum is also located under the airspace.

The largest management area under the airspace is Adirondack State Park, a National Historic Landmark, comprising close to 6 million acres. The Park is managed under the Adirondack Park State Land Management Plan (Adirondack 2001). Nearly half of the 6 million acres belongs to the people of New York State and is constitutionally protected to remain a “forever wild” forest preserve. The remaining half of the Park is private land which includes settlements, farms, timber lands, businesses, homes, and camps (Adirondack 2012).

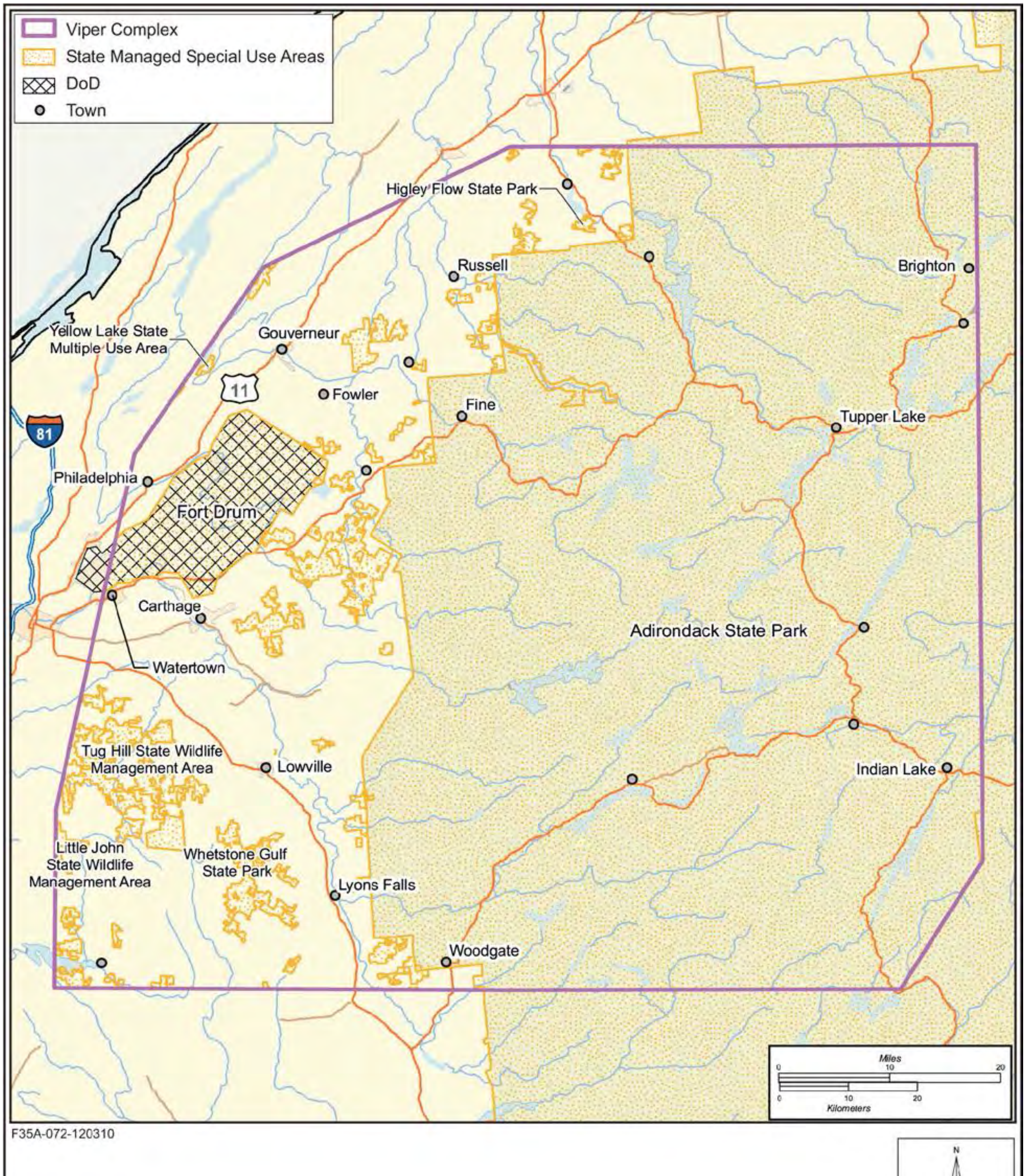


Figure BR3.10-5. Land Use under Viper Complex Airspace

BR3.10.2.2 Environmental Consequences

Under both scenarios, the proposed action would not change the types of land use and land status under the airspace units. Standard flight rules require all pilots to avoid direct overflight of populated areas by 1,000 feet and structures by 500 feet. While general noise would increase, individual overflights occur at various altitudes and are dispersed and transitory in nature. The F-35A would fly more of the time at higher altitudes than the F-16 aircraft it is proposed to replace, conducting operations below 5,000 feet AGL only 5 percent of the time. Changes in noise levels could cause annoyance, but would not change general land use patterns, land ownership, or affect management of lands or special use land areas beneath the airspace.

ANG Scenario 1

Under ANG Scenario 1, operations in both Viper Complex and Condor Scotty would decrease slightly to approximately six and less than one overflight per flying day, respectively. Additionally, 95 percent of F-35A operations occurring in these airspace units would be above 5,000 feet. The noise level of Viper Complex would increase 5 dB to 55 dB L_{dnmr}. Noise levels in Condor Scotty would remain at ambient levels, less than 45 dB L_{dnmr}. Operations in Yankee Laser would decrease to approximately two overflights per flying day. These operations would occur primarily above 18,000 feet MSL. The noise level below Yankee Laser airspace would increase 5 dB, but would remain at the low level of 54 dB L_{dnmr}. Although in both the Yankee Laser and Viper Complex, increases in the noise would be perceptible, and could cause annoyance, the overall noise levels would remain low. 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. Changes to noise levels would not result in changes to land use patterns, ownership, or management plans and policies. Increases in noise levels would not alter the status of special use areas. Therefore, the proposed action would not result in adverse impacts to land management and use under ANG Scenario 1 and no adverse impacts to special use areas would occur under ANG Scenario 1.

ANG Scenario 2

Daily operations in all Burlington airspace units would increase; however, the highest increase is in Viper Complex, which would increase by fewer than 2 operations per day. As in ANG Scenario 1, most flights would occur above 5,000 feet and overflight probabilities in any one area remain low. Under ANG Scenario 2, the noise level of the Viper Complex would increase 6 dB from 50 to 56 dB L_{dnmr}. The baseline noise level of Condor Scotty would remain less than 45 dB L_{dnmr}, resulting in no perceptible change. The noise level within the Yankee Laser airspace would increase 7 dB from the baseline of 49 dB to 56 dB L_{dnmr}. Although increases in the noise would be perceptible, and could cause annoyance, the overall noise levels would remain low. Changes to noise levels would not result in changes to land use patterns, ownership, or management plans and policies. Increases in noise levels would not alter the status of special use areas. Therefore, the proposed action would not result in adverse impacts to land management and use under ANG Scenario 2.

BR3.11 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 most comparable data among the various locations.

BR3.11.1 Base

BR3.11.1.1 Affected Environment

Employment and Earnings

Information regarding employment and earnings is presented for Chittenden County. Comparisons are also presented for the state of Vermont.

In Chittenden County, the total civilian labor force increased from 84,154 in 2000 to 91,950 in 2010, an increase of approximately 9 percent. The largest contributions to employment in 2010 were made by educational services, health care, and social assistance (28 percent); retail trade (12 percent); and arts, entertainment, recreation, accommodation, and food services (12 percent) (U.S. Census Bureau 2010a, 2010b).

In Vermont, the total civilian labor force increased by 6 percent from 2000 to 2010. The largest employment sectors in 2010 were educational services, health care, and social assistance (27 percent); retail trade (12 percent), and manufacturing (10 percent).

Non-farm earnings in Chittenden County totaled more than $5.9 billion in 2009. The major contributions were from government and government enterprises (18 percent), health care (16 percent), and manufacturing (15 percent). In Vermont, non-farm earnings totaled over $16.5 billion in 2009, with the major contributions made by government and government enterprises (19 percent), health care (15 percent), and manufacturing (13 percent) (U.S. Bureau of Economic Analysis 2010).

The number of authorized personnel levels at Burlington AGS was 1,130 in 2009. This included 333 full-time military, 67 full-time civilians, and 730 traditional guardsmen (personal communication, Wright 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 additional weeks per year with the ANG.

The 158 FW of the VTANG purchases goods and services from local and regional firms. In 2009, annual construction and procurement expenditures by the 158 FW were more than $2.5 million (158 FW 2009a).

Population

Information describing the population is presented for Chittenden County and the City of South Burlington. Comparisons are also presented with conditions for the state of Vermont. Demographic data are from the U.S. Census Bureau 2010 Census and the 2008-2010 American Community Survey 3-Year Estimates.

The population of Chittenden County increased by 7 percent between 2000 and 2010, reaching 156,545 in 2010 (U.S. Census Bureau 2010b). The 2010 City of South Burlington population is currently about 17,900, an increase of 13 percent from 2000 (U.S. Census Bureau 2010a). By comparison, the population of Vermont increased by 3 percent, reaching 625,741 in 2010 (U.S. Census Bureau 2010a).

Housing

There is no military housing on Burlington AGS. Detailed information regarding the housing contained in the region is from the U.S. Census Bureau 2008-2010 American Community Survey 3-Year Estimates (U.S. Census Bureau 2010b) and from the CenStats Databases, the most comprehensive sources of information describing the current housing stock in detail.

There were 65,722 total households in Chittenden County in 2010, of which approximately 61 percent were owner-occupied. The vacancy rate for the region was approximately 1.4 percent (U.S. Census Bureau 2010b).

Over the period 2000-2010, the average annual number of building permits issued for residential units was 573. The number of units permitted on an annual basis varied from a high of 854 in 2004 to a low of 360 in 2008. The majority of these permits (about 60 percent) were for single-family homes (U.S. Census Bureau 2010c).

BR3.11.1.2 Environmental Consequences

ANG Scenario 1

Employment and Earnings

Under ANG Scenario 1 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 the data, the combined expenditures for proposed construction and modification projects for this beddown scenario would be $4.7 million during 2016 (refer to Section BR2.1.3 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 1 there would be no net change in military personnel. Construction workers would be drawn from the local labor force, and 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 1 there would be no net change in military personnel or regional in-migration; therefore, no project-related change to the regional housing market would be anticipated. Property values, as described in Appendix C, Section C2.7, are the result of multiple location and other variables. Property in the vicinity of airports and military airfields has been studied to determine if, and to what extent, aircraft noise could contribute to a discount in property values. The 1996 Fidell *et al*. study of two military facilities found indications that aircraft noise had no meaningful effect on residential property values. A 2003 study which combined the results of 33 airfield related property value studies estimated that a property could be discounted between 0.005 and 0.006 per dB DNL between the 65 dB DNL and 75 dB DNL noise contours. The property value discount above 75 dB DNL was not able to be defined based on study data but was estimated to be greater than the discount between 65 and 75 dB DNL (Nelson 2004).

ANG Scenario 2

Employment and Earnings

ANG Scenario 2 would result in an increase of 266 military personnel: an increase of 83 full-time and 183 part-time traditional guardsmen. The proposed positions would represent an increase of 21 percent of the existing full-time positions and 26 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. It is expected that any increase in staffing would be met primarily through local recruitment, particularly for part-time traditional guardsmen. Although unlikely, if all 83 full-time personnel relocated to the area, this would represent less than one percent of the Chittenden County labor force.

The increase in full-time positions would result in an annual increase in salaries of approximately $3.4 million. Salaries paid to part-time traditional guardsmen would result in an annual increase of approximately $693,000. Total salaries would result in less than 1 percent of total non-farm earnings in Chittenden County.

As any increases in secondary employment as a result of the increase in personnel would also be minor and would be expected to be met by the local labor force, ANG Scenario 2 would not affect short- or long-term regional employment and income trends.

The combined expenditures for proposed construction and modification projects for this beddown scenario would be $2.4 million during 2016 (refer to Section BR2.1.3 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.

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

Population

ANG Scenario 2 would result in an increase of 83 full-time and 183 part-time military positions. Under a conservative scenario, the full-time positions would be filled by relocating personnel. Combined with their approximately 113 family members, this would represent less than 1 percent of the Chittenden County population. Therefore, ANG Scenario 2 would not result in any changes to short- or long-term regional population trends.

Housing

Under ANG Scenario 2, 83 full-time and 183 part-time positions would be created. If all 83 full-time military personnel were in the market for housing units at the same time, this would represent less than one percent of the owner-occupied and renter-occupied units, individually. Therefore, ANG Scenario 2 would not result in changes to short- or long-term trends in the regional housing market. Property values, as described in Appendix C, Section C2.7, are the result of multiple location and other variables. Property in the vicinity of airports and military airfields has been studied to determine if, and to what extent, aircraft noise could contribute to a discount in property values. The 1996 Fidell *et al*. study of two military facilities found indications that aircraft noise had no meaningful effect on residential property values. A 2003 study which combined the results of 33 airfield related property value studies estimated that a property could be discounted between 0.005 and 0.006 per dB DNL between the 65 dB DNL and 75 dB DNL noise contours. The property value discount above 75 dB DNL was not able to be defined based on study data but was estimated to be greater than the discount between 65 and 75 dB DNL (Nelson 2004).

BR3.12 Environmental Justice/Protection of Children

BR3.12.1 Base

BR3.12.1.1 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.

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.

Minority and Low-Income Populations

Table BR3.12-1 displays the total, minority, and low-income populations for the affected areas in the vicinity of Burlington AGS. This information was derived from the 2010 United States Census of Population American Community Survey, which is the latest source of information at the required level of detail. Based on the data, 4.7 percent of the state population is composed of minorities and 11.3 percent are low-income populations. The area of comparison for this analysis consists of the cities of South Burlington and Winooski, the focus of potential effects. As the data in Table BR3.12-1 show, the proportion of minority population for the area of comparison exceeds the state average, whereas it falls below the average for low-income populations. Winooski clearly contributes the greatest to each of these populations.

Table BR3.12-1. Total Minority and Low-Income Populations in the Vicinity of Burlington AGS

Geographic Area	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income[1]*	*Children Under Age 18*	*Percent Children*
South Burlington	17,904	1,790	10%	788	4.4%	3,384	18.9%
Winooski	7,267	1,264	17.4%	1,788	24.6%	1,308	18.0%
Area of Comparison (Combined)	25,171	3,054	12.1%	2,576	10.2%	4,692	18.6%
Chittenden County	156,545	11,584	7.4%	17,063	10.9%	30,370	19.4%
Vermont	625,741	29,410	4.7%	70,709	11.3%	12,592	20.7%

Source: U.S. Census Bureau 2010b.
Note: [1]The 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 BR3.12-2 displays the total population, minority, and low-income populations in the vicinity of Burlington IAP subject to noise levels equal to or greater than 65 dB DNL. The minority population affected by baseline noise levels exceeds the proportion of the combined area of comparison of South Burlington and Winooski by 0.9 percent, and for low-income populations it falls below by 0.2 percent. In the context of the area of comparison (i.e., South Burlington and Winooski), the 581 members of minority populations affected by noise represent about 2.3 percent of the total population. Similarly, the affected low-income population accounts for 1.8 percent of the combined populations in the cities of South Burlington and Winooski. Such impacts likely affect Winooski to a greater degree since its minority population is more than double that of South Burlington. While these data provide a perspective on the relative population affected, baseline conditions still indicate a disproportionate impact on minority populations within the 65 dB DNL noise contours and greater when compared to both county and state proportions (7.4 and 4.7, respectively). In contrast, low-income populations subjected to baseline noise conditions experience no disproportionate impacts relative to the area of comparison, county, or state.

Table BR3.12-2. Total Baseline Minority Population and Low-Income Population Affected by Noise Levels Greater than 65 dB DNL at Burlington AGS					
Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	2,808	374	13%	346	12%
70 – 75	1,211	141	12%	79	7%
75 – 80	574	65	11%	37	6%
80 – 85	9	1	11%	1	11%
85+	0	0	0	0	0
Total	**4,602**	**581**	**13%**	**463**	**10%**

Source: U.S. Census Bureau 2010b.
Note: [1]The 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 2010, the number of children under the age of 18 living in the Cities of South Burlington and Winooski were 4,692 (or 18.5 percent of the total population). Chittenden County had 24 percent of the population under the age of 18 in 2010 (see Table BR3.12-1). The Burlington AGS has no on-base schools. However, there is a math and science camp (Starbase) for children in grades four through six that occurs for approximately 10 months out of the year; it accommodates up to 30 children per week on the installation (primarily within Building 90). Currently, this building and two off-base schools are exposed to aircraft noise greater than 65 dB DNL. For a discussion of speech interference in the classroom, refer to Section BR3.2, Noise.

BR3.12.1.2 Environmental Consequences

For each scenario, noise levels of 65 dB DNL and greater were identified (see Noise, Section BR3.2). Within the noise contour bands, the affected population was determined using 2010 Census Bureau census block group data. Table BR3.12-3 provides the total population that would be affected for each of the scenarios by noise levels of 65 dB DNL and greater.

Table BR3.12-3. Burlington ANG Scenarios 1 and 2 Projected Population Affected by Noise Levels Greater than 65 dB DNL			
Noise Contour	*Baseline*	*ANG Scenario 1*	*ANG Scenario 2*
65 – 70	2,808	4,330	4,593
70 – 75	1,211	1,740	2,356
75 – 80	574	586	756
80 – 85	9	7	14
85+	0	0	0
Total	**4,602**	**6,663**	**7,719**

Source: U.S. Census Bureau 2010b.

ANG Scenario 1

Minority and Low-Income Populations

Table BR3.12-4 displays the total population and proportional representation of minority and low-income populations subject to noise levels 65 dB DNL and greater under ANG Scenario 1. Under this scenario, the total population affected by noise levels of 65 dB DNL and greater would increase by 8 percent (+2,061) when compared to baseline. Of the 6,663 individuals (or close to 27 percent of total population in the area of comparison), 11 percent would consist of minority and 16 percent would be low-income populations. With the addition of over 2,000 people to the total affected population, the proportion of minority populations impacted would decrease relative to baseline conditions, from 13 to 11 percent. Additionally, the affected groups would decrease below the proportion for the area of comparison (12.1 percent), so no disproportionate effects on minority populations would result for ANG Scenario 1. However, when compared to county and state minority populations there would continue to be disproportionate impacts but decreasing by 2 percent from baseline conditions (13 to 11 percent). Conversely, the proportion of affected low-income population would increase under this scenario, exceeding both baseline conditions and the area of comparison by about 6 percent and county and state proportions by about 5 percent. This change would represent a disproportionate impact. However, the actual numbers of low-income individuals would comprise about 4.2 percent of the total population for the area of comparison.

Table BR3.12-4. Total Minority and Low-Income Populations Affected by Noise Levels Greater than 65 dB DNL under Burlington ANG Scenario 1

Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	4,330	416	10%	725	17%
70 – 75	1,740	255	15%	285	16%
75 – 80	586	76	13%	53	9%
80 – 85	7	1	14%	1	14%
85+	0	0	0	0	0
Total	**6,663**	**748**	**11%**	**1,064**	**16%**
Baseline Conditions	*4,602*	*581*	*13%*	*463*	*10%*

Source: Wyle 2011, U.S. Census Bureau 2010b.
Note: [1]The 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

The Burlington AGS has no on-base schools. However, there is a math and science camp (Starbase) on the installation (primarily within Building 90). Currently, this building and two other off-base schools are exposed to aircraft noise greater than 65 dB DNL. Under AGS Scenario 1 an additional school would be exposed to noise levels greater than 65 dB DNL. Classroom speech interference would be roughly the same as baseline conditions. For a discussion of speech interference in schools, refer to Section BR3.2, Noise.

ANG Scenario 2

Minority and Low-Income Populations

Table BR3.12-5 displays the total population and proportional representation of minority and low-income populations affected by noise levels 65 dB DNL and greater under ANG Scenario 2. Under this scenario, the total population affected would increase by 12.4 percent (+3,117) when compared to baseline. Of the 7,719 individuals (or close to 31 percent of total population in the area of comparison), 11 percent would consist of minority and 16 percent would be low income populations. With the addition of over 3,100 people to the total affected population, the proportion of minority populations impacted would decrease relative to baseline conditions, from 13 to 11 percent. Additionally, the affected groups would decrease below the proportion for the area of comparison (12.1 percent), so no disproportionate effects on minority populations would result for ANG Scenario 2. However, when compared to county and state minority populations there would continue to be disproportionate impacts, but decreasing by 2 percent from baseline conditions (13 to 11 percent). Conversely, the proportion of affected low-income population would increase under this scenario, exceeding both baseline conditions and the area of comparison by about 6 percent and county and state proportions by about 5 percent. This change would represent a disproportionate impact. However, the actual numbers of low-income individuals would comprise about 4.9 percent of the total population for the area of comparison.

Table BR3.12-5. Total Minority and Low-Income Populations Affected by Noise Levels Greater than 65 dB DNL under Burlington ANG Scenario 2

Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income[1]*
65 – 70	4,593	459	10%	706	15%
70 – 75	2,356	289	12%	433	18%
75 – 80	756	106	14%	84	14%
80 – 85	14	2	14%	1	7%
85+	0	0	0	0	0
Total	**7,719**	**856**	**11%**	**1,224**	**16%**
Baseline Conditions	*4,602*	*581*	*13%*	*463*	*10%*

Source: Wyle 2011, U.S. Census Bureau 2010b.
Note: [1]The 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

The Burlington AGS has no on-base schools. The math and science camp on the installation as well as two off-base schools would continue to be exposed to aircraft noise greater than 65 dB DNL. Under ANG Scenario 2, an additional two schools would be affected by noise levels greater than 65 dB DNL. Classroom speech interference would be slightly higher than baseline conditions. For a discussion of speech interference in the classroom, refer to Section BR3.2, Noise.

BR3.12.2 Airspace

BR3.12.2.1 Affected Environment

Aircraft operating out of Burlington AGS train in airspace that overlies land in New York, Vermont, and Maine. In general, land underlying these airspace units is rural in nature, with communities widely dispersed. Communities include small towns that range in population from less than 100 to more than 7,000. The largest town is Farmington, near the southeastern boundary of the Condor 2 MOA. The Penobscot Nation holds two parcels of federal Indian Reservation lands underlying the Condor MOAs:

the Alder Stream and Carrabassett Valley properties (158 FW 2009c). These lands, towns, and communities comprise the affected environment.

BR3.12.2.2 Environmental Consequences

Noise levels would perceptibly increase from baseline under both scenarios but would remain well below the threshold 65 dB DNL; therefore, no disproportionate impacts to minority and low-income populations are anticipated. This is also the case with children; no impacts to children are anticipated if either of the two scenarios was implemented because noise levels remain generally consistent with those found under baseline conditions. For more detailed information regarding general effects of noise to all populations, refer to Section BR3.3. Airspace and ground safety is discussed in Section BR3.4. In conclusion, no disproportionate or adverse impacts related to environmental justice are anticipated, nor would there be any special health or safety risks to children.

BR3.13 Community Facilities and Public Services

BR3.13.1 Base

BR3.13.1.1 Affected Environment

Potable Water

Champlain Water District provides potable water to the communities of Chittenden County, including Burlington AGS. Champlain Water District is Vermont's largest regional public water supplier, serving 68,000 people in twelve municipal water systems in Chittenden County. The District receives its water primarily from the Shelburne Bay watershed, part of Lake Champlain (Champlain Water District 2009). In calendar year 2008, 526 thousand cubic feet of potable water was supplied to the Burlington AGS (personal communication, McBeth 2009).

Wastewater Treatment

Burlington AGS generates wastewater from sanitary, stormwater, and industrial processes, including oil/water separator discharge, wash rack discharge, floor wash down, latrines, sinks, and showers (Burlington AGS 2009a). Wastewater is collected in pipelines and discharged to the South Burlington Airport Parkway Wastewater Treatment Plant (personal communication, McBeth 2009). Based on the current capacity of the two wastewater plants in South Burlington (Airport Parkway and South Burlington Wastewater Treatment Plants) and future infrastructure upgrades as outlined in the 2006 South Burlington Comprehensive Plan, wastewater treatment plant capacity is not projected to be a limitation on future growth in South Burlington (South Burlington 2006).

Electric Power and Natural Gas

Green Mountain Power Corporation generates and distributes electricity in Vermont to approximately 94,000 customers, including the Burlington AGS. Proposed electricity generation from Green Mountain Power in 2011 is 2,180.3 gigawatt-hours (Green Mountain Power 2007). Electricity consumption for calendar year 2008 at the installation was 4,151 megawatt-hours (4.1 gigawatt-hours) (Burlington AGS

2009b). In addition, Burlington AGS has installed a 1.4 mega-watt photo-voltaic solar power array and is awaiting funding for the 0.7 solar power array (personal communication, Wright 2010).

Vermont Gas Systems provides natural gas to over 40,000 customers within Chittenden and Franklin Counties, including the Burlington AGS. Natural gas consumption for calendar year 2008 at the installation was 173,131 hundred cubic feet (personal communication, McBeth 2009).

Solid Waste Management

Municipal solid waste is managed in accordance with the Burlington AGS Solid Waste Management Plan (Burlington AGS 2009a) 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.

Various users at the installation generate solid waste in the form of office trash, non-hazardous industrial wastes, normal municipal waste, and construction debris. These nonhazardous solid wastes are collected in dumpsters located throughout the installation. There is no disposal of solid waste on the installation; rather, solid waste collection and disposal are handled by the Vermont Army National Guard and delivered to the Burlington transfer facility or the Moretown Landfill in Moretown, Vermont (Burlington AGS 2009a). In 2008, 484 tons of solid waste was generated at the installation, of which 201 tons were recycled (Burlington AGS 2009a). Mooretown Landfill is permitted to accept 1,000 tons of waste per day (286,000 tons per year) and as of October 2008 was estimated to have a remaining capacity of 767,520 tons. In addition, the New England Waste Services Landfill in Coventry, Vermont is in the process of constructing a landfill with a proposed capacity of 5,000,000 tons (Vermont Department of Environmental Conservation [DEC] 2008).

Scrap metal is recycled at Burlington AGS under a Qualified Recycling Program (Burlington AGS 2009b). Designated dumpsters are located at the recycling area for other recyclables such as paper, cardboard, plastic, and glass bottles. These materials are picked up on a weekly basis by All Cycle Waste, Inc. (Burlington AGS 2009b).

Schools

There are no schools or housing located on Burlington AGS; therefore, all school-aged dependents attend the surrounding community schools. The majority of school-aged dependents of full time ANG personnel are assumed to live within Chittenden County. These students would primarily attend schools within the Burlington School District or the South Burlington School District. The Burlington District of Chittenden County Schools includes one high school, one technical center, three middle schools, six elementary schools, and one pre-kindergarten only school with a total enrollment in 2009/2010 of 3,648 students (South Burlington School District 2010). The South Burlington School District has a total

Kindergarten through 12-grade capacity of 2,455 students. Future projections call for slight drops in enrollment through the year 2012, to 2,379 students, and then growth in the years following up to 2015, the end of the projection, to a population of 2,450 (South Burlington School District 2008). Part time ANG employees are currently dispersed throughout Chittenden, Franklin, Lamoille, Washington, Addison, and Grand Isle counties, in addition to other states around the country; school-aged dependents attend schools at their place of residence.

BR3.13.1.2 Environmental Consequences

Under ANG Scenario 1, there would be no change in the number of personnel stationed at Burlington AGS and therefore, there would be no impacts to community facilities and services under Scenario 1. In addition, any construction associated with the proposed action under both scenarios would include internal alterations only. 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 baseline conditions and are, therefore, not addressed further within this section.

ANG Scenario 2 would include an increase of 627 people (266 personnel and 361 dependents) to Burlington AGS. This represents a 24 percent increase from the baseline population of 2,576 people (1,130 full and part-time military personnel and civilian contractors, and 1,446 dependents) currently at Burlington AGS. It is assumed any increase in personnel would be dispersed throughout Chittenden, Franklin, Lamoille, Washington, Addison, and Grand Isle counties as current employees are similarly dispersed. Therefore, the maximum utilization is assessed under ANG Scenario 2 as it assumed that all personnel would live within the vicinity of Burlington AGS. The increase in personnel and dependents would represent at a maximum, an increase of less than 1 percent for Chittenden County, and subsequently, a less than 1 percent increase in demand for services.

For the range of community facilities and public services discussed below, the installation is required to proactively plan for and assess all specific infrastructure and utility requirements and other essential services to ensure that the proposed increase in personnel and their dependents would be accommodated under each proposed scenario. The installation routinely evaluates community facilities and services to account for fluctuations associated with new units assigned to the installation and the deployment of existing units. In addition, the installation identifies infrastructure or utility needs within the scope of each corresponding project. If particular projects require additional infrastructure or utilities, they are incorporated as a part of that project. This process ensures that any infrastructure or utility deficiencies are identified in the initial planning stages.

Potable Water

Water consumption would be expected to increase under ANG Scenario 2 as a result of the increase in personnel and it is assumed that population impacts will be incurred on and off base. As described in Section BR3.13.1.1, potable water is supplied to both South Burlington and Burlington AGS from the Champlain Water District and though it is understood that 266 additional personnel would work away from home during the day, it is assumed that the majority of their consumptive water use would occur at their place of residence. According to a 2005 water use report by the United States Geological Survey

(USGS), the average total domestic per capita use of potable water in 2005 was 64 gallons per day (gpd) for the state of Vermont (USGS 2005). Therefore, with a maximum increase of 627 personnel and dependents (assuming 64 gallons/day/capita), the maximum additional demand on water supply from the Champlain Water District is estimated to be 40,128 gpd (0.04 million gallons per day [mgd]). As the Champlain Water District currently supplies a population of over 68,000 people, an increase in less than 1 percent in users located throughout multiple counties would not exceed annual capacity.

Wastewater Treatment

Wastewater generation would be expected to increase under ANG Scenario 2 as a result of the increase in personnel. The maximum increase of 627 personnel and dependents (assuming 64 gallons/capita/day) would result in an increase to the municipal waste water treatment plant of 40,128 gpd (0.04 mgd). Current capacity and projected upgrades would accommodate this increase. Though it is understood that 266 additional personnel would work away from home during the day, it is assumed that the majority of their wastewater generation would occur at their place of residence.

Electricity

Electricity consumption would be expected to increase under ANG Scenario 2 as a result of the increase in personnel. As discussed above, Green Mountain Power supplies electricity to the cities of Burlington and South Burlington as well as Burlington AGS. According to the U.S. Department of Energy State Energy Consumption Estimates, the average annual electricity consumption for a U.S. residential home in 2008 was 11,040 kilowatt hours (kWh) (U.S. Department of Energy 2010). Assuming each personnel member constitutes one household, an increase in 266 personnel would increase electricity use by approximately 2,936,640 kWh (2.9 gigawatt-hours) per year. This increase would represent less than 1 percent of the proposed 2011 electricity generation of 2,180.3 gigawatt-hours at Green Mountain Power. Though it is understood that 288 additional personnel would work away from home during the day, it is assumed that the majority of their consumptive electricity use would occur at their place of residence. In addition, the Burlington AGS's Sustainable Energy Solar Demonstration Project would help reduce reliance on traditional power supplies.

Natural Gas

Natural gas consumption would be expected to increase under ANG Scenario 2 as a result of the increase in personnel. Vermont Gas Systems provides natural gas to the cities of Burlington and South Burlington, as well as Burlington AGS. According to the U.S. Department of Energy, average residential consumption of natural gas within the United States in 2008 was 75,000 cubic feet (750 hundred cubic feet) per household (U.S. Department of Energy 2010). Assuming each person constitutes one household, an increase in 266 personnel would increase natural gas use by approximately 199,500 hundred cubic feet. Though it is understood that 266 additional personnel would work away from home during the day, it is assumed that the majority of their consumptive natural gas use would occur at their place of residence.

Solid Waste Management

There are no new construction projects or additions to existing facilities proposed under either scenario; however, the internal alterations to be constructed under both scenarios could generate minor construction and demolition debris requiring landfill disposal. Proposed increases in personnel and equipment use under ANG Scenario 2 would also contribute to an increase in solid waste generation. Compliance with the Burlington AGS 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.

Schools

The installation is required to plan for and assess all essential services to ensure that existing educational services can adequately accommodate the proposed increase of personnel and their dependents with implementation of each scenario. There would be an increase of approximately 128 school-aged children associated with ANG Scenario 2, a 25 percent increase when compared with the current baseline of 511 school-aged children associated with personnel at Burlington AGS. The 128 school-aged children would attend schools throughout Chittenden, Franklin, Lamoille, Washington, Addison, and Grand Isle counties. It is assumed the increase in school-aged children would be similarly dispersed when compared with the existing distribution.

BR3.14 Ground Traffic and Transportation

BR3.14.1 Base

BR3.14.1.1 Affected Environment

Regional and Local Circulation

Burlington AGS is located approximately 1.5 miles east of Interstate (I)-89 within the City of South Burlington, Vermont. I-89 has the highest traffic volume of any roadway in South Burlington with an average daily traffic (ADT) of 52,300 (Vermont Agency of Transportation 2009) and provides access to Montreal to the north, Boston to the south, and New Hampshire to the east. U.S. Highway 2 (Williston Road), State Route (SR) 15, and SR 2A (Essex Road) provide access to the secondary roads that connect to Burlington AGS's Main Gate and the East Gate serving the installation.

National Guard Avenue is the secondary road that provides access to the Main Gate. This road is accessed from the north via Lime Kiln Road and from the south via Airport Parkway. The East Gate can also be accessed via National Guard Avenue. Traffic volume counts for these roads in the vicinity of Burlington AGS are (followed by year of survey): Lime Kiln Road with an ADT of 7,800 (2005); Airport Parkway with an ADT of 8,300 (2006), and National Guard Avenue with an ADT of 2,000 (2005) (Chittenden County Metropolitan Planning Organization 2010).

Circulation at Burlington AGS

The roadway network within Burlington AGS consists of two primary access roads: NCO Drive and Falcon Street. NCO Drive runs in a southeast/northwest direction across the installation and is the main road providing access within the installation. The intersection of NCO Drive and National Guard Avenue is expected to function at a LOS between A and B for all approaches through the year 2011 (Lamoureux & Dickinson, 2005). Falcon Street connects NCO Drive with National Guard Avenue to the north. T-Bird Lane is a cul-de-sac serving Buildings 319 and 332.

The current employment level at Burlington AGS is 1,130 personnel. Of those personnel, 333 are full-time military personnel, 67 are civilian contractors, and the remaining 730 personnel are part-time accessing the installation once a month during Unit Training Assembly (UTA) weekends. The increase in traffic associated with UTA weekends often creates congestion as traffic backs up onto National Guard Avenue during peak traffic hours. This leads to heavy traffic entering and exiting the installation (158 FW 2010a); however, plans to relocate the entrance gate about a quarter-mile east on National Guard Avenue are underway and should resolve issues associated with traffic back-ups (158 FW 2010b). With the exception of UTA weekends, traffic on National Guard Avenue is relatively light, increasing in the morning and afternoon peak periods when personnel are entering or exiting the installation.

The installation has a total of 854 general-use vehicle parking spaces that are distributed over approximately 12 locations. In addition, 125 operational parking spaces are set aside in specific locations throughout the installation (158 FW 2010b). During a normal weekday, these spaces are sufficient for full-time installation employees. On UTA weekends, personnel numbers can reach as high as 950. The combination of available general use and operational parking spaces are adequate to support this surge in personnel (158 FW 1995).

BR3.14.1.2 Environmental Consequences

Construction activities would begin in 2016 under both scenarios (ANG Scenario 1 and ANG Scenario 2) and would take approximately 1 year to complete. Construction traffic could temporarily result in negligible increases in the use of some on-base roadways during construction activities. However, construction under both scenarios at Burlington AGS would consist solely of internal alterations and, therefore, would be minimal and short-term.

Under ANG Scenario 1, on-base employment would remain at the current level of 1,130 personnel. There would be no change in travel demand for the installation and conditions would remain similar to that of baseline conditions.

Under ANG Scenario 2, on-base employment would increase by 266 personnel, from 1,130 to 1,396. The additional 266 personnel would consist of 83 full-time and 183 part-time employees. This increase in full-time personnel would generate up to 83 additional one-way vehicle trips to and from the installation during morning and evening peak periods. Estimating that each full-time employee makes two trips per day (not taking into consideration carpooling and other alternative modes of transportation) and that all employees would be on the installation at the same time, implementation of ANG Scenario 2 would add an additional 166 trips onto the existing roadway network after the construction phase is completed. During UTA weekends, that traffic would be expected to increase by 366 trips per day. The proposed increase in employment and associated travel demand would potentially increase peak period travel demand by 24 percent. The anticipated increase in traffic volume would exceed the primary screening criterion (11.8 percent) for the threshold of concern, but would not exceed the threshold of significance (26.7 percent) (see Chapter 3 Methodology, Section 3.15, Ground Traffic and Transportation). The greatest impact on traffic flow would most likely occur on UTA weekends, with potential congestion issues occurring on National Guard Avenue and at the intersection at Lime Kiln, Airport Parkway, Ethan Allen and National Guard. Plans to relocate the entrance gate on National Guard Avenue would help alleviate any potential congestion due to the increase in personnel associated with this scenario. In addition, there have been recent intersection improvements at the Lime Kiln, Airport Parkway, Ethan Allen, and National Guard intersection that would help alleviate potential congestion. This intersection has been studied and, as mentioned above, improvements have been made by the City of South Burlington, but more permanent improvements and studies could be required to more effectively alleviate congestion and safety issues associated with this intersection (City of South Burlington 2006).

BR3.15 Hazardous Materials and Waste

BR3.15.1 Base

BR3.15.1.1 Affected Environment

Hazardous Materials

Hazardous materials are used at Burlington AGS for aircraft maintenance; AGE maintenance; ground vehicle maintenance; petroleum, oil, and lubricants (POL) management, storage, and distribution; deicing; munitions storage; and facilities maintenance (Ensafe PCCI 2009). Types of hazardous substances found on the installation include paints, oil, jet fuel, gasoline, sealants and solvents, antifreeze, hydraulic fluid, hydrazine, grease lubes, batteries, and tires. In addition, a hydrazine facility is operated by the Fuels Maintenance shop for the servicing of aircraft hydrazine systems (158 FW 2010c).

Hazardous materials on Burlington AGS used by tenants and contractor personnel are controlled through the Hazardous Materials Pharmacy Program (HAZMART) pollution prevention process (158 FW 2010c). This process provides centralized points 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 AGS personnel to ensure users are aware of exposure and safety risks (158 FW 2010c, Ensafe PCCI 2009).

The Burlington AGS Hazardous Material Emergency Planning and Response Plan (HAZMAT-SPCC) (Ensafe PCCI 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 event of a spill, including notification, containment, decontamination, and cleanup of spilled materials. The Quick Reference Spill Response Guide (Red Plan; 158 FW 2010b) is distributed to all generation areas for first responder emergency response.

Hazardous Waste

Burlington AGS is regulated as a large quantity hazardous waste generator under the Resource Conservation and Recovery Act (RCRA). The Burlington AGS Hazardous Waste Management Plan (158 FW 2010c) governs the Burlington AGS Hazardous Wastes Management Program. Hazardous wastes are initially stored at one of the 49 satellite accumulation points or 12 universal accumulation points near the 2 generation points or work locations. A trained hazardous waste technician transports these 27 wastes to the onsite central accumulation site storage facility where the wastes can be stored for up to 90 days. The Defense Reutilization and Marketing Office arranges contracted services for the transport from the central accumulation site to the TSD disposal facility, but the Environmental Office is responsible for hazardous waste management on the installation. The total quantity of hazardous waste generated at Burlington AGS in 2010 was 13,700 pounds (personal communication, Wright 2011). Burlington AGS recycles POL products (including used oil and oil filters), lead, silver, and lead-acid batteries.

Toxic Substances

Regulated toxic substances typically associated with buildings and facilities include asbestos, LBP, and PCBs. The Asbestos Management Plan (ANG 2005) provides guidance for the location, condition, and recommended methods of managing the asbestos found throughout the base, including the type and percentage of asbestos found in each type of material. An asbestos facility register is maintained by Base Civil Engineering, Technical Services Branch. Buildings are tested for LBP prior to maintenance or demolition, especially if they were built prior to 1978 (ANG 2006). Although materials may be screened for poly-chlorinated biphenyl (PCB) contamination prior to disposal, Burlington AGS has no known PCB materials onsite and is considered “PCB Free” (158 FW 2010c).

Environmental Restoration Program

Six ERP sites (Sites 1, 2, 3, 4, 5A, and 5B) have been identified since the ERP began at Burlington AGS (CH2MHILL 2010). Each of these sites has progressed through the Remedial Investigation phase. The final Feasibility Study that analyzes remedial options for each site, was completed and approved by the State of Vermont DEC. The Proposed Plan for final remediation of all sites was presented to state agencies and the public in late 2010, and the final Record of Decision signed in late 2011.

Burlington AGS is in the initial phase of its Military Munitions Response Program (MMRP); the Final Work Plan for the Comprehensive Site Analysis Phase One was complete in April 2010 (USACE).

BR3.15.1.2 Environmental Consequences

Hazardous Materials

Training activities and other functions are expected to be similar between the F-35A and F-16 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 F-16 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 for F-16 aircraft (personal communication, Luker 2010; Fetter 2008).

Under both beddown 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. However, since use of the aircraft is expected to decrease from the current operational rate, and, while the specific use of the hazardous materials discussed above would be phased out as F-16 aircraft are transitioned, other hazardous material quantities may be added in support of the six additional aircraft that would be operated and serviced at Burlington AGS under ANG Scenario 2.

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

The F-35A replaces the hydrazine canister (currently used by the F-16s, but not F-15Cs) with an integrated power package (basically a small jet engine) for use in emergency engine restart situations, thus eliminating the potential for hydrazine leaks.

Hazardous Waste

The types of hazardous waste streams generated by F-35A operations are expected to be less than they are for F-16 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). The use of hydrazine has been eliminated in the F-35A. As with hazardous materials, the waste streams that are targeted for omission or substitution as aircraft are transitioned to the F-35 would decrease over the amounts currently generated by maintaining F-16 aircraft.

The exact amounts of hazardous waste that would be generated under each scenario are unknown; however, under both scenarios Burlington AGS would continue to operate within its large quantity generator hazardous waste permit conditions. In addition, 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 Burlington AGS procedures. Although initial testing has indicated that Buildings 70, 120, 140, and 360 were negative for ACM, it is possible that these particular buildings do contain ACM and must be further tested prior to any renovation activities (ANG 2006). 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 Burlington AGS procedures. Buildings 130, 140, 150, and 360 were all built prior to 1978 and would require LBP testing prior to renovation activities (ANG 2006). Any LBP would also be managed and disposed of in accordance with Toxic Substances Control Act, OSHA regulations, Vermont requirements (regarding site work practices for buildings with LBP), and established Burlington AGS procedures.

Environmental Restoration Program

At Burlington AGS, although some of the current ERP sites are located within proximity to the industrial section of the aircraft services area, neither upgrades to existing facilities nor future operations would affect known ERP locations. Buildings 120, 130, 131, and 132 are located within 100 feet of ERP Sites 5A and 5B; however, all construction associated with this scenario would include internal alterations within existing facility footprints and would not require any ground-breaking activities. Therefore, no impacts to ERP sites would occur. In addition, construction would not be expected to affect any MMRP sites (should they be discovered throughout the implementation of the Work Plan [USACE 2010]) as no ground-breaking activity would occur under this scenario.

BR4.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

BR4.1 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 Burlington AGS and training in associated airspace.

Burlington AGS is an active military installation that undergoes changes in missions in 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 actions (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. As a joint use facility, the installation occupies part of Burlington IAP.

Past and Present Actions Relevant to the Proposed Action

Burlington AGS has been a military installation since 1946. During this time, it has grown, been developed, and supported numerous kinds of aircraft. Burlington AGS currently supports F-16 aircraft.

Incremental Impacts of the Proposed Action with Reasonably Foreseeable Future Actions

Prior to F-35A facility construction (proposed in 2016), Burlington AGS 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 2013 to 2015 include those listed in Table BR4.1-1. Other on-going maintenance and repair activities are also likely to occur at the installation during this period.

Table BR4.1-1. Current and Reasonably Foreseeable Actions at Burlington AGS and Burlington IAP

Project Name/Description	*Approximate Area (acres)*	*New Impervious Surface (acres)*	*Anticipated Year for Implementation*
Burlington AGS Projects			
Repair to Taxiways D/F and addition of arm/de-arm pads Taxiways will also be widened to 75 feet	3.51	3.51	2014
Burlington IAP Projects			
Maintenance Facility Expansion – an addition of the existing maintenance facility is being planned; this expansion is to accommodate additional and existing snow removal equipment necessary to maintain the runway to standards during snow/ice events	0.41	0.41	2014-2015
Land Acquisition Program – In coordination with the city of South Burlington, the airport is continuing its land acquisition program for homes located inside the 65 dB L_{dnmr} noise contour; twenty homes are included in this year's program; homes purchased by the airport are demolished and returned to green space	N/A	N/A	Ongoing
Total	**3.92 acres**	**3.92 acres**	----

Two on-going NEPA projects are known from the airspace—the Condor MOA proposal and construction of wind turbines. The ANG proposes to combine the Condor 1 and 2 MOAs, divide the combined MOA into Condor Low MOA and Condor High MOA, and lower the flight floor of the proposed Condor Low MOA from 7,000 feet MSL (between approximately 2,800 to 6,300 feet AGL) to 500 feet AGL.

Two wind turbine projects are planned for areas beneath the Condor MOA. It is standard procedure to enter the locations of known wind power projects into the onboard navigation systems on ANG aircraft. Pilots are therefore aware of the wind projects' locations, and avoid them much as they would a surface threat (such as a surface to air missile site). Therefore, the wind turbine projects would have no effect on airspace management in the Condor MOA.

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 Burlington AGS and whether such a relationship would result in potentially additive impacts not identified when the proposed action is considered alone.

Past implementation of changes at Burlington AGS are integrated into baseline conditions and analyzed under the no-action alternative. All activities and effects of these past actions are reflected under the affected environment/no-action sections. 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.

None of the future on-base actions 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-base 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.

One reasonably foreseeable action, the changes to the Condor MOA, would have little cumulative effect when considered with the F-35A beddown at Burlington AGS. Under this proposal, Condor 1 and 2 MOAs would be combined and the floor of the MOA would be lowered. Since F-35A aircraft would continue to fly above 7,000 feet MSL, the noise levels would not change from those presented under the proposed action and remain less than 45 dB L_{dnmr}. Therefore, no cumulative effects are anticipated to the environment.

BR4.2 Irreversible and Irretrievable 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 Burlington AGS are associated with construction impacts.

For the Burlington AGS, 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 installation facilities would not disturb land, but would consume limited amounts of material typically associated with interior renovations (wiring, insulation, windows, and drywall). An undetermined, but limited, 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.

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.

Hill Air Force Base

How to Use This Document

Our goal is to give you a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the no-action alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement, or EIS, is shown below.

EXECUTIVE SUMMARY

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

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Detailed Guide for Reading the Final EIS

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

CHAPTER 2
- Overview of the Proposed Action and Alternatives
- Alternative Identification Process
- Summary Comparison of the Proposed Action and Alternatives

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Section BR3.0 Affected Environment and Environmental Consequences	**Section HL3.0** Affected Environment and Environmental Consequences	**Section JX3.0** Affected Environment and Environmental Consequences	**Section Mc3.0** Affected Environment and Environmental Consequences	**Section MH3.0** Affected Environment and Environmental Consequences	**Section SH3.0** Affected Environment and Environmental Consequences
Section BR4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section HL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section JX4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section Mc4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section SH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

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HL1.0 HILL AIR FORCE BASE OVERVIEW

This section presents an overview of Hill Air Force Base (AFB); the specifics of the proposed action as it relates to both the airfield and the associated airspace; construction and modification required at the base; changes to personnel; Utah Department of Environmental Quality (DEQ) consultation and review for the necessary changes in the existing Hill AFB permits that would be required should Hill AFB be selected as one of the beddown locations for the F-35A; and identified public and agency concerns with the proposal.

Hill AFB is located in northern Utah, approximately 25 miles north of Salt Lake City and 11 miles south of Ogden (Figure HL1.0-1). The base is situated on a high plateau with the Wasatch Range to the east and the Great Salt Lake to the west. The majority of the installation is within Davis County, although the northern tip of Hill AFB is in Weber County. It is bounded to the west by Interstate (I)-15 and the cities of Roy, Sunset, and Clearfield. To the south, the base is bordered by State Route (SR)-193 and the cities of Clearfield and Layton. On the east edge of the base, developed areas of Layton City and unincorporated areas of Davis County exist. To the north is the Davis-Weber Canal and the cities of Riverdale and South Weber (Figure HL1.0-2).

Figure HL1.0-1. Location of Hill AFB

Hill AFB is an Air Force Materiel Command (AFMC) base located in northern Utah; it is home to many operational and support missions, with the Ogden Air Logistics Center serving as the host organization. The center provides worldwide engineering and logistics management for the F-16 Fighting Falcon, A-10 Thunderbolt II, and Minuteman III intercontinental ballistic missile. The base performs depot maintenance of the F-16, A-10, F-22A, and C-130 Hercules aircraft, and has been proposed as the first

Figure HL1.0-2. Hill AFB Boundary

F-35 airframe maintenance depot. The 388th Fighter Wing (388 FW) under Air Combat Command (ACC) and the 419th Fighter Wing (419 FW) of the Air Force Reserve Command (AFRC) jointly operate the 48 F-16 Fighting Falcon aircraft at Hill AFB. One F-16 squadron (24 aircraft) was recently inactivated in 2010. Prior to that time, the 388 FW operated 72 total aircraft. In the sections that follow, HL2.0 presents the base-specific description of the proposed action and the three beddown scenarios proposed at Hill AFB. Section HL3.0 addresses baseline conditions and environmental consequences that could result if any of the three scenarios were implemented at Hill AFB. Refer to Chapter 3 for a complete and detailed definition of resources and the methodology applied to identify potential impacts. Section HL4.0 identifies other, 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 any of the beddown scenarios were implemented at Hill AFB.

HL2.0 HILL AFB ALTERNATIVE (24, 48, AND 72 AIRCRAFT SCENARIOS)

The Hill AFB F-35A beddown alternative includes three scenarios; the following presents the elements of these scenarios for the base in Section HL2.1 and the airspace in Section HL2.2.

HL2.1 Hill AFB: Base

Four elements have the potential to affect Hill AFB: 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.

HL2.1.1 Aircraft Transition

Under the proposed action, a total of 24 (ACC Scenario 1), 48 (ACC Scenario 2), or 72 (ACC Scenario 3) F-35A aircraft, would be based at Hill AFB. The beddown would start in 2015 with delivery of the first F-35As to Hill AFB, and would be complete by 2020 when the full complement of 24, 48, or 72 F-35As would be at the base depending upon the beddown scenario implemented.

The F-35As would replace the 48 F-16s currently at Hill AFB. Timing of the F-16 replacement would generally match the arrival of F-35As. However, for ACC Scenario 1 the drawdown of F-16s could occur more quickly. At no time, however, would the combination of F-35As and F-16s on base exceed a maximum total of 72 at Hill AFB. Aircraft for 388 FW and the 419 FW under each scenario would total 24 (ACC Scenario 1), 48 (ACC Scenario 2), or 72 (ACC Scenario 3). All other based aircraft would remain unchanged.

HL2.1.2 Airfield Operations

Like existing F-16 units at Hill AFB, the operational F-35A aircraft would be integrated into the Combat Air Forces (CAF). The CAF defends the homeland of the United States (U.S.) as well as deploys forces worldwide to meet threats and ensure the security of the U.S. To fulfill this role, the 388 FW and 419 FW must train as they would fight.

As a depot facility with an adjacent test and training range, Hill AFB supports many aircraft types that conduct about 47,000 operations per year. The U.S. Air Force (Air Force) anticipates that by 2020, the total of 24 F-35A operational aircraft would fly 10,667 operations (ACC Scenario 1) per year from Hill AFB; 48 F-35As would fly 21,334 operations (ACC Scenario 2), and 72 aircraft would fly 32,001 operations (ACC Scenario 3). Based on proposed requirements and deployment patterns, F-35A operational aircraft would fly additional operations during deployments, or at other locations for exercises or in preparation for deployments. In addition, each squadron could participate in remote training exercises. Some of these missions could involve ordnance delivery training or missile firing exercised (within the scope of existing National Environmental Policy Act [NEPA] documentation) at approved ranges such as the Nevada Test and Training Range near Nellis AFB or Eglin AFB's overwater ranges in the Gulf of Mexico.

Total airfield operations at Hill AFB would decrease in all scenarios (Table HL2.1-1) compared to baseline levels (46,633 operations). Decreases of 50.1 percent, 27.2 percent, or 4.4 percent relative to baseline totals would occur under ACC Scenarios 1, 2, and 3, respectively. This reduction derives from reductions in aircraft under ACC Scenarios 1 and 2 and the limited F-35A airfield pattern work required for pilot proficiency training.

Table HL2.1-1. Hill AFB Baseline F-16 and Proposed F-35A Airfield Operations

Baseline	*ACC Scenario 1*	*ACC Scenario 2*	*ACC Scenario 3*
F-16s	*24 F-35As*	*48 F-35As*	*72 F-35As*
34,032	10,667	21,334	32,001
Net Change	**-23,365**	**-12,698**	**-2,031**

Source: Wyle 2010.

The F-35As would employ similar departure and landing procedures as currently used by the F-16s at Hill AFB. However, the new aircraft would fly fewer closed patterns. Due to differences in performance, the flight profile and tracks for the F-35A would also vary somewhat from those used by F-16s. F-35A operations would adhere to existing restrictions, avoidance procedures, and the quiet-hours program at Hill AFB. Currently F-16s operate an average of 260 flying days per year, a standard planning format to maintain consistency and make for equal comparison, among the six alternatives.

The F-16s at Hill AFB currently fly approximately 0.5 percent of their operations during environmental night (10:00 p.m. to 7:00 a.m.) accounting for 170 annual operations. The F-35A would be expected to fly about 0.6 percent of the time during environmental night. Operations during environmental night would total approximately 64 for ACC Scenario 1, 128 for ACC Scenario 2, and 192 for ACC Scenario 3. Thus, despite the increase in percentage (0.1 percent) of flying during environmental night, actual operations during that period would decrease in ACC Scenarios 1 and 2, and increase negligibly (less than 0.1 operation per flying day) under ACC Scenario 3.

HL2.1.3 Construction

To support proposed F-35A operations, additional infrastructure and facilities would be required at Hill AFB (Table HL2.1-2) under each ACC scenario (24, 48, or 72 aircraft). A total of 10 projects are proposed under ACC Scenario 1 (Figure HL2.1-1), 13 projects under ACC Scenario 2 (Figure HL2.1-2), and 15 projects would be undertaken for ACC Scenario 3 (Figure HL2.1-3).

Construction would occur between 2014 and 2018. Proposed construction, modification, repair, and infrastructure improvements for the maximum beddown scenario (72 aircraft) would result in a 0.68 acre increase to impervious surfaces and disturb 5.25 acres (total affected area). ACC Scenarios 1 and 2 would affect less area and create less impervious surface. Total affected area includes the construction footprint of the proposed facilities, plus the surrounding lands where construction-related clearing and grading would occur. For those projects with internal alterations only, the proposed construction would be within an existing facility and therefore, no surrounding lands would be affected by construction activities (i.e., impact areas). Infrastructure upgrades, such as connecting new facilities to water and power systems, would also add to the affected areas on the base. The overall cost for ACC Scenario 3 would be approximately $40,800,000. Costs for ACC Scenarios 1 and 2 would total $18 and $30 million, respectively.

Table HL2.1-2. Proposed Construction and Modifications for Hill AFB

Year	*Action*	*Total Affected Area (acres)*	*New Impervious Surface (acres)*
	ACC Scenario 1 (24 F-35As)		
2014	Addition and Alteration to Hangar 45W for Squadron Operations/Aircraft Maintenance Unit (AMU)	0.46	0.13
2014	Construct 1 Modular Storage Magazine; demolish 3 existing igloos 1391, 1411, and 1494	2.60	0.05
2014	Alteration to Building 119 for Squadron Operations	0	0
2014	Renovate Building 48 for wash rack	0	0
2014	Construct COMSEC Vault inside Building 891	0	0
2014	Alteration to Building 62 for aerospace ground equipment (AGE)	0	0
2014	Renovate Buildings 30 and 125 for Field Training Detachment	0	0
2014	Alteration to Parts Store, Building 39	0	0
2014	Addition and Alteration to Building 118 for Flight Simulators (Phase I)	0.31	0.08
2016-2018	Various Minor Internal Renovations/Alterations	0	0
Total	**Cost: $18,075,000**	**3.37**	**0.26**
	ACC Scenario 2 (48 F-35As)		
2014	Addition and Alteration to Hangar 45W for Squadron Operations/AMU	0.46	0.13
2014	Construct 1 Modular Storage Magazine; demolish 3 existing igloos 1391, 1411, and 1494	2.60	0.05
2014	Addition and Alteration to Building 118 for Flight Simulators (Phase I)	0.31	0.08
2014	Alteration to Building 119 for Squadron Operations	0	0
2014	Renovate Building 48 for wash rack	0	0
2014	Construct COMSEC Vault inside Building 891	0	0
2014	Alteration to Building 62 for AGE	0	0
2014	Renovate Buildings 30 and 125 for Field Training Detachment	0	0
2014	Alteration to Parts Store, Building 39	0	0
2015	Alteration to Building 5 for Squadron Operations (second squadron)	0	0
2015	Addition and Alteration to Hangar 45E for Squadron Operations/AMU	0.46	0.12
2016	Addition to Building 118 for flight simulators (Phase II)	0.44	0.12
2016-2018	Various Minor Internal Renovations/Alterations	0	0
Total	**Cost: $30,419,000**	**4.27**	**0.50**

Table HL2.1-2. Proposed Construction and Modifications for Hill AFB			
Year	***Action***	***Total Affected Area (acres)***	***New Impervious Surface (acres)***
ACC Scenario 3 (72 F-35As)			
2014	Addition and Alteration to Hangar 45W for Squadron Operations/AMU	0.46	0.13
2014	Construct 2 Modular Storage Magazines; demolish 3 existing igloos 1391, 1411, and 1494	3.12	0.10
2014	Addition and Alteration to Building 118 for Flight Simulators (Phase I)	0.31	0.08
2014	Alteration to Building 119 for Squadron Operations	0	0
2014	Addition and Alteration to Hangar 45E for Squadron Operations/AMU	0.46	0.12
2014	Renovate Building 48 for wash rack	0	0
2014	Construct COMSEC Vault, Building 891	0	0
2014	Alteration to Building 62 for AGE	0	0
2014	Renovate Buildings 30 and 125 for Field Training Detachment	0	0
2014	Alteration to Parts Store, Building 39	0	0
2015	Alteration to Building 5 Squadron Operations (second squadron)	0	0
2016	Addition to Building 118 for flight simulators (Phase II)	0.44	0.12
2017	Alteration to Building 5 Squadron Operations (third squadron)	0	0
2018	Addition and Alteration to Hangar 42 for Squadron Operations/AMU	0.46	0.13
2016-2018	Various Minor Internal Renovations/Alterations	0	0
Total	**Cost: $40,800,000**	**5.25**	**0.68**

HL2.1.4 Personnel Changes

Beddown of the F-35A operational aircraft at Hill AFB would require sufficient and appropriately skilled personnel to operate and maintain the aircraft and provide necessary support services. For Hill AFB, the F-35A personnel positions would be drawn from the equivalent positions associated with existing F-16 manpower authorizations. The number of personnel in support of the F-35A per scenario is shown in Table HL2.1-3, as is the total number of military personnel at Hill AFB affected by the proposed transition from the F-16s to the F-35A under each scenario. Base Operations Support (BOS) personnel, who add about 10 percent to the total of military personnel, include civilian government employees and other military such as security police and administration. BOS personnel would add 53, 106, and 159 positions to the total for the three ACC scenarios, respectively. As a depot facility with a large workforce, Hill AFB supports almost 22,000 authorized personnel. Changes associated with the proposed beddown would range from a 5 percent decrease to a less than 1 percent increase.

Table HL2.1-3. Proposed Military Personnel Changes: Hill AFB				
Aircraft	***Baseline***	***Proposed Scenarios***		
	F-16 Personnel[1]	*F-35A Personnel*		
		ACC 1	ACC 2	ACC 3
F-16	1,742	-1,742	-1,742	-1,742
F-35A	-	532	1,064	1,596
BOS Personnel	-	53	106	159
Total Personnel	**1,742**	**585**	**1,170**	**1,755**
Net Change	**N/A**	**-1,157**	**-572**	**+13**

Note: [1]Includes an Air Force Reserve F-16 squadron.

Figure HL2.1-1. Hill AFB Construction Projects – ACC Scenario 1

Figure HL2.1-2. Hill AFB Construction Projects – ACC Scenario 2

Figure HL2.1-3. Hill AFB Construction Projects – ACC Scenario 3

HL2.2 Training Airspace and Ranges

Airspace associated with Hill AFB consists of Military Operations Area (MOAs), Air Traffic Control Assigned Airspace (ATCAAs), and Restricted Areas of the Utah Test and Training Range (UTTR) (Table HL2.2-1 and Figures HL2.2- 1, HL2.2-2). UTTR consists of two major subset complexes: North Range and South Range. Each includes restricted airspace and MOAs; and the South Range offers supersonic operating areas for training operations. UTTR also includes ATCAAs and an Altitude Reservation (ALTRV). Since the airspace units in the North and South Ranges are often scheduled together, this Environmental Impact Statement (EIS) evaluates these larger combined training areas. Neither the basing action nor alternative scenarios will require changes in special use airspace attributes, volume, or proximity; nor will changes be needed in the type and number of ordnance employed at the ranges.

Table HL2.2-1. Hill AFB Training Airspace

Training Area Name	*Airspace*	*Floor (feet MSL unless otherwise noted)**	*Ceiling (feet MSL unless otherwise noted)**
North Range (UTTR)	R-6404 A	Surface	58,000
	R-6404 B	Surface	13,000
	R-6404 C	100 above ground level (AGL)	28,000
	R-6404 D	13,000	25,000
Lucin	Lucin MOA A	100 AGL	9,000
	Lucin MOA B	100 AGL	7,500
	Lucin MOA C	100 AGL	6,500
	Lucin A ALTRV	9,000	18,000
	Lucin B ALTRV	7,500	18,000
Sevier	Sevier MOA A	100 AGL	14,500
	Sevier MOA B	100 AGL	9,500
	Sevier MOA C	14,500	18,000
	Sevier MOA D	9,500	18,000
White Elk/Currie Tippet	White Elk MOA	14,000	18,000
	Currie ATCAA	18,000	58,000
	Tippet ATCAA	18,000	58,000
South Range (UTTR)	Gandy MOA	100 AGL	18,000
	Gandy ATCAA	18,000	58,000
	R-6402 A	Surface	58,000
	R-6402 B	100 AGL	58,000
	R-6405	100 AGL	58,000
	R-6406 A	Surface	58,000
	R-6406 B	100 AGL	58,000
	R-6407	Surface	58,000

Source: Air Force 2011.
Legend: MSL = mean sea level; AGL = above ground level; BNI = but not including all MOAs extend to 18,000 feet MSL unless otherwise noted.
Notes: *MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to the average sea level. The elevation of a mountain, for example, is marked by its highest point and is typically illustrated as a small circle on a topographic map with the MSL height shown in either feet or meters or both. Because aircraft fly across vast landscapes, where points above the ground can and do vary, MSL is used is denote the "plain" on which the floors and ceilings of special use airspace are established and the altitude at which aircraft must operate within that special use airspace.

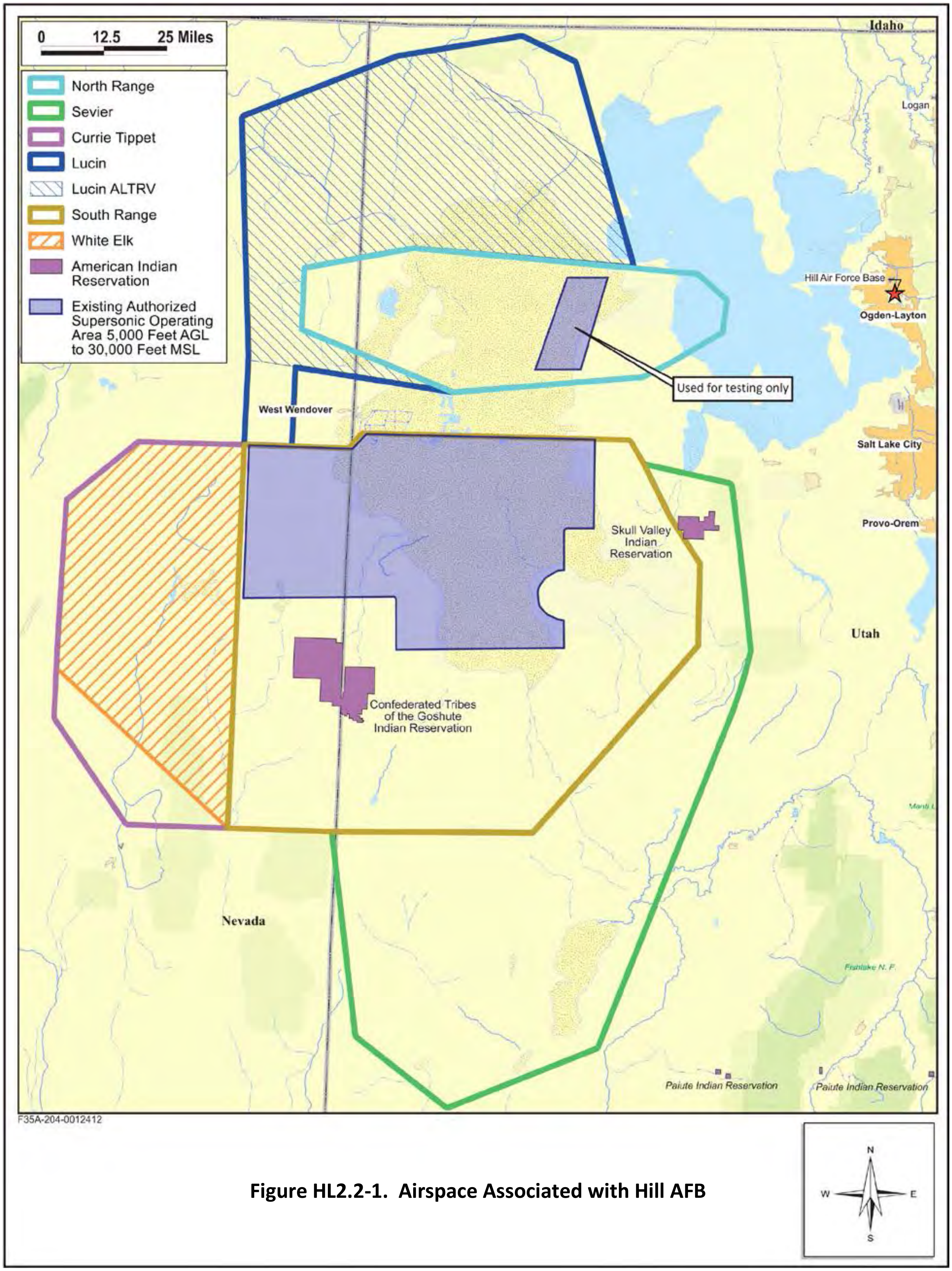


Figure HL2.2-1. Airspace Associated with Hill AFB

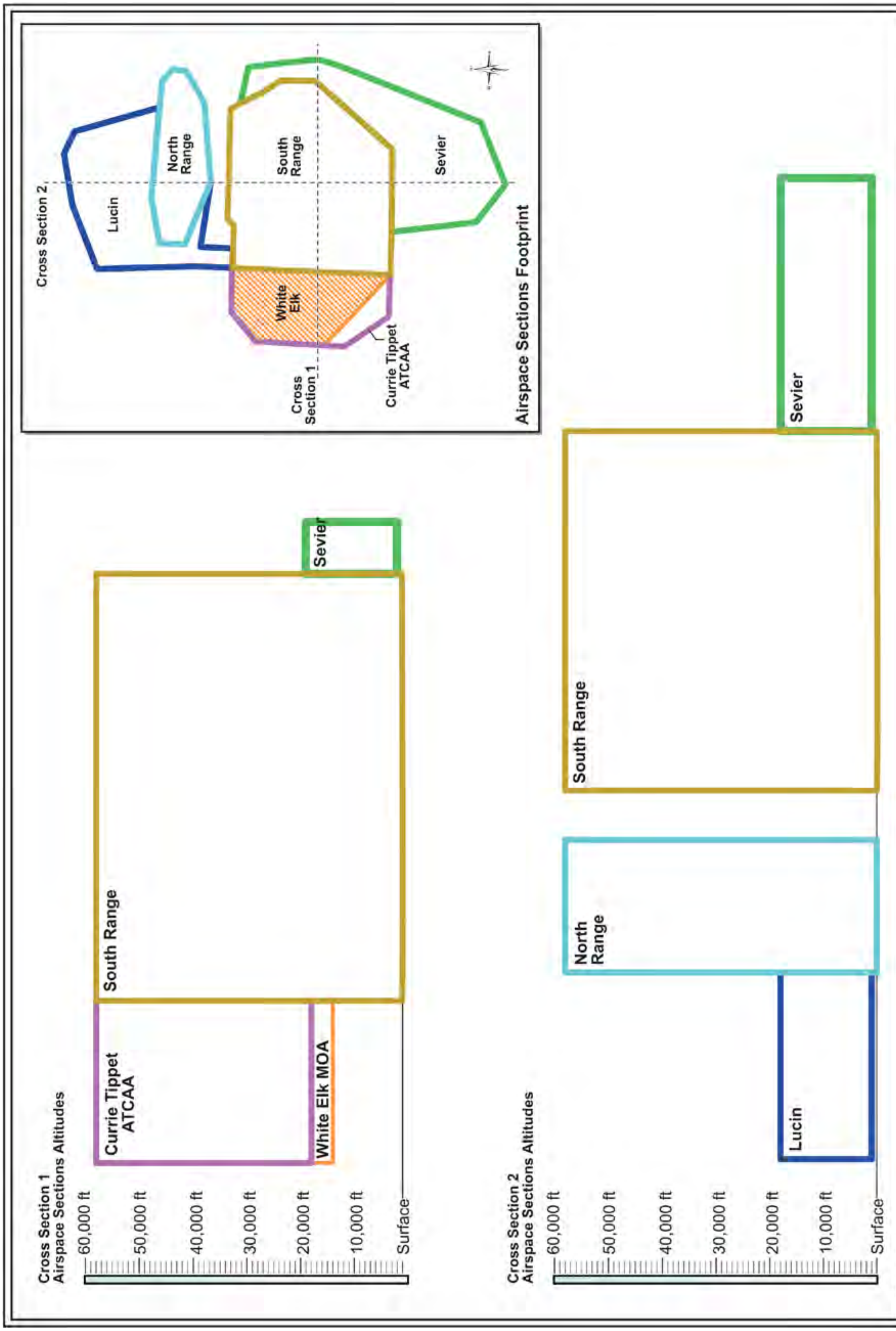


Figure HL2.2-2. Hill AFB Associated Airspace Cross Sections

HL2.2.1 Airspace Use

As the replacement for the F-16 fighter aircraft, the F-35A would conduct the missions and training programs necessary to fulfill its multi-role responsibilities (refer to Chapter 2). The Air Force expects the F-35A would operate in the airspace currently associated with Hill AFB but somewhat differently than the F-16s now using that airspace. These differences would derive from different capabilities and requirements. All F-35A flight activities would take place in currently existing airspace; therefore, no airspace modifications would be required for the F-35A based at Hill AFB.

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

The F-35A would fly more of the time at higher altitudes than the F-16 (Table HL2.2-2) and rarely engage in air-to-air training below 5,000 feet mean sea level (MSL). The F-16s currently operate 70 to 85 percent of the time below 23,000 feet MSL depending upon mission type. In contrast, the F-35A would fly 80 percent of the time above 23,000 feet MSL. The F-16s account for about 83 percent of the training activity at the UTTR. While not generating as many operations, test activities have scheduling priority and can dominate use of the complex. Regardless of the altitude structure and percent use indicated in Table HL2.2-2, F-35 aircraft (as do existing military aircraft) would adhere to all established floors and ceilings of airspace units. For example, the floor of White Elk MOA lies at 14,000 ft MSL, so the F-35A would not fly below that altitude in that airspace unit. Rather pilots would adapt training to this and other airspace units like the Gandy MOA with a lower floor.

Table HL2.2-2. Proposed Action and No-Action Altitude Distribution

Altitude (feet)	***Percentage of Use***		
	F-35A	*F-16*	
	Multi-role	Air-to-Ground	Air-To-Air
500 – 1,000 AGL	2%	15%	5%
1,000 – 5,000 AGL	3%	15%	10%
5,000 – 15,000 MSL	5%	25%	15%
15,000 – 23,000 MSL	10%	30%	40%
>23,000 MSL	80%	15%	30%

Table HL2.2-3 presents historic baseline operations (prior to November 2011) in the UTTR airspace. The information is broken down into total aircraft operations (includes aircraft operating out of Hill AFB and other transient users) and then presents a subset of this information for Hill AFB F-16 aircraft.

Table HL2.2-3. UTTR Baseline Airspace Operations		
Airspace Unit	*Total Baseline*	*F-16 Aircraft Baseline*
North Range	5,073	4,160
Lucin	1,522	1,309
Sevier	761	654
Currie Tippet	548	451
South Range	7,610	6,240
Total[1]	**15,514**	**12,814**

Source: Air Force 2011.
Note:
[1]Totals provided only as a general trend of activity and not directly linked to the number of operations generated from an airfield.

In late 2012, the Federal Aviation Administration (FAA) charted the White Elk MOA west of and adjacent to the South Range (Air Force 2011). This MOA, which extends from 14,000 to 18,000 feet MSL, wholly underlies the Currie Tippet ATCAAs. This new airspace was developed for current F-16 users and not to support any F-35A basing actions. Because this MOA is newly charted, and aircraft have not had the opportunity to generate many operations, the operational data that are applied here were derived from the Proposed White Elk Military Operations Area EIS (Air Force 2011). Operations within the White Elk MOA will occur despite any decisions regarding basing the F-35A so this EIS recognizes this situation to estimate no-action conditions (Table HL2.2-4). The no-action alternative is presented in column two of the table, reflecting expected conditions and serves as the basis for comparison to the proposed action.

Table HL2.2-4. Comparison of ACC Scenarios – Airspace Operations						
Airspace Unit	*Total No-Action Alternative*	*F-16 Aircraft No-Action*	*ACC Scenario*	*F-35A Operations*	*Net Change (Total)*	*Percent Change Total*
North Range	5,073	4,160	1	1,693	-2,467	-49%
			2	3,387	-773	-15%
			3	5,080	+920	+18%
Lucin	1,522	1,248	1	508	-740	-49%
			2	1,016	-232	-15%
			3	1,523	+275	+18%
Sevier	761	624	1	254	-370	-49%
			2	508	-116	-15%
			3	762	+138	+18%
White Elk/Currie Tippet	9,687	9,200	1	253	-8,947	-97%
			2	505	-8,695	-95%
			3	758	-8,442	-92%
South Range	7,610	6,240	1	2,540	-3,700	-49%
			2	5,080	-1,160	-15%
			3	7,620	+1,380	+18
Total[1]	**21,520**	**18,436**	**1**	**5,248**	**-13,188**	**-61%**
			2	**10,496**	**-7,940**	**-37%**
			3	**15,743**	**-2,693**	**-13%**

Source: Air Force 2011.
Note: [1]Totals provided only as a general trend of activity and not directly linked to the number of operations generated from an airfield.

In the table above, projected operations are presented under each of the basing scenarios. ACC Scenario 1 would produce a substantial decrease of about 49 percent in operations in most airspace units, while ACC Scenario 2 would decrease operations by 15 percent from baseline conditions. Overall operations would decrease under each scenario. ACC Scenario 3 would result in an increase of approximately 18 percent for all airspace units except White Elk/Currie Tippet. Under ACC Scenario 1, the F-35As would account for 66 percent of the training operations on UTTR. This percentage would rise to 85 percent (slightly higher than the no-action alternative F-16s) in ACC Scenario 3.

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 training airspace. The percentage of environmental night flying in the airspace would match that defined for the base (i.e., 0.6 percent), this would represent a 0.1 percent increase over baseline rates. For ACC Scenarios 1 and 2, overall decreases in operations would likewise reduce the total number of operations during environmental night. Night operations would decrease by less than 1 per flying day in all scenarios.

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. A subsection of the South Range permits supersonic operations for training; no other areas in UTTR allow such events below 30,000 feet MSL. 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 events lasting no more than 2 to 3 minutes. All supersonic flight would be conducted above 15,000 feet MSL in authorized airspace, with 80 percent occurring above 30,000 feet MSL.

HL2.2.2 Ordnance Use and Defensive Countermeasures

Most air-to-ground training would be simulated, where nothing is released from the aircraft, and target scoring is done electronically. As was discussed in Chapter 2, section 2.1.2, however, the F-35A (like the F-16) is capable of carrying and employing several types of air-to-air and air-to-ground ordnance (including strafing) and pilots would need training in their use. As the Air Force currently envisions, the type and number of ordnance would not differ from that currently employed by the F-16s. F-35A pilots would only use ranges and airspace authorized (i.e., approved and analyzed by DoD [ranges] and charted by the FAA [airspace]) for the type of ordnance being employed and within the number already approved at a range and/or target. If in the future the Air Force identifies weapons systems that are either new or could exceed currently approved levels, appropriate NEPA documentation would need to occur prior to their employment.

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, it is expected to use fewer defensive countermeasures 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 expenditures would match that of the 388 FW and 419 FW F-16s on a per operation basis. Chapter 2, section 2.1.2, provides details on the composition and characteristics of flares.

Flares would be used only in airspace already approved for such use. Current restrictions define the amount or altitude of flare use in the approved special use areas. Under ACC Scenario 3, F-35As would use up to 31,630 flares per year for 72 aircraft. For ACC Scenarios 1 and 2, flare use would be proportionately less. Flare use in ACC Scenarios 1 and 2 would decrease in relation to reduction in aircraft operations for all airspace units. While annual operations would increase slightly under ACC Scenario 3 in all airspace units except White Elk/Currie Tippet, F-35A use would not be expected to exceed total no-action levels. Based on the emphasis on flight at higher altitudes, roughly 90 percent of F-35A 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.

HL2.3 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 a 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.

HL2.4 Permits, Agency Consultations, and Government-to-Government Consultation

Hill AFB operates under agreements with a series of environmental permitting agencies for such resources as air quality, water, and cultural resources.

Permitting. The following section describes the permits that are required to implement any of the three scenarios at this basing alternative location.

- Facilities that discharge stormwater from certain activities (including industrial activities, construction activities, and municipal stormwater collection systems) require Clean Water Act Section 402, National Pollution 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 (USEPA)'s *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the EISA* (December 2009). As applicable, Hill AFB will coordinate with the USEPA, Region VIII and Utah DEQ regarding proposed construction near any Environmental Restoration Program (ERP) sites on base.
- A conformity applicability 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. Because Hill AFB is within an area that is in nonattainment and/or maintenance for several criteria pollutants, a conformity applicability determination was undertaken in this EIS.

- Personnel conducting construction and/or demolition activities will strictly adhere to all applicable occupational safety requirements during construction activities.
- Sampling for asbestos-containing materials (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 is present, Hill AFB 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. Other hazardous waste and material issues and permits will be addressed as needed.

Consultation. In January 2010, initial informal consultation was initiated with the Nevada and Utah State Historic Preservation Offices (SHPOs); however, no responses were received. In August 2012, Section 106 of the National Historic Preservation Act (NHPA) consultation was re-initiated by Hill AFB and letters sent to the two SHPOs requesting concurrence with the Air Force determination of no adverse impacts to the Area of Potential Effect (APE). The Utah and Nevada SHPOs responded that they had no further comments (see Appendix B); consultation completed. Follow-on telephone calls were conducted in April 2013 to ascertain whether the SHPOs concurred with the Air Force conclusion of no adverse effects or had any further comments. The SHPOs indicated they concurred and had no other comments.

Government-to-Government. State and project-specific government-to-government consultation and their status are described below. On November 27, 1999, the Department of Defense (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).

Hill AFB conducted informal government-to-government consultation with 20 American Indian Tribes who could have the potential to be affected by the proposal (see Appendix B for consultation specifics). The letter (sent January 2010 and another in August 2012) requested concurrence with the Air Force determination of no adverse impacts within the APE. Both the Hopi Tribe and Confederated Tribe of the Goshute Indian Reservation provided their concurrence in August 2012. No other correspondence or response has been received from the other American Indian Tribes, despite numerous emails and phone calls throughout the multi-year NEPA process. As such, the Air Force has made the determination that there would be no adverse effects to the APE and therefore, according to 36 CFR 800.4(d)(1) *No historic properties affected*: "If the agency official finds that either there are no historic properties present or there are historic properties present but the undertaking will have no effect upon them as defined in § 800.16(i), the agency official shall provide documentation of this finding, as set forth in § 800.11(d), to the SHPO/THPO. The agency official shall notify all consulting parties, including Indian tribes and Native Hawaiian organizations, and make the documentation available for public inspection prior to approving the undertaking. (i) If the SHPO/THPO, or the Council if it has entered the Section 106 process, does not object within 30 days of receipt of an adequately documented finding, the agency official's responsibilities under Section 106 are fulfilled."

HL2.5 Public and Agency Concerns

HL2.5.1 Scoping

Scoping meetings were conducted January 19 through 22, 2010, in Ogden and Layton, Utah and West Wendover, Nevada. Ninety-three people attended these three scoping meetings.

Due to a severe winter storm and unsafe road conditions, the scoping meeting in Callao was postponed. This decision was made only after consulting with local Callao residents who advised against the travel and who indicated their community would be unlikely to attend due to the weather. Hill AFB was tasked to arrange a smaller meeting, which occurred on February 9, 2010. No issues were raised, and residents asked to be kept informed as the EIS process continues.

The comments that were received from the public and agencies prior to close of the scoping period included 39 letters (2 agencies, 1 American Indian Tribe, 28 elected officials, 2 general public, and 6 organizations). The majority of comments at the scoping meetings expressed enthusiastic support for the beddown of the F-35A and encouraged the Air Force to select Hill AFB as the alternative location. The main concerns raised in a few of the comments were effects of noise and what economic impacts would occur from bringing these aircraft to the area. A detailed comment was submitted expressing concerns about past and on-going encroachment by residential development in the areas affected by noise around the base. The same commentor also provided detailed maps of these developments and indicated support for the proposed action.

During the scoping meetings, people were given the opportunity to ask questions and provide comments on the proposal. Some of the questions included:

- Is the noise output of the F-35A more than the F-16? (see Table HL3.2)
- Why is Hill AFB preferred over the other bases? (see Chapter 2.2.4)
- Does the Air Force have an idea of the number of alternatives they'll analyze? (see Chapter 2.2)
- How many F-35As will the Air Force eventually get? (see Chapter 1.2)
- Are you going to let us know the noise abatement and changes in zoning that may occur? (see HL2.1.2 for avoidance procedures and 3.10.1.1 for zoning changes)
- Will changes to flight patterns result due to beddown of the F-35As at Hill AFB? (see Section HL2.1.2)
- Will F-35A beddown require a change in ordnance being flown from Hill AFB? (see Chapter 2, Section 2.1.2)
- When will Air Force incorporate actual noise data from a production engine? (see Chapter 3.3)

- Will there be an increase in night operations because of the F-35A's multi-role capabilities? (see Section HL2.2.1)
- What is the manpower requirement for the F-16 squadrons? (see Table HL2.1-3)
- Will this aircraft change the crash-zones from those currently existing? (see Section HL3.10.1.1)
- Will fuel be jettisoned in flight? (see Sections HL3.4.1.1 and HL3.4.1.2)
- How much revenue will the F-35A generate in Ogden, Utah? (see Section HL3.11.1.2)

HL2.5.2 Draft EIS Public Comment Period

Official notification of the F-35A Operational Basing Draft EIS public comment period began with the Notice of Availability (NOA) announcement on April 13, 2012 in the *Federal Register*. This marked the start of the 45-day review period which would end on June 1, 2012; however, the Air Force was requested to hold another hearing the first week of June. As a result, the public comment period was extended 19 more days to June 20, 2012. A notice was placed in the *Federal Register* on May 23, 2012 announcing this extension.

During the week of May 1, 2012, three hearings were held in Layton and Ogden, Utah and Wendover, Nevada. A total of 102 people attended the hearings with 43 oral comments presented and 3 written comments received. Both the oral and written comments expressed general support for the basing action at Hill AFB. As was mentioned in Chapter 1, during the 64-day comment period, a total of 934 written comments were received, of which only two were associated with the Hill AFB alternative and both were in support of basing the F-35As at Hill AFB. No other issues were identified.

HL2.5.3 Revised Draft EIS Public Comment Period

The 45-day public comment period for the Revised Draft EIS began on May 31, 2013 when the NOA was published in the *Federal Register* (Appendix A). The Revised Draft EIS was circulated for review and comment to government agencies, local organizations, American Indian tribes, interested private citizens, and public libraries. Copies of the Revised Draft EIS were delivered by May 31, 2013 to 35 libraries and the entire two-volume document was posted on the Air Force website at www.accplanning.org for viewing electronically. On the same day (or as soon as possible given publication deadlines) as the NOA appeared in the *Federal Register*, the Air Force announced the availability of the Revised Draft EIS NOA in over 20 local newspapers.

There were 11,172 comments received in letter, note, email, and postcard format during the 45-day public comment period. Of these, 823 were in letter, handwritten note, and email format and 10,349 were postcard format. Only two of the 823 comments were associated with the basing action at Hill AFB: one that expressed support and one that was in opposition to basing F-35As at Hill AFB.

HL2.6 Differences Between the Draft EIS and the Final EIS

Following the Draft EIS, a Revised Draft EIS was published which included factual corrections, additional and/or supplemental information, and improvements or modifications to the analyses presented in the Draft EIS. The re-analysis included noise impacts to low-income and minority populations based on updated census data (not available when the 2012 Draft EIS was published) in the noise section (HL3.2) and environmental justice/protection of children (HL3.12); inserting documents incorporated by reference (HL2.7); adding mitigation measures (HL2.8); correcting typographical and grammatical errors, as needed; correcting mapping and labeling mistakes in text and figures throughout; inserting new or revised information, where applicable; and including responses to comments received during the Draft EIS public review period in Volume II, Appendix E.

In this Final EIS, several changes were made and include the following:

- In Chapter 3, Section 3.5, Figure 3-2 was revised to correctly portray the DoD clear zone as a square and Table 3-5 was added with F-16 and F-15 historic mishap data.
- Where applicable, Section HL2.4 and Appendix B were updated to reflect current status of agency and government-to-government consultations.
- Throughout the document, corrected typographical and grammatical errors in the text.
- Responded to Revised Draft EIS comments in Volume II, updated Appendix E.

HL2.7 Documents Incorporated by Reference

In accordance with CEQ regulations for implementing NEPA and with the intent of reducing the size of this document, the following material relevant to the proposed action at the alternative locations and basing scenarios is incorporated by reference and identified according to the alternative location. These documents are part of the administrative record and are available upon request.

Sustainable Ranges Report to Congress, Department of Defense (DoD 2012). Report published in April 2012. A report to Congress on the sustainability of all DoD ranges describing the training requirements and the existing range resources to meet these requirements.

Proposed White Elk Military Operations Area Final EIS (Air Force 2011a). Published in April 2011. Document presenting modifications to airspace associated with Utah Test and Training Range (UTTR) and aircraft operations. Airspace includes the Restricted Airspace: R-6402A/B, R-6404A/B/C/D, R-6406A/B, Lucin A/B/C MOAs, Sevier A/B/C MOAs, Gandy MOA, Gandy Air Traffic Control Assigned Airspace (ATCAA), and Currie/Tippet ATCAA. Ranges include UTTR North and South.

F-35 Follow-On Development Evaluation and Weapons School Beddown (Air Force 2011b). Final EIS published April 2011. Documentation presenting aircraft operations in MOAs/ATCAAs/ Restricted Airspace and air-to-ground range activities within Nevada Test and Training Range (NTTR).

Provide Additional Capabilities at the UTTR EA (Air Force 2007). Published in April 2007. Documentation of aircraft operations in UTTR associated airspace and range activities.

Proposed Multiple Target TS-5, UTTR-South Final EA (Air Force 2000a). Published in February 2000. Documentation associated with UTTR range activities.

Cruise Missile Test Operations at the Utah Test and Training Range Final EA (Air Force 2000b). Published in September 2000. Documentation associated with UTTR range activities.

Renewal of the Nellis Air Force Range Land Withdrawal Legislative Final EIS (Air Force 1999a). Published in March 1999. Documentation presenting aircraft operations in MOAs/ATCAAs/Restricted Airspace, air-to-ground range activities, range maintenance, and ground-based operations.

Noise and Supersonic Effects at the Utah Test and Training Final EA (Air Force 1999b). Published in November 1999. Documentation associated with aircraft operations in UTTR associated airspace.

HL2.8 Mitigation Measures

No other extra-ordinary mitigation measures are required beyond those prescribed under existing federal and state laws, regulations, and permit requirements. Refer to Chapter 2, section 2.6.1 for a description of measures being adopted, as best management practices and management actions, to minimize and/or avoid adverse impacts.

HL3.0 HILL AFB AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

HL3.1 Airspace Management and Use

HL3.1.1 Base

HL3.1.1.1 Affected Environment

Hill AFB is located in northern Utah approximately 25 miles north of Salt Lake City. A number of communities surround Hill AFB with Ogden to the north and Layton south of the base. Currently, the 388 FW and the 419 FW, fly a total of 48 F-16 aircraft in support of their mission for the Air Force. These units average 260 flying days per year.

A baseline total of 34,032 operations are annually conducted in the base air traffic environment by the two F-16 wings, and with transient aircraft the local airfield baseline supports a total of 46,633 operations. Terminal airspace currently supporting operations at Hill AFB also includes a larger airspace encompassing Hill AFB and seven airports within 35 nautical miles (nm) of the base. The Hill AFB Radar Control Facility sequences and separates military air traffic within this larger airspace. All military aircraft using this airspace must maintain communication with Hill AFB Radar Control Facility (Clover Control), employ a transponder that allows precise radar tracking by Clover Control, and have altitude-reporting equipment.

The F-16 traffic out of Hill AFB follows procedural separation by flying above light, civil traffic and below Salt Lake International Airport commercial traffic. Recently updated departure routes, developed to accommodate a new runway, provide an increased safety buffer zone between military aircraft and Salt Lake City aircraft, and offer additional departure route flexibility. These routes ensure the safe passage of military, civilian, and commercial aircraft in this airspace environment. For many decades, aircraft based at Hill AFB have flown in this airspace environment. No comments were received during the public scoping period revealing conflict with civil or commercial aviation.

HL3.1.1.2 Environmental Consequences

Beddown of 24, 48, or 72 F-35A operational aircraft at Hill AFB would not affect airspace use or management in the base air traffic environment and vicinity. Eventual replacement of F-16 aircraft at Hill AFB would result in a net loss of 24 aircraft under ACC Scenario 1, no net loss of aircraft assigned under ACC Scenario 2, and an increase of 24 based aircraft under ACC Scenario 3. Airfield operations would decrease by a respective 50.1 percent, 27.2 percent, and 4.4 percent (Table HL3.1-1). No changes would be required to the Hill AFB terminal airspace or the base arrival and departure procedures to accommodate the F-35A aircraft performance or operations. The number of average annual flying days (i.e., 260) would not change. Therefore, effects on airspace use in the local air traffic environment would be unnoticeable.

Table HL3.1-1. Comparison of ACC Scenarios – Airfield Operations

Aircraft	*Baseline*	*ACC Scenario 1*	*ACC Scenario 2*	*ACC Scenario 3*
Based F-16	34,032	0	0	0
Transients[1]	12,601	12,601	12,601	12,601
F-35A	-	10,667	21,334	32,001
Total	**46,633**	**23,268**	**33,935**	**44,602**
Percent Change from Baseline	**-**	**-50.1%**	**-27.2%**	**-4.4%**

Source: Wyle 2011.
Note: [1]Includes F-15C, KC-135, C-21, A-10, and others.

HL3.1.2 Airspace

HL3.1.2.1 Affected Environment

The affected airspace for Hill AFB consists of the UTTR, as divided into the North and South Ranges. Airspace units within these ranges include Gandy, Lucin, Sevier, White Elk MOA, R-6402, R-6404, R-6405, R-6406, and R-6407, as well as the Currie/Tippet ATCAA, Gandy ATCAA, and Lucin ALTRV (refer to Table HL2.2-1 and Figure HL2.2-1). UTTR receives considerable use for testing activities which can dominate scheduling. When used for training, these airspace units receive 83 percent of their use by F-16s based at Hill AFB. In total, the F-16s fly over 18,500 operations annually in these airspace units for air-to-air training, ordnance delivery missions, and exercises.

No low-altitude civil routes (called Victor routes) transit the UTTR. Only one high level jet route, J56, bisects the UTTR southern Restricted Areas and Tippet ATCAA, but aircraft on the route are under positive air traffic control at altitudes above 18,000 feet MSL. Commercial aircraft activity in Utah has increased recently and is expected to continue to grow over the next 20 years as the population of the state also increases. Most of this present and anticipated growth would occur at the Salt Lake and Ogden airports. No civilian airports reside under the UTTR airspace, although two private airstrips underlie the Lucin MOAs and may be used occasionally.

As noted in Chapter 2, section 2.1.2, F-35A aircraft would not use military training routes, either to access the special use airspace or conduct training. Due to their predominantly higher altitude missions, advanced electronics, and speed, the F-35As would use MOAs, ATCAAs, and Restricted Areas.

HL3.1.2.2 Environmental Consequences

Selection of Hill AFB as an F-35A beddown alternative would not result in impacts to airspace use and management within this region. None of the three beddown scenarios would require changes to the current configuration of the MOAs, ATCAAs, and Restricted Areas considered for F-35A use, nor would any of the scenarios alter the normal scheduled times for use of UTTR airspace. The incremental replacement of F-16 operations by the F-35A would generally result in a decrease in the amount of activity in the airspace units identified under ACC Scenarios 1 (-49 percent) and 2 (-15 percent) (see Table HL2.2-3). Decreases in use of the White Elk/Currie Tippet would range from -82 to -90 percent. ACC Scenario 3 would increase operations in the UTTR airspace by an average of 18 percent. Such an increase would translate into about 10 more operations per flying days dispersed throughout the expansive airspace units. Therefore, with decreases or only minor increases in use, no impacts in airspace use and management would be expected.

Civil and general aviation traffic on J56 would not be impacted by F-35A training aircraft within the UTTR. Military traffic within the ATCAA and civilian traffic on J56 would both be under radar control in Class A airspace and would be routed to avoid conflicts. FAA data from a heavy traffic flow day (a mid-summer Thursday) indicates only one aircraft filed J56 for the 24-hour period analyzed and no aircraft filed the route on two other days analyzed (FAA 2010). Radio equipped civil or general aviation traffic flying Visual Flight Rule through the UTTR can contact Clover Control for advisory service when transiting the MOAs. Additionally, Hill AFB operations/airspace representatives provide periodic briefings to civil aviation pilots in the area on military aircraft operations as part of the on-going Midair Collision Avoidance Program.

Close coordination of scheduling and use of the airspace between the Hill AFB scheduling offices and the Salt Lake City Air Route Traffic Control Center would continue to ensure safe air traffic operations throughout this region. Therefore, other air traffic traveling near these airspace units would not conflict with military flight activities. In addition, the F-35A would conduct a greater percentage of training at higher altitudes than the F-16. Since the proposed beddown basically represents a continuation of current activities although at higher altitude, no adverse impacts on airspace use and management would be expected.

HL3.2 Noise

This section describes the noise environment under baseline conditions and then presents the potential impacts that could occur under the three scenarios. For purposes of this EIS, the noise environment at Hill AFB was modeled using NOISEMAP. The Air Force uses 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 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. Specific detailed information on supplemental metrics (e.g., annoyance) is presented in Appendix C.

Both Sound Exposure Level (SEL) and Maximum Sound Level (L_{max}) metrics would apply to any beddown scenario. As shown in Table HL3.2-1, the SEL and L_{max} noise levels reflect conditions specific to flight activity at Hill AFB, 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 F-16 aircraft it is replacing.

Table HL3.2-1. SEL and L_{max} Comparison for Hill AFB

Condition	***Based F-16C[1, 2]***				***F-35A[2, 3]***			
	SEL (dBA)	*L_{max} (dBA)*	*Power (%NC)*	*Speed (kts)*	*SEL (dBA)*	*L_{max} (dBA)*	*Power (%ETR)*	*Speed (kts)*
Afterburner Assisted Take-off[4] (1,000 feet AGL)	**95**	**89**	92%	300	**116**	**114**	100%	300
Military Power Take-off (1,000 feet AGL)	**95**	**89**	92%	300	**116**	**114**	100%	300
Departure Holddown (6.500 MSL; 1,710 AGL)	**87**	**80**	90%	350	**93**	**89**	40%	350
Arrival (non-break, through 1,000 feet AGL, gear down)[5]	**97**	**89**	92%	200	**99**	**95**	40%	180
Overhead Break (downwind leg, 2,000 feet AGL, gear down)	**91**	**81**	92%	200	**93**	**87**	40%	200
Touch and Go (downwind leg, 2,000 feet AGL, gear down)	**90**	**81**	92%	250	**93**	**87**	40%	210
Re-entry Pattern (downwind leg, 2,000 feet AGL, gear up)	**80**	**74**	87%	300	**84**	**78**	30%	300
Radar Pattern (downwind leg, 2,000 feet AGL, gear up)	**81**	**74**	87%	250	**84**	**78**	30%	250

Hill AFB nominal elevation = 4,789 feet MSL; Weather: 40°F, 70% Relative Humidity; and SEL = Sound Exposure Level; L_{max} = Maximum (instantaneous) Sound Level; dBA = A-weighted decibel; NC=Engine Core revolutions per minute; kts = knots; ETR = Engine thrust request.
Notes: All numbers are rounded.
[1]Modeled F-16C with F110-GE-100 engine.
[2]90 percent of all F-16 departures utilize afterburners, whereas only 5 percent of F-35 departures would utilize afterburner.
[3]Modeled with reference acoustic data for an F-35A (Air Force 2009c).
[4]Power reduced from afterburner to military power prior to reaching 1,000 feet AGL.
[5]F-16C values reflect gear up condition.

HL3.2.1 Base

HL3.2.1.1 Affected Environment

The data used for baseline noise conditions were derived from the 1999 AICUZ (Air Force 1999c) study and data updated and verified by the 388 FW and 419 FW in 2010. Under baseline, there were 46,633 airfield operations flown annually at Hill AFB. This total includes 34,032 operations generated by the 388 FW and 419 FW F-16s and an additional 12,601 operations conducted by transient, military, as well as civilian and commercial aircraft (refer to Table HL3.1-1). Under baseline conditions, 46,440 operations occur during environmental daytime hours (i.e., 7:00 a.m. and 10:00 p.m.) and there were 193 operations generated at environmental nighttime (or between 10:00 p.m. to 7:00 a.m.). A 10-decibel (dB) penalty is applied to F-16 operations occurring during environmental nighttime hours (refer to Chapter 3.3 and Appendix C for more detailed resource definition and methodology used to evaluate impacts).

Noise Exposure

Figure HL3.2-1 shows the 65 to 85 dB day-night average sound level (DNL) contour bands, in 5-dB increments, for Hill AFB baseline conditions. Table HL3.2-2 presents noise exposure within each dB DNL contour band for off-base acreage, population, housing units, and representative receptors.

Representative receptors include on- and off-base places of worship, schools, child care facilities, hospitals, and residential locations potentially within areas affected by aircraft noise of 65 dB DNL and 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 2010b). Generally, to determine the population counts by contour band, this analysis uses U.S. Census block groups (from the American Community Survey, 5-year estimates) and assumes an even distribution of population within each block group under the respective contour band (U.S. Census Bureau 2010b). Adopting this methodology gives a good estimate (i.e., more conservative) of the number of people who may be exposed to noise levels within the noise contour band. Where there are low or inconsistent population densities, actual houses were counted using aerial photographs (Google Earth February 2013) and using the U.S. Census population multiplier for Davis County of 3.3 people per household and 2.95 for Weber County.

Table HL3.2-2. Off-Base Noise Exposure within Baseline Contours at Hill AFB

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*	*Receptors*[2]
65 – 70	1,962	6,045	2,227	12
70 – 75	343	1,289	420	3
75 – 80	14	379	114	0
80 – 85	0	0	0	0
85+	0	0	0	0
Total	**2,319**	**7,713**	**2,761**	**15**

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]A portion of these receptors are on-base; refer to Figure HL3.2-1.

Arrivals of transient EA-6B and based F-16 operations dominate the DNL to the north of the base with the two virtually detached DNL lobes north of the base due to Runway 14 arrivals and topographical effects. Transient B-1 and based F-16 departures from Runway 14 dominate the DNL to the south of the base.

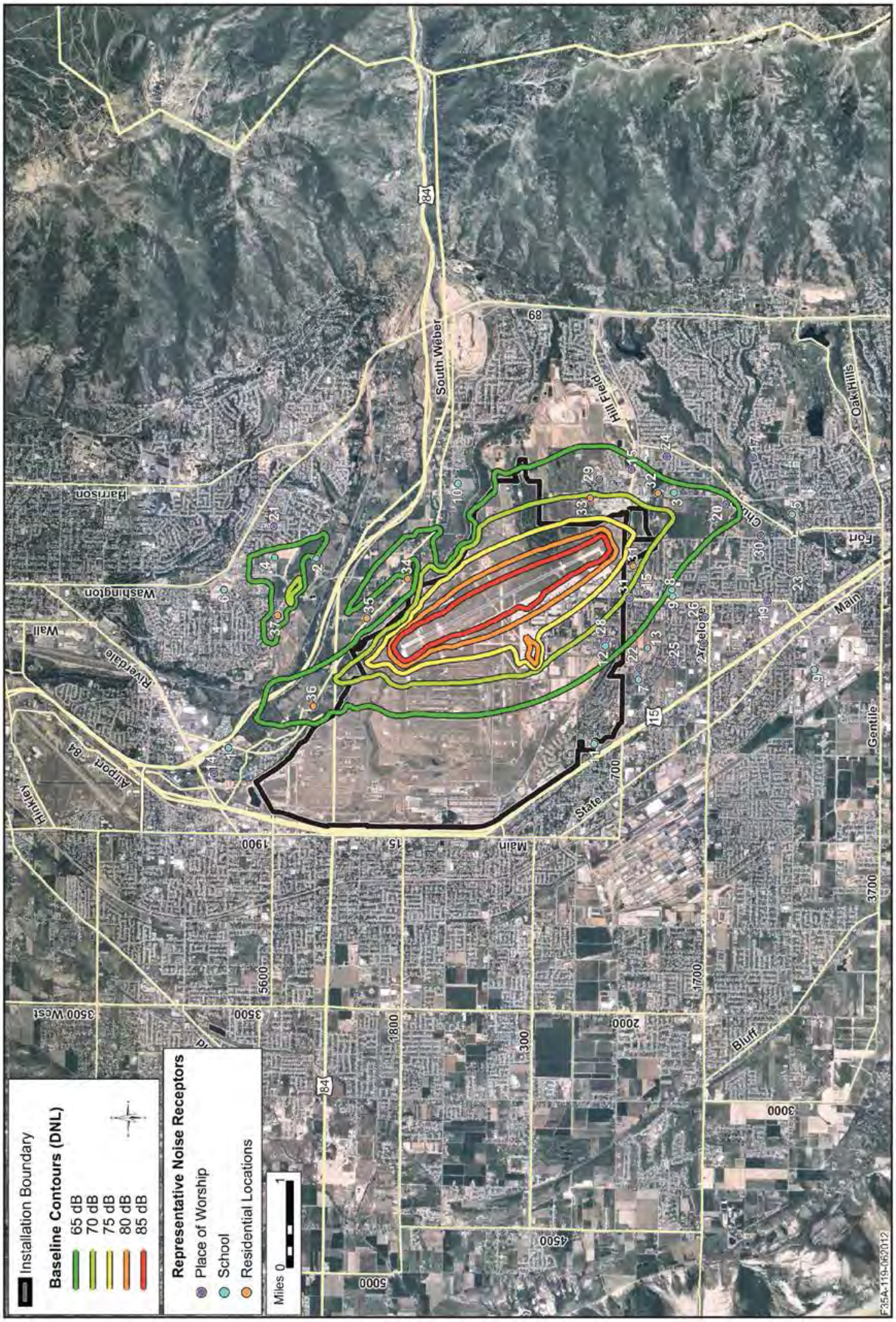


Figure HL3.2-1. Baseline Noise Conditions at Hill AFB

In total, exposure to noise levels within contour bands of 65 dB DNL and greater include an estimated 2,319 acres, 7,713 people, and 2,761 households. Affected representative receptors include four schools, six places of worship, and five residential areas (three of which lie within the 70 to 75 dB DNL contour). One school (#12) and a chapel (#28) are on Hill AFB. Twenty-two representative receptors are within areas subject to noise levels less than 65 dB DNL. Table HL3.2-3 presents baseline decibel levels for representative receptors on or near Hill AFB.

Table HL3.2-3. Baseline Decibel Levels at Representative Locations on and near Hill AFB

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
1	Christian Heritage School	School	<65
2	Evergreen Montessori	School	<65
3	Faith Baptist Church Academy	School	66
4	H Guy Child Elementary School	School	67
5	King Elementary School	School	<65
6	La Petite Academy	School	<65
7	North Davis Junior High	School	<65
8	North Ridge Seminary	School	65
9	Northridge High School	School	<65
10	South Weber Elementary	School	<65
11	Hill Field School[1]	School	<65
12	Child Care Center[1]	School	67
13	Weber State University	School	<65
14	Alpine Church	Worship	<65
15	Alpine Community Church	Worship	67
16	Bethany Korean Baptist Church	Worship	66
17	Church of Jesus Christ of LDS	Worship	<65
18	Hillfield Catholic Chapel	Worship	69
19	Layton Hills Baptist Church	Worship	<65
20	Light of the Valley Lutheran Church	Worship	66
21	The Church of Jesus Christ of LDS: Branch for the Deaf	Worship	<65
22	The Church of Jesus Christ of LDS: Layton Wsue Institute	Worship	<65
23	The Church of Jesus Christ of LDS: Summerfield	Worship	<65
24	The Church of Jesus Christ of LDS: Twenty-Eight	Worship	<65
25	The Church of Jesus Christ of LDS	Worship	<65
26	The Church of Jesus Christ of LDS: Fairfield	Worship	<65
27	Grace Chapel of Utah	Worship	<65
28	Chapel[1]	Worship	67
29	The Church of Jesus Christ of LDS: Layton Morgan	Worship	68
30	Church of Jesus Christ of LDS	Worship	<65
31	Sunrise Drive/Hillgate Way	Residential	72
32	North Fairfield/Love Lane	Residential	68
33	North Fairfield/East 3400 North	Residential	71
34	East South Weber Drive/South Canyon Meadows Drive	Residential	<65
35	West South Weber Drive/East 6650 South	Residential	<65
36	West South Weber Drive	Residential	67
37	East 5600 South/5150 East	Residential	70

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Located on Hill AFB.

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 where L_{max} would be greater than or equal to 65 dB and 75 dB. Table HL3.2-4, which presents indoor speech interference under baseline, reveals that events per hour average 3.6 for windows closed and 4.4 for windows open.

Table HL3.2-4. Baseline Indoor Speech Interference at Representative Locations on and near Hill AFB

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*
14	Alpine Church	3	6
15	Alpine Community Church	4	4
16	Bethany Korean Baptist Church	4	4
17	Church of Jesus Christ of LDS	3	4
18	Hillfield Catholic Chapel	4	4
19	Layton Hills Baptist Church	2	4
20	Light of the Valley Lutheran Church	4	4
21	The Church of Jesus Christ of LDS: Branch for the Deaf	2	4
22	The Church of Jesus Christ of LDS: Layton Wsue Institute	3	4
23	The Church of Jesus Christ of LDS: Summerfield	2	4
24	The Church of Jesus Christ of LDS: Twenty-Eight	4	4
25	The Church of Jesus Christ of LDS	2	4
26	The Church of Jesus Christ of LDS: Fairfield	2	4
27	Grace Chapel of Utah	2	4
28	Chapel[2]	4	4
29	The Church of Jesus Christ of LDS: Layton Morgan	4	4
30	Church of Jesus Christ of LDS	3	4
31	Sunrise Drive/Hillgate Way	4	4
32	North Fairfield/Love Lane	4	4
33	North Fairfield/East 3400 North	4	4
34	East South Weber Drive/South Canyon Meadows Drive	1	5
35	West South Weber Drive/East 6650 South	2	6
36	West South Weber Drive	4	6
37	East 5600 South/5150 East	5	6

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Located on Hill AFB.

Classroom Speech Interference

Because of the nature of activities in schools, different speech interference criteria are used. For schools, two additional classroom criteria have to be applied to evaluate if speech interference would inhibit classroom learning. When considering intermittent noise caused by aircraft overflights, guidelines for classroom interference indicate that an appropriate criterion is a limit on indoor background equivalent noise levels of 35 to 40 dB (equivalent noise level [L_{eq}]) and a limit on single events of 50 dB L_{max}. The 50 dB L_{max} for single events equates to outdoor L_{max} of 65 dB and 75 dB for windows open and closed, respectively. Thus the number of annual average daily events whose L_{max} would be greater than or equal to 65 dB and 75 dB serve as the measure of potential classroom effects and are presented as NA65 L_{max} and NA75L_{max} for windows open and closed, respectively, on a per-hour basis. Because classrooms are in use during the day predominantly, these criteria are applied for aircraft operations occurring between 8:00 a.m. and 4:00 p.m. rather than between 7:00 a.m. and 10:00 p.m. for standard speech interference. Table HL3.2-5 presents the baseline classroom levels for the school receptors. Eleven of the thirteen schools, including those on Hill AFB, are exposed to noise that exceeds the outdoor equivalent noise level of 60 dB L_{eq} over an 8-hour period.

Table HL3.2-5. Baseline Classroom Speech Interference for Schools on or near Hill AFB

Location ID Number	*Receptor*	*Outdoor Equivalent Noise Level (L_{eq})*	*Number of Events Above a Maximum Outdoor Noise Level of 75 dB (NA75L_{max})*[1]	
			Windows Closed	*Windows Open*
1	Christian Heritage School	66	7	12
2	Evergreen Montessori	64	5	10
3	Faith Baptist Church Academy	70	8	8
4	H Guy Child Elementary School	71	4	10
5	King Elementary School	65	5	8
6	La Petite Academy	59	3	9
7	North Davis Junior High	65	4	8
8	North Ridge Seminary	68	7	8
9	Northridge High School	58	1	5
10	South Weber Elementary	60	1	6
11	Hill Field School[2]	62	3	7
12	Child Care Center[2]	70	7	8
13	Weber State University	66	7	8

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Located on Hill AFB.

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 HL3.2-6 lists the probabilities of indoor awakening from average daily nighttime (10:00 p.m. to 7:00 a.m.) events for the same representative residential locations, with probability of awakening ranging between 1 and 2 percent for windows open and averaging 1 percent for windows closed.

Table HL3.2-6. Baseline Indoor Sleep Disturbance at Representative Locations on and near Hill AFB

Location ID Number	*Receptor*	*Average Nightly (10:00 p.m. to 7:00 a.m.) Probability of Awakening (%)[1]*	
		Windows Closed	*Windows Open*
31	Sunrise Drive/Hillgate Way	1%	1%
32	North Fairfield/Love Lane	1%	1%
33	North Fairfield/East 3400 North	1%	1%
34	East South Weber Drive/South Canyon Meadows Drive	1%	1%
35	West South Weber Drive/East 6650 South	1%	1%
36	West South Weber Drive	1%	2%
37	East 5600 South/5150 East	1%	2%

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Under baseline conditions, less than 0.5 percent of the F-16 aircraft operations occur between 10:00 p.m. and 7:00 a.m. and representative locations currently experience 196 annual potential sleep disturbance events with 1 to 2 percent probability of awakening.

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 Hill AFB that are exposed to contour bands of 80 dB DNL and greater, so PHL does not apply to baseline conditions.

Occupational Noise

Current 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 Hill AFB. 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 analyses.

HL3.2.1.2 Environmental Consequences

ACC Scenario 1

Noise Exposure

ACC Scenario 1 involves beddown of 24 F-35A aircraft at Hill AFB and drawdown of 48 F-16s. Proposed F-35A flight operations would total 10,667 annually. About two-thirds of these proposed operations would consist of departures and arrivals; the remaining one-third would involve pattern work in the vicinity of the airfield. Annual F-35A flight operations generated by the 388 FW and 419 FW, when added to transient military, commercial, and civilian aircraft (12,601 operations), would total approximately 23,368, a 50-percent decrease from baseline. Figure HL3.2-2 shows the 65 to 85 dB DNL contour bands, in 5-dB increments, resulting from Hill AFB ACC Scenario 1. Baseline contours are also presented for comparison purposes. Table HL3.2-7 presents the noise exposure in terms of estimated off-base acreage, population, households, and on- and off-base representative receptors within each DNL contour band. When compared to baseline conditions, ACC Scenario 1 noise levels of 65 dB DNL and greater would decrease and affect: 1,166 fewer acres; 3,765 less people; 1,380 less households; and 9 fewer representative receptors.

Table HL3.2-7. Off-Base Noise Exposure under ACC Scenario 1 for Hill AFB Proposed/Baseline

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*	*Receptors*[2]
65 – 70	1,004/1,962	2,952/6,045	1,072/2,227	5/12
70 – 75	148/343	939/1,289	292/420	1/3
75 – 80	1/14	57/379	17/114	0/0
80 – 85	0/0	0/0	0/0	0/0
85+	0/0	0/0	0/0	0/0
Total	**1,153/2,319**	**3,948/7,713**	**1,381/2,761**	**6/15**

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]A portion of these receptors are on-base; refer to Figure HL3.2-2.

Overall, the DNL contours would decrease relative to the baseline conditions by 1 to 5 dB. The most noticeable off-base reductions would be northeast of the base and south of the base. The lobes adjacent to the interstate from the baseline would almost totally disappear with only a small remnant of 65 dB DNL north of the interstate. The F-35A would generate approximately 68 percent less equivalent annual flight operations[1] than the F-16s. With 48 F-16 aircraft eliminated, transient EA-6B operations and base F-35A arrivals to Runway 14 would dominate the DNL exposure north of the base. Transient B-1 and based F-35A departures from Runway 14 would dominate the DNL exposure south of the base.

[1] Equivalent annual flight operations equal daytime (7:00 a.m. to 10:00 p.m.) flight operations plus ten times the nighttime (10:00 p.m. to 7:00 a.m.) flight operations.

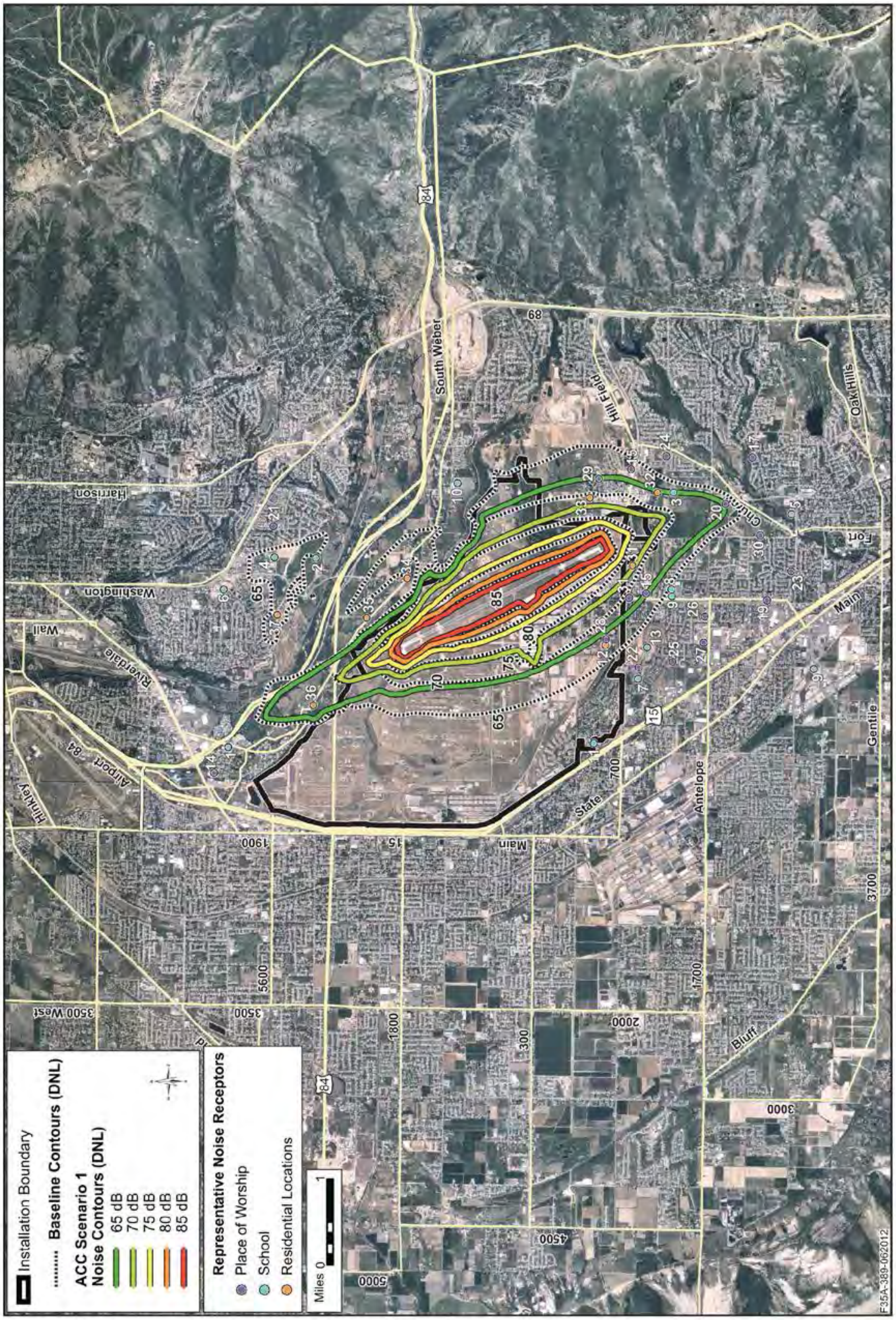


Figure HL3.2-2. ACC Scenario 1 Proposed Noise Contour Bands at Hill AFB

Decibel levels for representative locations of representative receptors near Hill AFB are provided in Table HL3.2-8. Under ACC Scenario 1, all receptors would experience a decrease in exposure to noise levels. A total of 27 receptors would experience noise levels of less than 65 dB DNL and three residential receptors (#31, #33, and #37) would experience negligible decreases in noise levels between 1 and 4 dB DNL.

Table HL3.2-8. Decibel Levels under ACC Scenario 1 at Representative Locations near Hill AFB Projected/Baseline

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
1	Christian Heritage School	School	<65/<65
2	Evergreen Montessori	School	<65/<65
3	Faith Baptist Church Academy	School	65/66
4	H Guy Child Elementary School	School	<65/67
5	King Elementary School	School	<65/<65
6	La Petite Academy	School	<65/<65
7	North Davis Junior High	School	<65/<65
8	North Ridge Seminary	School	<65/65
9	Northridge High School	School	<65/<65
10	South Weber Elementary	School	<65/<65
11	Hill Field School[1]	School	<65/<65
12	Child Care Center[1]	School	<65/67
13	Weber State University	School	<65/<65
14	Alpine Church	Worship	<65/<65
15	Alpine Community Church	Worship	65/67
16	Bethany Korean Baptist Church	Worship	<65/66
17	Church of Jesus Christ of LDS	Worship	<65/<65
18	Hillfield Catholic Chapel	Worship	67/69
19	Layton Hills Baptist Church	Worship	<65/<65
20	Light of the Valley Lutheran Church	Worship	65/66
21	The Church of Jesus Christ of LDS: Branch for the Deaf	Worship	<65/<65
22	The Church of Jesus Christ of LDS: Layton Wsue Institute	Worship	<65/<65
23	The Church of Jesus Christ of LDS: Summerfield	Worship	<65/<65
24	The Church of Jesus Christ of LDS: Twenty-Eight	Worship	<65/<65
25	The Church of Jesus Christ of LDS	Worship	<65/<65
26	The Church of Jesus Christ of LDS: Fairfield	Worship	<65/<65
27	Grace Chapel of Utah	Worship	<65/<65
28	Chapel[1]	Worship	<65/67
29	The Church of Jesus Christ of LDS: Layton Morgan	Worship	65/68
30	Church of Jesus Christ of LDS	Worship	<65/<65
31	Sunrise Drive/Hillgate Way	Residential	71/72
32	North Fairfield/Love Lane	Residential	66/68
33	North Fairfield/East 3400 North	Residential	69/71
34	East South Weber Drive/South Canyon Meadows Drive	Residential	<65/<65
35	West South Weber Drive/East 6650 South	Residential	<65/<65
36	West South Weber Drive	Residential	66/67
37	East 5600 South/5150 East	Residential	66/70

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Located on Hill AFB.

Speech Interference

Table HL3.2-9 enumerates the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour for receptors that generally would experience indoor maximum sound levels of at least 50 dB with windows closed and open. Under this scenario, the mean number of speech interfering events across all receptors would be 2.3 and 3.1 per hour for windows closed and open, respectively, with an average decrease of 2 or less events per hour relative to baseline.

Table HL3.2-9. ACC Scenario 1 Indoor Speech Interference at Representative Locations at Hill AFB

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
14	Alpine Church	2	4	-1	-2
15	Alpine Community Church	2	3	-2	-1
16	Bethany Korean Baptist Church	2	3	-2	-1
17	Church of Jesus Christ of LDS	2	3	-1	-1
18	Hillfield Catholic Chapel	3	3	-1	-1
19	Layton Hills Baptist Church	2	3	0	-1
20	Light of the Valley Lutheran Church	2	3	-2	-1
21	The Church of Jesus Christ of LDS: Branch for the Deaf	2	3	0	-1
22	The Church of Jesus Christ of LDS: Layton Wsue Institute	2	3	-1	-1
23	The Church of Jesus Christ of LDS: Summerfield	2	2	0	-2
24	The Church of Jesus Christ of LDS: Twenty-Eight	2	3	-2	-1
25	The Church of Jesus Christ of LDS	2	3	0	-1
26	The Church of Jesus Christ of LDS: Fairfield	2	3	0	-1
27	Grace Chapel of Utah	2	3	0	-1
28	Chapel[2]	2	3	-2	-1
29	The Church of Jesus Christ of LDS: Layton Morgan	2	3	-2	-1
30	Church of Jesus Christ of LDS	2	3	-1	-1
31	Sunrise Drive/Hillgate Way	3	3	-1	-1
32	North Fairfield/Love Lane	3	3	-1	-1
33	North Fairfield/East 3400 North	3	3	-1	-1
34	East South Weber Drive/South Canyon Meadows Drive	1	3	0	-2
35	West South Weber Drive/East 6650 South	3	4	+1	-2
36	West South Weber Drive	4	4	0	-2
37	East 5600 South/5150 East	3	3	-2	-3

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Located on Hill AFB.

Classroom Speech Interference

Table HL3.2-10 presents the potential speech interference impacts for classrooms under ACC Scenario 1. Under this scenario, L_{eq} noise levels would decrease for 10 schools and remain the same for 1 school. Only two are subject (Northridge High School and South Weber Elementary) to an increase of one even per hour with windows closed. Events would decrease for all other schools with windows open and closed.

Table HL3.2-10. ACC Scenario 1 Classroom Speech Interference for Schools near Hill AFB						
Location ID Number	***Receptor***	***Outdoor Equivalent Noise Level (L_{eq})***	***Number of Events Above a Maximum Outdoor Noise Level of 75 dB ($NA75L_{max}$)[1]***			
			Windows Closed	*Windows Open*	*Change from Baseline*	
					Windows Closed	*Windows Open*
1	Christian Heritage School	65	4	6	-3	-6
2	Evergreen Montessori	62	3	4	-2	-6
3	Faith Baptist Church Academy	68	4	4	-4	-4
4	H Guy Child Elementary School	67	4	4	0	-6
5	King Elementary School	65	3	4	-2	-4
6	La Petite Academy	57	2	4	-1	-5
7	North Davis Junior High	61	2	4	-2	-4
8	North Ridge Seminary	66	3	4	-4	-4
9	Northridge High School	58	2	3	+1	-2
10	South Weber Elementary	59	2	3	+1	-3
11	Hill Field School[2]	58	2	3	-1	-4
12	Child Care Center[2]	67	3	4	-4	-4
13	Weber State University	63	3	4	-4	-4

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Located on Hill AFB.

Sleep Disturbance

Table HL3.2-11 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. Overall, the probabilities of awakening would decrease or remain unchanged. For windows closed and open, percentage awakening would range between 0 and 1 percent.

Table HL3.2-11. ACC Scenario 1 Indoor Sleep Disturbance at Representative Locations at Hill AFB					
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
31	Sunrise Drive/Hillgate Way	1%	1%	0%	0%
32	North Fairfield/Love Lane	0%	1%	-1%	0%
33	North Fairfield/East 3400 North	0%	1%	-1%	0%
34	East South Weber Drive/South Canyon Meadows Drive	0%	1%	-1%	0%
35	West South Weber Drive/East 6650 South	1%	1%	0%	0%
36	West South Weber Drive	1%	1%	0%	-1%
37	East 5600 South/5150 East	1%	1%	0%	-1%

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

Under ACC Scenario 1, there are no residential areas on or adjacent to Hill AFB that are exposed to noise levels of 80 dB DNL and greater. Therefore, PHL is not an issue for ACC Scenario 1.

Occupational Noise

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

ACC Scenario 2

Noise Exposure

ACC Scenario 2 would involve beddown of 48 F-35A aircraft at Hill AFB and drawdown of 48 F-16s. Proposed F-35A flight operations would total 21,334 annually. Similar to ACC Scenario 1, about two-thirds of these proposed operations would consist of departures and arrivals; the remaining one-third would involve pattern work in the vicinity of the airfield. Annual F-35A flight operations generated by the 388 FW and 419 FW, when added to other transient military, commercial, and civilian aircraft (12,601 total operations), would total approximately 33,935, a 27 percent decrease from baseline.

Figure HL3.2-3 shows the 65 to 85 dB DNL contour bands for ACC Scenario 2. Baseline contours are also presented for comparison purposes. Table HL3.2-12 presents the noise exposure in terms of estimated off-base acreage, population, housing units, and on- and off-base representative receptors within each 5-dB DNL contour band. When compared to baseline conditions, ACC Scenario 2 noise levels of 65 dB DNL and greater would affect: 491 fewer acres, 1,247 less people, 465 less households, and 2 fewer receptors.

Table HL3.2-12. Off-Base Noise Exposure under ACC Scenario 2 for Hill AFB Proposed/Baseline

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*	*Receptors*[2]
65 – 70	1,504/1,962	4,969/6,045	1,806/2,227	11/12
70 – 75	314/343	1,226/1,289	408/420	2/3
75 – 80	10/14	271/379	82/114	0/0
80 – 85	0/0	0/0	0/0	0/0
85+	0/0	0/0	0/0	0/0
Total	**1,828/2,319**	**6,466/7,713**	**2,296/2,761**	**13/15**

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]A portion of these receptors are on-base; refer to Figure HL3.2-3.

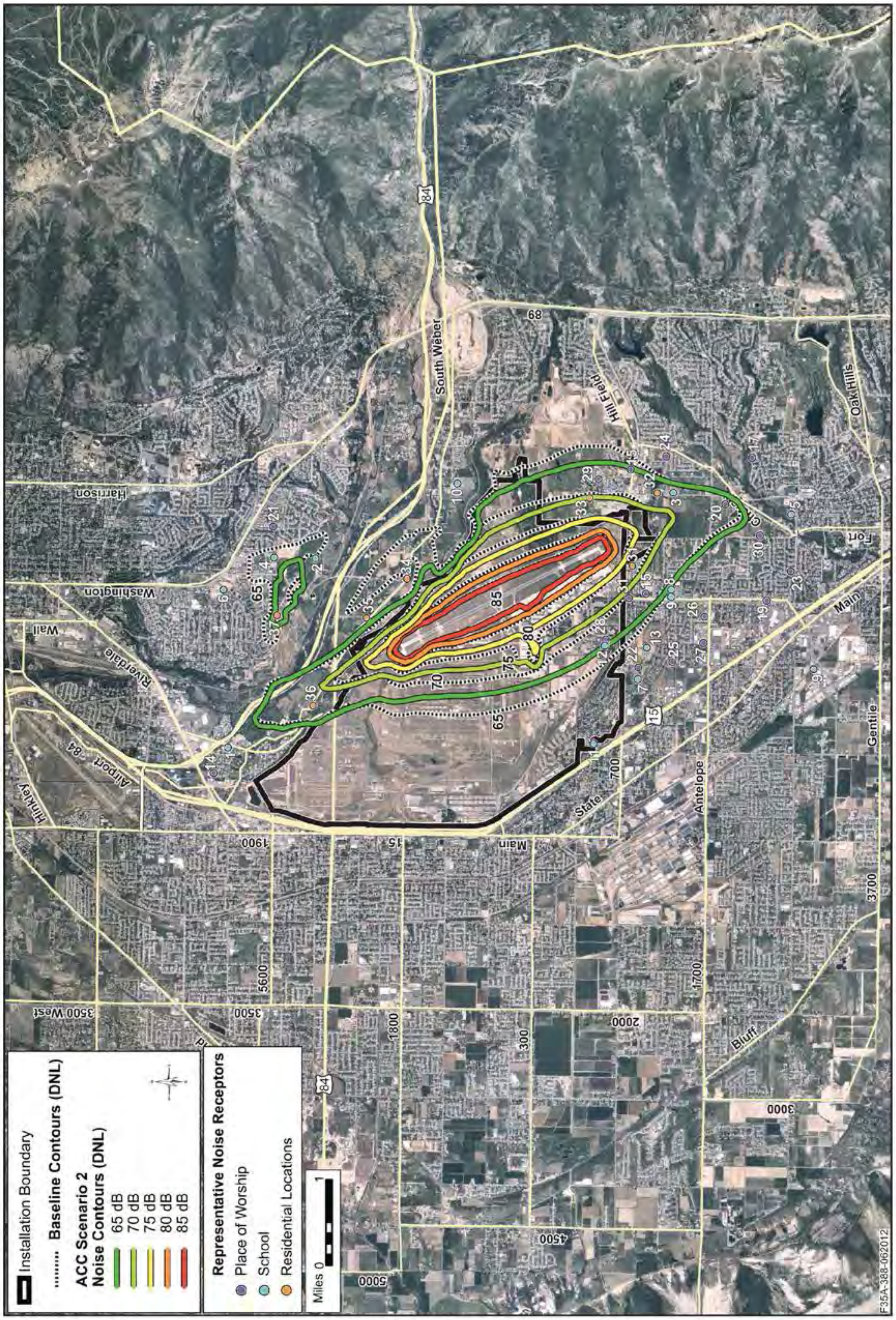


Figure HL3.2-3. ACC Scenario 2 Proposed Noise Contour Bands at Hill AFB

Overall, the main 65 dB DNL contours would extend to the north and south about the same as baseline but would be narrower. The most noticeable off-base reduction in affected area would be northeast of the base. The lobes adjacent to the interstate in baseline would almost totally disappear with only a small remnant of 65 dB DNL north of the interstate. The F-35A would generate approximately 36 percent less equivalent annual flight operations than the F-16s. With 48 F-16 aircraft eliminated, based F-35A arrivals to Runway 14 and transient EA-6B operations would dominate the DNL exposure north of the base. Based F-35A and transient B-1 departures from Runway 14 would dominate the DNL exposure south of the base.

Table HL3.2-13 shows representative receptors by name, type, and decibel level compared to no-action conditions. Under ACC Scenario 2, with the exception of two receptors, all locations would experience either a similar noise environment as found under no-action conditions or an imperceptible decrease in noise levels. A total of 22 receptors would be subject to noise levels of less than 65 dB DNL. One school (#8) and one residential location (#35) would experience an imperceptible 1-dB increase.

Table HL3.2-13. Decibel Levels under ACC Scenario 2 at Representative Locations near Hill AFB Projected/Baseline

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
1	Christian Heritage School	School	<65/<65
2	Evergreen Montessori	School	<65/<65
3	Faith Baptist Church Academy	School	66/66
4	H Guy Child Elementary School	School	65/67
5	King Elementary School	School	<65/<65
6	La Petite Academy	School	<65/<65
7	North Davis Junior High	School	<65/<65
8	North Ridge Seminary	School	66/65
9	Northridge High School	School	<65/<65
10	South Weber Elementary	School	<65/<65
11	Hill Field School[1]	School	<65/<65
12	Child Care Center[1]	School	65/67
13	Weber State University	School	<65/<65
14	Alpine Church	Worship	<65/<65
15	Alpine Community Church	Worship	67/67
16	Bethany Korean Baptist Church	Worship	65/66
17	Church of Jesus Christ of LDS	Worship	<65/<65
18	Hillfield Catholic Chapel	Worship	69/69
19	Layton Hills Baptist Church	Worship	<65/<65
20	Light of the Valley Lutheran Church	Worship	66/66
21	The Church of Jesus Christ of LDS: Branch for the Deaf	Worship	<65/<65
22	The Church of Jesus Christ of LDS: Layton Wsue Institute	Worship	<65/<65
23	The Church of Jesus Christ of LDS: Summerfield	Worship	<65/<65
24	The Church of Jesus Christ of LDS: Twenty-Eight	Worship	<65/<65
25	The Church of Jesus Christ of LDS	Worship	<65/<65
26	The Church of Jesus Christ of LDS: Fairfield	Worship	<65/<65
27	Grace Chapel of Utah	Worship	<65/<65
28	Chapel[1]	Worship	66/67
29	The Church of Jesus Christ of LDS: Layton Morgan	Worship	67/68

Table HL3.2-13. Decibel Levels under ACC Scenario 2 at Representative Locations near Hill AFB Projected/Baseline			
Location ID Number	***Receptor***	***Type***	***Decibel Level (dB DNL)***
30	Church of Jesus Christ of LDS	Worship	<65/<65
31	Sunrise Drive/Hillgate Way	Residential	72/72
32	North Fairfield/Love Lane	Residential	68/68
33	North Fairfield/East 3400 North	Residential	71/71
34	East South Weber Drive/South Canyon Meadows Drive	Residential	<65/<65
35	West South Weber Drive/East 6650 South	Residential	65/<65
36	West South Weber Drive	Residential	67/67
37	East 5600 South/5150 East	Residential	67/70

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Located on Hill AFB.

Speech Interference

In terms of speech interference, Table HL3.2-14 presents the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour for the representative receptors (that generally would experience indoor maximum sound levels of at least 50 dB) with windows closed and open. Under ACC Scenario 2, speech interference events would increase by 4 per hour (windows closed) at location #35; two other sites, #34 and #36 would experience 2 more events per hour when compared to baseline; and 7 out of the 24 locations would experience 1 more event per hour. One site, #28, would experience 1 fewer event per hour with windows closed, while the other #13 would experience similar numbers of speech interference events as found under baseline conditions. For windows open, only two sites, #21 and #34, would expect to experience 1 event more per hour.

Table HL3.2-14. ACC Scenario 2 Indoor Speech Interference at Representative Locations at Hill AFB					
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
14	Alpine Church	4	6	+1	0
15	Alpine Community Church	4	4	0	0
16	Bethany Korean Baptist Church	4	4	0	0
17	Church of Jesus Christ of LDS	3	4	0	0
18	Hillfield Catholic Chapel	4	4	0	0
19	Layton Hills Baptist Church	3	4	+1	0
20	Light of the Valley Lutheran Church	4	4	0	0
21	The Church of Jesus Christ of LDS: Branch for the Deaf	3	5	+1	+1
22	The Church of Jesus Christ of LDS: Layton Wsue Institute	3	4	0	0
23	The Church of Jesus Christ of LDS: Summerfield	3	4	+1	0
24	The Church of Jesus Christ of LDS: Twenty-Eight	4	4	0	0
25	The Church of Jesus Christ of LDS	3	4	+1	0
26	The Church of Jesus Christ of LDS: Fairfield	3	4	+1	0
27	Grace Chapel of Utah	3	4	+1	0
28	Chapel[2]	3	4	-1	0
29	The Church of Jesus Christ of LDS: Layton Morgan	4	4	0	0
30	Church of Jesus Christ of LDS	3	4	0	0

Table HL3.2-14. ACC Scenario 2 Indoor Speech Interference at Representative Locations at Hill AFB					
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
31	Sunrise Drive/Hillgate Way	4	4	0	0
32	North Fairfield/Love Lane	4	4	0	0
33	North Fairfield/East 3400 North	4	4	0	0
34	East South Weber Drive/South Canyon Meadows Drive	3	6	+2	+1
35	West South Weber Drive/ East 6650 South	6	6	+4	0
36	West South Weber Drive	6	6	+2	0
37	East 5600 South/ 5150 East	5	6	0	0

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Assumed a noise level reduction of 16 dB (windows open) and 26 dB (windows closed).
[2]Located on Hill AFB.

Classroom Speech Interference

Table HL3.2-15 presents the potential speech interference impacts for classrooms under ACC Scenario 2. Relative to baseline conditions, the number of speech interference events with windows closed, would increase for five schools, decrease at six schools, and two schools would experience no change. With windows open, one school would experience no change; the remaining would experience a decrease in number of events.

Table HL3.2-15. ACC Scenario 2 Classroom Speech Interference for Schools near Hill AFB						
Location ID Number	*Receptor*	*Outdoor Equivalent Noise Level (L_{eq})*	*Number of Events Above a Maximum Outdoor Noise Level of 75 dB (NA75L_{max})*[1]			
			Windows Closed	*Windows Open*	*Change from Baseline*	
					Windows Closed	*Windows Open*
1	Christian Heritage School	66	6	9	-1	-3
2	Evergreen Montessori	64	6	8	+1	-2
3	Faith Baptist Church Academy	70	6	6	-2	-2
4	H Guy Child Elementary School	68	7	8	+3	-2
5	King Elementary School	66	4	6	-1	-2
6	La Petite Academy	58	3	8	0	-1
7	North Davis Junior High	63	4	6	0	-2
8	North Ridge Seminary	68	6	6	-1	-2
9	Northridge High School	60	3	5	+2	0
10	South Weber Elementary	61	4	5	+3	-1
11	Hill Field School[2]	60	4	5	+1	-2
12	Child Care Center[2]	69	4	6	-3	-2
13	Weber State University	65	4	6	-3	-2

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Located on Hill AFB.

Sleep Disturbance

Table HL3.2-16 lists the probabilities of indoor awakening events for receptors, during daily average environmental nighttime hours, with windows closed and open. Under ACC Scenario 2, the percentage probability of awakening would range between 1 and 2 percent with windows closed and opened, respectively. One location would experience a 1 percent increase in probability while all other would not experience any change.

Potential for Hearing Loss

Under ACC Scenario 2, no residential areas on or adjacent to Hill AFB are exposed to noise levels of 80 dB DNL and greater. Therefore, PHL is not an issue for this scenario.

Table HL3.2-16. ACC Scenario 2 Indoor Sleep Disturbance at Representative Locations[1] at Hill AFB

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
31	Sunrise Drive/Hillgate Way	1%	1%	0%	0%
32	North Fairfield/Love Lane	1%	1%	0%	0%
33	North Fairfield/East 3400 North	1%	1%	0%	0%
34	East South Weber Drive/South Canyon Meadows Drive	1%	1%	0%	0%
35	West South Weber Drive/East 6650 South	1%	2%	0%	1%
36	West South Weber Drive	1%	2%	0%	0%
37	East 5600 South/5150 East	1%	2%	0%	0%

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Occupational Noise

Air Force occupational noise exposure prevention procedures such as hearing protection and monitoring would continue to be applied under this scenario. These procedures would assure compliance with all applicable OSHA and Air Force occupational noise exposure regulations.

ACC Scenario 3

Noise Exposure

ACC Scenario 3 would involve beddown of 72 F-35A aircraft at Hill AFB and drawdown of 48 F-16s. Proposed F-35A flight operations under this scenario would total 32,001 annually. Similar to Scenarios 1 and 2, about two-thirds of these proposed operations would consist of departures and arrivals; the other third would involve pattern work in the vicinity of the airfield. Annual F-35A flight operations generated by the 388 FW and 419 FW, when added to other transient military, commercial, and civilian aircraft (12,601 total operations), would total 44,602, or a 4 percent decrease from baseline.

Figure HL3.2-4 shows the 65 to 85 dB DNL contour bands for Hill AFB ACC Scenario 3. Baseline contours are also presented for comparison purposes. Table HL3.2-17 presents the noise exposure in terms of

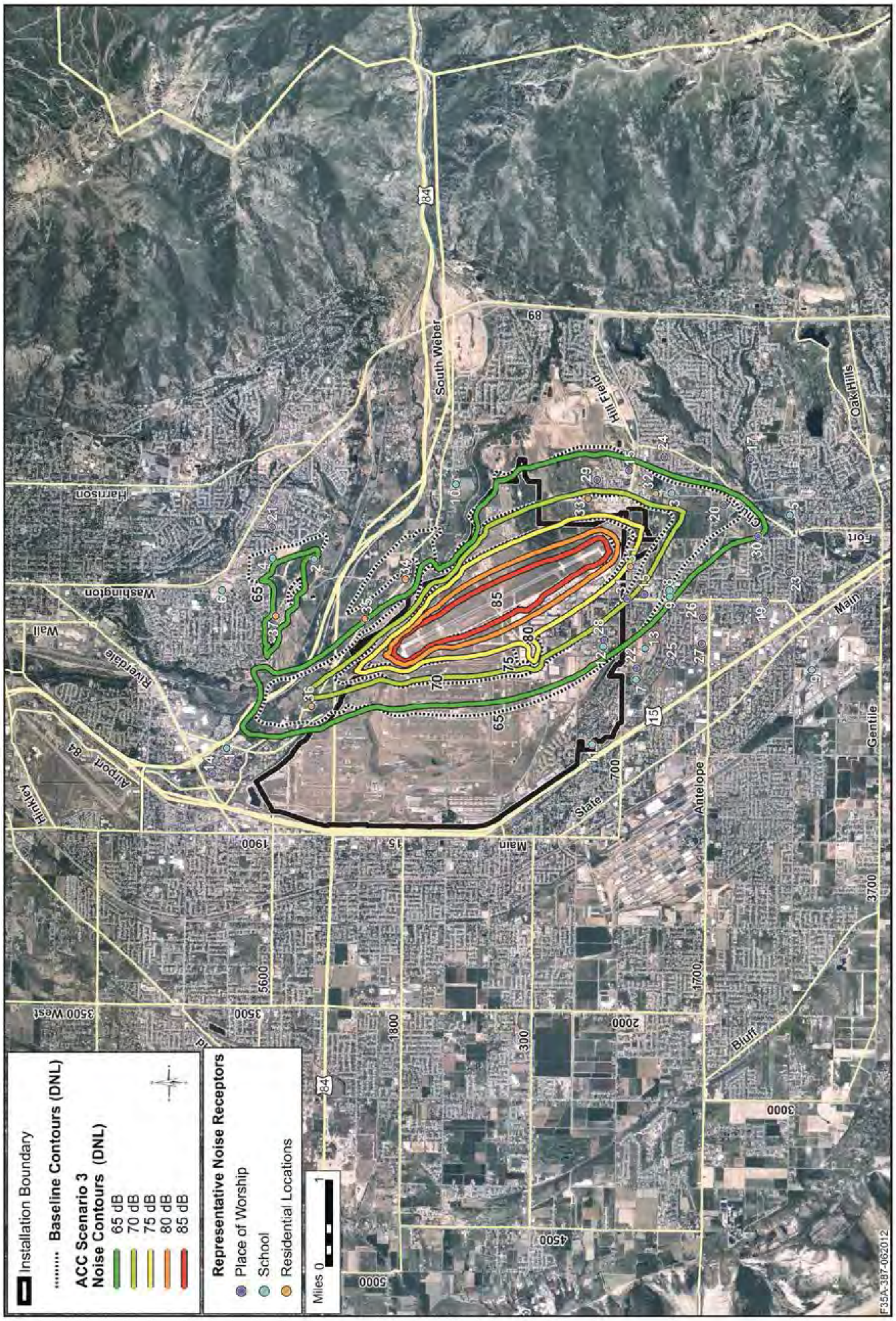


Figure HL3.2-4. ACC Scenario 3 Proposed Noise Contour Bands at Hill AFB estimated off-base acreage, population, housing units, and on- and off-base representative receptors within each 5-dB DNL contour band. When compared to baseline conditions, ACC Scenario 3 noise levels of 65 dB DNL and greater would affect: 183 more acres, 1,326 more people, and 466 more households; no changes in the number of receptors when compared to baseline conditions.

Table HL3.2-17. Off-Base Noise Exposure under ACC Scenario 3 for Hill AFB Proposed/Baseline

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*	*Receptors*[2]
65 – 70	1,994/1,962	6,995/6,045	2,532/2,227	12/12
70 – 75	476/343	1,554/1,289	546/420	3/3
75 – 80	32/14	490/379	149/114	0/0
80 – 85	0/0	0/0	0/0	0/0
85+	0/0	0/0	0/0	0/0
Total	**2,502/2,319**	**9,039/7,713**	**3,227/2,761**	**15/15**

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]A portion of these receptors are on-base; refer to Figure HL3.2-4.

Overall, the main 65 dB DNL contour would extend approximately 1,500 feet more to the north and south than the DNL contours for baseline. The most noticeable change would be the elimination of the lobe adjacent and south of the interstate. The F-35A would generate approximately 5 percent less equivalent annual flight operations than the F-16s. With 48 F-16 aircraft eliminated, based F-35A arrivals to Runway 14 and transient EA-6B operations would dominate the DNL exposure north of the base. Based F-35A departures from Runway 14 would dominate the DNL exposure south of the base.

Table HL3.2-18 shows representative receptors by name, type, and decibel level compared to baseline conditions. Under this scenario, 12 receptors would experience increased noise levels, with 2 changing from less than 65 dB DNL greater than 65 dB. A total of 20 receptors would remain subject to noise levels less than 65 dB DNL; 1 receptor (#30) would experience a 2-dB increase, all others would experience a 1-dB change at most.

Table HL3.2-18. Decibel Levels under ACC Scenario 3 at Representative Locations near Hill AFB Projected/Baseline

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
1	Christian Heritage School	School	<65/<65
2	Evergreen Montessori	School	<65/<65
3	Faith Baptist Church Academy	School	67/66
4	H Guy Child Elementary School	School	65/67
5	King Elementary School	School	<65/<65
6	La Petite Academy	School	<65/<65
7	North Davis Junior High	School	<65/<65
8	North Ridge Seminary	School	66/65
9	Northridge High School	School	<65/<65
10	South Weber Elementary	School	<65/<65
11	Hill Field School[1]	School	<65/<65
12	Child Care Center[1]	School	67/67

Table HL3.2-18. Decibel Levels under ACC Scenario 3 at Representative Locations near Hill AFB Projected/Baseline

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
13	Weber State University	School	<65/<65
14	Alpine Church	Worship	<65/<65
15	Alpine Community Church	Worship	68/67
16	Bethany Korean Baptist Church	Worship	67/66
17	Church of Jesus Christ of LDS	Worship	<65/<65
18	Hillfield Catholic Chapel	Worship	70/69
19	Layton Hills Baptist Church	Worship	<65/<65
20	Light of the Valley Lutheran Church	Worship	67/66
21	The Church of Jesus Christ of LDS: Branch for the Deaf	Worship	<65/<65
22	The Church of Jesus Christ of LDS: Layton Wsue Institute	Worship	<65/<65
23	The Church of Jesus Christ of LDS: Summerfield	Worship	<65/<65
24	The Church of Jesus Christ of LDS: Twenty-Eight	Worship	<65/<65
25	The Church of Jesus Christ of LDS	Worship	<65/<65
26	The Church of Jesus Christ of LDS: Fairfield	Worship	<65/<65
27	Grace Chapel of Utah	Worship	<65/<65
28	Chapel[1]	Worship	67/67
29	The Church of Jesus Christ of LDS: Layton Morgan	Worship	68/68
30	Church of Jesus Christ of LDS	Worship	65/<65
31	Sunrise Drive/Hillgate Way	Residential	74/72
32	North Fairfield/ Love Lane	Residential	69/68
33	North Fairfield/ East 3400 North	Residential	72/71
34	East South Weber Drive/ South Canyon Meadows Drive	Residential	<65/<65
35	West South Weber Drive/ East 6650 South	Residential	66/<65
36	West South Weber Drive	Residential	68/67
37	East 5600 South/ 5150 East	Residential	68/70

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Located on Hill AFB.

Speech Interference

In terms of speech interference, Table HL3.2-19 presents the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour for the representative receptors (which generally would have indoor maximum sound levels of at least 50 dB) with windows closed and open. The number of speech interfering events across all receptors would range from a high of nine events to a low of five, with windows open. With windows closed, speech interference events would range from a high of eight events per hour compared to a low of four per hour. In general, the number of events per hour, at any location with windows opened, would increase no more than three events when compared to baseline conditions. With windows closed, the number events would increase by no more than two events per hour when compared to baseline.

Table HL3.2-19. ACC Scenario 3 Indoor Speech Interference at Representative Locations at Hill AFB						
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	
14	Alpine Church	5	9	+2	+3	
15	Alpine Community Church	5	6	+1	+2	
16	Bethany Korean Baptist Church	5	6	+1	+2	
17	Church of Jesus Christ of LDS	4	6	+1	+2	
18	Hillfield Catholic Chapel	5	6	+1	+2	
19	Layton Hills Baptist Church	4	6	+2	+2	
20	Light of the Valley Lutheran Church	5	6	+1	+2	
21	The Church of Jesus Christ of LDS: Branch for the Deaf	5	7	+3	+3	
22	The Church of Jesus Christ of LDS: Layton Wsue Institute	4	6	+1	+2	
23	The Church of Jesus Christ of LDS: Summerfield	4	5	+2	+1	
24	The Church of Jesus Christ of LDS: Twenty-Eight	5	6	+1	+2	
25	The Church of Jesus Christ of LDS	4	5	+2	+1	
26	The Church of Jesus Christ of LDS: Fairfield	4	6	+2	+2	
27	Grace Chapel of Utah	4	5	+2	+1	
28	Chapel[2]	5	6	+1	+2	
29	The Church of Jesus Christ of LDS: Layton Morgan	5	6	+1	+2	
30	Church of Jesus Christ of LDS	5	6	+2	+2	
31	Sunrise Drive/Hillgate Way	6	6	+2	+2	
32	North Fairfield/Love Lane	6	6	+2	+2	
33	North Fairfield/East 3400 North	6	6	+2	+2	
34	East South Weber Drive/South Canyon Meadows Drive	4	8	+3	+3	
35	West South Weber Drive/East 6650 South	8	9	+6	+3	
36	West South Weber Drive	8	9	+4	+3	
37	East 5600 South/5150 East	7	8	+2	+2	

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[1]Located on Hill AFB.

Classroom Speech Interference

Table HL3.2-20 presents the potential speech interference impacts for classrooms under ACC Scenario 3. Under this scenario, with windows closed, the number of events would increase for 10 of the 13 schools, decrease at two schools, and remained unchanged at one school. With windows opened, seven schools would experience no change from baseline conditions in terms of numbers of speech interference events per hour. Five schools would experience increases in events of no more than two per hour; however, one school would experience one less event per hour if this scenario were implemented.

Table HL3.2-20. ACC Scenario 3 Classroom Speech Interference for Schools near Hill AFB						
Location ID Number	***Receptor***	***Outdoor Equivalent Noise Level (L_{eq})***	***Number of Events Above a Maximum Outdoor Noise Level of 75 dB ($NA75L_{max}$)[1]***			
			Windows Closed	*Windows Open*	*Change from Baseline*	
					Windows Closed	*Windows Open*
1	Christian Heritage School	67	8	12	+1	0
2	Evergreen Montessori	66	9	11	+4	+1
3	Faith Baptist Church Academy	71	8	8	0	0
4	H Guy Child Elementary School	69	10	11	+6	+1
5	King Elementary School	67	6	8	+1	0
6	La Petite Academy	60	5	11	+2	+2
7	North Davis Junior High	64	6	8	+2	0
8	North Ridge Seminary	69	8	8	+1	0
9	Northridge High School	61	4	7	+3	+2
10	South Weber Elementary	62	6	7	+5	+1
11	Hill Field School[2]	61	5	6	+2	-1
12	Child Care Center[2]	70	6	8	-1	0
13	Weber State University	66	6	8	-1	0

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed). [1]Located on Hill AFB.

Sleep Disturbance

Table HL3.2-21 lists the probabilities of indoor awakening events for receptors, during daily average environmental nighttime hours, with windows closed and open. Under ACC Scenario 3, the percentage awakening would range between 1 and 3 percent with windows closed and opened, respectively. Relative to baseline conditions, probabilities of awakening would increase 1 percent on average.

Table HL3.2-21. ACC Scenario 3 Indoor Sleep Disturbance at Representative Locations[1] at Hill AFB					
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
31	Sunrise Drive/Hillgate Way	1%	2%	0%	1%
32	North Fairfield/Love Lane	1%	1%	0%	0%
33	North Fairfield/East 3400 North	1%	2%	0%	1%
34	East South Weber Drive/South Canyon Meadows Drive	1%	2%	0%	1%
35	West South Weber Drive/East 6650 South	1%	2%	0%	1%
36	West South Weber Drive	2%	3%	1%	1%
37	East 5600 South/5150 East	1%	2%	0%	0%

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

Under ACC Scenario 3, no residential areas on or adjacent to Hill AFB are exposed to noise levels of 80 dB DNL. Therefore, PHL is not an issue for this scenario.

Occupational Noise

Air Force occupational noise exposure prevention procedures such as hearing protection and monitoring would continue to be applied under this scenario. These procedures will assure compliance with all applicable OSHA and Air Force occupational noise exposure regulations.

HL3.2.2 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 Hill AFB beddown scenarios include the airspace units associated with UTTR in Utah and Nevada. Proposed training activities would result from the replacement of F-16 aircraft by F-35A aircraft. As noted in Section HL3.1, the 388 FW and 419 FW would operate the F-35As within existing MOAs, overlying ATCAAs, restricted airspace, and ranges, performing similar types of combat training missions currently conducted in these airspace units. The noise analysis accounts for both subsonic noise and sonic booms in airspace authorized for supersonic flight. Subsonic noise is quantified by Onset-Rate Adjusted Day-Night Average Sound Level (L_{dnmr}); the cumulative sonic boom environment is quantified by C-weighted DNL (CDNL) and by the number of booms per month which would be heard on the ground (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 HL3.6 (Terrestrial Communities) for a discussion of noise impacts to wildlife.

Subsonic Noise

Figure HL3.2-5 presents the no-action condition and projected noise levels in L_{dmnr} for each of the blocks of airspace proposed for use around Hill AFB. Although noise levels would increase under nearly all scenarios, they would continue to remain below 45 L_{dnmr} in the White Elk/Currie Tippet MOA (Table HL3.2-21). In the other airspace units, noise levels would remain below 65 L_{dnmr}. For the North Range, subsonic noise levels would increase by 4 to 9 dB, depending upon scenario. In the adjacent Lucin airspace, projected operations would increase noise levels by 5 to 10 dB. These changes would be perceptible, particularly under ACC Scenario 3 which would generate the greatest increase. South Range noise levels would increase by at least 6 dB over no action; for ACC Scenario 3, the 10 dB increase would be perceived as a doubling of the sound. However, the area under UTTR is characterized by low population density and very few small communities (see Section HL3.10 Land Use). As such, the increased noise levels would likely result in limited annoyance and impacts to underlying population. Furthermore, these areas have been exposed to aircraft noise of this type for many decades. In the Sevier airspace, maximum noise levels under ACC Scenario 3 would remain quite low (47 L_{dnmr}), with ACC Scenarios 1 and 2 at or below 45 L_{dnmr}.

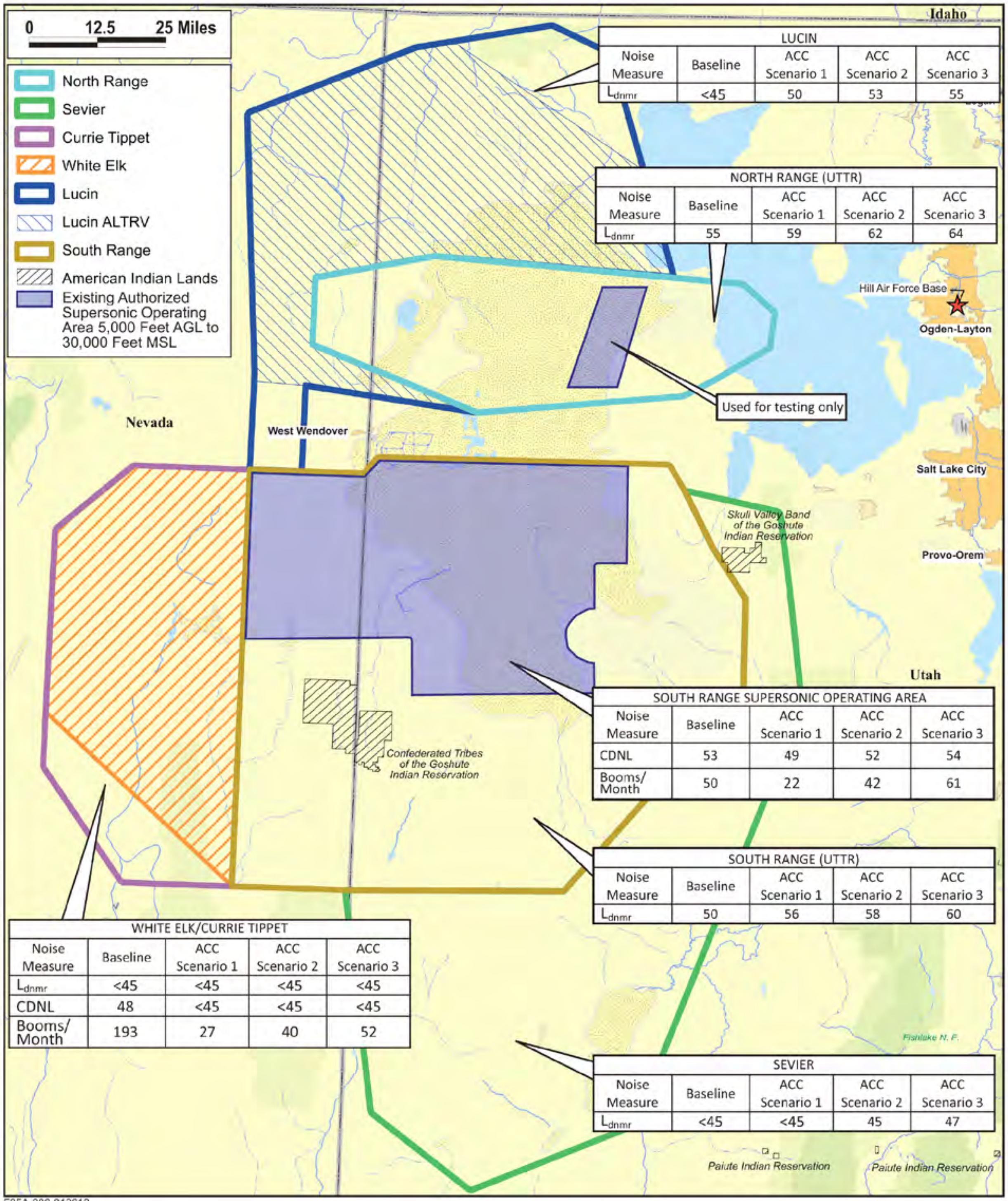
Supersonic Noise

Supersonic operations are permitted in the South Range supersonic operating area at altitudes above 5,000 feet MSL. The South Range Supersonic Operating Area primarily occurs within Restricted Airspace with no underlying populations. While the Hill AFB F-16s fly 20 percent of their supersonic events between 10,000 and 30,000 feet MSL, with 80 percent above 30,000 feet MSL, the F-35As would perform these events at higher altitudes. The F-35As would conduct brief supersonic events, 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 surface, and at 15,000 to 30,000 feet MSL, the effects tend to be rare and negligible.

Under ACC Scenarios 1 and 2, fewer total supersonic events would be performed, so these scenarios would generate lower CDNL levels than under no action. Only a 1 dB CDNL increase would occur under ACC Scenario 3, and it would not be perceptible on the ground. Similar to CDNL, the number of monthly booms under ACC Scenarios 1 and 2 would decrease in the South Range supersonic operating area. For ACC Scenario 3, booms would increase by 11 per month. On average, 2 to 3 booms per day would be heard in the center of the area and correspondingly fewer booms at its boundary under any scenario due to the nature of the training engagements. Although the "startle effect" of sonic booms is annoying, studies have been performed on the effect of sonic booms on various tasks, including driving. The studies have found that there is generally little or no adverse effect (Lips 1972, Nowakiwsky 1974).

The potential for sonic booms to damage structures is extremely small, with direct effects best quantified by the peak overpressures of individual booms (see Appendix C). At 1 pound per square foot (psf), the probability of a window breaking ranges from one in a billion (Sutherland 1990) to one in a million (Hershey and Higgins 1976). At 10 psf, the probability of breakage is between one in a hundred and one in a thousand (Haber and Nakaki 1989). Damage to plaster is in a comparable range but depends on the condition of the plaster. Adobe faces small risks similar to plaster, but assessment is complicated by adobe structures being exposed to weather, where they can deteriorate in the absence of any specific loads (Sutherland 1990). Similarly, other outdoor structures such as buildings, windmills, radio towers, etc., are resilient and routinely subject to wind loads far in excess of sonic boom pressures. Foundations and retaining walls, which are intended to support substantive earth loads, are not at risk from sonic booms.

Peak sonic boom overpressures directly under the flight track for the F-16C fighters range from 4.9 psf at 10,000 feet MSL to 1.6 psf at 30,000 feet MSL, and average about 2 psf. In contrast, peak sonic boom overpressures directly under the flight track for F-35As would range from 5.4 psf at 10,000 feet MSL to 1.9 psf at 30,000 feet MSL. For both aircraft, these overpressures diminish toward 0.1 psf with distance from the flight track. Since the F-35As would conduct 90 percent of supersonic operations at or above 30,000 feet MSL, overpressures of 1.9 psf or less would be common. At such low overpressures, sonic booms under the ACC Scenarios are not expected to damage maintained structures such as ranches and outbuildings, although damage to deteriorated structures may occur.



LUCIN				
Noise Measure	Baseline	ACC Scenario 1	ACC Scenario 2	ACC Scenario 3
L_{dnmr}	<45	50	53	55

NORTH RANGE (UTTR)				
Noise Measure	Baseline	ACC Scenario 1	ACC Scenario 2	ACC Scenario 3
L_{dnmr}	55	59	62	64

SOUTH RANGE SUPERSONIC OPERATING AREA				
Noise Measure	Baseline	ACC Scenario 1	ACC Scenario 2	ACC Scenario 3
CDNL	53	49	52	54
Booms/ Month	50	22	42	61

SOUTH RANGE (UTTR)				
Noise Measure	Baseline	ACC Scenario 1	ACC Scenario 2	ACC Scenario 3
L_{dnmr}	50	56	58	60

WHITE ELK/CURRIE TIPPET				
Noise Measure	Baseline	ACC Scenario 1	ACC Scenario 2	ACC Scenario 3
L_{dnmr}	<45	<45	<45	<45
CDNL	48	<45	<45	<45
Booms/ Month	193	27	40	52

SEVIER				
Noise Measure	Baseline	ACC Scenario 1	ACC Scenario 2	ACC Scenario 3
L_{dnmr}	<45	<45	45	47

Figure HL3.2-5. Baseline and Proposed Noise Environment for Airspace used by Hill AFB

HL3.3 Air Quality

Emissions associated with operations at Hill AFB include emissions of volatile organic compound (VOCs) and nitrogen oxides (NO_x), both of which are precursors to ozone (O_3), as well as carbon monoxide (CO), sulfur dioxide (SO_2), 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 (PM_{10}). Emissions of lead are not addressed because the affected areas contain no significant sources of this criteria pollutant, and operations at Hill AFB would not result in substantial emissions of lead.

HL3.3.1 Base

HL3.3.1.1 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, SO_2, and directly-emitted PM_{10} and $PM_{2.5}$. For pollutants that undergo chemical reactions and interact within the atmosphere to form secondary pollutants, such as O_3 and its precursors NO_x and VOCs, and precursors of PM_{10} and $PM_{2.5}$, the affected environment is a larger regional area. The chemical transformations and interactions that create O_3 and secondary PM_{10} 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 Hill AFB (refer to Section 3.4 for further discussion of mixing height).

Regional Environment

The affected environment for base-generated emissions includes Hill AFB, the area surrounding the base where aircraft operate below 3,000 feet AGL, and the airspace overlying these areas. Hill AFB is located in Davis and Weber Counties. The Utah Division of Air Quality (UDAQ) has primary jurisdiction over air quality and stationary source emissions within the affected environment. Davis County is a maintenance area for 1-hour ozone (precursor pollutants for ozone include VOCs, NO_x, and sulfur oxides [SO_x]). Davis and Weber counties are designated as nonattainment for the 24-hour $PM_{2.5}$ standard.

Impacts of the proposed beddown were evaluated in two ways. For the criteria pollutants designated as maintenance or nonattainment, the analysis evaluated the net contribution of those pollutants relative to the pertinent *de minimis* thresholds. The other criteria pollutants were evaluated in the context of existing local air quality, baseline emissions at the base and in the region, and the relative contribution of the proposed beddown scenarios to regional emissions.

Hill AFB is located in a developed area, with numerous air emission sources. The majority of emissions from permitted stationary sources in Davis and Weber Counties 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 PM_{10} and $PM_{2.5}$ emissions. Fugitive dust sources include unpaved roads, agricultural cropland, and construction sites.

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. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the No-Action Alternative and the Proposed Action alternatives have been quantified to the extent feasible in this EIS for information and comparison purposes only.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). 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 CO_2, which has a value of one. For example, under the USEPA's Mandatory Greenhouse Gas Reporting Rule, CH_4 has a GWP of 21, which means that it is considered to have a global warming effect 21 times greater than CO_2 on an equal-mass basis. Total GHG source emissions are often reported as a CO_2 equivalent (or CO_2e). The CO_2e 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

Hill AFB has a current Title V Operating Permit issued by UDAQ whereby facility-wide requirements are established in accordance with the Utah State Implementation Plan control strategy and the UDAQ Rules. Stationary sources are regulated under this Operating Permit, and include abrasive blasting, aircraft engine test facilities, gas turbine and rocket testing facilities, degreasing and solvent use, coatings application, internal combustion engines, fuel dispensing, and other miscellaneous sources.

Mobile source emissions include emissions from aircraft operations (take-offs and landings), AGE, and aircraft maintenance operations such as engine run-ups and trim checks. To establish baseline conditions, emissions from all based F-16 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 F-16s were also included in baseline calculations. Table HL3.3-1 summarizes baseline emissions; these emissions were based on flight profiles and engine maintenance runups developed as part of the noise analysis (Wyle 2011). This approach was taken for consistency purposes with the noise evaluation and for comparability. For aircraft, sulfur oxides are calculated based on weight percent sulfur content of jet propellant-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. Aerospace ground equipment emissions were calculated using F-16C-associated equipment and modeled in the Air Force Conformity Applicability Model program (Air Force 2002). Emission factors were derived from IERA Aircraft/Auxiliary Power Units/Aerospace Ground Support Equipment, except for CO_2, which were derived from Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling--Compression-Ignition (USEPA 2002). For CH_4 and N_2O 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 2008). Refer to Appendix D for the concepts used in these emission estimates.

Table HL3.3-1. Baseline Emissions for Hill AFB

Source	***Pollutants in Tons per Year***						
	CO	*NO_x*	*VOCs*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
F-16-Related Operations	551.16	411.13	94.13	12.38	59.28	53.78	93,256
Davis County	36,171.83	8,751.84	14,503.87	463.42	1,175.59	698.98	-
% Contribution	*1.52*	*4.70*	*0.65*	*2.67*	*5.04*	*7.69*	-
Weber County	30,793.61	6,196.62	13,466.18	113.64	1,121.54	535.97	-
% Contribution	*1.79*	*6.63*	*0.70*	*10.89*	*5.29*	*10.03*	-

Note: [1]In metric tons per year or mT/y.

As presented in the table above, emissions associated with baseline F-16C operations (aircraft, AGE, and commuting personnel) contribute minimal amounts of any criteria pollutant in Davis County (currently in maintenance for ozone and nonattainment for $PM_{2.5}$). In Weber County (currently in nonattainment for $PM_{2.5}$), baseline emissions of CO and VOCs contribute less than 2 percent of the county total; no more than 7 percent for NO_x and PM_{10}; and no more than 11 percent of SO_2 and $PM_{2.5}$. For both counties, primary contributors to ozone (Davis County is in maintenance status for ozone) are vehicle exhaust, industrial facilities, gasoline vapors, chemical solvents, and biogenic emissions. Primary sources of $PM_{2.5}$ (both Davis and Weber Counties are in nonattainment for this criteria pollutant) are fly ash from power plants, carbon black from cars and trucks, and soot from fireplaces and woodstoves (Utah DAQ 2012).

HL3.3.1.2 Environmental Consequences

Air quality impacts within the affected environment were reviewed relative to 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. Appendix D provides air emissions factors. At Hill AFB, the affected environment includes two counties where two criteria pollutants are in nonattainment ($PM_{2.5}$ for Davis and Weber Counties) or in maintenance status (ozone for Davis County). In accordance with General Conformity requirements for maintenance and nonattainment areas, the net change in calculated emissions were evaluated against the *de minimis* thresholds of 100 tons for each applicable pollutant: VOCs, NO_x, SO_x, and $PM_{2.5}$. Thus, if the net change from baseline to proposed emissions was less than de minimis thresholds the beddown conformed to requirements.

For attainment criteria pollutant emissions of CO and PM_{10}, 250 tons per year per was used as an indicator of significance, or non-significance, of the net air quality impacts for purposes of NEPA. This value is used by the USEPA in their New Source Review standards as the threshold for triggering the CAA's Prevention of Significant Deterioration permitting requirements for new major stationary sources (e.g., energy plants) in attainment areas. No similar regulatory threshold is available for mobile source (such as aircraft) emissions, which are the primary sources for this proposal."

ACC Scenario 1

ACC Scenario 1 would beddown 24 F-35A aircraft at Hill AFB to replace the 48 F-16C aircraft currently based there. Under ACC Scenario 1, both construction and operational activities would result in air pollutant emissions.

Construction

Under ACC Scenario 1, major construction would occur in calendar year 2014 and 2015, with minor internal construction and renovation activities taking place between 2016 through 2018. 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 the projected 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). Projected building and infrastructure demolition, as well as construction timeframes and disturbance footprints were used to determine fugitive dust emissions (i.e., PM).

Table HL3.3-2 summarizes annual construction emissions associated with ACC Scenario 1. Regionally, construction emissions in 2015 (the year in which the most construction would occur), for any of the criteria pollutants, would contribute no more than 0.5 percent for either Davis or Weber County. As indicated, projected annual construction emissions would not exceed the *de minimis* thresholds for NO_x, VOCs, SO_x, and $PM_{2.5}$ in any given year. Therefore, no further conformity analysis is required to implement ACC Scenario 1 construction activities at Hill AFB. Additionally, construction-related emissions of CO and PM_{10} would be well below 250 tons-per-year major Prevention of Significant Deterioration permitting threshold, indicating emissions are not significant.

Table HL3.3-2. Proposed Construction Emissions under ACC Scenario 1 at Hill AFB						
Construction Activity	***Pollutants in Tons per Year***					
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
2014						
Construction	6.44	1.21	0.39	0.12	5.47	0.61
Construction Crew Privately-Owned Vehicles (POV)	5.71	0.26	0.30	0.0	0.01	0.01
Total 2014	**12.15**	**1.47**	**0.69**	**0.12**	**5.48**	**0.62**
2015						
Construction	6.47	1.30	0.39	0.13	5.48	0.61
Construction Crew POVs	5.71	0.26	0.30	0.0	0.01	0.01
Total 2015	**12.18**	**1.56**	**0.69**	**0.13**	**5.49**	**0.62**
2016-2017						
Construction	6.26	1.50	0.40	0.15	1.04	0.18
Construction Crew POVs	5.71	0.26	0.30	0.0	0.01	0.01
Total 2017	**11.97**	**1.76**	**0.7**	**0.15**	**1.05**	**0.19**
2018						
Construction	5.08	0.76	0.29	0.07	0.30	0.07
Construction Crew POVs	5.71	0.26	0.30	0.0	0.01	0.01
Total 2018	**10.79**	**1.02**	**0.59**	**0.07**	**0.31**	**0.08**
Major Source Threshold	**250**	**-**	**-**	**-**	**250**	**-**
***de Minimis* Thresholds**	**-**	**100**	**100**	**100**	**-**	**100**

Operations

Air quality impacts from operations were first determined by evaluating the net change in emissions associated with replacing 48 F-16C aircraft with 24 F-35A aircraft. Operational emissions sources under ACC Scenario 1 include both mobile and stationary sources. Mobile sources include: 1) aircraft operations within and above the airfield (including runways, taxi areas, and overlying airspace), 2) vehicle (government-owned vehicles [GOVs] and POVs) operations, and 3) AGE associated with 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 ACC Scenario 1 and no new building or facility construction would be introduced calling for new stationary sources and associated emissions.

Table HL3.3-3 presents a summary of annual source emissions generated under ACC Scenario 1 compared to baseline emissions and regionally for the two counties. While some aircraft operations could coincide with construction activities during the beddown process in 2015 to 2018, this overlap would not cause emissions to exceed *de minimis* levels or major source thresholds. For example, in 2015 (the year in which the most construction takes place), emissions added to operational activities would be as follows: CO 68.12 tons, NO_x 99.56 tons, VOCs 3.56 tons, SO_x 8.47 tons, PM_{10} 6.56 tons, and $PM_{2.5}$ 1.69 tons. Please note that these emissions represent the greatest amount that could be generated if all F-35A aircraft were operating in 2015; however, this would not be the case. Aircraft would be phased in and at no time would emissions exceed *de minimis* levels under ACC Scenario 1.

Table HL3.3-3. Proposed Annual Operational Emissions under ACC Scenario 1 at Hill AFB							
Activity	***Pollutants in Tons per Year***						
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
Aircraft	18.44	90.65	0.74	6.63	0.45	0.45	28,741.87
Engine Runups	0.45	0.08	0.01	0.02	0.00	0.00	81.94
AGE[2]	6.61	5.89	0.36	1.66	0.54	0.52	1,538.64
POVs	30.44	1.38	1.77	0.03	0.08	0.08	1,462.83
Total Annual ACC Scenario 1 Emissions	**55.94**	**98.00**	**2.87**	**8.34**	**1.07**	**1.07**	**30,287.16**
Baseline Annual Emissions	551.16	411.13	94.13	12.38	59.28	53.78	93,256
% Davis Contribution	0.15	1.12	0.02	1.80	0.09	0.15	-
% Weber County Contribution	0.18	1.58	0.02	7.34	0.10	0.20	-
Net Change	***-495.23***	***-313.13***	***-91.25***	***-4.03***	***-58.21***	***-52.71***	***-62,968.68***
***de Minimis* Thresholds**	**-**	**100**	**100**	**100**	**-**	**100**	**-**
Major Source Threshold	**250**	**-**	**-**	**-**	**250**	**-**	**-**

Notes:
[1]CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310), (40 Code of Federal Regulations [CFR] 98, Subpart A, Table A-1) in metric tons per year.
[2]With 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 data indicate that beddown of 24 F-35A aircraft at Hill AFB would result in substantial emission decreases in five of the six criteria pollutants relative to baseline conditions. For SO_x, the decrease would be smaller. In all instances, the net change in criteria pollutants would decrease and therefore do not exceed *de minimis* thresholds. In Davis County, F-35A operational (aircraft, AGE, and commuting personnel) emissions would contribute no more than 2 percent of any criteria pollutant. In Weber County, with the exception of SO_x at about 7 percent, F-35A operations would contribute no more than 2 percent of any criteria pollutant. Because the net change in criteria pollutant emissions actually decrease when compared to baseline, and would not exceed established *de minimis* thresholds, no further conformity analysis is required to implement ACC Scenario 1 at Hill AFB. In terms of GHGs, there would be an incremental decrease of CO_2e regional emissions associated with ACC Scenario 1.

ACC Scenario 2

ACC Scenario 2 would beddown 48 F-35A aircraft at Hill AFB, replacing the existing 48 F-16Cs. Under ACC Scenario 2, both construction and operational activities would result in emissions of air pollutants. Construction and operational emission assumptions are the same as those presented for ACC Scenario 1.

Construction

ACC Scenario 2 construction would primarily occur in 2014 and 2015, with minor internal construction and renovation activities occurring from 2016 through 2018. Construction related emissions would be similar to those presented in Table HL3.3-2 with only minor increases in 2016 through 2018. As is the case for ACC Scenario 1, the results indicate that projected annual construction emissions would not exceed *de minimis* thresholds for NO_x, VOCs, SO_x, and $PM_{2.5}$ or represent significant regional contributions. Additionally, construction-related emissions of CO and PM_{10} would be well below 250 tons-per-year major Prevention of Significant Deterioration permitting threshold, indicating emissions are not significant.

Operations

Air quality impacts from operations associated with ACC Scenario 2 were determined by evaluating the net change in emissions associated with replacing 48 F-16 aircraft with 48 F-35A aircraft. Sources of operational emissions evaluated are the same as those presented under ACC Scenario 1. Table HL3.3-4 summarizes annual operational emissions projected under ACC Scenario 2 compared to baseline emissions and regionally for the two counties. While some aircraft operations could coincide with construction activities during the beddown process in 2015 to 2018, this overlap would not cause emissions to exceed *de minimis* levels or major source thresholds. For example, in 2015 (the year in which the most construction takes place), emissions added to operational activities would be as follows: CO 119.16 tons, NO_x 188.89 tons, VOCs 6.21 tons, SO_x 15.7 tons, PM_{10} 7.56 tons, and $PM_{2.5}$ 2.69 tons. Please note that these emissions represent the greatest amount that could be generated if all F-35A aircraft were operating in 2015; however, this would not be the case. Aircraft would be phased in and at no time would emissions exceed *de minimis* levels under ACC Scenario 2 when compared to baseline (i.e., there would still be a net reduction in overall emissions).

Table HL3.3-4. Proposed Annual Operational Emissions under ACC Scenario 2 at Hill AFB

Activity	*Pollutants in Tons per Year*						
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
F-35A Aircraft	31.93	172.59	1.24	12.14	0.83	0.83	52,617.46
Engine Run-ups	0.96	0.20	0.03	0.04	0.00	0.00	182.62
AGE[2]	13.22	11.79	0.71	3.32	1.07	1.04	3,077.29
POVs	60.87	2.75	3.54	0.06	0.16	0.16	2,925.65
Total Annual ACC Scenario 2 Emissions	**106.98**	**187.33**	**5.52**	**15.57**	**2.07**	**2.07**	**55,726.77**
Baseline Annual Emissions	551.16	411.13	94.13	12.38	59.28	53.78	93,256
% Davis Contribution	0.30	2.14	0.04	3.36	0.18	0.30	-
% Weber County Contribution	0.35	3.02	0.04	13.70	0.18	0.39	-
Net Change	***-444.18***	***-223.80***	***-88.61***	***3.19***	***-57.21***	***-51.71***	***-37,529.06***
***de Minimis* Thresholds**	**-**	**100**	**100**	**100**	**-**	**100**	**-**
Major Source Threshold	**250**	**-**	**-**	**-**	**250**	**-**	**-**

Notes:
[1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR 98, Subpart A, Table A-1) in metric tons per year.
[2]With 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.

Data indicate that beddown of 48 F-35A aircraft at Hill AFB would result in net emission decreases for all criteria pollutants, with the exception of SO_x. These net changes would be well below *de minimis* levels, even with construction emissions added. This includes SO_x which is only an additional 3.19 tons per year (plus 0.13 for construction emissions) compared to baseline conditions and thus would not exceed the 100-ton threshold assigned to this pollutant. Regionally, F-35A operations (including aircraft, AGE, and commuting personnel) would generate no more than 3.4 percent of any criteria pollutant in Davis County. For Weber County, regional contribution of the F-35A emissions would be less than 1 percent and no more than 3.02 percent for five of the criteria pollutants, the only exception would be SO_x which would represent 13.7 percent of regional county emissions.

In addition, according to 40 CFR Part 93, Subpart B (*Determining Conformity of General Federal Actions to State or Federal Implementation Plans*), Section 153 (g)(1) this change would be presumed to conform because it would not:

- cause or contribute to any new violation,
- interfere with provisions in the Utah ozone maintenance plan,
- increase the frequency or severity of any existing violation, or
- delay and/or conflict with any ongoing emission reduction efforts.

Under ACC Scenario 2, when compared to baseline conditions, criteria pollutant emissions would experience changes that would not exceed their major source thresholds; therefore, no further conformity analysis is required. While some aircraft operations could coincide with construction activities during the beddown process, it is not anticipated that this overlap would cause emissions to exceed *de minimis* levels or major source thresholds. In terms of GHGs, there would be an incremental decrease of CO_2e regional emissions.

ACC Scenario 3

ACC Scenario 3 would base 72 F-35A aircraft, replacing the existing 48 F-16C aircraft at Hill AFB. Under ACC Scenario 3, both construction and operational activities would result in air pollutant emissions. Construction and operational emission assumptions are the same as those presented under ACC Scenario 1.

Construction

ACC Scenario 3 construction would primarily occur in 2014 and 2015, with minor internal construction and renovation activities occurring from 2016 through 2018. Construction related emissions would be similar to those presented in Table HL3.3-2 with minor increases in 2016 through 2018. As is the case for ACC Scenario 1, the results indicate that projected annual construction emissions would not exceed *de minimis* thresholds for NO_x, VOCs, SO_x, and $PM_{2.5}$ or represent significant regional contributions. Therefore, no further conformity analysis is required to implement ACC Scenario 3 construction activities at Hill AFB. Additionally, construction-related emissions of CO and PM_{10} would be well below 250 tons-per-year major Prevention of Significant Deterioration permitting threshold, indicating emissions are not significant.

Operations

Air quality impacts from operations associated with ACC Scenario 3 were first determined by evaluating the net change in emissions associated with replacing 48 F-16C aircraft with 72 F-35A aircraft. Table HL3.3-5 summarizes annual emissions projected under ACC Scenario 3 compared to baseline emissions and regionally for the two counties. While some aircraft operations could coincide with construction activities during the beddown process in 2015 to 2018, this overlap would not cause emissions to exceed *de minimis* levels or major source thresholds. For example, in 2015 (the year in which the most construction takes place), emissions added to operational activities would be as follows: CO 172.62 tons, NO_x 282.54 tons, VOCs 8.97 tons, SO_x 23.48 tons, PM_{10} 8.59 tons, and $PM_{2.5}$ 3.72 tons. Please note that these emissions represent the greatest amount that could be generated if all F-35A aircraft were operating in 2015; however, this would not be the case. Aircraft would be phased in and at no time would emissions exceed *de minimis* levels under ACC Scenario 3 when compared to baseline (i.e., there would still be a net reduction in overall emissions).

Table HL3.3-5. Proposed Annual Operational Emissions under ACC Scenario 3 at Hill AFB

Activity	***Pollutants in Tons per Year***						
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
F-35A Aircraft	47.89	258.89	1.86	18.21	1.25	1.25	78,926.19
Engine Run-ups	1.41	0.28	0.04	0.06	0.00	0.00	264.56
AGE[2]	19.83	17.68	1.07	4.98	1.61	1.56	4,615.93
POVs	91.31	4.13	5.31	0.09	0.24	0.24	4,388.48
Total Annual ACC Scenario 3 Emissions	**160.44**	**280.98**	**8.28**	**23.35**	**3.10**	**3.10**	**83,580.79**
Baseline Annual Emissions	551.16	411.13	94.13	12.38	59.28	53.78	93,256
% Davis Contribution	0.44	3.21	0.06	5.04	0.26	0.44	-
% Weber County Contribution	0.52	4.53	0.06	20.55	0.28	0.58	-
Net Change	***-390.73***	***-130.16***	***-85.85***	***10.97***	***-56.18***	***-50.68***	***-9,675.04***
***de Minimis* Thresholds**	**-**	**100**	**100**	**100**	**-**	**100**	**-**
Major Source Threshold	**250**	**-**	**-**	**-**	**250**	**-**	**-**

Notes:
[1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR 98, Subpart A, Table A-1) in metric tons per year.
[2]With 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.

Data indicate that beddown of 72 F-35As at Hill AFB would result in net emission decreases for all criteria pollutants, with the exception of SO_x. These net changes would be well below *de minimis* levels. Even SO_x which would contribute only an additional 10.97 tons per year (plus 0.13 for construction emissions) when compared to baseline, and thus would not exceed the 100-ton threshold. Regionally, F-35A operations (including aircraft, AGE, and commuting personnel) would generate no more than 5 percent of any criteria pollutant in Davis County. For Weber County, regional contribution of F-35A emissions would be no more than 5 percent for the majority of criteria pollutants, the only exception would be SO_x which would represent 21 percent of regional county emissions.

In addition, according to 40 CFR Part 93, Subpart B (*Determining Conformity of General Federal Actions to State or Federal Implementation Plans*), Section 153 (g)(1) this change would be presumed to conform because it would not:

- cause or contribute to any new violation,
- interfere with provisions in the Utah ozone maintenance plan,
- increase the frequency or severity of any existing violation, or
  delay and/or conflict with any ongoing emission reduction efforts.

Under ACC Scenario 3, when compared to baseline conditions, criteria pollutant emissions would experience changes that would not exceed their major source thresholds; therefore, no further conformity analysis is required. While some aircraft operations could coincide with construction activities during the beddown process, it is not anticipated that this overlap would cause emissions to exceed *de minimis* levels or major source thresholds. In terms of GHGs, there would be an incremental decrease of CO_2e regional emissions associated with ACC Scenario 3 operations.

Climate Change Adaptation

In addition to assessing the greenhouse gas emissions that would come from ACC Scenarios 1 through 3, and the potential, albeit negligible, impact on climate change, the analysis must also assess how climate change might impact the proposed action and mission. Then, it must identify 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 Hill AFB, adaptation issues requiring evaluation and consideration could revolve around changes in winter and summer temperatures, as well as drought and aridity in the Southwest. 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 Utah and the Southwest. Predicted increases in average temperatures and longer, hotter summers might require the ACC and AFRC 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 southwest Asia where plus 100 degrees Fahrenheit (°F) temperatures are common, such conditions would likely fall within a manageable range for fulfilling the mission. Conversely, shorter winters resulting from the same predicted climate change would reduce currently existing issues with cold weather maintenance and operations. It could also reduce the number of days affected by “unflyable” weather. 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.

The report projects average sea level increases ranging from 1 to 2 feet by the year 2100 depending upon the emission scenario. Hill AFB lies at an elevation of about 4,800 feet MSL and over 600 miles from the ocean. Given these factors, even the greatest projected rise in sea level would not affect the infrastructure at Hill AFB.

Predictions from the report suggest that the Southwest could face droughts, scarcity of water supplies, and wildfire. Reduced availability of freshwater is likely to occur, with implications for the base and communities in the arid region encompassing Hill AFB. 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. Although surrounded by urban lands, Hill AFB 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.

HL3.3.2 Airspace

It is not anticipated that flight operations in special use airspace would affect regional air quality nor substantially alter existing GHG emissions under any of the scenarios. First, the areas underlying almost all airspace units in which the aircraft would operate are in attainment (Davis County excepted); second, over 95 percent of operations would occur above 5,000 feet AGL (see Table 2-7) and thus take place above the mixing height of 3,000 feet AGL; third, as identified in Section HL3.3.1.2 replacing F-16 aircraft with F-35A aircraft would reduce pollutant emissions within the airfield environment for every criteria pollutant; 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, projected airspace operations under any action scenario would not affect regional air quality. 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.

HL3.4 Safety

Aircraft safety addresses Accident Potential Zones (APZs), aircraft mishaps, bird/wildlife-aircraft strike hazards (BASH), and fuel dumping. 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 requirements, and no changes to existing ground safety procedures would occur. The affected environment includes the airfield and airspace in which Hill AFB aircraft operate.

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 appropriately fit local operation and land use considerations, the northern APZ I at Hill AFB is 8,000 feet long and 3,000 feet wide; the northern APZ II is 3,000 square feet. The southern APZs at Hill AFB have been modified due to the hazard presented by the mountains east of Hill AFB. The southern APZ I is not the typical rectangular shape and is somewhat wider than usual. The southern APZ I is an average of 5,200 feet wide by 5,000 feet long. The southern APZ I configuration is retained along the extended runway centerline. The southern APZ II has been omitted because departing traffic from Runway 14 initiates a right turn within 2 nm of the TACAN system, prior to the south boundary of APZ.

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).

HL3.4.1 Base

HL3.4.1.1 Affected Environment

The affected environment for safety includes the airfield at Hill AFB and its immediate vicinity. Aircraft flight operations from Hill AFB are governed by standard flight rules. Specific safety requirements are contained in standard operating procedures that must be followed by all aircrews operating from the airfield (Hill AFB Instruction 13-201, Air Traffic Control and Flight Operations) to ensure flight safety. In the last 10 years, there have been seven Class A aircraft accidents at Hill AFB, while over 266,000 airfield operations have been conducted, resulting in a mishap rate of 2.63 (AFSC 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 HL3.4-1) (AFSC 2010).

According to the Air Force Safety Center BASH statistics, more than 50 percent of bird/wildlife strikes occur below 400 feet, and 90 percent occur at less than 2,000 feet AGL (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 BASH (AFSC 2009b).

Hill AFB has an effective, on-going BASH program through which information and assistance is freely shared between airfield users and the local air traffic controllers. Since 2007, BASH-related accidents within the Hill AFB airfield area have yielded 26 incidents with no Class A mishaps (personal communication, Gendreau 2010).

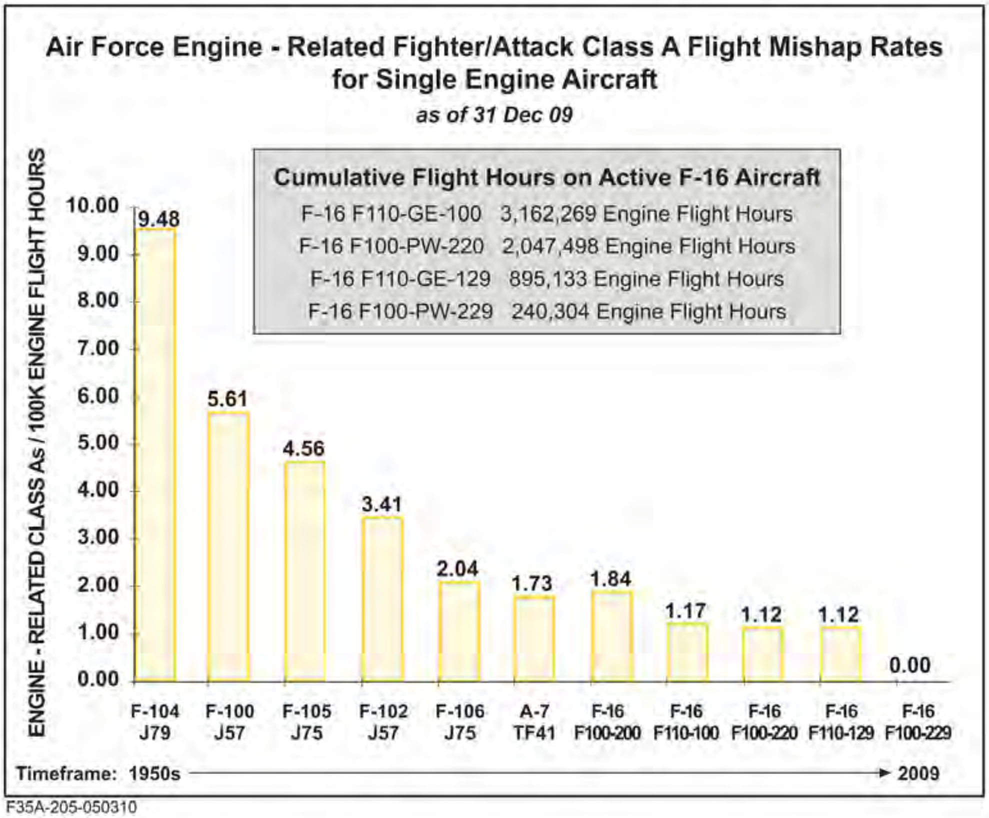


Figure HL3.4-1. Air Force Engine-Related Mishap Rates

Source: AFSC 2010.
Note: "Engine-related" excludes mishaps caused by Foreign Object Damage, BASH, or failure of support systems external to the engine (e.g., fuel starvation).

Deer can be found in areas north and east of the runway and in fields at the north end of Hill AFB outside the airfield proper. Deer are closely monitored by 75 CEG/CEVR to ensure they do not enter the runway or airfield environment. The Hill AFB BASH Plan has an airfield deer removal protocol should deer enter the airfield environment (AFSC 2009b).

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 MSL, 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.

HL3.4.1.2 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 life time) (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 projected 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 2012 are provided in Table HL3.4-1.

Table HL3.4-1. F-22A Class A Flight Mishap History

Year	Class A		Destroyed		Fatal		Hours Flown per Year	Cumulative Flight Hours
	Number of Mishaps	Rate[1]	A/C	Rate	Pilot	All		
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
FY10	0	0	0	0	0	0	24,675	94,519
FY11	1	6.54	1	6.54	1	1	15,289	109,808
FY12	3	11.32	0	0	0	0	26,507	136,315
Lifetime	**10**	**7.34**	**3**	**2.20**	**2**	**2**	**-**	**136,315**

Source: AFSC 2013.
Note: [1]Mishap rate is based on 100,000 hours of flight.
[2]One 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 F-16 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 F-16 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 includes all facets of flight operations and comprehensive emergency procedures. The sophistication and fidelity of current simulators and related computer programs are commensurate with the advancements made in aircraft technology. These factors should minimize risk associated with F-35A mishaps due to pilot error.

There would be decreases in operations under all scenarios 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.

While the proposed decrease in airfield flight operations does lessen the potential for aircraft incidents, it is statistically modest. With seven aircraft incidents occurring in the airfield vicinity during a 10-year period, the average number of aircraft incidents is one per every 1.4 years. Decreasing flight operations would decrease the potential number of aircraft incidents as shown in Table HL3.4-2, based on historical records. In addition, current airspace safety procedures discussed previously would continue to be implemented and additional airfield flight operations would adhere to established safety procedures.

Table HL3.4-2. ACC Scenarios 1 through 3 Comparison

ACC Scenario	*Percentage Airfield Operations Change from Baseline*	*Number of Years Expected Between Aircraft Accidents at Hill AFB*
1	-50.1%	2.2
2	-27.2%	1.9
3	-4.4%	1.5

Source: AFSC 2010.

The F-35A will have the capacity to dump fuel for emergency situations and would follow all procedures similar to those currently required by the F-16 aircraft.

HL3.4.2 Airspace

HL3.4.2.1 Affected Environment

The airspace directly associated with the proposed action at Hill AFB includes Restricted Areas, MOAs, and ATCAAs (see Figure HL2.2-1), known collectively as the UTTR. The volume of airspace encompassed by the combination of airspace elements constitutes the region of influence for airspace safety. UTTR training airspace includes the Gandy MOA/ATCAA, Lucin MOAs/ATCAAs, Sevier MOAs/ATCAAs, White Elk MOA/Currie Tippet ATCAA, R-6402, R-6404, R-6405, R-6406, and R-6407. 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 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 UTTR are governed by standard flight rules. Additionally, under the Commander 388 FW, the 388 Range Squadron is the designated operating agency for the range and is responsible for the overall management, control, and safety of the UTTR. This includes airspace management, and scheduling and controlling all range assets. UTTR activity must comply with Air Force Instruction (AFI) 13-212, *Range Planning and Operations*, and supplements/addendums (Hill AFB 2011).

Self-protection flares (i.e., decoy flares) are authorized for use above 2,000 feet AGL on all UTTR ranges and within MOAs (Hill AFB 2005). 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 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. Vegetation on the UTTR is sparse.

Since 1986 when records for UTTR fire events began, unplanned fires involving wild lands have occurred mostly in live ordnance bombing/testing areas throughout the range. Weather and careless use/disposal of ignition sources have also contributed to several of the fires. From 1986 to 2007, there have been 139 fires, with an average of seven fire events a year (Hill AFB 2007a). The greatest number of fires occurred in 1996, with 20 fire events, while 1990 only recorded two (Hill AFB 2007a). Fire-fighting mutual aid agreements exist between the UTTR Fire Department and Utah Bureau of Land Management (BLM) and several cities and entities around the range (Hill AFB 2007a).

Historic information for the last 3 years for the UTTR airspace indicates that 22 bird/wildlife-aircraft strikes have occurred (personal communication, Gendreau 2010) with no Class A mishaps. These data reflect total strikes experienced by all users of the airspace, not just aircraft from Hill AFB.

HL3.4.2.2 Environmental Consequences

Under the proposed action, the overall decrease in F-35A airspace and range training operations in the UTTR airspace would incrementally decrease the potential for aircraft accidents or mishaps. Additionally, 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 operations at the UTTR, impacts to aviation safety are considered to be negligible.

Under ACC Scenarios 1, 2, and 3, the F-35A would operate in the same airspace environment as the current aircraft, but with fewer UTTR training operations under Scenarios 1 and 2. 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 current Hill AFB F-16 aircraft. In addition, F-35A aircrews operating in the UTTR training airspace would be required to follow applicable procedures outlined in the Hill AFB 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 each range. Hill AFB F-16 aircraft deployed approximately 31,630 flares annually; the F-35A would likely deploy considerably fewer flares than F-16 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 pounds/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 device, which would strike the ground with a momentum of 0.16 pounds/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. A Safe and Initiation 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, within the UTTR airspace under the 72 aircraft scenario (#3), 31,600 flares would be deployed annually within the 8,900 square-mile airspace. Large portions of the UTTR consist of ranges with access for only official personnel. It is estimated, therefore, that this area contains an approximate population density of 1 person 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 0.00044 per year. Actual potential for strikes would likely be less than this very low probability due to the scarcity of populations in the affected area.

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.

HL3.5 Geology, Soils, and Water

HL3.5.1 Base

HL3.5.1.1 Affected Environment

Geology

Hill AFB is located in Davis and Weber Counties in north-central Utah, just west of the Wasatch Mountains and east of the Great Salt Lake. The base sits on an alluvial bench composed of Quaternary deposits that formed during the Pleistocene Epoch as part of the Weber Delta District, which formed when the Weber River emptied into Lake Bonneville (Hill AFB 2007a). The base is located within the Basin and Range physiographic province that is characterized by numerous north-south oriented, fault-tilted mountain ranges separated by intervening, broad, sediment filled basins. Rocks within the Basin and Range province vary widely in age and composition. Valley-fill deposits consist mostly of late Cenozoic lakebeds and alluvium, as much as 10,000 feet thick (Utah Geological Survey 2010). Hill AFB also sits within the Intermountain Seismic Belt and is west of the Wasatch Fault, one of the most active faults in Utah (Utah Geological Survey 1996).

Topography

The land of Hill AFB is generally a broad, flat alluvial plain, with little topographic relief. Land elevation for the base is about 4,800 feet above MSL (Hill AFB 2007a).

Soils

Soils at Hill AFB are composed of sands and gravels, with some silts and clays. There are ten soil complexes identified within base boundaries, which are as follows: Ackmen, Francis, Hillfield, Kidman, Kilburn, Layton, Marriott, Parleys, Preston, and Timpangos. These soils are very deep, well-draining, moderately permeable, and moderately prone to erosion (Hill AFB 2007a).

Surface Water

There are no streams, rivers, or lakes located within the boundaries of Hill AFB. As such, the base has no surface water rights in the State of Utah. However, there are 20 man-made, stormwater ponds scattered throughout the base (Figure HL3.5-1). Most are dry throughout the year, but a few retain enough water to be important habitats for wildlife (Hill AFB 2007a).

Groundwater

Hill AFB gets its water from the Delta Aquifer. The water from this aquifer originates in the Wasatch Mountains to the east and flows westward to the Great Salt Lake. The Delta Aquifer is composed of mostly coarse-grained, Tertiary-age stream and delta sediments with the top of the aquifer being 500 to 700 feet below the ground surface, and being 50 to 200 feet thick (Utah Geological Survey 2010). Reports from the U.S. Geological Survey state that the aquifer level has dropped 40 feet since 1950, indicating that the water is being used faster than the aquifer can recharge. See Community Facilities and Public Services Section HL3.13 for more detailed information on capacity.

Figure HL3.5-1. Stormwater Ponds in Relation to Proposed Construction/Demolition at Hill AFB

Floodplains

There are no floodplains within the base boundaries.

HL3.5.1.2 Environmental Consequences

ACC Scenario 1

Under ACC Scenario 1, a total of 3.37 acres would be disturbed for proposed construction. However, only 0.26 acres of new impervious surface would be added to the base. Most of the construction would occur on areas of the base that have been previously disturbed or are currently occupied by existing buildings or structures. As such, no adverse impacts to geology, topography, and soils would occur. A site-specific Stormwater Pollution Prevention Plan (SWPPP) would be developed as part of the construction contract and approved by the base prior to construction taking place (Peterson 2010). This would minimize any negative impacts from stormwater to surface water. No impacts to surface water, ground water, or floodplains would occur from implementation of plans under ACC Scenario 1.

ACC Scenario 2

Under ACC Scenario 2, a total of 4.27 acres would be disturbed, with a total of 0.5 acre of new impervious surface added to the base. Construction would occur on areas of the base that have been previously disturbed. No adverse impacts to geology, topography, and soils would occur. As with ACC Scenario 1, site specific SWPPPs would be required as part of the construction contract and would be used to minimize any impacts from stormwater to surface water. No impacts to surface water, groundwater, or floodplains would occur from implementation of ACC Scenario 2.

ACC Scenario 3

Under ACC Scenario 3, a total of 5.25 acres of land would be disturbed. Of this, only 0.68 acre of new impervious surface would be added. Construction would occur on areas of the base that have been previously disturbed. No adverse impacts to geology, topography, and soils would occur. Site specific SWPPPs would be developed and implemented to minimize any potential impacts from the additional impervious surface. SWPPPs would also include measures to minimize impacts from stormwater runoff and erosion potential during construction activities. No adverse impacts to surface water, groundwater, or floodplains would occur from implementation of ACC Scenario 3.

HL3.6 Terrestrial Communities (Vegetation and Wildlife)

HL3.6.1 Base

HL3.6.1.1 Affected Environment

The majority of Hill AFB is comprised of landscaped areas such as lawns, ornamental trees, or maintained open fields of grass. Grass species include non-native cheat grass (*Bromus tectorum*) and native grasses such as Kentucky bluegrass (*Poa pratensis*), common wildrye (*Secale cereal*), Indian rice grass (*Achnatherum hymenoides*), and squirrel tail (*Elymus elymoides*). The remaining vegetated portion of the base is comprised of native sagebrush (*Artemisia tridentata*) habitat primarily consisting of sagebrush and rabbit brush (*Ericameria nauseosa*), with an understory of cheat grass or native bunch grasses such as Indian grass or bluebunch wheatgrass (*Pseudoroegneria spicata*). However, the majority of this sagebrush is disturbed, with the exception of a small area in the northern and eastern portion of the base. Several areas have been invaded by the highly invasive forb, Dyer's woad (*Isatis tinctoria*) (Hill AFB 2007a).

Wildlife present on base consists primarily of wildlife tolerant of human activity and development. Common bird species include European starling (*Sturnus vulgaris*), ring-necked pheasant (*Phasianus colchicus),* horned lark *(Eremophila alpestris),* lazuli bunting *(Passerina amoena)* red-tailed hawk (*Buteo jamaicensis)*, Swainson's hawk (*Buteo swainsoni)*, and northern harrier (*Circus cyaneus)*. A small herd of mule deer (*Odocoileus hemionus*) (approximately 60) occupy habitat immediately adjacent to Hill AFB and frequently uses habitat on the base. Another common mammal species is the red fox (*Vulpes vulpes*) (Hill AFB 2007a and Air Force 2009b).

HL3.6.1.2 Environmental Consequences

Removal and potential disturbance of vegetation would be required for all scenarios. ACC Scenario 3 would disturb approximately 5.25 acres creating 0.68 acre of new impervious surface, while ACC Scenarios 1 and 2 would disturb approximately 3.37 acres and 4.27 acres respectively; creating 0.26 and 0.5 acres of new impervious surface respectively. However, nearly all of the area is highly disturbed, previously developed, or consists of landscaped or mowed grassy areas. The ecological value of this habitat is low and is further reduced by persistent disturbance as a result of daily activities. Due to its low habitat value and lack of native plant species, construction impacts to native vegetation would not occur for any scenario.

The removal of non-native plant communities as a result of any of the scenarios would not reduce the regional population numbers and distribution of common wildlife. The areas proposed for development are primarily disturbed or degraded, and common wildlife would be expected to relocate and utilize comparable habitat types both on and off of Hill AFB.

Annual military operations for F-35A at Hill AFB are proposed to decrease for ACC Scenarios 1, 2, and 3 by 50.1, 27.2, and 4.4 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, including those for migratory birds, to negligible levels (see Safety Section HL3.4).

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 F-16 aircraft, the number of times that an individual animal would be exposed, and the area that would be affected would decrease with all scenarios.

HL3.6.2 Airspace

HL3.6.2.1 Affected Environment

The airspace associated with Hill AFB covers 19,457 square miles of land within Utah and Nevada. It is found within the Great Basin, a part of the Basin and Range physiographic province. A variety of vegetation types can be found in this region, including sagebrush, salt desert shrub communities, vegetated and sparsely vegetated dunes, greasewood shrublands, lodgepole pine, quaking aspen, and pinyon-juniper (Bailey 1995).

Wildlife found under the training airspace includes a variety of birds, mammals, reptiles, amphibians, and invertebrates. Common bird species include those found on the base, with the addition of species such as the band-tailed pigeon (*Patagioenas fasciata)*, black-throated sparrow (*Amphispiza bilineata)*, Brewer's sparrow (*Spizella breweri)*, golden eagle (*Aquila chrysaetos)*, and Gambel's quail (*Callipepla gambelii)*. Common mammals include black bear (*Ursus americanus*), elk (*Cervus elaphus)*, moose (*Alces alces)*, black-tailed jack rabbit (*Lepus californicus*), pronghorn (*Antilocapra americana)*, and snowshoe hare (*Lepus americanus)*. Common reptiles and amphibians include the desert side-blotched lizard (*Uta stansburiana stejnegeri*) and the Great Basin spadefoot (*Spea intermontana)* (Bailey 1995).

HL3.6.2.2 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 under ACC Scenarios 1 and 2 by approximately 49 and 15 percent, respectively, and increase by approximately 18 percent under ACC Scenario 3. Decreased operations would result in a decreased opportunity for bird-aircraft strikes to occur. Section HL3.4 (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 strikes occur. In addition, current procedures for avoiding flight operations during periods of high concentrations of migratory birds (both in space and time) would continue. Adherence to the existing, effective BASH program would minimize the risk of bird-aircraft strikes (see Safety Section HL3.4) for ACC Scenario 3.

The only identified countermeasure that would be employed by F-35A during training operations is flares. Flare deployment would be equal to or less than current levels conducted by F-16 aircraft and would be used only in airspace units currently approved for its use. In addition, current restrictions on the amount or altitude of flare use would continue to apply. As a result, flare deployment associated with the proposed action would have no impact on terrestrial communities. Ordnance, such as JDAMS, would occur in ranges already authorized for their use.

Overall, impacts to wildlife from proposed changes in subsonic and supersonic 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 F-16 aircraft, the majority (95 percent) of the operations would occur above 5,000 feet AGL (operations under 5,000 feet AGL would occur less frequently than baseline operations), and under ACC Scenario 3, overflights below 5,000 feet AGL for the entire airspace would occur about three times per day compared to seven times per day under baseline conditions; 3) supersonic flight only would be conducted in areas authorized for such activities (South Range) above 15,000 feet MSL (with 80 percent occurring above 30,000 feet MSL) and the total number of supersonic flights occurring would decrease from baseline under ACC Scenarios 1 and 2; and 4) although supersonic flights would continue, this situation would not be measurably different than the conditions found under baseline and operations done by F-16 fighter aircraft; wildlife should be habituated to the noise (see Section HL3.2 for more details on noise).

HL3.7 Wetlands and Freshwater Aquatic Communities

HL3.7.1 Base

HL3.7.1.1 Affected Environment

There are no wetlands on the base, however there are a few small ponds created from water runoff and precipitation (see Figure HL3.5-1 and Soil and Water Section 3.5 for more details). These ponds provide habitat for a variety of fish, waterfowl, and shorebirds. Vegetation within these ponds includes plants such as pondweeds (*Potamogeton* spp.), water lilies (*Nymphaea* spp.) and smartweeds (*Polygonum* spp.) (Hill AFB 2007a). No other aquatic or wetland habitats occur on base.

HL3.7.1.2 Environmental Consequences

No wetlands have been identified on Hill AFB, and the few small ponds that occur are not located within the vicinity of the proposed project footprints. Therefore, construction activities under these scenarios would have no impact on wetlands and aquatic communities.

HL3.8 Threatened, Endangered, and Special Status Species/Communities

HL3.8.1 Base

HL3.8.1.1 Affected Environment

No federally listed or special status species or special status communities have been observed on base.

HL3.8.2.2 Environmental Consequences

Annual operations at Hill AFB are projected to decrease for ACC Scenarios 1, 2, and 3 by 50.1, 27.2, and 4.4 percent, respectively. While noise from an individual overflight for the F-35A would be higher than the F-16 aircraft, the number of times that an individual animal would be exposed would decrease with all scenarios. As a result there would be no impacts to listed species as a result of the proposed action on the base.

HL3.8.2 Airspace

HL3.8.2.1 Affected Environment

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 actions.

No federally listed species have been known to occur under the proposed airspace; however, two candidate species, the yellow-billed cuckoo (*Coccyzus americanus*) and the greater sage-grouse (*Centrocercus urophasianus*) occur in Utah and Nevada under the airspace.

The greater sage-grouse is a candidate species. On March 23, 2010, the U.S. Fish and Wildlife Service (USFWS) announced a 12-month finding on the petition to list the greater sage-grouse, finding that the listing was warranted but precluded by higher priority species (USFWS 2010). Greater sage-grouse prefer large, relatively open and undisturbed sage brush dominated communities. Breeding activity occurs in what is called a lek, which usually is found in open areas such as ridges, rocky knolls, or bare openings (Sage-Grouse Conservation Team 2004, Utah Division of Wildlife Resources [DWR] 2009).

The taxonomy of the yellow-billed cuckoo is debated, however most taxonomist separate it into two subspecies, eastern and western. The USFWS recognizes the yellow-billed cuckoos that occur in the western U.S. (generally west of the crest of the Rocky Mountains) as a Distinct Population Segment, and a Candidate Species. The yellow-billed cuckoo is found in disjunct fragments of dense riparian habitats, usually consisting of cottonwood and willow (Utah DWR 2010).

HL3.8.2.2 Environmental Consequences

Impacts to potentially occurring threatened, endangered, or special status species underlying Hill AFB airspace would be similar to those described within the terrestrial section (Section HL3.6). Analysis presented in Section HL3.6.2 for more common wildlife species underlying Hill AFB training airspace would also apply to threatened and endangered species. Under the proposed action for Hill AFB, the total annual number of operations by F-35As would decrease for ACC Scenarios 1 and 2, by 49 and 15 percent, respectively; and increase by 18 percent for ACC Scenario 3. The F-35As would also fly at higher altitudes than F-16 aircraft.

Overall, impacts to the yellow-billed cuckoo and the greater sage-grouse would be minimal due to the proposed change in subsonic and supersonic operations 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 F-16 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. Under ACC Scenario 3, overflights below 5,000 feet AGL for the entire airspace would occur about three times per day compared to seven times per day under baseline conditions. 3) Supersonic flight only would be conducted in areas authorized for such activities (South Range) above 15,000 feet MSL, with 80 percent occurring above 30,000 feet MSL. The total number of supersonic flights occurring would decrease from baseline under ACC Scenarios 1 and 2. 4) Although supersonic flights would continue, this situation would not be measurably different than the conditions found under baseline and operations done by F-16 fighter aircraft; wildlife should be habituated to the noise.

HL.3.9 Cultural and Traditional Resources

HL3.9.1 Base

HL3.9.1.1 Affected Environment

As defined in Chapter 3, section 3.10.2, the APE for Hill AFB consists of all areas of ground disturbance associated with proposed construction or remodeling activities. Aircraft operations and the areas affected by noise levels 65 dB DNL and greater also fall under the APE and are evaluated for their potential to affect historic structures and districts where noise vibrations could adversely impact those types of resources. For airspace operational effects, only those cultural resources that would reasonably be affected by visual (overflights) and noise intrusions are considered. These include architectural resources; archaeological resources with standing structures, such as historic ranches, ghost towns, American Indian settlements; and traditional cultural properties. Prehistoric and historic archaeological sites lacking standing structures are not included as they are generally ground surface or even subsurface deposits that would not be affected by implementing the basing alternatives.

Archaeological Resources

Survey efforts at Hill AFB have resulted in the survey of 12.5 percent of the total area and the recordation of one archaeological site. That site is ineligible for listing in the NRHP. Given the extensive development of the remaining 5,858.87 acres of Hill AFB, the potential for undisturbed archaeological deposits of significance is extremely low; therefore, there is no need for additional archaeological survey of Hill AFB (Hill AFB 2007b). However, an Unanticipated Discovery Plan is in place should archaeological remains be recovered on base.

Architectural Resources

Based on the recommendations from two major architectural surveys (Salo *et al.* 2003, 2007b), Hill AFB determined that there are 127 buildings and structures that are considered eligible either individually or as contributing elements to an historic district on Hill AFB proper. These structures include three historic districts located on Hill AFB --Ogden Arsenal/Ogden Air Materiel Area (AMA) Historic District (112 buildings and structures), the Hill Field Historic Housing District (6 buildings and structures), and the Strategic Air Command District (6 buildings and structures). Seven buildings and structures on Hill AFB are individually eligible for listing in the NRHP (Hill AFB 2008).

The Ogden Arsenal/Ogden AMA Historic District is associated with World War I, World War II, and the Cold War. The Hill Field Historic Housing District, comprised of six buildings, is considered eligible for listing in the NRHP under Criterion A for its association with World War II. The Strategic Air Command facilities on the eastern side of Hill AFB is also recommended eligible for listing in the NRHP as a proposed district under Criterion A for its association with the Cold War.

Traditional Resources

No traditional cultural properties have been identified on Hill AFB. Given the extensive development on Hill AFB, the potential for undisturbed archaeological resources associated with American Indians is extremely low.

HL3.9.1.2 Environmental Consequences

ACC Scenario 1

Under this scenario, multiple buildings/structures would be altered, renovated, or demolished (30, 41, 42, 45E/W, 48, 62, 119, 125, 891, 1391, 1411, and 1494). Seven buildings/structures are either elements of infrastructure or are not yet historic (41, 62, 118, 119, 125, 891, and 1411). Four buildings (30, 42, 45E, and 48) have been determined ineligible for listing on the NRHP. Two of the buildings (storage igloos 1391 and 1494) are contributing elements of the Ogden Arsenal/Ogden AMA Historic District; however, demolition of Buildings 1391 and 1494 was mitigated through a Memorandum of Agreement dated February 2005 between Hill AFB and the Utah SHPO.

One 388 EMS munitions storage igloo would be constructed within the boundaries of the Ogden Arsenal/Ogden AMA Historic District; however the general size and function of the structures would be similar to existing munitions storage igloos within the proposed historic district. The visual impact to the Ogden Arsenal/Ogden AMA Historic District would not be considered an adverse effect to the district.

No NRHP-listed or eligible archaeological sites or traditional cultural properties would be impacted under this beddown scenario. Concurrence of no adverse effects within the APE was received from both the Utah and Nevada SHPOs. Therefore, under ACC Scenario 1, there would be no adverse effect to historic properties. No Tribes identified properties of religious or cultural significance in the APE.

ACC Scenario 2

Under this scenario numerous buildings/structures would be altered, renovated, or demolished (5, 30, 41, 42, 45E, 45W, 48, 62, 118, 119, 125, 891, 1391, 1411, and 1494). Seven buildings/structures are either elements of infrastructure or are not yet historic (41, 62, 118, 119, 125, 891, and 1411). Four buildings (30, 45E, 45W, and 48) have been determined ineligible for listing on the NRHP. Two of the buildings (storage igloos 1391 and 1494) are contributing elements of the Ogden Arsenal/Ogden AMA Historic District; however, demolition of Buildings 1391 and 1494 was mitigated through a Memorandum of Agreement dated February 2005 between Hill AFB and the Utah SHPO. Building 5 is eligible for listing in the NRHP as a World War II administrative building, built in the International Style. Level II HABS/HAER documentation, which provides photographic documentation of the outside of the structure, has been done for Building 5 (Hill AFB 2007) Since the proposed alteration would consist of interior modifications and since the building was originally used for administrative services, these modifications would not adversely affect the eligibility of Building 5.

One 388 EMS munitions storage igloos would be constructed within the boundaries of the Ogden Arsenal/Ogden AMA Historic District. As described under ACC Scenario 1, this visual impact to the Ogden Arsenal/Ogden AMA Historic District would not be considered an adverse effect to the district.

No NRHP-listed or eligible archaeological sites or traditional cultural properties would be impacted under this beddown scenario. Concurrence of no adverse effects within the APE was received from both the Utah and Nevada SHPOs. Therefore, under ACC Scenario 2, there would be no adverse effect to historic properties. No Tribes identified properties of religious or cultural significance in the APE.

ACC Scenario 3

Under this scenario sixteen buildings/structures would be altered, renovated, or demolished (5, 30, 40, 42, 43, 45E, 45W, 48, 62, 118, 119, 125, 891, 1391, 1411, and 1494). Seven buildings/structures are either elements of infrastructure or are not yet historic (41, 62, 118, 119, 125, 891, and 1411). Six buildings (30, 42, 43, 45E, 45W, and 48) have been determined ineligible for listing on the NRHP. Two of the buildings (storage igloos 1391 and 1494) are contributing elements of the Ogden Arsenal/Ogden AMA Historic District; however, demolition of Buildings 1391 and 1494 was mitigated through a Memorandum of Agreement dated February 2005 between Hill AFB and the Utah SHPO. Building 5 is eligible for listing in the NRHP as a World War II administrative building, built in the International Style. Level II HABS/HAER documentation, which provides photo documentation of the outside of the structure, has been done for Building 5 (Hill AFB 2007). Since the proposed alteration would consist of interior modifications, these modifications would not adversely affect the eligibility of Building 5.

Two 388 EMS munitions storage igloos would be constructed within the boundaries of the Ogden Arsenal/Ogden AMA Historic District. As described under ACC Scenario 1, this visual impact to the proposed Ogden Arsenal/Ogden AMA Historic District would not be considered an adverse effect to the district.

No NRHP-listed or eligible archaeological sites or traditional cultural properties would be impacted under this beddown scenario. Concurrence of no adverse effects within the APE was received from both the Utah and Nevada SHPOs. Therefore, under ACC Scenario 3, there would be no adverse effects to historic properties. No Tribes identified properties of religious or cultural significance in the APE.

HL3.9.2 Airspace

HL3.9.2.1 Affected Environment

Hundreds of prehistoric archaeological sites are located under the Hill AFB airspace. These sites consist of lithic scatters, which contain stone tool artifacts or the remnants of their production; complex assemblage sites, which contain lithic artifacts, fire-cracked rock (associated with food preparation) and burned stone; lithic scatters with fire-cracked rock; and lithic scatters with groundstone (associated with plant processing or stone tool production). These sites date to the full range of known prehistoric time periods for the area, including Paleoindian, Archaic, Late Prehistoric, and Fremont.

Eight structures, located off Air Force property, beneath the affected airspace are listed on the NRHP: American Legion Hall in McGill, Nevada; Bonneville Salt Flats Race Track in Wendover, Utah; Central Pacific Railroad Grade Historic District near Umbria junction in Utah; Desert Experimental Range Station Historic District in Milford, Utah; Iosepa Settlement Cemetery in Iosepa, Utah; Lincoln Highway Bridge within the Dugway Proving Ground, Utah; Tanner, A. N., House in Grouse Creek, Utah; and Topaz War Relocation Center Site in Delta, Utah (NRHP 2010).

A search of ghost towns on lands underlying affected airspace revealed the presence of 52 ghost towns. Several of the ghost towns contain standing wood/log structures associated with historic mining, ranching, stage or Pony Express routes, or railroad stations. Most of the ghost towns have not been subjected to professional archaeological and/or architectural assessments.

The Confederated Tribes of the Goshute Indian Reservation and the Skull Valley Band of Goshute Indian Reservation are located under the affected airspace.

Hill AFB has had an active American Indian consultation program since 2005 with 18 tribes identified in an ethnographic study as having ancestral ties to Hill AFB-managed properties. Hill AFB holds annual meetings with interested Tribes to offer these Tribes a chance to ask questions, state concerns, and receive updates regarding Hill AFB-managed properties, the cultural resources located on these lands, and any projects that may have had an effect on these cultural resources. In addition to consultation letters described above, a government-to-government meeting with the Confederated Tribes of the Goshute Indians was held on August 5, 2010. Noise issues pertaining to the Reservation and surrounding area were discussed. Additionally, the proposed action was discussed at three of the annual American Indian Tribe meetings held in late August 2010, 2011, and 2012.

HL3.9.2.2 Environmental Consequences

There would be no impacts to cultural resources due to the implementation of the proposed action under any of the scenarios. Aircraft operations would decrease under ACC Scenarios 1 and 2, by 49 and 15 percent, respectively and increase 18 percent in all airspace units, except White Elk/Currie Tippet, under ACC Scenario 3. While subsonic noise levels would perceptibly change in the majority of airspace units (see Figure HL3.2-5), these increases would not be adverse to underlying cultural resources. Noise levels would still fall below the 65 dB DNL standard used to assess effects on communities (see discussion in Appendix C, Section C1.3.1).

Sonic booms in authorized airspace would increase negligibly from 2 per day to 2.7 per day under ACC Scenario 3 and decrease perceptibly under ACC Scenarios 1 and 2 (see Figure HL3.2-5). However, supersonic operations are not permitted in airspace overlying American Indian reservations. The minor increase experienced under ACC Scenario 3, therefore, would not result in changes to the auditory setting to listed or eligible archaeological, architectural, or traditional resources. This includes ghost towns and other historic structures where over pressures from sonic booms would average less than 2 psf or less; levels at which research has shown that impacts to structures are minimal (see Appendix C, Sections C2.8.2 and C10 as well as Battis 1988, Haber and Nakaki 1989).

Visual intrusions under the proposed action due to overflights would be minimal and would not represent an increase over baseline conditions sufficient to cause adverse impacts to the settings of cultural resources. Due to the high altitude of the overflights, small size of the aircraft, and the high speeds, the aircraft would not be readily visible to observers on the ground. Indeed, at an altitude of 8,000 feet AGL, an F-35A would appear about 0.07 inches in size.

Use of ordnance and defensive countermeasures would occur in areas already used for these activities. No additional ground disturbance would occur under the airspace due to the proposed action. Flares deployed from the aircraft would not pose a visual intrusion either for the following reasons: flares are small in size and burn only for a few seconds and the high relative altitude of the flights would make them virtually undetectable to people on the ground. Overall, flares are unlikely to adversely affect cultural resources. Therefore, the introduction of material to archaeological sites or standing structures from the use of flares would not have an adverse effect on these resources.

Given the current use of the airspace and the nature of the proposed future use of the project area, there would be no adverse impact to NRHP-eligible or listed archaeological resources, architectural resources, or traditional cultural properties. Therefore, under all scenarios, no effect to historic properties is expected from the proposed action. Section 106 consultation and agreements on the effects of the proposed action on historic properties were completed with the Utah and Nevada SHPOs and both concurred with the Air Force determination of no adverse effects in the APE.

In January 2010 and again in August 2012, government-to-government consultation letters were sent to the following American Indian groups informing them about the proposed project and requesting their concurrence with the Air Force determination of no effect within the APE.

- Blackfeet Tribe
- Confederated Salish and Kootenai Tribes of the Flathead Reservation
- Confederated Tribes of the Goshute Indian Reservation
- Crow Tribe of Montana
- Eastern Shoshone Tribe
- Hopi Tribe
- Navajo Nation
- Northern Arapaho Tribe
- Northwest Band of Shoshone Nation
- Paiute Indian Tribe of Utah
- Pueblo of Zuni
- San Juan Southern Paiute Tribe
- Shoshone-Bannock Tribes of the Fort Hall Reservation
- Shoshone –Paiute Tribes of the Duck Valley Indian Reservation
- Te-Moak Tribe of Western Shoshone
- Ute Indian Tribe
- Ute Mountain Indian Tribe
- Wells Band Council
- White Mesa Ute Council

Despite verifying that the letters were delivered and requesting concurrence within 30 days of receipt of the letters, only two out of the 19 responded. The Hopi Tribes had no comment and the Confederated

Tribes of the Goshute Indian Reservation (Goshute Tribe) requested further information. Hill AFB provided further information and met with the Goshute Tribe and this resulted in their concurrence of no adverse effects would occur resulting from this proposal. Hill AFB will continue to actively communicate with the Goshute Tribe to ensure government-to-government consultation continues.

HL3.10 Land Use

HL3.10.1 Base

The following section describes the existing conditions and examines the extent to which the beddown of the F-35A at Hill AFB 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 alternatives for the proposed action, local zoning categories were consolidated and/or renamed. Table HL3.10-1 provides a cross-reference between the Davis and Weber County classifications and those used in the impact analysis.

Table HL3.10-1. Land Use Categories

County Land Use Classification	*EIS Land Use Classification*
Multi-family Residential, Single Family Residential	Residential
Institutional, Office, Retail	Commercial
Industrial, Utilities	Industrial
Common, Government	Public/Quasi Public
Hill AFB	Military
Agriculture, Forest, Cemetery	Open/Agricultural
No Data	Unclassified

HL3.10.1.1 Affected Environment

Hill AFB covers approximately 6,723 acres. The majority of the base is open space with developed areas located in the southern and western portion of the base. Residential areas are located in the southwestern areas of the base. The northern and eastern portions of the base are primarily vacant and not available for development.

General siting criteria have been established for land development and use at military airfields. For example, APZs, which address height restrictions, development density, and land use in and around military airports, are enforced to reduce the potential for aircraft-related hazards. Clear Zones are established at each end of a runway and are 3,000 feet wide by 3,000 feet long. The DoD requires that control of the land within each Clear Zone be acquired through purchase, lease, or easement to minimize exposure and prevent obstructions. Land use within a Clear Zone is restricted to utility lines, roadways, and limited agricultural uses. Hill AFB has a single runway. Both the northern and southern Clear Zones are contained within the base boundary (Hill AFB 2010b).

APZ I is normally a 3,000-foot wide by 5,000-foot long area immediately beyond the Clear Zone. Although farther from the end of the runway, this zone still possesses a significant potential for accidents. Land use within APZ I allows for limited industrial and retail activities, outdoor recreation, and virtually unlimited agricultural uses. APZ II is a continuation of APZ I that is normally 3,000 feet wide and 7,000 feet long. This zone still has a measurable potential for accidents. Land use in APZ II excludes facilities for public gatherings and limits dwellings to two single units per acre (Hill AFB 2010b).

Local conditions and flight patterns at Hill AFB require a modification of the south Clear Zone and the APZs. Off the north end of the runway, APZ I extends for 8,000 feet and APZ II extends an additional 3,000 feet, primarily due to the proximity of the Ogden-Hinckley Airport. To the south of the runway, the Clear Zone has been modified to follow property lines, and APZ I widens to the west as it extends south. APZ II is omitted since departing traffic initiates a right turn within two nautical miles of the base TACAN system. Current land use in the APZs is agricultural. The State of Utah has purchased land use easements for property in the APZs. The easements restrict the use of the land within the APZs per AICUZ requirements. South Weber restricts development in APZs, and Riverdale City allows only agricultural use within the APZ (Hill AFB 2010b).

Existing Aircraft Noise and Land Use Compatibility Surrounding the Base

Land use activities most sensitive to noise typically include residential and commercial areas, public services, and areas associated with cultural and recreational uses. Noise measurements 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 DoD has established noise compatibility criteria for various land uses. According to these criteria, noise levels equal to or less than 65 dB DNL are compatible with land uses such as residences, transient lodging, and medical facilities.

Hill AFB is located in Davis and Weber Counties in Utah. The two largest cities near the base are Salt Lake City, located approximately 25 miles to the south and Ogden, located approximately 7 miles to the north. The area surrounding the base is suburban, with areas of agricultural use interspersed with areas of low-to-medium density residential development. Smaller nearby communities include Layton to the south, Sunset and Clearfield to the west, Roy and Riverdale to the north, and South Weber to the southeast. To the south of the base, commercial development occurs along SR-232, SR-193, and SR-108. Development is generally constrained to the east by the Wasatch Front and to the west by the Great Salt Lake.

The AICUZ program is a DoD program that addresses public health and safety through an analysis of aircraft noise, aircraft accident potential, and land use development in the areas surrounding military installations. Hill AFB published its latest AICUZ Study in 1993. The communities of South Weber and Layton, surrounding the base have incorporated the AICUZ study contours into their planning documents.

The City of South Weber recommends in its 2007 General Plan that no residential development be allowed inside the 75+ dB DNL noise contour area. In support of this recommendation, the State of Utah has purchased easements inside the 75+ dB DNL noise contour to prevent incompatible development. The plan further recommends that the most recent AICUZ report or other officially adopted Air Force noise study be used to determine the location of the 75 dB DNL noise contour. In Layton City, current out-leased parcels, as a result of the AICUZ plan, are proposed to remain undeveloped in the future Layton City plan. Also, industrial/manufacturing land uses are proposed for the area along the east and south of the base and will be compatible with identified noise impact zones (Hill AFB 2010b).

Table HL3.10-2 summarizes land use area acreage surrounding the base within the existing (baseline) noise level contours. Land uses in the areas surrounding the base include commercial, open/agricultural, and residential. Residential areas located south, north, and east of the base (689 acres) are currently exposed to aircraft noise levels greater than or equal to 65 dB DNL. However, no residential areas are currently exposed to noise levels greater than 75 dB DNL.

Table HL3.10-2. Off-Base Land Uses Affected by Noise Levels 65 dB DNL and Greater under all ACC Scenarios

Land Use Category	*65-70 dB DNL*			*70-75 dB DNL*			*75-80 dB DNL*			*80-85 dB DNL*			*85+ dB DNL*			*Totals*		
	Baseline	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*
ACC Scenario 1																		
Residential	621	273	-348	68	30	-38	0	0	0	0	0	0	0	0	0	689	303	-386
Commercial	391	141	-250	49	9	-40	1	0	-1	0	0	0	0	0	0	441	150	-291
Industrial	30	34	4	12	2	-10	0	0	0	0	0	0	0	0	0	42	36	-6
Public/Quasi Public	13	3	-10	24	29	5	9	1	-8	0	0	0	0	0	0	46	33	-13
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Open/Agricultural	492	312	-180	62	26	-36	0	0	0	0	0	0	0	0	0	554	338	-216
Unclassified	415	241	-174	128	52	-76	4	0	-4	0	0	0	0	0	0	547	293	-254
Total	**1,962**	**1,004**	**-958**	**343**	**148**	**-195**	**14**	**1**	**-13**	**0**	**0**	**0**	**0**	**0**	**0**	**2,319**	**1,153**	**-1,166**
ACC Scenario 2																		
Residential	621	451	-170	68	76	8	0	0	0	0	0	0	0	0	0	689	527	-162
Commercial	391	275	-116	49	29	-20	1	0	-1	0	0	0	0	0	0	441	304	-137
Industrial	30	35	5	12	12	0	0	0	0	0	0	0	0	0	0	42	47	5
Public/Quasi Public	13	20	7	24	24	0	9	9	0	0	0	0	0	0	0	46	53	7
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Open/Agricultural	492	373	-119	62	61	-1	0	0	0	0	0	0	0	0	0	554	434	-120
Unclassified	415	351	-64	128	112	-16	4	1	-3	0	0	0	0	0	0	547	464	-83
Total	**1,962**	**1,505**	**-457**	**343**	**314**	**-29**	**14**	**10**	**-4**	**0**	**0**	**0**	**0**	**0**	**0**	**2,319**	**1,829**	**-490**
ACC Scenario 3																		
Residential	621	619	-2	68	116	48	0	1	1	0	0	0	0	0	0	689	736	47
Commercial	391	391	0	49	51	2	1	2	1	0	0	0	0	0	0	441	444	3
Industrial	30	30	0	12	23	11	0	0	0	0	0	0	0	0	0	42	53	11
Public/Quasi Public	13	23	10	24	15	-9	9	18	9	0	0	0	0	0	0	46	56	10
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Open/Agricultural	492	461	-31	62	118	56	0	1	1	0	0	0	0	0	0	554	580	26
Unclassified	415	470	55	128	153	25	4	10	6	0	0	0	0	0	0	547	633	86
Total	**1,962**	**1,994**	**32**	**343**	**476**	**133**	**14**	**32**	**18**	**0**	**0**	**0**	**0**	**0**	**0**	**2,319**	**2,502**	**183**

Source: Wyle 2011 and U.S. Census Bureau 2010b.

Based on the results of the AICUZ and the analysis of current noise levels around the base, areas of residential use in South Weber, Layton, and Clearfield currently lie within areas assumed to be exposed to noise levels equal to or greater than 65 dB DNL (Table HL3.10-2).

HL3.10.1.2 Environmental Consequences

All proposed scenarios would require new facility construction. New facilities would be designed and sited to be compatible with the existing base master plan, airfield safety guidelines and planning documents. New 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 (refer to Section HL3.4). 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 land use impact analysis compares the proposed noise contours for each scenario to: 1) baseline noise contours, which show the existing noise environment, and 2) AICUZ study contours, which have been adopted by the Cities of Layton and South Weber for planning purposes. The comparison of the proposed contours to the baseline contours shows potential change in noise conditions and land use compatibility (refer to Table HL3.10-2 and Figures HL3.10-1, HL3.10-2, and HL3.10-3) for all scenarios.

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 (refer to Table HL3.10-3 and Figure HL3.10-4) for all scenarios.

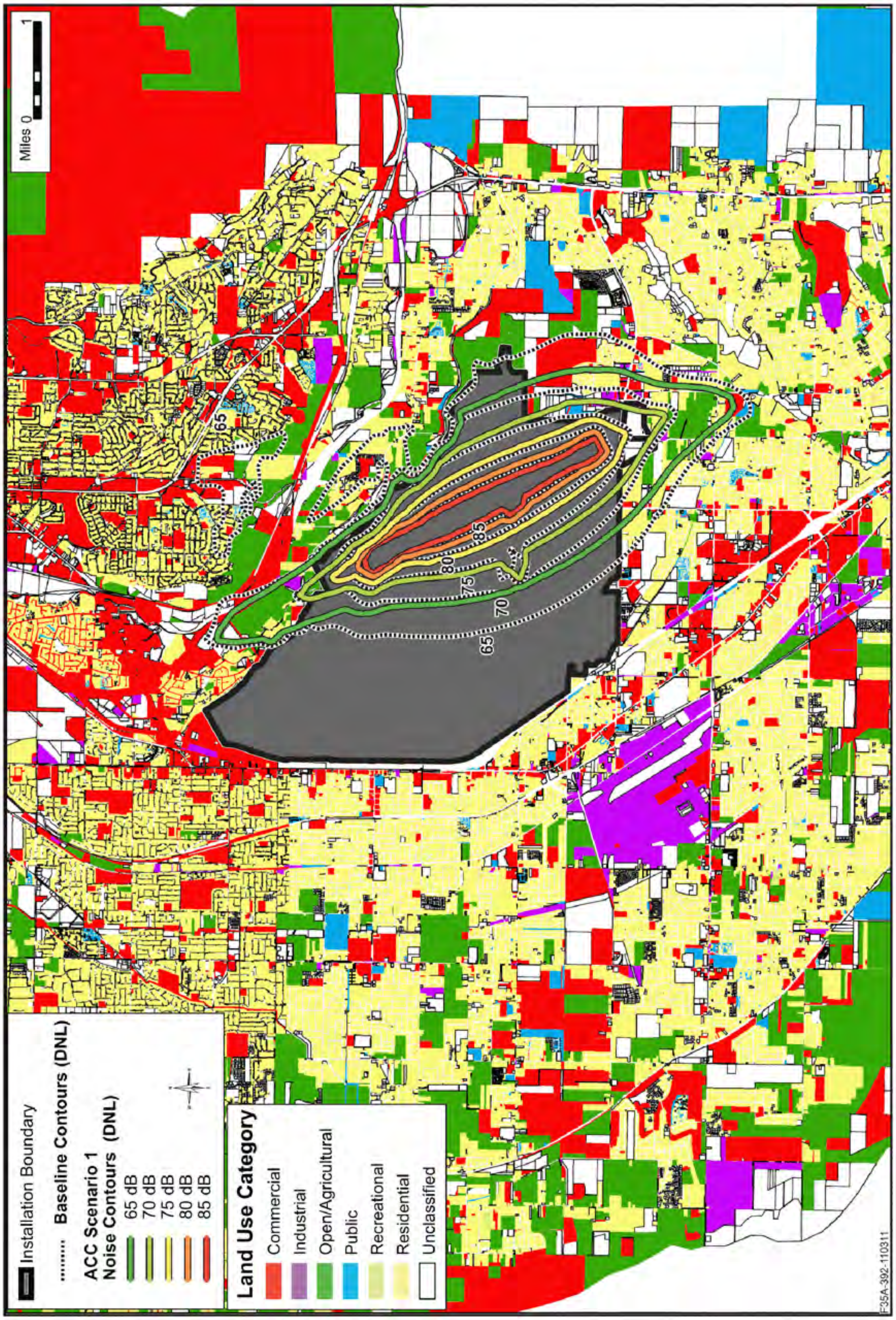


Figure HL3.10-1. Baseline Contours Compared to ACC Scenario 1 Contours Over Land Use Map

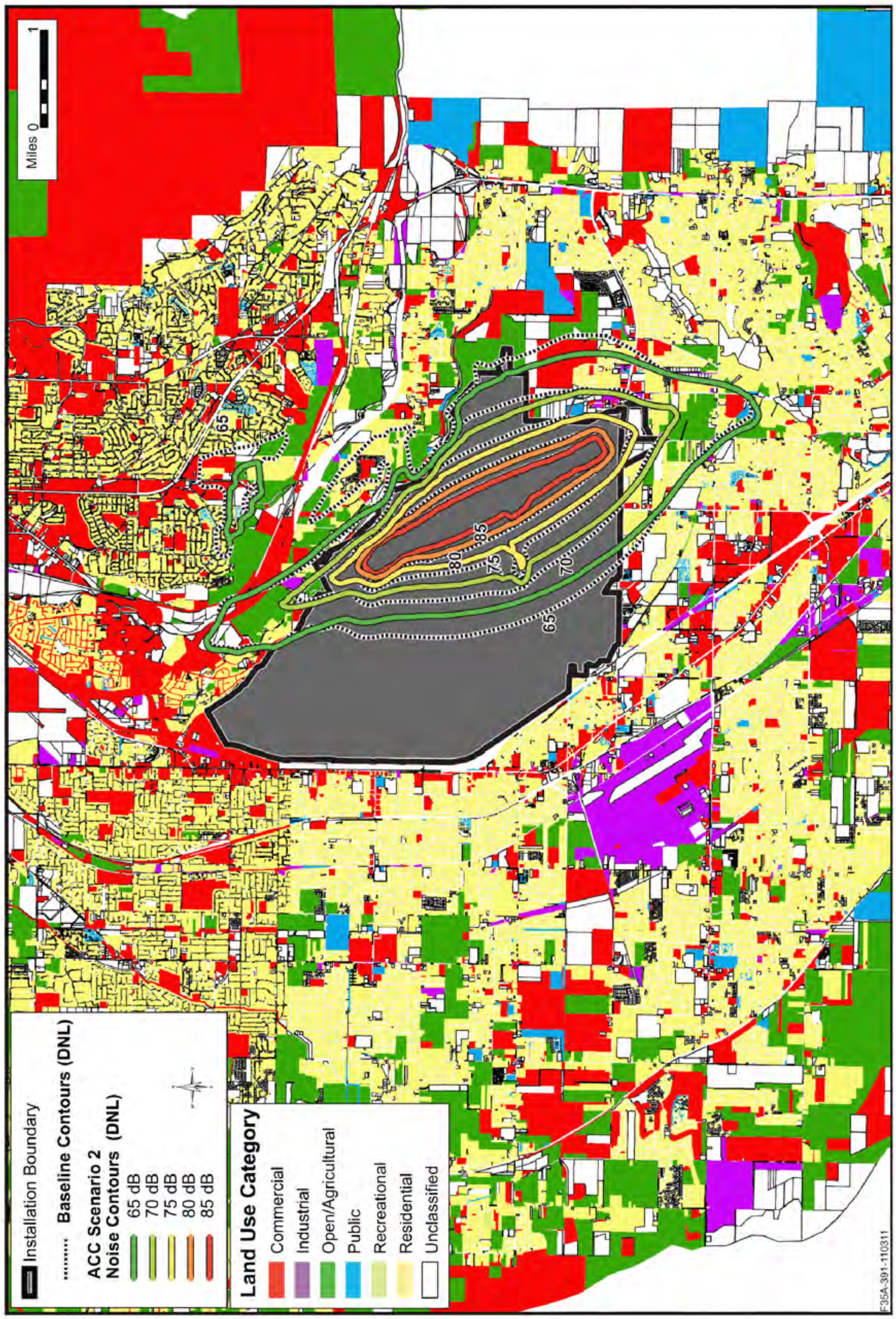


Figure HL3.10-2. Baseline Contours Compared to ACC Scenario 2 Contours Over Land Use Map

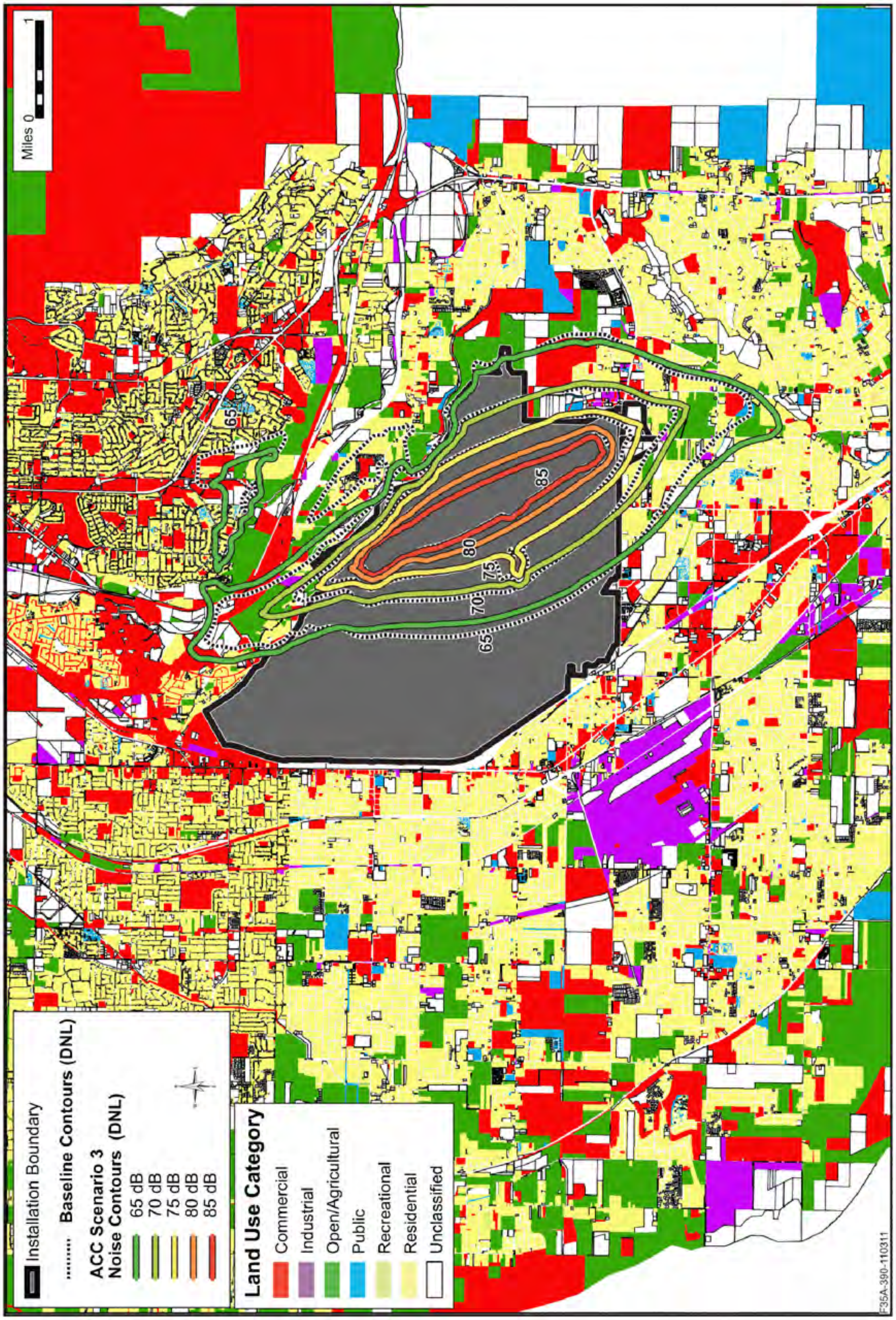


Figure HL3.10-3. Baseline Contours Compared to ACC Scenario 3 Contours Over Land Use Map

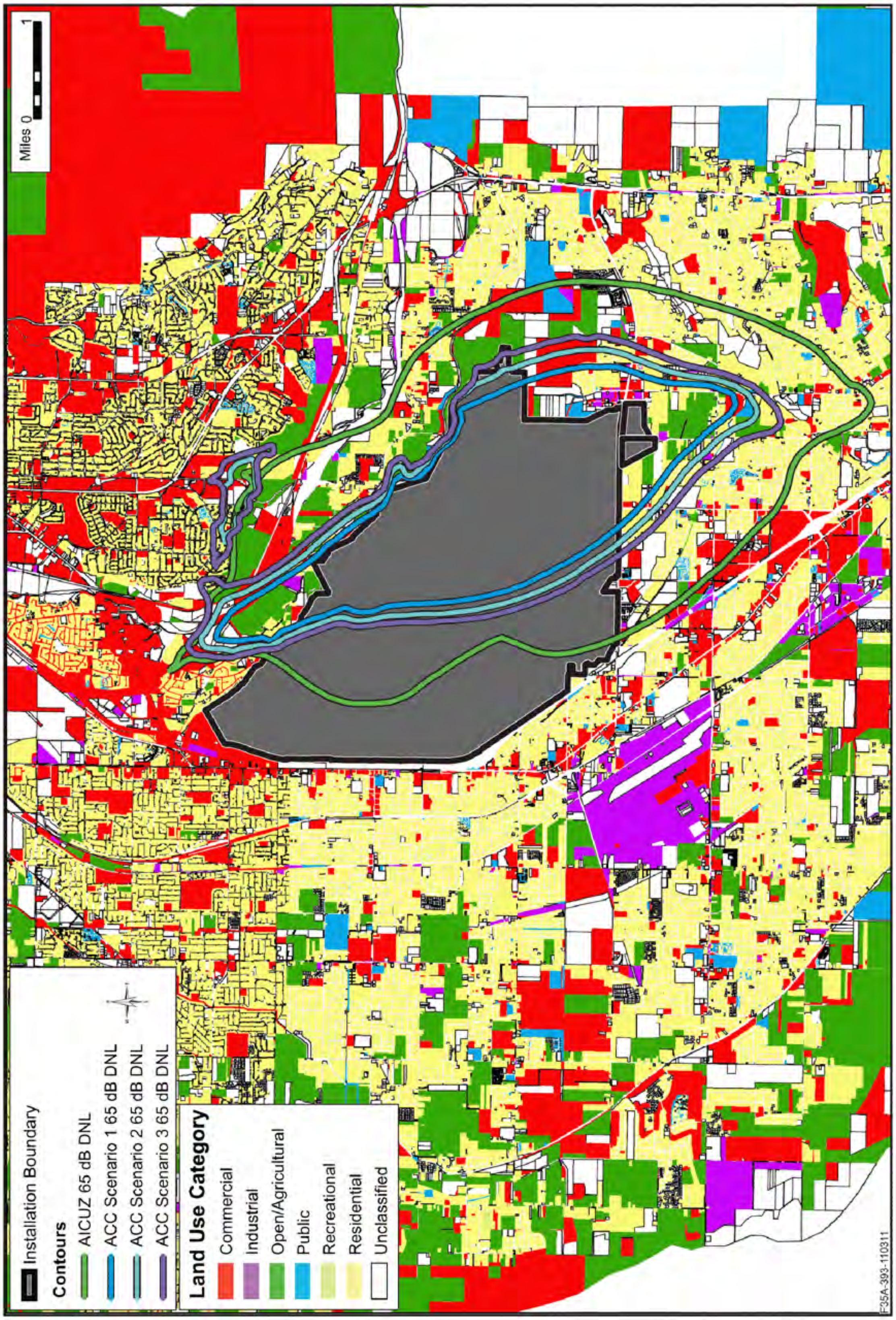


Figure HL3.10-4. Comparison of AICUZ Planning Contours to ACC Scenarios 1, 2, and 3 Contours Over Land Use Map

ACC Scenario 1

Under ACC Scenario 1, the decrease in airfield operations would result in an overall 1,166 acre (50 percent) decrease in area affected by noise equal to or greater than 65 dB DNL when compared to baseline conditions (refer to Section HL3.2). Residential use areas affected by noise levels equal to or greater than 65 dB DNL would decrease by 56 percent (refer to Table HL3.10-2 and Figure HL3.10-1). The current 65 to 70 dB DNL contour area would decrease by 958 acres, including a corresponding decrease of residential use by 348 acres. Residential use in the proposed 70 to 75 dB DNL contour area would decrease by 38 acres. No residential land use would occur in areas affected by noise levels greater than 75 dB DNL (refer to Table HL3.10-2 and Figure HL3.10-1). Table HL3.10-3 provides a comparison of land use acreages that would be affected by noise levels equal to or greater than 65 dB from the proposed action compared to the 65 dB DNL contour prepared as part of the AICUZ study. Under ACC Scenario 1, the 65 dB DNL and above noise zone would be smaller than the AICUZ 65 dB DNL and above noise zone. Figure HL3.10.4 shows the location of the AICUZ 65 dB DNL contour compared to ACC Scenario 1. While noise levels above 65 dB DNL would affect approximately 273 acres of residential lands under ACC Scenario 1, the AICUZ planning contours already include this area. Noise contours for ACC Scenario 1 would fall almost entirely within the existing AICUZ noise contours adopted by several local communities. In fact, the overall area of land contained within the 65 dB DNL and greater range would be approximately 5,184 acres less than the total AICUZ contour area (refer to Figure HL3.10-4 and Table HL3.10-3). Noise contours exceeding 85 dB DNL primarily cover service areas, specifically the flightline area. Therefore, ACC Scenario 1 would not impact land use plans on or adjacent to Hill AFB.

Table HL3.10-3. Difference between AICUZ 65 dB DNL and Proposed Scenarios 65 dB DNL (in acres)

EIS Land Use Classification	*AICUZ*	*ACC Scenario 1*	*Net Change*	*ACC Scenario 2*	*Net Change*	*ACC Scenario 3*	*Net Change*
Residential	2,050	273	-1,777	451	-1,599	619	-1,431
Commercial	1,060	141	-919	275	-785	391	-669
Industrial	84	34	-50	35	-49	30	-54
Public/Quasi Public	162	3	-159	20	-142	23	-139
Recreational	5	0	-5	0	-5	0	-5
Open Space	1,353	312	-1,041	373	-980	461	-892
Unclassified	1,474	241	-1,233	351	-1,123	470	-1,004
Total	**6,188**	**1,004**	**-5,184**	**1,505**	**-4,683**	**1,994**	**-4,194**

Source: Wyle 2011.

ACC Scenario 2

Under ACC Scenario 2, the decrease in airfield operations would result in an overall 21 percent reduction in areas affected by noise levels equal to or greater than 65 dB DNL when compared to baseline conditions (refer to Table HL3.10-2 and Figure HL3.10-2)—residential use areas would decrease by 24 percent. No residential land use would occur in areas affected by noise levels greater than 85 dB DNL.

When compared to the AICUZ, ACC Scenario 2 would introduce an overall reduction of 4,683 acres (or 76 percent) of area affected by noise levels equal to 65 dB DNL (refer to Table HL3.10-3, Figure HL3.10-3, and Section HL3.2). In fact, residential areas affected by noise levels of 65 dB DNL would decrease by 78 percent. Therefore, there would be no incompatibilities with the AICUZ if this ACC Scenario were implemented.

ACC Scenario 3

Under ACC Scenario 3, the increase in airfield operations would result in an overall increase in the area affected by noise levels greater than or equal to 65 dB DNL by 183 acres (7.9 percent) when compared to baseline conditions (refer to Figure HL3.10-3 and Section HL3.2). The current 65 to 70 dB DNL contour area would increase overall by 32 acres, but the residential use area would decrease by 2 acres. The current 70 to 75 dB DNL contour area would increase under the proposed action to include 48 additional acres of land zoned for residential use. The current 75 to 80 dB DNL contour area would increase to include 1 additional acre of land zoned for residential use. No residential land use would occur in areas affected by noise levels above 80 dB DNL (refer to Table HL3.10-2). ACC Scenario 3 would result in 47 additional acres of residential use affected by noise levels greater than or equal to 65 dB DNL, a 7 percent increase, incompatible under FICUN standards (refer to Table HL3.10-2). Noise contours exceeding 85 dB DNL primarily cover service areas, specifically the flightline area.

As with ACC Scenario 2, when the noise contours are compared to the AICUZ study contours, 65 dB DNL and above noise zones would extend to the north, slightly beyond the AICUZ 65 dB DNL and above noise zone, over the community of Riverdale (refer to Figure HL3.10-4). In a portion of this area, the noise levels would exceed 75 dB DNL.

HL3.10.2 Airspace

HL3.10.2.1 Affected Environment

The training airspace associated with Hill AFB is located over northwestern Utah and eastern Nevada, approximately 50 miles west of Hill AFB and includes North Range, Lucin, South Range, including restricted airspace and Gandy MOA and ATCAA, Sevier, and White Elk/Currie Tippet. Most of the land in the analysis area is federally held and managed by the BLM, the DoD, and the Utah Department of Natural Resources, Division of Forestry, Fire, and State Lands. Lands also are held privately, but to a much lesser degree. Few people live under the airspace. Population clusters occur primarily in Dugway, Callao, the Confederated Tribes of the Goshute Indian Reservation, and the Skull Valley Band of the Goshute Indian Reservation in Utah (see Section HL3.9 for discussion of American Indian reservations), and in Cherry Creek, Currie, and McGill in Nevada. Most of the land in the analysis area is unimproved, and very little developed land exists. Land use in the analysis area consists predominantly of agriculture, military testing and training, and recreation.

Lucin airspace overlies vast open space areas and mountainous terrain in Box Elder County, Utah and Elko County in Nevada. The Raft River Mountain Range, part of the Sawtooth National Forest is located under the northern reach of Lucin, near the Idaho border. This division of the Sawtooth Forest offers dispersed camping and opportunities for remote fishing, hiking, picnicking and off-highway vehicle riding. The North Range is restricted airspace. The land area under the airspace includes the restricted UTTR, vast salt flats with some solar evaporation ponds, and agriculture. The land area under South includes Wendover Range, Dugway Proving Grounds, and Deseret Test Center, Numerous BLM-managed Wilderness Study Areas (WSA) are located under South Range, including Scott's Basin WSA, Fish Springs WSA, Deep Creek Mountains WSA, Cedar Mountains WSA, Marble Canyon WSA, and the Desert Peak Wilderness. The Confederated Tribes of the Goshute Indian Reservation straddles the Utah-Nevada Border.

Sevier overlies Howell Peak WSA, Notch Peak WSA, King Top WSA Conger Mountain WSA, Wah Wah Mountains WSA, and the Wasatch National Forest. The Skull Valley Band of the Goshute Indian Reservation is located in the northern part of the airspace.

White Elk/Currie Tippet overlies portions of White Pine County and Elko Counties in Nevada. Most of the land under this airspace proposal consists of federal lands managed by the BLM. Private lands comprise the remaining area under the affected airspace. Ely and Elko BLM Districts in Nevada include the Goshute Peak WSA, the South Pequop WSA, the Goshute Canyon Wilderness, and Becky Peak Wilderness. A part of the High Schells Wilderness in the Humboldt-Toiyabe National Forest is also under the airspace, as are the towns of Currie, Cherry Creek and McGill.

Special use lands or areas such as WSA and Wilderness Areas, and National Forests in the analysis area require particular management attention because of their designation or proposed designation by Congress, the BLM, or the U.S. Forest Service (USFS). Special Use Areas are shown in Table HL3.10-4.

Table HL3.10-4. Land Ownership and Special Use Areas under Training Airspace

Land Owner	*Acres*	*Special Use Areas*
North Range (UTTR), and Lucin		
USFS	47,678	Sawtooth National Forest
BLM	1,771,264	Bluebell WSA, Goshute Peak WSA
DoD	357,971	Hill Air Force Range
State of Utah	154,733	-
State of Nevada	88,121	-
Other	1,083,187	-
Total	**3,502,954**	**-**
South Range (UTTR), Sevier, and White Elk/Currie Tippet		
USFS	221150	Humboldt National Forest, Wasatch National Forest Desert Peak Wilderness
BLM	4,960,555	South Pequop WSA, Goshute Canyon WSA, Goshute Canyon WSA, Scott's Basin WSA, Howell Peak WSA, Fish Springs WSA, Deep Creek Mountains WSA, Cedar Mountains WSA, Deep Creek Mountains WSA, Marble Canyon WSA, Cedar Mountains WSA, , Conger Mountain WSA, Howell Peak WSA, Wah Wah Mountains WSA, Notch Peak WSA, King Top WSA
Bureau of Indian Affairs	2,498	-
Confederated Tribes of the Goshute Indian Reservation	112,816	-
Skull Valley Band of Goshute Indian Reservation	17,607	-
State of Utah	400,208	-
USFWS	17,975	Fish Springs NWR
DoD	1,371,746	Wendover Range, Dugway Proving Grounds, Deseret Test Center
Private	255,906	-
Total	**2,178,756**	**-**

Wilderness and Wilderness Study Areas

The BLM, in accordance with Section 603(c) of the Federal Land Management Policy Act, reports to Congress on the federal lands under its management suitable for inclusion in the National Wilderness Preservation System. Inclusion of land into the National Wilderness Preservation System is intended to preserve areas in a primitive state that possess little evidence of human activity. The Wilderness Act of 1964 identified criteria for evaluating areas for wilderness characteristics and gave direction on how designated wilderness areas should be managed. Subject to certain exemptions, use of motor vehicles or other motorized equipment, landing of aircraft, and construction of structures and roads are prohibited in wilderness areas. Each federal agency is responsible for evaluating, nominating, managing, and protecting designated and potential wilderness areas within the lands they manage.

A result of the land inventory was the identification of a number of WSAs. The major factors evaluated for each WSA include wilderness qualities such as naturalness, size, solitude, and special features; additional wilderness quality factors include multiple resource benefits, balancing the geographic distribution of wilderness areas, diversity of natural systems, and manageability.

To be designated as a WSA, an area must be a roadless area of at least 5,000 acres of public lands or of a manageable size; it must possess qualities of naturalness, that is it must generally appear to have been affected primarily by the forces of nature; and the area must provide outstanding opportunities for solitude or primitive and unconfined types of recreation. In addition, WSAs often have special qualities such as ecological, geological, educational, historical, scientific and scenic values (BLM 2010).

As described above, Wilderness Areas and WSAs are located within the airspace proposed for use by the F-35A (refer to Table HL3.10-4 and Figures HL3.10-5 and HL3.10-6). The FAA does not restrict aircraft flight over WSAs.

HL3.10.2.2 Environmental Consequences

Under all scenarios, the proposed action would not result in changes to the types of land use and land status under the airspace units. Grazing would continue to be the predominant land use, federal agencies (primarily the BLM) would continue to be the largest land managers, and public lands would not be withdrawn for military use. 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 persons, vehicles, or structures by 500 feet. Furthermore, the FAA and DoD have identified and published avoidance criteria for specific aviation-related or noise sensitive areas (FAA 2010). While general noise would increase, individual overflights occur at various altitudes and are dispersed and transitory in nature. Neither changes in noise levels nor changes in the number and frequency of sonic booms from the proposed action would change general land use patterns, land ownership, or affect management of lands or special use land areas beneath the airspace.

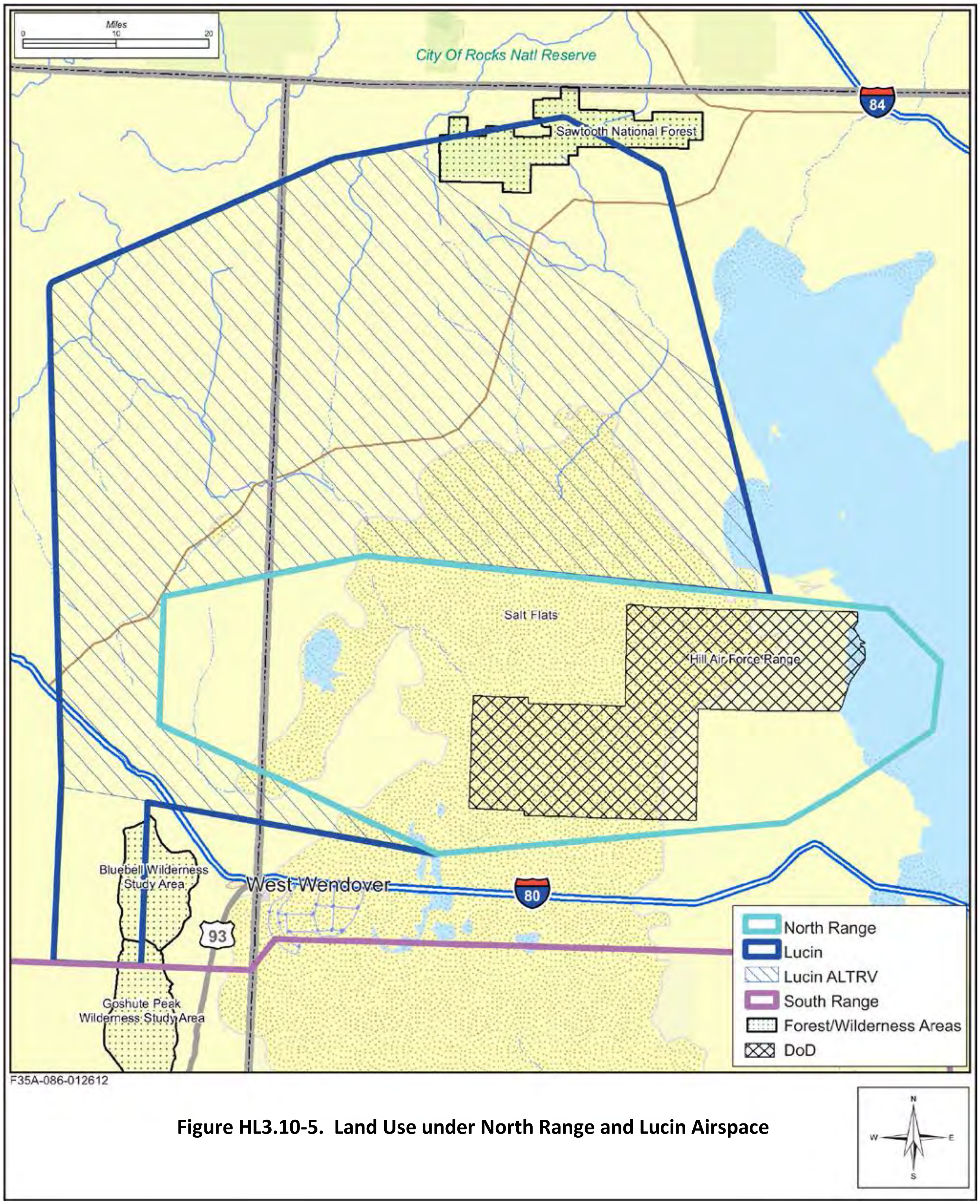


Figure HL3.10-5. Land Use under North Range and Lucin Airspace

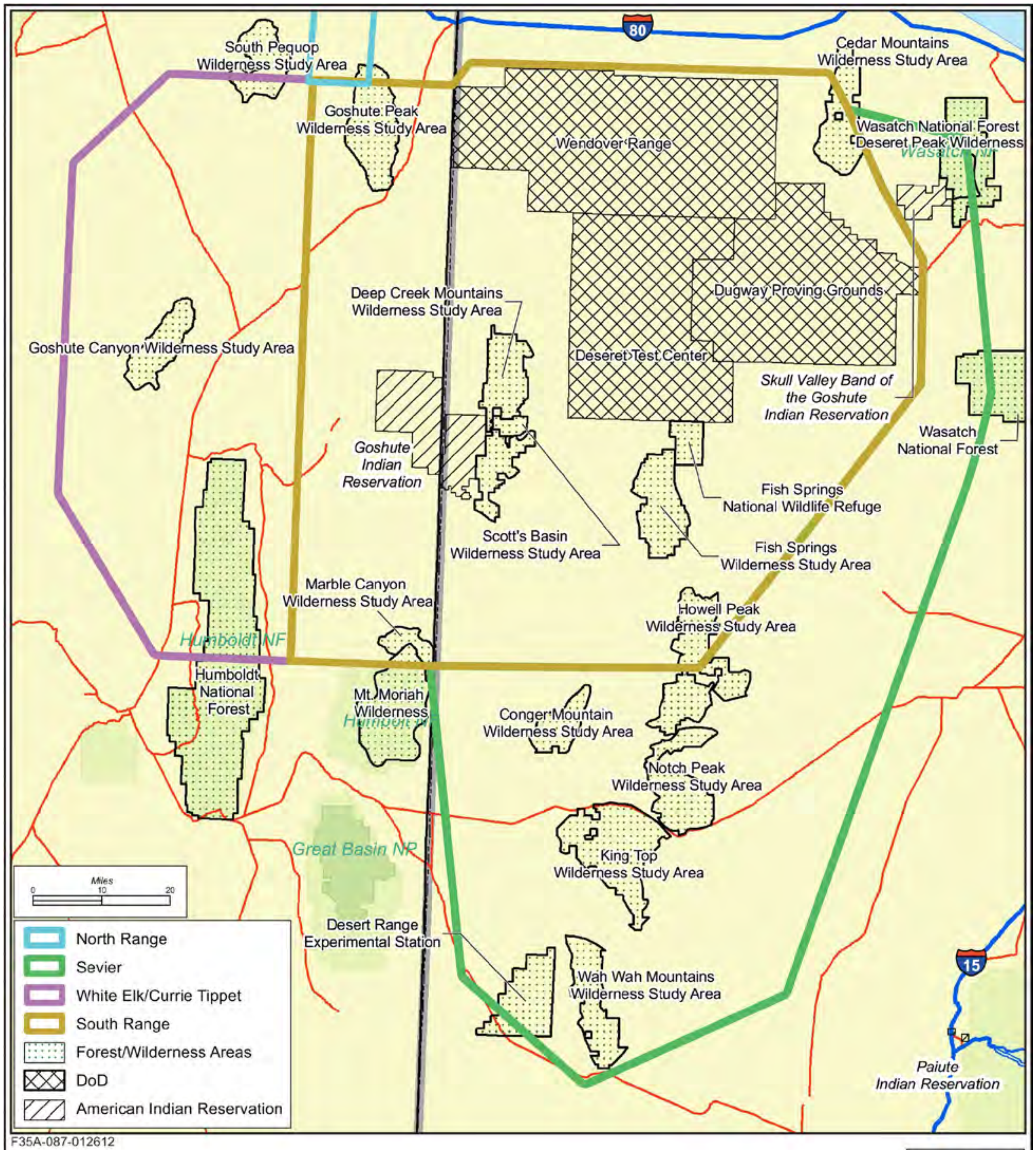


Figure HL3.10-6. Land Use under North Range, Sevier, White Elk/Currie Tippet, and South Range Airspace

In summary, these resources and special use areas (i.e., Wild and Scenic Rivers, Wilderness Areas, WSAs, Wildlife Management Areas, and Research Natural Areas) would not be substantially affected by implementation of the proposed action. No aspect 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.

ACC Scenario 1

Under ACC Scenario 1, operations in all UTTR airspace units would decrease by an average of 49 percent. The North Range and the South Range, with the most operations, would decrease from 20 overflights to 6, and 29 to 10, per day, respectively. The other airspace units have a total of 3 overflights or fewer per flying day. Under ACC Scenario 1, the noise level of the Lucin airspace would increase from less than 45 to 50 dB L_{dnmr}, and the noise level of the North Range would increase 4 dB from the no-action level of 55 L_{dnmr} to 59 dB $L_{dnmr.}$ Under White Elk/Currie Tippet and Sevier, noise levels would remain at ambient levels (less than 45 dB L_{dnmr}). The noise level of the South Range would increase 6 dB from 50 to 56 dB L_{dnmr}. This would occur in the airspace that overlies the Confederated Tribes of the Goshute Indian Reservation. The increase in noise, however, would be ameliorated by the general guidance that aircraft would avoid towns and structures by 1,000 feet. Under the portion of South Range that allows for supersonic flight, the noise level would decrease from 53 dB CDNL to 49 dB CDNL, with a decrease in sonic booms, from 50 per month to 22 per month. Although increases in noise in North Range and South Ranges would be perceptible, the overall noise levels would remain low. Changes to noise levels would not result in changes to land use patterns, ownership, or management plans and policies. Increases in noise levels would not alter the status of wilderness study areas or prevent them from becoming wilderness areas in the future. Therefore, the proposed action would not result in adverse impacts to land management and use.

ACC Scenario 2

Under ACC Scenario 2, operations in all UTTR airspace units would decrease by an average of 16 percent. The North Range and the South Range, with the most operations, would see 13 and 20 overflights per day, respectively, while the others would see daily totals of 4 overflights or fewer. Under ACC Scenario 2, the noise level of Lucin airspace would increase 8 dB from the baseline level of less than 45 to 53 dB L_{dnmr}, and the noise level of North Range would increase 7 dB from the baseline level of 55 to 62 dB L_{dnmr}. The noise levels of White Elk/Currie Tippet and Sevier would remain at very low levels, at less than 45 dB L_{dnmr}. The noise level of South Range would increase 8 dB from 50 dB L_{dnmr} to 58 dB L_{dnmr}. This would occur in the airspace that overlies the Confederated Tribes of the Goshute Indian Reservation. The increase in noise, however, would be ameliorated by the general guidance that aircraft do not fly within 1,000 feet AGL above a town or a structure. Under the portion of South Range that allows for supersonic flight, the noise level would decrease from 53 CDNL to 52 CDNL, with a decrease in sonic booms, from 50 per month to 42 per month. While changes in the noise environment could be perceived in these areas the overall noise levels would remain below 60 dB L_{dnmr}. Changes to noise levels would not result in changes to land use patterns, ownership, or management plans and policies. Increases in noise levels would not alter the status of wilderness study areas or prevent them from becoming wilderness areas in the future. Therefore, the proposed action would not result in adverse impacts to land management and use.

ACC Scenario 3

Under ACC Scenario 3, operations in all UTTR airspace units would increase by an average of 18 percent. The North Range and the South Range, with the most operations, would increase to about 20 and 29 overflights per day, respectively, while the others would see daily totals increase of 6 or fewer. Under ACC Scenario 3, the noise level of Lucin would increase from less than 45 to 55 dB L_{dnmr}, and the noise level of North Range would increase from the baseline level of 55 to 64 dB L_{dnmr}. The noise level of South Range would increase 10 dB from 50 dB L_{dnmr} to 60 dB L_{dnmr}, a change that could be perceived as twice as loud as current levels. This would occur in the airspace that overlies the Confederated Tribes of the Goshute Indian Reservation. The increase in noise, however, would be ameliorated by the general guidance that aircraft avoid towns and structures by 1,000 feet. Under the portion of South Range that allows for supersonic flight, the noise level would increase slightly from 53 dB CDNL to 54 dB CDNL, with an increase in sonic booms, from 50 per month to 61 per month. While changes in the noise environment could be perceived in these areas (especially in North and South Ranges), none would be affected by noise levels above 65 dB L_{dnmr}. Changes to noise levels would not result in changes to land use patterns, ownership, or management plans and policies. Increases in noise levels would not alter the status of wilderness study areas or prevent them from becoming wilderness areas in the future. Therefore, the proposed action would not result in adverse impacts to land management and use.

HL3.11 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 comparable data among the various locations.

HL3.11.1 Base

HL3.11.1.1 Affected Environment

Employment and Earnings

Information regarding employment and earnings is presented for Davis and Weber counties, whose economies are closely associated with activities at Hill AFB. Comparisons are also presented for the state of Utah. Data are from the U.S. Census Bureau and the U.S. Bureau of Economic Analysis.

In the region, the total civilian labor force increased from 213,964 in 2000 to 261,723 in 2010, an increase of approximately 22 percent. The largest contributions to employment in 2010 were made by educational services, health care, and social assistance (20 percent); manufacturing (12 percent); and retail trade (11 percent).

In Utah, the total civilian labor force increased by 23 percent from 2000 to 2010. The largest employment sectors in 2010 were educational services and health care and social assistance (22 percent), retail trade (13 percent), manufacturing (11 percent), and professional services (11 percent).

Non-farm earnings in the two-county region totaled more than $10.7 billion in 2009. The major contributions were from government and government enterprises (31 percent), manufacturing (12 percent), and health care (10 percent). In Utah, non-farm earnings totaled over $67.7 billion in 2009, with the major contributions made by government and government enterprises (20 percent), manufacturing (11 percent), professional services (9 percent), health care (9 percent), and retail trade (8 percent) (U.S. Bureau of Economic Analysis 2010).

The number of active duty military personnel stationed at Hill AFB was 5,663, with an additional 16,172 civilian workers in 2009. Active duty military dependents totaled 5,903. The value of payrolls associated with government personnel at Hill AFB was approximately $1 billion in 2009 (Air Force 2009a).

Hill AFB also purchases substantial quantities of goods and services from local and regional firms. In 2009, annual construction and procurement expenditures by the Base were over $1 billion. The Air Force estimates that the economic stimulus of Hill AFB created approximately 29,328 secondary jobs in the civilian economy (Air Force 2009a).

Population

As with *Employment and Earnings*, information describing population is presented for Davis and Weber counties. Comparisons are also presented with conditions for the state of Utah. Demographic data are from the U.S. Census Bureau 2000 Census and the 2008-2010 American Community Survey 3-Year Estimates.

The population of the two-county region increased by 24 percent between 2000 and 2010, reaching 537,715 in 2010. The 2010 City of Ogden population was 82,825, an increase of 7.5 percent from 2000. By comparison, the population of Utah increased by 23 percent during the same period, reaching 2,763,885 in 2010 (U.S. Census Bureau 2010a, 2010b).

Housing

Detailed information regarding the housing contained in the two-county region is from the 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.

There were 183,757 total housing units in the region in 2010, of which approximately 71 percent were owner-occupied. The vacancy rate for the region was approximately 8.4 percent (U.S. Census Bureau 2010b). Over the period 2000-2010, the annual average number of building permits issued for residential units was 3,478. The number of units permitted on an annual basis varied from a high of 4,806 in 2006 to a low of 1,466 in 2010. The majority of these permits (about 89 percent) were for single-family homes (U.S. Census Bureau 2010c).

Of the active duty personnel assigned to Hill AFB in 2009, approximately 12 percent reside on-base in government family and unaccompanied housing (Air Force 2009a).

HL3.11.1.2 Environmental Consequences

For the following impact analysis, it is assumed that although the AFRC units would continue at Hill AFB, the interaction of the ACC and AFRC units with regard to the F-35A beddown is unknown at this time. In order to use the most conservative measure of potential impacts, the economic analysis assumes that the ACC units would be reduced and the AFRC F-16 fighter aircraft would not be replaced. For other resources (population, housing, and employment) the AFRC wing is included. Therefore, under ACC Scenario 1 there would be a decrease in 685 personnel, 100 under ACC Scenario 2, and an increase in 485 under ACC Scenario 3.

ACC Scenario 1

Employment and Earnings

ACC Scenario 1 would result in a net decrease to the total authorized personnel at Hill AFB of 1,157 military personnel (5 percent decrease). The positions would represent a decrease of 39 percent of the authorized F-16 fighter aircraft personnel. The decrease in positions would result in an annual decrease in salaries of approximately $25.9 million. Total lost salaries would result in less than 1 percent of total non-farm earnings in the region.

This loss of regional spending would affect final demand in numerous economic sectors. On-going indirect impacts would result in an estimated 290 lost jobs and an estimated $12.0 million in reduced labor income. The jobs include full- and part-time positions, and the income includes both employee compensation and proprietors' income. These employment impacts represent less than 1 percent of the 261,723 people in the region's civilian labor force in 2010 (U.S. Census Bureau 2010b). The long-term loss of the direct and associated secondary positions may result in an increase in the regional unemployment rate as laid-off employees seek new positions. The long-term loss of the direct and associated secondary positions would be partially offset in the short-term by the gain of jobs as a result of construction expenditures, as described below.

Federal, state, and local government tax revenues would decline as a result of this lost economic activity. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would lose approximately $2.5 million annually, and Utah and local governments would lose approximately $1.8 million annually. The loss of long-term tax revenues associated with the lost military and civilian positions would be partially offset by the short-term gain in tax revenues associated with construction expenditures.

The total combined expenditures for proposed construction and modification projects for this beddown scenario would be $18.1 million. The peak year of impacts would be 2014 (refer to Section HL2.1.3 for more information).

Total regional employment impacts from construction spending would total an estimated 113 full- and part-time jobs in the peak year 2014, including 65 direct construction jobs, 21 indirect jobs to support these construction activities, and 27 induced jobs from regional purchases due to the increased earnings of affected workers. Total peak year labor income impacts are estimated at $5.1 million.

Overall, the total represents less than 1 percent of the region's civilian labor force in 2010 and the construction employment represents less than 1 percent of the 12,644 total regional construction jobs in 2010 (U.S. Census Bureau 2010b). Therefore, the regional labor force should be able to absorb the short-term direct construction, indirect, and induced jobs as a result of this beddown scenario.

Additional taxes would accrue to the federal, state, and local governments as a result of the construction activities. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would collect an additional $2.0 million over the entire project with about $944,000 due to peak year construction. In addition, Utah and local governments would collectively gain $1.0 million with $482,000 collected as a result of peak year construction projects.

Population

ACC Scenario 1 would result in a net decrease of 1,157 positions if all of the military and civilian positions were reassigned. Under a conservative scenario, the employees would relocate from the region. Combined with their approximately 1,666 family members, this would represent less than 1 percent of the regional population. ACC Scenario 1 would not result in an impact to regional population.

Housing

ACC Scenario 1 would result in the loss of 1,157 positions. A conservative scenario would result in 1,157 housing units put up for sale at the same time as personnel relocate from the area. This would represent less than 1 percent of the total regional housing units. Housing impacts would be further reduced given that this beddown scenario would be phased over approximately 4 years, and it is unlikely that all military personnel would relocate at the same time or own homes. In addition, not all civilian personnel would relocate.

Property values, as described in Appendix C, Section C2.7, are the result of multiple location and other variables. Property in the vicinity of airports and military airfields has been studied to determine if, and to what extent, aircraft noise could contribute to a discount in property values. The 1996 Fidell *et al.* study of two military facilities found indications that aircraft noise had no meaningful effect on residential property values. A 2003 study which combined the results of 33 airfield related property value studies estimated that a property could be discounted between 0.005 and 0.006 per dB DNL between the 65 dB DNL and 75 dB DNL noise contours. The property value discount above 75 dB DNL was not able to be defined based on study data but was estimated to be greater than the discount between 65 and 75 dB DNL (Nelson 2004).

ACC Scenario 2

Employment and Earnings

ACC Scenario 2 would result in a net decrease to the total authorized personnel at Hill AFB of 572 military personnel (3 percent). The positions would represent approximately 2 percent of military and less than 1 percent of civilian employment at Hill AFB, and less than 1 percent of the total civilian labor force in the region. The decrease in positions would result in an annual decrease in salaries of approximately $12.9 million. Total lost salaries would result in less than 1 percent of total non-farm earnings in the region.

This loss of regional spending would affect final demand in numerous economic sectors. On-going indirect impacts would result in an estimated 37 lost jobs and an estimated $1.6 million in reduced labor income. The jobs include full- and part-time positions, and the income includes both employee compensation and proprietors' income. These employment impacts represent less than 1 percent of the 261,723 people in the region's civilian labor force in 2010 (U.S. Census Bureau 2010b). The long-term loss of the direct and associated secondary positions may result in an increase in the regional unemployment rate as laid-off employees seek new positions. The long-term loss of the direct and associated secondary positions would be partially offset in the short-term by the gain of jobs as a result of construction expenditures, as described below.

Federal, state, and local government tax revenues would decline as a result of this lost economic activity. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would lose approximately $323,000 annually, and Utah and local governments would lose approximately $226,000 annually. The loss of long-term tax revenues associated with the lost military and civilian positions would be partially offset by the short-term gain in tax revenues associated with construction expenditures.

The total combined expenditures for proposed construction and modification projects for this beddown scenario would be $30.4 million. The peak year of impacts would be 2014 (refer to Section HL2.1.3 for more information).

Total regional employment impacts from construction spending would total an estimated 158 full- and part-time jobs in the peak year 2014, including 91 direct construction jobs, 30 indirect jobs to support these construction activities, and 37 induced jobs from regional purchases due to the increased earnings of affected workers. Total peak year labor income impacts are estimated at $7.0 million.

Overall, the total represents less than one percent of the region's civilian labor force in 2010 and the construction employment represents less than 1 percent of the 12,644 total regional construction jobs in 2010 (U.S. Census Bureau 2010b). Therefore, the regional labor force should be able to absorb the short-term direct construction, indirect, and induced jobs as a result of this beddown scenario.

Additional taxes would accrue to the federal, state, and local governments as a result of the construction activities. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would collect an additional $3.3 million over the entire project with about $1.3 million due to peak year construction. In addition, Utah and local governments would collectively gain $1.7 million with $670,000 collected as a result of peak year construction projects.

Population

ACC Scenario 2 would result in a net decrease of 572 positions if all of the military and civilian positions were reassigned. Under a conservative scenario, the employees would relocate from the region. Combined with their approximately 824 family members, this would represent less than 1 percent of the regional population. ACC Scenario 2 would not result in an impact to regional population.

Housing

ACC Scenario 2 would result in the loss of 100 positions. A conservative scenario would result in 100 housing units put up for sale at the same time as personnel relocate from the area. This would represent less than 1 percent of the total regional housing units. Housing impacts would be further reduced given that this beddown scenario would be phased over approximately 4 years, and it is unlikely that all military personnel would relocate at the same time or own homes. In addition, not all civilian personnel would relocate.

Property values, as described in Appendix C, Section C2.7, are the result of multiple location and other variables. Property in the vicinity of airports and military airfields has been studied to determine if, and to what extent, aircraft noise could contribute to a discount in property values. The 1996 Fidell *et al*. study of two military facilities found indications that aircraft noise had no meaningful effect on residential property values. A 2003 study which combined the results of 33 airfield related property value studies estimated that a property could be discounted between 0.005 and 0.006 per dB DNL between the 65 dB DNL and 75 dB DNL noise contours. The property value discount above 75 dB DNL was not able to be defined based on study data but was estimated to be greater than the discount between 65 and 75 dB DNL (Nelson 2004).

ACC Scenario 3

Employment and Earnings

ACC Scenario 3 would result in a net increase to the total authorized personnel at Hill AFB of 13 military personnel. The proposed positions would represent approximately 8 percent of military and less than 1 percent of civilian employment at Hill AFB, and less than 1 percent of the total civilian labor force in the region. The increase in full-time positions would result in an annual increase in salaries of approximately $20 million. Total new salaries would result in less than 1 percent of total non-farm earnings in the region. Some of these earnings would be paid to taxes, and some would be saved and invested, but most would be spent on consumer goods and services in the region. This spending would represent final demand increases to numerous economic sectors.

On-going indirect impacts would total an estimated 216 jobs and an estimated $8.9 million in labor income. The jobs include full- and part-time positions, and the income includes both employee compensation and proprietors' income. These jobs—in addition to the primary impacts—would last as long as the personnel changes are in effect and the income would occur each year (though results are presented in 2012 dollars).

These employment impacts represent less than 1 percent of the 261,723 people in the region's civilian labor force in 2010 (U.S. Census Bureau 2010b). With 2010 unemployment rates averaging 7.8 percent in the region (Utah Department of Workforce Services 2010), it would be expected that many of the new jobs would be filled by this unemployed labor force. Other jobs would be filled by family members of the new personnel, by other regional workers taking second jobs, and by existing employees working extra hours. Therefore, secondary employment impacts would not be expected to result in in-migration to the region.

Additional taxes would accrue to the federal, state, and local governments as a result of this new economic activity. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would collect an additional $1.8 million annually, and Utah and local governments would collectively gain $1.4 million annually.

The total combined expenditures for proposed construction and modification projects for this beddown scenario would be $40.8 million. The peak year of impacts would be 2014 (refer to Section HL2.1.3 for more information).

Total regional employment impacts from construction spending would total an estimated 170 full- and part-time jobs in the peak year 2014, including 98 direct construction jobs, 32 indirect jobs to support these construction activities, and 40 induced jobs from regional purchases due to the increased earnings of affected workers. Total peak year labor income impacts are estimated at $7.6 million.

Overall, the total represents less than one percent of the region's civilian labor force in 2010 and the construction employment represents less than 1 percent of the 12,644 total regional construction jobs in 2010 (U.S. Census Bureau 2010b). Therefore, the regional labor force should be able to absorb the short-term direct construction, indirect, and induced jobs as a result of this beddown scenario.

Additional taxes would accrue to the federal, state, and local governments as a result of the construction activities. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would collect an additional $4.7 million over the entire project with about $1.4 million due to peak year construction. In addition, Utah and local governments would collectively gain $2.3 million with $722,000 collected as a result of peak year construction projects.

Population

Under ACC Scenario 3, there would be a net increase of 13 total authorized personnel at Hill AFB. Combined with their associated 19 dependents, the total regional population of would increase by 1,183, or less than 1 percent.

Housing

Under ACC Scenario 3, 13 additional personnel would be assigned to Hill AFB over approximately 4 years; this would represent less than 1 percent of the total owner-occupied and the total renter-occupied housing stock, respectively. Given that the vacancy rate for the region is about 8.4 percent and the phased nature of the personnel influx, the short-term impacts to the regional housing market would be expected to be negligible.

Property values, as described in Appendix C, Section C2.7, are the result of multiple location and other variables. Property in the vicinity of airports and military airfields has been studied to determine if, and to what extent, aircraft noise could contribute to a discount in property values. The 1996 Fidell *et al*. study of two military facilities found indications that aircraft noise had no meaningful effect on residential property values. A 2003 study which combined the results of 33 airfield related property value studies estimated that a property could be discounted between 0.005 and 0.006 per dB DNL between the 65 dB DNL and 75 dB DNL noise contours. The property value discount above 75 dB DNL was not able to be defined based on study data but was estimated to be greater than the discount between 65 and 75 dB DNL (Nelson 2004).

HL3.12 Environmental Justice/Protection of Children

HL3.12.1 Base

HL3.12.1.1 Affected Environment

Executive Order 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. No analysis was conducted for areas airspace units with less than 5 percent of the operations. See Chapter 3, Section 3.1.3 for a further discussion of this approach.

Minority and Low-Income Populations

Hill AFB is located in Davis and Weber Counties in north central Utah. Table HL3.12-1 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 Hill AFB. This information was derived from the 2010 U.S. Census of Population, which is the latest source of information at the required level of detail. Based on the census data for the total state population, 8 percent are minority and 11 percent are low-income populations. Since the base and the areas subject to noise overlap several city jurisdictions (Layton, Riverdale, South Weber, and Washington Terrace), combining these provides a suitable area for comparison. Minority population proportions within the area of comparison exceed the state average by 3.7 percent, whereas low-income populations fall 3.5 percent below the Utah average. Layton, with a total population of over 67,000, dominates the proportions within the area of comparison and contains the greatest amount of land subject to noise from aircraft operations.

Table HL3.12-1. Total Minority and Low-Income Populations within the Vicinity of Hill AFB

Geographic Area	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]	*Persons Under Age 18*	*Percent Children*
Area of Comparison	90,855	10,697	11.8%	7,136	7.9%	23,357	28.2%
Davis County	306,479	20,841	6.8%	22,067	7.2%	104,509	34.1%
Weber County	231,236	15,955	6.9%	27,286	11.8%	69,140	29.9%
State of Utah	2,763,885	223,875	8.1%	315,083	11.4%	862,332	31.5%

Source: U.S. Census Bureau 2010b.
Note: [1]The 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 HL3.12-2 displays the total, minority, and low-income populations in the vicinity of Hill AFB exposed to 65 dB DNL and greater noise contour bands under baseline conditions. Out of a total population of 90,855 in the area of comparison, 7,713 (or approximately 8.5 percent) would be affected by noise levels 65 dB DNL and greater. Of the total population (7,713) subject to noise levels of 65 dB DNL and greater, about 10 percent are considered minority and about 10 percent are low income. Relative to the proportions in the area of comparison, affected minority populations would be less (by 1.8 percent), whereas low-income proportions would exceed the comparison area by 2.1 percent. Although indicating a slight disproportionate effect on low income populations for the area, the proportion remains below Utah averages. In contrast, the affected proportion of minority populations exceeds the state average by less than 2 percent. Although disproportionate in this context, the difference is slight and the overall population affected under baseline conditions is minimal.

Table HL3.12-2. Total Baseline Population Minority and Low-Income Population Affected by Noise Greater than 65 dB DNL at Hill AFB

Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	6,045	521	9%	492	8%
70 – 75	1,289	184	14%	176	14%
75 – 80	379	75	20%	61	16%
80 – 85	0	0	0	0	0
85+	0	0	0	0	0
Total	**7,713**	**780**	**10%**	**729**	**10%**

Source: U.S. Census Bureau 2010b.
Note: [1]The 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 2010, the number of children under the age of 18 living in the area of comparison was 23,357 (28 percent of the population). Davis County and Weber County had 34 and 30 percent, respectively, of their total population under the age of 18 in 2010 (see Table HL3.12-1). Currently there are four schools and child care centers that are exposed to aircraft noise greater than 65 dB DNL.

HL3.12.1.2 Environmental Consequences

For each scenario, noise levels of 65 dB DNL and greater were identified (see Noise, Section HL3.2). Within the noise contour bands, the affected population was determined using 2010 Census Bureau census block group data. Table HL3.12-3 provides the proposed total population that would be affected for each of the scenarios by noise levels of 65 dB DNL and greater.

Table HL3.12-3. Hill AFB Scenarios 1, 2, and 3 Projected Population Affected by Noise Greater than 65 dB DNL

Noise Contour	*Baseline*	*ACC Scenario 1*	*ACC Scenario 2*	*ACC Scenario 3*
65 – 70	6,045	2,952	4,969	6,995
70 – 75	1,289	939	1,226	1,554
75 – 80	379	57	271	490
80 – 85	0	0	0	0
85+	0	0	0	0
Total	**7,713**	**3,947**	**6,467**	**9,038**

Source: U.S. Census Bureau 2010b.

ACC Scenario 1

Minority and Low-Income Populations

Table HL3.12-4 displays the total population and proportional representation of minority and low-income populations affected by noise levels 65 dB DNL and greater under ACC Scenario 1. Under this scenario, the total population affected by noise levels 65 dB DNL and greater would decrease from baseline by 42 percent (-3,947). Of the 3,947 individuals (or about 4 percent of total population in the area of comparison) subjected to noise levels 65 dB DNL and greater, 11 percent would consist of minority and 2 percent would be low-income populations. The affected minority percentage would exceed baseline levels by 1 percent, but 353 fewer people would be affected. The proportions of low-income residents would be 8 percent lower than baseline. However, when compared to the proportion of minority and low-income populations in the area of comparison—11.8 percent and 7.9 percent, respectively—neither minority nor low-income populations would be disproportionately affected. The relationship to Utah averages for both would remain similar to baseline, with slight disproportionality of effects on minority populations.

Table HL3.12-4. Total Minority and Low-Income Populations Affected by Noise Greater than 65 dB DNL under Hill AFB ACC Scenario 1					
Noise Contour	***Total Population***	***Minority Population***	***Percent Minority***	***Low-Income Population***	***Percent Low-Income[1]***
65 – 70	2,952	256	9	41	1
70 – 75	939	160	17	23	2
75 – 80	57	11	19	2	4
80 – 85	0	0	0	0	0
85+	0	0	0	0	0
Total	**3,947**	**427**	**11%**	**66**	**2%**
Baseline Conditions	*7,713*	*780*	*10%*	*729*	*10%*

Source: U.S. Census Bureau 2010b.
Note: [1]The 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

Currently there are four schools that are exposed to aircraft noise greater than 65 dB DNL. Under ACC Scenario 1, two fewer schools would be exposed to aircraft noise greater than 65 dB DNL. In general, the number of speech interference events would also decrease. See Section HL3.6, Noise, for a discussion of speech interference in the classroom.

ACC Scenario 2

Minority and Low-Income Populations

Table HL3.12-5 displays the total population and proportional representation of minority and low-income populations affected by noise levels 65 dB DNL and greater under ACC Scenario 2. Under this scenario, the total population affected by noise levels 65 dB DNL and greater would decrease relative to baseline by 17 percent (-1,246). Of the 6,467 individuals (or close to 7 percent of the total population in the area of comparison) subjected to noise levels 65 dB DNL and greater, 10 percent would consist of minority populations and 1 percent would be low-income populations. Reductions in the proportions in this scenario relative to ACC Scenario 1 stem from the shift in the noise contours to cover lands with fewer minority and low-income populations. In both instances, the proportions would remain at or below baseline levels, and would not result in disproportionate effects. When compared to the proportion of minority and low-income populations in the four city area—11.8 percent and 7.9 percent, respectively—the proportion affected by noise levels 65 dB DNL and greater would not be considered disproportionate under ACC Scenario 2. The relationship to Utah averages for both would remain similar to baseline, with slight disproportionality of effects on minority populations.

Table HL3.12-5. Total Minority and Low-Income Populations Affected by Noise Greater than 65 dB DNL under Hill AFB ACC Scenario 2					
Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	4,969	454	1	53	1
70 – 75	1,226	166	14	27	2
75 – 80	271	53	20	7	3
80 – 85	0	0	0	0	0
85+	0	0	0	0	0
Total	**6,467**	**673**	**10%**	**93**	**1%**
Baseline Conditions	*7,713*	*780*	*10%*	*729*	*10%*

Source: U.S. Census Bureau 2010b.
Note: [1]The 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

Currently there are four schools and that are exposed to aircraft noise greater than 65 dB DNL. Under ACC Scenario 2, five schools would be exposed to aircraft noise greater than 65 dB DNL, with three schools experiencing an increase in noise levels. However, the number of interfering events generally decreases. See Section HL3.2, Noise, for a discussion of speech interference in the classroom.

ACC Scenario 3

Minority and Low-Income Populations

Table HL3.12-6 displays the total population and proportional representation of minority and low-income populations affected by noise levels 65 dB DNL and greater under ACC Scenario 3. Under this scenario, the total population affected by noise levels 65 dB DNL and greater would increase relative to baseline by 26 percent (+1,865). Of the 9,038 individuals (or about 10 percent of the area of comparison's total population) subjected to noise levels 65 dB DNL and greater, 10 percent would be considered minority populations and 9 percent would be low-income populations. In both instances, the proportions would remain at or below baseline levels, and would not result in disproportionate effects. When compared to the proportion of minority populations in the four city area—11.8 percent—the proportion affected by noise levels 65 dB DNL and greater would not be considered disproportionate under ACC Scenario 3. For low-income populations, proportions under ACC Scenario 3 would exceed the area of comparison by 1.1 percent. Although slightly disproportionate impacts would still be less than baseline levels. The relationship to Utah averages for both would remain similar to baseline, with slight disproportionality of effects on minority populations.

Table HL3.12-6. Total Minority and Low-Income Populations Affected by Noise Greater than 65 dB DNL under Hill AFB ACC Scenario 3

Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	6,995	657	9	526	8
70 – 75	1,554	169	11	194	13
75 – 80	490	94	20	79	16
80 – 85	0	0	0	0	0
85+	0	0	0	0	0
Total	**9,038**	**920**	**10%**	**799**	**9%**
Baseline Conditions	*7,713*	*780*	*10%*	*729*	*10%*

Source: U.S. Census Bureau 2010b.
Note: [1]The 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

Currently there are four schools and that are exposed to aircraft noise greater than 65 dB DNL. Under ACC Scenario 3, a total of five schools would be exposed to aircraft noise greater than 65 dB DNL. Three of the five schools would be subject to increases in noise. See Section HL3.6, Noise, for a discussion of speech interference in the classroom.

HL3.12.2 Airspace

HL3.12.2.1 Affected Environment

Airspace proposed for use by the proposed action includes restricted areas associated with the UTTR North and South Ranges as well as adjacent MOAs and ATCAAs. Under the restricted airspace, the military lands contain no residential areas or communities. As a result, neither minority and low-income populations nor children are found within these areas. While this is the case for airspace overlying military ranges, there are several small communities under the MOA/ATCAA airspace including Montello, Gandy, Trout Creek, Callao, Currie, and McGill. On average, these areas support about 1 to 5 persons per square mile, and none include disproportionate populations of minorities or low-income individuals. Also, the Skull Valley Band of the Goshute Indian Reservation and the Confederated Tribes of the Goshute Indian Reservation underlie MOA/ATCAA airspace. Current noise levels lie well below the 65 dB DNL threshold dictating assessment of Environmental Justice impacts.

Protection of Children

Since population density is extremely low in the airspace units over these areas, and they contain few small communities, the number of children exposed to aircraft is negligible. The few communities where most children reside underlie airspace where noise levels do not reach thresholds sufficient to present risks to health or safety of children.

HL3.12.2.2 Environmental Consequences

Noise levels are expected to increase from baseline conditions under all three proposed scenarios. Average noise levels in Lucin, North Range, and South Range would increase perceptibly (9 to 10 dB

L_{dnmr}), but would remain below 65 dB L_{dnmr} under all ACC scenarios. Noise levels in the MOA airspace over the Confederated Tribes of the Goshute Indian Reservation would increase by 10 dB L_{dnmr} under ACC Scenario 3, from 50 dB L_{dnmr} to 60 dB L_{dnmr}, which would be perceived as a doubling of noise. Noise levels for this area would increase perceptibly under ACC Scenarios 1 and 2 by 4 to 8 dB as well. Noise in the airspace over the Skull Valley Band of the Goshute Indian Reservation would increase slightly but not exceed 47 dB L_{dnmr} under ACC Scenario 3. Government-to-government consultation with these tribes is currently on-going concerning existing noise levels in the airspace. Supersonic flights would not occur over either reservation. For the White Elk/Currie Tippet airspace, noise levels would remain below 45 dB L_{dnmr}, less than the threshold for impacts for Environmental Justice. No impacts to minorities, low-income populations, or children would result from implementation of any scenario since: (1) no noise levels would reach or exceed the threshold of 65 dB DNL; (2) none of the areas include disproportionate representations of minority or low-income populations; and (3) these levels would not present any health or safety risks. Refer to Sections HL3.3 and HL3.4 for detailed impacts of noise and safety on populations in general.

HL3.13 Community Facilities and Public Services

HL3.13.1 Base

HL3.13.1.1 Affected Environment

Potable Water

Davis County, including Hill AFB, receives water provided primarily by Weber Basin Water Conservancy District. The drinking water supply comes from the Weber River and its tributaries along the Wasatch Front. In addition, ground water from the Delta Aquifer is used to supplement surface water resources (Weber Basin Water Conservancy District 2010). Based on long-term production records, Hill AFB uses approximately 4.3 million gallons per day (mgd) of potable water. An average of 3.37 mgd (approximately 78 percent) is produced from six (of eight) wells located on base that draw their water from the Delta Aquifer. The remaining 22 percent is purchased from the Weber Basin Conservancy District. The active Hill AFB wells include Wells 2, 3, 6, 7, 8, and 9 primarily located in the north-central portion of the base. Two other Hill AFB wells, 4 and 5, are not used as potable water sources due to high iron content (Air Force 2002). Potable water on base is distributed through a main that runs along Wardleigh Road and another main that is located beneath the aircraft parking apron. A dedicated fire main that serves the maintenance hangars on the flight line also runs beneath the apron (Air Force 2008).

Wastewater Treatment

Hill AFB generates wastewater from sanitary, stormwater, and industrial processes. Hill AFB has a sanitary sewer system, which consists of a buried gravity pipe system that collects wastewater from various base buildings and discharges it off-base for treatment and disposal into the North Davis County Sewer District (Air Force 2008). North Davis County Sewer District (NDSD) owns and operates approximately 100 miles of sewer collection lines that convey and deliver wastewater to its treatment facility located near the Great Salt Lake in Syracuse, Utah. The treatment plant has capacity to treat 34 mgd of wastewater (NDSD 2010).

In addition, Hill AFB has an Industrial Wastewater Treatment Plant located in the southeast corner of the base in Building 575. Industrial wastewater is primarily generated by the Total Force Fighter Wing and the aircraft depot maintenance areas. Treated fluids are discharged off-base into the NDSD near the South Gate. There are two other discharge points near the base medical clinic and the Tooele Army Depot Rail Center. These discharge points have established levels of industrial waste contaminants that make them part of the Industrial Wastewater System even though the effluent is not treated. The NDSD has issued a permit for industrial wastewater (USEPA Registry Id: 110010919426) and the base must ensure compliance with established levels of various metal contaminants. The actual average daily capacity of the system is approximately 432,000 gallons per day (gpd), and the actual average daily flow is approximately 320,000 gallons (Air Force 2008).

Electric Power and Natural Gas and Steam

Electrical power for Hill AFB is provided by Rocky Mountain Power and transferred to the base on two 46 kilovolt overhead transmission lines. Rocky Mountain Power (subsidiary of PacifiCorp) serves more than 1.7 million people in three states and has a net generation capacity of 10,483 megawatts (Rocky Mountain 2010). Substation No. 4 (primarily serving the area proposed for the F-35A facilities) was completely rebuilt in 2006 and contains two new transformers and associated switchgear. The physical condition of the electrical distribution system on base varies from poor to good. The building service transformers and the internal service equipment are aging and should be replaced. In addition, pad-mounted Switches 4B3 and 4B4 are scheduled for replacement (Air Force 2008).

Questar Energy Company provides natural gas to Hill AFB through three main entry points that distribute gas throughout the base. A main line, parallel with and underneath Canberra Drive, provides service to the flight line buildings. The distribution system consists of approximately 240,575 linear feet of on-base natural gas mains that range in size from one to eight inches, 500 main valves, 1,500 regulators, and 62 metering stations (Air Force 2008).

Steam is the primary method for heating facilities at Hill AFB. The steam system consists of 416,092 linear feet of above and below ground steam heating mains. Steam is generated from 11 on-base central heating plants that serve both industrial and commercial buildings. The capacity and quantity of the boilers in each heating plant varies. Overall, the capacity of the 11 central heating plants exceeds one Billion British Thermal Units/hour. The primary fuel for the central heating plants is natural gas with fuel oil as back-up. In addition to the central heating plants, there are several small steam boilers that serve individual buildings (Air Force 2008).

Solid Waste Management

Solid waste is managed in accordance with the Hill AFB Solid Waste Management Plan and guidelines specified in AFI 32-7042, *Waste Management* (2009). Various users at the installation generate solid waste in the form of office trash, nonhazardous industrial wastes, normal municipal waste, and construction debris. Hill AFB operates a solid waste landfill that is used for construction and demolition debris (primarily concrete and asphalt) (Hill AFB 2010c). In Fiscal Year 2009, Hill AFB generated 67,467 tons of construction and demolition waste. Total non-hazardous solid waste generation at Hill AFB in 2009 was 8,870 tons; however, 2,647 tons were disposed of at landfills. The remaining solid waste was diverted to waste-to-energy plants, composted, mulched, recycled, donated, or reused (Hill AFB 2010c). A contractor collects curbside recyclables within Hill AFB. The installation currently recycles paper, cardboard, plastics, tin, aluminum, glass, scrap metal, batteries, and used oil in accordance with their Qualified Recycling Program (Hill AFB 2008).

Two landfills service the Davis County area including the Bountiful City Landfill and the Davis Landfill. With the currently operating landfills and the existing capacity at publicly owned facilities, no disposal capacity restrictions are anticipated for Davis County in the next 20 years (Utah DEQ 2006).

Schools

Hill AFB lies within the Davis School District, which as of fall 2009, operates 8 traditional high schools, 15 junior high schools, and 58 elementary schools. In addition, the District operates two alternative high schools, Mountain High and Canyon Heights, and one alternative junior high, Davis Junior High. The District serves 65,452 students based on the October 1, 2009 enrollment report. Davis School District projects student growth of over 800 students for 2011. The District projects an additional 4,438 students over the next five years measured from October 2009 to October 2014 (Davis School District 2009). There are no on-base schools at Hill AFB (Hill AFB 2005).

HL3.13.1.2 Environmental Consequences

Under ACC Scenarios 1 and 2 there would be a decrease of 5 percent and 3 percent, respectively, in the number of personnel and dependents stationed at Hill AFB when compared with the total number of currently-based personnel. As a result, 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 Hill AFB and within the surrounding community, or remain similar to that under the baseline conditions. Under ACC Scenario 3, personnel would increase by less than 1 percent when compared with the total number of currently based personnel. As a result, potable water, electricity, and natural gas consumption; wastewater and solid waste generation; and the number of school-aged children would be expected to remain similar to that under baseline conditions and therefore are not further addressed within this section.

As a result of the proposed construction and internal alterations to existing facilities under all three scenarios, the building space and facilities to be constructed would generate construction and demolition debris requiring landfill disposal. Off-installation contractors completing construction projects would be responsible for disposing of waste generated from construction activities. Contractors are required to comply with federal, state, local, and Air Force regulations for the collection and disposal of municipal solid waste from the installation. Much of this material can be recycled or reused, or otherwise diverted from landfills, per the Air Force Qualified Recycling Program (Hill AFB 2008). All non-recyclable construction and demolition waste would be disposed of at the on-site construction and demolition landfill at Hill AFB or disposed of at an off-site landfill.

Construction and demolition waste contaminated with hazardous waste, ACM, LBP, or other undesirable components would be removed by licensed contractors and disposed of in a local hazardous waste-permitted landfill in accordance with AFI 32-7042, *Waste Management* (2009), federal, state, and local laws and regulations (see also Section HL3.15, Hazardous Materials and Waste).

As discussed in Chapter 3, disposal for low observable coating repair and maintenance waste would be contracted out to a vendor and occur elsewhere. Disposal and demilitarization activities would not affect waste streams at Hill AFB.

HL3.14 Ground Traffic and Transportation

HL3.14.1 Base

HL3.14.1.1 Affected Environment

Regional and Local Circulation

Hill AFB is approximately 25 miles north of Salt Lake City and 11 miles south of Ogden, Utah. The base is easily accessed because of its proximity to surrounding highways. The north-south I-15 bounds Hill AFB on the west and is a four-lane divided highway that carries an average daily traffic (ADT) of approximately 100,000 (Utah Department of Transportation [DOT] 2008). The east-west SR 193 borders the southern boundary of the base and, where it intersects with I-15, has an ADT of roughly 25,000 (Utah DOT 2008). To the east, SR 60 and I-84 run southeast-northwest and parallel the eastern boundary of the base. These highways carry ADTs of 14,000 and 15,000, respectively.

Hill AFB has four access gates: the South Gate located on the north side of the SR 193/SR 232 intersection, east of I-15; the Roy Gate at Exit 338 on I-15; the West Gate located east of Exit 335 on I-15; and the Southwest Truck Gate, which is accessible from SR 193 off Exit 334 on I-15. There is a fifth gate, East Gate, which is currently closed on Landfill Road (Hill AFB 2010b). The majority of the traffic entering and exiting the base uses the South Gate and the West Gate, which both have ADT volumes between 15,000 and 20,000 (Hill AFB 2009b). Traffic volume entering the base peaks from 5 a.m. to 8 a.m., while exiting traffic peaks from 3 p.m. to 5 p.m. The main destinations after entry onto the base are the south base area and the 1200 Zone (the group of buildings north of M Avenue). Nearly half the vehicles entering the West Gate proceed to the south base area. Most vehicles entering the Roy Gate proceed to the 1200 Zone. The majority of vehicles entering either the Southwest Gate or the South Gate proceed to the south base area (Hill AFB 2010b).

Circulation at Hill AFB

Within Hill AFB, internal roadways and travel routes are well established. The majority of traffic flow on the base is confined to Southgate Avenue and Wardleigh Road and then disperses to various streets within the grid-like network of secondary roads (Hill AFB 2009c). Southgate Avenue begins at the South Gate and heads north. Outside of the gate, it has four lanes in each direction. From the South Gate northward, it narrows to two lanes in each direction (Hill AFB 2004). Many buildings and facilities are easily accessible from Southgate Avenue. A traffic study in 2004 found that the intersection of 6th Avenue with Southgate Avenue (just north of the South Gate) was functioning at a Level of Service F. It was recommended that a traffic signal be installed at this intersection to alleviate congestion (Hill AFB 2004).

Wardleigh Road is the main connection from Southgate Avenue to the Roy Gate. Wardleigh Road begins at Southgate Avenue and heads west, where it is a four-lane road; two lanes in each direction without a median. As the road continues northward to the Roy Gate, it becomes a three-lane section; one lane in each direction with a two-way center turn-lane. Wardleigh Road provides the primary access to buildings and facilities in the northern portion of the base. The average level of service for intersections along Wardleigh Road ranges from A to C (Hill AFB 2004), indicating acceptable traffic conditions.

The Hill AFB General Plan Update (2010a) notes the following inbound traffic backup issues that affect the surrounding communities:

- At the South Gate – extending traffic one mile south on Hill Field Road,
- At the South Gate – extending traffic east to U.S. Highway 89, and
- At the West Gate – backing up traffic on I-15.

Currently, the West Gate is being moved closer to Wardleigh Road, and upon completion, should alleviate the congestion problems associated with the I-15 on/off ramps. Plans are also currently under way to add an additional outbound lane to South Gate to alleviate internal stacking issues during peak hours (Hill AFB 2010b). The majority of buildings and facilities on the base have associated parking lots, yet parking demands appear to be higher than capacity (Hill AFB 2004, 2010a). The 2010 *General Plan Update* identifies the construction of structured parking facilities and/or remote personal vehicle parking lots as options to balance parking demands with land development constraints.

HL3.14.1.2 Environmental Consequences

Construction activities would occur sometime between Fiscal Year 2014 and 2018 under all three beddown scenarios and would take approximately 2 years to complete. This would result in approximately 0.68 acres of net new impervious surface, and temporarily disturb 5.25 acres under the maximum scenario (ACC Scenario 3). Construction equipment would be driven to proposed construction areas and would be kept on-site for the duration of the respective activity. Construction workers would drive daily in their personal vehicles to and from the construction site. In general, construction traffic would result in increases in the use of on-base roadways during construction activities; however, increases would be temporary and intermittent, occurring only during active construction periods.

Under ACC Scenarios 1 and 2 there would be a decrease of 5 percent and 3 percent, respectively, in the number of personnel and dependents stationed at Hill AFB when compared with the total number of currently based personnel. As a result, the decrease in employment would reduce vehicle trips to and from the base during morning and evening peak periods, or would remain similar to that under baseline conditions. Under ACC Scenario 3, personnel would increase by less than 1 percent when compared with the total number of currently based personnel. Traffic would be expected to remain similar to that under baseline conditions and therefore, no measurable effects would result.

HL3.15 Hazardous Materials and Waste

HL3.15.1 Base

HL3.15.1.1 Affected Environment

Hazardous Materials

Hazardous materials are used at Hill AFB in support of aircraft operations and maintenance missions including petroleum, oil, and lubricants management and distribution. Types of hazardous materials used at Hill AFB include solvents, solder (lead and silver), batteries, liquid cooling oil, lubricating oils, sludge oil, hydraulic fluid, paint, jet propellant-8, diesel fuel, motor gasoline, antifreeze, scrap metal, bead blast metals (lead and cadmium), and contaminated solids. In addition, a hydrazine facility is operated on base for the servicing of aircraft hydrazine systems (Hill AFB 2010b).

Hazardous materials on Hill AFB used by tenants and contractor personnel are controlled through the Hazardous Materials Pharmacy Program (HAZMART)/Installation HAZMART Management Program pollution prevention process (AFMC 2006). This process provides centralized points of contact and management of the acquisition, tracking, 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 Hill AFB personnel to ensure users are aware of exposure and safety risks (Hill AFB 2010b).

The Hill AFB Integrated Spill Prevention, Control, and Countermeasures Plan (Hill AFB 2010c) addresses spill prevention, contingency planning, and emergency response. Each generation point has a site specific contingency plan, which addresses spill prevention and emergency actions specific to materials and activities associated with the site (Hill AFB 2009a).

Hazardous Waste

Hill AFB is regulated as a large quantity hazardous waste generator under Resource Conservation and Recovery Act. The Hill AFB Hazardous Waste Management Plan (2009) governs the Hill AFB Hazardous Waste Management Program. There is one central accumulation site (less than 180 day storage area) at Building 514 and a permitted 365-day storage facility at Building 888. There are 65 initial accumulation points near work locations, and 95 accumulation sites. The Hill AFB central accumulation site and permitted storage facility are operated by the Civil Engineering Environmental Division (Hill AFB 2009a). A list of hazardous waste streams and quantities produced on base is compiled annually and continuously tracked through the Waste Inventory Tracking System (Hill AFB 2009a). Through the Qualified Recycling Program, Hill AFB recycles solder excess and scrap metal (lead and silver); lead-acid, alkaline, nickel metal hydride, and carbon zinc batteries; aerosol cans; oil; jet fuel; and used antifreeze (Hill AFB 2009a, Hill AFB 2008).

Toxic Substances

Regulated toxic substances typically associated with buildings and facilities include asbestos, LBP, and poly-chlorinated biphenyls. None of these materials are discussed in the Hazardous Waste Management Plan (2009); rather, the Hazardous Waste Control Facility will coordinate response on a case-by-case basis (Hill AFB 2009a). The Asbestos Management Plan provides guidance for the identification of ACM and the management of asbestos wastes, disposed of at an off-base, permitted landfill (Hill AFB 2010d). The Asbestos Material Program is coordinated by the environmental Management Division, but generally implemented by the Base Civil Engineering. The Base Civil Engineer maintains building survey records, project review, and material removal.

Environmental Restoration Program

Due to its extensive history serving military industrial, munitions, and aircraft missions, Hill AFB has 109 ERP sites across the installation and its associated facilities. Forty-five of the ERP sites are regulated under Comprehensive Environmental Response, Compensation, and Liability Act and 64 are being managed under other regulatory programs (Select Engineering Services 2010). On the main installation, all remedial actions are in place for areas with potential to impact human populations. Clusters of sites are bundled into Operable Units, and Operable Units 1, 2, 3, 4, 5, 6, 7, 8, and 12 have Records of Decision and Remedial Actions in place. Feasibility Studies are being developed for Operable Units 9, 10, and 11. Operable Unit 13 was designated in response to poly-chlorinated biphenyl contamination discovered in 2007, and, although a removal action has occurred, a Record of Decision was signed in 2011. Additionally, there is extensive groundwater contamination as well as many underground storage tank (UST) sites across the installation.

Hill AFB has three active Military Munitions Response Program sites (Site BP504, Powder Burning Pit; Site DA503, Munitions Dump; and Site SR502, Backstop Area/Small Arms Firing Range) as identified in the Phase II Site Evaluation (Bay West Inc. 2009, Select Engineering Services 2010). BP504 is located south of Browning Avenue Road and northeast of the current aircraft runway. DA503 is located in an active industrial area. Further investigation and remediation activities are still in early planning stages. SR502 is located south of Building 741.

HL3.15.1.2 Environmental Consequences

Hazardous Materials

Training activities and other functions are expected to remain similar between the new and F-16 aircraft. Additionally, the F-35A was designed to reduce the quantities and types of hazardous materials needed for maintenance of the F-35A and would be less than those currently used for maintenance of F-16 aircraft. The major differences 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 for F-16 aircraft (personal communication, Luker 2010; Fetter 2008).

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

The F-35A replaces the hydrazine canister (currently used by the F-16s) with an integrated power package (basically a small jet engine) for use in emergency engine restart situations, thus eliminating the potential for hydrazine leaks.

Hazardous Waste

The types of hazardous waste streams generated by F-35A operations are expected to be less than they are for F-16 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 amounts currently generated in support of F-16 aircraft operations. Disposal of low observable coatings and demilitarization activities would be contracted out to a vendor and would not affect waste streams at Hill AFB.

Under ACC Scenario 1, hazardous waste quantities would decrease further as fewer aircraft would be operable than under baseline conditions. The exact amounts of hazardous waste that would be generated under each scenario are unknown; however, under all scenarios Hill AFB would continue to operate within its large quantity generator hazardous waste permit conditions. In addition, 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 Hill AFB procedures prior to any renovation activities. If any issues are discovered during renovation 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 Hill AFB procedures. Any LBP would also be managed and disposed of in accordance with Toxic Substance Control Act, OSHA regulations, Utah requirements (regarding site work practices for buildings with LBP), and established Hill AFB procedures.

Environmental Restoration Program

Operable Unit 9 and a UST Site (Building 914 UST) overlap the proposed 4-Bay Simulator Facility, the old Simulator Facility, and Buildings 48 and 62. A UST Site (Building 43 UST) overlaps Building 42 and 43, and there is a UST Site (Building 41 UST) adjacent to Building 40. Although these ERP operable units and USTs overlap proposed renovation or construction sites neither upgrades to existing facilities nor future operations would adversely affect these locations. If, in the future, ground-disturbing activities in the areas of any of the contaminated sites (or sites that have been closed but are subject to further monitoring or mitigation) become necessary to implement the proposed action, close coordination with ERP leadership and potential impacts on ERP sites in and around the proposed ground-disturbing locations would need to be studied and mitigation measures implemented, as necessary.

HL4.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

HL4.1 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 a beddown of the F-35A aircraft at the base and training in associated airspace.

Hill AFB 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 base, 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 base, conduct aircraft operations, and maintain facilities. All of these actions (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

Hill AFB has been a military installation for over 90 years. During this time, it has grown, been developed, and supported numerous kinds of aircraft. Hill AFB currently supports 48 F-16 aircraft. For the UTTR, two airspace projects have resulted in recent changes to the airspace. Mountain Home AFB completed an action to expand the Paradise MOA laterally and vertically by 16,985 cubic nm. This expansion extended the eastern boundary of the Paradise MOA in Nevada to the east, and also lowered the floor altitude from 14,500 feet MSL to 10,000 feet MSL. This resulted in more airspace coverage of Elko County in which the Currie/Tippet ATCAA is currently located. In addition, the White Elk MOA, extending from 14,000 feet to 18,000 feet MSL, now directly underlies the Currie/Tippet ATCAA with the exception of its southwest corner. The Currie/Tippet ATCAA extends from 18,000 to 58,000 feet MSL, when activated. Operations in the White Elk MOA continue use of chaff and flares that already occur in the ATCAA; supersonic flight already authorized in the overlying ATCAA also remains unchanged.

Creation of the White Elk MOA increased operations in this airspace (from 548 to 9,590 per year), and supersonic flight in the Currie/Tippet ATCAA raised noise levels in the area and affected the noise environment of the underlying lands (from less than 45 to 49 dB L_{dnmr}). Lowering of the floor and changing the shape of the Paradise MOA did result in slightly increased noise levels (from 45 to 47 dB L_{dnmr}). However, should the F-35A be beddown at Hill AFB, the F-16 aircraft would be phased out as a consequence of this beddown and use of these new airspace units would decrease. Since both of these actions have occurred, the reconfiguration of the Paradise MOA and the creation of the White Elk MOA are included under baseline conditions.

Incremental Impacts of the Proposed Action with Reasonably Foreseeable Future Actions

During the timeframe (2014 to 2020) for F-35A facility construction, Hill AFB 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 2014 through 2018 include those listed in Table HL4.1-1. Other on-going maintenance and repair activities are also likely to occur at the base during this period. No reasonably foreseeable airspace actions are known for the UTTR.

Table HL4.1-1. Current and Reasonably Foreseeable Actions at Hill AFB

Project Name/Description	*Approximate Area (acres)*[1]	*New Impervious Surface (acres)*	*Anticipated Year for Implementation*
Robotic NDI Facility, Phase 1; Demolition of 1901, 1902, 1946	1.02[2]	0.75	2015
Consolidated Training Facility; Demolition of B245 and 250	0.82	0.52	2016
Replace Dorms, Phase 2; Demolition of B345, 348, 349	1.44	0.98	2013-2015
Consolidated Transportation Facility, Phase 1; Demolition of B1642	1.36	0.91	2015
Non-Secure Software Engineering Development Facility; Demolition of B1723	0.80	0.73	2016
Total	**5.44**	**3.89**	-

Notes:
[1]Approximate Area includes the proposed new building footprint plus the footprint of the proposed demolition.
[2]As these projects are proposed future actions, exact building dimensions are not yet configured; therefore, a conservative estimate was used of 0.75 acre per building for proposed construction.

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 Hill AFB and whether such a relationship would result in potentially additive impacts not identified when the proposed action is considered alone.

All activities and effects of past actions 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 analysis, none of the future on-base actions 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 base 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 substantial for all resources.

HL4.2 Irreversible and Irretrievable 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 Hill AFB are associated with construction impacts.

For the Hill AFB, 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 installation facilities would not disturb land, but would consume limited amounts of material typically associated with interior renovations (wiring, insulation, windows, and drywall). An undetermined, but limited, 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.

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.

Jacksonville Air Guard Station

How to Use This Document

Our goal is to give you a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the no-action alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement, or EIS, is shown below.

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

OVERALL PROPOSAL VOLUME I

PREFACE
Detailed Guide for Reading the Final EIS

CHAPTER 1
Purpose and Need for the Air Force F-35A Operational Beddown

CHAPTER 2
- Overview of the Proposed Action and Alternatives
- Alternative Identification Process
- Summary Comparison of the Proposed Action and Alternatives

CHAPTER 3
Resource Definition and Methodology

INFORMATION SPECIFIC TO EACH BASE VOLUME I

CHAPTER 4
Six Base-Specific Sections

Burlington AGS	Hill AFB	Jacksonville AGS	McEntire JNGB	Mountain Home AFB	Shaw AFB
Section BR1.0 Proposed Action Overview	**Section HL1.0** Proposed Action Overview	**Section JX1.0** Proposed Action Overview	**Section Mc1.0** Proposed Action Overview	**Section MH1.0** Proposed Action Overview	**Section SH1.0** Proposed Action Overview
Section BR2.0 Base-Specific Project Details	**Section HL2.0** Base-Specific Project Details	**Section JX2.0** Base-Specific Project Details	**Section Mc2.0** Base-Specific Project Details	**Section MH2.0** Base-Specific Project Details	**Section SH2.0** Base-Specific Project Details
Section BR3.0 Affected Environment and Environmental Consequences	**Section HL3.0** Affected Environment and Environmental Consequences	**Section JX3.0** Affected Environment and Environmental Consequences	**Section Mc3.0** Affected Environment and Environmental Consequences	**Section MH3.0** Affected Environment and Environmental Consequences	**Section SH3.0** Affected Environment and Environmental Consequences
Section BR4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section HL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section JX4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section Mc4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section SH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

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Appendix E – Revised Draft EIS Public Comments and Responses

JX1.0 JACKSONVILLE AIR GUARD STATION OVERVIEW

This section presents an overview of the 125th Fighter Wing (125 FW) installation at the Jacksonville Air Guard Station (AGS); the specifics of the proposed action as it relates to both the airfield at Jacksonville AGS and the associated airspace; construction and modifications required at the installation; changes to personnel; state consultation and associated permits that would be required should Jacksonville AGS be selected as one of the beddown locations for the F-35A; and identified public and agency concerns with the proposal.

The 125 FW of the Florida Air National Guard (FLANG) is located at Jacksonville International Airport (IAP), 10 miles north of downtown Jacksonville in Duval County in northeastern Florida (Figure JX1.0-1). Facilities and land area associated with the 125 FW currently comprise 342 acres on property owned by the Jacksonville Airport Authority and leased to the FLANG (Figure JX1.0-2).

Figure JX1.0-1. Location of Jacksonville AGS

The federal mission of the 125 FW is to provide fully-trained and qualified personnel to the Commander-in-Chief of North American Aerospace Defense (NORAD) in time of war or national emergency for the defense of the North American continent. Further, the unit provides immediate response to any unidentified aircraft that enters United States (U.S.) airspace, including interception and interdiction, on both the Atlantic and Gulf of Mexico coasts of Florida. The 125 FW also maintains a state mission of protecting life and property and preserving peace, order, and public safety. The 125 FW currently

Figure JX1.0-2. Jacksonville International Airport Boundary

operates 18 F-15C aircraft, one C-26B, and one C-130 aircraft. Overall, the F-15Cs of the 125 FW emphasize air-to-air missions. In the sections that follow, JX2.0 presents the base-specific description of the proposed action and the two beddown scenarios proposed at Jacksonville AGS. Section JX3.0 addresses baseline conditions and environmental consequences that could result if either of the two scenarios were implemented at Jacksonville AGS. Refer to Chapter 3 for a complete and detailed definition of resources and the methodology applied to identify potential impacts. Section JX4.0 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 Jacksonville AGS.

JX2.0 JACKSONVILLE AGS ALTERNATIVE (18 AND 24 AIRCRAFT SCENARIOS)

The Jacksonville AGS F-35A beddown alternative includes two scenarios; the following presents the elements of these scenarios for the base in Section JX2.1 and the airspace in Section JX2.2.

JX2.1 Jacksonville AGS: Base

Four elements of this proposed action have the potential to affect Jacksonville AGS: 1) transition from F-15Cs to F-35As, 2) airfield operations conducted by F-35As, 3) construction and modification projects to support beddown the F-35A, and 4) personnel changes to meet F-35A requirements. Each is explained below.

JX2.1.1 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 Jacksonville AGS. Under either scenario the beddown would be completed in 2020, with delivery of the full complement of 18 or 24 F-35As to Jacksonville AGS. Drawdown of the F-15Cs would match the arrival of the F-35As on a one-for-one basis under ANG Scenario 1; for ANG Scenario 2, the drawdown would occur so that no more than 24 total aircraft of both types would operate from the installation.

JX2.1.2 Airfield Operations

The 125 FW at Jacksonville AGS is an integral component of the Combat Air Forces (CAF). The CAF defends the homeland of the United States (U.S.) as well as deploys forces worldwide to meet threats and ensure the security of the U.S. To fulfill this role, the 125 FW must train as it would fight.

The U.S. Air Force (Air Force) anticipates that by 2020, the total of 18 (ANG Scenario 1) or 24 (ANG Scenario 2) F-35A operational aircraft would fly, respectively, 5,486 or 7,296 operations per year at Jacksonville IAP. Currently, the 125 FW flies an average of 235 flying days per year (out of a possible 260); however, for the purposes of this analysis and to make equal comparison among the six alternatives, the total number of possible flying days was assumed to be 260, including both Saturday and Sunday (on Guard weekends). The 260 days is a standard planning factor and maintains consistency between reserve and active-duty squadrons. In total, Jacksonville IAP supports about 128,000 operations annually, with 94 percent consisting of commercial and civilian flights occurring 365 days per year. Based on proposed requirements and deployment patterns under CAF, 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 the Jacksonville AGS would participate in remote training exercises. Some of these missions could involve ordnance delivery training or missile firing exercises (within the scope of existing National Environmental Policy Act [NEPA] documentation) 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.

The proposed F-35A airfield operations at Jacksonville AGS would represent a decrease (ANG Scenario 1) or minor increase (ANG Scenario 2) in total annual operations compared to total baseline F-15C levels depending upon the scenario (Table JX2.1-1). Under ANG Scenario 1, total Jacksonville IAP airfield operations (128,107) would decrease by 1.4 percent, with a 0.06 percent increase under the ANG Scenario 2. Neither change would be meaningful in terms of Jacksonville IAP which undergoes variations greater than these on an annual basis.

Table JX2.1-1 Jacksonville AGS Baseline F-15C and Proposed F-35A Operations

Baseline	*ANG Scenario 1*	*ANG Scenario 2*
F-15Cs	*18 F-35As*	*24 F-35As*
7,223	5,486	7,296
Net Change	**-1,737**	**+73**

Source: Wyle 2011.

The F-35As would employ similar departure and landing procedures as currently used by the F-15Cs at Jacksonville AGS. However, this new aircraft would fly fewer closed patterns. Due to differences in performance, the flight profile and tracks for the F-35A would vary somewhat from those used by the F-15Cs. F-35A operations would adhere to existing restrictions, avoidance procedures, and the quiet-hours program at Jacksonville AGS. The F-15Cs currently fly 1.2 percent of the time between the hours of 10:00 p.m. and 7:00 a.m. (environmental night). At this percentage, the F-15Cs fly about 87 total operations annually during environmental night. In contrast, the civilian and commercial aircraft perform 12 percent of their operations after 10:00 p.m., or about 14,400 operations per year. The F-35A would not fly between these hours; no environmental night (10:00 p.m. to 7:00 a.m.) operations would occur since the F-35A could complete all of its after-dark flight activity before 10:00 p.m. On rare occasions such as weather contingencies or special mission exercises, some F-35A operations could occur during environmental night.

JX2.1.3 Construction

To support proposed F-35A operations, additional infrastructure and facilities would be required at Jacksonville AGS (Table JX2.1-2) under either ANG Scenario 1 or 2. A total of three infrastructure improvement projects would be implemented in 2017 under both ANG scenarios (Figure JX2.1-1).

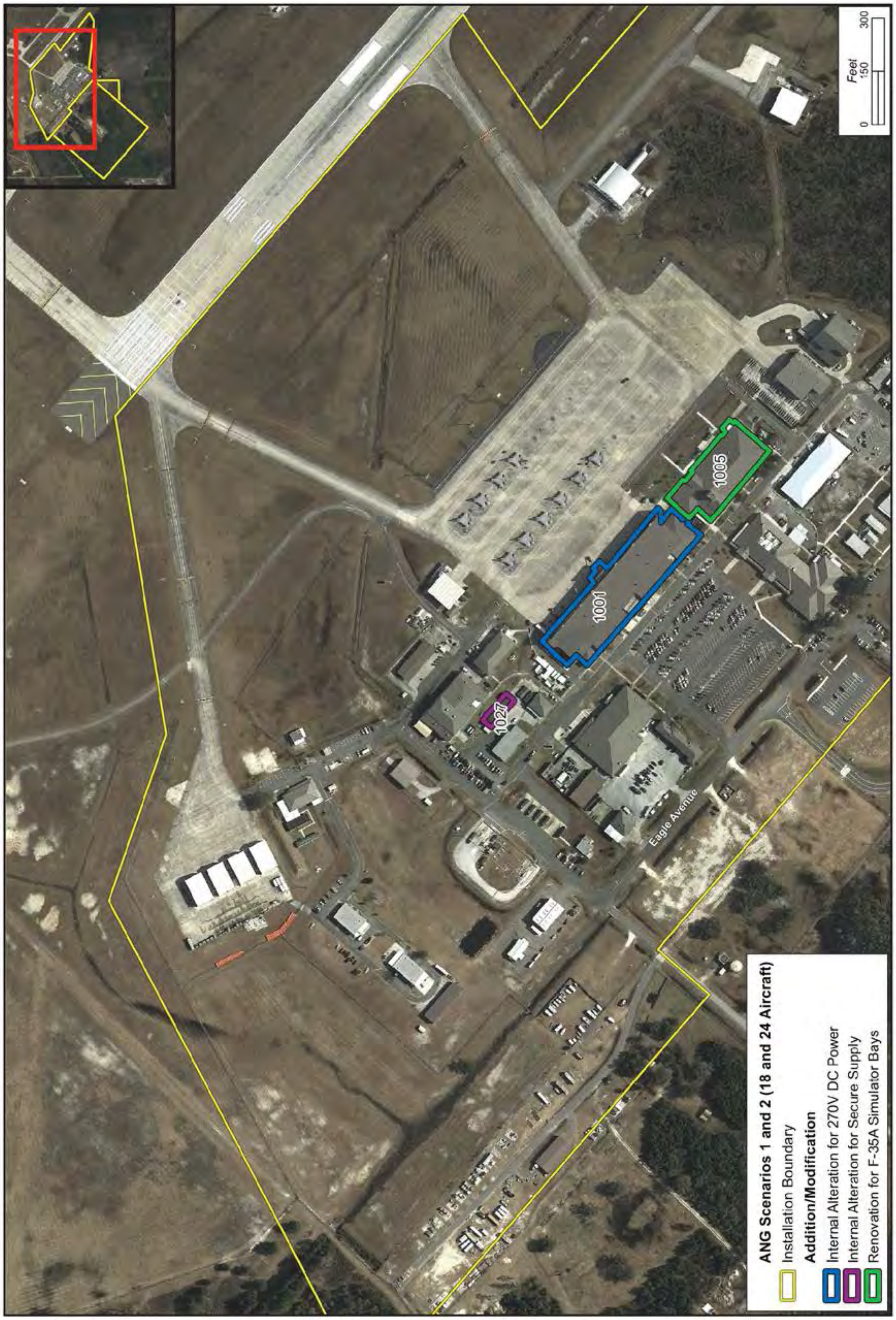


Figure JX2.1-1. Jacksonville AGS Construction Projects – ANG Scenarios 1 and 2

Table JX2.1-2. Proposed Construction and Modifications for Jacksonville AGS			
Year	***Action***	***Total Affected Area (acres)***[1]	***New Impervious Surface (acres)***
2017	Renovate Building 1005 for F-35A Simulator Bays	0	0
2017	Provide 270V DC Power in Building 1001 (6 Bays)	0	0
2017	Provide Additional Secure Space in LRS Base Supply, Building 1027	0	0
Total	**Cost: $400,000**	**0**	**0**

Note: [1]All construction includes only internal modifications; consequently, there are no associated affected areas of new impervious total affected areas as a result.

In total, infrastructure improvements would not increase any facility footprint as all proposed improvements would be internal. The overall cost of the improvements would total approximately $400,000. Because the proposed construction would occur within existing facilities, no surrounding lands would be affected by construction activities.

JX2.1.4 Personnel Changes

Beddown of the F-35A operational aircraft at Jacksonville AGS would require sufficient and appropriately skilled personnel to operate and maintain the new aircraft and to provide other necessary support services. The existing 1,035 personnel at Jacksonville AGS would be sufficient for beddown of 18 aircraft; however, a 24 percent increase in personnel (249) would be required to support an additional 6 F-35A aircraft under ANG Scenario 2. In general, it is expected that any increase in staffing at Jacksonville AGS would be through local recruiting and there would be limited relocation of personnel from other Department of Defense (DoD) locations to support this effort (Table JX2.1-3). No changes to civilian government personnel or contractors have been identified.

Table JX2.1-3. Proposed Personnel Changes: Jacksonville AGS					
	Baseline	***Proposed Scenarios***		***Per Scenario Net Change***	
	F-15C Personnel	*F-35A Personnel*			
		ANG 1	ANG 2	ANG 1	ANG 2
Total	**1,035**	**1,035**	**1,284**	**0**	**+249**

JX2.2 Training Airspace and Ranges

The 125 FW uses several airspace units (Table JX2.2-1 and Figures JX2.2-1 and JX2.2-2) including overland Military Operations Areas (MOAs) and Restricted Areas, as well as four offshore Warning Areas and an Altitude Reservation (ALTRV) subsumed under a Special Operating Area (SOA). Chapter 2 provides definitions of these airspace units. Neither the basing action nor alternative scenarios will require changes in special use airspace attributes, volume, or proximity; nor will changes be needed in the type and number of ordnance employed at the ranges.

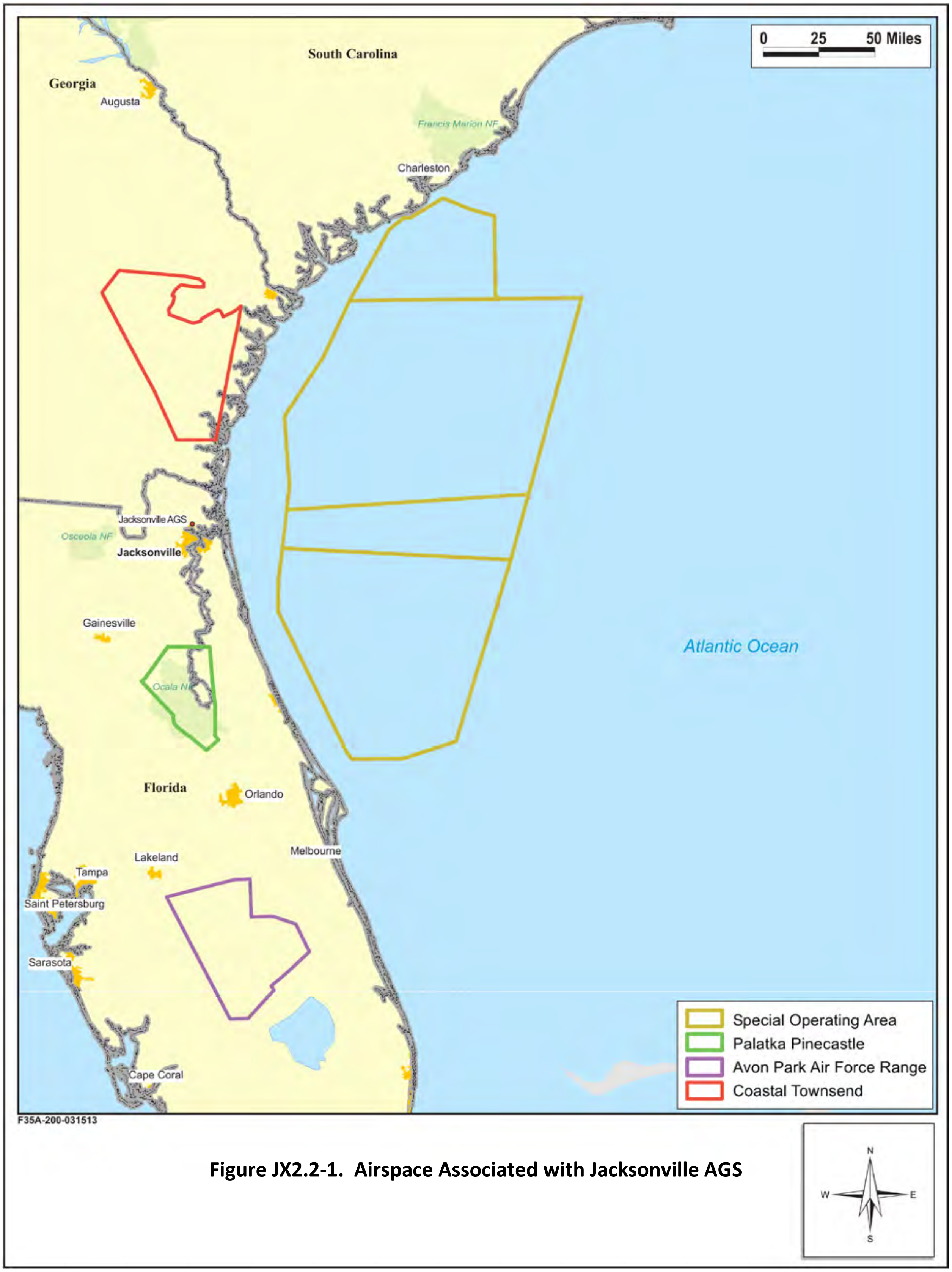


Figure JX2.2-1. Airspace Associated with Jacksonville AGS

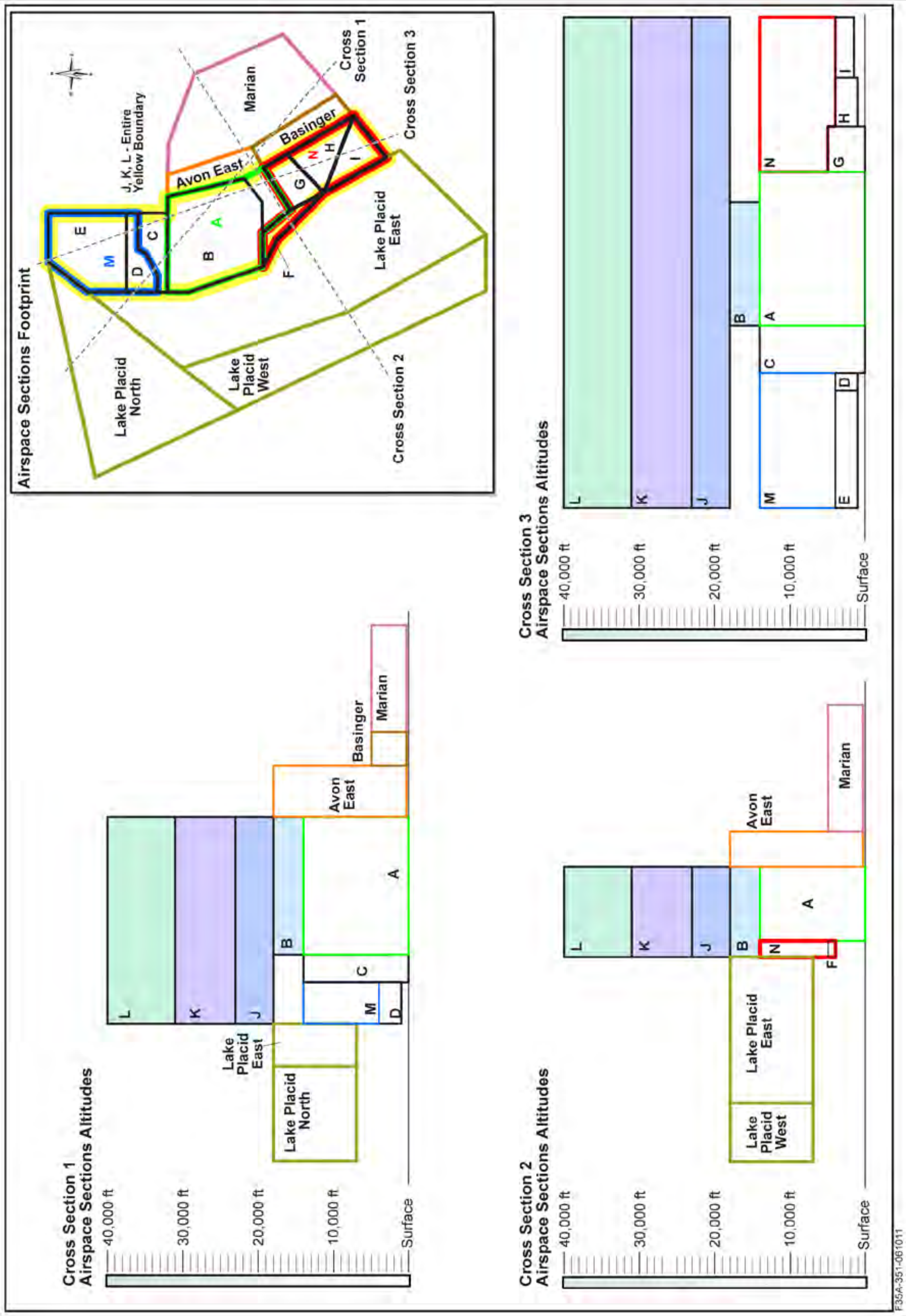


Figure JX2.2-2. Jacksonville AGS Associated Airspace Cross Sections

Table JX2.2-1. Jacksonville AGS Training Airspace

	Airspace	Floor (*feet MSL unless otherwise noted*)*	Ceiling (*feet MSL unless otherwise noted*)*
Avon Park Air Force Range (APAFR)	Avon MOA E Low/High	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
Palatka Pinecastle	Palatka MOA 1/2	3,000 AGL	18,000
	Palatka Air Traffic Control Assigned Airspace (ATCAA)	18,000	30,000
	R-2910 A	Surface	23,000
	R-2910 B/C	Surface	9,000
Coastal Townsend	Coastal MOA 1/2	3,000 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-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
SOA	W-134[1]	4,500	Unlimited
	W-157 A[1]	Surface	43,000
	W-158 A[1]	Surface	43,000
	W-159 A[1]	Surface	43,000
	Strike ALTRV	16,000	20,000

Source: Federal Aviation Administration (FAA) chartered airspace as of November 2011.
Legend: MSL = mean sea level; AGL = above ground level; BNI = but not including all MOAs extend to 18,000 feet MSL unless otherwise noted.
Notes: *MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to the average sea level. The elevation of a mountain, fo and is typically illustrated as a small circle on a topographic map with the MSL height shown in either feet or meters or both. Because aircraft fly a the ground can and do vary, MSL is used is denote the "plain" on which the floors and ceilings of special use airspace are established and the altitu that special use airspace.
[1]Supersonic flight authorized above 10,000 feet MSL.

JX2.2.1 Airspace Use

As the replacement for fighter aircraft, the F-35As would conduct missions and training programs necessary to fulfill its multirole 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 that the F-35A would operate in the airspace currently used by the 125 FW, but somewhat differently than the F-15Cs now using that airspace. These differences would derive from enhanced capabilities and changed requirements for the F-35A.

The 125 FW primarily trains for their F-15C air-to-air mission in the overwater SOA, conducting 88 percent of their total operations in these units. The four offshore Warning Areas, which are often scheduled together, support 3,393 annual operations by all users, especially the Navy F-18s. The 125 FW performs 48 percent (1,621) of these operations. In Palatka Pinecastle (which also includes an air-to-ground range), the 125 FW accounts for 83 percent of total operations. Conversely, both the Coastal Townsend airspace block and Avon Park, which includes an air-to-ground range, receive rare and sporadic use by the 125 FW.

Although the F-35As would perform the air-to-air missions of the F-15C aircraft, they would also need to train for their air-to-ground mission within the F-35As multi-role capabilities. As such, the F-35A would fly differently. These differences would include shifted emphasis on airspace units, the use of higher altitudes overall, combined use of existing airspace, reduced night operations, fewer supersonic events, and higher altitudes for supersonic flights.

The F-35A would fly more of the time at higher altitudes than the F-15C (Table JX2.2-2). The F-15Cs generally operate 90 percent of the time below 23,000 feet mean sea level (MSL). In contrast, the F-35A would operate 80 percent of the time above 23,000 feet MSL, with 30 percent of the flight time above 30,000 feet MSL. This would result in the F-35A aircraft conducting most of their operations in the higher altitude regimes of the airspace units. In the MOAs, all flight activities would be above 5,000 feet above ground level (AGL), except for strafing practice events. All airspace associated with Jacksonville AGS lies within the typical flight distance available during a standard daily training flight for both the F-15C and the F-35A. Regardless of the altitude structure and percent use indicated in Table JX2.2-2, F-35 aircraft (as do existing military aircraft) would adhere to all established floors and ceilings of airspace units. For example, the floor of Coastal MOA 4 lies at 14,000 ft MSL, so the F-35A would not fly below that altitude in that airspace. Rather, pilots would adapt training to this and other airspace units like the Palatka MOAs 1/2 and Coastal MOAs 1/2 with lower floors.

Table JX2.2-2. Baseline and Proposed Altitude Distribution

Altitude (feet)	***Percentage of Use***	
	F-15C	*F-35A*
	Air-to-Air	Multi-role
500 – 1,000 AGL	0.25%	2%
1,000 – 5,000 AGL	8.75%	3%
5,000 – 15,000 MSL	36%	5%
15,000 – 23,000 MSL	45%	10%
>23,000 MSL	10%	80%

Table JX2.2-3 shows baseline use of Jacksonville AGS airspace and reflects the total number of aircraft (Jacksonville AGS aircraft as well as other Air Force, Navy, and transient aircraft); fighter aircraft (F-15C from Jacksonville AGS) are also indicated and would be the aircraft replaced by the F-35A.

Table JX2.2-3. Jacksonville AGS Baseline Airspace Operations		
Airspace Unit	*Total Baseline*	*F-15C Baseline*
SOA[1]	3,393	1,621
Palatka Pinecastle	272	226
Coastal Townsend	3,216	0[3]
APAFR	7,664	0[3]
Total[2]	**14,545**	**1,847**

Notes:
[1]SOA operations presented for context and comparison; not analyzed in detail per Section 3.1.3.
[2]Totals provided only as a general trend of activity and not directly linked to the number of operations generated from an airfield.
[3]Rare use; data on use not recorded.

In November 2011, the Federal Aviation Administration (FAA) charted expanded airspace associated with APAFR. This new airspace configuration was created for current users and not done to support any F-35A basing actions. As shown in Table JX2.2-4, overall increases would be 4 percent for ANG Scenario 1 and 10 percent for ANG Scenario 2. Neither reflects an order of magnitude greater than year-to-year changes in operations. For specific units, the changes in airspace use would increase between 2 to 98 percent, depending upon the airspace unit. While Palatka Pinecastle would support the largest percent increase, total operations would remain about one per training day. On average, operations in the MOAs would increase from about 1 per day to between 1 and 2 per day for ANG Scenarios 1 and 2, respectively. Under ANG Scenario 1, the 125 FW would conduct 1,729 annual operations (all environmental day) in the overwater SOA; ANG Scenario 2 would involve 2,299 annual F-35A operations. As noted previously (Section 3.1.3), these overwater airspace units receive no further detailed analysis.

Table JX2.2-4. Comparison of ANG Scenarios – Airspace Operations						
Airspace Unit	*Total No-Action Alternative*	*F-15C Baseline*	*ANG Scenario*	*F-35A Operations*	*Net Change*	*Percent Change Total*
SOA[2]	3,393	1,621	1	1,729	+108	+3%
			2	2,299	+678	+20%
Palatka Pinecastle	272	226	1	370	+144	+53%
			2	493	+267	+98%
Coastal Townsend	3,216	0	1	247	+247	+8%
			2	328	+328	+10%
APAFR	7,664	0	1	123	+123	+2%
			2	164	+164	+2%
Total[2]	**14,545**	**1,847**	**1**	**2,469**	**+622**	**+4%**
			2	**3,284**	**+1,437**	**+10%**

Notes:
1SOA operations presented for context and comparison; not analyzed in detail per Section 3.1.3.
[2]Totals provided only as a general trend of activity and not directly linked to the number of operations generated from an airfield.

Like F-15C aircraft, the F-35A would fly approximately 60 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 airspace.

The F-15Cs currently fly approximately 1.2 percent of their time during environmental night (10:00 p.m. to 7:00 a.m.). It is expected that the F-35s would not fly any operations in the associated airspace during environmental night. All after-dark combat training can be achieved before 10:00 p.m. For rare weather contingencies and special mission training, the F-35As could fly during this period.

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. This would represent a substantial decrease from the F-15Cs which have only an air-to-air mission. Supersonic flight during air combat training would be performed only in the overwater Warning Areas, at least 15 nautical miles (nm) offshore. Most (90 percent) supersonic flight would be conducted above 30,000 feet MSL, with 10 percent occurring above 15,000 feet MSL.

JX2.2.2 Ordnance Use and Defensive Countermeasures

Most air-to-ground training would be simulated, where nothing is released from the aircraft, and target scoring is done electronically. As was discussed in Chapter 2, section 2.1.2, however, the F-35A (like the F-16) is capable of carrying and employing several types of air-to-air and air-to-ground ordnance (including strafing) and pilots would need training in their use. As the Air Force currently envisions, the type and number of ordnance would not differ from that currently employed by the F-16s. F-35A pilots would only use ranges and airspace authorized (i.e., approved and analyzed by DoD [ranges] and charted by the FAA [airspace]) for the type of ordnance being employed and within the number already approved at a range and/or target. If in the future the Air Force identifies weapons systems that are either new or could exceed currently approved levels, appropriate NEPA documentation would need to occur prior to their employment.

Like the F-15C, 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, it is expected to use fewer defensive countermeasures per training mission. However, because the F-35A is so new, this reduction in flare use cannot be defined yet. For the purposes of this analysis, it is estimated that F-35A flare expenditure would match or be less than that of F-15Cs on a per operation basis. Chapter 2, section 2.1.2, provides details on the composition and characteristics of flares.

Flares would be used in the MOAs (and in overwater SOA) currently approved for such use. Under the proposed action at Jacksonville AGS, F-35As would use up to (14,700) flares per year (in 2019 and after). Annual flare use would not increase over baseline, even though operations would increase under both scenarios. Based on the emphasis on flight at higher altitudes for the F-35A, roughly 90 percent of F-35A 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.

JX2.3 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.

JX2.4 Permits, Agency Consultations, and Government-to-Government Consultation

Jacksonville AGS operates under agreements with a series of environmental permitting agencies for such resources as air, water, and cultural resources.

Permitting. The following section describes the permits that are required to implement either of the two scenarios at this basing alternative location.

- 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 United States Environmental Protection Agency's (USEPA's) *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act* (December 2009). Since the proposed alterations would not create new impervious surfaces, this requirement would not be applicable.
- As applicable, Jacksonville AGS will coordinate with the USEPA, Region IV and Florida Department of Environmental Protection (DEP) regarding proposed construction near Environmental Restoration Program sites on-base.
- A formal conformity applicability 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. Because Jacksonville AGS is in an attainment area for all criteria pollutants, a conformity applicability analysis is not necessary.
- Personnel conducting construction and/or demolition activities will strictly adhere to all applicable occupational safety requirements during construction activities.
- Sampling for asbestos-containing material (ACM) and lead-based paint (LBP) would occur prior to demolition activities for those buildings not previously tested; all materials would be handled in accordance with Air Force policy. If ACM or LBP is present, Jacksonville AGS 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. Other hazardous waste and material issues and permits will be addressed as needed.

Consultation. In January 2010, the Air Force initiated Section 106 consultation with the Florida State Historic Preservation Office (SHPO); however, they responded that more information was required in order to make a determination of effect. In response to the Draft EIS, the SHPO concurred in June 2012 that there would be no effect to National Historic Preservation Act (NHPA) properties within the Area of Potential Effect (APE). The Georgia SHPO responded in April 2013 with a statewide concurrence of no adverse effects in the APE associated with F-35A operations (see Appendix B).

Government-to-Government. Project-specific government-to-government consultation and their status are described below. On November 27, 1999, the Department of Defense (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).

Jacksonville AGS initiated project-specific, government-to-government consultation in January 2010 and again in October 2012 by sending letters to the four federally-recognized American Indian groups that would have potential interest in the proposed action at Jacksonville AGS, they were the: Miccosukee Tribe of Indians, Muscogee (Creek) Nation, Poarch Band of Creek Indians, and Seminole Tribe of Florida. In the letter, the Air National Guard requested any negative responses to the conclusion stated in the Draft EIS that there would be no effects to cultural and traditional resources. While the Air Force made several attempts requesting feedback (by letter and phone calls in 2012 and 2013), no responses were received (see Appendix B for specifics on consultation). As such, the Air Force has made the determination that there would be no adverse effects to the APE and therefore, according to 36 CFR 800.4(d)(1) *No historic properties affected*: "If the agency official finds that either there are no historic properties present or there are historic properties present but the undertaking will have no effect upon them as defined in § 800.16(i), the agency official shall provide documentation of this finding, as set forth in § 800.11(d), to the SHPO/THPO. The agency official shall notify all consulting parties, including Indian tribes and Native Hawaiian organizations, and make the documentation available for public inspection prior to approving the undertaking. (i) If the SHPO/THPO, or the Council if it has entered the Section 106 process, does not object within 30 days of receipt of an adequately documented finding, the agency official's responsibilities under Section 106 are fulfilled."

JX2.5 Public and Agency Concerns

JX2.5.1 Scoping

Scoping meetings were held February 8 through 12, 2010 in Brunswick, Georgia; Jacksonville, Avon Park, Lake Wales, and Palatka, Florida. Sixty-one people attended the meetings.

During the 30-day scoping period, the Air Force received 11 letters (6 agencies [though not responses to Interagency and Intergovernmental Coordination for Environmental Planning {IICEP}]), 4 general public, and 1 elected official. Of the six agencies writing to support this alternative, two aviation agencies wished to know more about airspace operations. There were four letters from the general public, two in support and two concerned about noise. The one elected official from the governor's office lent his support of the proposal.

The majority of comments received at the scoping meetings indicated their complete support to beddown the aircraft at Jacksonville AGS. Two written comments requested that noise be evaluated and also requested examination of potential disturbance to wildlife. One commentor asked that the contours be presented for use in the Avon Park Joint Land Use Study (JLUS), currently in development.

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:

- Where would the F-35A fly? (see Table JX2.2-1)
- How would it conflict with other aircraft? (see Section JX3.1.2.2)
- Is the noise output of the F-35A more than the F-15C? (see Table JX3.2-1)
- How would the noise from the F-35A affect hearing aids or hearing loss? (see Section JX3.2.1.2)
- Would aircraft crashes increase? (see Section JX3.4.1.2)
- What kind of effects would the F-35A have on wildlife? (see Section JX3.6.1.2 and JX3.6.2.2)
- Can the F-35A noise contours be presented for use in the Avon Park JLUS, currently in development? (see Section JX3.2.2 and Figure JX3.2-4)
- How would overflights of the F-35A affect land use? (see Sections JX3.10.1.2 and JX3.10.2.2)

JX2.5.2 Draft EIS Public Comment Period

Official notification of the F-35A Operational Basing Draft EIS public comment period began with the Notice of Availability (NOA) announcement on April 13, 2012 in the *Federal Register*. This marked the start of the 45-day review period which would end on June 1, 2012; however, the Air Force was requested to hold another hearing the first week of June. As a result, the public comment period was extended 19 more days to June 20, 2012. A notice was placed in the *Federal Register* on May 23, 2012 announcing this extension.

From May 3 through May 10, 2012, four hearings were held in Jacksonville, Avon Park, and Palatka, Florida and in Brunswick, Georgia. At the four hearings, a total of 20 people attended, with one person expressing their support in the form of an oral comment; no written comments were received at the hearings. As was mentioned in Chapter 1, during the 64-day comment period, a total of 934 written comments were received, of which five were associated with the Jacksonville ANG alternative. All commented on their support to base F-35As at Jacksonville International Airport. No other issues were identified.

JX2.5.3 Revised Draft EIS Public Comment Period

The 45-day public comment period for the Revised Draft EIS began on May 31, 2013 when the NOA was published in the *Federal Register* (Appendix A). The Revised Draft EIS was circulated for review and comment to government agencies, local organizations, American Indian tribes, interested private citizens, and public libraries. Copies of the Revised Draft EIS were delivered by May 31, 2013 to 35 libraries and the entire two-volume document was posted on the Air Force website at www.accplanning.org for viewing electronically. On the same day (or as soon as possible given publication deadlines) as the NOA appeared in the *Federal Register*, the Air Force announced the availability of the Revised Draft EIS NOA in over 20 local newspapers.

There were 11,172 comments received in letter, note, email, and postcard format during the 45-day public comment period. Of these, 823 were in letter, handwritten note, and email format and 10,349 were postcard format. No general public comments were received associated with the basing action at Jacksonville AGS.

JX2.6 Differences Between the Draft EIS and the Final EIS

Following the Draft EIS, a Revised Draft EIS was published which included factual corrections, additional and/or supplemental information, and improvements or modifications to the analyses presented in the Draft EIS. The re-analysis included noise impacts to low-income and minority populations based on updated census data (not available when the 2012 Draft EIS was published) in the noise section (JX3.2) and environmental justice/protection of children (JX3.12); inserting documents incorporated by reference (JX2.7); adding mitigation measures (JX2.8); correcting typographical and grammatical errors, as needed; correcting mapping and labeling mistakes in text and figures throughout; inserting new or revised information, where applicable; and including responses to comments received during the Draft EIS public review period in Volume II, Appendix E.

In this Final EIS, several changes were made and include the following:

- In Chapter 3, Section 3.5, Figure 3-2 was revised to correctly portray the DoD clear zone as a square and Table 3-5 was added with F-16 and F-15 historic mishap data.
- Where applicable, Section JX2.4 and Appendix B were updated to reflect current status of agency and government-to-government consultations.
- Throughout the document, corrected typographical and grammatical errors in the text.
- Responded to Revised Draft EIS comments in Volume II, updated Appendix E.

JX2.7 Documents Incorporated by Reference

In accordance with CEQ regulations for implementing NEPA and with the intent of reducing the size of this document, the following material relevant to the proposed action at the alternative locations and basing scenarios is incorporated by reference and identified according to the alternative location. These documents are part of the administrative record and are available upon request.

Proposed Modernization and Expansion of Townsend Bombing Range (TBR) (USMC 2013). Final EIS published in March 2013. Documentation to expand TBR to accommodate weapons drop zones for multiple weapon systems at the range and in associated restricted airspace and MOAs. Airspace includes the Coastal 1/2 MOAs, Restricted Airspace R-3007A/B/C/D, and overlying ATCAAs.

Sustainable Ranges Report to Congress, Department of Defense (DoD 2012). April 2012. A report to Congress on the sustainability of all DoD ranges describing the training requirements and the existing range resources to meet these requirements.

Atlantic Fleet Active Sonar Training (Navy 2012). EIS/OEIS published in May 2012. Documentation for aircraft and naval operations in all East Coast overwater Warning Areas are evaluated.

Renewal Authorization to Use Pinecastle Range, Ocala National Forest (Navy 2010). Final Supplemental EIS and Record of Decision. June and October 2010, respectively. Documentation presenting aircraft operations and range activities within the Pinecastle Bombing Range.

U.S. Marine Corps East Coast F-35B Basing (USMC 2010). Final EIS and Record of Decision published in October and December 2010, respectively. Documentation addressing F-35B operations (as well as existing aircraft) in overland and overwater airspace as well as at ranges in Georgia, North Carolina, and South Carolina. Airspace includes overwater Warning Areas off the coasts of Virginia, North/South Carolina, Georgia, and Florida; Coastal 1/2/4/5 and Core MOAs; Restricted Airspace R-3007A/B/C/D, and R-3606A; and overlying ATCAAs. Operations at the Dare County and Townsend Bombing Ranges were also evaluated.

Airspace Training Initiative Final EIS (Air Force 2010). Published in June 2010. Documentation associated with airspace operations in the Bull Dog, Gamecock, Poinsett Military Operations Areas, Poinsett Range, and associated restricted airspace. Includes introduction of ground-based electronic threat emitters and chaff and flare deployment.

Navy Cherry Point Range Complex Final EIS/OEIS (Navy 2009a). Record of Decision signed June 2009. Documentation for aircraft and naval operations in overwater Warning Areas adjacent to North Carolina.

Jacksonville Range Complex Final EIS/OEIS (Navy 2009b). Record of Decision signed June 2009. Documentation for aircraft and naval operations in overwater Warning Areas adjacent to the east coasts of Florida, Georgia, as well as South and North Carolina.

Navy Undersea Warfare Training Range (Navy 2009c). Record of Decision signed July 2009. Documentation for aircraft and naval operations in overwater Warning Areas adjacent to the east coasts of Florida, Georgia, as well as South and North Carolina.

Proposed Navy Air-to-Ground Training at Avon Park Air Force Range, FL Final EIS (Navy 2006). Record of Decision signed in August 2006. Documentation associated with aircraft operations, airspace (Avon North/South/East/Hi/Ultra Hi, Basinger, Lake Placid, and Marian MOAs; Restricted Airspace R-2901A/B/C/D/E/F/G/H/I; and overlying ATCAAs), and range activities at Avon Park Air Force Range.

Modifications to Gamecock Alpha Military Operations Area EA (Air Force 2006). Finding of No Significant Impacts signed June 2006. Documentation for airspace modification to Gamecock MOAs and airspace operations.

Shaw AFB Chaff and Flare Final EA (Air Force 2003). Published in December 2003. Evaluation of impacts associated with chaff and flare deployment in the Bulldog and Gamecock MOAs.

JX2.8 Mitigation Measures

No other extra-ordinary mitigation measures are required beyond those prescribed under existing federal and state laws, regulations, and permit requirements. Refer to Chapter 2, section 2.6.1 for a description of measures being adopted, as best management practices and management actions, to minimize and/or avoid adverse impacts.

JX3.0 JACKSONVILLE AGS AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

JX3.1 Airspace Management and Use

JX3.1.1 Base

JX3.1.1.1 Affected Environment

Jacksonville IAP, a joint-use airport, lies 10 miles north of downtown Jacksonville. The 125 FW leases 342 acres of land southwest of the airport runway complex and terminal, which is publicly owned by the Jacksonville Airport Authority. Currently, the 125 FW flies and maintains 18 F-15C aircraft in support of its mission for the FLANG.

Operations out of Jacksonville IAP use airspace immediately surrounding the field, and within a 30-nm local area with six regional or military airports. The FAA operates Jacksonville Approach Control and provides air traffic control services within this airspace for arriving and departing aircraft. A total of 128,107 operations were conducted at Jacksonville AGS under baseline conditions, including over 12,000 military operations and nearly 117,000 civilian operations. Aircraft based at the Jacksonville AGS have flown in this airspace environment for many decades. No comments were received during the public scoping period revealing conflicts with civil or commercial aviation.

JX3.1.1.2 Environmental Consequences

Beddown of 18 or 24 F-35A operational aircraft at Jacksonville AGS would not affect airspace management and use within the local air traffic environment. Eventual replacement of F-15C aircraft at Jacksonville AGS by the F-35A would result in a 1.4 percent net decrease in airfield operations under ANG Scenario 1 and no noticeable change (0.06 percent increase) under ANG Scenario 2 from baseline conditions (Table JX3.1-1). In contrast to baseline average annual flying days of 235, the 125 FW is expected to fly no more than 260 days annually with the F-35A. Fewer operations per day would result. No changes to the Jacksonville IAP terminal airspace installation arrival or 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 JX3.1-1. Comparison of ANG Scenarios – Airfield Operations			
Jacksonville AGS Beddown Scenario	*Baseline*	*ANG Scenario 1*	*ANG Scenario 2*
Based F-15C	7,223	0	0
Based C-130, C-12	1,807	1,807	1,807
Transients[1]	3,209	3,209	3,209
F-35A	-	5,486	7,296
Civilian/Commercial	115,868	115,868	115,868
Total	**128,107**	126,370	**128,180**
Percent Change from Baseline	**-**	**-1.4%**	**+0.06%**

Source: Wyle 2011.
Note: [1]Transients include P-3, UH-60.

JX3.1.2 Airspace

JX3.1.2.1 Affected Environment

The 125 FW currently uses several airspace units which consist of MOAs, Restricted Areas, and an ATCAA (refer to Table JX2.2-1 and Figure JX2.2-1). These same airspace units would be used by the F-35A on a continuing basis for training. In total, the Jacksonville AGS F-15s fly over 200 operations in these overland airspace units, accounting for 12 percent of total use. As noted previously, the 125 FW flies 48 percent (1,621 of 3,393) of the total operations in the SOA.

Victor routes are civil airways below 18,000 feet MSL; no Victor Routes transit the Avon or Palatka MOAs. Two high level jet routes (above 18,000 feet MSL) traverse above the Palatka MOA, J55 and J81. Commercial aircraft activity in Florida has increased recently and is expected to continue to grow over the next 20 years as the population of the state also increases. Most of this present and anticipated growth would occur at the Orlando and Jacksonville airports. No civilian airports occur under the airspace units used by the 125 FW, although several private airstrips underlie the Palatka MOA and may be used occasionally.

As noted in Chapter 2, Section 2.1.2, F-35A aircraft would not use military training routes, either to access the special use airspace or conduct training. Due to their predominantly higher altitude missions, advanced electronics, and speed, the F-35As would use MOAs, ATCAAs, Restricted Areas, and Warning Areas.

JX3.1.2.2 Environmental Consequences

Selection of Jacksonville AGS for 18 or 24 F-35A operational aircraft would not result in adverse impacts on airspace use and management throughout this region. Neither scenario would require any changes to the current lateral or vertical configuration of the MOAs, Restricted Areas, or ATCAA, nor would it alter their normally scheduled times of use. Based on the average planning factor of 260 flying days per year, total average operations would increase an average of 4 percent under ANG Scenario 1, and would increase by 10 percent under ANG Scenario 2 largely driven by the increase in the Palatka Pinecastle operations (Table JX2.2-4).

Impacts to civil and commercial aviation traffic in 125 FW training areas would be negligible due to minimal increases in F-35A operations and the lack of Victor routes traversing the Palatka and Coastal Townsend airspaces. Additionally, the traffic on the high altitude routes J81 and J55 are within positive control airspace (over 18,000 feet MSL) and transit above the Palatka MOA with its ceiling of 18,000 feet MSL. An FAA traffic survey revealed 30 aircraft received Air Traffic Control (ATC) clearance through the R-3007 airspace on a heavy traffic day (mid-summer Thursday) (FAA 2010).

Close coordination of scheduling and use of these, MOAs, ATCAA, and Restricted Areas by 125 FW scheduling and Jacksonville Air Route Traffic Control Center (ARTCC) would continue to ensure safe air traffic operations throughout this region. Other air traffic traveling near these airspace units would not be in conflict with military flight activities. In addition, the F-35A would conduct a greater percentage of training at higher altitudes than the F-15Cs. Therefore, since the proposed beddown represents a continuation of current activities with slight decreases in operations, no impacts to airspace use and management would be expected.

JX3.2 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 EIS, the noise environment at Jacksonville IAP was modeled using two software programs: 1) NOISEMAP and 2) Integrated Noise Model (INM). The Air Force and ANG 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 NEPA documentation. NOISEMAP 7 is the latest software version and includes the input component (BASEOPS), the calculation component (NMAP), and the output component (NMPlot) (AFCEE 2010). The military NOISEMAP-generated contours are presented here. Specific detailed information on supplemental metrics (e.g., annoyance) is also presented in Appendix C.

A second program, INM, applies to Jacksonville AGS because it jointly operates out of the Jacksonville IAP. The FAA uses INM to evaluate aircraft noise generated at and around civilian airports. As detailed in Chapter 3, section 3.3.5, INM was not used as a primary model since it precludes comparison and consistency across all six alternative locations. For modeling purposes, the civilian/commercial aircraft noise levels generated under INM were combined logarithmically with military aircraft noise calculated by NOISEMAP for Jacksonville IAP.

Both Sound Exposure Level (SEL) and Maximum Sound Level (L_{max}) metrics would apply to any beddown. As shown in Table JX3.2-1, the SEL and L_{max} noise levels reflect conditions specific to flight activity at Jacksonville AGS, 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 F-15C aircraft.

Table JX3.2-1. SEL and L_{max} Comparison for Jacksonville AGS								
Event	*Based F-15A*[1]				*F-35A*[2]			
	SEL (dBA)	*L_{max} (dBA)*	*Power (%NC)*	*Speed (kts)*	*SEL (dBA)*	*L_{max} (dBA)*	*Power (%ETR)*	*Speed (kts)*
Afterburner Assisted Take-off[3] (1,000 feet AGL)	**112**	**104**	90%	275	**119**	**116**	100%	300
Military Power Take-off (1,000 feet AGL)	**112**	**104**	90%	275	**119**	**116**	100%	300
Arrival (non-break, through 1,000 feet AGL, gear down[4])	**100**	**92**	82%	180	**99**	**95**	40%	180
Overhead Break (downwind leg, 2,000 feet AGL, gear down)	**78**	**70**	72%	180	**93**	**87**	40%	200
Low Approach and Go (downwind leg, 2,000 feet AGL, gear down)	**95**	**85**	82%	180	**93**	**87**	40%	210

Jacksonville AGS nominal elevation = 30 feet MSL; Weather: 69°F, 80% Relative Humidity; dBA = A-weighted decibel; NC=Engine Core revolutions per minute; kts = knots; ETR = Engine thrust request.
Source: Wyle 2011.
Notes: All numbers are rounded.
[1]Modeled F-15C with F110-PW-229 engine.
[2]Modeled with reference acoustic data for an F-35A (Air Force 2009).
[3]Power reduced from Afterburner to military power prior to reaching 1,000 feet AGL.
[4]F-15C values reflect gear up conditions.

JX3.2.1 Base

JX3.2.1.1 Affected Environment

Data used for baseline noise conditions were derived from the 2006 INM study and the 2006 NMAP. It was validated by Jacksonville AGS in 2010. Under baseline, 128,107 airfield operations are flown annually at Jacksonville IAP. This total includes 7,223 operations generated by the 125 FW and an additional 120,884 operations conducted predominantly by civilian and commercial aircraft (refer to Table 2-2). Under baseline conditions, nearly 99 percent of the 125 FW operations occur during environmental daytime hours (i.e., 7:00 a.m. and 10:00 p.m.); only 84 operations out of the 7,223 total operations occurred during environmental nighttime (or between 10:00 p.m. to 7:00 a.m.). F-15C operations occurring during environmental nighttime hours are subjected to a 10 decibel (dB) penalty for each operation during the night (refer to Section 3.3 for more detailed resource definition and methodology used to evaluate impacts).

Noise Exposure

Figure JX3.2-1 shows the 65 to 85 dB Day-Night Average Sound Level (DNL) contour bands, in 5-dB increments, for Jacksonville IAP baseline conditions. Departures of based F-15 aircraft from Runways 07 and 25 dominate the DNL contours to the east and west of the station/airport, respectively. The contribution of civilian aircraft is approximately 2 to 3 dB less than the military aircraft contribution.

Table JX3.2-2 presents noise exposure within each dB DNL contour band for off-airport acreage, population, households, and representative receptors. Representative receptors include off-installation (i.e., beyond limits of Jacksonville IAP) places of worship, schools, child care facilities, hospitals, and residential locations potentially with areas affected by aircraft noise of 65 dB DNL and greater. According to the U.S. Census Bureau, households are defined as a house, an apartment, a mobile home,

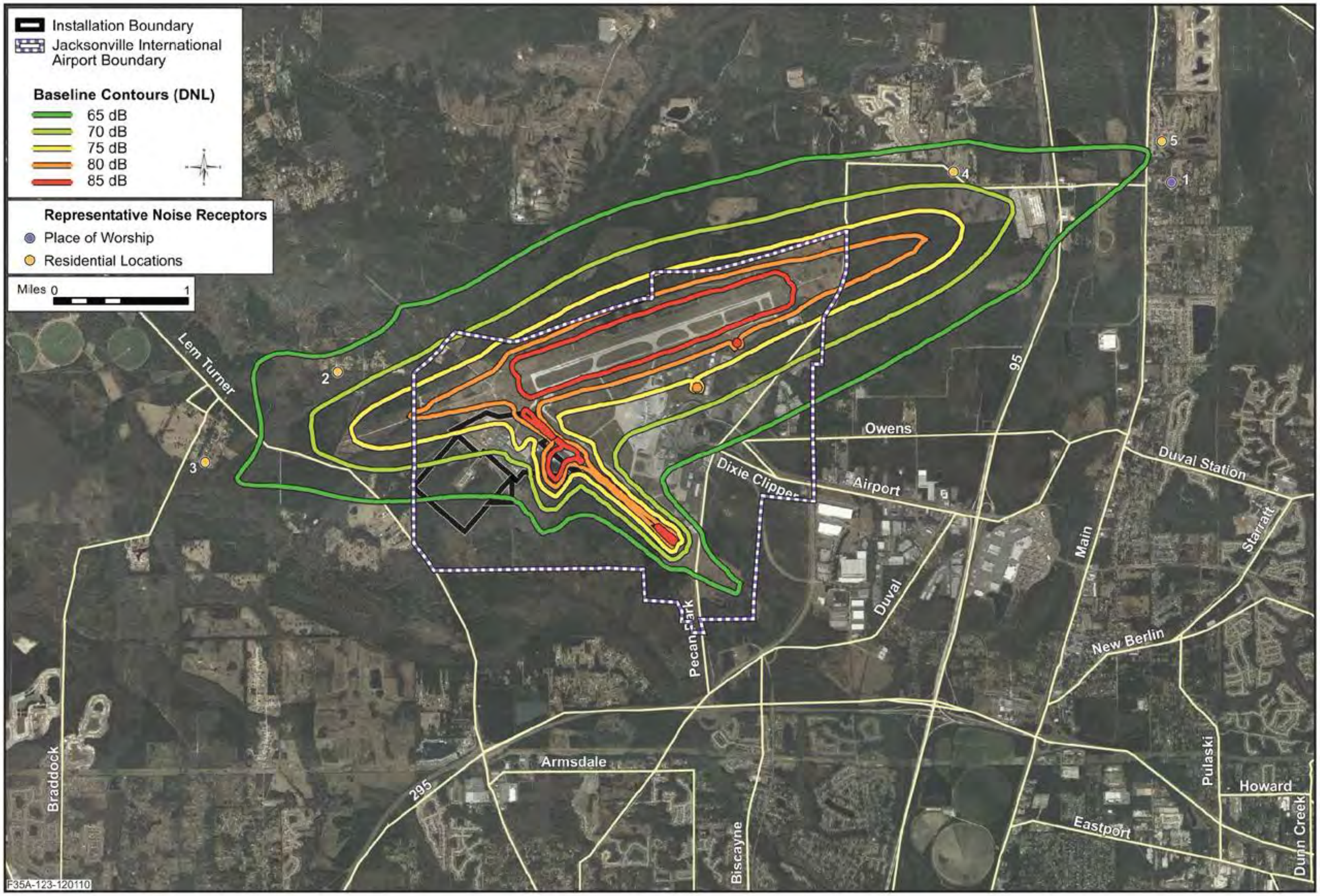


Figure JX3.2-1. Baseline Noise Conditions at Jacksonville AGS a group of rooms, or a single room occupied (or if vacant, intended for occupancy) as separate living quarters. Separate living quarters are those in which the occupants live separately from any other people in the building and that have direct 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 2010b). Generally, to determine the population counts by contour band, this analysis uses U.S. Census block groups (from the American Community Survey, 5-year estimates) and assumes an even distribution of population within each block group under the respective contour band (U.S. Census Bureau 2010b). Adopting this methodology gives a good estimate (i.e., more conservative) of the number of people who may be exposed to noise levels within the noise contour band. Where there are low or inconsistent population densities, actual houses were counted using aerial photographs (Google Earth 2013) and using the U.S. Census population multiplier for Duval County of 2.47 people per household. Acreage reported here excludes the entire Jacksonville IAP because it is directly associated with aircraft operations, and does not include any receptors or residential areas.

Table JX3.2-2. Off-Airport Noise Exposure within Baseline Contours at Jacksonville IAP

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households[2]*	*Receptors[3]*
65 – 70	2,197	296	83	2
70 – 75	945	12	5	0
75 – 80	36	0	0	0
80 - 85	64	0	0	0
85+	0	0	0	0
Total	**3,242**	**308**	**88**	**2**

Notes: : Wyle 2011 and U.S. Census Bureau 2010b.
[1]Exclusive of upper bound for all bands.
[2]Based on actual house counts.
[3]All noise receptors are located off-base; refer to Figure JX3.2-1

In total, exposure to noise levels of 65 dB DNL and greater include an estimated 3,242 acres, 308 people, and 88 households. Table JX3.2-3 lists the DNL for five off-airport representative receptors around Jacksonville IAP under baseline conditions. Affected representative receptors include four residential areas and a church. Three of the representative receptors are within areas subject to noise levels less than 65 dB whereas two experience 67 dB DNL. No schools or hospitals lie within the affected area outside the airport.

Table JX3.2-3. Baseline Decibel Levels at Representative Locations near Jacksonville IAP

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
1	Pleasant Park Church	Worship	<65
2	Owenby Lane	Residential	67
3	Thomas Mill Road/Thomas Mill Road East	Residential	<65
4	Pecan Park Road	Residential	67
5	Moss Hollow Drive	Residential	<65

Source: Wyle 2011 and U.S. Census Bureau 2010b.

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) (or number of events [NA] above 75 L_{max}) and NA65 L_{max} (windows open). NA means "number of events above," so this analysis examines the number of annual average daily overflight events where L_{max} would be greater than or equal to 65 dB and 75 dB. Table JX3.2-4 presents indoor speech interference under baseline. The average number of speech interference events is 2.3 for windows closed and 5.8 for windows open.

Classroom Speech Interference

The affected area includes no schools within the baseline noise contours; therefore, classroom speech interference is not an issue.

Table JX3.2-4. Baseline Indoor Speech Interference at Representative Locations near Jacksonville AGS

Location ID Number	*Receptor*	*Average Daily Indoor Events per Hour[1] Daytime (7:00 a.m. to 10:00 p.m.)*	
		Windows Closed	*Windows Open*
2	Owenby Lane	2	4
3	Thomas Mill Road/Thomas Mill Road East	2	6
4	Pecan Park Road	2	6
5	Moss Hollow Drive	3	7

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

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 JX3.2-5 lists the probabilities of indoor awakening from average daily nighttime (10:00 p.m. to 7:00 a.m.) events for the same representative residential locations, with probability of awakening ranging between 4 and 14 percent for windows closed and between 18 and 26 percent for windows open.

Table JX3.2-5. Baseline Indoor Sleep Disturbance at Representative Locations on and near Jacksonville AGS			
Location ID Number	***Receptor***	***Average Nightly (10:00 p.m. to 7:00 a.m.) Probability of Awakening (%)[1]***	
		Windows Closed	*Windows Open*
2	Owenby Lane	4%	18%
3	Thomas Mill Road/Thomas Mill Road East	13%	25%
4	Pecan Park Road	10%	23%
5	Moss Hollow Drive	14%	26%

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed 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 greater than 80 dB DNL. Under baseline conditions there are no residential areas on or adjacent to the airport 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 Jacksonville IAP. While these sources may contribute to the overall noise environment, they are not distinguishable from aircraft-generated noise at and adjacent to the airport. For this reason, these other noise sources were not considered under baseline nor are they analyzed under any of the beddown scenarios.

JX3.2.1.2 Environmental Consequences

ANG Scenario 1

Noise Exposure

ANG Scenario 1 involves the beddown 18 F-35A aircraft at Jacksonville IAP and drawdown of 18 F-15Cs. Proposed annual F-35A flight operations would total 5,486. About 92 percent of these proposed operations would consist of departures and arrivals; the remaining 8 percent would involve pattern work in the vicinity of the airport. Annual F-35A flight operations, when added to commercial and civilian aircraft (120,884 operations), would total approximately 126,370 annually, a negligible 1.4 percent decrease from baseline. Figure JX3.2-2 depicts the proposed 65 to 85 dB DNL noise contour bands in 5-dB increments, resulting from Jacksonville AGS ANG Scenario 1. Baseline contours are also presented for comparison purposes.

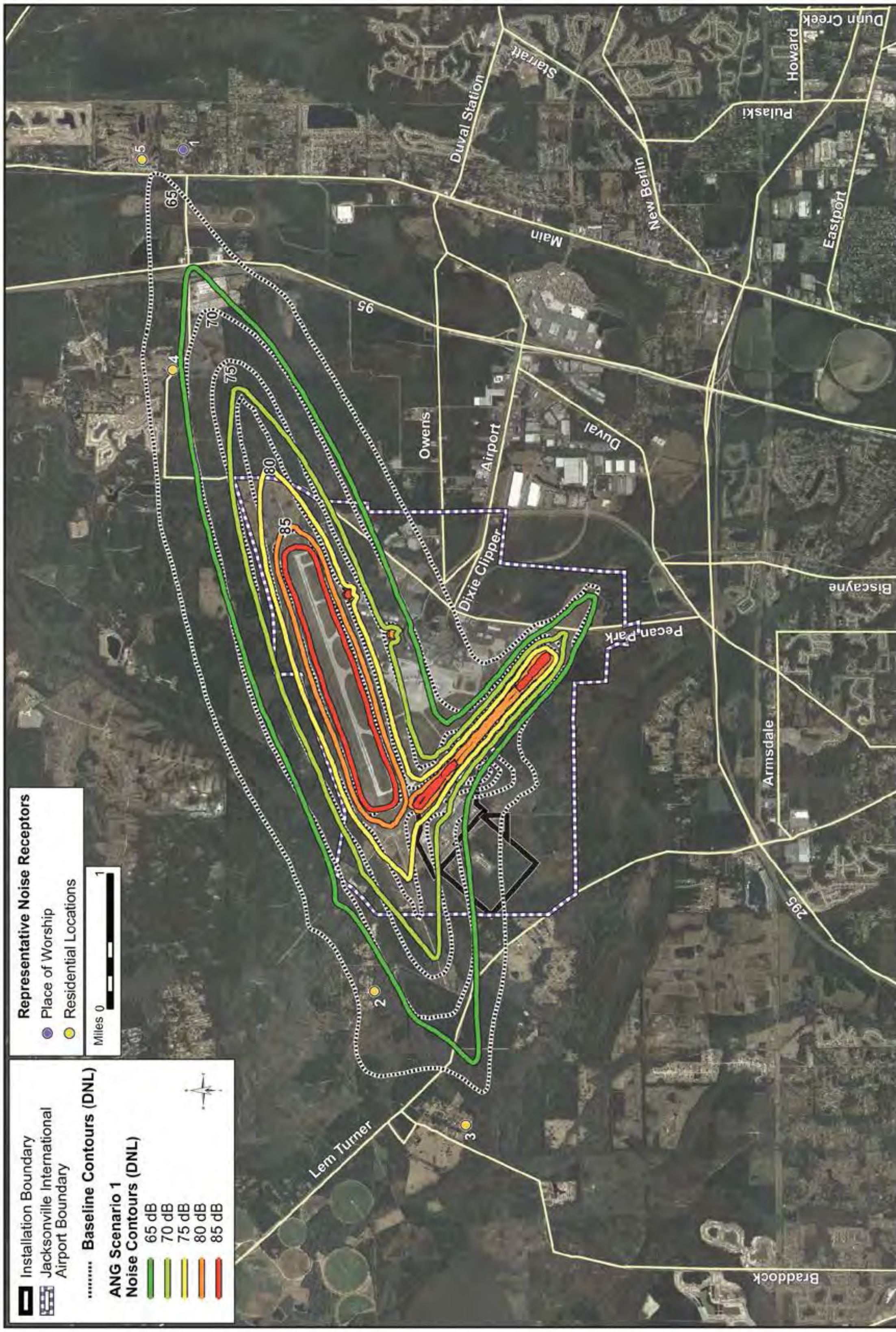


Figure JX3.2-2. ANG Scenario 1 Proposed Noise Contour Bands at Jacksonville AGS

Table JX3.2-6 presents noise exposure in terms of estimated off-airport acreage, population, households, and representative receptors. When compared to baseline conditions, ANG Scenario 1 noise levels of 65 dB DNL and greater would decrease and affect: 1,512 fewer acres, 138 fewer people, and 43 fewer households. The number of representative receptors affected by 65 dB DNL and greater would decrease by two.

Table JX3.2-6. Off-Airport Noise Exposure under ANG Scenario 1 at Jacksonville AGS Proposed/Baseline

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*	*Receptors*[2]
65 – 70	1,360/2,197	170/296	45/83	0/2
70 – 75	360/945	0/12	0/5	0/0
75 – 80	10/36	0/0	0/0	0/0
80 - 85	0/64	0/0	0/0	0/0
85+	0/0	0/0	0/0	0/0
Total	**1,730/3,242**	**170/308**	**45/88**	**0/2**

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes: [1]Exclusive of upper bound for all bands.
[2]All noise receptors are located off-base; refer to Figure JX3.2-2

Overall, the DNL contours would decrease relative to baseline conditions by approximately 2 to 3 dB for operations from Runways 07/25. The F-35A would generate approximately 31 percent less equivalent annual flight operations[1] than the based F-15. The effect of the reduction in operations would be somewhat offset by the effect of the shallower climb profiles of the modeled F-15 departures, relative to the proposed modeled F-35A departure profiles. With the 18 F-15 aircraft eliminated, F-35A departures from runways 07 and 25 would dominate the DNL exposure east and west of the station/airport, respectively. The contribution of civilian aircraft would be approximately 1 to 2 dB less than the military aircraft contribution.

Under ANG Scenario 1, Table JX3.2-7 shows representative receptors by name, type, and decibel level compared to baseline conditions. Under this scenario, all locations would either experience a decrease in noise levels to below 65 dB DNL or remain consistent with baseline conditions. No receptors would be subject to noise levels above 65 dB DNL.

Table JX3.2-7. Decibel Levels under ANG Scenario 1 at Representative Locations near Jacksonville AGS Proposed/Baseline

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
1	Pleasant Park Church	Worship	<65/<65
2	Owenby Lane	Residential	<65/67
3	Thomas Mill Road/Thomas Mill Road East	Residential	<65/<65
4	Pecan Park Road	Residential	<65/67
5	Moss Hollow Drive	Residential	<65/<65

Source: Wyle 2011 and U.S. Census Bureau 2010b.

[1] Equivalent annual flight operations equal daytime (7:00 a.m. to 10:00 p.m.) flight operations plus ten times the nighttime (10:00 p.m. to 7:00 a.m.) flight operations.

Speech Interference

In terms of speech interference, Table JX3.2-8 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 NA75L_{max} and NA65L_{max}. Under this scenario, the average number of speech interfering events across all receptors would range from a high of seven with windows open, to a low of one with windows closed. In general, noise events per hour would decrease by 1 event per hour for all receptors, relative to baseline.

Table JX3.2-8. ANG Scenario 1 Indoor Speech Interference at Representative Locations at Jacksonville AGS

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
2	Owenby Lane	1	4	-1	0
3	Thomas Mill Road/Thomas Mill Road East	1	5	-1	-1
4	Pecan Park Road	1	5	-1	-1
5	Moss Hollow Drive	2	7	-1	0

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Sleep Disturbance

Analyses of sleep disturbance for residential receptors indicate there would be no changes from baseline conditions under ANG Scenario 1.

Potential for Hearing loss

Under ANG Scenario 1, there would be no residential areas on or adjacent to the airport that are exposed to contour bands of 80 dB DNL and greater; therefore, no potential for hearing loss would occur.

Occupational Noise

Air Force occupational noise exposure prevention procedures such as hearing protection and monitoring would continue to be applied under this scenario. These procedures would assure compliance with all applicable OSHA and Air Force occupational noise exposure regulations.

ANG Scenario 2

Noise Exposure

ANG Scenario 2 would involve beddown of 24 F-35A aircraft at Jacksonville IAP and drawdown of 18 F-15Cs. Proposed annual F-35A flight operations would total 7,296, with all occurring during environmental daytime hours (7:00 a.m. to 10:00 p.m.). About 92 percent of these proposed operations would consist of departures and arrivals; the remaining 8 percent would involve pattern work in the vicinity of the airport. Total F-35A flight operations, when added to commercial and civilian aircraft

(120,884 operations), would total approximately 128,880 annually; a 0.06 percent increase from baseline. Figure JX3.2-3 depicts the proposed 65 to 85 dB DNL noise contour bands under ANG Scenario 1; baseline contours are also presented for comparison purposes.

Overall, the DNL contours would decrease relative to baseline by approximately 1 dB for operations from Runways 07/25. The F-35A would generate approximately 8 percent less equivalent annual flight operations than the based F-15. The effect of the reduction in flight operation would be somewhat offset by the effect of the shallower climb profiles of the modeled F-15 departures, relative to the proposed modeled F-35A departure profiles. With the 18 F-15 aircraft eliminated, based F-35A departures from Runways 07 and 25 would dominate the DNL exposure east and west of the station/airport, respectively. The contribution of civilian aircraft would be approximately 2 to 3 dB less than the military aircraft contribution.

Table JX3.2-9 presents the noise exposure in terms of estimated off-airport 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 would affect 1,057 fewer acres, 98 fewer people, 31 fewer households, and 2 less representative receptors. The decrease of numbers impacted within population, households, and receptors categories is due to the reduction in size of the 65 to 70 dB DNL contour band.

Table JX3.2-9. Off-Airport Noise Exposure under ANG Scenario 2 for Jacksonville AGS Proposed/Baseline

Contour Band (dB DNL) [1]	*Acreage*	*Population*	*Households*	*Receptors* [2]
65 – 70	1,637/2,197	210/296	57/83	0/2
70 – 75	515/945	0/12	0/5	0/0
75 – 80	33/36	0/0	0/0	0/0
80 - 85	0/64	0/0	0/0	0/0
85+	0/0	0/0	0/0	0/0
Total	**2,185/3,242**	**210/308**	**57/88**	**0/2**

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]All noise receptors are located off-base; refer to Figure JX3.2-3

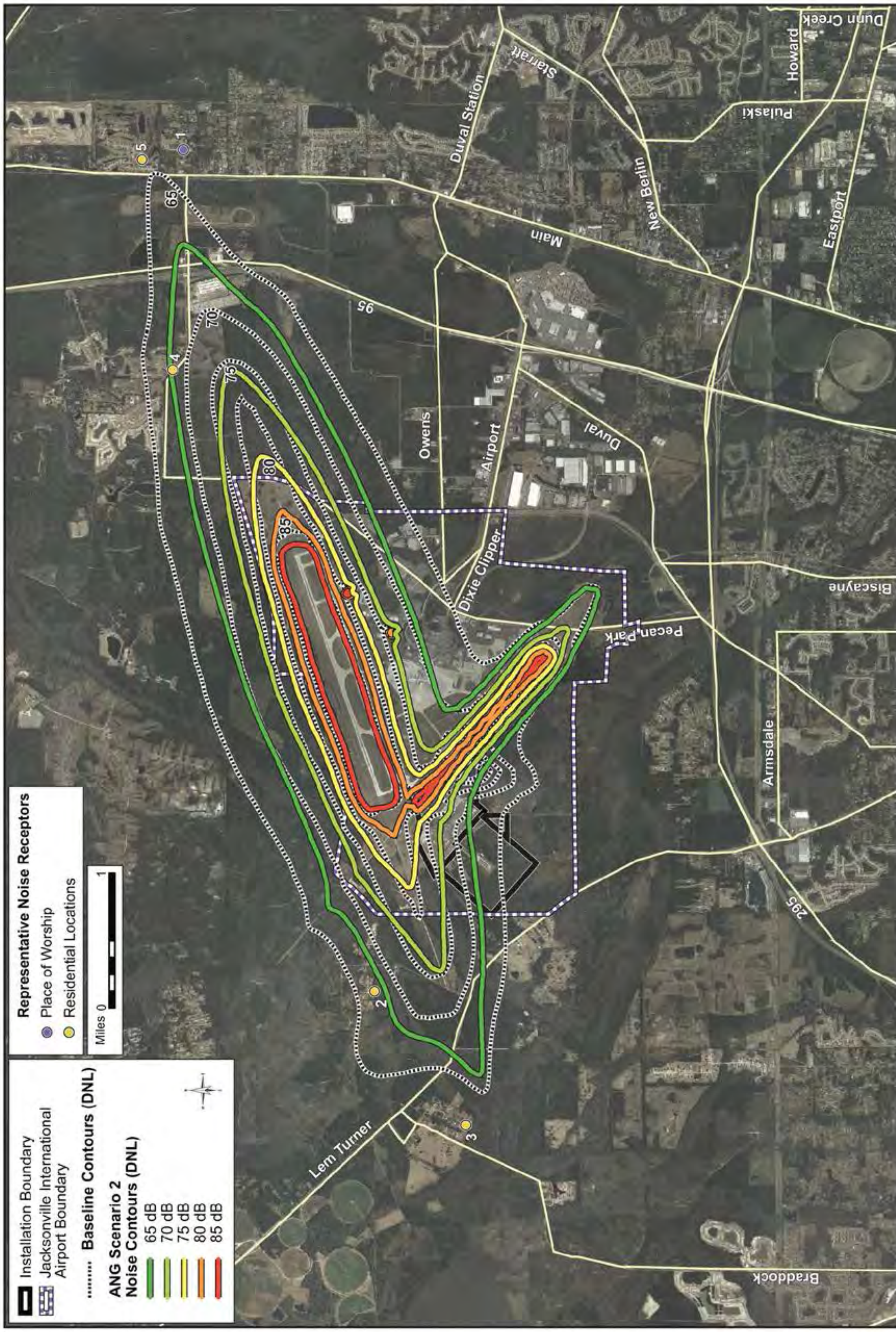


Figure JX3.2-3. ANG Scenario 2 Proposed Noise Contour Bands at Jacksonville AGS

Under ANG Scenario 2, Table JX3.2-10 shows representative receptors by name, type, and decibel level compared to baseline conditions. Under this scenario, all locations would either experience a decrease in noise levels of 2 dB or remain consistent with baseline conditions. No receptor would be subject to noise levels greater than 65 dB DNL.

Table JX3.2-10. Decibel Levels under ANG Scenario 2 at Representative Locations near Jacksonville AGS Proposed/Baseline

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
1	Pleasant Park Church	Worship	<65/<65
2	Owenby Lane	Residential	<65/67
3	Thomas Mill Road/Thomas Mill Road East	Residential	<65/<65
4	Pecan Park Road	Residential	65/67
5	Moss Hollow Drive	Residential	<65/<65

Source: *Source:* Wyle 2011 and U.S. Census Bureau 2010b.

Speech Interference

In terms of speech interference, Table JX3.2-11 presents the average daily indoor daytime (7:00 a.m. to 7:00 p.m.) events per hour for representative receptors that generally would have indoor maximum sound levels of at least 50 dB with windows closed and open. The number of speech interfering events across all locations would range from 4 to 7 with windows open. This ANG Scenario represents similar conditions as are found under baseline. With windows closed, there would be from 1 to 2 speech interfering events, again similar to the levels found under baseline conditions.

Table JX3.2-11. ANG Scenario 2 Indoor Speech Interference at Representative Locations at Jacksonville AGS

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
2	Owenby Lane	2	4	0	0
3	Thomas Mill Road/Thomas Mill Road East	1	6	-1	0
4	Pecan Park Road	2	5	0	-1
5	Moss Hollow Drive	2	7	-1	0

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Classroom Speech Interference

Under ANG Scenario 2, no schools would be affected. As such, no classroom speech interference is anticipated.

Sleep Disturbance

Analyses of sleep disturbance for residential receptors indicate there would be no changes from baseline conditions under ANG Scenario 2.

Potential for Hearing loss

Under ANG Scenario 2, there would be no residential areas on or adjacent to the airport that are exposed to contour bands of 80 dB DNL and greater; therefore, no potential for hearing loss would occur.

Occupational Noise

Air Force occupational noise exposure prevention procedures such as hearing protection and monitoring would continue to be applied under this scenario. These procedures will assure compliance with all applicable OSHA and Air Force occupational noise exposure regulations.

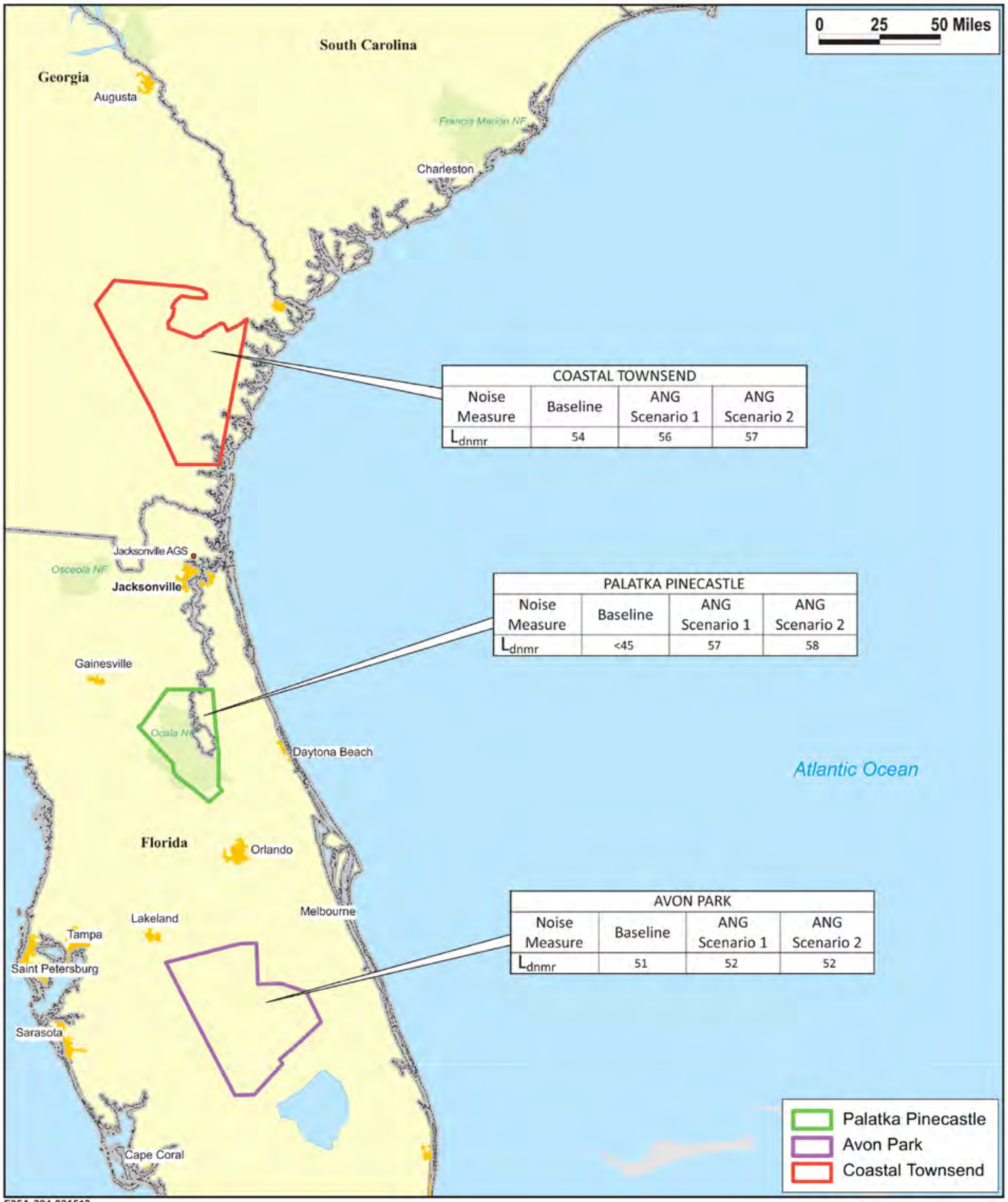
JX3.2.2 Airspace

This section presents noise conditions in the airspace and ranges that would be used by F-35A aircraft under either of the Jacksonville AGS beddown scenarios. The airspace and ranges associated with the 125 FW include units in Florida, Georgia, and over the Atlantic Ocean. Training activities in these airspace units would result from replacing F-15C aircraft with F-35A aircraft. As noted in Section JX3.1, the 125 FW would operate the F-35As within existing MOA, overlying ATCAA, restricted airspace, and ranges, performing similar types of combat training missions currently conducted in these airspace units. The noise analysis accounts for both subsonic noise and sonic booms in airspace authorized for supersonic flight. Subsonic noise is quantified by dB Onset-Rate Adjusted Day-Night Average Sound Level (L_{dnmr}); the cumulative sonic boom environment is quantified by C-weighted DNL (CDNL) and by the number of booms per month that would be heard on the surface (refer to Chapter 3, 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 sounds, 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 JX3.6 (Terrestrial Communities) for a discussion of noise impacts to wildlife.

Subsonic Noise

Figure JX3.2-4 presents the baseline and projected noise levels in L_{dnmr} for each of the blocks of airspace proposed for use by the F-35A aircraft. Although noise levels would increase under both scenarios, they would continue to remain below 65 L_{dnmr}. For Palatka Pinecastle, subsonic noise levels would increase substantially (12 to 13 dB L_{dnmr}) under both scenarios. These changes would be perceived as a doubling of sound. Persons under this airspace would likely experience increased annoyance with aircraft noise. Several small communities underlie this airspace, especially on its periphery where noise and overflights would be less. Most of the underlying land consists of national forest. In addition, all aircraft would continue to avoid these communities by at least 2,000 feet in accordance with FAA regulations. For Coastal Townsend, noise levels would increase by 2 to 3 dB under ANG Scenarios 1 and 2, respectively.



COASTAL TOWNSEND			
Noise Measure	Baseline	ANG Scenario 1	ANG Scenario 2
L_{dnmr}	54	56	57

PALATKA PINECASTLE			
Noise Measure	Baseline	ANG Scenario 1	ANG Scenario 2
L_{dnmr}	<45	57	58

AVON PARK			
Noise Measure	Baseline	ANG Scenario 1	ANG Scenario 2
L_{dnmr}	51	52	52

Figure JX3.2-4. Baseline and Proposed Noise Environment for Airspace used by Jacksonville AGS

While perceptible, the effects on underlying areas would not be as great as for Palatka Pinecastle. Several communities, including Hinesville with a population of over 30,000, underlie this airspace and have been exposed to noise from aircraft and military training for many decades so the noise increase would introduce only negligible changes to the existing noise environment. At APAFR, noise levels would increase by 1 dB under ANG Scenarios 1 and 2. This would not be perceptible. Several communities, including Lake Wales, Frostproof, and Avon Park, underlie this airspace and have been exposed to noise from aircraft and military training for many decades; however, the 1 dB increase would not introduce changes to the existing noise environment.

Supersonic Noise

For Jacksonville AGS, proposed supersonic activities would comprise about 10 percent of total air combat training, and all of these events would occur in the overwater SOA. All supersonic flight would continue to be conducted more than 15 nm away from land. In contrast to 125 FW F-15C aircraft, which fly supersonic about 30 percent of total air combat training, the F-35A would perform a lower frequency of supersonic events. The F-15C aircraft fly 20 percent of their supersonic events between 10,000 and 30,000 feet MSL, and 80 percent above 30,000 feet MSL. The F-35A, however, 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 noticeable effects on the surface. 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-15Cs with almost all occurring above 30,000 feet MSL and not over populations, these activities warrant no further detailed analysis. Section 3.1.3 provides additional rationale for this approach.

JX3.3 Air Quality

Emissions associated with operations at Jacksonville AGS include emissions of volatile organic compounds (VOCs) and nitrogen oxides (NO_x), both of which are precursors to ozone (O_3), as well as carbon monoxide (CO), sulfur dioxide (SO_2), 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 (PM_{10}). Emissions of lead (Pb) are not addressed because the affected areas contain no significant sources of this criteria pollutant, and operations at Jacksonville AGS would not result in substantial emissions of lead.

JX3.3.1 Base

JX3.3.1.1 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 installation. These pollutants include CO, SO_2, and directly-emitted PM_{10} and $PM_{2.5}$. For pollutants that undergo chemical reactions and interact within the atmosphere to form secondary pollutants, such as O_3 and its precursors NO_x and VOCs, and precursors of PM_{10} and $PM_{2.5}$, the affected environment is a larger regional area. The chemical transformations and interactions that create O_3 and secondary PM_{10} 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 Jacksonville AGS (refer to Section 3.4 for further discussion of mixing height).

Regional Environment

The affected environment for AGS-generated emissions includes the Jacksonville AGS, the area surrounding the station where aircraft operate below 3,000 feet AGL (i.e., Jacksonville IAP), and the airspace overlying these areas and where aircraft train. Jacksonville AGS is located in a relatively rural area within Duval County, and falls within the Jacksonville (Florida)-Brunswick (Georgia) Interstate Air Quality Control Region (AQCR) (40 Code of Federal Regulations [CFR] 81.91). This AQCR includes 25 counties in Florida and 14 counties in Georgia. Impacts of the proposed action are evaluated in the context of existing local air quality, baseline emissions for the installation and in the region, and relative contribution of the proposed action to regional emissions.

Air quality in the 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 81.310 and 81.311); therefore, no conformity analysis is required. Table JX3.3-1 summarizes the regional emissions (stationary and mobile) of criteria pollutants and precursor emissions for this AQCR.

Table JX3.3-1. Baseline Regional Emissions (tons per year)

	VOCs	*NO_x*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
Jacksonville (Florida)-Brunswick (Georgia) Interstate AQCR	338,072	251,176	1,719,048	133,671	59,030	77,806

Source: USEPA 2008.

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. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the No-Action Alternative and the Proposed Action alternatives have been quantified to the extent feasible in this EIS for information and comparison purposes only.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). 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 CO_2, which has a value of one. For example, under the USEPA's Mandatory Greenhouse Gas Reporting Rule, CH_4 has a GWP of 21, which means that it is considered to have a global warming effect 21 times greater than CO_2 on an equal-mass basis. Total GHG source emissions are often reported as a CO_2 equivalent (or CO_2e). The CO_2e 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 Environmental Impact Statement (EIS), a more thorough discussion of GHG is presented in Section 3.4.

Base Environment

Jacksonville AGS is co-located with Jacksonville IAP, which is a joint civil-military public airport located 10 miles north of the central business district of Jacksonville, Florida. 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 those 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 PM_{10} and $PM_{2.5}$ emissions. Fugitive dust sources include unpaved roads, agricultural cropland, and construction sites.

The Florida DEP has primary jurisdiction over air quality and stationary source emissions. The city of Jacksonville's (which shares the same boundaries as Duval County) Environmental and Compliance Department, Air Quality Branch, has authority to issue and monitor air quality permits for facilities located within the city limits. Stationary source emissions included in the baseline are 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 installation emissions. 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 installation does not maintain any air permits.

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 F-15C 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 F-15C aircraft were also included in baseline calculations. Table JX3.3-2 summarizes baseline emissions; these emissions were based on flight profiles and engine maintenance runups developed as part of the noise analysis (Wyle 2011). 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-15C-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 CO_2, which were derived from Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling--Compression-Ignition (USEPA 2004). For CH_4 and N_2O 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 2007). Refer to Appendix D for the concepts used in developing these emission estimates.

Table JX3.3-2. Baseline Emissions for Jacksonville AGS (2006)

Pollutants in Tons per Year						
CO	*NO_x*	*VOCs*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
209.15	62.90	39.42	19.46	5.82	5.46	26,580

Source: 125 FW 2008a.
Note: [1]Measured in metric tons per year or mT/yr.

JX3.3.1.2 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 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 beddown 18 F-35A aircraft at Jacksonville AGS by replacing the current 18 F-15 aircraft. Under ANG Scenario 1, both construction and operational activities would result in air pollutant emissions.

Construction

Under ANG Scenario 1, no new construction would be required; only internal alterations of three buildings would occur. Therefore, the only construction-related air quality impacts anticipated would be minor amounts of emissions generated on a temporary basis by trucks transferring materials to and from the buildings being renovated. As a result, no thresholds would be exceeded and there would be no air quality impacts generated by construction activities.

Operations

Air quality impacts were determined by evaluating the net change in emissions associated with replacing 18 F-15C 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 privately-owned vehicles [POVs]) operations, and 3) AGE associated with 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 JX3.3-3 presents a summary of annual source emissions generated under ANG Scenario 1 compared to baseline emissions. While some aircraft operations could coincide with construction activities during the beddown process, it is not anticipated that this overlap would cause emissions to exceed *de minimis* levels or major source thresholds.

Table JX3.3-3. Proposed Annual Operational Emissions under ANG Scenario 1 at Jacksonville AGS

Activity	*Pollutants in Tons per Year*						
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
Aircraft	12.68	32.75	0.42	17.36	1.13	1.13	11,945
Engine Runups	0.29	0.19	0.01	0.13	0.01	0.01	92
AGE[2]	3.86	3.44	0.21	0.97	0.31	0.30	895
POVs	34.42	1.69	2.23	0.04	0.10	0.10	1857
Total Annual ANG Scenario 1 Emissions							
Baseline Annual Emissions	209.15	62.90	39.42	19.46	5.82	5.46	26,580
Net Change	***-157.01***	***-24.83***	***-36.54***	***-0.96***	***-4.27***	***-3.92***	***-11,791***
Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**-**

Notes:
[1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR 98, Subpart A, Table A-1) in metric tons per year.
[2]With 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 18 F-35A aircraft at Jacksonville would result in net emission decreases for all criteria pollutants. Therefore, ANG Scenario 1 would not introduce emissions which would noticeably affect regional air quality. No new major pollutant sources would exceed 250 tons. Emissions associated with replacing 18 F-15s with 18 F-35As and construction needed to support this scenario would incrementally decrease regional emissions of CO_2e.

ANG Scenario 2

ANG Scenario 2 would beddown 24 F-35A aircraft at Jacksonville AGS, replacing the current 18 F-15C 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

ANG Scenario 2 construction includes the same interior alterations required under ANG Scenario 1. Annual emissions associated with ANG Scenario 2 would be negligible and short-term. 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 18 F-15C aircraft with 24 F-35A aircraft. Sources of operational emissions are the same as those presented under ANG Scenario 1. Table JX3.3-4 summarizes annual operational emissions proposed under ANG Scenario 2 compared to baseline conditions. As was done for ANG Scenario 1, stationary source emissions were assumed to remain unchanged.

Table JX3.3-4. Proposed Annual Operational Emissions under ANG Scenario 2 at Jacksonville AGS

Activity	*Pollutants in Tons per Year*						
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
Aircraft	14.17	37.56	0.47	19.75	1.28	1.28	13,588
Engine Runups	0.39	0.26	0.01	0.18	0.01	0.01	122
AGE[2]	5.13	4.57	0.28	1.29	0.42	0.40	1,194
POVs	43.06	2.12	2.79	0.05	0.13	0.13	2,329
TOTAL Annual ANG Scenario 2 Emissions	**62.74**	**44.51**	**3.56**	**21.26**	**1.83**	**1.82**	**17,232**
Baseline Annual Emissions	209.15	62.90	39.42	19.46	5.82	5.46	26,580
Net Change	***-146.41***	***-18.39***	***-35.86***	***1.80***	***-3.99***	***-3.64***	***-9,348***
Major Source Threshold	250	250	250	250	250	250	-

Notes:
[1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR 98, Subpart A, Table A-1) in metric tons per year.
[2]With 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 net emission decreases for all listed pollutants, with the exception of SO_x. While emissions for this pollutant would increase, they would remain well below the 250-ton major source 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. ANG Scenario 2 construction and operational activities would incrementally decrease regional emissions of CO_2e.

Climate Change Adaptation

In addition to assessing the greenhouse gas emissions that would come 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 identify 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 Jacksonville AGS, adaptation issues requiring evaluation and consideration could revolve around sea level changes, 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 Florida and the Southeast. In terms of coastal areas near the installation, the report projects average sea level increases ranging from 1 to 2 feet by the year 2100 depending upon the emission scenario. Jacksonville AGS lies at an elevation of about 30 feet MSL and about 15 miles from the ocean. The St. John's River is located a little more than 4 miles to the southeast of the airfield, comprising an estuary directly linked to the Atlantic Ocean. Given these factors, even the greatest projected rise in sea level (2 feet) would not directly affect the infrastructure at Jacksonville AGS. However, such sea level increases would inundate much of the Jacksonville area, affecting access and infrastructure outside the installation. Some adaptation in response may be needed, possibly resulting in longer commutes to Jacksonville AGS.

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.

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 Jacksonville AGS. 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. Although surrounded by urban lands, Jacksonville AGS 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.

JX3.3.2 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 and thus take place above mixing height; third, as identified in Section JX3.3.1.2, replacing F-15C aircraft with F-35A aircraft would generally reduce pollutant emissions within the airfield environment for every criteria pollutant except for minor increases in SO_x and NO_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 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.

JX3.4 Safety

Aircraft safety addresses Runway Protection Zones (RPZs), aircraft mishaps, Bird/Wildlife-Aircraft Strike Hazards (BASH), and fuel dumping. 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. The affected environment includes the airfield and airspace in which Jacksonville AGS aircraft operate.

RPZs are rectangular zones extending outward from the ends of active runways at commercial airports and delineate those areas recognized as having the greatest risk of aircraft mishaps, most of which occur during take-off or landing. Development restrictions associated with RPZs are intended to preclude incompatible land use activities from being established in these areas. The City of Jacksonville, utilizes the FAA's airport land-use compatibility guidelines, and as such, the RPZs have controlled development to be 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).

JX3.4.1 Base

JX3.4.1.1 Affected Environment

The affected environment for safety includes the airfield at Jacksonville IAP and its immediate vicinity. Aircraft flight operations from Jacksonville AGS are governed by standard flight rules. Specific safety requirements are contained in standard operating procedures that must be followed by all aircrews operating from the airfield (125 FW Instruction 13-1, *Airfield Operations*) to ensure flight safety. The last Class A mishap associated with Jacksonville AGS aircraft was in 1994 with the crash of an F-16 north of the field (125 FW 2005), while over 145,000 airfield operations have been conducted (Jacksonville IAP 2009). This equates to a Class A mishap rate of 0.69, which is lower than the Air Force F-15 Class A rate of 2.38 or the F-16 rate of 3.55 (refer to Table 3-5). At Jacksonville IAP, the areas directly beyond either end of runways 07/25 and 13/31 are designated RPZs. These zones extend for 2,500 feet from the end of the runways, with a width of 1,000 feet at the end of the runway and 1,750 feet at the end of the RPZ (125 FW 2005). The City of Jacksonville, Florida utilizes the FAA's airport land-use compatibility guidelines, and as such, the RPZs have allowed development to be compatible with airport operations.

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 JX3.4-1) (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 AGL (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).

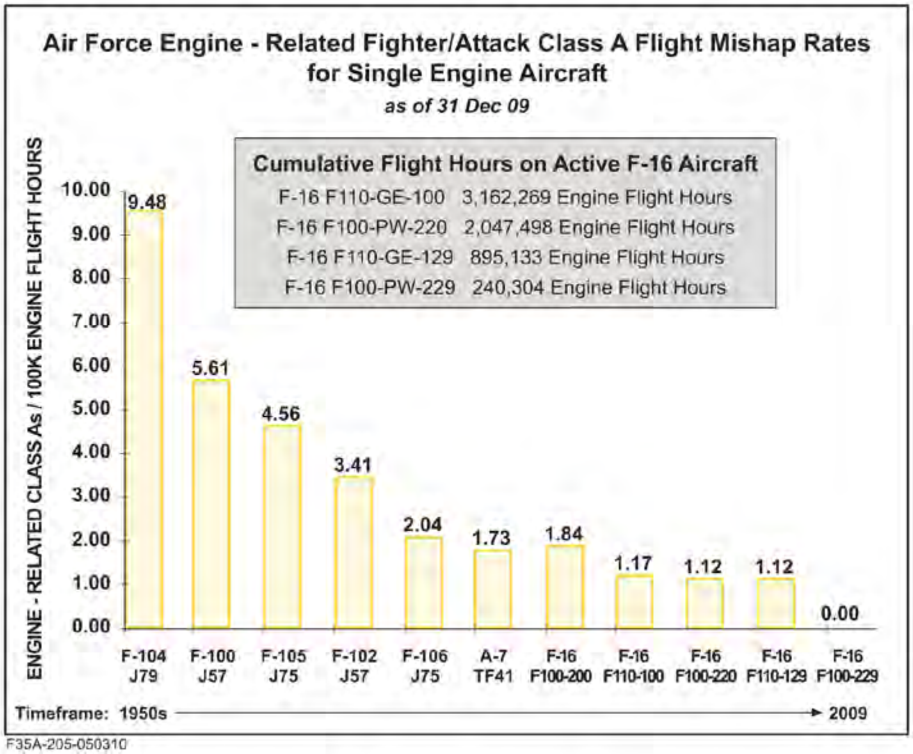


Figure JX3.4-1. Air Force Engine-Related Mishap Rates

Source: AFSC 2010.
Note: "Engine-related" excludes mishaps caused by Foreign Object Damage, BASH, or failure of support systems external to the engine (e.g., fuel starvation).

The FLANG 125 FW has an effective, on-going BASH program through which information and assistance is freely shared between airfield users, the Jacksonville IAP staff, and the local air traffic controllers. BASH-related accidents within the immediate Jacksonville AGS airspace are rare and no bird strikes resulting in aircraft damage have occurred at the 125 FW installation or involving FLANG aircraft in the past ten years (personal communication, Gaffney 2010). However, a feral pig collision with an F-16 on the runway did cause a Class B accident in 1988 (125 FW 2005).

For use in emergency situations, F-15 aircraft (all models) 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 coastal bases. Air Force Instruction 11-2F-F15V3 covers the fuel dumping procedures, and local operating policies cover specific fuel dumping areas for each base.

JX3.4.1.2 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 life time) (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 2012 are provided in Table JX3.4-1.

Table JX3.4-1. F-22A Class A Flight Mishap History

Year	*Class A*		*Destroyed*		*Fatal*		*Hours Flown per Year*	*Cumulative Flight Hours*
	Number of Mishaps	*Rate*[1]	*A/C*	*Rate*	*Pilot*	*All*		
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
FY10	0	0	0	0	0	0	24,675	94,519
FY11	1	6.54	1	6.54	1	1	15,289	109,808
FY12	3	11.32	0	0	0	0	26,507	136,315
Lifetime	**10**	**7.34**	**3**	**2.20**	**2**	**2**	**-**	**136,315**

Source: AFSC 2013.
Note: [1]Mishap rate is based on 100,000 hours of flight.
[2]One 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 F-15C 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 F-15C 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 the advancements made in aircraft technology. These factors should minimize risk associated with F-35A mishaps due to pilot error.

There would be a slight decrease in total airfield operations of about 1.4 percent for ANG Scenario 1, and a less than 0.1 percent increase under 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 small decrease in airfield flight operations would technically lessen the potential for aircraft incidents; however, it is statistically insignificant in light of the fact that Jacksonville AGS has had only one Class A mishap in 16 years. In addition, current airfield safety procedures discussed previously would continue to be implemented and additional airfield flight operations would adhere to established safety procedures.

Similar to the F-15, F-35A aircraft will have the capability to dump fuel for emergency situations and would follow procedures similar to those currently required by the F-15C aircraft.

JX3.4.2 Airspace

JX3.4.2.1 Affected Environment

The airspace directly associated with the proposed action as it relates to the 125 FW at Jacksonville IAP includes Restricted Areas, Warning Areas, and MOAs (refer to Figure JX2.2-1). 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. The volume of airspace encompassed by the combination of airspace elements constitutes the affected environment for airspace management. Training airspace includes Basinger, Marian, Lake Placid, Palatka, and Coastal MOAs and the Townsend and Avon Park Ranges as shown in Table JX2.2-1. 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 section describes the existing operations within the training airspace units and the following section evaluates changes that would occur with the introduction of the F-35A.

The 125 FW schedules use of all training areas and the operational support staff and aircrews are charged with the air and ground safety of all operations in ranges and airspace and must comply with AFI 13-212, *Range Planning and Operations*, Volumes 1 through 3. Safety records at Jacksonville AGS reveal no Class A mishaps within associated training airspace units since 1999, as well as only minor BASH incidents (personal communication, Gaffney 2010). These data reflect total strikes experienced by all users of the airspace, not just aircraft from Jacksonville AGS.

Aircrews are authorized to use self-protection (also known as decoy) flares in overwater training areas only, thus eliminating the potential for wildfires started from flares.

JX3.4.2.2 Environmental Consequences

Under the proposed action, the increase in F-35A airspace and range training operations the Jacksonville AGS training airspace (i.e., MOAs, R-2901, and R-3007) would incrementally increase the potential for aircraft accidents or mishaps. Current airspace safety procedures would continue to be implemented, however, 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 both ANG Scenarios, 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 F-15C aircraft. In addition, F-35A aircrews operating in the Jacksonville AGS associated training airspace would be required to follow applicable procedures outlined in the 125 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. Jacksonville AGS F-15C aircraft deployed nearly 14,000 flares in 2009 (personal communication, Simpler 2010); the F-35A would likely deploy considerably fewer in keeping with its stealth capabilities. Given that flare deployment is only in the overwater Warning Areas, the likelihood of a flare causing a wildfire would not change 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 lb-sec (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 lb-sec 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. However, all flare training by 125 FW pilots is in overwater areas; no flares are released over land and residual flare debris would not impact people or structures.

JX3.5 Geology, Soils, and Water

JX3.5.1 Base

JX3.5.1.1 Affected Environment

Geology

Jacksonville AGS is situated in the Atlantic Coastal Plain in Duval County, Florida. Geologic units in the Duval County region consist of formations that range from Eocene to Holocene in age. The Eocene age units are the Oldsmar Limestone, 500- to 800-feet thick and the Ocala Limestone, 250- to 400-feet thick. The Eocene rocks are overlain by the Miocene age Hawthorn Group, 270-to 490-feet thick. The Hawthorn Group is comprised mainly of carbonates, phosphates, sand, and clays. The most recent undifferentiated sediments of the Pliocene and Holocene age, consisting of medium-grained quartz sands, silt, clay, and shell fragments, occur just beneath the surface and have an approximate thickness of 209 feet. There are no geologic faults in the vicinity of Jacksonville AGS (125 FW 2002).

Topography

Jacksonville AGS is situated in the Atlantic Coastal Plain in Duval County, Florida. The topography of the installation is level with a land elevation of approximately 20 feet above MSL (125 FW 2002).

Soils

The land on Jacksonville AGS is composed of seven separate soil types. The majority of the land on the installation is classified as urban land because it has been extensively developed. The remaining soil types on the installation are Arents, Pelham fine sand, Sapelo find sand, Mascotte fine sand, Surrency loamy fine sand, and Yulee clay. Areas of Arents are generally level, and some areas of Surrency loamy fine sand are depressional. The other soil types all have slopes of 0 to 2 percent. All soils on the installation, with the exception of Arents, are poorly drained and have low potential for development. Areas covered with these soil types can be built upon, however, with the implementation of fill material and an appropriate stormwater management system (125 FW 2002).

Surface Water

Jacksonville AGS is in the vicinity of Cedar Creek, Little Cedar Creek, and the Broward River. The only surface water that occurs on the installation includes multiple unnamed tributaries of Cedar Creek. These tributaries are located in the southern portion of the installation, and flow in a southerly direction before discharging into Cedar Creek (125 FW 2002) (Figure JX3.5-1).

Figure JX3.5-1. Water Bodies in Relation to Proposed Renovation at Jacksonville AGS

Groundwater

There are two aquifer systems in the vicinity of Jacksonville AGS. The shallow aquifer system is composed of limestones, shales, and sands with confining layers of clay. The shallow aquifer system varies in thickness from 10 to 130 feet. This aquifer system has increasingly been used as a source of potable water due to the increases in water demand in the Jacksonville area. The deeper aquifer in the area is the Floridian aquifer system. This aquifer system is composed of porous limestone and varies in thickness from 500 to 2,100 feet. The Floridian aquifer system is the primary source of potable water for Duval County (125 FW 2002). See Community Facilities and Public Services, Section JX3.13 for more detailed information on capacity.

Floodplains

A small portion of Jacksonville AGS lies within the 100-year floodplain for Cedar Creek and its tributaries. This area is in the southern part of the installation east of FLANG Road (125 FW 2002).

JX3.5.1.2 Environmental Consequences

ANG Scenario 1

Under ANG Scenario 1, no land would be disturbed. Construction would include only interior renovations within existing facilities. As such, geology, topography, and soils would not be impacted by ANG Scenario 1. No new impervious surface would be added to the installation from the construction on areas that are currently undeveloped. There would be no impact to floodplains or to groundwater resources from ANG Scenario 1.

ANG Scenario 2

Similar to ANG Scenario 1, no land would be disturbed, as construction would include only interior renovations to existing facilities. As such, geology, topography, and soils would not be impacted by ANG Scenario 2. No new impervious surface would be added to the installation from the construction on areas that are currently undeveloped. There would be no impact to floodplains or to groundwater resources from ANG Scenario 2.

JX3.6 Terrestrial Communities (Vegetation and Wildlife)

JX3.6.1 Base

JX3.6.1.1 Affected Environment

The majority of Jacksonville AGS is comprised of landscaped areas such as lawns, ornamental trees, or maintained open fields of grass. Scattered pockets of densely wooded areas occur outside the installation within Jacksonville IAP. These areas contain slash pine (*Pinus elliottii*), longleaf pine (*Pinus palustris*), sweetgum (*Liquidambar styraciflua*), bay (*Laurus nobilis*), blackberry (*Rubus spp.*), wax myrtle (*Myrica cerifera*), inkberry (*Ilex glabra*), saw palmetto (*Serenoa repens*) and fetterbush (*Leucothoe fontanesiana*). Native grasses found on undeveloped portions of the facility include lopsided indiangrass (*Sorghastrum secundum*), panicgrass species (*Panicum* spp.), chalky bluestem (*Andropogon capillipes*), and pineland threeawn (*Aristida stricta*) (Jacksonville IAP 2009).

Wildlife present on the installation and within the Jacksonville IAP consists primarily of wildlife tolerant of human activity and development. Common bird species include American crow (*Corvus brachyrhynchos*), barn swallow (*Hirundo rustica*), eastern meadowlark *(Sturnella magna*), northern cardinal (*Cardinalis cardinalis*), pileated woodpecker (*Dryocopus pileatus*), and northern mockingbird (*Mimus polyglottos*). Common mammal species include cottontail rabbit (*Sylvilagus floridanus*), coyote (*Canis latrans*), nine-banded armadillo (*Dasypus novemcinctus*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*) (Jacksonville IAP 2009).

JX3.6.1.2 Environmental Consequences

Implementation of the proposed action at Jacksonville AGS would have relatively few impacts on terrestrial communities. All of the construction associated with the proposed action would be interior renovations. As a result, there would be no loss of vegetation or terrestrial habitat.

Annual military operations at Jacksonville AGS are proposed to decrease by 1,737 (24 percent) under ANG Scenario 1, and increase by 73 operations (1 percent) with ANG Scenario 2. Total airfield operations would decrease by 1.4 percent under ANG Scenario 1, and would increase by 0.06 percent under ANG Scenario 2. 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 strikes occur. In addition, current procedures for avoiding flight operations during periods of high concentrations of migratory bird (both in time and space) would continue. Adherence to the existing, effective BASH program would minimize the risk of bird-aircraft strikes, including those for migratory birds, to negligible levels (see Safety, Section JX3.4).

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 F-15C aircraft, the number of times that an individual animal would be exposed (and the area that would be affected) would decrease under all scenarios.

JX3.6.2 Airspace

JX3.6.2.1 Affected Environment

The airspace associated with Jacksonville AGS covers over 1,527 square miles of land within Florida and Georgia. 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, slash pine, 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, raccoons, opossums (*Didelphis virginiana*), flying squirrels (*Glaucomys volans*), and numerous species of ground-dwelling rodents. Primary game birds include bobwhite quail *(Colinus virginianus*) and wild turkey (*Meleagris gallopavo*). Migratory bird species, reptiles and amphibians are 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.

JX3.6.2.2 Environmental Consequences

No construction would occur beneath the training airspace; therefore, no impacts to vegetation would occur. Operations within the airspace would increase from no action by 4 percent under ANG Scenario 1 and by 10 percent under ANG Scenario 2.

Section JX3.4 (Safety) established that bird-aircraft strikes are currently rare in the airspace. BASH incidents within training airspace are not expected to increase as most of the F-35A would operate at or above 5,000 feet AGL. Ninety-five percent of bird strikes occur below this altitude. 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 current BASH Plan would further reduce the likelihood of bird strike in training airspace (see Safety, Section JX3.4). Therefore, there would be no impacts to migratory birds.

The only identified defensive countermeasure that would be employed by F-35A during training is flares. Flare deployment would be equal to or less than current levels conducted by F-15C aircraft and would be used only in airspace units currently approved for its use. In addition, current restrictions on the amount or altitude of flare use would continue to apply. As a result, flare use associated with the proposed action would have no impact on terrestrial communities. Ordnance employment would occur at Avon Park Range, which permits ordnance delivery by JDAMS.

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 F-15C aircraft, the majority (95 percent) of the operations would occur above 5,000 feet AGL (operations under 5,000 feet AGL would occur less at about the same rate as baseline operations), and under ANG Scenario 2, overflights below 5,000 feet AGL for the entire airspace would occur approximately 2.2 times per day compared to 1.6 times per day under baseline conditions; 3) supersonic flights would occur over water under the proposed action; and 4) under ANG Scenario 2, noise levels would increase by 13 dB in Palatka/Pinecastle (58 dB L_{dnmr}), in Coastal Townsend by 3 dB (or 57 dB L_{dnmr}), and by 1 dB (or 52 dB L_{dnmr}) in APAFR airspace. As this airspace is currently used by F-15C aircraft, wildlife should be habituated to the noise and not be adversely impacted by rises in the noise levels.

JX3.7 Wetlands and Freshwater Aquatic Communities

JX3.7.1 Base

JX3.7.1.1 Affected Environment

Over 3,000 acres of wetlands are located on Jacksonville IAP property. Within Jacksonville AGS, there are several hardwood and mixed forested wetlands located within the western portion of the installation near the munitions storage and in the south western portion of the installation (refer to Figure JX3.5-1). These forested wetlands are dominated primarily by cypress (*Taxodium* spp.), black gum (*Nyssa sylvatica*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), elm (*Ulmus* spp.), swamp bay (*Persea palustris*), loblolly bay (*Gordonia lasianthus*), red bay (*Persea borbonia*), sweet bay (*Magnolia virginiana*), ironwood (*Carpinus caroliniana*), and sugarberry (*Celtis laevigata*). These wetlands provide habitat for a number of common wildlife species such as great blue heron (*Ardea herodias*), great egret (*Ardea alba*), cottonmouth (*Agkistrodon piscivorous*), and beavers (*Castor canadensis*) (Jacksonville IAP 2009).

JX3.7.1.2 Environmental Consequences

There are several forested wetlands located within the western portion of the installation near the munitions storage and in the south western portion of the installation. However, all of the construction associated with the proposed action would be interior renovations. Therefore, construction activities under these scenarios would have no impact on wetlands.

JX3.8 Threatened, Endangered, and Special Status Species/Communities

JX3.8.1 Base

JX3.8.1.1 Affected Environment

During a 2003 survey conducted on Jacksonville IAP, the following state and federally listed species were observed on Jacksonville IAP: American alligator (*Alligator mississippiensis*), bald eagle (*Haliaeetus leucocephalus*), and gopher tortoise (*Gopherus polyphemus*). Bald eagles are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, and have been observed in the past within a one-mile radius and south of the installation (Jacksonville IAP 2009). The American alligator is considered a federally threatened species only due to its similarity in appearance with the American crocodile, which is considered federally endangered; therefore, American alligator is not discussed further, as U.S. Fish and Wildlife Service (USFWS) does not consult on this species.

The gopher tortoise is listed as threatened by the State of Florida, and by the USFWS in the western portion of its range (west of Mobile). The USFWS considers the gopher tortoise a candidate species and will determine whether to propose adding the eastern population to the federal list of threatened and endangered species. Gopher tortoises have been observed in the past on airport property (125 FW 2005). There are no special status communities located on Jacksonville IAP.

JX3.8.1.2 Environmental Consequences

Impacts to potentially occurring threatened, endangered, or special status species on Jacksonville AGS would be similar to those described within the terrestrial section (Section JX3.6). That is, studies indicate that wildlife species, whether they are common or protected species, already occupying lands exposed to training noise are generally not affected by slight to moderate increases in ambient noise levels, as they have already habituated from periodic to frequent loud overflight noise. All of the construction associated with the proposed action would be interior renovations, therefore no habitat would be impacted by the proposed action. Total annual operations at Jacksonville IAP are proposed to decrease by 1.4 percent under ANG Scenario 1, and increase by 0.06 percent under ANG Scenario 2. While noise from an individual single event from the F-35A would be higher than F-15C aircraft, the number of times that an individual animal would be exposed and the area that would be affected would decrease under ANG Scenario 1 and increase slightly under ANG Scenario 2.

JX3.8.2 Airspace

JX3.8.2.1 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, invertebrates and fish were excluded from review and analysis as they, too, would not likely be impacted by the proposed action.

The land under this airspace is within Florida and Georgia, with additional airspace utilized off the coast of South Carolina, Georgia, and Florida. Species included in the analysis of airspace currently are presented in Table JX3.8-1 and include 4 reptiles, 1 amphibian, 11 birds, and 4 mammals. No critical habitat occurs under the airspace.

Table JX3.8-1 Threatened, Endangered, and Special-Status Species/Communities that Occur or Potentially Occur under Airspace Associated with Jacksonville AGS

Species	*Status F/S*	*Areas of Occurrence*
Reptiles/Amphibians		
American Alligator *Alligator mississippiensis*	T/T	Found in a variety of freshwater habitats including rivers, marshes, swamps, and lakes.
Eastern Indigo Snake *Drymarchon corais couperi*	T/T	Found primarily in pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks.
Sand Skink *Neoseps reynoldsi*	T/T	Prefers rosemary scrub.
Blue-Tailed Mole Skink *Eumeces egregius lividus*	T/T	Found in well-drained sandy uplands above 100 feet.
Flatwoods Salamander *Ambystoma cingulatum*	T/T	Found in seasonally wet, pine flatwoods, and pine savannas in the southern U.S.
Birds		
Florida Grasshopper Sparrow *Ammodramus savannarum floridanus*	E/E	Requires large areas of frequently burned dry prairie habitat, with patchy open areas sufficient for foraging.
Florida Scrub-Jay *Aphelocoma coerulescens*	T/T	Found mainly in scrub woodlands along coasts, rivers, and on some high inland ridges of peninsular Florida.
Crested Caracara *Caracara cheriway*	T/T	Their typical habitats are either comprised of dry prairie with some wetter areas or agricultural environments.
Wood Stork *Mycteria americana*	E/E	Inhabit mainly tidal waters, marshes, swamps, streams and mangroves.
Red-Cockaded Woodpecker *Picoides borealis*	E/T	Found in mature, living, open-pine forests that are frequently maintained by naturally occurring summer fires.
Snail Kite *Rostrhamus sociabilis plumbeus*	E/E	Prefer large open freshwater marshes and lakes.

Table JX3.8-1 Threatened, Endangered, and Special-Status Species/Communities that Occur or Potentially Occur under Airspace Associated with Jacksonville AGS		
Species	***Status F/S***	***Areas of Occurrence***
Limpkin *Aramus guarauna*	T/T	Found in woody swamps and marshes.
Little Blue Heron *Egretta caerulea*	T/T	Found in freshwater swamps, lagoons, coastal thickets and islands.
Piping Plover *Charadrius melodus*	T/T	Lives the majority of its life on open sandy beaches or rocky shores, often in high, dry sections away from water.
Kirtland's Warbler *Dendroica kirtlandii*	E/E	Rare Migrant
Whooping Crane *Grus americana*	XN/SSC	Prefer flat, open palmetto prairie interspersed with shallow wetlands and lakes.
Mammals		
Florida Panther *Puma concolor coryi*	E/E	Found in mixed swamp forests and hammock forests.
West Indian Manatee *Trichechus manatus*	E/E	Found in shallow rivers, canals, saltwater bays, estuaries and coastal areas.
Puma *Puma concolor* (all subsp. except coryi)	T(SA)	Found in mixed swamp forests and hammock forests.
Florida bonneted bat *Eumops floridanus*	C	Roosts in cliff crevices, tree cavities and buildings.

Source: USFWS 2010a, 2010b.
Notes: E= Endangered; T= Threatened; SA = Similarity of Appearance to a listed taxon; XN = Experimental Population; SSC = Species of Special Concern; C = Candidate.

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.

JX3.8.2.2 Environmental Consequences

Overall, there would likely be no adverse effects to federally listed species due to 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 F-15C 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 or about the same rate as baseline operations. Under ANG Scenario 2, overflights below 5,000 feet AGL for the entire airspace would occur approximately 2.2 times per day compared to 1.6 times per day under baseline conditions. 3) Supersonic flight would occur overwater under the proposed action. Under ANG Scenario 2, noise levels would increase by 13 dB in Palatka/Pinecastle (58 dB L_{dnmr}), in Coastal Townsend by 3 dB (or 57 dB L_{dnmr}), and by 1 dB (or 52 dB L_{dnmr}) in APAFR airspace. As this airspace is currently used by F-15C aircraft, wildlife should be habituated to the noise and not be adversely impacted by rises in the noise levels.

JX3.9 Cultural and Traditional Resources

JX3.9.1 Base

JX3.9.1.1 Affected Environment

As defined in Chapter 3, section 3.10.2, the APE for Jacksonville AGS consists of all areas of ground disturbance associated with proposed construction or remodeling activities. Aircraft operations and the areas affected by noise levels 65 dB DNL and greater also fall under the APE and are evaluated for their potential to affect historic structures and districts where noise vibrations could adversely impact those types of resources. For airspace operational effects, only those cultural resources that would reasonably be affected by visual (overflights) and noise intrusions are considered. These include architectural resources; archaeological resources with standing structures, such as historic ranches, ghost towns, American Indian settlements; and traditional cultural properties. Prehistoric and historic archaeological sites lacking standing structures are not included as they are generally ground surface or even subsurface deposits that would not be affected by implementing the basing alternatives.

Archaeological Resources

A cultural resources survey of the Jacksonville AGS was conducted in March and April 2010. Although the report for this evaluation is still preliminary, it concluded that because of disturbance from construction, the majority of the installation has low probability for containing archaeological resources. Only one cultural resource was noted. The resource consists of isolated historic artifacts and a possible road bed. No other resources were encountered and the isolated find is not considered significant; therefore, no sites are recommended eligible for inclusion on the NRHP. The findings of the evaluation are pending concurrence from the Florida State Historic Preservation Office (SHPO) (HDR/e2M 2010).

Architectural Resources

A preliminary evaluation at Jacksonville AGS of all buildings constructed prior to 1990 was conducted in March 2010. The evaluation concluded that no buildings, structures, or objects at the installation are eligible for listing in the NRHP (HDR/e2M 2010). The Florida SHPO concurred.

Traditional Resources

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

JX3.9.1.2 Environmental Consequences

ANG Scenario 1

Under ANG Scenario 1, buildings would be renovated, but no new construction would occur. As discussed previously, no buildings or archaeological sites at Jacksonville AGS facility are eligible for listing in the NRHP. Concurrence of no effect within the APE was received from the Florida SHPO in June 2012.

Therefore, no adverse impacts to historic properties at this facility. No Tribes identified properties of religious or cultural significance in the APE.

ANG Scenario 2

Under ANG Scenario 2, buildings would be renovated, but no new construction would take place. As discussed previously, no buildings or archaeological sites at the Jacksonville AGS facility are eligible for listing in the NRHP. Concurrence of no effect within the APE was received from the Florida SHPO in June 2012. Therefore, there would be no impacts to historic properties at this facility. No Tribes identified properties of religious or cultural significance in the APE.

JX3.9.2 Airspace

JX3.9.2.1 Affected Environment

There are 29 NRHP-listed cultural resources located under the Jacksonville AGS airspace, including private residences, hotels, schools, businesses, courthouses, jails, and churches. No traditional cultural properties are known under the airspace and no American Indian reservations underlie the airspace

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.

JX3.9.2.2 Environmental Consequences

There would be no adverse impacts to cultural resources due to the implementation of the proposed action under either scenario. Aircraft operations in the airspace would increase by 4 percent under ANG Scenario 1 and by 10 percent under ANG Scenario 2. Noise would increase by 2 dB under ANG Scenario 1 and 3 dB under ANG Scenario 2 in the Coastal Townsend airspace and 12 dB under ANG Scenario 1 and 13 dB under ANG Scenario 2 in Palatka Pinecastle, although total noise levels would not exceed 58 dB L_{dnmr}. Noise would increase by 1 dB under ANG Scenarios 1 and 2 in the Avon Park airspace.

Visual intrusions under the proposed action would be minimal and would not represent an increase over baseline conditions sufficient to cause adverse impacts to the settings of cultural resources. Due to the high altitude of the overflights, small size of the aircraft, and the high speeds, the aircraft would not be readily visible to observers on the ground. Indeed, at an altitude of 8,000 feet AGL, an F-35A would appear about 0.07 inches in size.

Use of ordnance and defensive countermeasures would occur in areas already used for these activities. No additional ground disturbance would occur under the airspace due to the proposed action. Flares deployed from the aircraft would not pose a visual intrusion either for the following reasons: flares are small in size and burn only for a few seconds and the high relative altitude of the flights would make them virtually undetectable to people on the ground. Overall, flares are unlikely to adversely affect cultural resources. Therefore, the introduction of material to archaeological sites or standing structures from the use of flares would not have an adverse effect on these resources.

Therefore, there would be no impacts to historic properties at this facility. No Tribes identified properties of religious or cultural significance in the APE.

ANG Scenario 2

Under ANG Scenario 2, buildings would be renovated, but no new construction would take place. As discussed previously, no buildings or archaeological sites at the Jacksonville AGS facility are eligible for listing in the NRHP. Concurrence of no effect within the APE was received from the Florida SHPO in June 2012. Therefore, there would be no impacts to historic properties at this facility. No Tribes identified properties of religious or cultural significance in the APE.

JX3.9.2 Airspace

JX3.9.2.1 Affected Environment

There are 29 NRHP-listed cultural resources located under the Jacksonville AGS airspace, including private residences, hotels, schools, businesses, courthouses, jails, and churches. No traditional cultural properties are known under the airspace and no American Indian reservations underlie the airspace

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.

JX3.9.2.2 Environmental Consequences

There would be no adverse impacts to cultural resources due to the implementation of the proposed action under either scenario. Aircraft operations in the airspace would increase by 4 percent under ANG Scenario 1 and by 10 percent under ANG Scenario 2. Noise would increase by 2 dB under ANG Scenario 1 and 3 dB under ANG Scenario 2 in the Coastal Townsend airspace and 12 dB under ANG Scenario 1 and 13 dB under ANG Scenario 2 in Palatka Pinecastle, although total noise levels would not exceed 58 dB L_{dnmr}. Noise would increase by 1 dB under ANG Scenarios 1 and 2 in the Avon Park airspace.

Visual intrusions under the proposed action would be minimal and would not represent an increase over baseline conditions sufficient to cause adverse impacts to the settings of cultural resources. Due to the high altitude of the overflights, small size of the aircraft, and the high speeds, the aircraft would not be readily visible to observers on the ground. Indeed, at an altitude of 8,000 feet AGL, an F-35A would appear about 0.07 inches in size.

Use of ordnance and defensive countermeasures would occur in areas already used for these activities. No additional ground disturbance would occur under the airspace due to the proposed action. Flares deployed from the aircraft would not pose a visual intrusion either for the following reasons: flares are small in size and burn only for a few seconds and the high relative altitude of the flights would make them virtually undetectable to people on the ground. Overall, flares are unlikely to adversely affect cultural resources. Therefore, the introduction of material to archaeological sites or standing structures from the use of flares would not have an adverse effect on these resources.

Proposed use of the airspace would be similar to ongoing training operations. Given the current use of the airspace and the nature of the proposed future use of the project area, there would be no adverse potential effects to NRHP-eligible or listed archaeological resources, architectural resources, or traditional cultural properties. Therefore, under all scenarios, no effect to historic properties is expected from the proposed action.

In January 2010, an informal government-to-government letter was sent to the Miccosukee Tribe of Indians, Muscogee (Creek) Nation, Poarch Band of Creek Indians, and Seminole Tribe of Florida informing them of the proposed project; no responses were received. In October 2012, project specific, government-to-government consultation letters were again sent to the four tribes requesting if they had any responses to the Air Force conclusion of no adverse effects to cultural and traditional resources; no responses were received. In May 2013, these same Tribes were sent copies of the Revised Draft EIS, and to date no responses were received.

JX3.10 Land Use

JX3.10.1 Base

The following section describes the existing conditions and examines the extent to which the beddown of the F-35A at Jacksonville AGS 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 JX3.10-1 provides a cross-reference between the Duval County classifications and those used in this analysis.

Table JX3.10-1. Land Use Categories

County Land Use Classification	*EIS Land Use Classification*
Acreage Not Zoned for Agriculture, Residential, Vacant Residential	Residential
Institutional, Retail/Office,	Commercial
Industrial, Mining	Industrial
Public/Semi-Public	Public/Quasi Public
Recreation	Recreational
Military	Military
Vacant/Non-Residential, Agricultural, Non-Assessed, Parcels with No Value	Open/Agricultural
No Data Available/Other	Unclassified

JX3.10.1.1 Affected Environment

The Jacksonville AGS occupies a 342-acre parcel of land leased from the Jacksonville Airport Authority on the southwestern edge of Jacksonville IAP located in Duval County. Historical and proposed land use development at the Jacksonville AGS is presented in the FLANG Master Plan (FLANG 2005). This plan establishes goals, policies, and criteria that drive decisions regarding timing, placement, and priority of identified development needs in support of military operations and missions. A major goal of the plan is to improve operational efficiency, effectiveness and functionality pursuant to the mission of the 125 FW. Land use at the Jacksonville AGS can be divided into eight categories as defined by the ANG Land Use

Classification System: Aircraft Maintenance, Aircraft Operations, Airfield Pavements, Command and Support, Industrial, Open Space, Safety Zone, and Special Categories.

General siting criteria have been established for land development and use at commercial and military airfields. For example, RPZ'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. RPZs are located off each runway end and development at the Jacksonville AGS is constrained by design and height restrictions including in these areas. Clear Zones and RPZs are located within the airport property. In 2007, the City of Jacksonville adopted a new Part 10 of its Land Use and Zoning Code to recognize Airport Environs Zones which include all property within a Height and Hazard Zone, Noise Zone, Notice Zone, School Regulation Zone, Miscellaneous Use Zone, Runway Safety Area and Runway Protection Zone. The Height and Hazard zones are based on the limits defined in Federal Aviation Regulations (FAR) Part 77, *Objects Affecting Navigable Airspace* (Jacksonville IAP 2009).

Existing Aircraft Noise and Land Use Compatibility Surrounding the Installation

Land use activities most sensitive to noise typically include residential and commercial use, public services, and areas associated with cultural and recreational uses. Noise measurements 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 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 JX3.2-1 along with a discussion of potential effects on noise-sensitive receptors and nearby housing and population.

Local land use classifications adjacent to the installation consist mainly of agricultural lands with rural residential areas, light industrial and commercial land uses surround the Jacksonville AGS and Jacksonville IAP as well (Jacksonville IAP 2009).

Noise contours were prepared as part of the 2001 Master Plan Update for Jacksonville IAP. The future 2021 60, 65, and 70 dB DNL contours have been incorporated into the City of Jacksonville Land Use and Zoning Code Part 10 in order to protect the properties and occupants surrounding the airport, and prevent the encroachment of development that might impair the utility of the airport (Jacksonville IAP 2009). The JIA noise study contour area defining 65 dB DNL and above includes compatible use areas such as the airport operations area and agricultural use areas to the northeast of the airport. A portion of a commercial area located within the northeast end of the 65 dB DNL planning contour includes a recreational vehicle park. Small areas zoned for residential use at the west end of the airport would be considered incompatible under the plan.

Based on the results of the analysis of current noise levels and the noise study for the 2009 Master Plan, land use incompatibilities currently exist around the Jacksonville AGS airfield. The baseline contour area including noise levels equal to or greater than 65 dB DNL include 125 acres of land zoned for residential use (Table JX3.10-2). Overall, however, higher noise levels are generally confined to areas within the installation boundary and areas adjacent to the airfield complex zoned for compatible uses. No residential areas are exposed to noise levels greater than 75 dB DNL. Noise sensitive receptors (schools, hospitals and churches) potentially affected by the proposed action are identified and discussed in detail in the noise analysis, Section JX3.2.

Table JX3.10-2. Off-Base Land Uses Affected by Noise Levels 65 dB DNL and Greater under each ANG Scenarios

Land Use Category	65-70 dB DNL			70-75 dB DNL			75-80 dB DNL			80-85 dB DNL			85+ dB DNL			Totals		
	Baseline	Proposed	Acres Change	Baseline	Proposed	Acres Change	Baseline	Proposed	Acres Change	Baseline	Proposed	Acres Change	Baseline	Proposed	Acres Change	Baseline	Proposed	Acres Change
ANG Scenario 1																		
Residential	121	10	-111	4	0	-4	0	0	0	0	0	0	0	0	0	125	10	-115
Commercial	88	43	-45	0	0	0	0	0	0	0	0	0	0	0	0	88	43	-45
Industrial	86	29	-57	7	2	-5	1	1	0	1	0	-1	0	0	0	95	32	-63
Public/Quasi Public	1,024	981	-43	657	282	-375	0	9	9	63	0	-63	0	0	0	1,744	1,272	-472
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Open/Agricultural	874	295	-579	277	76	-201	35	0	-35	0	0	0	0	0	0	1,186	371	-815
Unclassified	4	2	-2	0	0	0	0	0	0	0	0	0	0	0	0	4	2	-2
Total	**2,197**	**1,360**	**-837**	**945**	**360**	**-585**	**36**	**10**	**-26**	**64**	**0**	**-64**	**0**	**0**	**0**	**3,242**	**1,730**	**-1,512**
ANG Scenario 2																		
Residential	121	36	-85	4	0	-4	0	0	0	0	0	0	0	0	0	125	36	-89
Commercial	88	62	-26	0	0	0	0	0	0	0	0	0	0	0	0	88	62	-26
Industrial	86	51	-35	7	2	-5	1	1	0	1	0	-1	0	0	0	95	54	-41
Public/Quasi Public	1,024	1,058	34	657	393	-264	0	32	32	63	0	-63	0	0	0	1,744	1,483	-261
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Open/Agricultural	874	427	-447	277	120	-157	35	0	-35	0	0	0	0	0	0	1,186	547	-639
Unclassified	4	3	-1	0	0	0	0	0	0	0	0	0	0	0	0	4	3	-1
Total	**2,197**	**1,637**	**-560**	**945**	**515**	**-430**	**36**	**33**	**-3**	**64**	**0**	**-64**	**0**	**0**	**0**	**3,242**	**2,185**	**-1,057**

Source: Wyle 2011 and U.S. Census Bureau 2010b.

JX3.10.1.2 Environmental Consequences

No new construction would occur as a result of the proposed action and no change to the existing airfield-related RPZs and Clear Zones would occur (Section JX3.4). Therefore, the focus of this analysis is on 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 land use analysis compares the proposed noise contours for each scenario to: 1) baseline noise contours, which show the existing noise environment, and 2) noise contours prepared as part of the 2001 Master Plan Update, which have been adopted by the City of Jacksonville for planning purposes. The comparison of the proposed contours to the baseline contours shows potential change in noise conditions and land use compatibility (refer to Table JX3.10-2 and Figures JX3.10-1 and JX3.10-2). The comparison of the proposed 65 dB DNL contour areas to the noise study planning area illustrates the potential for the proposed action to affect land use planning activities (Figure JX3.10-2).

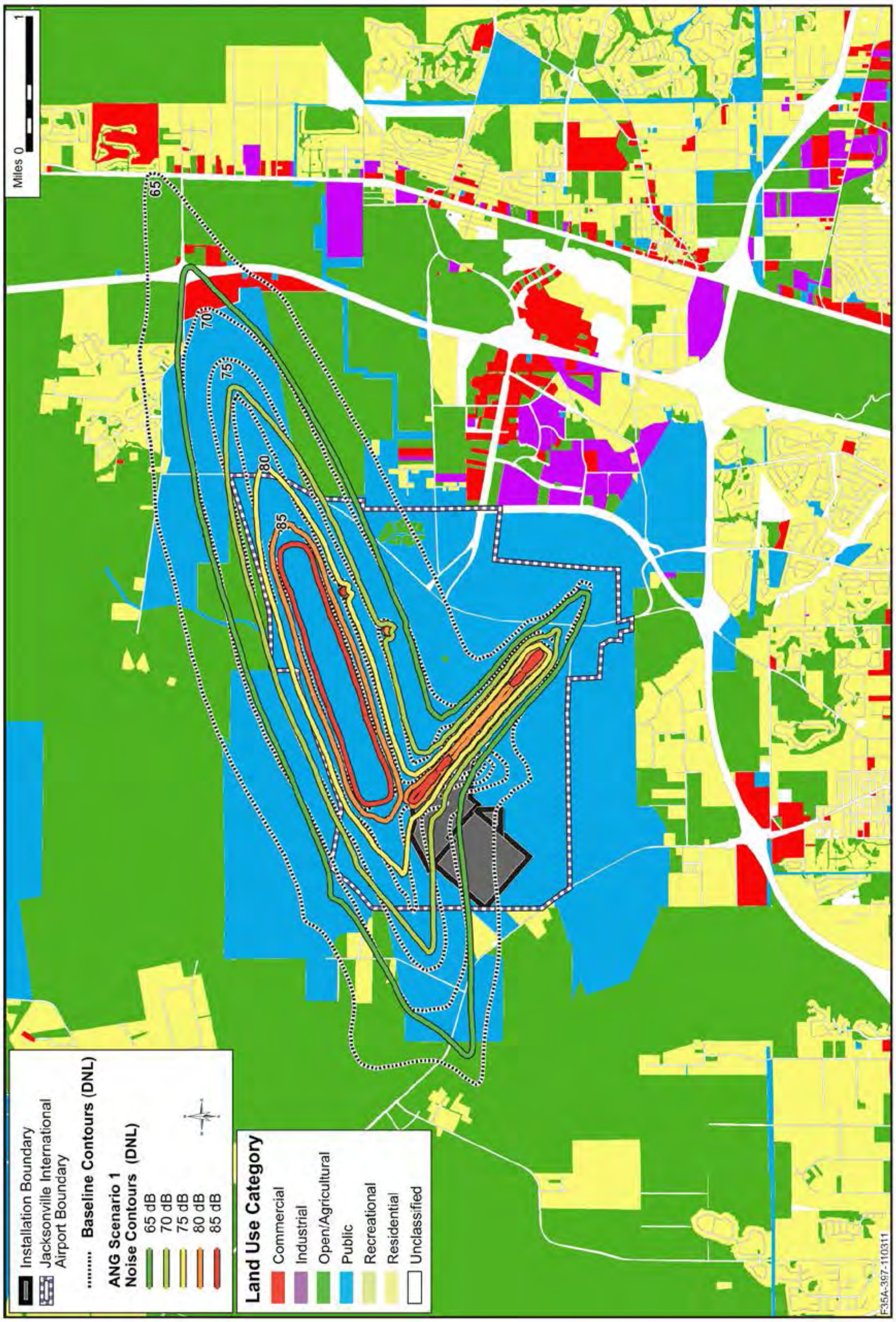


Figure JX3.10-1. Baseline Contours Compared to ANG Scenario 1 Contours Over Land Use Map

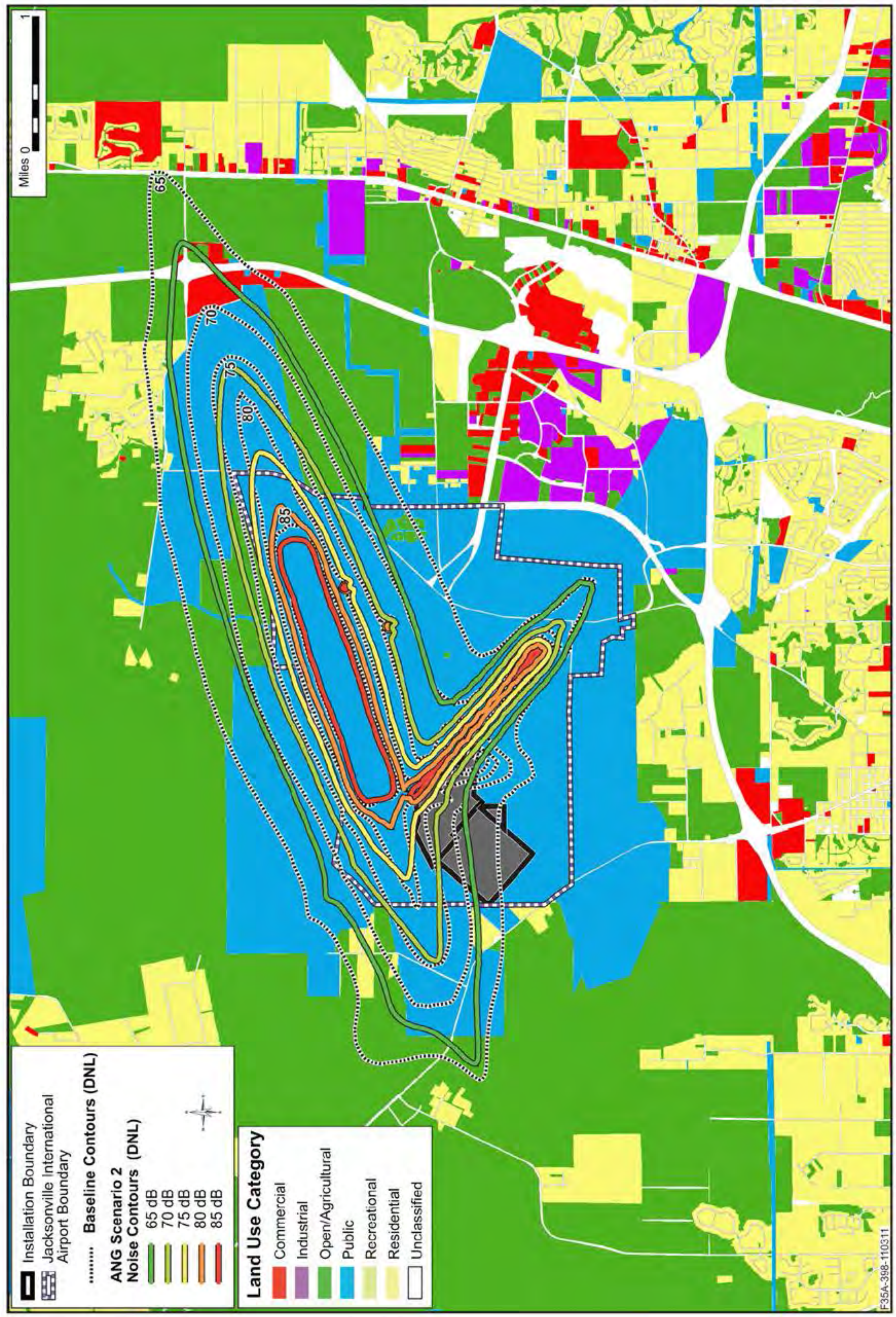


Figure JX3.10-2. Baseline Contours Compared to ANG Scenario 2 Contours Over Land Use Map

ANG Scenario 1

Under ANG Scenario 1, the proposed action would result in an overall reduction in the area affected by noise greater than or equal to 65 dB DNL by 1,512 acres (47 percent) (refer to Figure JX3.10-1) (see Section JX3.2, Noise). The current 65 to 70 dB DNL contour area would decrease, removing 111 acres of land defined for residential use from a currently incompatible situation by Federal Interagency Committee on Urban Noise (FICUN) standards (refer to Table JX3.10-2). No residential land use would remain in areas affected by noise greater than 70 dB DNL.

Figure JX3.10-3 shows the difference between the Jacksonville IAP Noise Study 65 dB DNL contour and the 65 dB DNL of ANG Scenarios 1 and 2. Both ANG Scenarios 1 and 2 would extend beyond the Jacksonville IAP planning contours to the east and northwest over agricultural, airport impact areas (public), commercial, and residential areas. Due to operational differences, the proposed contours over the southern portion of the base would remain entirely within base boundaries.

ANG Scenario 2

Under ANG Scenario 2, the proposed action would result in an overall reduction in the area affected by noise greater than or equal to 65 dB DNL by 1,057 acres (33 percent). The current 65 to 70 dB DNL contour area would decrease removing 85 acres of residential use from a currently incompatible situation by FICUN standards (refer to Table JX3.10-2). No residential land use would remain in areas affected by noise greater than 70 dB DNL.

JX3.10.2 Airspace

JX3.10.2.1 Affected Environment

This section summarizes land use underlying Palatka Pinecastle, Coastal Townsend and Avon Park Complex airspace identified for training activities under the proposed action.

Agriculture, forestry, federal lands and rural communities are the primary land uses in the Palatka Pinecastle airspace in Florida. Numerous, sparsely populated communities are scattered throughout the counties under the airspace. Daytona Beach is approximately 75 miles east of the center of the Palatka 1 MOA and the City of Ocala lies under the southern region of the Palatka 2 MOA. The areas under the airspace lie within Highland, Marion, Orange, Lake, Putnam, Seminole, Osceola, Okeechobee, Hardee, Sumter, and Polk counties in Florida. Small communities surround the Ocala National Forest under the airspace, including Fort McCoy, Eureka, Georgetown, and Welaka. County and city comprehensive plans establish requirements and guidelines applicable to the private lands in the respective jurisdictions.

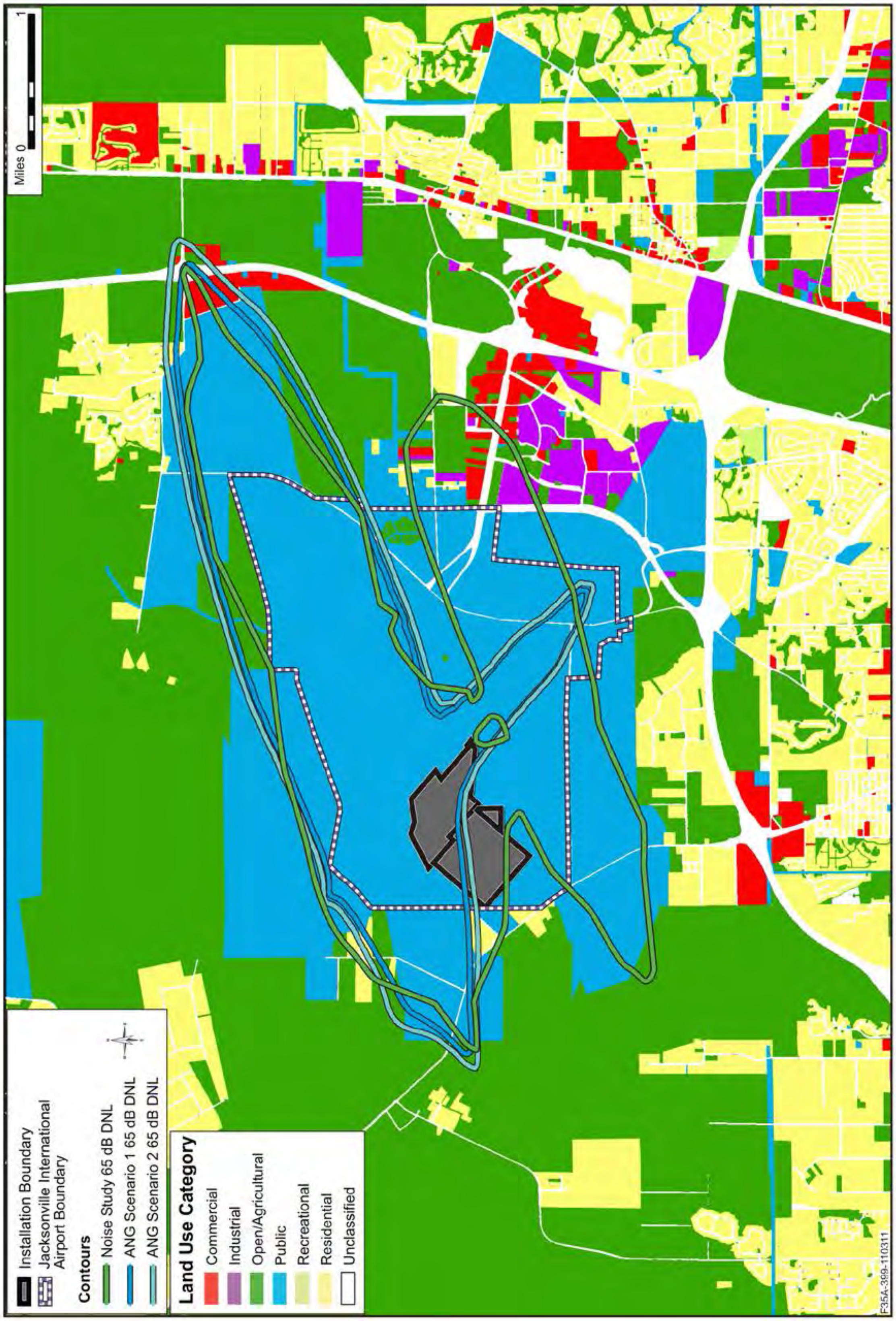


Figure JX3.10-3. Comparison of JIA Noise Study Contours to ANG Scenarios 1 and 2 Contours Over Land Use Map

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 Pierce. Several small towns are under the airspace, ranging in population from 200 (Gardi) to 30,400 (Hinesville). DoD-managed lands, Fort Stewart Military Reservation and the Townsend Range also lie under the airspace (Figure JX3.10-4). Special use areas have been identified under the airspace and are shown on Table JX3.10-3. Special use areas provide recreational opportunities and/or solitude or wilderness experiences. These areas may include public land areas such as national forests or state and local parks. Notably, Ocala National Forest is located directly under the Palatka Pinecastle airspace. It encompasses 383,000 acres and includes more than 600 lakes, rivers, and springs (Figure JX3.10-5). The forest is managed by the U.S. Department of Agriculture (USDA) Forest Service and hosts a variety of recreation, scenic and historic areas, including year-round camping, hiking, swimming, and fishing (USDA Forest Service 2010). State-managed lands include Wekiwa State Forest, Dunns Creek State Park, Lake George State Forest, and Seminole State Forest under Palatka Pinecastle including State Park in Orange County and the Okeechobee Battlefield State Park in Okeechobee County.

Table JX3.10-3. Land Ownership under Training Airspace

Land Owner	***Acres***	***Special Use Areas***
Palatka Pinecastle		
Federal	327,100	Ocala National Forest
DoD	19,228	Rodman Bombing Range, Pinecastle Impact Range, Lake Ocklawaha
State of Florida	87,084	Lake George State Forest, Lake George Conservation Area, Dunns Creek State Park, Caravelle Ranch Wildlife Management Area, Seminole State Forest
Private	226,864	-
Total	**660,276**	
Coastal Townsend (w/o R-3005)		
DoD	32,212	Fort Steward Military Reserve, Townsend Bomb Range
Department of Justice (DoJ)	456	Federal Law Enforcement Training Center
State of Georgia	105,092	Savannah National Wildlife Refuge (NWR), Big Hammond Wildlife Management Area (WMA), Big Hammock Natural Area (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 Alatamaha State Park, Jerico River NA, Little Hogan Island NA, Richmond Hill WMA, Townsend WMA
Private	1,671,586	-
Total	**1,809,346**	
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 State Park (SP), Lake Wales Ridge State Forest (SF), Lake Kissimmee SP

Coastal Townsend overlies the Altamaha-Rayonier Natural Area the Penholoway Swamp Wildlife Management Area (WMA), the Altamaha WMA and the Sansavilla WMA. Wildlife Management Areas protect coastal wetlands habitat areas while allowing some recreation access. Recreational uses in these areas include hunting, camping, canoeing, fishing, and bird watching.

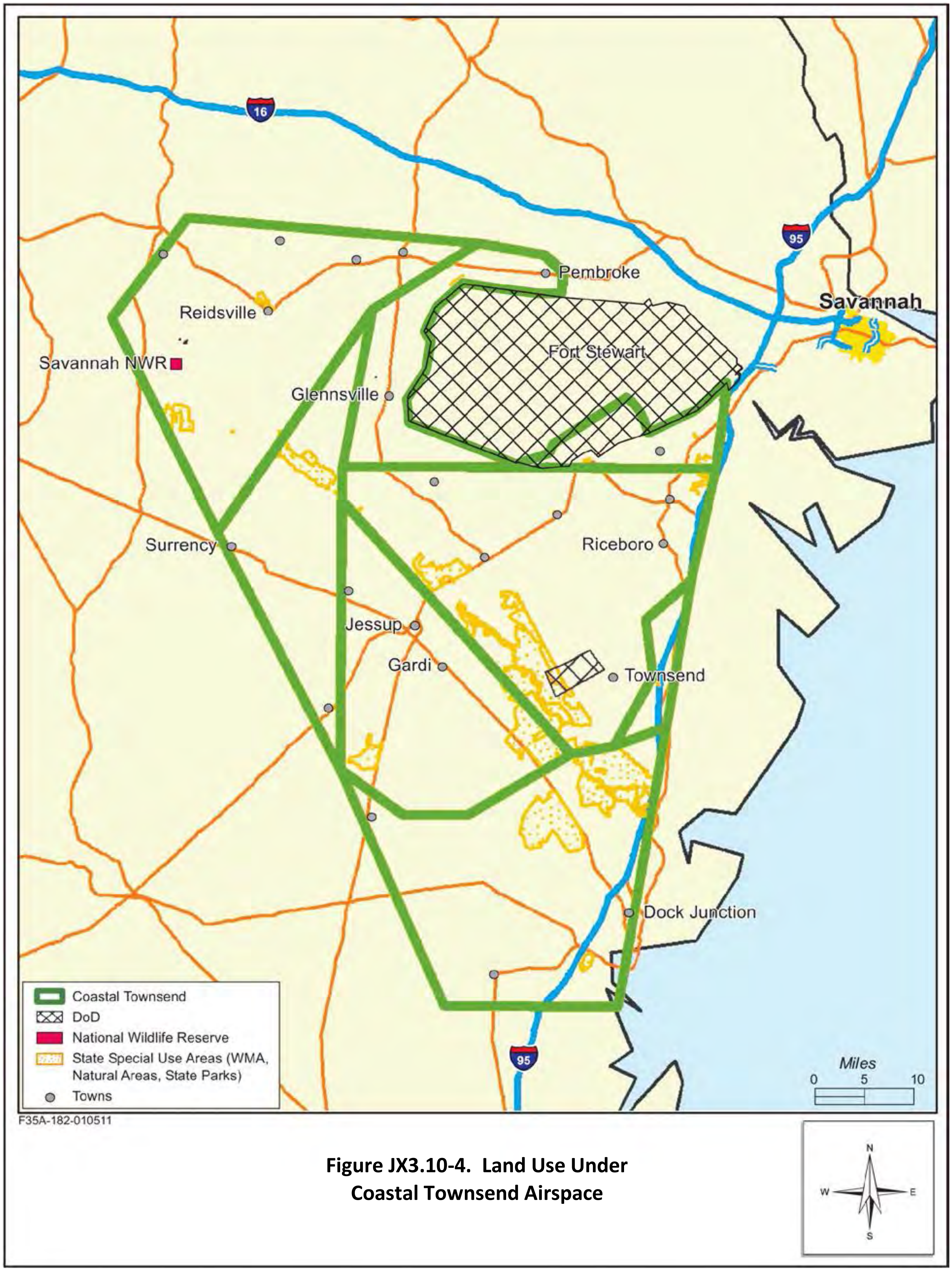


Figure JX3.10-4. Land Use Under Coastal Townsend Airspace

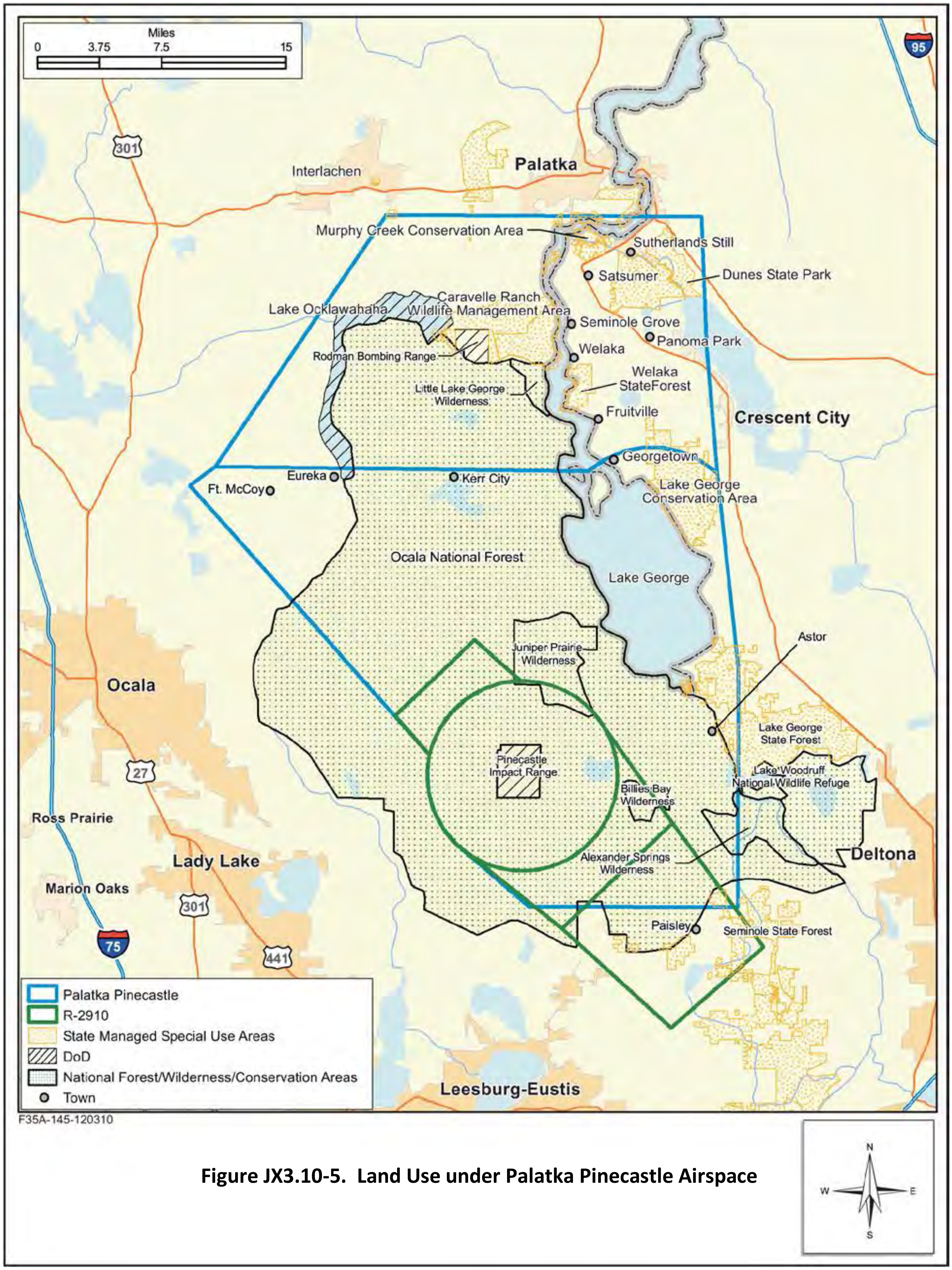


Figure JX3.10-5. Land Use under Palatka Pinecastle Airspace

The Avon Park complex 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. The Avon Park Air Force Range underlies the Avon Park complex, which includes military use, hunting, camping, and wildlife habitat management (Figure JX3.10-6).

Special use areas under the Avon Park complex 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.

JX3.10.2.2 Environmental Consequences

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. The proposed action would not generate changes to the status or use of underlying lands, nor would it affect existing plans or policies implemented for land management. 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.

While general noise would increase, individual overflights occur at various altitudes and are dispersed and transitory in nature. Approximately 80 percent of the time, the F-35A would operate above 23,000 feet MSL, with 30 percent of flight time above 30,000 feet MSL (refer to Table JX2.2-2). Changes in noise levels from the proposed action would not affect general land use patterns, land ownership, or affect management of lands or special use land areas beneath the airspace. Because the SOA is overwater, proposed F-35A use would have no effect on land use.

ANG Scenario 1

Under ANG Scenario 1, operations in the Palatka Pinecastle and Coastal Townsend airspace units would increase from one to two per flying day, and less than one per flying day, respectively. 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. The noise level of the Coastal Townsend airspace would increase from 54 dB L_{dnmr} to 56 dB L_{dnmr}. The noise level of Avon Park would increase imperceptibly from 51 dB L_{dnmr} to 52 dB L_{dnmr}. The noise level of the Palatka Pinecastle airspace would increase from less than 45 L_{dnmr} to 57 dB L_{dnmr}, which would be perceived as a doubling of noise. However, noise levels would not exceed 65 dB L_{dnmr}. While noise levels would increase, changes to noise levels would not result in changes to land use patterns, ownership, or management plans and policies. Therefore, the proposed action would result in no incompatible land use under ANG Scenario 1 (Table JX3.10-3).

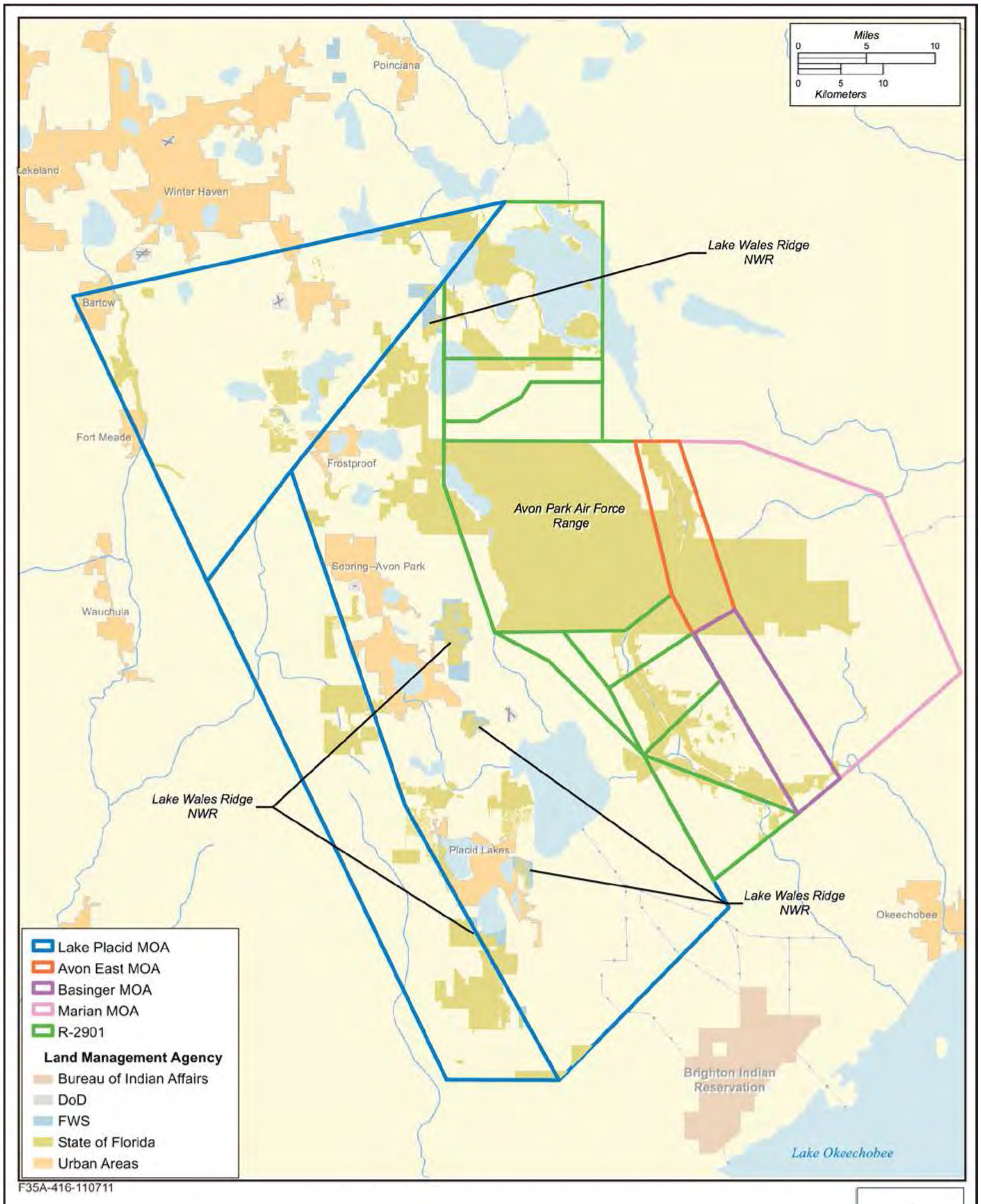


Figure JX3.10-6. Land Use under Avon Park Air Force Range

ANG Scenario 2

Under ANG Scenario 2, operations in the Palatka Pinecastle and Coastal Townsend airspace units would increase from one to three per day, and slightly more than one per day, respectively. However, similar to ANG Scenario 1, the probability of recurring overflight remains low. The baseline noise level of the Coastal Townsend airspace would increase from 54 dB L_{dnmr} to 57 dB L_{dnmr}. The noise level of Avon Park would increase imperceptibly from 51 dB L_{dnmr} to 52 dB L_{dnmr}. The noise level of the Palatka Pinecastle airspace would increase from less than 45 dB L_{dnmr} to 58 dB L_{dnmr}, which would be perceived as a doubling of noise. However, noise levels would not exceed 65 dB L_{dnmr}. Changes to noise levels would not result in changes to land use patterns, ownership, or management plans and policies. Therefore, the proposed action would result in no incompatible land use (refer to Table JX3.10-3).

JX3.11 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 comparable data among the various locations.

JX3.11.1 Base

JX3.11.1.1 Affected Environment

Employment and Earnings

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

In the region, the total civilian labor force increased from 386,241 in 2000 to 444,591 in 2010, an increase of approximately 15 percent. The largest contributions to employment in 2010 were made by educational services, health care, and social assistance (22 percent); retail trade (13 percent); and finance, insurance, and real estate (12 percent).

In Florida, the total civilian labor force increased by 23 percent from 2000 to 2010. The largest employment sectors in 2010 were educational services, health care, and social assistance (21 percent); retail trade (13 percent), and professional services (12 percent).

Non-farm earnings in the region totaled more than $30.6 billion in 2009. The major contributions were from government and government enterprises (18 percent), health care (12 percent), and finance and insurance (11 percent). In Florida, non-farm earnings totaled over $435 billion in 2009, with the major contributions made by government and government enterprises (18 percent), health care (13 percent), and professional services (9 percent) (U.S. Bureau of Economic Analysis 2010).

The number of authorized personnel levels at Jacksonville AGS was 1,035 in 2009. This included 346 full-time military, 41 full-time civilians, and 648 traditional guardsmen (personal communication, Frank 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 Duval County and the City of Jacksonville. Comparisons are also presented with conditions for the state of Florida. Demographic data are from the U.S. Census Bureau 2000 Census and the 2008-2010 American Community Survey 3-Year Estimates.

Duval County's population increased 11 percent between 2000 and 2010, reaching 864,263 in 2010. The City of Jacksonville population also grew by 11 percent over the same period, reaching 821,784 in 2010. By comparison, the population of Florida increased by 17 percent, reaching 18,801,310 in 2010 (U.S. Census Bureau 2010a, 2010b).

Housing

There is no military housing on Jacksonville AGS. Information regarding housing within Duval County is from the 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.

There were 387,488 total housing units in the region in 2010, of which approximately 62 percent were owner-occupied. The vacancy rate for the region was approximately 16 percent (U.S. Census Bureau 2010b). Over the period 2000-2010, the annual average number of building permits issued for residential units was 7,025. The number of units permitted on an annual basis varied from a high of 13,507 in 2005 to a low of 1,501 in 2010. The majority of these permits (about 65 percent) were for single-family homes (U.S. Census Bureau 2010c).

JX3.11.1.2 Environmental Consequences

ANG Scenario 1

Employment and Earnings

Under ANG Scenario 1, there would be no 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.

The combined expenditures for proposed construction and modification projects for this beddown scenario would be $400,000 during 2015 (refer to Section JX2.1.3 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 1, there would be no net change in military personnel. Construction workers would be drawn from the local labor force and, therefore, no regional in-migration would be associated with construction spending. Overall, there would be no project-related change to regional population.

Housing

Under ANG Scenario 1, there would be no net change in military personnel or regional in-migration. therefore, no project-related change to the regional housing market would be anticipated. Property values, as described in Appendix C, Section C2.7, are the result of multiple location and other variables. Property in the vicinity of airports and military airfields has been studied to determine if, and to what extent, aircraft noise could contribute to a discount in property values. The 1996 Fidell *et al*. study of two military facilities found indications that aircraft noise had no meaningful effect on residential property values. A 2003 study which combined the results of 33 airfield related property value studies estimated that a property could be discounted between 0.005 and 0.006 per dB DNL between the 65 dB DNL and 75 dB DNL noise contours. The property value discount above 75 dB DNL was not able to be defined based on study data but was estimated to be greater than the discount between 65 and 75 dB DNL (Nelson 2004).

ANG Scenario 2

Employment and Earnings

ANG Scenario 2 would result in an increase of 249 military personnel: approximately 87 full-time and 162 part-time traditional guardsmen. The proposed positions would represent approximately 24 percent of the existing full-time positions and 24 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. It is expected that any increase in staffing would be met primarily through local recruitment, particularly for part-time traditional guardsmen. Although unlikely, if all 87 full-time personnel relocated to the area, this would represent less than 1 percent of the Duval County labor force.

The increase in full-time positions would result in an annual increase in salaries of approximately $3.4 million. Salaries paid to part-time traditional guardsmen would result in an annual increase of approximately $597,000. Total salaries would result in less than 1 percent of total non-farm earnings in Duval County.

Any increases in secondary employment as a result of the increase in personnel would also represent less than 1 percent of the Duval County labor force and would be expected to be met by the local labor force. Therefore, ANG Scenario 2 would not affect short- or long-term regional employment and income trends.

The combined expenditures for proposed construction and modification projects for this beddown scenario would also be $400,000 during 2015 (refer to Section JX2.1.3 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.

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

Population

ANG Scenario 2 would result in an increase of 87 full-time and 162 part-time military positions. Under a conservative scenario, the full-time positions would be filled by relocating personnel. Combined with their approximately 118 family members, this would represent less than 1 percent of the Duval County population. Therefore, ANG Scenario 2 would not result in any changes to short- or long-term regional population trends.

Housing

Under ANG Scenario 2, 87 full-time and 162 part-time positions would be created. If all 87 full-time military personnel were in the market for housing units at the same time, this would represent less than 1 percent of the owner-occupied and renter-occupied units, individually. Therefore, ANG Scenario 2 would not result in changes to short- or long-term trends in the regional housing market. Property values, as described in Appendix C, Section C2.7, are the result of multiple location and other variables. Property in the vicinity of airports and military airfields has been studied to determine if, and to what extent, aircraft noise could contribute to a discount in property values. The 1996 Fidell *et al*. study of two military facilities found indications that aircraft noise had no meaningful effect on residential property values. A 2003 study which combined the results of 33 airfield related property value studies estimated that a property could be discounted between 0.005 and 0.006 per dB DNL between the 65 dB DNL and 75 dB DNL noise contours. The property value discount above 75 dB DNL was not able to be defined based on study data but was estimated to be greater than the discount between 65 and 75 dB DNL (Nelson 2004).

JX3.12 Environmental Justice/Protection of Children

JX3.12.1 Base

JX3.12.1.1 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.

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.

Minority and Low-Income Populations

Table JX3.12-1 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 Jacksonville AGS. This information was derived from the 2010 U.S. Census of Population, which is the latest, comparable source of information at the required level of detail. Based on the data, 22 percent of the state population is composed of minorities and 15 percent are low-income populations. However, in the city of Jacksonville and Duval county which encompass the base and serve as the area of comparison, minorities account for much higher proportions (40.6 and 37.2, respectively). Low-income population proportions are only slightly higher than the state average.

Table JX3.12-1. Total Population, Minority Population, and Low-Income Population within the Vicinity of Jacksonville AGS

Geographic Area	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income[1]*	*Children Under Age 18*	*Percent Children*
Jacksonville	821,784	333,644	40.6%	124,911	15.2%	196,406	23.9%
Duval County	864,263	321,506	37.2%	128,775	14.9%	201,373	23.3%
Florida	**18,801,310**	**4,042,282**	**21.5%**	**2,763,793**	**14.7%**	**3,948,275**	**21.0%**

Source: U.S. Census Bureau 2010b.
Note: [1]The 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 JX3.12-2 displays the total, minority, and low-income populations in the vicinity of Jacksonville AGS exposed to 65 dB DNL and greater noise contour bands under baseline conditions. Out of a total population of over 860,000 in Duval County, 308 people (or about 0.03 percent) would be affected by noise levels of 65 dB DNL and greater. Of the total population (308) subject to noise contour bands of 65 dB DNL and greater, about 31 percent of that total would be considered minority and 8 percent low income. When compared to the proportion of total population in Duval County—37 percent minority and 15 percent low income—people affected by noise levels of 65 dB DNL and greater generated by aircraft operations at Jacksonville IAP are not disproportionately affected. However, when compared to state percentages of minority population (22 percent) there are disproportionate impacts to this population. Low-income populations are not disproportionately affected when compared to state levels (8 percent versus 21 percent).

Table JX3.12-2. Total Baseline Population, Minority Population, and Low-Income Population Affected by Noise Greater than 65 dB DNL at Jacksonville AGS					
Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	296	93	31%	24	8%
70 – 75	12	4	33%	1	8%
75 – 80	0	0	0	0	0
80 – 85	0	0	0	0	0
85+	0	0	0	0	0
Total	**308**	**97**	**31%**	**25**	**8%**

Source: U.S. Census Bureau 2010b.
Note: [1]The 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 2010, the number of children under the age of 18 living in Duval County was 201,373 (23 percent) (see Table JX3.12-1). Currently, there are no schools exposed to aircraft noise levels of 65 dB DNL and greater in the vicinity of Jacksonville AGS (Duval County Public Schools 2010a).

JX3.12.1.2 Environmental Consequences

For each scenario, noise levels of 65 dB DNL and greater were identified (see Section JX3.2, Noise). Within the noise contour bands, the affected population was determined using 2010 Census Bureau census block group data. Table JX3.12-3 provides the proposed total population that would be affected for each of the scenarios by noise levels of 65 dB DNL and greater. Under either of the ANG Scenarios, areas affected by noise levels 65 dB DNL and greater would decrease.

Table JX3.12-3. Jacksonville ANG Scenarios 1 and 2 Projected Population Affected by Noise Greater than 65 dB DNL			
Noise Contour	*Baseline*	*ANG Scenario 1*	*ANG Scenario 2*
65 – 70	296	170	210
70 – 75	12	0	0
75 – 80	0	0	0
80 – 85	0	0	0
85+	0	0	0
Total	**308**	**170**	**210**

Source: U.S. Census Bureau 2010b.

ANG Scenario 1

Minority and Low-Income Populations

Table JX3.12-4 displays the total population and proportional representation of minority and low-income populations affected by noise levels 65 dB DNL and greater under ANG Scenario 1. Under this scenario, the total population subjected to noise levels 65 dB DNL and greater would decrease from baseline by 44 percent (-138). Of the 170 individuals subjected to noise levels 65 dB DNL and greater, 32 percent would consist of minority and 5 percent would be low-income populations. When compared to the proportion of minority and low-income populations in Duval County—37 percent and 15 percent, respectively—proportionally ANG Scenario 1 would affect fewer minority and low-income populations, and not result in disproportionate impacts. However, proportions of both minority and low-income populations exceed state averages. With the overall reduction in minorities and low-income people (-53 and -17), ANG Scenario 1 cannot be considered to result in any new or additional impacts for environmental justice.

Table JX3.12-4. Total Minority and Low-Income Populations Affected by Noise Greater than 65 dB DNL under Jacksonville ANG Scenario 1

Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	170	54	32%	8	5%
70 – 75	0	0	0	0	0
75 – 80	0	0	0	0	0
80 – 85	0	0	0	0	0
85+	0	0	0	0	0
Total	**170**	**54**	**32%**	**8**	**5%**
Baseline Conditions	*308*	*97*	*31%*	*25*	*8%*

Source: U.S. Census Bureau 2010b.
Note: [1]The 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

Currently, there are no schools exposed to aircraft noise greater than 65 dB DNL. 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 JX3.12-5 displays the total population and proportional representation of minority and low-income populations affected by noise levels 65 dB DNL and greater under ANG Scenario 2. Under this scenario, the total population affected by noise levels 65 dB DNL and greater would decrease from baseline by 32 percent (-98). Of the 210 individuals subjected to noise levels 65 dB DNL and greater, 32 percent would consist of minority and 6 percent would be low-income populations, and not result in disproportionate impacts. However, proportions of both minority and low-income populations exceed state averages. With the overall reduction in minorities and low-income people (-53 and -17), ANG Scenario 2 cannot be considered to result in any new or additional impacts for environmental justice.

Table JX3.12-5. Total Minority and Low-Income Populations Affected by Noise Greater than 65 dB DNL under Jacksonville ANG Scenario 2					
Noise Contour	***Total Population***	***Minority Population***	***Percent Minority***	***Low-Income Population***	***Percent Low-Income[1]***
65 – 70	210	67	32%	12	6%
70 – 75	0	0	0%	0	0
75 – 80	0	0	0%	0	0
80 – 85	0	0	0	0	0
85+	0	0	0	0	0
Total	**210**	**67**	**32%**	**12**	**6%**
Baseline Conditions	*308*	*97*	*31%*	*25*	*8%*

Source: U.S. Census Bureau 2010b.
Note: [1]The 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

Currently, there are no schools exposed to aircraft noise greater than 65 dB DNL. Under ANG Scenario 2, no schools would be exposed to aircraft noise greater than 65 dB DNL.

JX3.12.2 Airspace

JX3.12.2.1 Affected Environment

The airspace associated with Jacksonville AGS covers land within Florida 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 Avon Park, consists of military ranges where the public and residences are excluded. Baseline noise levels for all the airspace are well below the threshold of 65 dB DNL applied to Environmental Justice impacts.

JX3.12.2.2 Environmental Consequences

Section JX3.2 discusses noise levels within the training airspace. Noise levels are expected to increase from baseline under both scenarios, especially for Palatka Pinecastle. While annoyance to underlying populations may increase, noise levels in the airspace would not exceed the threshold of 65 dB L_{dnmr}. As presented in Section JX3.3, emissions from aircraft operations were evaluated for operations below 3,000 feet MSL. Training in the airspace would occur primarily above 5,000 feet AGL; therefore, no impacts to minority or low-income populations or youth populations would occur. Airspace and ground safety is discussed in Section JX3.4. Analysis indicates negligible impact to populations under the training airspace. Consequently, no disproportionate or adverse impacts related to environmental justice are anticipated, nor would there be any special health or safety risks to children.

JX3.13 Community Facilities and Public Services

JX3.13.1 Base

JX3.13.1.1 Affected Environment

Potable Water

Jacksonville Electric Authority (JEA) provides potable water to Duval County, including the city of Jacksonville and Jacksonville AGS. JEA's water system consists of 134 artesian wells within the Floridian Aquifer and serves more than 305,000 water customers in northeast Florida (JEA 2010). All-time peak usage (water delivered in a 24-hour period for customer use) was 147 million gallons per day in 2002 (JEA 2010). The Jacksonville AGS has one 8-inch metered line connection into the main JEA system. Average water use is about 18,700 gallons per day (125 FW 2002).

Wastewater Treatment

Jacksonville AGS generates wastewater from sanitary, stormwater, and industrial processes, including latrines, showers, other sanitary facilities, and oil/water separators. The Jacksonville AGS has a sanitary sewer system that discharges its domestic wastewater and light-industrial wastewater to the Highlands Wastewater Treatment Plant operated by JEA. JEA's wastewater and sewer systems currently serve over 232,000 customers and treat over 60 million gallons per day (JEA 2010).

Electric Power and Natural Gas

The JEA electric system currently serves more than 417,000 customers in Jacksonville and parts of three adjacent counties in Florida. JEA's total peak generating capacity is approximately 3,050 megawatts (JEA 2010); in FY 2008, JEA produced 16.3 million gigawatt-hours of electricity (JEA 2010). Electricity consumption at Jacksonville AGS for April 2009 through April 2010 was 7,352.77 megawatt-hours (7.35 gigawatt-hours) (personal communication, Cunningham 2010).

Teco People's Gas serves more than 330,000 commercial, industrial, and residential customers, including Duval County and Jacksonville AGS.

Solid Waste Management

Solid waste is managed in accordance with the Jacksonville AGS Solid Waste Management Plan and guidelines specified in Air Force Instruction (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.

Various users at the installation generate solid waste in the form of office trash, non-hazardous industrial wastes, normal municipal waste, and construction debris. These nonhazardous wastes are collected and disposed of off-site at the Trail Ridge Landfill owned by Waste Management Incorporated. Trail Ridge Landfill is also a certified construction and demolition landfill. Trail Ridge Landfill is currently accepting approximately 3,200 tons per day but is permitted to accept 5,000 tons of waste per day. As of July 2010, Trail Ridge Landfill is estimated to have a remaining site life expectancy of 7 years (personal communication, Sweeney 2010).

Schools

There are no residences or schools located on Jacksonville AGS. Therefore, school-age dependents attend schools within the Duval County School District. The Duval County School District has more than 160 schools divided into seven districts. Jacksonville AGS is located within District 1 which includes 11 elementary schools, three middle schools, and one high school (Duval County Public Schools 2010b).

JX3.13.1.2 Environmental Consequences

Under ANG Scenario 1, there would be no change in the number of personnel and dependents stationed at Jacksonville AGS. 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 existing conditions and are, therefore, not addressed further within this section. ANG Scenario 2 would include an increase of 587 people (249 personnel and 338 dependents) to Jacksonville AGS. This represents a 24 percent increase from the baseline population of 2,387 people (994 full and part-time military personnel, 41 civilian contractors, and 1,352 dependents) currently at Jacksonville AGS. The increase in personnel and dependents would represent, at a maximum, an increase of less than 0.1 percent for Duval County, and subsequently, a less than 0.1 percent increase in demand for services.

For the range of community facilities and public services discussed below, the installation is required to proactively plan for and assess all specific infrastructure and utility requirements and other essential services to ensure that the proposed increase in personnel and their dependents would be accommodated under each proposed alternative. The installation routinely evaluates community facilities and services to account for fluctuations associated with new units assigned to the installation and the deployment of existing units. In addition, the installation identifies infrastructure or utility needs within the scope of each corresponding project. If particular projects require additional infrastructure or utilities, they are incorporated as a part of that project. This process ensures that any infrastructure or utility deficiencies are identified in the initial planning stages.

Potable Water

Water consumption would be expected to increase under ANG Scenario 2 as a result of the increase in personnel and it is assumed that population impacts will be incurred on and off base. As described in Section JX3.14.1.1, potable water is supplied to both the city of Jacksonville and Jacksonville AGS from the Floridian Aquifer and though it is understood that 249 additional personnel would work away from home during the day, it is assumed that the majority of their consumptive water use would occur at their place of residence. According to a 2005 water use report by the U.S. Geological Survey (USGS), the average total domestic per capita use of potable water in 2005 was 96 gallons per day (gpd) for the state of Florida (USGS 2005). Therefore, with a maximum increase of 587 personnel and dependents, the additional demand on water supply from the Floridian Aquifer is estimated to be 56,352 gpd (0.056 million gallons per day [mgd]), less than a .01 percent increase compared to JEA peak of 147 mgd in 2002 (JEA 2010).

Wastewater Treatment

Wastewater generation would be expected to increase under ANG Scenario 2 as a result of the increase in personnel. Assuming conservatively that wastewater flow equals water consumption, the maximum increase of 587 personnel and dependents (assuming 96 gallons/capita/day [gpd]) would also result in an increase to the municipal waste water treatment plant of 56,352 gpd (0.056 mgd), less than a 0.01 percent increase compared to JEA's average 60 million gallons per day (mgd) of wastewater influx (JEA 2010). Though it is understood that 249 additional personnel would work away from home during the day, it is assumed that the majority of their wastewater generation would occur at their place of residence.

Electricity

Electricity consumption would be expected to increase under ANG Scenario 2 as a result of the increase in personnel. According to the U.S. Department of Energy State Energy Consumption Estimates, the average annual electricity consumption for a U.S. residential home in 2008 was 11,040 kilowatts (U.S. Department of Energy 2010). Assuming each personnel member constitutes one household, an increase in 259 personnel would increase electricity use approximately 2,748,960 kilowatts (2.7 gigawatt-hours) per year. Though it is understood that 249 additional personnel would work away from home during the day, it is assumed that the majority of their consumptive electricity use would occur at their place of residence.

Natural Gas

Natural gas consumption would be expected to increase under ANG Scenario 2 as a result of the increase in personnel. According to the U.S. Department of Energy, average residential consumption of natural gas within the U.S. in 2008 was 75,000 cubic feet (750 hundred cubic feet) per household (U.S. Department of Energy 2010). Assuming each personnel member constitutes one household, an increase in 249 personnel would increase natural gas use by approximately 186,750 hundred cubic feet. Though it is understood that 249 additional personnel would work away from home during the day, it is assumed that the majority of their consumptive natural gas use would occur at their place of residence.

Solid Waste Management

There are no new construction projects or additions to existing facilities proposed under either beddown scenario; however, the internal alterations to be constructed under both scenarios could generate minor construction and demolition debris requiring landfill disposal. Proposed increases in personnel and equipment use under ANG Scenario 2 would also contribute to an increase in solid waste generation. Compliance with the Jacksonville AGS 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 beddown scenarios.

Schools

The installation is required to plan for and assess all essential services to ensure that existing educational services can adequately accommodate the proposed increase of personnel and their dependents with implementation of each scenario. Under ANG Scenario 2, there would be an expected increase of 123 school-age dependents. This would represent a 25 percent increase to the baseline of 488 school-age dependents currently associated with personnel at Jacksonville AGS.

JX3.14 Ground Traffic and Transportation

JX3.14.1 Base

JX3.14.1.1 Affected Environment

Regional and Local Circulation

Jacksonville AGS is located at the western edge of Jacksonville IAP in Duval County, approximately 10 miles north of downtown Jacksonville, Florida. Regional access to Jacksonville AGS (within Jacksonville IAP) is considered excellent due to the proximity of local highways. Interstate (I)-95 provides regional access to Jacksonville IAP from the north and south and is the primary route for transportation to and from the airport. The east-west I-295 runs parallel to the southern boundary of the airport and connects with Interstate 95 southeast of Jacksonville IAP. These are both limited access, divided highways and have average daily traffic (ADT) of 89,000 (I-95) and 57,500 (I-295) in the direct vicinity of the airport (Florida Department of Transportation [DOT] 2008). I-95 is a six lane highway, and I-295 currently has four lanes with expansion capability. State Route (SR)-115 (Lem Turner Road) provides regional access from the northwest to Jacksonville IAP. SR-115 has an ADT of 10,500 at its intersection with I-295 (Florida DOT 2008).

SR 102 (Airport Road) provides direct access to Jacksonville IAP from I-95 and carries an ADT volume of 15,400 (Florida DOT 2008). SR 102 intersects SR 243 (International Airport Blvd) approximately 3 miles east/northeast of the entrance to Jacksonville AGS. This intersection currently functions at level of service (LOS) B (personal communication, Chapman 2010). SR 102 splits and connects to Pecan Park Road which bounds the entire eastern border of the airport. To the south, Terrell Road runs east-west and bounds the southern border of Jacksonville IAP. Terrell Road connects SR 115 and Pecan Park Road, and provides the primary access to Jacksonville AGS via FLANG Drive. The intersection of Terrell Road and SR 115 currently functions at LOS C (personal communication, Chapman 2010).

Circulation at Jacksonville AGS

FLANG Road enters Jacksonville AGS from the south at the installation’s only entry gate. Circulation within the installation is minimal and consists of six roads. Eagle Avenue, which intersects with FLANG Road, is the primary thoroughfare through the installation. Dart Avenue parallels Falcon Avenue and provides access to the Maintenance Hangar, Base Operations, and other facilities. Sabre Avenue, Mustang Avenue, and Dagger Street serve as connectors between Eagle and Dart Avenues. Shooting Star Road connects the flightline with the Alert Area and services the aircraft maintenance facilities (FLANG 2005).

Personnel on the installation associated with the F-15Cs total 1,035. Of those personnel, 346 are full-time military personnel, 41 are civilian contractors, and the remaining 648 personnel are part-time accessing the installation once a month during Unit Training Assembly (UTA) weekends. The maximum number of POVs at Jacksonville AGS on a weekday is roughly 400 vehicles, with an additional 10 commercial deliveries per day (personal communication, Vitetta 2010). Overall, traffic and circulation are good throughout the majority of the installation and there are no areas considered to have traffic flow issues (FLANG 2005; personal communication, Vitetta 2010). However, the main gate does experience congestion during peak traffic hour ingress and egress to the installation on UTA weekends (FLANG 2005).

The majority of on-base parking is in the two large lots to the north and south of the Wing Headquarters building. During UTA weekends, when the number of POVs on the installation can reach up to 1,000 (personal communication, Vitetta 2010), these lots are often full. Overflow parking is located on the grass areas south of Eagle Avenue (FLANG 2005). Recommendations for circulation improvements in the FLANG Master Plan Update (2005) include: the realignment of Eagle Avenue to meet antiterrorism standoff distance requirements; construction of new parking lots to meet personnel increases; and establishment of access control points to restrict POV use to Eagle Avenue and the parking lots.

JX3.14.1.2 Environmental Consequences

Construction activities would begin in 2017 under both ANG Scenarios 1 and 2, requiring approximately 1 year to complete. Construction traffic could temporarily result in negligible increases in the use of some on-base roadways during construction activities. However, construction under both scenarios at Jacksonville AGS would consist solely of internal alterations and, therefore, would be minimal and short-term.

ANG Scenario 1

Under ANG Scenario 1, on-base personnel would remain at the current level of 1,035 personnel. There would be no change in travel demand for the installation and conditions would remain similar to that under current conditions.

ANG Scenario 2

Under ANG Scenario 2, on-base personnel would increase by 249, from 1,035 to 1,284. The additional 249 personnel would consist of 87 full-time and 162 part-time employees. This increase in full-time personnel would generate up to 87 additional one-way vehicle trips to and from the installation during morning and evening peak periods. Estimating that each full-time employee makes two trips per day (not taking into consideration carpooling and other alternative modes of transportation) and that all employees would be on the installation at the same time, the implementation of ANG Scenario 2 would add an additional 174 trips onto the existing roadway network after the construction phase is completed. During UTA weekends, that traffic would be expected to increase by 324 trips per day. The proposed increase in personnel and associated travel demand would potentially increase peak period travel demand by 24 percent. The anticipated increase in traffic volume would exceed the primary screening criterion (11.8 percent) for the threshold of concern, but would not exceed the threshold of significance (26.7 percent) (see Chapter 3 Methodology, Section JX3.15, Ground Traffic and Transportation). The greatest impact on traffic flow would most likely occur on UTA weekends, with potential congestion issues occurring during peak morning and evening travel periods.

JX3.15 Hazardous Materials and Waste

JX3.15.1 Base

JX3.15.1.1 Affected Environment

Hazardous Materials

Hazardous materials are used at Jacksonville AGS for aircraft operations and maintenance including petroleum, oil, and lubricants (POL) management and distribution (125 FW 2008b). Types of hazardous substances found on Jacksonville AGS include: solvents, solder (lead and silver), batteries, liquid cooling oil, lubricating oils, sludge oil, hydraulic fluid, paint, jet propellant (JP)-8, diesel fuel, motor gasoline, antifreeze, scrap metal, bead blast metals (lead and cadmium), and contaminated solids.

Hazardous materials on Jacksonville AGS are controlled through a Hazardous Material Pharmacy (HAZMART) (125 FW 2008b). This process centralizes procurement, handling, storage, and issuing of hazardous materials and their turn-in, recovery, reuse, or recycling.

The 125 FW FLANG Spill Prevention and Response Plan (125 FW 2008c) consists of three related plans. The Quick Reference Spill Response Guide (Red Plan) is distributed to all generation areas for first responder emergency response. The Spill Prevention, Control, and Countermeasure Plan details the proper oil handling procedures needed to minimize potential spills and releases at the point of use. The Oil and Hazardous Substance Pollution Control Plan (OHSPC) identifies on-base storage locations and describes hazardous substance storage and spill prevention and control provisions. The OHSPC Plan further outlines activities to be undertaken to minimize the adverse effects in the incidence of a spill, including roles and responsibilities, notification, containment, decontamination, and cleanup of spilled materials.

Hazardous Waste

The Jacksonville AGS is regulated as a small quantity hazardous waste generator under the Resource Conservation and Recovery Act (RCRA). The Jacksonville AGS Final Hazardous Waste Management Plan (125 FW 2008b) governs the Jacksonville AGS Hazardous Waste Management Program. Hazardous wastes are stored at one central accumulation site (less than 180 day storage area) and at 30 satellite accumulation points near work locations. Jacksonville AGS recycles solder excess (lead and silver), used JP-8 and diesel fuel, used oil and filters, hydraulic fluid and filters, mixed fluids (JP-8, hydraulic fluid, and oil), lead-acid batteries, aerosol cans, and used antifreeze.

Toxic Substances

Regulated toxic substances typically associated with buildings and facilities include asbestos, LBP, and poly-chlorinated biphenyls (PCBs). The Asbestos Management Plan provides guidance for the identification of ACM and the management of asbestos wastes, which are disposed of at an off-base, permitted landfill (125 FW 2006). An asbestos facility register is maintained by an Asbestos Operations Officer, who is appointed by the Base Civil Engineer. The Base Civil Engineer also has responsibility for the LBP program and appoints the LBP Program and Operations Officers (125 FW 2007). Although a survey was complete in 1997 (125 FW 1997), all older buildings are screened for LBP on an as-needed basis, generally prior to renovation or demolition activities. Although materials may be screened for PCB contamination prior to disposal, Jacksonville AGS has no known PCB materials onsite and is considered “PCB Free” (125 FW 2008b).

Environmental Restoration Program

There are 12 Environmental Restoration Program (ERP) cleanup sites within the industrial zone/airport area at Jacksonville AGS (Sites 1, 2, 3E, 3W, 4, 5, 6, 7, 8, 9, 10, and 11) (FLANG 2002). No Further Action and Site Closure status was granted to Sites 1, 2, 3W, 4, 5, 6, 7, 8, and 9 in 1997. In 2002, further assessment was recommended for the remaining three sites (Sites 3E, 10, and 11). Any proposed actions to occur within the vicinity of an ERP site are required to be coordinated with the Jacksonville ERP manager. In addition, six underground storage tanks (USTs) (tanks 12, 23/24, 27, 30, and 31) are undergoing additional site assessment and closure activities (FLANG 2010). There are no Military Munitions Response Program (MMRP) sites at Jacksonville AGS (Air Force 2007; personal communication, Vitetta 2010).

JX3.15.1.2 Environmental Consequences

Hazardous Materials

Operations are expected to either decline or remain consistent with existing levels. In addition, training flight times and other activities are expected to remain similar between the new F-35A and F-15C aircraft. The F-35A was designed to reduce the quantities and types of hazardous materials needed for maintenance and would be less than those currently used for maintenance of the F-15C aircraft. The major differences would be the omission of 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 for fighter aircraft (Fetter 2008 and personal communication Luker 2010).

Under ANG Scenarios 1 and 2, 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. Likewise, under ANG Scenario 1 the use of the aircraft is expected to decline slightly or stay the same over the current rate, which may translate into the decreased need for aircraft maintenance and servicing operations. Under ANG Scenario 2, the use of the aircraft would remain consistent with the current rate and aircraft maintenance and servicing operations would be expected to remain consistent with baseline levels. Alternatively, while the specific use of the hazardous materials would be phased out as current fighter aircraft are transitioned, other hazardous material quantities may be increased in support of the six additional aircraft that would be operated and serviced at Jacksonville AGS under ANG Scenario 2.

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

The F-35A replaces the hydrazine canister (currently used by the F-16s but not by F-15Cs) with an integrated power package (basically a small jet engine) for use in emergency engine restart situations, thus eliminating the potential for hydrazine leaks.

Hazardous Waste

The types of hazardous waste streams generated by F-35A operations are expected to be less than for F-15C aircraft because operations involving cadmium and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced for the F-35A (Fetter 2008 and personal communication, Luker 2010). 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 amounts currently generated by maintaining F-15C aircraft.

The exact amounts of hazardous waste that would be generated under each scenario are unknown; however, under both scenarios Jacksonville AGS 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 Jacksonville AGS procedures. According to current ACM surveys, of the three buildings selected for renovation none are listed as having ACM issues (125 FW 2006). If any issues are discovered during renovation 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 Jacksonville AGS procedures. Any LBP would also be managed and disposed of in accordance with Toxic Substance Control Act (TSCA), OSHA regulations, Florida requirements (regarding site work practices for buildings with LBP), and established Jacksonville AGS procedures.

Environmental Restoration Program (ERP)

Although all 12 ERP sites at Jacksonville AGS are located within proximity to the industrial section of the aircraft services area, neither upgrades to existing facilities nor future operations would affect known active or closed ERP locations (personal communication, Vitetta 2010; 125 FW 2002). Although Building 1027 lies within ERP Site 9 and ERP Site 2 is adjacent to Building 1001, neither of these ERP sites were determined to require further remedial action for soil or groundwater contamination. If ground-disturbing activities in the areas of Sites 3E, 10, and 11 (or sites that have been closed but are subject to further monitoring or mitigation) become necessary to implement the proposed action, a detailed study of the potential impacts on ERP sites in and around the proposed ground-disturbing locations would need to be assessed and mitigation measures implemented.

Additionally, although there are six UST sites that will undergo additional site assessment and potential remediation action or other closure activities, none of these sites are within the vicinity of activities associated with the proposed action (Dyer 2010 and personal communication, Vitetta 2010).

JX4.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

JX4.1 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 F-35A aircraft at the installation and training in associated airspace.

Jacksonville AGS is an active military installation that undergoes changes in mission and in 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. All of these actions (i.e., mission changes, facility improvements) will continue to occur before, during, and after the proposed action is implemented, regardless of which alternative is selected. As a joint use facility, the installation occupies part of Jacksonville IAP.

Past and Present Actions Relevant to the Proposed Action

Jacksonville AGS has been a military installation since 1968. During this time, it has grown, been developed, and supported numerous kinds of aircraft. It currently supports 18 F-15C, one C-26B, and one C-130 aircraft.

Incremental Impacts of the Proposed Action with Reasonably Foreseeable Future Actions

During the timeframe (2017) for F-35A facility construction, Jacksonville AGS 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 2013 through 2015 include those listed in Table JX4.1-1. Other on-going maintenance and repair activities are also likely to occur at the installation during this period. No changes to airspace configuration or use are known from this area.

Table JX4.1-1. Current and Reasonably Foreseeable Actions at Jacksonville AGS and Jacksonville IAP			
Project Name/Description	*Approximate Area (acres)*	*New Impervious Surface (acres)*	*Anticipated Year for Implementation*
Jacksonville AGS			
*Construct Vehicle Covered Storage Facility	0.13	0.13	2013
*Expand and Repair Taxiways and Aircraft Parking	17.5	3.50	2013
*Demolish Building 1011, Guard House	0.01	0	2013
*Replace Fire/Crash/Rescue Station	0.39	0.39	2014
Jacksonville IAP			
Concourse B Renovation	**0**	0	2015
Total	**18.03**	4.02	-

Note: *Associated with the 125 FW Construction Program EA.

One airspace action could contribute to additional noise levels—if Shaw AFB were chosen as an ACC beddown location for the F-35A in combination with Jacksonville as an ANG beddown location.

Analysis of Cumulative Effects

The following analysis considers how the impacts of the actions listed in Table JX4.1-1 might affect or be affected by those resulting from the proposed action at Jacksonville AGS and whether such a relationship would result in potentially additive impacts not identified when the proposed action is considered alone.

All activities and effects of past actions are integrated into baseline conditions and analyzed under the no-action alternative. All activities and effects of these past actions are reflected under the affected environment/no-action sections. 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 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.

F-35A Operational Beddown at Shaw AFB. If Shaw AFB were chosen as a beddown location for the F-35A in combination with Jacksonville AGS, then the two proposals would interact in the use of Coastal Townsend. There would be no intersection with construction, personnel, aircraft inventory or use of any other airspace units. Subsonic noise levels at Coastal Townsend would increase by 7 dB L_{dnmr}. This increase would be perceptible and likely cause annoyance in people underlying the airspace. The maximum increase in noise levels under Jacksonville AGS ANG Scenario 2 and Shaw AFB ACC Scenario 3 would not exceed 65 $L_{dnmr.}$

JX4.2 Irreversible and Irretrievable 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 Jacksonville AGS are associated with construction impacts.

For the Jacksonville AGS, 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 facilities would not disturb land, but 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 amounts of construction debris that would consume landfill space.

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 chemicals and other materials. None of these activities would be expected to substantively affect environmental resources.

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McEntire Joint National Guard Base

How to Use This Document

Our goal is to give you a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the no-action alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement, or EIS, is shown below.

EXECUTIVE SUMMARY

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

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Detailed Guide for Reading the Final EIS

CHAPTER 1
Purpose and Need for the Air Force F-35A Operational Beddown

CHAPTER 2
- Overview of the Proposed Action and Alternatives
- Alternative Identification Process
- Summary Comparison of the Proposed Action and Alternatives

CHAPTER 3
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INFORMATION SPECIFIC TO EACH BASE — VOLUME I

CHAPTER 4
Six Base-Specific Sections

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Section BR1.0 Proposed Action Overview	**Section HL1.0** Proposed Action Overview	**Section JX1.0** Proposed Action Overview	**Section Mc1.0** Proposed Action Overview	**Section MH1.0** Proposed Action Overview	**Section SH1.0** Proposed Action Overview
Section BR2.0 Base-Specific Project Details	**Section HL2.0** Base-Specific Project Details	**Section JX2.0** Base-Specific Project Details	**Section Mc2.0** Base-Specific Project Details	**Section MH2.0** Base-Specific Project Details	**Section SH2.0** Base-Specific Project Details
Section BR3.0 Affected Environment and Environmental Consequences	**Section HL3.0** Affected Environment and Environmental Consequences	**Section JX3.0** Affected Environment and Environmental Consequences	**Section Mc3.0** Affected Environment and Environmental Consequences	**Section MH3.0** Affected Environment and Environmental Consequences	**Section SH3.0** Affected Environment and Environmental Consequences
Section BR4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section HL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section JX4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section Mc4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section SH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

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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 about 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 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 defends the homeland of the United States (U.S.) as well as deploys forces worldwide to meet threats and ensure the security of the U.S. To fulfill this role, 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 (within the scope of existing National Environmental Policy Act [NEPA] documentation) 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 (out of a possible 260); however, for the purposes of this analysis and to compare the alternatives on an equal basis, the total number of possible flying days was assumed to be 260, including both Saturday and Sunday (on Guard weekends). The 260 days is a standard planning factor and maintains consistency between reserve and active-duty squadrons. 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, with the F-35A averaging 260 flying days per year, the operations per day would be reduced 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

Baseline	***ANG Scenario 1***	***ANG Scenario 2***
F-16s	*18 F-35As*	*24 F-35As*
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.

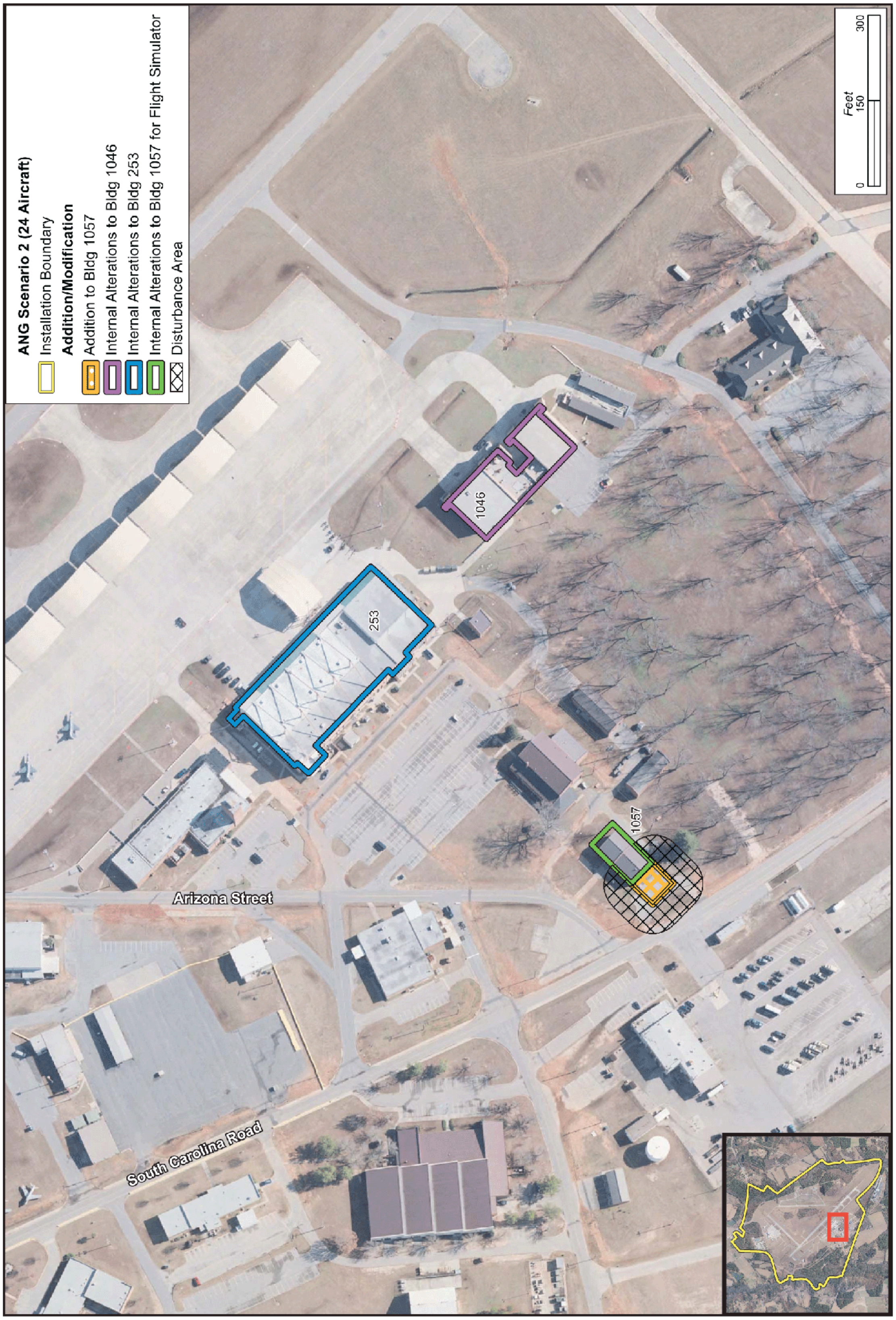

Figure Mc2.1-1. McEntire JNGB Construction Projects – ANG Scenarios 1 and 2

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 2014 to 2016 (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.

Table Mc2.1-2. Proposed Construction and Modifications for McEntire JNGB

Year	*Action*	*Total Affected Area (acres)*	*New Impervious Surface (acres)*
2014	Provide 28/270V DC Power in Building 253 (6 Bays)	0	0
2014	Provide 28/270V DC Power in Building 1046 (1 Bay)	0	0
2016	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, totals 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

	Baseline	*Proposed Scenarios*		*Per Scenario Net Change*	
	F-16 Personnel	*F-35A Personnel*			
		ANG 1	ANG 2	ANG 1	ANG 2
Total	**1,554**	**1,183**	**1,554**	**-371**	**0**

Mc2.2 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.

Neither the basing action nor alternative scenarios require changes in special use airspace attributes, volume, or proximity; nor will changes be needed in the type and number of ordnance employed at the ranges.

Mc2.2.1 Airspace Use

As the replacement for F-16 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 F-16 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 Areas (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 the same 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. Pilots would adapt training activities, where necessary, to ensure their accomplishment within available airspace. No changes to airspace structure are anticipated. 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

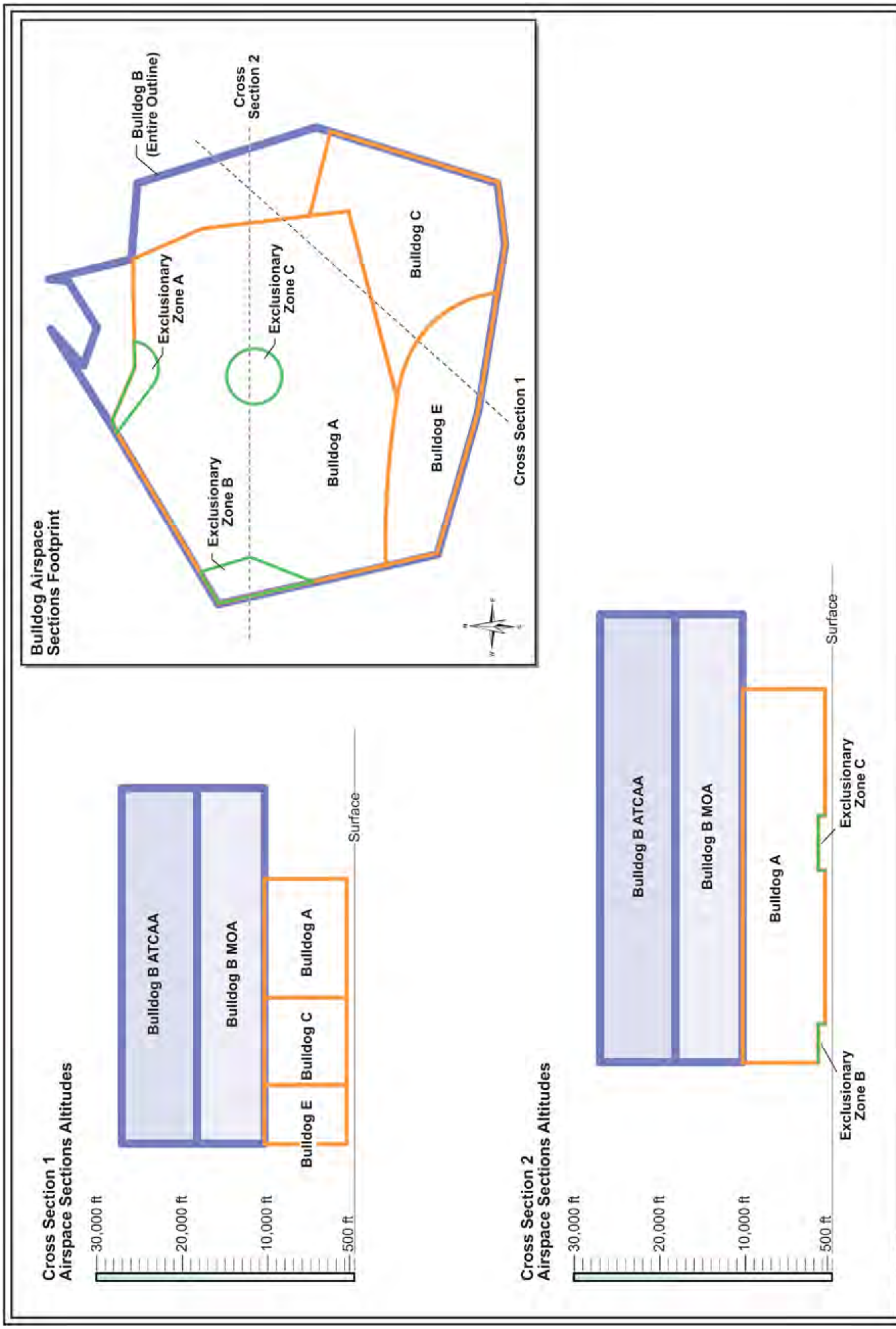

Figure Mc2.2-2. McEntire JNGB Associated Airspace Cross Sections: Bulldog

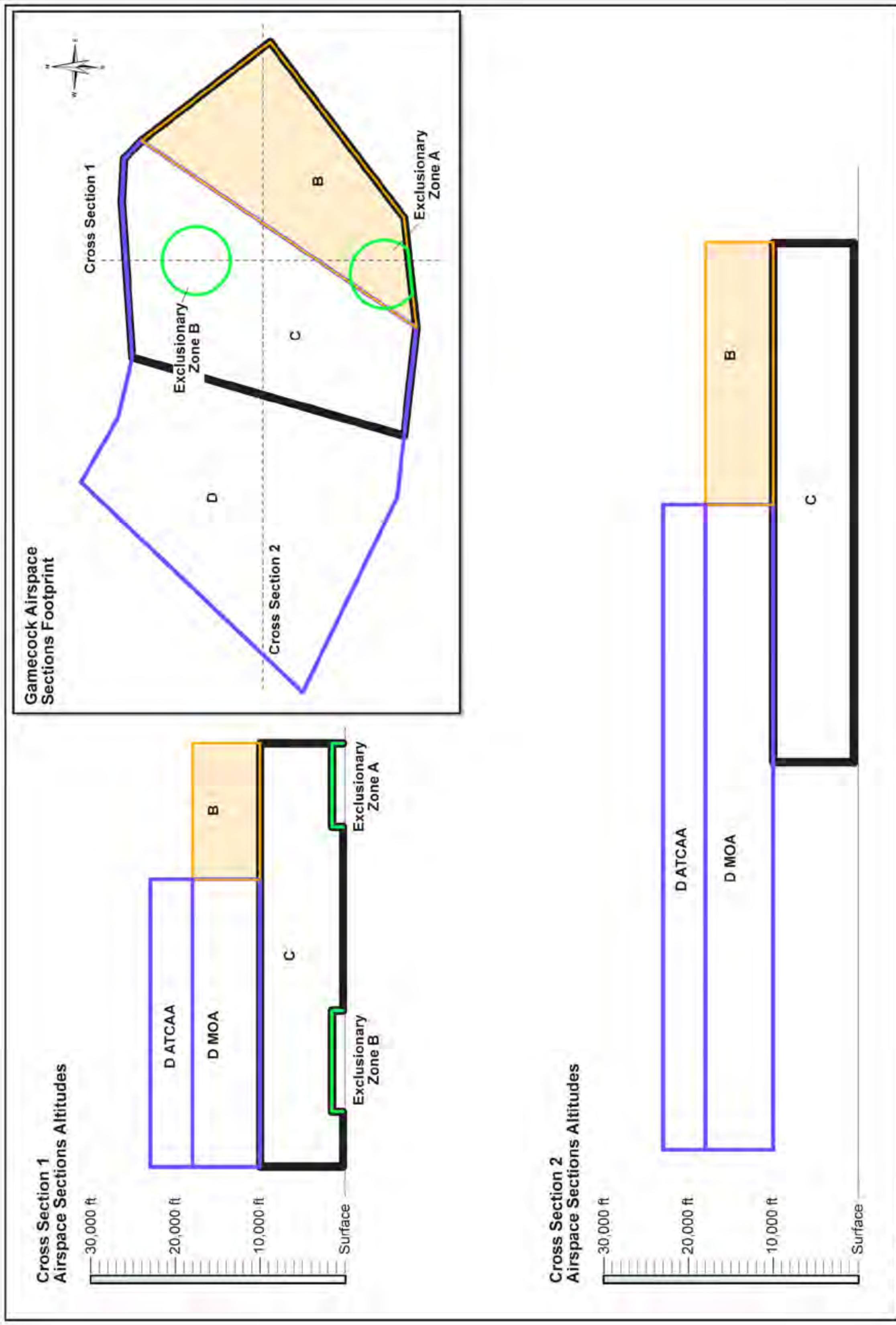

Figure Mc2.2-3. McEntire JNGB Associated Airspace Cross Sections: Gamecock

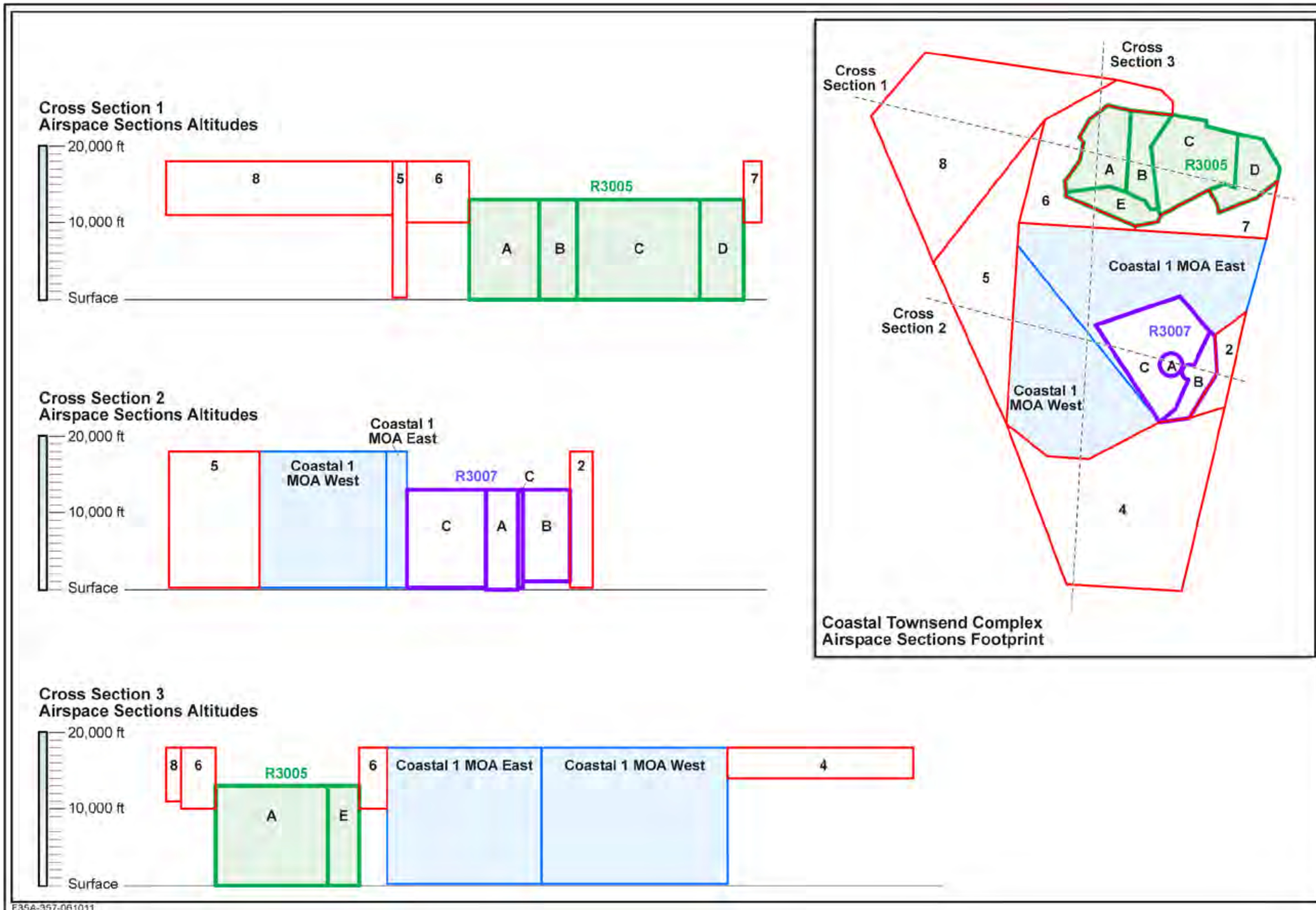

Figure Mc2.2-4. McEntire JNGB Associated Airspace Cross Sections: Coastal Townsend

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/C	500 AGL	To BNI 10,000
	Bulldog MOA B	10,000	18,000
	Bulldog MOA D	500 AGL	17,000
	Bulldog MOA E	5,000 AGL	To BNI 10,000
	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).
Legend: MSL = mean sea level; AGL = above ground level; BNI = but not including all MOAs extend to 18,000 feet MSL unless otherwise noted.
Notes: *MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to the average sea level. The elevation of a mountain, for example, is marked by its highest point and is typically illustrated as a small circle on a topographic map with the MSL height shown in either feet or meters or both. Because aircraft fly across vast landscapes, where points above the ground can and do vary, MSL is used is denote the "plain" on which the floors and ceilings of special use airspace are established and the altitude at which aircraft must operate within that special use airspace.
[1]Supersonic 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. Regardless of the altitude structure and percent use indicated in Table Mc2.2-2, F-35 aircraft (as do existing military aircraft) would adhere to all established floors and ceilings of airspace units. For example, the floor of Coastal MOA 4 lies at 14,000 ft MSL, so the F-35A would not fly below that altitude in that airspace. Rather pilots would adapt training to this and other airspace units like the Bulldog MOAs A/C/D with lower floors.

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-35A 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						
Airspace Unit[1]	***Total Baseline***[2]	***F-16 Aircraft Baseline***[3]	***ANG Scenario***	***F-35A Operations***	***Net Change (Total)***	***Percent Change Total***
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%
Total[4]	**22,652**	**2,496**	**1**	**890**	**-1,606**	**-7%**
			2	**1,183**	**-1,313**	**-6%**

Notes: [1]Excludes W-161/177 and MAEWR per rationale with Chapter 3.
[2]Includes all aircraft.
[3]Includes only F-16 aircraft from McEntire JNGB.
[4]Totals 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 10 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, and target scoring is done electronically. As was discussed in Chapter 2, section 2.1.2, however, the F-35A (like the F-16) is capable of carrying and employing several types of air-to-air and air-to-ground ordnance (including strafing) and pilots would need training in their use. As the Air Force currently envisions, the type and number of ordnance would not differ from that currently employed by the F-16s. F-35A pilots would only use ranges and airspace authorized for the type of ordnance being employed and within the number already approved at a range and/or target. If in the future the Air Force identifies weapons systems that are either new or could exceed currently approved levels, appropriate NEPA documentation would need to occur prior to their employment.

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, it is expected to use fewer defensive countermeasures 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, Agency Consultations, and Government-to-Government Consultation

McEntire JNGB operates under agreements with a series of environmental permitting agencies for such resources as air, water, and cultural resources.

Permitting: The following section describes the permits that are required to implement either of the two scenarios at this basing alternative location.

- 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 applicability 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. Because McEntire JNGB is in an attainment area for all criteria pollutants, a conformity applicability analysis is not necessary.
- Personnel conducting construction and/or demolition activities will strictly adhere to all applicable occupational safety requirements during construction activities.
- 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 is 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. Other hazardous waste and material issues and permits will be addressed as needed.

Consultation. In January 2010, informal consultation was initiated with the South Carolina and Georgia State Historic Preservation Offices (SHPOs); however, no responses were received. In October 24, 2012, Section 106 of the National Historic Preservation Act (NHPA) consultation was re-initiated by the Air Force and letters sent to the two SHPOs notifying them that no response had been received from earlier correspondence regarding the proposed action. In April 2013, the Georgia SHPO concurred with the Air Force conclusion of no adverse effects in the Area of Potential Effect (APE) and in June 2013, the South Carolina SHPO responded to the Revised Draft EIS, concurring with the Air Force determination of no adverse effects in the APE.

Government-to-Government. 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).

Project-specific government-to-government consultation was initiated in January 2010 when letters were sent to the two federally-recognized American Indian Tribes that potentially had interest in the proposal. The letters requested whether they had any issues or concerns with the Air Force proposal. No responses were received, nor were any submitted by the Tribes after they received copies of the Draft EIS in March 2012. Another letter was sent in October 2012, to both the Catawba Indian Nation and the East Band of Cherokee Indians, asking for a negative response with the proposed action. Despite numerous emails and phone calls in April and May 2013, no responses were received (see Appendix B for specifics on consultation). As such, the Air Force has made the determination that there would be no adverse effects to the APE and therefore, according to 36 CFR 800.4(d)(1) *No historic properties affected*: "If the agency official finds that either there are no historic properties present or there are historic properties present but the undertaking will have no effect upon them as defined in § 800.16(i), the agency official shall provide documentation of this finding, as set forth in § 800.11(d), to the SHPO/THPO. The agency official shall notify all consulting parties, including Indian tribes and Native Hawaiian organizations, and make the documentation available for public inspection prior to approving the undertaking. (i) If the SHPO/THPO, or the Council if it has entered the Section 106 process, does not object within 30 days of receipt of an adequately documented finding, the agency official's responsibilities under Section 106 are fulfilled."

Mc2.5 Public and Agency Concerns

Mc2.5.1 Scoping

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)

Mc2.5.2 Draft EIS Public Comment Period

Official notification of the F-35A Operational Basing Draft EIS public comment period began with the Notice of Availability (NOA) announcement on April 13, 2012 in the *Federal Register*. This marked the start of the 45-day review period which would end on June 1, 2012; however, the Air Force was requested to hold another hearing the first week of June. As a result, the public comment period was extended 19 more days to June 20, 2012. A notice was placed in the *Federal Register* on May 23, 2012 announcing this extension.

During the week of April 30, 2012, four hearings were held in Sumter, Eastover, and Kingstree, South Carolina and in Brunswick, Georgia. At the four hearings, a total of 39 people attended, with eight people expressing their support in the form of oral comments; two written comments were submitted and they too were in support of the basing action at McEntire JNGB. As was mentioned in Chapter 1, during the 64-day comment period, a total of 934 written comments were received, of which four were associated with the McEntire JNGB alternative. All expressed their support to base F-35As at McEntire JNGB. No other issues were identified.

Mc2.5.3 Revised Draft EIS Public Comment Period

The 45-day public comment period for the Revised Draft EIS began on May 31, 2013 when the NOA was published in the *Federal Register* (Appendix A). The Revised Draft EIS was circulated for review and comment to government agencies, local organizations, American Indian tribes, interested private citizens, and public libraries. Copies of the Revised Draft EIS were delivered by May 31, 2013 to 35 libraries and the entire two-volume document was posted on the Air Force website at www.accplanning.org for viewing electronically. On the same day (or as soon as possible given publication deadlines) as the NOA appeared in the *Federal Register*, the Air Force announced the availability of the Revised Draft EIS NOA in over 20 local newspapers.

There were 11,172 comments received in letter, note, email, and postcard format during the 45-day public comment period. Of these, 823 were in letter, handwritten note, and email format and 10,349 were postcard format. No general public comments were received associated with the basing action at McEntire JNGB.

Mc2.6 Differences Between the Draft EIS and the Final EIS

Following the Draft EIS, a Revised Draft EIS was published which included factual corrections, additional and/or supplemental information, and improvements or modifications to the analyses presented in the Draft EIS. The re-analysis included noise impacts to low-income and minority populations based on updated census data (not available when the 2012 Draft EIS was published) in the noise section (Mc3.2) and environmental justice/protection of children (Mc3.12); inserting documents incorporated by reference (Mc2.7); adding mitigation measures (Mc2.8); correcting typographical and grammatical errors, as needed; correcting mapping and labeling mistakes in text and figures throughout; inserting new or revised information, where applicable; and including responses to comments received during the Draft EIS public review period in Volume II, Appendix E.

In this Final EIS, several changes were made and include the following:

- In Chapter 3, Section 3.5, Figure 3-2 was revised to correctly portray the DoD clear zone as a square and Table 3-5 was added with F-16 and F-15 historic mishap data.
- Where applicable, Section Mc2.4 and Appendix B were updated to reflect current status of agency and government-to-government consultations.
- Throughout the document, corrected typographical and grammatical errors in the text.
- Responded to Revised Draft EIS comments in Volume II, updated Appendix E.

Mc2.7 Documents Incorporated by Reference

In accordance with CEQ regulations for implementing NEPA and with the intent of reducing the size of this document, the following material relevant to the proposed action at the alternative locations and basing scenarios is incorporated by reference and identified according to the alternative location. These documents are part of the administrative record and are available upon request.

Proposed Modernization and Expansion of Townsend Bombing Range (TBR) (USMC 2013). Final EIS published in March 2013. Documentation to expand TBR to accommodate weapons drop zones for multiple weapon systems at the range and in associated restricted airspace and MOAs. Airspace includes the Coastal 1/2 MOAs, Restricted Airspace R-3007A/B/C/D, and overlying ATCAAs.

Sustainable Ranges Report to Congress, Department of Defense (DoD 2012). April 2012. A report to Congress on the sustainability of all DoD ranges describing the training requirements and the existing range resources to meet these requirements.

Atlantic Fleet Active Sonar Training (Navy 2012). EIS/OEIS published in May 2012. Documentation for aircraft and naval operations in all East Coast overwater Warning Areas are evaluated.

U.S. Marine Corps East Coast F-35B Basing (USMC 2010). Final EIS and Record of Decision published in October and December 2010, respectively. Documentation addressing F-35B operations (as well as existing aircraft) in overland and overwater airspace as well as at ranges in Georgia, North Carolina, and South Carolina. Airspace includes overwater Warning Areas off the coasts of Virginia, North/South Carolina, Georgia, and Florida; Coastal 1/2/4/5 and Core MOAs; Restricted Airspace R-3007A/B/C/D, and R-3606A; and overlying ATCAAs. Operations at the Dare County and Townsend Bombing Ranges were also evaluated.

Airspace Training Initiative Final EIS (Air Force 2010). Published in June 2010. Documentation associated with airspace operations in the Bull Dog, Gamecock, Poinsett Military Operations Areas, Poinsett Range, and associated restricted airspace. Includes introduction of ground-based electronic threat emitters and chaff and flare deployment.

Navy Cherry Point Range Complex Final EIS/OEIS (Navy 2009a). Record of Decision signed June 2009. Documentation for aircraft and naval operations in overwater Warning Areas adjacent to North Carolina.

Jacksonville Range Complex Final EIS/OEIS (Navy 2009b). Record of Decision signed June 2009. Documentation for aircraft and naval operations in overwater Warning Areas adjacent to the east coasts of Florida, Georgia, as well as South and North Carolina.

Navy Undersea Warfare Training Range (Navy 2009c). Record of Decision signed July 2009. Documentation for aircraft and naval operations in overwater Warning Areas adjacent to the east coasts of Florida, Georgia, as well as South and North Carolina.

Modifications to Gamecock Alpha Military Operations Area EA (Air Force 2006). Finding of No Significant Impacts signed June 2006. Documentation for airspace modification to Gamecock MOAs and airspace operations.

Shaw AFB Chaff and Flare Final EA (Air Force 2003). Published in December 2003. Evaluation of impacts associated with chaff and flare deployment in the Bulldog and Gamecock MOAs.

Mc2.8 Mitigation Measures

No other extra-ordinary mitigation measures are required beyond those prescribed under existing federal and state laws, regulations, and permit requirements. Refer to Chapter 2, section 2.6.1 for a description of measures being adopted, as best management practices and management actions, to minimize and/or avoid adverse impacts.

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 no more than 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

Aircraft	*Baseline*	*ANG Scenario 1*	*ANG Scenario 2*
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: [1]Includes 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.

As noted in Chapter 2, section 2.1.2, F-35A aircraft would not use military training routes, either to access the special use airspace or conduct training. Due to their predominantly higher altitude missions, advanced electronics, and speed, the F-35As would use MOAs, ATCAAs, Restricted Areas, and Warning Areas.

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. Visual Flight Rule (VFR) traffic could fly unimpeded under the floor of the MOAs, but flights at lower altitudes may not be as smooth and are not as fuel 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 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 C. Specific detailed information on supplemental metrics (e.g., annoyance) is also presented in Appendix C.

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 F-16 aircraft.

Table Mc3.2-1. SEL and L_{max} Comparison for McEntire JNGB								
Condition	*Based F-16C*[1, 2]				*F-35A*[2, 3]			
	SEL (dBA)	*L_{max} (dBA)*	*Power (%NC)*	*Speed (kts)*	*SEL (dBA)*	*L_{max} (dBA)*	*Power (%ETR)*	*Speed (kts)*
Afterburner Assisted Take-off[4] (1,000 feet AGL)	117	113	95.5%	300	117	115	100%	300
Military Power Take-off (1,000 feet AGL)	113	110	97%	300	117	115	100%	300
Arrival (non-break, through 1,000 feet AGL, gear down)[5]	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; ETR = Engine thrust request.

Notes: All numbers are rounded.

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

[2]90 percent of all F-16 departures utilize afterburners, whereas only 5 percent of F-35 departures would utilize afterburner.

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

[4]Power reduced from afterburner to military power prior to reaching 1,000 feet AGL.

[5]F-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, childcare 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

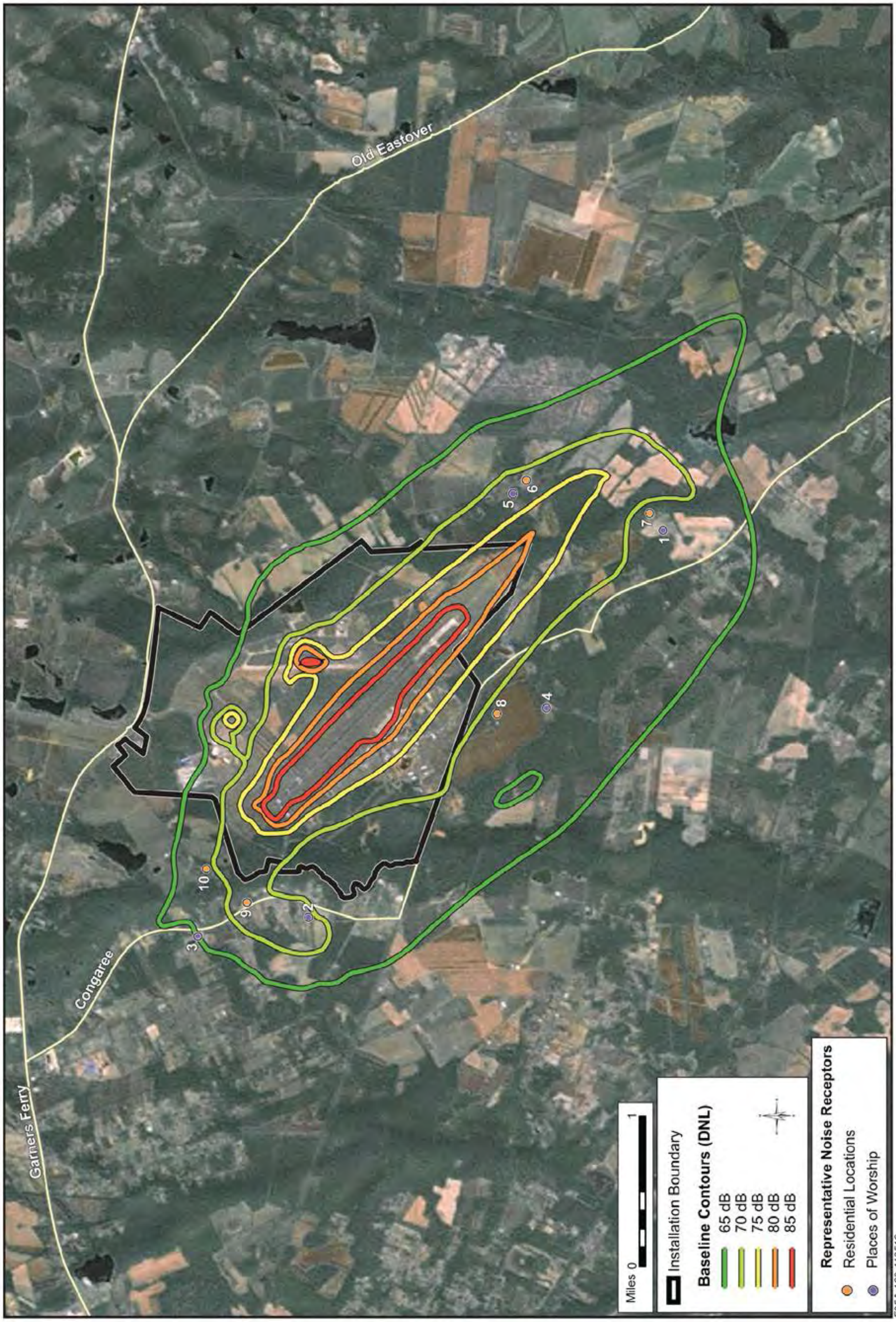

Figure Mc3.2-1. Baseline Noise Conditions at McEntire JNGB

quarters. Separate living quarters are those in which the occupants live separately from any other people living 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).

Table Mc3.2-2. Off-Base Noise Exposure within Baseline Contours at McEntire JNGB

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*	*Receptors*[2]
65 – 70	3,152	538	201	6
70 – 75	804	140	53	4
75 – 80	222	35	13	0
80 - 85	2	0	0	0
85+	0	0	0	0
Total	**4,180**	**713**	**267**	**10**

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes: [1]Exclusive of upper bound for all bands.
[2]All noise receptors are located off-base; refer to Figure Mc3.2-1.

To determine the population counts by contour band, this analysis uses the U.S. Census block groups (from the American Community Survey, 5-year estimates) and assumes an even distribution of population within each block group under the respective contour band (U.S. Census Bureau 2010b). Adopting this methodology gives a good estimate (i.e., more conservative) of the number of people who may be exposed to noise levels within the noise contour band. Where there are low or inconsistent population densities, actual houses were counted using aerial photographs (Google Earth 2013) and using the U.S. Census population multiplier for Richland County of 2.45 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.

In total, exposure to noise levels within contour bands of 65 dB DNL and greater include an estimated 4,180 acres, 713 people, and 267 households. Of the 10 receptors affected by noise levels 65 dB DNL and greater, five are places of worship and five are residential areas. Four receptors are found within the 70 to 75 dB DNL contour band and six within the 65 to 70 dB DNL contour band. Table Mc3.2-3 shows baseline decibel levels for representative receptors near McEntire JNGB. No schools or hospitals lie within noise contour bands 65 dB DNL and greater.

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

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
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

Source: Wyle 2011 and U.S. Census Bureau 2010b.

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 where 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

Location ID Number	*Receptor*	*Average Daily Indoor Events per Hour*[1] *Daytime (7:00 a.m. to 10:00 p.m.)*	
		Windows Closed	*Windows Open*
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 and U.S. Census Bureau 2010b.
Note: [1]Assumed 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]*	
		Windows Closed	*Windows Open*
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 and U.S. Census Bureau 2010b.
Note: [1]Assumed 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 and affect 2,728 fewer acres, 468 fewer people, 176 fewer households, and 6 fewer representative receptors.

Table Mc3.2-6. Off-Base Noise Exposure under ANG Scenario 1 for McEntire JNGB Proposed/Baseline

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*	*Receptors*[2]
65 – 70	1,030/3,152	173/538	64/201	4/6
70 – 75	346/804	59/140	22/53	0/4
75 – 80	75/222	13/35	5/13	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**	**245/713**	**91/267**	**4/10**

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes: [1]Exclusive of upper bound for all bands.
[2]All noise receptors located off-base; refer to Figure Mc3.2-2.

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. When compared to baseline conditions, only one receptor would be exposed to noise levels of 70 dB DNL (versus the four found under baseline), four receptors would be exposed to noise levels between 65 and 70 dB DNL (one less than baseline), and the other five would experience noise levels less than 65 dB DNL. In general, noise levels would decrease for all 10 receptors under ANG Scenario 1.

Table Mc3.2-7. Decibel Levels under ANG Scenario 1 at Representative Locations near McEntire JNGB Proposed/Baseline

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
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

Source: Wyle 2011 and U.S. Census Bureau 2010b.

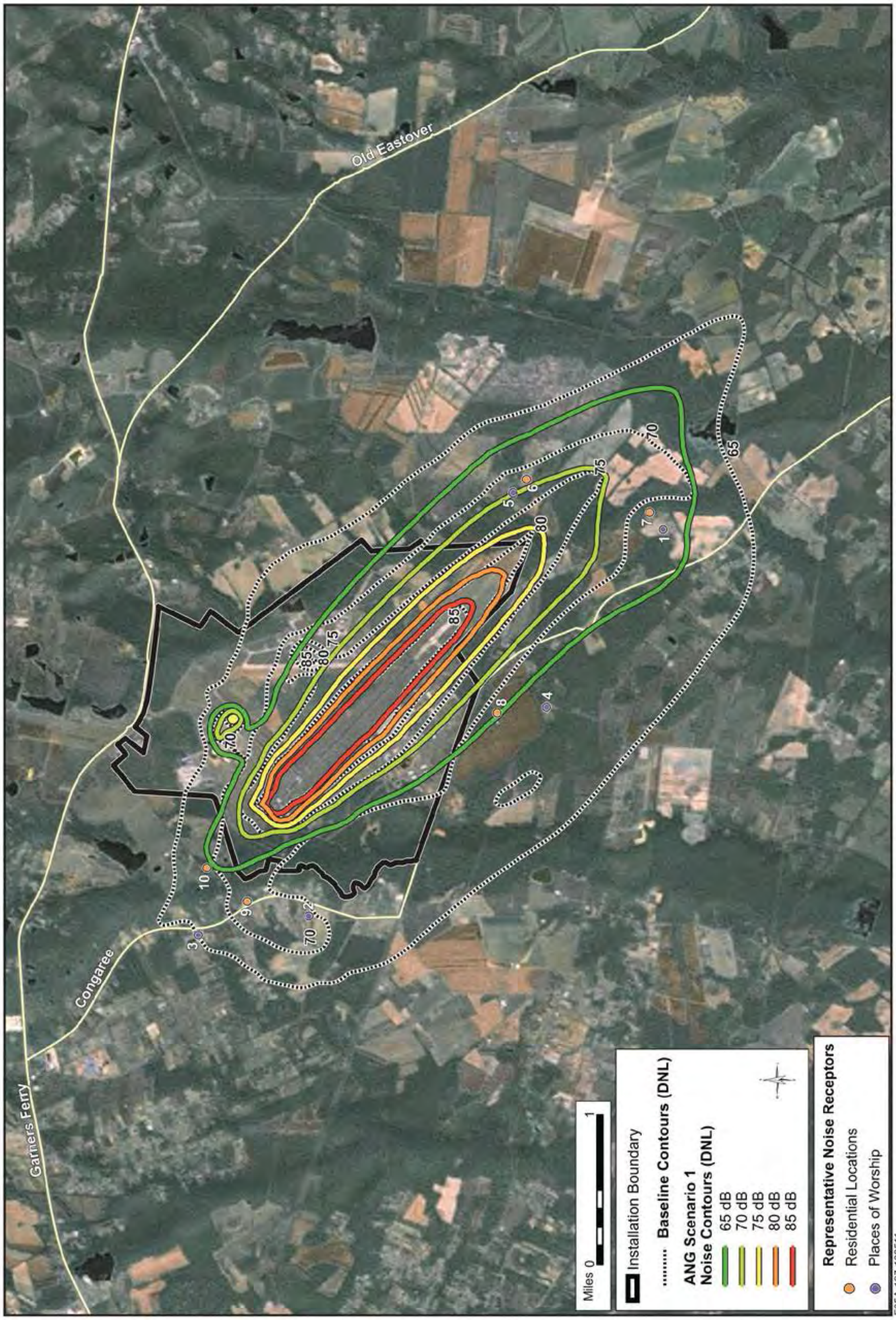

Figure Mc3.2-2. ANG Scenario 1 Proposed Noise Contour Bands at McEntire JNGB

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.

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: [1]Assumed 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 and U.S. Census Bureau 2010b.
Note: [1]Assumed 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

Air Force 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 Air Force occupational noise exposure regulations.

ANG Scenario 2

Noise Exposure

ANG Scenario 2 would involve replacing 24 F-16s with 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, 392 fewer people, 147 less households, and 4 fewer representative receptors.

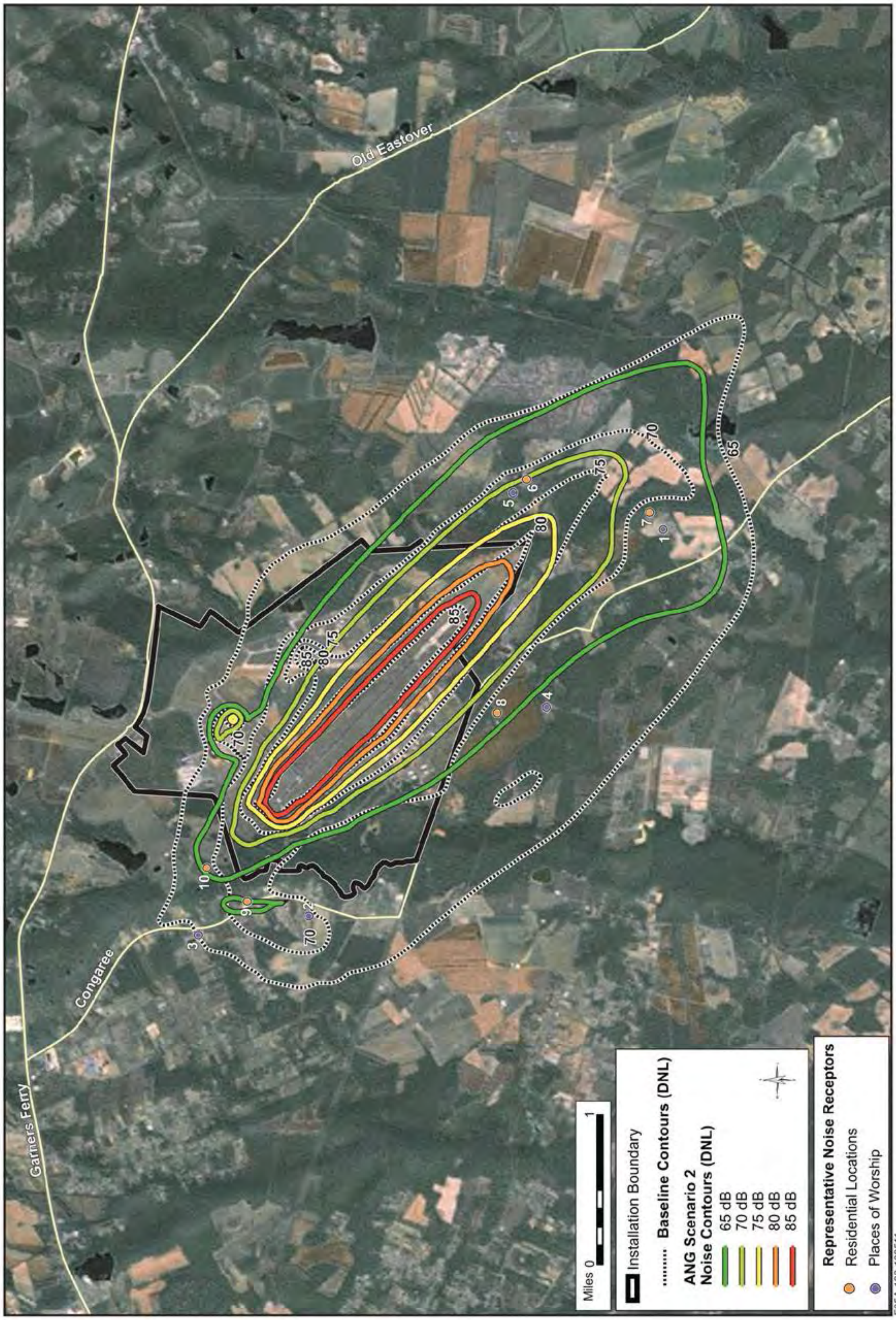

Figure Mc3.2-3. ANG Scenario 2 Proposed Noise Contour Bands at McEntire JNGB

Table Mc3.2-10. Off-Base Noise Exposure under ANG Scenario 2 for McEntire JNGB Proposed/Baseline				
Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*	*Receptors[2]*
65 – 70	1,371/3,152	222/538	83/201	4/6
70 – 75	449/804	76/140	28/53	2/4
75 – 80	127/222	22/35	9/13	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**	**321/713**	**120/267**	**6/10**

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]All 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 F-35A SEL 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 fewer equivalent annual flight operations than the F-16. With the elimination of 24 F-16 aircraft, departures generated by 24 F-35A aircraft from Runway 14 would dominate the DNL.

Table Mc3.2-11 shows representative receptors by name, type, and decibel level under ANG Scenario 2 compared to baseline conditions. When compared to baseline conditions, all representative receptors would experience reductions in overall noise values under ANG Scenario 2. One place of worship and one residential area would be exposed to noise levels between 70 and 75 dB DNL and one place of worship and four residential areas would be exposed to 65 to 70 dB DNL noise levels. Three places of worship would be exposed to noise levels less than 65 dB DNL; this is a reduction of three receptors when compared to baseline conditions.

Table Mc3.2-11. Decibel Levels under ANG Scenario 2 at Representative Locations near McEntire JNGB Proposed/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

Source: Wyle 2011 and U.S. Census Bureau 2010b.

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.

Table Mc3.2-12. ANG Scenario 2 Indoor Speech Interference at Representative Locations at McEntire JNGB

Location ID Number	*Receptor*	*Average Daily Indoor Events per Hour[1] 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 and U.S. Census Bureau 2010b.
Note: [1]Assumed 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					
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 and U.S. Census Bureau 2010b.
Note: [1]Assumed 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 Air Force 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 Air Force 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 either 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 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 fewer supersonic events. Current fighter 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 over water and not over populations, these activities warrant no further detailed analysis. Section 3.1.3 provides additional rationale for this approach.

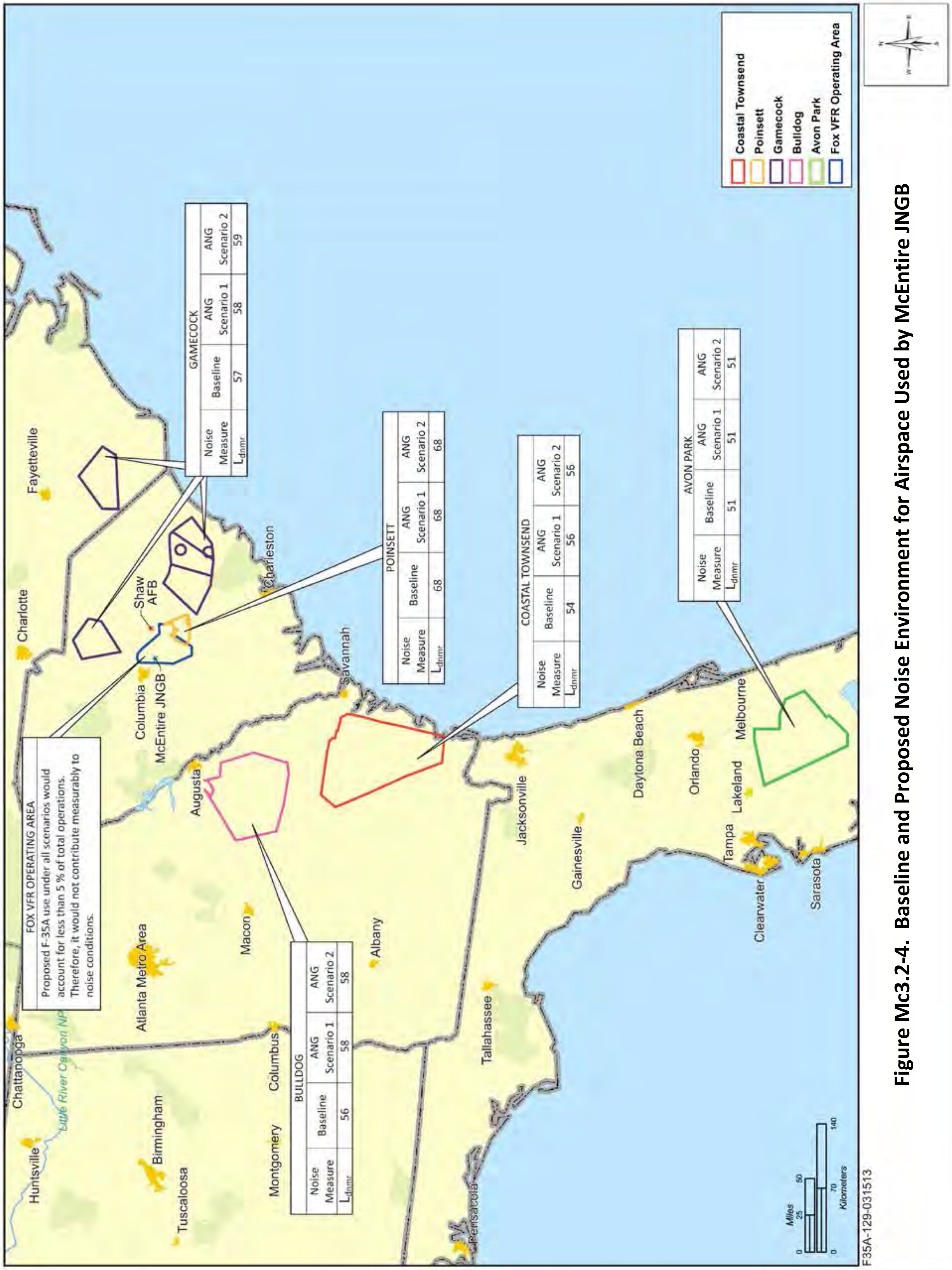

Figure Mc3.2-4. Baseline and Proposed Noise Environment for Airspace Used by McEntire JNGB

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 (O_3), as well as carbon monoxide (CO), sulfur dioxide (SO_2), 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 (PM_{10}). 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, SO_2, and directly-emitted PM_{10} and $PM_{2.5}$. For pollutants that undergo chemical reactions and interact within the atmosphere to form secondary pollutants, such as O_3 and its precursors NO_x and VOCs, and precursors of PM_{10} and $PM_{2.5}$, the affected environment is a larger regional area. The chemical transformations and interactions that create O_3 and secondary PM_{10} 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. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the No-Action Alternative and the Proposed Action alternatives have been quantified to the extent feasible in this EIS for information and comparison purposes only.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). 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 CO_2, which has a value of one. For example, under the USEPA's Mandatory Greenhouse Gas Reporting Rule, CH_4 has a GWP of 21, which means that it is considered to have a global warming effect 21 times greater than CO_2 on an equal-mass basis. Total GHG source emissions are often reported as a CO_2 equivalent (or CO_2e). The CO_2e 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 PM_{10} 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 F-16 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 F-16 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 CO_2, which were derived from Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling--Compression-Ignition (USEPA 2002). For CH_4 and N_2O 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 D for the concepts used in developing these emissions estimates.

Table Mc3.3-2. Baseline Emissions for McEntire JNGB (2006)

Pollutants in Tons per Year						
CO	*NO_x*	*VOCs*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
197.62	127.10	22.64	20.16	8.10	7.60	33,685

Note: [1]Measured 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, the facility addition would occur in calendar year 2016. 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 the 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*					
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
2016						
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. In terms of GHGs, there would be a net incremental decrease of CO_2e regional emissions under ANG Scenario 1.

Table Mc3.3-4. Proposed Annual Operational Emissions under ANG Scenario 1 at McEntire JNGB

Activity	*Pollutants in Tons per Year*						
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[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**	**-**

Notes:
[1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR 98, Subpart A, Table A-1) in metric tons per year.
[2]With 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.

ANG Scenario 2

ANG Scenario 2 would base 24 F-35A aircraft at McEntire JNGB, 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**	**-**

Notes:
[1]CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310), (40 CFR 98, Subpart A, Table A-1) in metric tons per year.
[2]With 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.

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 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).

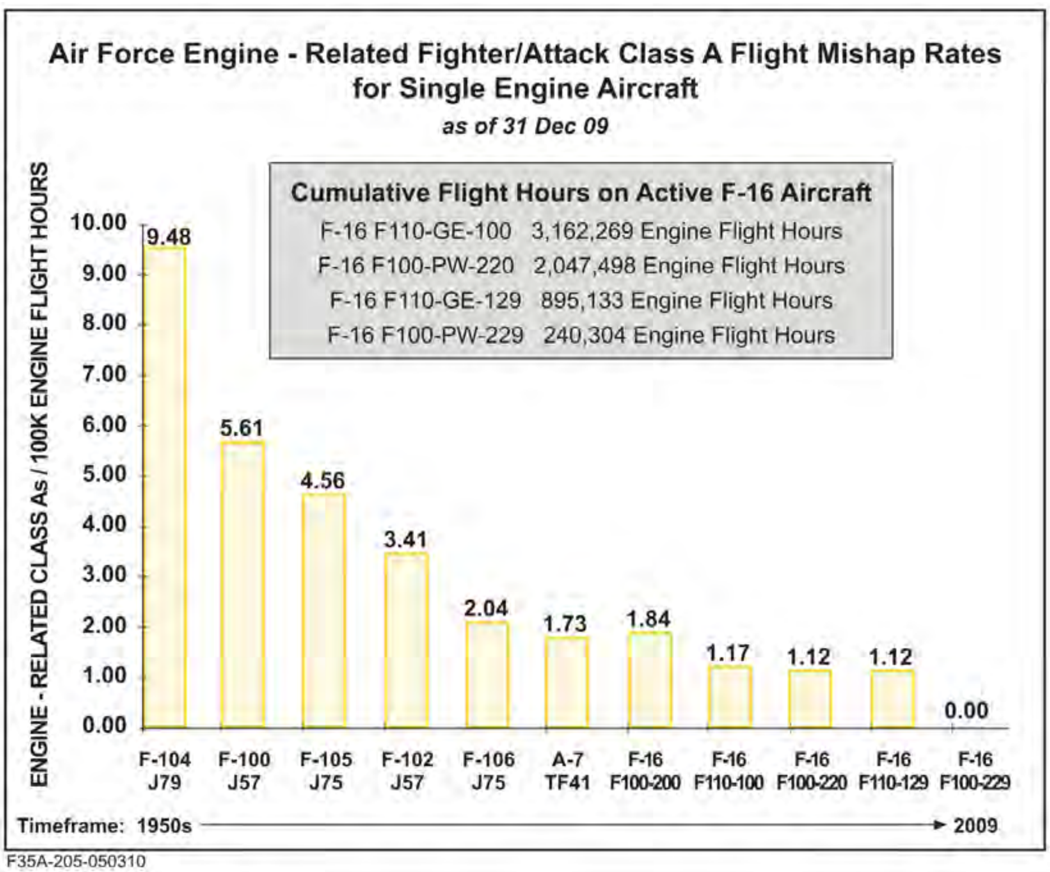

Figure Mc3.4-1. Air Force Engine-Related Mishap Rates

Source: AFSC 2010. *Note*: "Engine-related" excludes mishaps caused by Foreign Object Damage, bird strike, or failure of support systems external to the engine (e.g., fuel starvation).

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 life time) (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 2012 are provided in Table Mc3.4-1.

Table Mc3.4-1. F-22A Class A Flight Mishap History

Year	Class A		Destroyed		Fatal		Hours Flown per Year	Cumulative Flight Hours
	Number of Mishaps	Rate[1]	A/C	Rate	Pilot	All		
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

Table Mc3.4-1. F-22A Class A Flight Mishap History								
Year	***Class A***		***Destroyed***		***Fatal***		***Hours Flown per Year***	***Cumulative Flight Hours***
	Number of Mishaps	*Rate*[1]	*A/C*	*Rate*	*Pilot*	*All*		
FY10	0	0	0	0	0	0	24,675	94,519
FY11	1	6.54	1	6.54	1	1	15,289	109,808
FY12	3	11.32	0	0	0	0	26,507	136,315
Lifetime	**10**	**7.34**	**3**	**2.20**	**2**	**2**	**-**	**136,315**

Source: AFSC 2013.
Note: [1]Mishap rate is based on 100,000 hours of flight.
[2]One 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 F-16 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 F-16 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 F-16 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 F-16 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 F-16 aircraft deployed approximately 80,000 flares annually in the airspace; the F-35A would likely deploy considerably fewer flares than F-16 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 his 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 by 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 (refer to Chapter 2, section 2.6.1 for examples of these practices). There would be no impact to floodplains or to groundwater resources from ANG Scenario 1.

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

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.

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 illinoinensis*) 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 sphenocephala*), 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 F-16 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 F-16 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; and 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 Wetlands 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 F-16 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

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

Mc3.8.2.2 Environmental Consequences

Overall, there would likely be no adverse effects 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 F-16 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

As defined in Chapter 3, section 3.10.2, the APE for McEntire JNGB consists of all areas of ground disturbance associated with proposed construction or remodeling activities. Aircraft operations and the areas affected by noise levels 65 dB DNL and greater also fall under the APE and are evaluated for their potential to affect historic structures and districts where noise vibrations could adversely impact those types of resources. For airspace operational effects, only those cultural resources that would reasonably be affected by visual (overflights) and noise intrusions are considered. These include architectural resources; archaeological resources with standing structures, such as historic districts, ghost towns, and American Indian settlements; and traditional cultural properties. Prehistoric and historic archaeological sites lacking standing structures are not included as they are generally ground surface or even subsurface deposits that would not be affected by implementing the basing alternatives.

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

The South Carolina SHPO responded to the October 2012 consultation letter requesting more information on the APE and effects therein. The revisions made in this section address these concerns. No responses were received from the Florida SHPO as of publication of this document.

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. Both the South Carolina and Georgia SHPOs concurred with the Air Force determination of no adverse effects in the APE. Therefore, no adverse impacts to historic properties are anticipated due to ANG Scenario 1. No Tribes identified properties of religious or cultural significance in the APE.

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. No Tribes identified properties of religious or cultural significance in the APE.

Mc3.9.2 Airspace

Mc3.9.2.1 Affected Environment

There are 111 NRHP-listed cultural resources located under the Shaw AFB airspace APE, including private residences, businesses, courthouses, depots, and churches, plantations, battle sites, historic districts, campgrounds, schools, farms, and a bottling plant. Additionally, there is the potential for unknown cultural resources (archaeological, architectural, or traditional) to be located under the airspace. No American Indian reservations underlie the airspace and no traditional cultural properties are known within this area.

A letter initiating government-to-government consultation was sent to Catawba Indian Nation informing them about the proposed project in January 2010. The Nation responded that they would like to be included in any consultation pursuant to the proposed project and was sent a copy of the Draft EIS in March 2012 and the Revised Draft EIS in May 2013. In June 2013, the Catawba Nation responded they had no further comments. To date, no further response was received from the Eastern Band of the Cherokee.

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 L_{dnmr} 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 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 L_{dnmr} would occur in Gamecock, Bulldog, and Coastal Townsend (under ANG Scenario 1).

Visual intrusions under the proposed action would be minimal and would not represent an increase over baseline conditions sufficient to cause adverse impacts to the settings of cultural resources. Due to the high altitude of the overflights, small size of the aircraft, and the high speeds, the aircraft would not be readily visible to observers on the ground. Indeed, at an altitude of 8,000 feet AGL, an F-35A would appear about 0.07 inches in size.

Use of ordnance and defensive countermeasures would occur in areas already used for these activities. No additional ground disturbance would occur under the airspace due to the proposed action. Flares deployed from the aircraft would not pose a visual intrusion either for the following reasons: flares are small in size and burn only for a few seconds and the high relative altitude of the flights would make them virtually undetectable to people on the ground. Overall, flares are unlikely to adversely affect cultural resources. Therefore, the introduction of material to archaeological sites or standing structures from the use of flares would not have an adverse effect on these resources.

Proposed use of the airspace would be similar to ongoing training operations. Given the current use of the airspace and the nature of the proposed future use of the project area, there would be no adverse potential effects to NRHP-eligible or listed archaeological resources, architectural resources, or traditional cultural properties. Therefore, under all scenarios, no adverse effects to historic properties are expected from the proposed action.

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 base. 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/McCrady 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 DNL 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*		
	Baseline	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*
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 and U.S. Census Bureau 2010b.

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. Because 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)

EIS Land Use Classification	*AICUZ*	*ANG Scenario 1*	*Net Change*	*ANG Scenario 2*	*Net Change*
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.

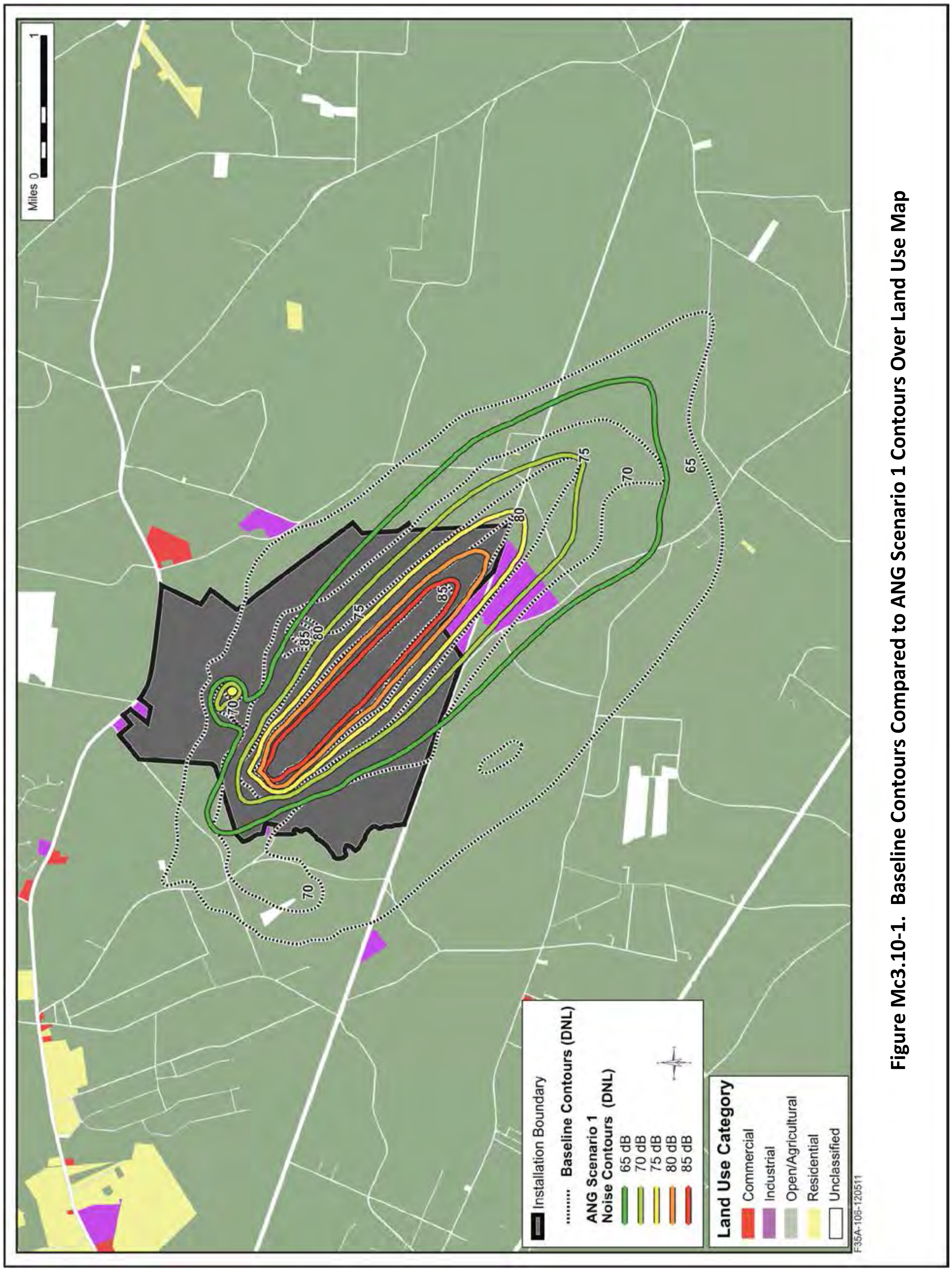

Figure Mc3.10-1. Baseline Contours Compared to ANG Scenario 1 Contours Over Land Use Map

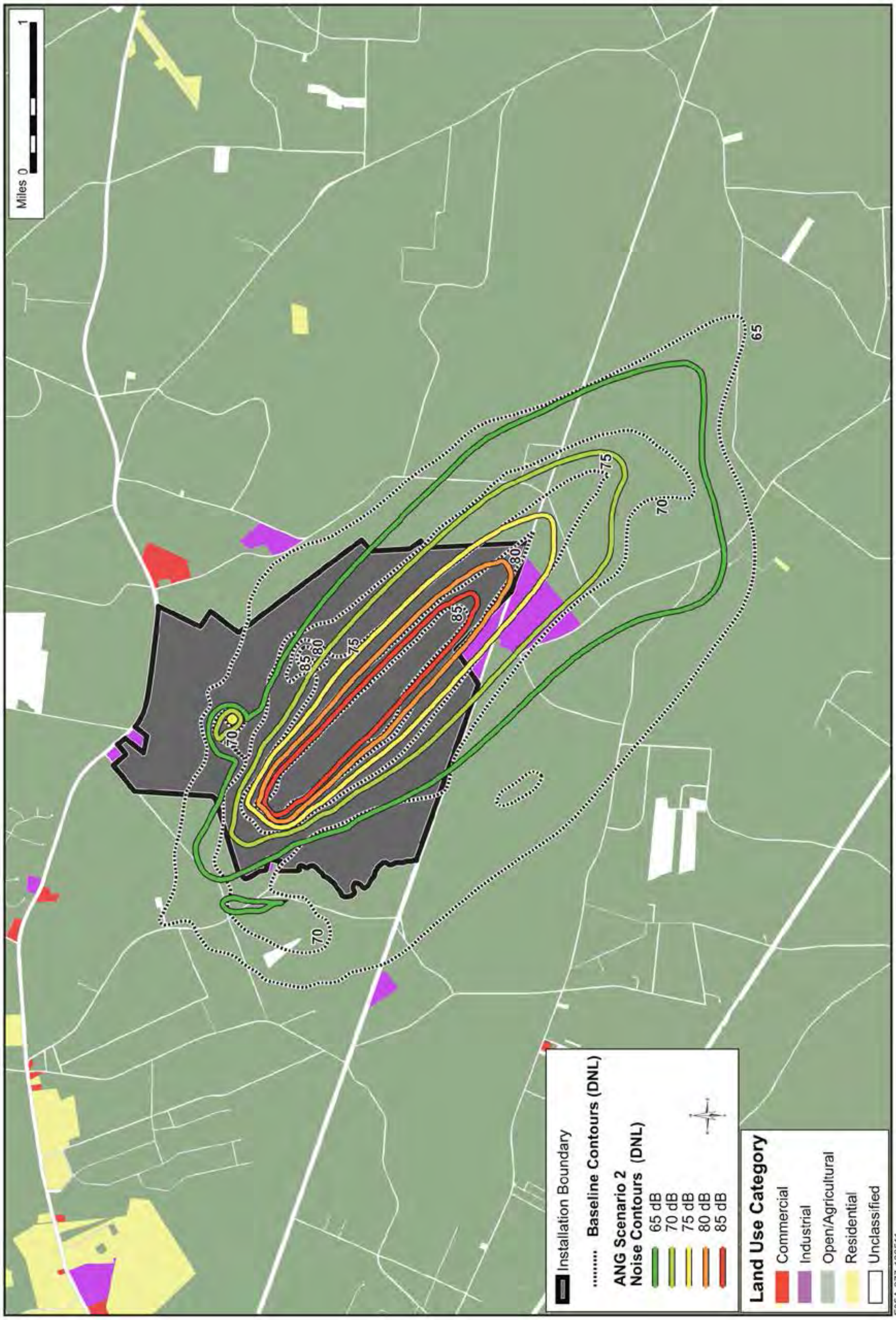

Figure Mc3.10-2. Baseline Contours Compared to ANG Scenario 2 Contours Over Land Use Map

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 (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 Mc3.10-3). 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 are located over areas of Georgia; Poinsett airspace is located over areas of South Carolina; and Avon Park is located over areas of Florida (Figure 3.10-4). 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 MOAs B, C, D in Georgia; I in South Carolina, and A in North Carolina (see Figure Mc2.2-1). These airspaces primarily extend in altitude from a floor of 7,000 to 10,000 feet MSL to a ceiling of 18,000 feet MSL, while Gamecock C and I have floors of 100 feet AGL. 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 D MOA.

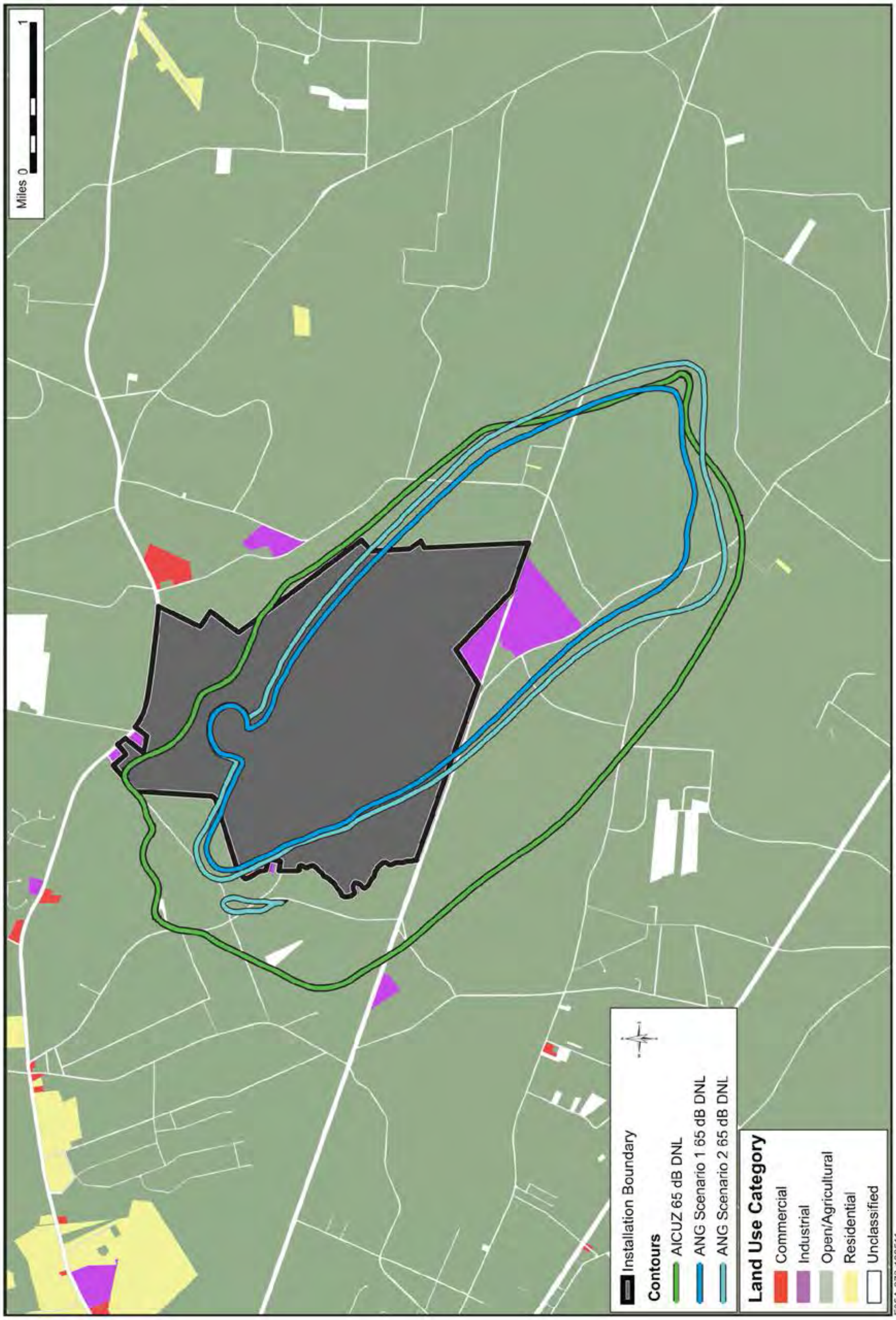

Figure Mc3.10-3. Comparison of AICUZ Planning Contours to ANG Scenarios 1 and 2 Contours Over Land Use Map

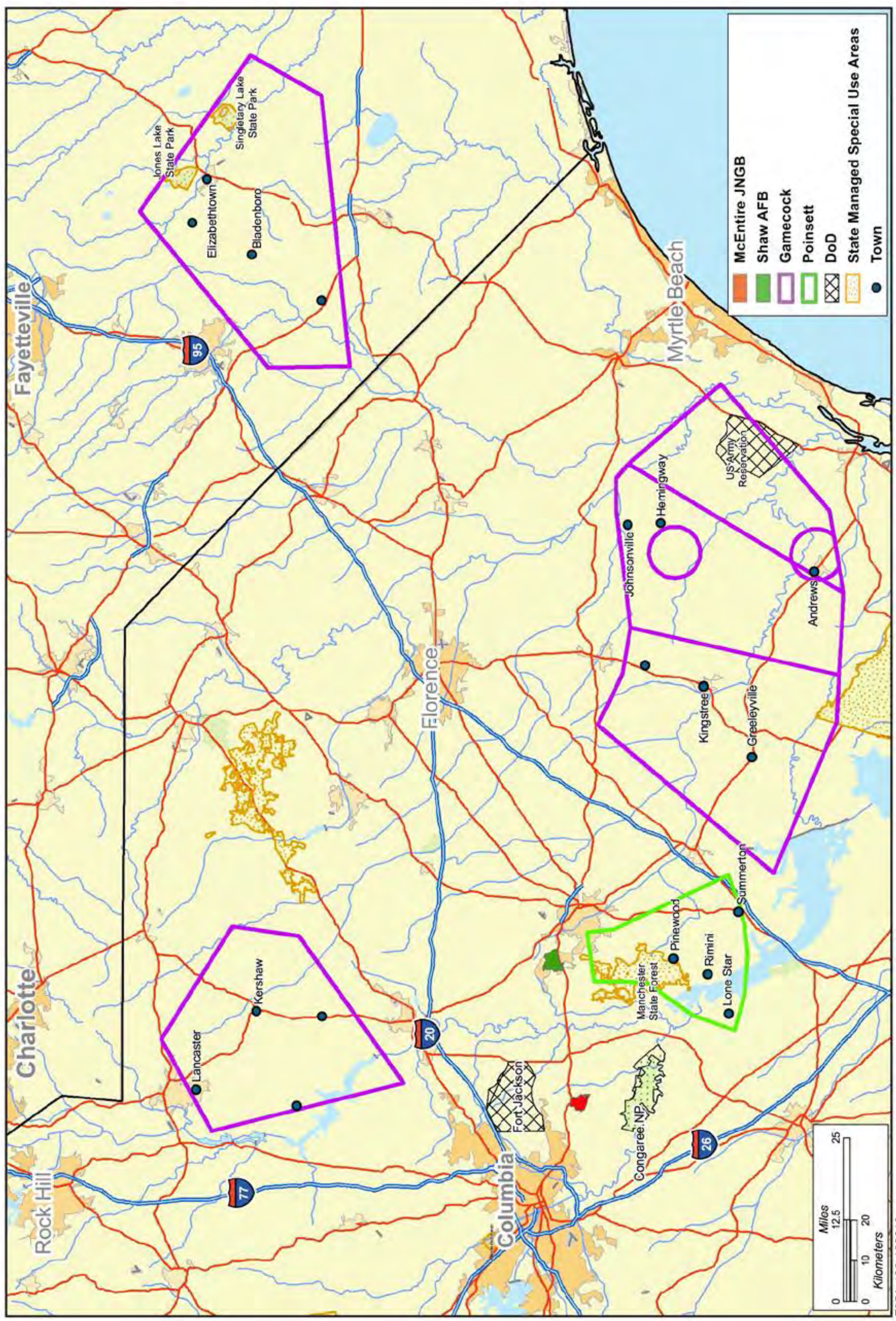

Figure Mc3.10-4. Land Use Under Gamecock and Poinsett Airspace

Table Mc3.10-4. Land Ownership and Special Use Areas under Training Airspace		
Land Owner	***Acres***	***Special Use Areas***
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 Ohoopee 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 Alatamaha 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	**253,790**	**-**

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 airspace units range in altitude from 500 feet AGL to 27,000 feet MSL, and extend 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 Ohoopee River and Little Ohoopee River originate in Washington County and flow under the southwestern portion of Bulldog. These rivers provide numerous recreational opportunities (Georgia River Network 2010). The Ohoopee 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.

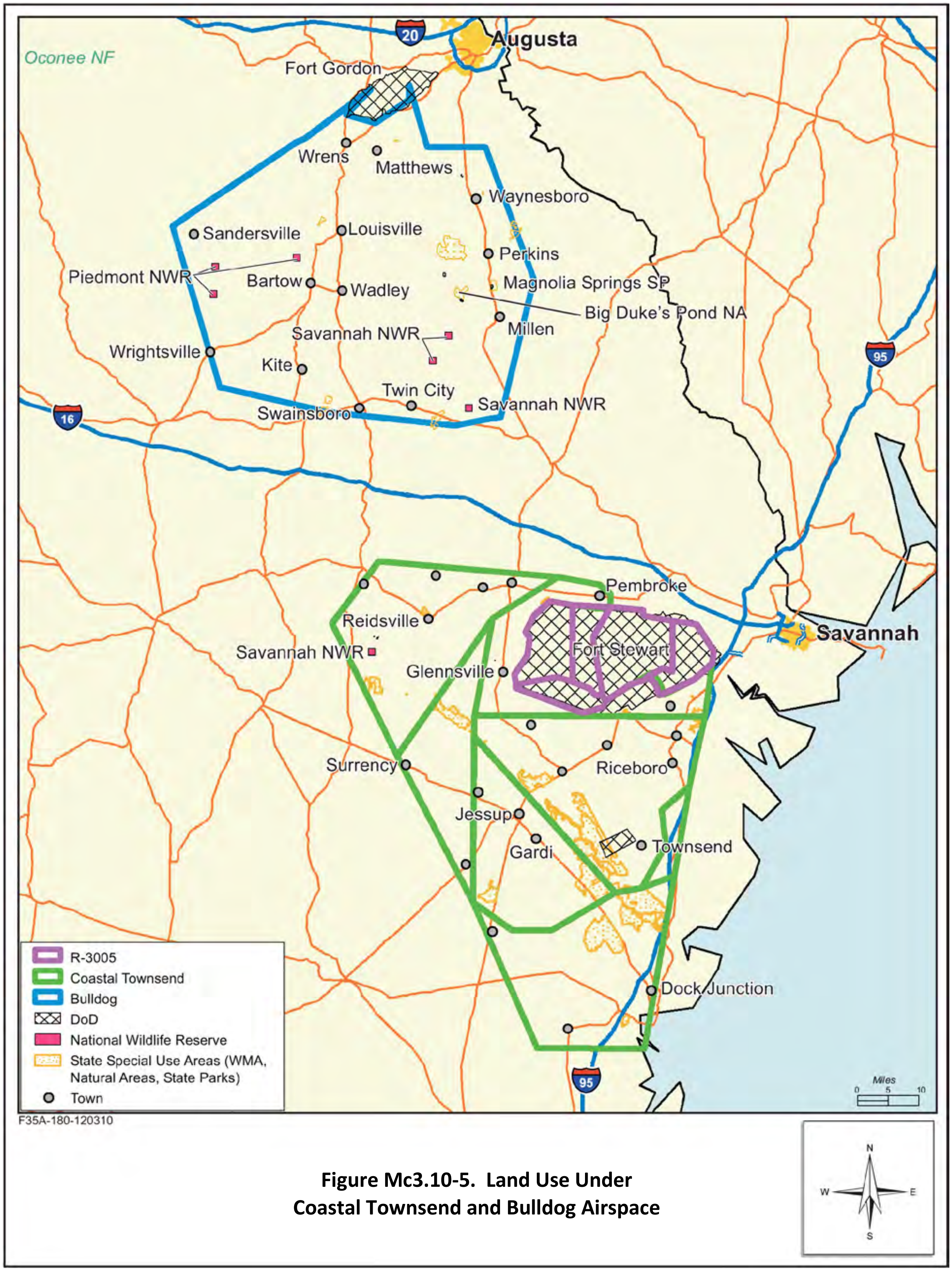

Figure Mc3.10-5. Land Use Under Coastal Townsend and Bulldog Airspace

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 comparable data 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.

The combined expenditures for proposed construction and modification projects for this beddown scenario would be $1.175 million between 2014 and 2016 (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.

Property values, as described in Appendix C, Section C2.7, are the result of multiple location and other variables. Property in the vicinity of airports and military airfields has been studied to determine if, and to what extent, aircraft noise could contribute to a discount in property values. The 1996 Fidell *et al*. study of two military facilities found indications that aircraft noise had no meaningful effect on residential property values. A 2003 study which combined the results of 33 airfield related property value studies estimated that a property could be discounted between 0.005 and 0.006 per dB DNL between the 65 dB DNL and 75 dB DNL noise contours. The property value discount above 75 dB DNL was not able to be defined based on study data but was estimated to be greater than the discount between 65 and 75 dB DNL (Nelson 2004).

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.

The combined expenditures for proposed construction and modification projects for this beddown scenario would be $1.175 million between 2014 and 2016 (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. Property values, as described in Appendix C, Section C2.7, are the result of multiple location and other variables. Property in the vicinity of airports and military airfields has been studied to determine if, and to what extent, aircraft noise could contribute to a discount in property values. The 1996 Fidell *et al*. study of two military facilities found indications that aircraft noise had no meaningful effect on residential property values. A 2003 study which combined the results of 33 airfield related property value studies estimated that a property could be discounted between 0.005 and 0.006 per dB DNL between the 65 dB DNL and 75 dB DNL noise contours. The property value discount above 75 dB DNL was not able to be defined based on study data but was estimated to be greater than the discount between 65 and 75 dB DNL (Nelson 2004).

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 2010 U.S. Census of Population, which is the latest source of information at the required level of detail. Based on the data, 32 percent of the state's population was composed of minorities and 17 percent were low-income populations. In Richland County, which forms the area of comparison for environmental justice, contained 51 percent minority population was and 16 percent low income population.

Table Mc3.12-1. Total Minority and Low-Income Population within the Vicinity of McEntire JNGB

Geographic Area	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income[1]*	*Children Under Age 18*	*Percent Children*
Richland County	384,504	196,482	51.1%	61,136	15.9%	86,898	22.6%
South Carolina	4,625,364	1,461,615	31.6%	786,312	17.0%	1,068,459	23.1%

Source: U.S. Census Bureau 2010b.
Note: [1]The 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, minority, and low-income populations in the vicinity of McEntire JNGB exposed to 65 dB DNL and greater noise contour bands under baseline conditions. Out of the total population (384,504) in Richland County, 713 individuals (or 0.2 percent) are subjected to noise levels 65 dB DNL and greater. Of the total population (713) exposed to noise contour bands 65 dB DNL and greater, 73 percent (526 people) are considered minority and 12 percent (85 people) are low-income populations. The proportion of minority populations affected exceeds that found at both the county and state levels, reflecting ongoing disproportionate impacts However, the percent of low-income populations (at 12 percent) subjected to noise levels 65 dB DNL and greater are less than that found at the county (16 percent) and state (17 percent) levels. Therefore, impacts to low-income populations are not considered disproportionate.

Table Mc3.12-2. Total Baseline Minority and Low-Income Population Affected by Noise Greater than 65 dB DNL at McEntire JNGB					
Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	538	402	75%	63	12%
70 – 75	140	99	71%	18	13%
75 – 80	35	25	72%	4	12%
80 – 85	0	0	0	0	0
85+	0	0	0	0	0
Total	**713**	**526**	**73%**	**85**	12%

Source: U.S. Census Bureau 2010b.
Note: [1]The 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 2010, the number of children under the age of 18 living in Richland County was 86,898 (22.6 percent) (see Table Mc3.12-1). Currently, there are no schools exposed to aircraft noise levels of 65 dB DNL and greater 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). Within the noise contour bands, the affected population was determined using 2010 Census Bureau census block group data. Table Mc3.12-3 provides the proposed total population that would be affected for each of the two ANG scenarios by noise levels of 65 dB DNL and greater. Under either of the ANG Scenarios, populations affected by noise levels 65 dB DNL and greater would decrease.

Table Mc3.12-3. McEntire JNGB ANG Scenarios 1 and 2 Projected Population Totals Affected by Noise Greater than 65 dB DNL			
Noise Contour	*Baseline*	*ANG Scenario 1*	*ANG Scenario 2*
65 – 70	538	173	222
70 – 75	140	59	76
75 – 80	35	13	22
80 – 85	0	0	1
85+	0	0	0
Total	**713**	**245**	**321**

Source: U.S. Census Bureau 2010b.

ANG Scenario 1

Minority and Low-Income Populations

Table Mc3.12-4 displays the total population and proportional representation of minority and low-income populations affected by noise levels 65 dB DNL and greater under ANG Scenario 1. Under this scenario, the total population affected by noise levels 65 dB DNL and greater would decrease from baseline by 66 percent (-468). Overall, this represents a decrease in impacts to all people, including minority and low-income populations. For minorities, the number of people affected would decrease 340 (-65 percent), and low-income individuals potentially affected by aircraft noise would shrink by 55 (65 percent). Of the 245 individuals (close to 0.06 percent of Richland County's total population) exposed to noise levels 65 dB DNL and greater, 74 percent would consist of minority and 13 percent would be low-income populations. These levels would slightly exceed baseline proportions by about 1 percent. In addition, ANG Scenario 1 would result in disproportionate impacts to minority populations when compared to county- and state-wide populations; however, the percent of low-income populations (at 13 percent) subjected to noise levels 65 dB DNL and greater would be less than that found at the county (16 percent) and state (17 percent) levels. Therefore, impacts to low-income populations would not be considered disproportionate.

Table Mc3.12-4. Total Minority and Low-Income Populations Affected by Noise Greater than 65 dB DNL under McEntire ANG Scenario 1

Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	173	133	77	21	12
70 – 75	59	44	75	7	12
75 – 80	13	9	69	2	15
80 – 85	0	0	0	0	0
85+	0	0	0	0	0
Total	**245**	**186**	**74%**	**30**	**13%**
Baseline Conditions	*713*	*526*	*73%*	*85*	*12%*

Source: U.S. Census Bureau 2010b.
Note: [1]The 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

Currently, there are no schools exposed to aircraft noise levels of 65 dB 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 and proportional representation of minority and low-income populations affected by noise levels 65 dB DNL and greater under ANG Scenario 2. Under this scenario, the total population affected by noise levels 65 dB DNL and greater would decrease from baseline by 55 percent (-392). Overall, this represents a decrease in impacts to all people, including minority and low-income populations. For minorities, the number of people affected would decrease 242 (-54 percent), and low-income individuals potentially affected by aircraft noise would shrink by 39 (54 percent). Of the 321 individuals (close to 0.08 percent of Richland County's total population) subjected to noise levels exceeding 65 dB DNL and greater, 74 percent would be considered minority and 13 percent would be low-income populations. These levels would slightly exceed baseline proportions by about 1 percent. In addition, ANG Scenario 1 would result in disproportionate impacts to minority populations when compared to county- and state-wide populations; however, the percent of low-income populations (at 13 percent) subjected to noise levels 65 dB DNL and greater would be less than that found at the county (16 percent) and state (17 percent) levels. Therefore, impacts to low-income populations would not be considered disproportionate.

Table Mc3.12-5. Total Minority and Low-Income Populations Affected by Noise Greater than 65 dB DNL under McEntire ANG Scenario 2

Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	222	169	76	27	12
70 – 75	76	58	76	9	12
75 – 80	22	15	68	3	14
80 – 85	1	0	0	0	0
85+	0	0	0	0	0
Total	**321**	**242**	**74%**	**39**	**13%**
Baseline Conditions	*713*	*526*	*73%*	*85*	*12%*

Source: U.S. Census Bureau 2010b.
Note: [1]The 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 0.76 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 only open Unit Training Assembly (UTA) weekend mornings 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 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 2014 and 2016 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; Ensafe 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 F-16 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 F-16 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.

The F-35A replaces the hydrazine canister (currently used by the F-16s) with an integrated power package (basically a small jet engine) for use in emergency engine restart situations, thus eliminating the potential for hydrazine leaks.

Hazardous Waste

The types of hazardous waste streams generated by F-35A operations are expected to be less than for F-16 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 F-16 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 MMRP sites are located in the industrial area of the installation, only the 2.77-in Rocket Maintenance Facility potential MMRP 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 (2014 to 2016) 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 (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			
Project Name/Description	***Approximate Facility Footprint (acres)***	***New Impervious Surface (acres)***	***Anticipated Year for Implementation***
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
Demolish Building 157	0.18	0	2014
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	**20.85**	16.31	-

Source: Personal communication, Fleischer 2010.

In addition to construction projects on the installation, there is one possible proposal that could interact with the beddown of the F-35A at McEntire JNGB: the F-35A Operational Beddown at Shaw AFB.

- 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.

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 F-16 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 12 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

Airspace Unit	*Baseline (L_{dnmr})*	*Proposed F-35A Operational Beddown at McEntire JNGB (Scenario 2)*	*Proposed F-35A Operational Beddown at Shaw AFB (Scenario 3)*	*Cumulative Noise Levels (L_{dnmr}) F-35A McEntire JNGB + F-35A Shaw AFB*	*Change from Baseline (dB)*
Bulldog	56	58	63	64	+8
Gamecock	57	59	65	66	+9
Coastal Townsend	54	61	64	66	+12
Poinsett	68	68	68	71	+3
APAFR	51	51	51	54	+3

Mc4.2 Irreversible and Irretrievable 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.

Mountain Home Air Force Base

How to Use This Document

Our goal is to give you a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the no-action alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement, or EIS, is shown below.

EXECUTIVE SUMMARY

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

OVERALL PROPOSAL VOLUME I

PREFACE
Detailed Guide for Reading the Final EIS

CHAPTER 1
Purpose and Need for the Air Force F-35A Operational Beddown

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- Overview of the Proposed Action and Alternatives
- Alternative Identification Process
- Summary Comparison of the Proposed Action and Alternatives

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Resource Definition and Methodology

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CHAPTER 4
Six Base-Specific Sections

Burlington AGS	Hill AFB	Jacksonville AGS	McEntire JNGB	Mountain Home AFB	Shaw AFB
Section BR1.0 Proposed Action Overview	**Section HL1.0** Proposed Action Overview	**Section JX1.0** Proposed Action Overview	**Section Mc1.0** Proposed Action Overview	**Section MH1.0** Proposed Action Overview	**Section SH1.0** Proposed Action Overview
Section BR2.0 Base-Specific Project Details	**Section HL2.0** Base-Specific Project Details	**Section JX2.0** Base-Specific Project Details	**Section Mc2.0** Base-Specific Project Details	**Section MH2.0** Base-Specific Project Details	**Section SH2.0** Base-Specific Project Details
Section BR3.0 Affected Environment and Environmental Consequences	**Section HL3.0** Affected Environment and Environmental Consequences	**Section JX3.0** Affected Environment and Environmental Consequences	**Section Mc3.0** Affected Environment and Environmental Consequences	**Section MH3.0** Affected Environment and Environmental Consequences	**Section SH3.0** Affected Environment and Environmental Consequences
Section BR4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section HL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section JX4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section Mc4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section SH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

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MH1.0 MOUNTAIN HOME AIR FORCE BASE OVERVIEW

This section presents an overview of the 366th Fighter Wing (366 FW) installation at Mountain Home Air Force Base (AFB); the specifics of the proposed action as it relates to both the airfield and associated airspace; construction and modifications required at the base; changes to personnel; state consultation and associated permits that would be required should Mountain Home AFB be selected as one of the beddown locations for the F-35A; and identified public and agency concerns with the proposal.

The 366 FW of Mountain Home AFB is located in southwestern Idaho approximately 50 miles southeast of Boise and 8 miles southwest of Mountain Home (Figure MH1.0-1). Mountain Home AFB occupies 6,844 acres of land and as of 2010 supports three squadrons of F-15E/SG aircraft (56 aircraft) (Figure MH1.0-2). The base has a 68 year history of adapting to the effects of changing Air Force missions, from the World War II heavy long range bombers (B-24s, B-29s, and B-47s), to modern fighters (F-16, F-15C) and bombers (B-1B) to the current F-15E/SG Fighter Wing. Mountain Home AFB has expanded, constricted, closed, and re-opened several times. Since 1990, the number of aircraft based at Mountain Home AFB has varied from a high of 76 to its present number of 56. The primary mission today of the 366 FW is to rapidly deploy to conflicts and trouble spots around the world, as well as being the foreign military pilot training location for the Republic of Singapore F-15SGs.

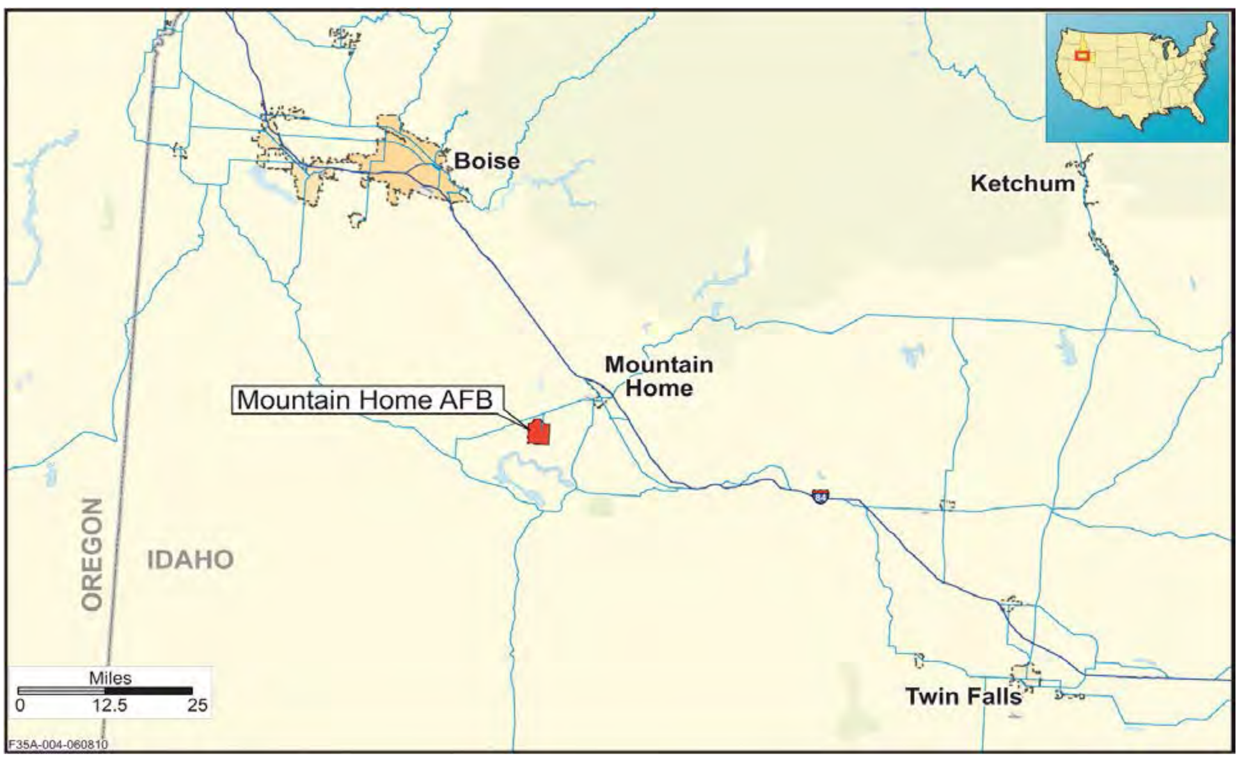


Figure MH1.0-1. Location of Mountain Home AFB

Figure MH1.0-2. Mountain Home AFB Boundary

In the sections that follow, MH2.0 presents the base-specific description of the proposed action and the three basing scenarios proposed at Mountain Home AFB. Section MH3.0 addresses baseline conditions and environmental consequences that could result if any of the three scenarios were implemented at Mountain Home AFB. Refer to Chapter 3 for a complete and detailed definition of resources and the methodology applied to identify potential impacts. Section MH4.0 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 any of the beddown scenarios were implemented at Mountain Home AFB.

MH2.0 MOUNTAIN HOME AFB ALTERNATIVE (24, 48, AND 72 AIRCRAFT SCENARIOS)

The Mountain Home AFB F-35A beddown alternative includes three scenarios; the following presents the elements of these scenarios for the base in Section MH2.1 and the airspace in Section MH2.2.

MH2.1 Mountain Home AFB: Base

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

MH2.1.1 F-35A Beddown

Under the proposed action, 24 (Air Combat Command [ACC] Scenario 1), 48 (ACC Scenario 2), or 72 (ACC Scenario 3) F-35A aircraft would be beddown at Mountain Home AFB. Delivery of the first F-35As to the base would start in 2014 and is scheduled to be completed by June 2018, when the full complement of F-35A aircraft would be based depending upon the scenario implemented.

The F-35A aircraft would add to the existing inventory of 56 F-15E/SGs at Mountain Home AFB. Aircraft at Mountain Home AFB in 2018 for each scenario would total 80 (ACC Scenario 1), 104 (ACC Scenario 2), or 128 (ACC Scenario 3). At no time, however, would the combination of F-35As and F-15E/SGs on base exceed a maximum total of 128 based aircraft (56 F-15E/SGs and 72 F-35As).

MH2.1.2 Airfield Operations

The 366 FW at Mountain Home AFB is an integral component of the Combat Air Forces (CAF). The CAF defends the homeland of the United States (U.S.) as well as deploys forces worldwide to meet threats and ensure the security of the U.S. To fulfill this role, the 366 FW must train as it would fight.

The U.S. Air Force (Air Force) anticipates that by 2018, the total of initial 24 F-35A operational aircraft (ACC Scenario 1) would fly 10,667 airfield operations per year at Mountain Home AFB. Under ACC Scenario 2, 21,334 operations would be conducted, with 32,001 operations performed under ACC Scenario 3 by F-35As. Based on proposed requirements and deployment patterns, 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 Mountain Home AFB would participate in training exercises and operate out of another U.S. base. Some of these missions could involve ordnance delivery training or missile firing exercises (within the scope of existing National Environmental Policy Act [NEPA] documentation) at approved ranges such as the Nevada Test and Training Range near Nellis AFB, Utah Test and Training Range (UTTR), or Eglin AFB's overwater ranges in the Gulf of Mexico.

Because no aircraft would be replaced at Mountain Home, all operations would be additive. The F-35A annual airfield operations in ACC Scenario 1 at Mountain Home AFB would represent an increase of 32.7 percent above total baseline operations of 32,612 (Table MH2.1-1). With the addition of 48 F-35A aircraft in ACC Scenario 2, annual airfield operations would increase by 65.4 percent, and with 72 F-35A aircraft (ACC Scenario 3), the increase would be 98.1 percent.

Table MH2.1-1. Mountain Home AFB Baseline F-15E/SG and Proposed F-35A Operations

	Proposed F-35A		
	ACC Scenario 1	*ACC Scenario 2*	*ACC Scenario 3*
F-35A	10,667	21,334	32,001
F-15E/SG	28,766	28,766	28,766
Other Aircraft	3,846	3,846	3,846
Total	**43,279**	**53,946**	**64,613**
Net Change	**+10,667**	**+21,334**	**+32,001**

Source: Wyle 2011.

The F-35As would employ generally similar departure and landing procedures as currently used by the F-15E/SGs at Mountain Home AFB. However, the new aircraft would fly fewer closed patterns; the F-35As would perform a take-off, one type of pattern operation, and a landing per operation. F-35A operations would adhere to existing restrictions, avoidance procedures, and the quiet-hours program at Mountain Home AFB. The base F-15E/SG aircraft at Mountain Home AFB currently average 240 flying days per year; however, a standard planning format of 260 days was used to maintain consistency and to make equal comparison among the six alternatives. Daily operations would increase from 125 per day under baseline to a maximum of 238 per day under ACC Scenario 3.

Under an Air Force initiative to increase readiness, the F-15E/SG fighters at Mountain Home AFB conduct 11.9 percent of their operations during environmental night (10:00 p.m. to 7:00 a.m.). In contrast, the F-35As would fly 0.6 percent of their operations during this period. With its capabilities and expected tactics, the F-35A would not need to fly at night as much as the F-15E/SG aircraft. Operations during environmental night would increase by less than 1 per day under all three beddown scenarios; total annual environmental night operations would increase by 64 for ACC Scenario 1, 128 for ACC Scenario 2, and 192 for ACC Scenario 3.

MH2.1.3 Construction

To support proposed F-35A operations, additional infrastructure and facilities would be required at Mountain Home AFB (Table MH2.1-2) under each scenario (24, 48, or 72 aircraft). Four projects are proposed under ACC Scenario 1 (Figure MH2.1-1), 19 projects under ACC Scenario 2 (Figure MH2.1-2), and 20 projects would be undertaken for ACC Scenario 3 (Figure MH2.1-3).

Table MH2.1-2. Proposed Construction and Modifications for Mountain Home AFB			
Year	***Action***	***Total Affected Area (acres)***	***New Impervious Surface (acres)***
ACC Scenario 1 (24 F-35As)			
2014	New Munitions Storage, Hayman Igloo	0.44	0.05
2014	New F-35A Parts Storage Facility	0.83	0.21
2014	New 4-Bay Fight Simulator Facility	1.29	0.46
2014	New Munitions Inspection Facility	0.61	0.11
Total	**Cost: $16,900,000**	**3.17**	**0.83**
ACC Scenario 2 (48 F-35As)			
2014	New Munitions Storage, Hayman Igloo	0.44	0.05
2014	New F-35A Parts Storage Facility	0.83	0.21
2014	New 4-Bay Fight Simulator Facility	1.29	0.46
2014	New Maintenance Group Administration Facility	1.29	0.46
2014	New Vehicle Maintenance, Building 1100	0.36	0.11
2014	New Munitions Administration Facility	0.66	0.13
2014	New Munitions Inspection Facility	0.61	0.11
2015	Internal Alterations to Squad Operations/ AMU, Building 196	0	0
2015	Internal Alterations to Squad Operations/AMU, Building 271	0	0
2015	Internal Alterations to Squad Operations, Building 278	0	0
2015	Internal Alterations to Squad Operations, Building 210	0	0
2015	Internal Alterations to AMU, Building 277	0	0
2015	Internal Alterations to AMU, Building 211	0	0
2015	Construct Airfield markings	0	0
2015	Addition and Alteration to Weapons Release Shop, Building 1225	0.83	0.34
2015	Construct HAMS Yard	1.29	0.46
2015	Construct R-11 petroleum, oil, and lubricants Parking	0.87	0.23
2015	Repair Multiple Hangars, electrical upgrade	0	0
2015	MSA Mobility Equipment Storage	0.51	0.07
Total	**Cost: $36,348,000**	**8.98**	**2.63**
ACC Scenario 3 (72 F-35As)			
2015	New Squadron Operations and AMU facility	2.08	0
2015	New Munitions Storage, Hayman Igloo	0.44	0.05
2015	New F-35A Parts Storage Facility	0.96	0.28
2015	New 6-Bay Fight Simulator Facility	1.48	0.57
2015	Maintenance Group Administration Facility	1.29	0.46
2015	Vehicle Maintenance, Building 1100	0.36	0.11
2015	New Munitions Administration Facility	0.66	0.13
2015	New Munitions Inspection Facility	0.61	0.11
2015	Internal Alterations to Squad Ops/AMU, Building 196	0	0
2015	Internal Alterations to Squad Ops/AMU, Building 271	0	0
2015	Internal Alterations to Squad Ops, Building 278	0	0
2015	Internal Alterations to Squad Ops, Building 210	0	0
2015	Internal Alterations to AMU, Building 277	0	0
2015	Internal Alterations to AMU, Building 211	0	0
2015	Construct Airfield markings	0	0
2015	Addition and Alteration to Weapons Release Shop, Building 1225	0.84	0.34
2015	Construct HAMS Yard	1.29	0.46
2015	Construct R-11 POL Parking	0.87	0.23
2015	Repair Multiple Hangars, electrical upgrade	0	0
2015	MSA Mobility Equipment Storage	0.51	0.07
Total	**Cost: $51,948,000**	**11.39**	**2.81**

Figure MH2.1-1. Mountain Home AFB Construction Projects – ACC Scenario 1

Figure MH2.1-2. Mountain Home AFB Construction Projects – ACC Scenario 2

Figure MH2.1-3. Mountain Home AFB Construction Projects – ACC Scenario 3

Most construction would occur between 2014 through 2015, depending on the scenario. Proposed construction, modification, repair, and infrastructure improvements for the maximum beddown scenario (72 aircraft) would establish 2.81 acres of new impervious surfaces and disturb a total affected area of 11.39 acres. The overall cost would be approximately $51,948,000 under the maximum beddown scenario (ACC Scenario 3). In contrast, under ACC Scenario 1, the total affected area would be 3.17 acres; under ACC Scenario 2, 8.98 total acres would be affected. Costs for ACC Scenarios 1 and 2 would be about $17 million and $36 million, respectively. Total affected area refers to the total area covered by the construction footprint of the proposed facilities, plus the surrounding lands where construction-related clearing and grading would occur. For those projects with internal alterations only, the proposed construction would be within an existing facility and therefore, no surrounding lands would be affected by construction activities (i.e., impact areas). Infrastructure upgrades, such as connecting new facilities to water and power systems, would also add to the affected areas on the base.

MH2.1.4 Personnel Changes

Beddown of the F-35A operational aircraft at Mountain Home AFB would require sufficient and appropriately skilled personnel to operate and maintain the new aircraft and provide other necessary support services. Overall, 532 military personnel would be required to support 24 F-35A operational aircraft (ACC Scenario 1), 1,064 military personnel for 48 operational aircraft (ACC Scenario 2), and 1,596 military personnel to support 72 F-35A operational aircraft (ACC Scenario 3). For Mountain Home AFB, the F-35A personnel positions would be in addition to the existing F-15E/SG manpower authorizations (Table MH2.1-3). Base operations support (BOS) personnel, which add about 10 percent to the total of military personnel, include civilian government employees and other military such as security police and administration. BOS personnel authorizations would add 53, 106, and 159 positions to total for the three ACC scenarios, respectively. Total base personnel authorizations would increase by 13 percent for ACC Scenario 1 up to 39 percent for ACC Scenario 3.

Table MH2.1-3. Proposed Military Personnel Changes: Mountain Home AFB

	Baseline	*ACC Scenario 1*	*ACC Scenario 2*	*ACC Scenario 3*
F-15E/SG	1,306	1,306	1,306	1,306
F-35A	0	532	1,064	1,596
BOS Personnel	N/A	53	106	159
Total Personnel	**1,306**	**1,891**	**2,476**	**3,061**
Net Change	**N/A**	**+585**	**+1,170**	**+1,755**

MH2.2 Training Airspace and Ranges

The 366 FW primarily uses the Mountain Home Range Complex (MHRC), which includes Military Operations Area (MOAs), Air Traffic Control Assigned Airspace (ATCAAs), and Restricted Areas (Figures MH2.2-1 and 2.2-2, Table MH2.2-1). Mountain Home AFB F-15E/SGs use this airspace for 95 percent of their operations. The 366 FW accounts for approximately 80 percent of total operations within the airspace. This airspace is also used by the A-10s from the Idaho ANG as well as transient aircraft (Mountain Home AFB 2008a).

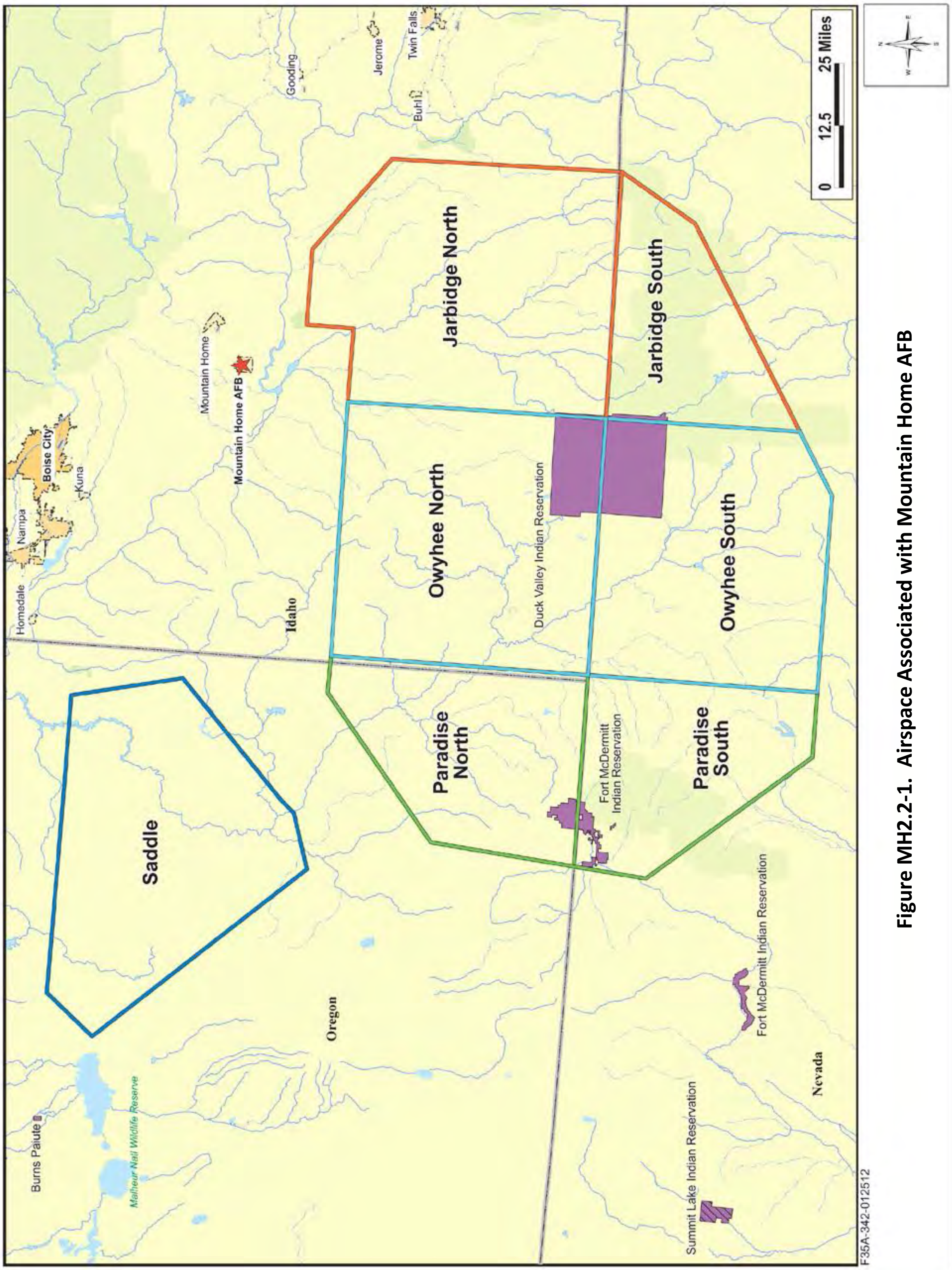


Figure MH2.2-1. Airspace Associated with Mountain Home AFB

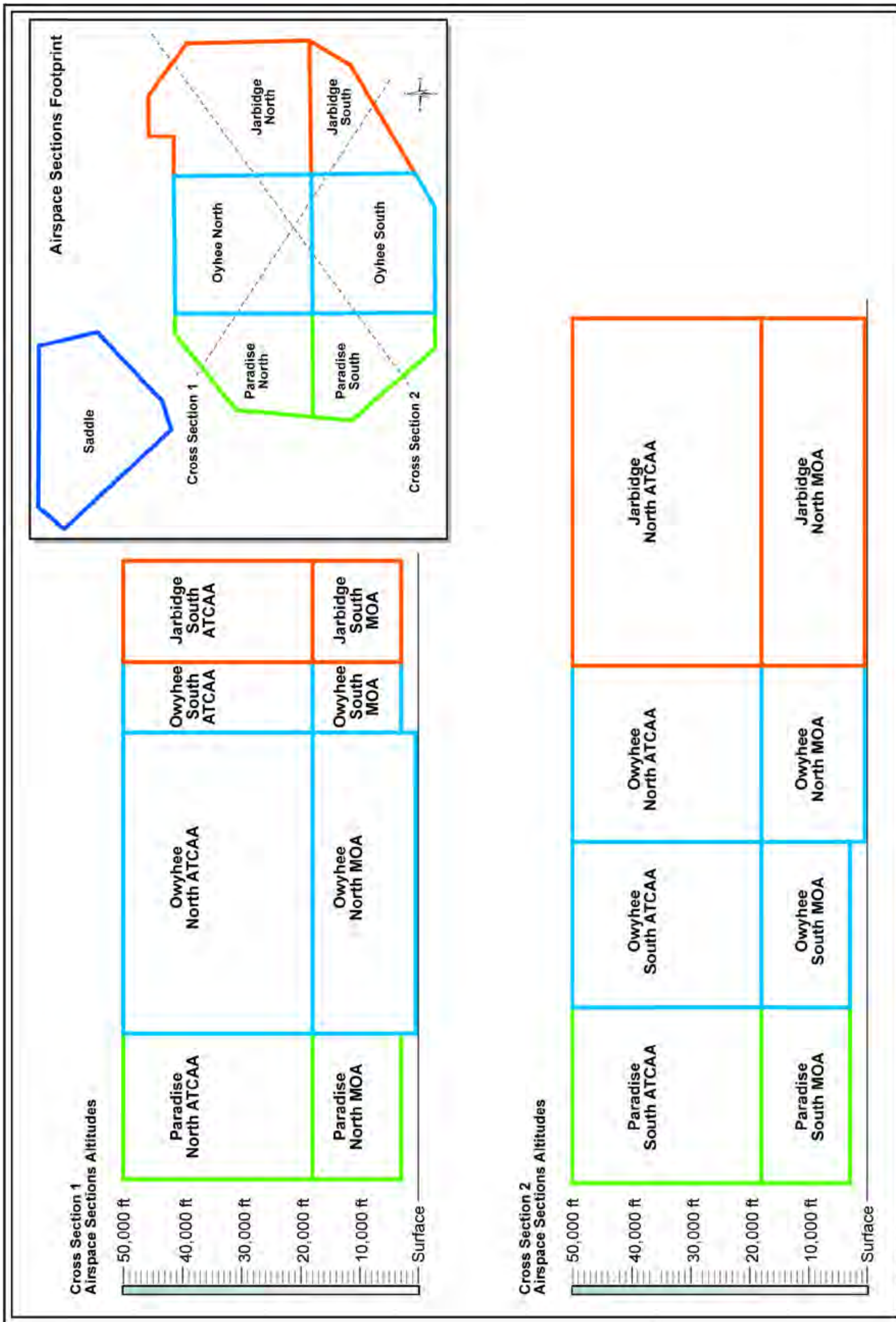


Figure MH2.2-2. Mountain Home AFB Associated Airspace Cross Sections

Table MH2.2-1. Mountain Home AFB Associated Training Airspace			
	Airspace	*Floor (feet MSL unless otherwise noted)**	*Ceiling (feet MSL unless otherwise noted)**
Jarbidge	Jarbidge North MOA	100 AGL	18,000
	Jarbidge South MOA[1]	3,000 AGL or 10,000 MSL[2]	18,000
	Jarbidge ATCAA[1]	18,000	50,000
	R-3202 Low	Surface	To BNI 18,000
	R-3202 High	18,000	29,000
	R-3204 A	Surface	100 AGL
	R-3204 B	100 AGL	To BNI 18,000
	R-3204 C	18,000	29,000
Owyhee	Owyhee North MOA[1]	100 AGL	18,000
	Owyhee South MOA[1]	3,000 AGL or 10,000 MSL[2]	18,000
	Owyhee ATCAA[1]	18,000	50,000
Saddle	Saddle MOA A	10,000	18,000
	Saddle MOA B	8,000	18,000
	Saddle ATCAA	18,000	50,000
Paradise North	Paradise MOA N	3,000 AGL or 10,000 MSL[2]	18,000
	Paradise E ATCAA	18,000	50,000
Paradise South	Paradise MOA S	3,000 AGL or 10,000 MSL[2]	18,000
	Paradise W ATCAA	18,000	50,000

Source: FAA 2003 and Mountain Home AFB 2008a.
Legend: MSL = mean sea level; AGL = above ground level; BNI = but not including all MOAs extend to 18,000 feet MSL unless otherwise noted.
Notes: *MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to the average sea level. The elevation of a mountain, for example, is marked by its highest point and is typically illustrated as a small circle on a topographic map with the MSL height shown in either feet or meters or both. Because aircraft fly across vast landscapes, where points above the ground can and do vary, MSL is used is denote the "plain" on which the floors and ceilings of special use airspace are established and the altitude at which aircraft must operate within that special use airspace.
[1]Approved for supersonic operations above 10,000 AGL, excepting airspace over the Duck Valley Indian Reservation where no supersonic operations are allowed.
[2]Whichever altitude is higher given the mountainous terrain.

MH2.2.1 Airspace Use

The F-35As would conduct missions and training programs necessary to fulfill its multi-role responsibilities (refer to Chapter 2). Neither the basing action nor alternative scenarios will require changes in special use airspace attributes, volume, or proximity; nor will changes be needed in the type and number of ordnance employed at the ranges. The Air Force expects the F-35A would operate in the airspace currently associated with Mountain Home AFB, but somewhat differently than the F-15E/SG aircraft now using that airspace. These differences would derive from enhanced capabilities and changed requirements for the F-35A. Such differences reflect the F-15E/SGs primary air-to-ground mission versus the F-35As multi-role mission. All F-35A flight activities would take place in existing airspace, so no airspace modifications would be required.

Although the F-35As would perform the missions of aircraft like F-16s, they represent a different aircraft with vastly different capabilities, and would fly somewhat differently. These differences include the use of higher altitudes overall, combined use of existing airspace, reduced night operations, and fewer supersonic events, and higher altitudes for supersonic flights. The F-35As would also fly differently than the F-15E/SG aircraft at Mountain Home AFB. Pilots would adapt training activities to ensure accomplishment of requirements within the associated Mountain Home AFB airspace.

The F-35A would fly more of the time at higher altitudes than the F-15E/SG (Table MH2.2-2). The F-35A would operate 80 percent of the time above 23,000 feet mean sea level (MSL). In contrast, the F-15E/SGs would continue to operate 76 percent of the time below 23,000 feet MSL, with 30 percent below 5,000 feet above ground level (AGL). Thus, the F-35A aircraft would conduct most of their operations in the high altitude Jarbidge, Owyhee, and Paradise ATCAAs with some basic fighter maneuver training in the Saddle ATCAA. Regardless of the altitude structure and percent use indicated in Table MH2.2-2, F-35 aircraft (as do existing military aircraft) would adhere to all established floors and ceilings of airspace units. For example, the floor of Saddle MOA A lies at 10,000 feet MSL, so the F-35A would not fly below that altitude in that airspace. Rather pilots would adapt training to this and other airspace units like the Jarbidge MOAs with lower floors.

Table MH2.2-2. Proposed Action and No-Action Altitude Distribution

Altitude (feet)	***Percentage of Use***	
	F-35A	*F-15E/SG*[1]
	Multi-role	Air-to-Ground
500 –1,000 AGL	2%	15%
1,000 –5,000 AGL	3%	15%
5,000 –15,000 MSL	5%	23%
15,000 –23,000 MSL	10%	23%
>23,000 MSL	80%	24%

Note: [1]Air-to-ground training mission.

Table MH2.2-3 presents historic baseline operations (prior to November 2011) in the MHRC airspace. The information is broken down into total aircraft operations (includes aircraft operating out of Mountain Home AFB, the Idaho National Guard, and other transient users) and then presents a subset of this information for Mountain Home AFB F-15E/SG aircraft.

Table MH2.2-3. MHRC Baseline Airspace Operations

Airspace Unit	***Total Based Aircraft Operations***	***F-15E/SG Aircraft Baseline***[1]
Jarbidge[2]	10,800	7,898
Owyhee	9,700	7,770
Paradise East	3,695	3,347
Paradise West	4,756	4,407
Saddle MOA A/B	2,900	2,121
Total[3]	**31,851**	**25,543**

Notes:
[1]Includes only based F-15E/SG aircraft for Mountain Home AFB.
[2]Jarbidge includes operations at air-to-ground ranges under R-3202 and R-3204.
[3]Totals provided only as a general trend of activity and not directly linked to the number of operations generated from the airfield.

In July 2012, the FAA charted expanded MHRC airspace (including lateral and vertical changes, to the Paradise, Owyhee MOAs and reconfiguration of the Jarbidge MOAs [Mountain Home AFB 2008]) to accommodate existing aircraft operations. This new airspace configuration was developed for current users and not to support any F-35A basing actions. Table MH2.2-4 presents these no-action estimates for the airspace in comparison to the ACC Scenarios for basing the F-35As.

Table MH2.2-4. Comparison of ACC Scenarios – Airspace Operations						
Airspace Unit	*Total No-Action Alternative*	*F-15E/SG Aircraft No-Action*[1]	*ACC Scenario*	*F-35A Operations*	*Net Change (Total)*	*Percent Change Total*
Jarbidge North[2]	10,800	7,898	1	1,300	+1,300	+12%
			2	2,603	+2,603	+24%
			3	3,905	+3,905	+36%
Jarbidge South[2]	2,000	1,463	1	241	241	+12%
			2	482	482	+24%
			3	723	723	+36%
Owyhee North	9,700	7,770	1	1,279	+1,279	+13%
			2	2,561	+2,561	+26%
			3	3,841	+3,841	+40%
Owyhee South	3,200	2,563	1	422	422	+13%
			2	845	845	+26%
			3	1,267	1,267	+40%
Paradise North	2,400	2,204	1	363	+363	+15%
			2	726	+726	+30%
			3	1,090	+1,090	+45%
Paradise South	2,400	2,204	1	363	+363	+15%
			2	726	+726	+30%
			3	1,090	+1,090	+45%
Saddle MOA A/B	2,900	2,121	1	349	+349	+12%
			2	699	+699	+24%
			3	1,048	+1,048	+36%
Total[3]	**33,400**	**26,223**	**1**	**4,317**	**4,317**	**+13%**
			2	**8,643**	**8,643**	**+26%**
			3	**12,963**	**12,963**	**+39%**

Notes:
[1]Includes only based F-15E/SG aircraft for Mountain Home AFB. Operations by these aircraft would continue under all scenarios.
[2]Jarbidge includes operations at air-to-ground ranges under R-3202 and R-3204.
[3]Totals provided only as a general trend of activity and not directly linked to the number of operations generated from the airfield.

Under all three scenarios airspace use would increase: ACC Scenario 1 – 13 percent; ACC Scenario 2 – 26 percent; ACC Scenario 3 – 39 percent. While the number of daily operations would increase in all airspace units, the added flights would be at higher altitudes. For example, total daily operations for all airspace units would increase by 50 under ACC Scenario 3, but 40 of those operations would occur above 23,000 feet MSL.

Like the F-15E/SG aircraft, 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 MHRC. In the larger airspace units, the duration of operations would be longer than in the smaller MOAs. On occasion during an exercise, the F-35A may spend up to 90 minutes in one or more airspace units.

The F-35A would fly, on average 0.6 percent of time during the environmental night (10:00 p.m. to 7:00 a.m.) compared to 11.9 percent of the time for F-15E/SGs currently using the airspace. Less than 1 daily operation during environmental night would be added as a result of implementing any of the scenarios.

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. All supersonic flight would be conducted above 15,000 feet MSL, with 90 percent occurring above 30,000 feet MSL. Only the Jarbidge North MOA/ATCAA and Owyhee North MOA/ATCAA permit supersonic flight down to 10,000 feet AGL. Supersonic flight is authorized above 30,000 feet MSL in the ATCAAs above the Paradise North and South and, Jarbidge South, and Owyhee South MOAs. The 366 FW aircraft currently fly about 4 percent of their time in air combat training involving supersonic events.

In a 1996 Settlement Agreement between the Air Force and the Shoshone-Paiute Tribes, the Air Force agreed, absent compelling national security circumstances, military contingencies, or hostilities, to not fly below 10,000 feet AGL, and voluntarily not fly below 15,000 feet AGL for training operations over the present boundaries of Duck Valley Indian Reservation except during emergencies, such as aircraft mechanical problems or avoidance of weather (Air Force 1998a). The Air Force also does not fly at any altitude within 5 nm of the town of Owyhee (Air Force 1998a). The Air Force complies with all other terms contained within the 1996 Settlement Agreement. Additionally, no supersonic operations would occur over the Duck Valley Indian Reservation (Air Force 1998b). These restrictions would not change if the F-35A were to base at Mountain Home AFB.

MH2.2.2 Ordnance Use and Defensive Countermeasures

Most air-to-ground training would be simulated, where nothing is released from the aircraft, and target scoring is done electronically. As was discussed in Chapter 2, section 2.1.2, however, the F-35A (like the F-16) is capable of carrying and employing several types of air-to-air and air-to-ground ordnance (including strafing) and pilots would need training in their use. As the Air Force currently envisions, the type and number of ordnance would not differ from that currently employed by the F-16s. F-35A pilots would only use ranges and airspace authorized for the type of ordnance being employed and within the number already approved at a range and/or target. If in the future the Air Force identifies weapons systems that are either new or could exceed currently approved levels, appropriate NEPA documentation would need to occur prior to their employment.

Like the F-15E/SG, 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, it is expected to use fewer defensive countermeasures 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 the expenditure of flares by the F-35As would match that of F-15E/SGs on a per operation basis for the 366 FW. Chapter 2, Section 2.1.2, provides details on the composition and characteristics of flares.

Flares would be used only in areas currently approved for flare use including Jarbidge North and South, Owyhee North and South, and Paradise North and South. All current restrictions on the amount, altitude, or timing of flare use would also apply. These include seasonal limitations to prevent wildfires and a prohibition of flare use over the Duck Valley Indian Reservation. Over most of the affected area, minimum flare release altitude is 2,000 feet AGL. Under the proposed action at Mountain Home AFB, F-35As could use up to 32,000 flares annually, in addition to the 62,000 plus flares employed by the F-15E/SGs. Based on the emphasis on flight at higher altitudes for the F-35A, roughly 80 percent of F-35A flare releases throughout the MOAs would occur above 10,000 feet MSL. At this altitude, most flares would be released more than 14 times higher than the minimum altitude required (700 feet) to ensure complete consumption.

MH2.3 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-action alternative) 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.

MH2.4 Permits, Agency Consultations, and Government-to-Government Consultation

Mountain Home AFB operates under agreements with a series of environmental permitting agencies for such resources as air, water, and historic resources.

Permitting. The following section describes the permits that would typically be required for the proposed action and discusses whether they would be required under this particular 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 3-210-10, *Low Impact Development*, and consistent with the U.S. Environmental Protection Agency's (USEPA's) *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, Mountain Home AFB will coordinate with the USEPA, Region X and Idaho Department of Environmental Quality (DEQ) regarding proposed construction near Environmental Restoration Program (ERP) sites on base.
- A formal conformity applicability 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. Because Mountain Home AFB is in an area of attainment for all criteria pollutants, a formal conformity applicability determination is not needed.
- Personnel conducting construction and/or demolition activities will strictly adhere to all applicable occupational safety requirements during construction activities.

- Sampling for asbestos-containing materials (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 is present, Mountain Home AFB 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.

Consultation. In January 2010 initial informal consultation was initiated with the Idaho, Nevada, and Oregon State Historic Preservation Offices (SHPOs); however, no responses were received. In October 2012 (following publication of the Draft EIS), Section 106 of the National Historic Preservation Act (NHPA) consultation was re-initiated by Mountain Home AFB and letters sent to all three SHPOs notifying them that no response had been received from earlier correspondence (January 2010) regarding the proposed action at Mountain Home AFB. In November 2012, the Idaho SHPO concurred with the Air Force conclusion of no adverse effects in the APE. In April 2013, the Oregon SHPO verbally concurred with the Air Force determination. While the Nevada SHPO did not respond to Mountain Home AFB directly, it did respond to the Hill AFB consultation letter and concurred with the Air Force determination of no adverse effects in the APE as a result of F-35A operations.

Government-to-Government. On November 27, 1999, the Department of Defense (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).

Project specific, government-to-government consultation letters were sent to six federally-recognized American Indian Tribes were first sent in January 2010 and then again in October 2012 to: Shoshone-Bannock Tribes, Northwestern Band of Shoshone, Summit Lake Paiute Tribe, Paiute-Shoshone Tribes of Fort McDermitt, and the Burns Paiute Tribe. In addition, the Shoshone-Paiute Tribes of Duck Valley were sent a government-to-government consultation letter in both January 2010 and again in November 2012. All letters requested responses by the end of November 2012 and were certified that they were delivered The Northwestern Band of Shoshone indicated they have no concerns as the Proposed Action does not pertain to them. The Shoshone-Paiute of Duck Valley requested further consultation and the Air Force met with the Tribe in early May 2013; they wish to continue consultation. No further correspondence from the four other American Indian Tribes was received, despite several requests for responses (refer to Appendix B for specifics on consultation). As such, the Air Force has made the determination that there would be no adverse effects to the APE and therefore, according to 36 CFR 800.4(d)(1) *No historic properties affected*: "If the agency official finds that either there are no historic properties present or there are historic properties present but the undertaking will have no effect upon them as defined in § 800.16(i), the agency official shall provide documentation of this finding, as set forth in § 800.11(d), to the SHPO/THPO. The agency official shall notify all consulting parties, including

Indian tribes and Native Hawaiian organizations, and make the documentation available for public inspection prior to approving the undertaking. (i) If the SHPO/THPO, or the Council if it has entered the Section 106 process, does not object within 30 days of receipt of an adequately documented finding, the agency official's responsibilities under Section 106 are fulfilled."

MH2.5 Public and Agency Concerns

MH2.5.1 Scoping

Scoping meetings were held February 16-19, 2010 in Grand View, Twin Falls, Boise, and Mountain Home, Idaho. Two-hundred fifty-five people attended the four scoping meetings.

A total of 119 letters (4 from agencies [USFWS], Idaho Economic Development Association [2 letters], Military Affairs Committee, 71 elected officials, and 41 general public) were received from the public and agencies prior to close of the scoping period. The majority of comments received at the scoping meetings expressed enthusiastic support for the beddown of F-35A and encouraged the Air Force to select Mountain Home AFB.

A large crowd (167 people) attended the meetings held in Mountain Home and the comments received were in full support for the beddown of the F-35A at Mountain Home AFB. As mentioned above, 71 elected officials (including the Governor, two Senators, and House of Representatives representative) sent letters in support of the proposal. In addition, 40 letters in favor of this location alternative were received and only 1 expressed concerns about noise. A total of 4,057 postcards were sent to the Air Force supporting the proposal and multiple resolutions of support came in favoring the operational beddown of F-35As at Mountain Home AFB.

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 level of the F-35A is less than that of an F-4 at full throttle? (see Table MH3.2-1)
- What affect would the F-35A aircraft have on threatened species such as sage grouse and other species of concern? (see Section MH3.8.1.2 and MH3.8.2.2)
- How would F-35A operations be coordinated with wildland firefighting? (see Section MH3.4.2.2)

MH2.5.2 Draft EIS Public Comment Period

Official notification of the F-35A Operational Basing Draft EIS public comment period began with the Notice of Availability (NOA) announcement on April 13, 2012 in the *Federal Register*. This marked the start of the 45-day review period which would end on June 1, 2012; however, the Air Force was requested to hold another hearing the first week of June. As a result, the public comment period was extended 19 more days to June 20, 2012. A notice was placed in the *Federal Register* on May 23, 2012 announcing this extension.

During the week of May 8, 2012, three hearings were held in Grand View, Boise, and Mountain Home, Idaho. At the hearings, a total of 88 people attended. For the three meetings held in Idaho, there were a total of 17 speakers and 6 written comments. Of the 17 speakers, 11 voiced their support for the proposed action at Mountain Home AFB, 4 people confused this action with the Air Education Training Command F-35A beddown at Gowen Field in Boise, 1 person was concerned about noise impacts to wildlife, and another person voiced their opposition to any more aircraft flying in the airspace and disturbing the peace.

As noted in Chapter 1, during the 64-day comment period, a total of 934 written comments were received, of which seven were associated with the Mountain Home AFB alternative. Five commenters expressed their support to base F-35As at the base. However, the two other comments included:

- not supporting the basing action since it would increase both noise and air pollution in areas where people recreate (see Section MH3.10.2.2), wildlife abound (see Section MH3.8.2.2 and Appendix C in Section C2.6.2 through C2.6.9), and ranchers raise cattle (see Appendix C, Section C2.6.1), and
- the United States Fish and Wildlife Service (USFWS) wrote about their concern of how sonic booms would impact sage grouse (this is addressed in MH3.8.2.2 and in Appendix C, Section C2.6.4).

No other issues were identified in comments submitted to the Air Force associated with the Mountain Home AFB basing alternative.

MH2.5.3 Revised Draft EIS Public Comment Period

The 45-day public comment period for the Revised Draft EIS began on May 31, 2013 when the NOA was published in the *Federal Register* (Appendix A). The Revised Draft EIS was circulated for review and comment to government agencies, local organizations, American Indian tribes, interested private citizens, and public libraries. Copies of the Revised Draft EIS were delivered by May 31, 2013 to 35 libraries and the entire two-volume document was posted on the Air Force website at www.accplanning.org for viewing electronically. On the same day (or as soon as possible given publication deadlines) as the NOA appeared in the *Federal Register*, the Air Force announced the availability of the Revised Draft EIS NOA in over 20 local newspapers.

There were 11,172 comments received in letter, note, email, and postcard format during the 45-day public comment period. Of these, 823 were in letter, handwritten note, and email format and 10,349 were postcard format. No general public comments were received associated with the basing action at Mountain Home AFB.

MH2.6 Differences Between the Draft EIS and the Final EIS

Following the Draft EIS, a Revised Draft EIS was published which included factual corrections, additional and/or supplemental information, and improvements or modifications to the analyses presented in the Draft EIS. The re-analysis included noise impacts to low-income and minority populations based on updated census data (not available when the 2012 Draft EIS was published) in the noise section (MH3.2) and environmental justice/protection of children (MH3.12); inserting documents incorporated by reference (MH2.7); adding mitigation measures (MH2.8); correcting typographical and grammatical errors, as needed; correcting mapping and labeling mistakes in text and figures throughout; inserting new or revised information, where applicable; and including responses to comments received during the Draft EIS public review period in Volume II, Appendix E.

In this Final EIS, several changes were made and include the following:

- In Chapter 3, Section 3.5, Figure 3-2 was revised to correctly portray the DoD clear zone as a square and Table 3-5 was added with F-16 and F-15 historic mishap data.
- Where applicable, Section MH2.4 and Appendix B were updated to reflect current status of agency and government-to-government consultations.
- Throughout the document, corrected typographical and grammatical errors in the text.
- Responded to Revised Draft EIS comments in Volume II, updated Appendix E.

MH2.7 Documents Incorporated by Reference

In accordance with CEQ regulations for implementing NEPA and with the intent of reducing the size of this document, the following material relevant to the proposed action at the alternative locations and basing scenarios is incorporated by reference and identified according to the alternative location. These documents are part of the administrative record and are available upon request.

Sustainable Ranges Report to Congress, Department of Defense (DoD 2012). Report published in April 2012. A report to Congress on the sustainability of all DoD ranges describing the training requirements and the existing range resources to meet these requirements.

F-35A Training Basing Final EIS (Air Force 2012a). Published in January 2012. Documentation for all airspace (Jarbidge North/South, Owyhee North/South, Paradise North/South, and Saddle A/B MOAs, Restricted Airspace R-3202 and R-3204A/B; and overlying ATCAAs) and Juniper Butte and Saylor Creek Ranges activities that proposed for use by the F-35A training units.

Proposed Royal Saudi Air Force F-15SA Beddown Final EA (Air Force 2012b). Published August 2012. Documentation of additional aircraft operations in the airspace and at the ranges. Documentation for all airspace (Jarbidge North/South, Owyhee North/South, Paradise North/South, and Saddle A/B MOAs; Restricted Airspace R-3202 and R-3204A/B; and overlying ATCAAs) and Juniper Butte and Saylor Creek Ranges activities that proposed for use by the Royal Saudi Air Force.

Republic of Singapore Air Force F-15SG Beddown Final EA (Air Force 2007b). Published in March 2007. Documentation for all airspace (Jarbidge North/South, Owyhee North/South, Paradise North/South, and Saddle A/B MOAs; Restricted Airspace R-3202 and R-3204A/B; and overlying ATCAAs) and Juniper Butte and Saylor Creek Ranges activities that proposed for use by the Royal Saudi Air Force.

Enhanced Training in Idaho Final EIS (Air Force 1998a). Published in January 1998. Documentation establishing the 12,000-acre Juniper Butte Tactical Training Range, no-drop targets, and electronic emitter sites as well as modifications to overlying airspace throughout out southwest Idaho.

MH2.8 Mitigation Measures

No other extra-ordinary mitigation measures are required beyond those prescribed under existing federal and state laws, regulations, and permit requirements. Refer to Chapter 2, section 2.6.1 for a description of measures being adopted, as best management practices and management actions, to minimize and/or avoid adverse impacts.

MH3.0 MOUNTAIN HOME AFB AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

MH3.1 Airspace Management and Use

MH3.1.1 Base

MH3.1.1.1 Affected Environment

Mountain Home AFB is located approximately 50 miles southeast of Boise, Idaho, and 8 miles southwest of Mountain Home, Idaho. Currently, the 366 FW flies and maintains 42 F-15E aircraft in support of its mission for the Air Force. The Republic of Singapore Air Force (RSAF) also operates a training squadron of 14 authorized F-15SG aircraft as part of the 366 FW but is maintained separately.

Airspace currently supporting aircraft operations at Mountain Home AFB includes the airspace surrounding the base and the larger airspace that encompasses the Mountain Home AFB radar approach control area. Mountain Home AFB approach control provides air traffic control services within this airspace for arriving and departing aircraft. A total of over 30,000 annual operations were conducted at Mountain Home AFB under baseline conditions, including almost 29,000 by based F-15E/SG aircraft. The only other airfields in the vicinity are the Mountain Home Municipal Airport (about 10 statute miles from Mountain Home AFB), Glenns Ferry Municipal Airport (almost 30 statute miles away), and two private-use airports at Owen and Grasmere (approximately 20 and 45 statute miles from base, respectively). Aircraft based at Mountain Home AFB have flown in this airspace environment for many decades. No comments were received during the public scoping period revealing conflicts with civil or commercial aviation.

MH3.1.1.2 Environmental Consequences

Beddown of 24, 48, or 72 F-35A operational aircraft at Mountain Home AFB would increase the number of operations conducted at Mountain Home AFB by about 33 percent (ACC Scenario 1), 65 percent (ACC Scenario 2), and 98 percent (ACC Scenario 3) (Table MH3.1-1). Even though the total operations increase for all scenarios, it would not affect airspace management and use within the local air traffic environment. Mountain Home AFB was surveyed for the F-35A beddown by ACC staff, and the runway and terminal airspace capacity were found to be adequate for 72 potential aircraft and their additional annual airfield operations totaling over 32,600 (Wyle 2011). No changes to the Mountain Home AFB terminal airspace or base arrival and departure procedures would be required to accommodate F-35A aircraft performance or operations. The increased operations would not exceed the capabilities of Mountain Home AFB Approach Control or its control tower for handling air traffic within the local airspace.

Table MH3.1-1. Comparison of ACC Scenarios – Airfield Operations				
Aircraft	***Baseline***	***ACC Scenario 1***	***ACC Scenario 2***	***ACC Scenario 3***
Based F-15E/SG	28,766	28,766	28,766	28,766
Transients[1]	3,846	3,846	3,846	3,846
F-35A	-	10,667	21,334	32,001
Total	**32,612**	**43,279**	**53,946**	**64,613**
Percent Increase from Baseline	**-**	**+32.7%**	**+65.4%**	**+98.1%**

Source: Wyle 2011.
Note: [1]Includes Gowen Field aircraft pattern work, F-15C, KC-135, C-21, A-10, and others.

MH3.1.2 Airspace

MH3.1.2.1 Affected Environment

The affected airspace for Mountain Home AFB includes the MOAs, ATCAAs, and Restricted Areas the F-35A would use on a continuing basis for training (refer to Table MH2.2-2 and Figure MH2.2-1). These local airspace units, known collectively as the MHRC, receive most of Mountain Home AFB's current F-15E/SG use. In total, the F-15E/SGs fly about 26,200 operations in the MHRC. The based aircraft account for 80 percent of the total use of this airspace. The Idaho Air National Guard, which operates A-10s, accounts for about 19 percent of total operations. Occasionally, Mountain Home AFB's F-15E/SGs fly training operations to the Nevada Test and Training Range, near Nellis AFB, or the Utah Test and Training Range. This pattern of airspace use would continue with the F-35As, but the frequency of local airspace use would increase with the proposed action.

No low-altitude civil routes (called Victor routes) transit the MHRC. Only one high level jet route, J523 transits the western edge of Paradise North/South MOA, but aircraft on the route are under positive air traffic control at altitudes above 18,000 feet MSL. Annual traffic counts on this route number about 365, or one per day (FAA 2010).

Commercial aircraft activity in Idaho and Nevada has increased recently and is expected to continue to grow over the next 20 years as the population of the states also increases. Most of this present and anticipated growth occurs at the Boise Airport. Two civilian airports occur under the Jarbidge North MOA, and one each underlies the Owyhee South, Paradise North, and Saddle A MOAs. A few private airstrips are widely scattered under the entire MOA airspace and may be used occasionally.

Use of the MHRC MOA airspace is required, on occasion, by the Bureau of Land Management (BLM) and Idaho Department of Fish and Game for management flights for fire spotting/response, game surveys, and other such activities. Mountain Home AFB airspace management assists in coordinating these flights when contacted by the agencies to help make both agency and military aircrews aware of the timing, duration, location, and altitudes of each other's flight activities. Close coordination of scheduling and use of these Restricted Areas and MOAs by the respective scheduling agencies for these and other activities ensures safe air traffic operations throughout this region. Therefore, other air traffic traveling in or near these airspace units are not in conflict with military flight activities.

As noted in Chapter 2, Section 2.1.2, F-35A aircraft would not use military training routes, either to access the special use airspace or conduct training. Due to their predominantly higher altitude missions, advanced electronics, and speed, the F-35As would use MOAs, ATCAAs, and Restricted Areas.

MH3.1.2.2 Environmental Consequences

Selection of Mountain Home AFB for beddown of 24, 48, or 72 F-35A operational aircraft would not result in impacts on airspace use and management throughout this region. The three ACC Scenarios would not require any changes to the current lateral or vertical configuration of the MOAs, ATCAAs, or Restricted Areas, nor would it alter their normally scheduled times of use. Proposed F-35A operations in the MHRC would result in average increases of 13, 26, or 39 percent for the respective scenarios.

Overall, the proposed increases in MHRC use would not affect civilian/commercial air traffic along the adjacent jet routes and would have little effect on the low-density general-aviation operations throughout this area. Civilian pilots can access real-time MOA information by contacting Cowboy Control for radio equipped aircraft, or calling (208) 828-4804 prior to flight. Continued coordination between Mountain Home AFB and agencies (BLM and Idaho Department of Fish and Game) conducting land and wildlife management flights would minimize any impacts military operations could have on these agency flights. Considering that the operations would represent a continuation of current activities, no adverse impacts on airspace use or management would be expected, despite the aforementioned increases.

MH3.2 Noise

This section describes the noise environment under baseline conditions and then presents the potential impacts that could occur under the three action scenarios. For purposes of this Environmental Impact Statement (EIS), the noise environment at Mountain Home AFB was modeled using NOISEMAP. The Air Force uses 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 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. Specific detailed information on supplemental metrics (e.g., annoyance) is presented in Appendix C.

Both Sound Exposure Level (SEL) and Maximum Sound Level (L_{max}) metrics would apply to any beddown scenario. As shown in Table MH3.2-1, the SEL and L_{max} noise levels reflect conditions specific to flight activity at Mountain Home AFB, 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 F-15E/SG aircraft already at the base.

Table MH3.2-1. SEL and L_{max} Comparison for Mountain Home AFB

Condition	Based F-15E/SG[1]				F-35A[2]			
	SEL (dBA)	L_{max} (dBA)	Power (%NC)	Speed (kts)	SEL (dBA)	L_{max} (dBA)	Power (%ETR)	Speed (kts)
Afterburner Assisted Take-off[3] (1,000 feet AGL)	**116**	**108**	92%	300	**116**	**113**	100%	300
Military Power Take-off (1,000 feet AGL)	**116**	**108**	92%	300	**116**	**113**	100%	300
Arrival (non-break, through 1,000 feet AGL, gear down[4])	**104**	**95**	83%	155	**99**	**95**	40%	180
Overhead Break (downwind leg, 1,800 feet AGL, gear down)	**80**	**73**	72%	200	**94**	**88**	40%	200
Low Approach and Go (downwind leg, 1,800 feet AGL, gear down)	**96**	**87**	82%	200	**94**	**88**	40%	210
Re-entry Pattern (downwind leg, 1,300 feet AGL, gear up)	**94**	**87**	80%	300	**84**	**79**	30%	300
Radar Pattern (downwind leg, 1,300 feet AGL, gear up)	**97**	**90**	82%	300	**85**	**80**	30%	250

Mountain Home AFB nominal elevation = 2,996 feet MSL; Weather: 55°F, 47% Relative Humidity; SEL = Sound Exposure Level; L_{max} = Maximum (instantaneous) Sound Level; dBA = A-Weighted Decibel; NC = Engine core revolutions per minute; kts = knots; ETR = Engine thrust request.
Notes: All numbers are rounded.
[1]Modeled F-15E/SG with F110-PW-229 engine.
[2]Modeled with reference acoustic data for an F-35A (Air Force 2009a).
[3]Power reduced from Afterburner to military power prior to reaching 1,000 feet AGL.
[4]F-15E/SG values reflect gear-up conditions.

MH3.2.1 Base

MH3.2.1.1 Affected Environment

The data used for baseline noise conditions were derived from the original RSAF beddown (Air Force 2007b) and the plus-up of RSAF F-15SG Squadron at Mountain Home AFB (Air Force 2009b). Under baseline, 32,612 airfield operations were flown annually at Mountain Home AFB. This total includes 28,766 operations generated by the based 366 FW and RSAF F-15E/SG aircraft and an additional 3,846 operations conducted by transient military as well as very few civilian and commercial aircraft. Under baseline conditions, based and transient aircraft conducted 29,193 operations during environmental daytime hours (i.e., 7:00 a.m. and 10:00 p.m.); a total of 3,419 operations were generated during environmental nighttime (or between 10:00 p.m. to 7:00 a.m.). Operations occurring during environmental nighttime hours are assessed a 10-decibel (dB) penalty applied for each operation (refer to Section 3.3 for more detailed resource definition and methodology used to evaluate impacts).

Noise Exposure

Figure MH3.2-1 presents baseline noise contours in 5-dB contour bands. Table MH3.2-2 presents noise exposure within each dB DNL contour band for off-base acreage, population, households, and on- and off-base representative receptors.

Representative receptors include on- and off-base places of worship, schools, child care facilities, hospitals, and residential locations potentially within areas affected by aircraft noise of 65 dB DNL and greater. According to the Census Bureau, households are defined as a house, an apartment, a mobile

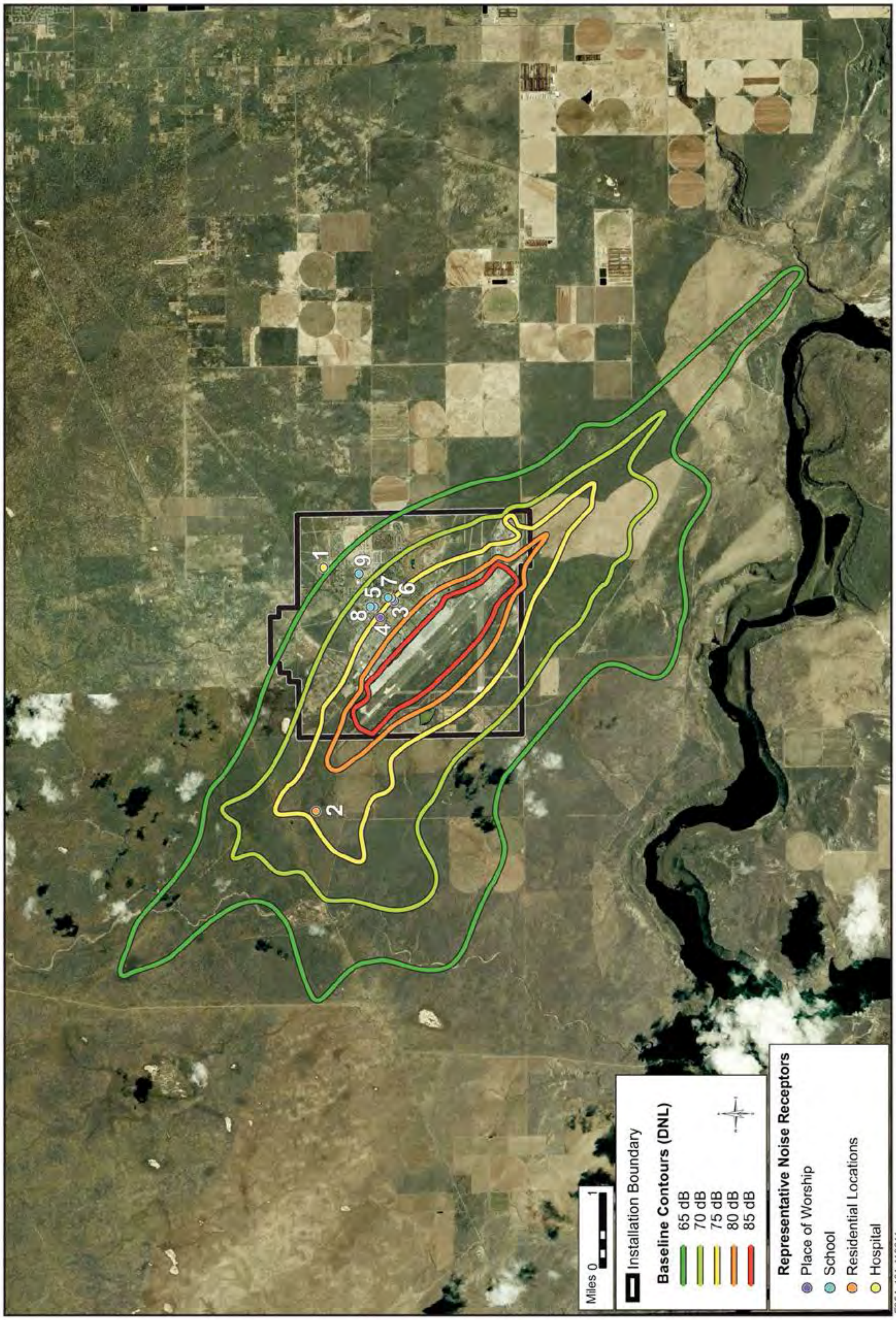


Figure MH3.2-1. Baseline Noise Conditions at Mountain Home AFB

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 2010b).

Generally, to determine the population counts by contour band, this type of 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 Mountain Home AFB where there are low or inconsistent population densities, actual houses were counted using current aerial photographs and using the U.S. Census population multiplier for Elmore County of 2.76 people per household.

Table MH3.2-2. Off-Base Noise Exposure within Baseline Contours at Mountain Home AFB

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*[2]	*Receptors*[3]
65 – 70	8,504	0	0	1
70 – 75	3,874	0	0	3
75 – 80	1,292	3	1	4
80 – 85	135	0	0	0
85+	0	0	0	0
Total	**13,805**	**3**	**1**	**8**

Source: Wyle 2011 and U.S. Census 2010b.
Notes:[1]Exclusive of upper bound for all bands.
[2]Based on actual house counts.
[3]All but 1 are located on-base; refer to Figure MH3.2-1.

In total, off-base exposure to noise levels of 65 dB DNL or greater include 13,805 acres, three people and one household. Table MH3.2-3 lists the DNL for nine representative receptors on and around Mountain Home AFB under baseline conditions. Of the nine representative receptors, eight lie within the base and nearer to the airfield where noise levels are higher. All but one receptor experiences noise levels of 65 dB DNL or greater.

Table MH3.2-3. Baseline Decibel Levels at Representative Locations on and near Mountain Home AFB

Location ID Number	*Receptor*[1]	*Type*	*Decibel Level (dB DNL)*
1	366 FW Hospital	Hospital	<65
2	Residential	Residential	76
3	Liberty Chapel	Worship	76
4	Chapel Annex	Worship	76
5	Boise State University (annex)	School	74
6	Child Care Center	School	75
7	Child Care Center	School	74
8	Education Facility	School	73
9	Base Primary School	School	68

Source: Wyle 2011 and U.S. Census 2010b.
Note: [1]Receptors 1 and 3 through 9 are on Mountain Home AFB.

Departures from Runway 30 and arrivals to Runway 12 of based F-15 aircraft dominate the DNL to the northwest of the base. Based F-15 departures from Runway 30 dominate the DNL to the west of the base (i.e., the western bulge of the DNL contours) and based F-15 arrivals to Runway 30 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 numbers 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 MH3.2-4, which presents indoor speech interference under baseline, reveals that speech interfering events per hour average 1.8 with windows closed and 4.3 with windows open.

Table MH3.2-4. Baseline Indoor Speech Interference at Representative Locations on and near Mountain Home AFB

Location ID Number	*Receptor*	*Average Daily Indoor Events per Hour[1] Daytime (7:00 a.m. to 10:00 p.m.)*	
		Windows Closed	*Windows Open*
1	366 FW Hospital	1	2
2	Residential	2	5
3	Liberty Chapel	2	5
4	Chapel Annex	2	5

Source: Wyle 2011 and U.S. Census 2010b.
Note: [1]Assumed 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. For schools, two additional classroom criteria have to be applied to evaluate if speech interference would inhibit classroom learning. When considering intermittent noise caused by aircraft overflights, guidelines for classroom interference indicate that an appropriate criterion is a limit on indoor background equivalent noise levels of 35 to 40 dB (equivalent noise level [L_{eq}]) and a limit on single events of 50 dB L_{max}. The 50 dB L_{max} for single events equates to outdoor L_{max} of 65 dB and 75 dB for windows open and closed, respectively. Thus the number of annual average daily events whose L_{max} would be greater than or equal to 65 dB and 75 dB serve as the measure of potential classroom effects and are presented as NA65 L_{max} and NA75L_{max} for windows open and closed, respectively, on a per-hour basis. Because classrooms are in use during the day predominantly, these criteria are applied for aircraft operations occurring between 8:00 a.m. and 4:00 p.m. rather than between 7:00 a.m. and 10:00 p.m. for standard speech interference. Table MH3.2-5 presents the baseline classroom levels and events for the school receptors. Noise levels at all of the on-base schools exceed the outdoor equivalent of 60 dB L_{eq} over an 8-hour period.

Table MH3.2-5. Baseline Classroom Speech Interference for Schools on Mountain Home AFB				
Location ID Number	*Receptor*	*Outdoor Equivalent Noise Level (L_{eq})*	*Number of Events Above a Maximum Outdoor Noise Level of 75 dB ($NA75L_{max}$)*[1]	
			Windows Closed	*Windows Open*
5	Boise State University (annex)	69	2	5
6	Child Care Center	70	2	5
7	Child Care Center	69	2	5
8	Education Facility	68	2	4
9	Base Primary School	64	1	3

Source: Wyle 2011 and U.S. Census 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Sleep Disturbance

Sleep disturbance is a concern for communities exposed to nighttime noise. 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 MH3.2-6 lists the probabilities of indoor awakening from average daily nighttime (10:00 p.m. to 7:00 a.m.) events for the single residence within the 65 dB DNL contour band. Because the 366 FW flies approximately 12 percent of its operations during environmental night (10:00 p.m. to 7:00 p.m.), the single affected residence experiences an estimated 22 to 31 percent probability of nighttime awakening with windows closed and open, respectively.

Table MH3.2-6. Baseline Indoor Sleep Disturbance at Representative Locations near Mountain Home AFB			
Location ID Number	*Receptor*	*Average Nightly (10:00 p.m. to 7:00 a.m.) Probability of Awakening (%)*[1]	
		Windows Closed	*Windows Open*
2	Residential	22%	31%

Source: Wyle 2011 and U.S. Census 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

Potential for Hearing Lost (PHL) applies to people living in high noise environments where they can experience long-term (40 years) hearing effects under noise levels greater than 80 dB DNL. No on-base or off-base residences occur within the 80 dB DNL or greater contour bands, so PHL is not an issue at Mountain Home AFB.

Occupational Noise

When on-base noise exposure occurs, existing Air Force occupational noise exposure prevention procedures, such as hearing protection and monitoring, are undertaken in compliance 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 the base. While these sources may contribute to the overall noise environment, they are not distinguishable from aircraft-generated noise at and adjacent to the base. For this reason, these other noise sources were not considered under baseline nor are they analyzed under any of the beddown scenarios.

MH3.2.1.2 Environmental Consequences

ACC Scenario 1

Noise Exposure

This scenario would beddown 24 F-35A aircraft at Mountain Home AFB, adding to the existing inventory and operations. F-35A operations would total 10,667 annually, with more than 99 percent (10,600 operations) during the environmental daytime hours (between 7:00 a.m. and 10:00 p.m.). About 81 percent of these proposed operations would consist of departures and arrivals; the remaining 19 percent would involve pattern work in the vicinity of the airfield. Annual operations generated by the F-35A, when added to existing and transient military aircraft activities (32,612) would total 43,279. This scenario would produce a 32.7 percent increase in operations. Figure MH3.2-2 depicts the noise contours under ACC Scenario 1; baseline contours are also presented for comparison purposes.

Table MH3.2-7 presents noise exposure in terms of estimated off-base acreage, population, households, and on- and off-base representative receptors. When compared to baseline conditions, ACC Scenario 1 noise levels of 65 dB DNL or greater would affect 1,005 more acres. All of this area consists of open or agricultural lands. No changes to the number of people or households exposed to noise levels of 65 dB DNL or greater would occur. One additional receptor, the base hospital, would be affected.

Table MH3.2-7. Off-Base Noise Exposure under ACC Scenario 1 at Mountain Home AFB Proposed/Baseline

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*[2]	*Receptors*[3]
65 – 70	9,056/8,504	0/0	0/0	2/1
70 – 75	4,131/3,874	0/0	0/0	3/3
75 – 80	1,445/1,292	3/3	1/1	4/4
80 – 85	178/135	0/0	0/0	0/0
85+	0/0	0/0	0/0	0/0
Total	**14,810/13,805**	**3/3**	**1/1**	**9/8**

Source: Wyle 2011 and U.S. Census 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]Based on actual house counts.
[3]All but 1 are located on-base; refer to Figure MH3.2-2.

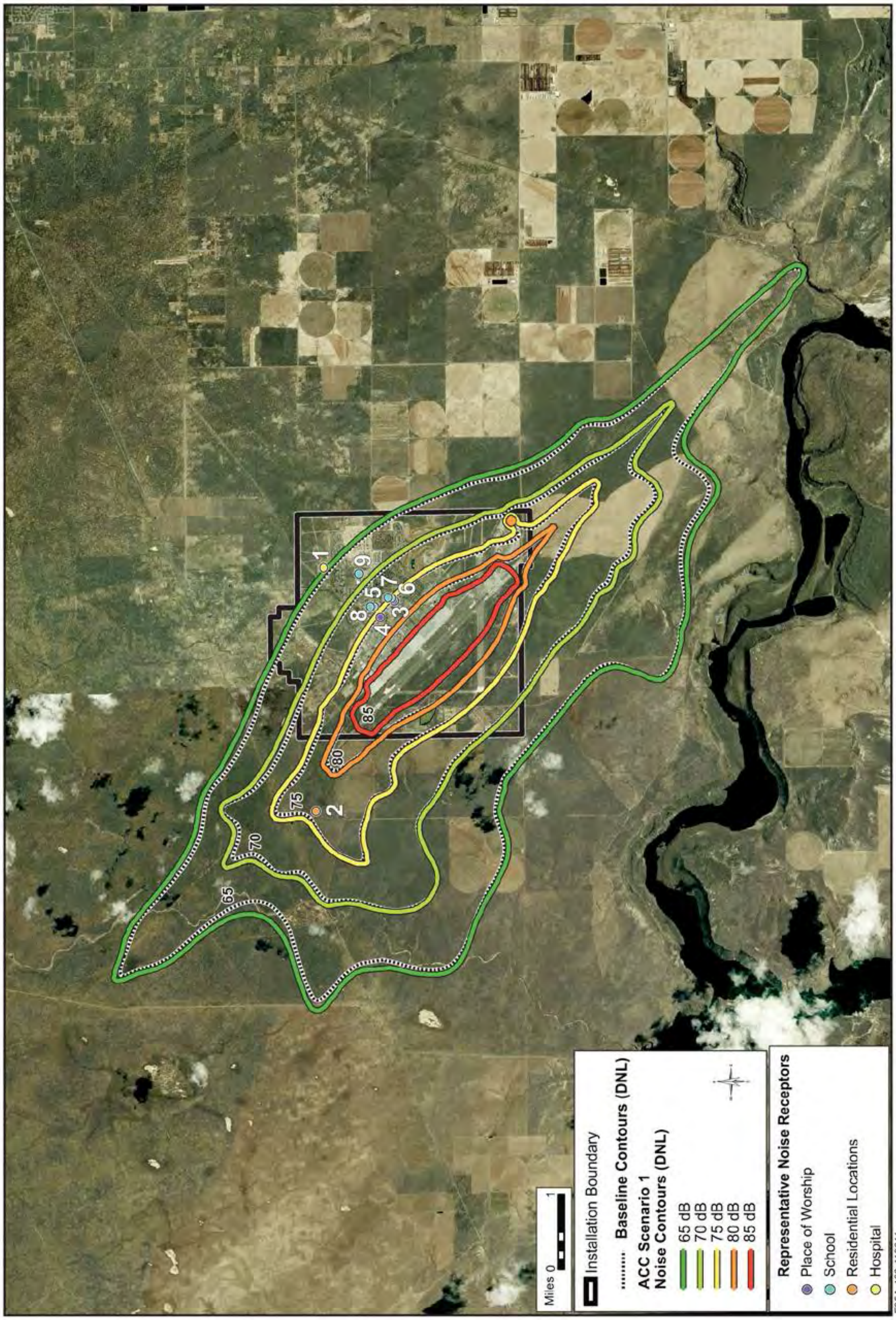


Figure MH3.2-2. ACC Scenario 1 Proposed Noise Contour Bands at Mountain Home AFB

Overall, the DNL contours would be about the same as baseline; operations by 24 Primary Aircraft Authorized (PAA) F-35A would not have a noticeable effect on the DNL contours relative to baseline. With the F-15E/SG operations maintained, departures[1] would be the major component of the DNL contours. Also, the F-35A would have similar departure SELs as the F-15E/SG with only 20 percent of the equivalent annual departures of the F-15E/SG. Similar to baseline, based F-15E/SG departures from Runway 30 would dominate the DNL to the west of the base (i.e., the western bulge of the DNL contours), and based F-15E/SG arrivals to Runway 30 would dominate the DNL to the southeast of the base.

Decibel levels for representative receptors on or near Mountain Home AFB are provided in Table MH3.2-8. Under ACC Scenario 1, noise levels for three receptors would increase by 1 dB and for the others, noise would continue at baseline levels.

Table MH3.2-8. Decibel Levels under ACC Scenario 1 at Representative Locations on and near Mountain Home AFB Proposed/Baseline

Location ID Number	*Receptor[1]*	*Type*	*Decibel Level (dB DNL)*
1	366 FW Hospital	Hospital	65/<65
2	Residential	Residential	76/76
3	Liberty Chapel	Worship	76/76
4	Chapel Annex	Worship	76/76
5	Boise State University (annex)	School	74/74
6	Child Care Center	School	75/75
7	Child Care Center	School	75/74
8	Education Facility	School	73/73
9	Base Primary School	School	69/68

Source: Wyle 2011 and U.S. Census 2010b.
Note: [1]Receptors 1 and 3 through 9 are on Mountain Home AFB.

Speech Interference

Table MH3.2-9 presents the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour for receptors that generally would experience indoor maximum sound levels of at least 50 dB with windows closed and open. Under this scenario, the mean number of speech interfering events across all receptors would be 3.0 and 5.3 per hour for windows open and closed, respectively, with an average increase of 1.8 or less event per hour relative to baseline.

[1] Equivalent annual flight operations equal daytime (7:00 a.m. to 10:00 p.m.-2200) flight operations plus ten times the nighttime (10:00 p.m. to 7:00 a.m.) flight operations.

Table MH3.2-9. ACC Scenario 1 Indoor Speech Interference at Representative Locations on and near Mountain Home AFB					
Location ID Number	***Receptor[2]***	***Average Daily Indoor Events per Hour[1] Daytime (7:00 a.m. to 10:00 p.m.)***			
		Windows Closed	*Windows Open*	*Change from Baseline*	
				Windows Closed	Windows Open
1	366 FW Hospital	3	4	2	2
2	Residential	1	3	1	1
3	Liberty Chapel	4	7	2	2
4	Chapel Annex	4	7	2	2

Source: Wyle 2011 and U.S. Census 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Receptors 1, 3, and4 are located on Mountain Home AFB.

Classroom Speech Interference

Table MH3.2-10 presents the potential speech interference impacts for classrooms at schools under ACC Scenario 1. For all five on-base schools, the L_{eq} noise levels would increase by 2 to 3 dB and the number of events would increase by 2 to 3 per hour.

Table MH3.2-10. ACC Scenario 1 Classroom Speech Interference for Schools on Mountain Home AFB				
Location ID Number	***Receptor***	***Outdoor Equivalent Noise Level (L_{eq})***	***Number of Events Above a Maximum Outdoor Noise Level of 75 dB (NA75L_{max})[1]***	
			Windows Closed	*Windows Open*
5	Boise State University (annex)	71	4	7
6	Child Care Center	73	4	8
7	Child Care Center	72	4	7
8	Education Facility	71	4	7
9	Base Primary School	66	4	6

Source: Wyle 2011 and U.S. Census 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Sleep Disturbance

Table MH3.2-11 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 the single affected off-base residence, the probability of awakenings would increase by 1 percent only with windows open. The probability of awakening within windows closed would not change.

Table MH3.2-11. ACC Scenario 1 Indoor Sleep Disturbance at Representative Locations near Mountain Home AFB					
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
2	Residential	18%	31%	0%	1%

Source: Wyle 2011 and U.S. Census 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

No on-base or off-base residences would be exposed to noise levels greater than 80 dB DNL under ACC Scenario 1. Therefore, PHL is not an issue.

Occupational Noise

Air Force occupational noise exposure prevention procedures such as hearing protection and monitoring would be implemented under this scenario. These procedures would comply with all applicable OSHA and Air Force occupational noise exposure regulations.

ACC Scenario 2

Noise Exposure

ACC Scenario 2 would add 48 F-35A aircraft to existing aircraft inventories found at Mountain Home AFB. Proposed F-35A flight operations under ACC Scenario 2 would total 21,334 annually, with more than 99 percent (21,200) occurring during environmental daytime hours (between 7:00 a.m. and 10:00 p.m.) and only 134 during environmental night. About 81 percent of these proposed operations would consist of departures and arrivals; the remaining 19 percent would involve pattern work in the vicinity of the airfield. In total, there would be 51,759 annual flight operations generated by the F-35As, F-15E/SGs, and transient military aircraft, a 65.4 percent increase relative to baseline levels. Figure MH3.2-3 depicts ACC Scenario 2 noise contours at Mountain Home AFB; baseline noise contour bands are also presented for comparison purposes.

Table MH3.2-12 presents off-base noise exposure, in terms of estimated acreage, population, households, and on- and off-base representative receptors. When compared to baseline conditions, ACC Scenario 2 noise levels of 65 dB DNL and greater would affect 2,086 more acres. All of these acres consist of open or agricultural lands. No changes to the number of people or households exposed to noise levels of 65 dB DNL or greater would occur under ACC Scenario 2 relative baseline conditions. One additional receptor, the base hospital would be affected.

Table MH3.2-12. Off-Base Noise Exposure under ACC Scenario 2 for Mountain Home AFB Proposed/Baseline

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*[2]	*Receptors*[3]
65 – 70	9,658/8,504	0/0	0/0	2/1
70 – 75	4,409/3,874	0/0	0/0	3/3
75 – 80	1,602/1,292	3/3	1/1	4/4
80 – 85	222/135	0/0	0/0	0/0
85+	0/0	0/0	0/0	0/0
Total	**15,891/13,805**	**3/3**	**1/1**	**9/8**

Source: Wyle 2011 and U.S. Census 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]Based on actual house counts.
[3]All but 1 are located on-base; refer to Figure 3.2-3.

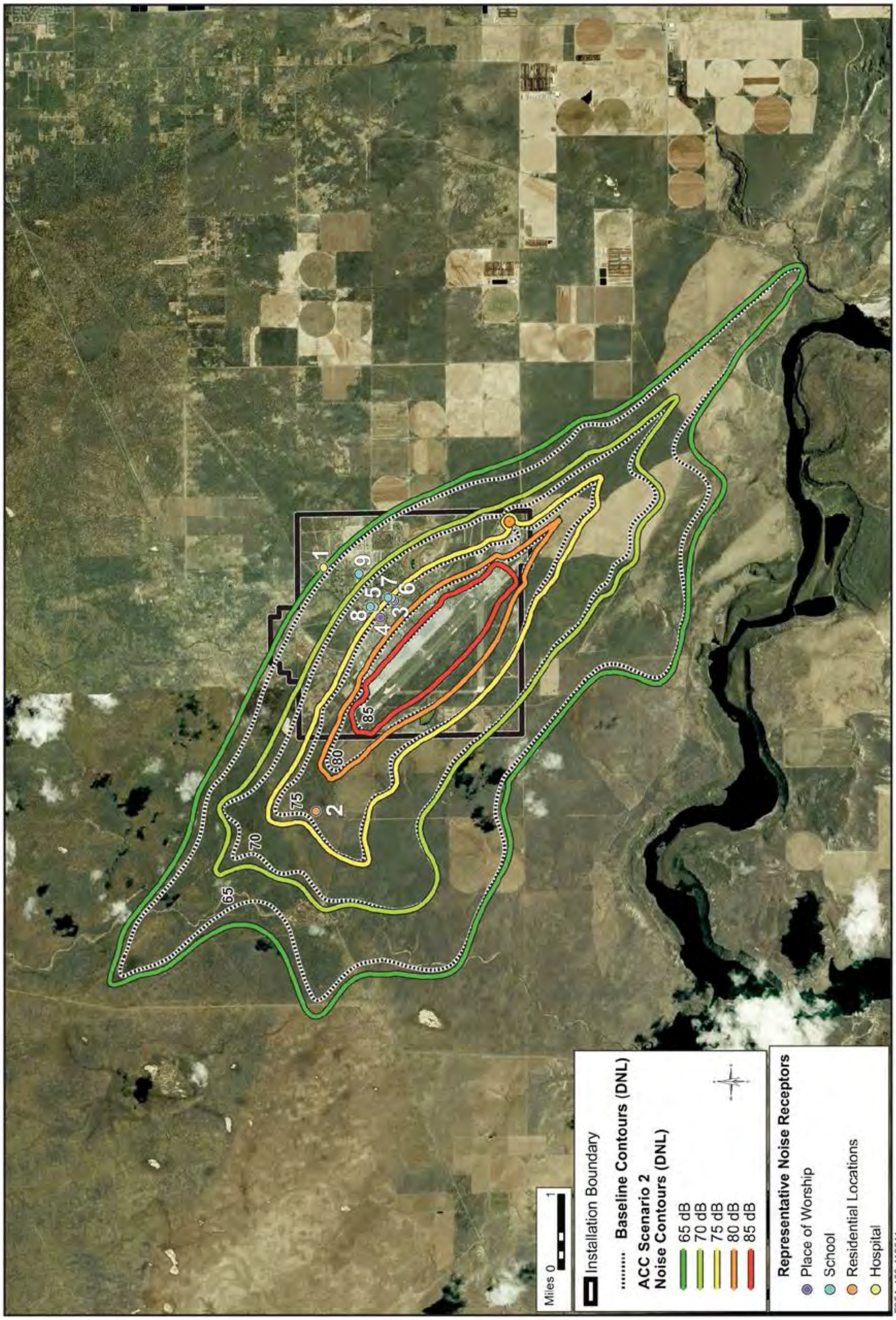


Figure MH3.2-3. ACC Scenario 2 Proposed Noise Contour Bands at Mountain Home AFB

Overall, the DNL contours would be approximately 1 dB greater than baseline; operations by 48 PAA F-35A would have the effect of increasing the DNL contours by less than 1 dB relative to baseline. With the F-15E/SG operations maintained, departures would be the major component of the DNL contours. Also, the F-35A would have similar departure SELS as the F-15E/SG with less than half equivalent annual departures. Similar to baseline, based F-15E/SG departures from Runway 30 would dominate the DNL to the west of the base (i.e., the western bulge of the DNL contours), and based F-15E/SG arrivals to Runway 30 would dominate the DNL to the southeast of the base.

Decibel levels for representative receptors on or near Mountain Home AFB are provided in Table MH3.2-13. Similar to ACC Scenario 1, three of the nine receptors would experience a 1 to 2 dB DNL increase in noise levels for ACC Scenario 2. The other six would continue to be exposed to noise levels unchanged from baseline.

Table MH3.2-13. Decibel Levels at Representative Locations under ACC Scenario 2 on and near Mountain Home AFB Proposed/Baseline

Location ID Number	***Receptor[1]***	***Type***	***Decibel Level (dB DNL)***
1	366 FW Hospital	Hospital	65/<65
2	Residential	Residential	76/76
3	Liberty Chapel	Worship	76/76
4	Chapel Annex	Worship	76/76
5	Boise State University (annex)	School	74/74
6	Child Care Center	School	75/75
7	Child Care Center	School	75/74
8	Education Facility	School	73/73
9	Base Primary School	School	69/68

Source: Wyle 2011 and U.S. Census 2010b.
Note: [1]Receptors 1 and 3 through 9 are on Mountain Home AFB.

Speech Interference

Table MH3.2-14 presents the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events for the representative receptors per hour that generally would experience indoor maximum sound levels of at least 50 dB with windows closed and open. The mean number of speech interfering events across all receptors would be 4 and 7.5 per hour, respectively, for windows closed and windows open. ACC Scenario 2 would result in an average increase of 3.4 or fewer events per hour relative to baseline.

Table MH3.2-14. ACC Scenario 2 Indoor Speech Interference at Representative Locations on and near Mountain Home AFB					
Location ID Number	***Receptor***[2]	***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	366 FW Hospital	4	6	3	4
2	Residential	2	5	2	3
3	Liberty Chapel	5	10	3	5
4	Chapel Annex	5	9	3	4

Source: Wyle 2011 and U.S. Census 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Receptors 1, 3, and 4 located on Mountain Home AFB.

Classroom Speech Interference

Table MH3.2-15 presents the potential speech interference impacts for classrooms at schools under ACC Scenario 2. Noise levels (L_{eq}) would increase by 2 dB for four of the five on-base schools and 1 dB for a child care center. The number of events per hour above NA75L_{max} would increase an average of 4.2 for windows closed and 5.4 for windows open.

Table MH3.2-15. ACC Scenario 2 Classroom Speech Interference for Schools on Mountain Home AFB				
Location ID Number	***Receptor***	***Outdoor Equivalent Noise Level (L_{eq})***	***Number of Events Above a Maximum Outdoor Noise Level of 75 dB (NA75L_{max})***[1]	
			Windows Closed	*Windows Open*
5	Boise State University (annex)	72	6	10
6	Child Care Center	73	6	11
7	Child Care Center	73	6	10
8	Education Facility	72	6	10
9	Base Primary School	67	6	8

Source: Wyle 2011 and U.S. Census 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Sleep Disturbance

Table MH3.2-16 lists the probabilities of indoor awakening events for receptors, during daily average environmental nighttime hours, with windows closed and open. For the single affected off-base residence, the probability of awakenings would increase by 1 percent only with windows open. The probability of awakening with windows closed would not change.

Table MH3.2-16. ACC Scenario 2 Indoor Sleep Disturbance at Representative Locations near Mountain Home AFB					
Location Identification 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
2	Residential	22%	32%	0%	1%

Source: Wyle 2011 and U.S. Census 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

No on- or off-base residences would be exposed to noise levels greater than 80 dB DNL under ACC Scenario 2. Therefore, PHL is not an issue.

Occupational Noise

Air Force occupational noise exposure prevention procedures such as hearing protection and monitoring would be implemented under this scenario. These procedures would assure compliance with all applicable OSHA and Air Force occupational noise exposure regulations.

ACC Scenario 3

Noise Exposure

ACC Scenario 3 would beddown 72 F-35A aircraft at Mountain Home AFB. Proposed F-35A flight operations under this scenario would total 32,001 annually. Of this total, more than 99 percent (31,800) of the operations would take place during environmental daytime hours (between 7:00 a.m. and 10:00 p.m.), with 201 during environmental night. About 84 percent of these operations would consist of departures and arrivals; the remaining 16 percent would involve pattern work in the vicinity of the airfield. Annual operations generated by F-35As along with existing and transient military aircraft would total 62,613, a 98.1 percent increase over baseline.

Figure MH3.2-4 shows the noise contours at Mountain Home AFB under ACC Scenario 3. Baseline contours are also presented for comparison purposes. Table MH3.2-17 presents off-base noise exposure, in terms of estimated acreage, population, households, and on- and off-base representative receptors. When compared to baseline conditions, ACC Scenario 3 noise levels of 65 dB DNL and greater would affect 3,455 more acres and 1 more receptor. No changes to the total number of people or households exposed to noise levels of 65 dB DNL or greater would occur under ACC Scenario 3.

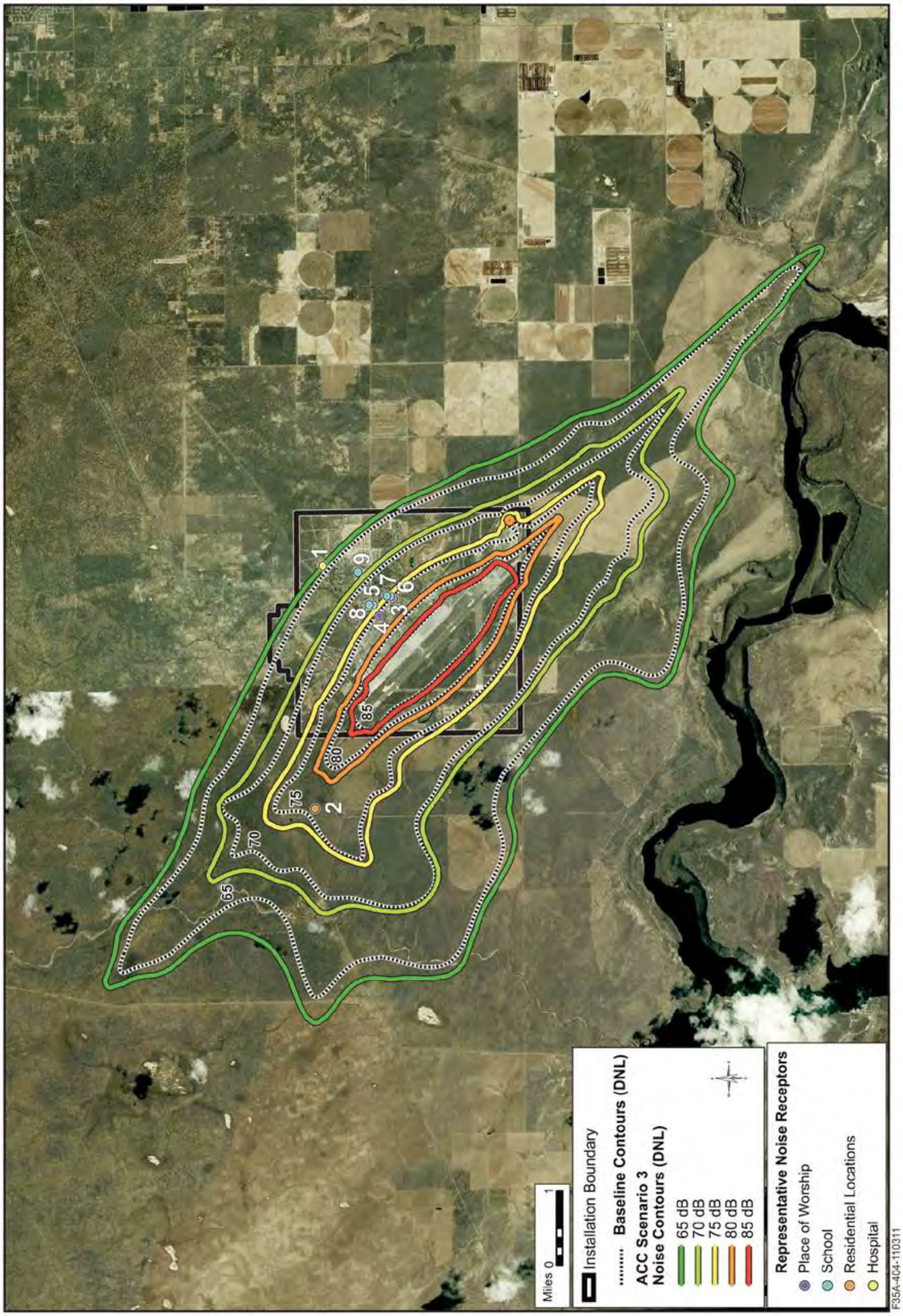


Figure MH3.2-4. ACC Scenario 3 Proposed Noise Contour Bands at Mountain Home AFB

Table MH3.2-17. Off-Base Noise Exposure under ACC Scenario 3 for Mountain Home AFB Proposed/Baseline				
Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*[2]	*Receptors*[3]
65 – 70	10,275/8,504	0/0	0/0	2/1
70 – 75	4,691/3,874	0/0	0/0	1/3
75 – 80	1,746/1,292	3/3	1/1	6/4
80 – 85	548/135	0/0	0/0	0/0
85+	0/0	0/0	0/0	0/0
Total	**17,260/13,805**	**3/3**	**1/1**	**9/8**

Source: Wyle 2011 and U.S. Census 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]Based on actual house counts.
[3]All but 1 are located on-base; refer to Figure MH3.2-4.

Overall, the DNL contours would be approximately 1 dB greater than baseline; operations by 72 PAA F-35A would have the effect of increasing the DNL contours by approximately 1 dB relative to baseline. With the baseline F-15E/SG operations maintained, departures would be the major component of the DNL contours. Also, the F-35A would have similar departure SELS as the F-15E/SG with 35 percent fewer equivalent annual departures. Similar to baseline, based F-15E/SG departures from Runway 30 would dominate the DNL to the west of the base (i.e., the western bulge of the DNL contours), and based F-15E/SG arrivals to Runway 30 would dominate the DNL to the southeast of the base.

Decibel levels for representative receptors on or near Mountain Home AFB are provided in Table MH3.2-18. Under ACC Scenario 3, noise levels for seven of the nine receptors would increase by 1 dB DNL; the other two receptors would continue to be exposed to baseline levels. All receptors would be subject to noise levels of 65 dB DNL or greater.

Table MH3.2-18. Decibel Levels at Representative Locations under ACC Scenario 3 near Mountain Home AFB Proposed/Baseline			
Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
1	366 FW Hospital	Hospital	65/<65
2	Residential	Residential	77/76
3	Liberty Chapel	Worship	76/76
4	Chapel Annex	Worship	76/76
5	Boise State University (annex)	School	75/74
6	Child Care Center	School	76/75
7	Child Care Center	School	75/74
8	Education Facility	School	74/73
9	Base Primary School	School	69/68

Source: Wyle 2011 and U.S. Census 2010b.
Note: [1]Receptors 1 and 3 through 9 are on Mountain Home AFB.

Speech Interference

Table MH3.2-19 presents the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour for receptors that generally would experience indoor maximum sound levels of at least 50 dB with windows closed and open. Under this scenario, the mean number of speech interfering events across all receptors would be 9.3 and 5.3 per hour for windows open and closed, respectively, with an average increase of 4.9 or fewer events per hour relative to baseline.

Table MH3.2-19. ACC Scenario 3 Indoor Speech Interference at Representative Locations at Mountain Home AFB

Location ID Number	*Receptor*[2]	*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	366 FW Hospital	5	7	4	5
2	Residential	2	6	2	4
3	Liberty Chapel	7	12	5	7
4	Chapel Annex	7	12	5	7

Source: Wyle 2011 and U.S. Census 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Receptors 1, 3, and 4 are located on Mountain Home AFB.

Classroom Speech Interference

Table MH3.2-20 summarizes the potential speech interference impacts for classrooms at schools under ACC Scenario 3. Noise levels (L_{eq}) would increase by 2 dB for four of the on-base schools; the base primary school would experience an increase of 3 dB. The number of events per hour above NA75L_{max} would increase an average of 5 for windows closed and 8 for windows open.

Table MH3.2-20. ACC Scenario 3 Classroom Speech Interference for Schools on Mountain Home AFB

Location ID Number	*Receptor*	*Outdoor Equivalent Noise Level (L_{eq})*	*Number of Events Above a Maximum Outdoor Noise Level of 75 dB (NA75L_{max})*[1]	
			Windows Closed	*Windows Open*
5	Boise State University	73	6	7
6	Child Care Center	74	6	8
7	Child Care Center	73	6	7
8	Education Facility	72	5	7
9	Base Primary School	68	5	6

Source: Wyle 2011 and U.S. Census 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Sleep Disturbance

For the single affected off-base residence, the probability of awakenings would increase by 1 percent only with windows open (Table MH3.2-21). No change would occur with windows closed.

Table MH3.2-21. ACC Scenario 3 Indoor Sleep Disturbance at Representative Locations[1] near Mountain Home AFB					
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
2	Residential	18%	31%	0%	1%

Source: Wyle 2011 and U.S. Census 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

No on- or off-base residences would be exposed to noise levels greater than 80 dB DNL under ACC Scenario 3. Therefore, PHL is not an issue.

Occupational Noise

Air Force occupational noise exposure prevention procedures such as hearing protection and monitoring would be implemented under this scenario. These procedures would assure compliance with all applicable OSHA and Air Force occupational noise exposure regulations.

MH3.2.2 Airspace

This section presents noise conditions airspace and ranges that would be used by F-35A aircraft under any of the beddown scenarios. The airspace and ranges associated with Mountain Home AFB include airspace units in southeastern Oregon, southern Idaho, and northern Nevada. Proposed training activities would result from additional F-35A aircraft. As noted in section MH2.2, the 366 FW would operate the F-35As within existing MOAs, overlying ATCAAs, restricted airspace, and on ranges of the Mountain Home Range Complex, performing similar types of combat training missions currently conducted in the airspace. The noise analysis accounts for both subsonic noise and sonic booms in airspace authorized for supersonic flight. Subsonic noise is quantified by Onset-Rate Adjusted Day-Night Average Sound Level (L_{dnmr}); the cumulative sonic boom environment is quantified by C-weighted DNL (CDNL) and by the number of booms per month which would be heard on the ground (refer to Section 3.3).

In rural and wildland 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 MH3.6 (Terrestrial Communities) for a discussion of noise impacts to wildlife.

MH3.2.2.1 Affected Environment

Subsonic Noise

Figure MH3.2-5 presents the baseline noise levels in L_{dnmr} for each of the blocks of airspace proposed for use under all three scenarios. As this shows, noise levels for all units except Jarbidge North and Owyhee North experience low noise levels below 45 dB L_{dnmr}. Both Jarbidge North and Owyhee North support the majority of operations which generate 64 dB L_{dnmr}.

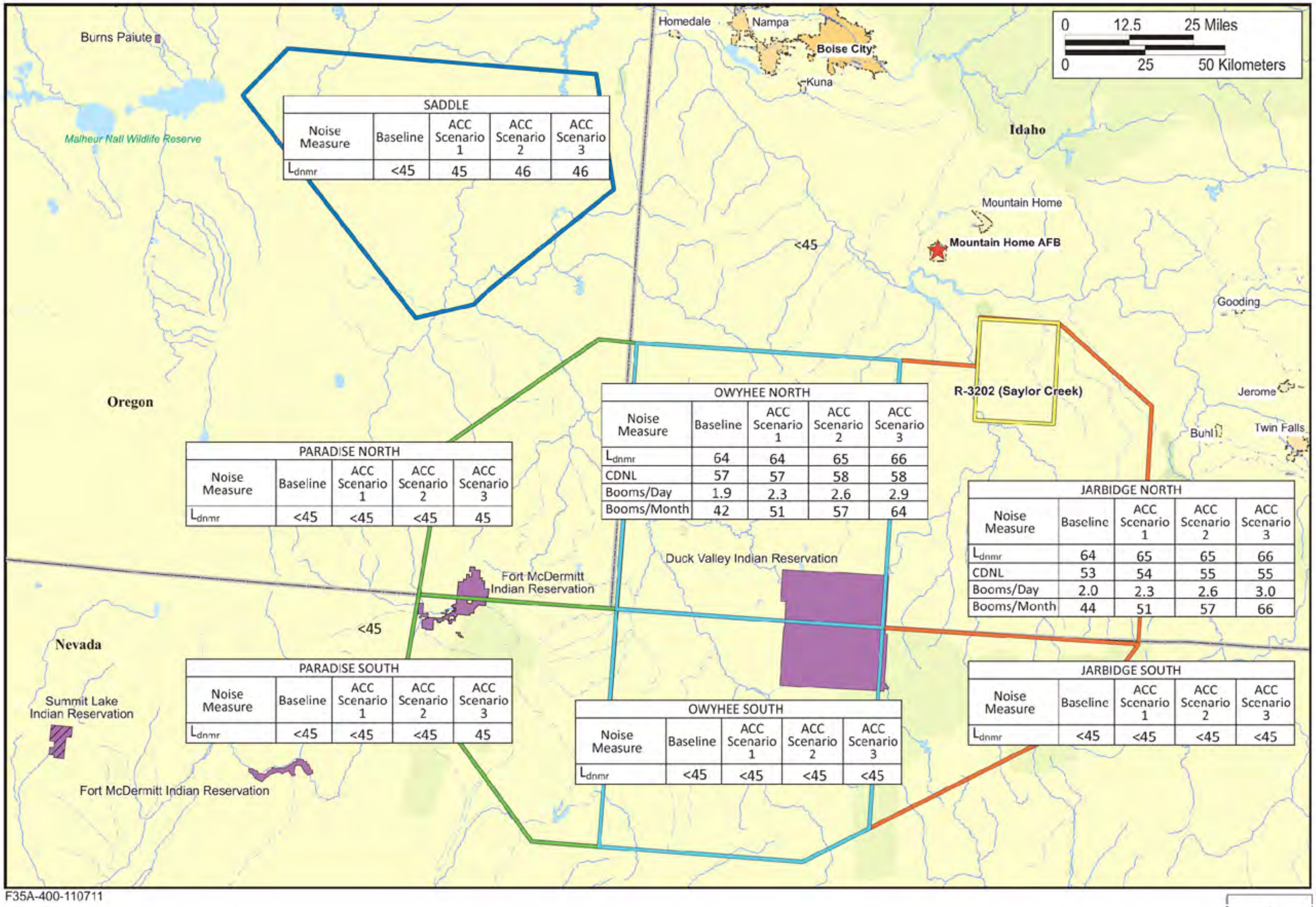
Supersonic Noise

Supersonic operations are permitted in Owyhee North and Jarbidge North MOAs and ATCAAs at altitudes above 10,000 feet MSL, except over the Duck Valley Indian Reservation where it is prohibited. Supersonic flight is also permitted above 30,000 feet MSL in the ATCAAs above all the other MOA airspace. As noted in Section 3.3, sonic booms generated at these high altitudes rarely reach the ground. On average, F-15E/SGs fly supersonic 4 percent of the time spent in air combat training with Mach numbers usually 1.1 or less, but occasionally up to about 1.3. They fly 20 percent of their supersonic events between 10,000 and 30,000 feet MSL, and 80 percent above 30,000 feet MSL. Supersonic operations in the Jarbidge North and Owyhee North generate an estimated 44 and 42 booms per month.

MH3.2.2.2 Environmental Consequences

Figure MH3.2-5 also presents the proposed noise levels in L_{dnmr} for each of the blocks of airspace proposed for use under all three scenarios. With the exception of Jarbidge and Owyhee North MOAs, noise levels in the airspace units would remain below 65 L_{dnmr}. In Jarbidge North, which supports the greatest number of baseline and projected operations, noise levels would increase 1 dB under ACC Scenarios 1 and 2, and by 2 dB under Scenario 3. For all ACC Scenarios, these increases would be imperceptible on the ground. Owyhee North would also experience increases in ACC Scenarios 2 and 3, by 1 and 2 dB, respectively. These increases would be imperceptible at ground level. While there are increases in noise levels within both MOAs, this amount of change would not create any adverse impacts to people underneath these airspace units. This is especially true because the land underlying these MOAs is quite rural with few people permanently living there. In Jarbidge and Owyhee South, Paradise North and South, and Saddle MOAs, noise levels would remain low continuing to experience noise levels at or below 45 L_{dnmr}. Such low levels are not anticipated to impact underlying populations, in fact such levels are often equated with ambient outdoor noise, although ambient noise differs greatly with topography and weather.

In terms of supersonic flight, the F-35As would perform these brief 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 surface, and at 15,000 to 30,000 feet MSL, the effects tend to be rare and negligible. Under baseline, the F-15E/SGs fly supersonic about 4 percent of air combat training. The F-35A is expected to fly supersonic during about 10 percent of all air combat operations.



SADDLE

Noise Measure	Baseline	ACC Scenario 1	ACC Scenario 2	ACC Scenario 3
L_{dnmr}	<45	45	46	46

PARADISE NORTH

Noise Measure	Baseline	ACC Scenario 1	ACC Scenario 2	ACC Scenario 3
L_{dnmr}	<45	<45	<45	45

PARADISE SOUTH

Noise Measure	Baseline	ACC Scenario 1	ACC Scenario 2	ACC Scenario 3
L_{dnmr}	<45	<45	<45	45

OWYHEE NORTH

Noise Measure	Baseline	ACC Scenario 1	ACC Scenario 2	ACC Scenario 3
L_{dnmr}	64	64	65	66
CDNL	57	57	58	58
Booms/Day	1.9	2.3	2.6	2.9
Booms/Month	42	51	57	64

OWYHEE SOUTH

Noise Measure	Baseline	ACC Scenario 1	ACC Scenario 2	ACC Scenario 3
L_{dnmr}	<45	<45	<45	<45

JARBIDGE NORTH

Noise Measure	Baseline	ACC Scenario 1	ACC Scenario 2	ACC Scenario 3
L_{dnmr}	64	65	65	66
CDNL	53	54	55	55
Booms/Day	2.0	2.3	2.6	3.0
Booms/Month	44	51	57	66

JARBIDGE SOUTH

Noise Measure	Baseline	ACC Scenario 1	ACC Scenario 2	ACC Scenario 3
L_{dnmr}	<45	<45	<45	<45

Figure MH3.2-5. Baseline and Proposed Noise Environment for Airspace Used by Mountain Home AFB

As shown in Figure MH3.2-5, projected CDNL and estimated number of sonic booms for locations under and near Owyhee North and Jarbidge North airspace are presented. Despite the increased number of supersonic events, beddown of the F-35A would not perceptibly change overall (CDNL) supersonic noise. In both the Owyhee North MOA/ATCAA and Jarbidge North MOA/ATCAA, CDNL noise levels would increase by 1 to 2 dB for all three scenarios but remain less than 60 dB CDNL. Booms would increase noticeably, as discussed below. Supersonic activity and booms would include events by both the existing F-15E/SGs and the proposed F-35As. On average, 1 to 3 booms per flying day would be heard in an area underlying the center of the Owyhee North and Jarbidge North airspace. This level of activity would represent an increase of no more than 1 boom per day under any of the ACC Scenarios. For both airspace units, the increases in sonic booms could be noticeable on the ground, but unlikely. In terms of sonic boom "startle effect," many consider the booms annoying, especially in a rural landscape. However, studies have been performed on the effect of sonic booms on various tasks, including driving and have found that there is generally little or no adverse effect (Lips 1972, Nowakiwsky 1974).

The potential for sonic booms to damage structures is small, with direct effects best quantified by the peak overpressures of individual booms (see Appendix C). At 1 pound per square foot (psf), the probability of a window breaking ranges from one in a billion (Sutherland 1990) to one in a million (Hershey and Higgins 1976). At 10 psf, the probability of breakage is between one in a hundred and one in a thousand (Haber and Nakaki 1989). Damage to plaster is in a comparable range but depends on the condition of the plaster. Adobe faces small risks similar to plaster, but assessment is complicated by adobe structures being exposed to weather, where they can deteriorate in the absence of any specific loads (Sutherland 1990). Similarly, other outdoor structures such as buildings, windmills, radio towers, etc., are resilient and routinely subject to wind loads far in excess of sonic boom pressures. Foundations and retaining walls, which are intended to support substantive earth loads, are not at risk from sonic booms.

Peak sonic boom overpressures directly under the flight track for the F-15E/SGs at Mountain Home AFB range from 6.4 psf at 10,000 feet MSL to 2.4 psf at 30,000 feet MSL. In contrast, peak sonic boom overpressures directly under the flight track for F-35As would range from 5.4 psf at 10,000 feet MSL to 1.9 psf at 30,000 feet MSL. For both aircraft, these overpressures diminish toward 0.1 psf with distance from the flight track. The F-35As would conduct 90 percent of supersonic flight at 30,000 feet MSL or higher, so the low end of the overpressure range (1.9 psf) would be common. Continued supersonic activity by F-15E/SG for Mountain Home AFB aircraft would use slightly lower altitudes (80 percent at 30,000 feet MSL or higher), but common overpressures would average about 2.5 psf. At such low overpressures, sonic booms under the proposed action are not expected to damage maintained structures such as ranches and outbuildings, although damage to deteriorated structures may occur.

MH3.3 Air Quality

Emissions associated with operations at Mountain Home AFB include emissions of volatile organic compounds (VOCs) and nitrogen oxides (NO_x), both of which are precursors to ozone (O_3), as well as carbon monoxide (CO), sulfur dioxide (SO_2), 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 (PM_{10}). Emissions of lead are not addressed because the affected areas contain no significant sources of this criteria pollutant, and operations at Mountain Home AFB would not result in substantial emissions of lead.

MH3.3.1 Base

MH3.3.1.1 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, SO_2, and directly-emitted PM_{10} and $PM_{2.5}$. For pollutants that undergo chemical reactions and interact within the atmosphere to form secondary pollutants, such as O_3 and its precursors NO_x and VOCs, and precursors of PM_{10} and $PM_{2.5}$, the affected environment is a larger regional area. The chemical transformations and interactions that create O_3 and secondary PM_{10} 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 Mountain Home AFB (refer to Section 3.4 for further discussion of mixing height).

Regional Environment

The affected environment for base-generated emissions includes Mountain Home AFB, the area surrounding the base where aircraft operate below 3,000 feet AGL, and the airspace overlying these areas and where aircraft train. Mountain Home AFB is located in Elmore County, Idaho, and is under the jurisdiction of the Idaho DEQ. The base is located within the Idaho Intrastate Air Quality Control Region (AQCR) #63 which consists of 22 counties in central Idaho, including Elmore County.

Air quality in the 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 Code of Federal Regulation [CFR] 81.341); therefore, no conformity analysis is required.

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. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the No-Action Alternative and the Proposed Action alternatives have been quantified to the extent feasible in this EIS for information and comparison purposes only.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). 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 CO_2, which has a value of one. For example, under the USEPA's Mandatory Greenhouse Gas Reporting Rule, CH_4 has a GWP of 21, which means that it is considered to have a global warming effect 21 times greater than CO_2 on an equal-mass basis. Total GHG source emissions are often reported as a CO_2 equivalent (or CO_2e). The CO_2e 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 GHGs is presented in Section 3.4.

Base Environment

Mountain Home AFB has a current Tier I Operating Permit issued by the Idaho DEQ under the federal operating permits program. The Tier I Operating Permit establishes facility-wide requirements in accordance with the Idaho State Implementation Plan control strategy and the Rules for the Control of Air Pollution in Idaho. Stationary sources are regulated under the Tier I Operating Permit, and include hospital boilers, jet engine testing within hush houses at the base, aircraft and aircraft parts surface coating operations, flight line area spray painting, vehicle spray painting, abrasive blasting, flight-line generators, and emergency generators.

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 F-15E/SG aircraft, 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 F-15 aircraft were also included in baseline calculations.

Baseline stationary and mobile source emissions are summarized in Table MH3.3-1 and were based on flight profiles and engine maintenance runups developed as part of the noise analysis (Wyle 2011). This approach was taken for consistency purposes with the noise evaluation and for comparability. For aircraft, sulfur oxides are calculated based on weight percent sulfur content of jet propellant (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-15-associated equipment and modeled in the Air Force Conformity Applicability Model program (Air Force 2002). Emission factors were derived from IERA Aircraft/Auxiliary Power Units/Aerospace Ground Support Equipment, except for CO_2, which was derived from Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling--Compression-Ignition (USEPA 2002). For CH_4 and N_2O 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 2008). Refer to Appendix D for the concepts used in these emission estimates.

Table MH3.3-1. Baseline Emissions for Mountain Home AFB						
Pollutants in Tons per Year						
CO	*NO_x*	*VOCs*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
514.34	421.22	61.43	13.46	28.57	22.51	68,582

Note: [1]CO_2e= carbon dioxide equivalent, which includes emissions calculated for carbon dioxide, methane and nitrous oxide and is measured and presented in metric tons per year or mT/yr.

MH3.3.1.2 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 regulations.

ACC Scenario 1

ACC Scenario 1 would beddown 24 F-35A aircraft at Mountain Home AFB in addition to the 56 F-15E/SG aircraft currently based there. Under ACC Scenario 1, both construction and operational activities would result in air pollutant emissions.

Construction

Construction at Mountain Home AFB under ACC Scenario 1 would occur in calendar year 2014. 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 the 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). These data were used to estimate combustion emissions from the equipment. Projected building demolition, as well as construction timeframes and disturbance footprints were used to determine fugitive dust emissions (i.e., PM).

Table MH3.3-2 summarizes the annual construction emissions associated with ACC Scenario 1. Data presented in the table below indicate that proposed annual construction emissions would not exceed 250 tons-per-year for any criteria pollutant. Indeed, the total emissions would be fractions of this threshold. Therefore, it is not anticipated that implementing ACC Scenario 1 construction activities would affect regional air quality.

Table MH3.3-2. Proposed Construction Emissions under ACC Scenario 1 at Mountain Home AFB						
Construction Year	***Pollutants in Tons per Year***					
	CO	*NO_x*	*VOC*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
2014	15.4	4.2	1.0	0.4	2.6	0.4
Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**

Operations

Air quality impacts from operations were determined by evaluating the net increase in emissions associated with the addition of 24 F-35A aircraft at Mountain Home AFB. Operational emissions sources under ACC 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 vehicle [GOVs] and privately-owned vehicles [POVs]) operations, and 3) AGE used for airfield 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 ACC Scenario 1 and no new building or facility construction would be introduced calling for new stationary sources and associated emissions.

Table MH3.3-3 presents a summary of annual emissions generated under ACC Scenario 1 in comparison with baseline conditions. The analysis shows that when compared to baseline conditions, beddown of 24 F-35A aircraft at Mountain Home AFB would result in net emission increases for all pollutants but would not create emissions exceeding any major source thresholds. Emissions due to construction and operations activities would incrementally increase regional emissions of CO_2e.

Table MH3.3-3. Proposed Annual Operational Emissions under ACC Scenario 1 at Mountain Home AFB							
Activity	***Pollutants in Tons per Year***						
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
Aircraft	16.66	69.29	0.70	1.73	0.24	0.24	22,856.63
Engine Runups	0.35	0.06	0.01	0.01	0.00	0.00	62.30
AGE[2]	6.61	5.89	0.36	1.66	0.54	0.52	1,538.64
POVs	36.55	1.65	2.12	0.04	0.10	0.10	1,756.76
Total Annual ACC Scenario 1 Emissions	**60.17**	**76.89**	**3.19**	**3.44**	**0.87**	**0.87**	**24,676.21**
Baseline Annual Emissions	514.34	421.22	61.43	13.46	28.57	22.51	68,582
Net Change	***574.50***	***498.11***	***64.62***	***16.90***	***29.45***	***23.39***	***93,258.66***
Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**-**

Notes:
[1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR 98, Subpart A, Table A-1) in metric tons per year.
[2]With 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.

ACC Scenario 2

ACC Scenario 2 would beddown 48 F-35A aircraft along with the existing 56 F-15E/SG aircraft at Mountain Home AFB. Under ACC 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 ACC Scenario 1.

Construction

ACC Scenario 2 construction would occur in calendar years 2014 through 2016. Table MH3.3-4 summarizes the annual construction emissions associated with this scenario. Results indicate that annual construction emissions would not exceed 250 tons per year for any criteria pollutant. Rather, total pollutant emissions for any year would represent a fraction of the threshold. It is not anticipated, therefore, that implementing ACC Scenario 2 construction activities would deteriorate regional air quality.

Table MH3.3-4. Proposed Annual Construction Emissions under ACC Scenario 2 at Mountain Home AFB

Construction Year	*Pollutants in Tons per Year*					
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
2014	10.1	4.6	0.8	0.5	4.0	0.6
2015	23.0	9.3	1.7	1.0	4.3	0.9
2016	15.0	4.8	1.0	0.5	4.0	0.6
Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**

Operations

Air quality impacts from operations associated with ACC Scenario 2 were determined by evaluating the net change in emissions associated with adding 48 F-35A aircraft at Mountain Home AFB. Sources of operational emissions are the same as those presented under ACC Scenario 1. Table MH3.3-5 summarizes annual operational emissions projected under ACC Scenario 2 compared to baseline conditions. The analysis shows that adding 48 F-35A aircraft at Mountain Home AFB would result in net emission increases for all pollutants; however, none would exceed major source thresholds. ACC Scenario 2 would not introduce emissions that would affect regional air quality since no listed pollutants would exceed 250 tons. Emissions due to construction and operations activities would incrementally increase regional emissions of CO_2e.

Table MH3.3-5. Proposed Annual Operational Emissions under ACC Scenario 2 at Mountain Home AFB

Activity	*Pollutants in Tons per Year*						
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
Aircraft	33.32	138.57	1.40	3.46	0.48	0.48	45,713.26
Engine Runups	1.01	0.16	0.03	0.04	0.00	0.00	177.84
AGE[2]	28.09	25.05	1.52	7.06	2.28	2.21	3,350.51
POVs	73.11	3.30	4.25	0.07	0.19	0.19	3,513.52
Total Annual ACC Scenario 2 Emissions	**135.53**	**167.09**	**7.19**	**10.63**	**2.96**	**2.96**	**49,406.83**
Baseline Annual Emissions	514.34	421.22	61.43	13.46	28.57	22.51	68,582
Net Change	***649.86***	***588.31***	***68.62***	***24.09***	***31.53***	***25.47***	***117,989.28***
Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**-**

Notes:
[1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR 98, Subpart A, Table A-1) in metric tons per year.
[2]With 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.

ACC Scenario 3

ACC Scenario 3 would beddown 72 F-35A aircraft along with the existing 56 F-15 aircraft at Mountain Home AFB. Construction and operational assumptions are the same as described for ACC Scenario 1.

Construction

Construction at Mountain Home AFB under ACC Scenario 3 would occur during calendar years 2015 through 2017. Table MH3.3-6 summarizes the annual construction emissions associated with ACC Scenario 3. Results indicate that annual construction emissions would not exceed 250 tons per year for any criteria pollutant and most emissions would be negligible. It is not anticipated, therefore, that implementing ACC Scenario 3 construction activities would affect regional air quality.

Table MH3.3-6. Proposed Annual Construction Emissions under ACC Scenario 3 at Mountain Home AFB

Construction Year	*Pollutants in Tons per Year*					
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
2015	43.6	9.2	2.7	0.9	6.9	1.1
2016	43.6	9.2	2.7	0.9	6.9	1.1
2017	18.5	5.6	1.2	0.6	6.7	0.9
Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**

Operations

Air quality impacts from operations associated with ACC Scenario 3 were determined by evaluating the net change in emissions associated with adding 72 F-35A aircraft at Mountain Home AFB. Sources of operational emissions are the same as those presented under ACC Scenario 1. Table MH3.3-7 summarizes annual operational emissions projected under ACC Scenario 3 compared to baseline conditions. The analysis shows that adding 72 F-35A aircraft at Mountain Home AFB would result in net emission increases for all pollutants. However, these increases would not exceed the 250-ton major source threshold. ACC Scenario 3 would not introduce emissions that would noticeably deteriorate regional air quality. ACC Scenario 3 construction and operational activities would incrementally increase regional emissions of CO_2e.

Table MH3.3-7. Proposed Annual Operational Emissions under ACC Scenario 3 at Mountain Home AFB

Activity	*Pollutants in Tons per Year*						
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e^2*
Aircraft	49.98	207.86	2.10	5.19	0.73	0.73	68,569.89
Engine Runups	1.51	0.24	0.04	0.06	0.00	0.00	264.26
AGE[2]	39.65	35.37	7.78	9.62	11.67	11.32	4,615.93
POVs	109.66	4.95	6.37	0.11	0.29	0.29	5,270.28
Total Annual ACC Scenario 3 Emissions	**200.80**	**248.41**	**16.29**	**14.98**	**12.69**	**12.69**	**74,115.75**
Baseline Annual Emissions	514.34	421.22	61.43	13.46	28.57	22.51	68,582
Net Change	***715.13***	***669.63***	***77.72***	***28.44***	***41.26***	***35.20***	***142,698.21***
Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**-**

Notes:
[1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR 98, Subpart A, Table A-1) in metric tons per year.
[2]With 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.

Climate Change Adaptation

In addition to assessing the greenhouse gas emissions that would come from ACC Scenarios 1-3, 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 identify 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 United States 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 Mountain Home AFB, adaptation issues requiring evaluation and consideration could revolve around changes in both winter and summer temperatures, as well as drought and aridity in the Northwest. 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 Utah and the Northwest. Predicted increases in average temperatures and longer, hotter summers might require the ACC 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 Northwest Asia where plus 100 degrees Fahrenheit (°F) temperatures are common, such conditions would likely fall within a manageable range for fulfilling the mission. Conversely, shorter winters resulting from the same predicted climate change would reduce currently existing issues with cold weather maintenance and operations. It could also reduce the number of days affected by "unflyable" weather. 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.

The report projects average sea level increases in distant coastal areas by 1 to 2 feet by the year 2100 depending upon the emission scenario. Mountain Home AFB lies at an elevation of about 3,000 feet

MSL and over 400 miles from the ocean. Given these factors, even the greatest projected rise in sea level would not affect the infrastructure at Mountain Home AFB.

Predictions from the report suggest that the Northwest could face droughts, scarcity of water supplies, and wildfire. Reduced availability of freshwater is likely to occur, with implications for the base and communities in the arid region encompassing Mountain Home AFB. 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. Surrounded by open and agricultural lands, Mountain Home AFB could be subject to increased 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.

MH3.3.2 Airspace

It is not anticipated that flight operations in special use airspace would affect regional air quality nor measurably alter existing GHG emissions under any of the scenarios. First, the areas under all airspace units in which the aircraft would operate are in attainment for criteria pollutants; and second, over 95 percent of operations would occur above 5,000 feet AGL, and thus take place above the mixing height of 3,000 feet AGL. Increases in all criteria pollutants are anticipated, as the number of aircraft operating in special use airspace would increase. The pollutant that would have the largest increase is NO_x. However, the total emissions would not exceed the 250 tons established as the threshold. In summary, because it is not anticipated that there would be net increases of listed criteria pollutant emissions exceeding the 250 tons established thresholds, proposed airspace operations under any action scenario would not affect regional air quality. Under any ACC scenario, 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.

MH3.4 Safety

Aircraft safety addresses Accident 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 and force protection 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. At Mountain Home AFB, neither the Clear Zone nor the APZs include housing or other incompatible land uses. Rather, the land is primarily open and used for grazing or agricultural purposes.

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 loss of aircraft, 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-15 aircraft have flown more than 5,700,000 hours since the aircraft entered the Air Force inventory during FY88. Over that period, 140 Class A mishaps have occurred and 118 aircraft have been destroyed. This results in a Class A mishap rate of 2.42 per 100,000 flight-hours, and an aircraft destroyed rate of 2.04 (Air Force Safety Center [AFSC] 2009a).

MH3.4.1 Base

MH3.4.1.1 Affected Environment

The affected environment for safety includes the airfield at Mountain Home AFB and its immediate vicinity. Aircraft flight operations from Mountain Home AFB are governed by standard flight rules. Specific procedures for the base are contained in standard operating procedures that must be followed by all aircrews operating from the installation (Mountain Home AFB Instruction 11-250, Airfield Operations and Base Flying Procedures) to ensure flight safety. Despite logging over 190,000 flying hours, only one based aircraft has been involved in a Class A mishap at Mountain Home AFB in a decade (AFSC 2010a). This factor results in a mishap rate of 1.06, lower than the total Air Force mishap rate. Additionally, a crash did occur during an air show in 2003, but it involved an F-16 from the Thunderbirds performing aerobatics rather than normal flying.

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 MH3.4-1) (AFSC 2010b).

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 AGL (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).

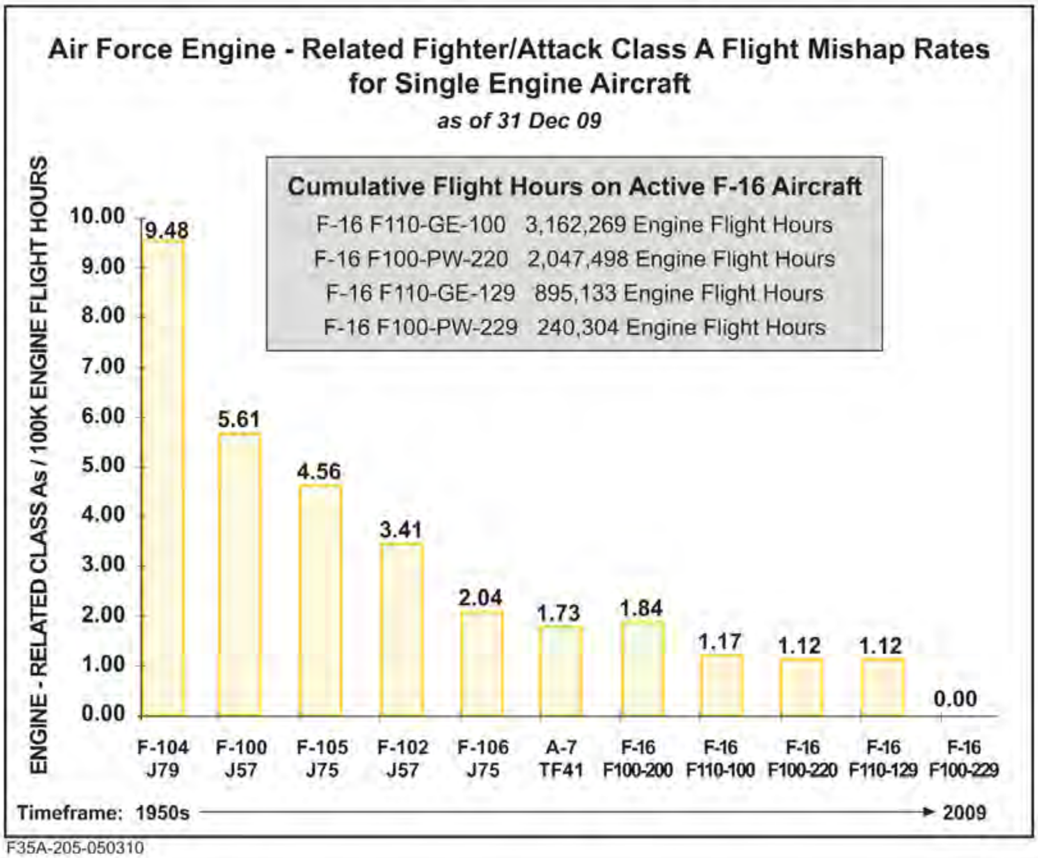


Figure MH3.4-1. Air Force Engine-Related Mishap Rates

Source: AFSC 2010a.

Note: "Engine-related" excludes mishaps caused by Foreign Object Damage, BASH, or failure of support systems external to the engine (e.g., fuel starvation).

The 366 FW maintains an aggressive program to minimize BASH potential. Over the past 20 years, aircraft based at Mountain Home AFB have experienced an average of less than 10 bird strikes per year. Most of these incidents resulted in little or no damage to the aircraft, and none resulted in a Class A mishap (personal communication, Gendreau 2010). The Fiscal Year 2000 through Fiscal Year 2007 mishap log notes seven bird strikes, none of which damaged an aircraft (personal communication, Gendreau 2010).

For use in emergency situations, the F-15 aircraft (all models) has 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 Instruction (AFI) 11-2F-F15V3 covers the fuel dumping procedures, and local operating policies define specific fuel dumping areas for each base.

MH3.4.1.2 Environmental Consequences

The F-35A is a new type of 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).

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 2012 are provided in Table MH3.4-1.

Table MH3.4-1. F-22A Class A Flight Mishap History

Year	*Class A*		*Destroyed*		*Fatal*		*Hours Flown per Year*	*Cumulative Flight Hours*
	Number of Mishaps	*Rate*[1]	*A/C*	*Rate*	*Pilot*	*All*		
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
FY10	0	0	0	0	0	0	24,675	94,519
FY11	1	6.54	1	6.54	1	1	15,289	109,808
FY12	3	11.32	0	0	0	0	26,507	136,315
Lifetime	**10**	**7.34**	**3**	**2.20**	**2**	**2**	**-**	**136,315**

Source: AFSC 2013.
Note: [1]Mishap rate is based on 100,000 hours of flight.
[2]One 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 other 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 F-16 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 new Air Force F-35A would use simulators extensively. Simulator training would include all facets of flight operations and comprehensive emergency procedures, which would minimize risk associated with mishaps due to pilot error. The sophistication and fidelity of current simulators and related computer programs are commensurate with the advancements made in aircraft technology.

There would be an increase in operations for ACC Scenarios 1, 2, and 3 compared to existing conditions. Under these scenarios, the increase in airfield use for take-offs, landings, proficiency training, and other flights would result in a commensurate increase in the safety risk to aircrews and personnel due to the accident and mishap potential associated with aircraft operations.

While the proposed increase in airfield flight operations does increase the potential for aircraft incidents, it is statistically modest. With only one aircraft incident occurring in the airfield vicinity during a 10-year period, the average number of aircraft incidents is one per every 10 years. Increasing flight operations would increase the potential number of aircraft incidents as shown in Table MH3.4-2, based on historical records. In addition, current airspace safety procedures discussed previously would continue to be implemented and additional airfield flight operations would adhere to established safety procedures.

Table MH3.4-2. ACC Scenarios 1 through 3 Comparison

Beddown Scenario	*Percentage Airfield Operations Change from Baseline*	*Number of Years Expected Between Aircraft Accidents at Mountain Home AFB*
ACC Scenario 1	+32.7%	7.7
ACC Scenario 2	+65.4%	5.9
ACC Scenario 3	+98.1%	4.8

Source: AFSC 2010a.

Similar to the F-15, F-35A aircraft will have the capability to dump fuel for emergency situations and would follow procedures similar to those currently required under AFI 11-2F-F15V3.

MH3.4.2 Airspace

MH3.4.2.1 Affected Environment

The airspace directly associated with the proposed action at Mountain Home AFB includes Restricted Areas, MOAs, and ATCAAs (see Figure MH2.2-1), known collectively as the MHRC. The volume of airspace encompassed by the combination of airspace elements constitutes the affected environment for airspace safety. MHRC training airspace includes the Jarbidge North and South MOAs/ATCAAs, Owyhee North and South MOAs/ATCAAs, Paradise North and South MOAs/ATCAAs, Saddle MOA/ATCAA, R-3202, and R-3204. These training areas allow military flight operations to occur and minimized exposure to civil aviation users, military aircrews, or the general public to hazards associated with military training and operations. This section describes the existing safety procedures within the training airspace units and evaluates changes that would occur with the introduction of the F-35A.

Aircraft flight operations in the MHRC are governed by standard flight rules. Additionally, under the Commander 366 FW, the 266 Range Control Squadron is the designated operating agency for the range and is responsible for operational monitoring, administration, and general safety of the MHRC. Activity in the MHRC must comply with AFI 13-212, *Range Planning and Operations*, Volumes 1-3 and supplements/addendums (Mountain Home AFB 2005a). Safety records indicate only one Class A mishap within the MHRC since 2000 (personal communication, Gendreau 2010).

Approximately 61,000 flares are released annually within the MOAs. Although flares are authorized for use, they may not be released lower than 2,000 feet AGL (Air Force 2007b), with some exceptions. Over the impact area of Saylor Creek Range, depending on aircraft type, they may be released as low as 700 feet AGL when fire risks are not high to extreme. For Juniper Butte Range, the Air Force established a minimum release altitude of 2,000 feet AGL (Air Force 2007b). Flares are not deployed in the Saddle MOA, or over inhabited areas such as Duck Valley Indian Reservation.

Prevention of fires includes reduction of ignition sources, management of vegetation and fuels, and maintenance of firebreaks. Fire risk is higher on the ranges and associated facilities, primarily due to increased ignition sources from ordnance use and rarely due to maintenance activities. The Air Force, therefore, employs a program of annually reducing fine fuels on the ranges to minimize fire spread. In addition, Mountain Home AFB implements aggressive fire suppression during the fire season, which can extend from May through November (Air Force 2004). Both Saylor Creek and Juniper Butte Ranges support fire suppression equipment and personnel, ensuring rapid response to any fires that may start. Mountain Home AFB also precludes the use of flares, training ordnance, and pyrotechnic devices during high, very high, and extreme fire risk conditions. Implementation of these fire management and suppression programs has substantially reduced both the number and extent of wild fires occurring on the ranges (Air Force 2004).

Historic information for the last 3 years for the MHRC airspace indicates that 23 bird/wildlife-aircraft strikes have occurred (personal communication, Gendreau 2010). All of these were minor incidents and did not result in a Class A mishap. These data reflect total strikes experienced by all users of the airspace, not just aircraft from Mountain Home AFB.

MH3.4.2.2 Environmental Consequences

Increases in operations and the addition of F-35A aircraft resulting from the proposed action would not require changes to the management or structure of the MHRC training airspace. The F-35A would fly mission profiles similar to those flown by current Mountain Home AFB F-15E/SG aircraft, only at higher average altitudes, including air-to-ground ordnance delivery, air combat training operations, and supersonic events. Under the proposed action scenarios, operations in the MHRC airspace would increase over no-action conditions. Such increases would not affect the capabilities of this airspace to accommodate the proposed training activities by the F-35As and would not result in a need for structural changes to the airspace. Total operations within the MHRC airspace and ranges would remain within the capability and capacity of the MHRC (ACC 2010).

Under all ACC Scenarios for Mountain Home AFB, 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 mitigated somewhat due to the fact the F-35A attains altitude more rapidly and would spend less time at lower altitudes where species generally fly than current 366 FW aircraft. In addition, F-35A aircrews operating in the MHRC would be required to follow applicable procedures outlined in the 366 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 each range. Additionally, the F-35A would likely deploy considerably fewer flares than F-16 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, within the MHRC airspace, 32,000 flares would be deployed annually within the 9,800 square-mile airspace. It is estimated that these areas contain an approximate population density of 1 person 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 0.00035 per year. Actual potential for strikes would be less than this very low probability due to the scarcity of population in the affected area. Additionally, flare release is prohibited over such as the Duck Valley Indian Reservation, thereby eliminating the probability for strikes in that location.

Under any of the three ACC Scenarios, the F-35A would deploy less than 15,000 additional flares in the airspace and about 7,000 inert munitions with spotting charges. All restrictions guiding the use of these munitions would continue to be strictly enforced; fire response and suppression capabilities would continue to meet all requirements.

MH3.5 Geology, Soils, and Water

MH3.5.1 Base

MH3.5.1.1 Affected Environment

Geology

Mountain Home AFB lies in Elmore County in southwestern Idaho. The base is situated in the western Snake River Plain, a northwest-trending structural basin bounded on both the southwest and northeast by high-angle faults. The Snake River Plain is thought to be an area of crustal rifting that began around 16 million years ago (Mountain Home AFB 2004). The upper bedrock unit is mostly Middle to Late Pleistocene-age basalts of the Snake River Group. Stratigraphic sequences below the Snake River Group include the olivine basalt flows of the Bruneau Formation. The basalt rock beneath the base is between 490 to 580 feet thick (Mountain Home AFB 2006b). Mountain Home AFB is situated south of the Central Idaho Seismic Zone, with the Boise Front and Danskin Mountain fault systems being located to the north (Idaho Geological Survey 2009).

Topography

The topography of Mountain Home AFB has little relief, and is generally flat. There are no major topographic features on the base (Mountain Home AFB 2006b).

Soils

Soils present are typical of semi-arid regions, characterized by poor drainage and lack of organic matter. The majority of the soils on Mountain Home AFB consist of Bahern Silt Loam, with the exception of the northeast portions of the base that includes silt loams, stony loams, and sandy loams. Slopes of 0 to 4 percent characterize most soils, with the exception of those along the eastern boundary that have slopes from 0 to 8 percent. These soil types have moderate potential for wind and water erosion.

Surface Water

Mountain Home AFB is located within the C.J. Strike Dam Recreation Annex watershed in a small, very shallow basin of approximately 55 square miles in size. No drainages or natural impoundments occur on base. During spring snow melt or during heavy thunderstorms, surface water flows into two ephemeral streams or into four man-made drainage ditches. Generally, surface water flows from northeast to southwest into Canyon Creek that ultimately drains into the Snake River (Mountain Home AFB 2004).

Groundwater

Mountain Home AFB relies on a regional, unconfined aquifer for its water. This aquifer is shared with the City of Mountain Home and other surrounding communities (Mountain Home 2004). These aquifers are sedimentary and volcanic aquifers composed of a mixture of loose gravels, sands, silts, and clays that comprise valley fill aquifers, intermixed with areas containing basalt, shale and sandstone rocks that have a more consistent structure (Idaho DEQ 2010). See Community Facilities and Public Services, Section MH3.13 for detailed information on capacity.

Floodplains

Mountain Home AFB does not lie within either a 100- or 500-year floodplain (Mountain Home AFB 2004).

MH3.5.1.2 Environmental Consequences

ACC Scenario 1

Under ACC Scenario 1, a total of 3.17 acres of land would be disturbed and a total of 0.83 acre of new impervious surface would be added to the base from the construction on areas that are currently undeveloped. Construction would take place in areas that have been previously disturbed, and would not disrupt any completely undeveloped land. As such, geology, topography, and soils would not be adversely impacted by ACC Scenario 1. Stormwater impacts to surface water would be minimized using best management practices (refer to Chapter 2, section 2.6.1 for examples of these practices) to prevent any erosion to soils exposed during construction. There would be no impact to floodplains, surface water, or to groundwater under ACC Scenario 1.

ACC Scenario 2

Under ACC Scenario 2, a total of 8.98 acres of land would be disturbed and a total of 2.63 acres of new impervious surface would be added. As with ACC Scenario 1, the area proposed for construction includes areas of the base that have been previously disturbed. Geology, topography, and soils would not be adversely impacted from the implementation of ACC Scenario 2. Stormwater impacts to surface water would be managed with best management practices to minimize any erosion or potential pollution from runoff. No impacts to floodplains, surface water, or groundwater would occur under ACC Scenario 2.

ACC Scenario 3

Under ACC Scenario 3, a total of 11.39 acres of land would be disturbed and a total of 2.81 acres of new impervious surface would be added. Proposed construction would take place on areas of the base that have been previously disturbed. There would be no adverse impacts to geology, topography, and soils from implementation plans under ACC Scenario 3. Stormwater impacts to surface water would be managed in a manner similar to the other ACC Scenarios 1 and 2. No impacts to floodplains surface water, or groundwater would occur under ACC Scenario 3.

MH3.6 Terrestrial Communities (Vegetation and Wildlife)

MH3.6.1 Base

MH3.6.1.1 Affected Environment

Mountain Home AFB includes landscaped/developed areas planted with turf, shrubs and trees, and undeveloped areas with native or non-native vegetation. The majority of the open space on base is dominated by exotic weedy annual grasses and invasive species such as cheatgrass (*Bromus tectorum*), tumble mustard (*Sisymbrium altissimum*), Russian thistle (*Salsola kali*), and bur buttercup

(*Ceratocephala testiculata*). Small patches of Wyoming big sagebrush (*Artemesia tridentata wyomingensis*), totaling approximately 380 acres, occur along the northern and eastern boundaries of the base; however, these areas are disturbed and have a weedy understory (Figure MH3.6-1).

Wildlife species common on base include those that are typical of disturbed environments and have habituated to noise and human presence. Approximately 60 wildlife species have been identified on base. Common bird species found on base include American robin (*Turdus migratorius)*, black-billed magpie (*Pica hudsonia)*, mourning dove (*Zenaida macroura)*, sage sparrow (*Amphispiza belli)*, sharp-shinned hawk (*Accipiter striatus)* and short-eared owl (*Asio flammeus)*, great-horned owl (*Bubo virginianus*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk, (*Buteo swainsoni*), and American kestrel (*Falco sparverius*). Common mammals include coyote (*Canis latrans)*, mountain cottontail (*Sylvilagus nuttallii)*, deer mouse (*Peromyscus maniculatus*), and badger (*Taxidea taxus).* Common reptiles and amphibians include common garter snake (*Thamnophis sirtalis)*, western fence lizard (*Selophorus occidentalis*), Great Basin gopher snake (*Pituophis catenifer deserticola*), western rattlesnake (*Crotalus viridus*), desert horned lizard (*Phrynosoma platyrhinos)*, Pacific tree frog *(Hyla regilla)*, and sagebrush lizard (*Sceloporous graciosusa)* (Mountain Home AFB 2009).

MH3.6.1.2 Environmental Consequences

Removal and potential disturbance of vegetation would be required for all scenarios. ACC Scenario 3 would disturb 11.39 acres creating 2.81 acres of new impervious surface, while ACC Scenario 1 and 2 would disturb 3.17 acres and 8.98 acres, creating 0.83 and 2.63 acres of new impervious surface, respectively. However, all of the area is highly disturbed or previously developed, or consists of landscaped or mowed grassy areas. The ecological value of this habitat is low and is further reduced by persistent disturbance as a result of daily activities. Due to its low habitat value and lack of native plant species, construction impacts to native vegetation would not occur for any scenario.

The removal of non-native plant communities as a result of any of the scenarios would not reduce the regional population numbers and distribution of common wildlife. The areas proposed for development are primarily disturbed or degraded, and common wildlife would be expected to relocate and utilize comparable habitat types both on and off of Mountain Home AFB.

Annual military operations at Mountain Home AFB are proposed to increase for all three scenarios. ACC Scenario 1 would result in an increase of 10,667 airfield operations. ACC Scenario 2 would result in an increase of 21,334 airfield operations. ACC Scenario 3 would result in an increase of 32,001 airfield operations. These would be increases in total airfield operations of 32.7, 65.4, and 98.1 percent, respectively. Increased levels of operations would result in an increased opportunity for bird/wildlife aircraft strikes to occur. Adherence to the existing, effective BASH program would minimize the risk of bird/wildlife aircraft strikes (see Safety, Section MH3.4).

Construction noise would be temporary in nature and, therefore, would have minor impacts to terrestrial species. Changes in operational noise are not expected to impact terrestrial species in the area because species on and near the installation are likely accustomed to elevated noise levels associated with aircraft and military operations.

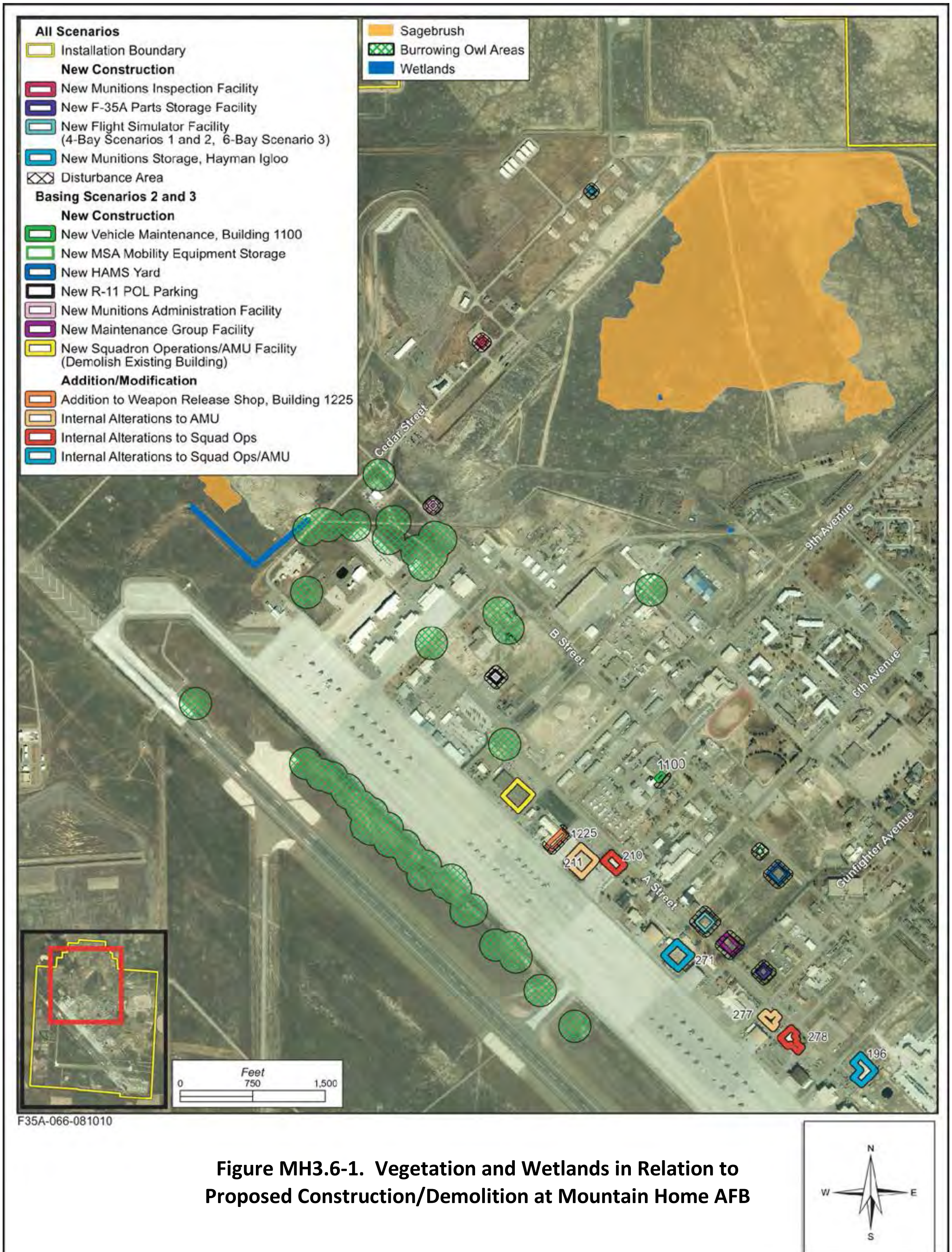


Figure MH3.6-1. Vegetation and Wetlands in Relation to Proposed Construction/Demolition at Mountain Home AFB

MH3.6.2 Airspace

MH 3.6.2.1 Affected Environment

Training ranges and airspace associated with the proposed action cover over 12,373 square miles and occur within the Intermountain Sagebrush Province/Sagebrush Steppe ecosystem (Bailey 1995). Vegetation at the ranges of particular management priority includes the sagebrush (slickspot peppergrass discussion is found in Section 3.11.2.3) (Mountain Home AFB 2009). Under baseline conditions, sagebrush habitat is managed for preservation to the maximum extent practicable. Aircraft operational restrictions include the altitude from which flares may be dispensed; during low fire risk periods flares are deployed at and above 2,000 feet AGL (Mountain Home AFB 2002). When fire risk is at high/very high and extreme, flare use is stopped. In this manner, the potential for wildfire ignition is minimized. Ground-based activities (e.g., range and emitter site operations and maintenance) are also conducted in a manner consistent with procedures outlined in the Mountain Home Integrated Natural Resource Management Plan (INRMP) (Mountain Home AFB 2009b). For instance: driving heavy vehicles only on existing trails and roads, designation of “firing areas” in cleared areas only, and performing ordnance clearing when the soil is sufficiently dry to avoid creating ruts by tire tracks. Over the years, Mountain Home AFB has made a concerted effort to replant with native vegetation, exterminate noxious weeds and invasive species, and conduct prescribed burning to promote native habitat regeneration (Mountain Home AFB 2009).

Under the airspace, a large variety of vegetation communities is found, from sagebrush to pinyon-juniper woodlands and grasslands. Within the native sagebrush areas are large expanses of non-native annual grasslands dominated by cheatgrass and crested wheatgrass (*Agropyron desertorum* and *A. cristatum*), the result of fires and rehabilitation practices. Deep, narrow rocky rhyolite canyons cut north to south though the sagebrush flats, and provide the highest diversity in grassland and shrubland species. In lower elevations, salt desert shrub habitat dominates. The Owyhee and Jarbidge Mountains run along the borders between the states, providing high elevations and forest-type cover.

Wildlife found under the training airspace includes a variety of birds (including migratory birds and hawks), mammals, reptiles, and amphibians. At the ranges, 71 species have been identified on Saylor Creek Range, 60 species on Juniper Butte Range, and over 75 species on the emitter sites (Mountain Home AFB 2009). Several species of concern are found within and underlying the airspace and are managed through procedures prescribed in the INRMP. They include the western burrowing owl (*Athene cunicularia*), ferruginous hawk (*Buteo regalis*), long-billed curlew (*Numenius americanus*), Brewer’s sparrow (*Spizella breweri*), loggerhead shrike (*Lanius ludovicianus*), sage sparrow (*Amphispiza belli*), sage thrasher (*Oreoscoptes montanus*), and kit fox (*Vulpes macrotis*).

Under the airspace, common mammal species include those found on base, in addition to species such as elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), feral horses (*Equus caballus*), cougar (*Puma concolor*), mink (*Mustela vison*), river otter (*Lutra canadensis*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethica*), bobcat (*Lynx rufus*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), badger, coyote, kit fox (*Vulpes macrotis*), skunk (*Mephitis mephitis*), long-tailed weasel (*Mustela frenata*), and black bear (*Ursus americanus*). Common bird species include mourning dove (*Zenaida macroura*), mountain quail (*Oreortyx pictus*), blue grouse (*Dendragapus obscurus*) prairie falcon (*Falco mexicanus)*, red-tailed hawk, western meadowlark (*Sturnella neglecta)*, and vesper sparrow (*Pooecetes gramineus)*. Common reptiles and Amphibians include the bullfrog (*Rana catesbeiana*), Pacific tree frog, Great Basin spadefoot (*Spea intermontana*), Woodhouse's toad (*Bufo woodhousii*), gopher snake (*Pituophis melanoleucus*), racer (*Coluber constrictor*), western fence lizard (*Sceloporus occidentalis*), sagebrush lizard, and western rattlesnake (Mountain Home AFB 2009). Again, this area has been overflown by aircraft since the 1940s and it can be assumed that wildlife underlying this airspace have become habituated to the noise levels and sonic booms as presented in Figure 3.3-2. Under existing conditions, noise levels in Owyhee North and Jarbidge North are measured at 64 L_{dnmr} whereas noise levels within the other airspace units are less than 45 L_{dnmr}. As for sonic booms, under baseline conditions, Owyhee North averages 42 booms per month and Jarbidge North 44 booms.

MH3.6.2.2 Environmental Consequences

No construction would occur beneath the training airspace; however, inert ordnance would be deployed in ranges authorized for their use. Existing range management procedures and ordnance removal guidelines would be adhered to and vegetation management (including sagebrush) measures prescribed in the Mountain Home AFB INRMP would persist. Mountain AFB would continue to follow mitigation and monitoring efforts (as outlined in Section 4.6 and Appendix 9 of the 2009 INRMP and those that will be outlined in the 2012 INRMP) to ensure preservation of sagebrush habitat from grazing, invasive species, wildfires, and routine maintenance activities (Mountain Home AFB 2009). No adverse or significant impacts are likely to affect vegetation, including sagebrush.

The only identified countermeasure that would be employed by the F-35A with the potential to affect vegetation is flares. Flare deployment could increase over current levels conducted by F-15E/SG aircraft and would occur within the same training areas. However, current restrictions on the amount or altitude of flare use would continue to apply. As a result, flare deployment associated with the proposed action would have no impact on terrestrial communities.

Impacts to migratory birds protected under the Migratory Bird Treaty Act would be negligible. For raptors, in studies on low-altitude jet overflights on nesting peregrine and prairie falcons, Ellis (1981) and Ellis *et al*. (1991) found that responses to frequent jet overflights were often minimal and did not result in reproductive failure. Although falcons were alarmed by the noise stimuli in this study, the negative responses were brief and they quickly resumed normal activities within a few seconds following an overflight. Flights at less than 500 feet from nests and sonic booms greater than 112 dB were most likely to elicit biologically significant responses (Ellis *et al*. 1991). Lamp (1989) found in a study of the impacts to wildlife of aircraft overflights at Naval Air Station Fallon in northern Nevada, that nesting raptors (golden eagle, bald eagle, prairie falcon, Swainson's hawk, and goshawk) either showed no response to low-level flights (less than 3,000 feet AGL) or only showed minor reactions. The flight levels proposed under this action are predominantly at a much higher altitude than those shown by research to affect raptors nesting. Noise modeling results suggest noise levels would be below 65 L_{dnmr};

well below the 112 dB shown to elicit significant biological responses. No long-term significant impacts are anticipated.

In general, animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes (Appendix C). Some studies showed that animals that had been previously exposed to jet aircraft noise exhibited greater degrees of alarm and disturbance to other objects creating noise, such as boats, people, and objects blowing across the landscape. Other factors influencing response to jet aircraft noise may include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and in the case of bird species, whether the animals are in the incubation/nesting phase.

Section MH3.4 (Safety) established that bird-aircraft strikes are currently rare in the airspace and would not be expected to increase substantially under the proposed action. The F-35A would fly predominantly above 5,000 feet AGL, which is above where 95 percent of strikes occur. Adherence to the INRMP and BASH Plan would further reduce the likelihood of bird strike in training airspace (see Safety, Section MH3.4).

Overall, impacts to wildlife from proposed changes in subsonic and supersonic 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) generally speaking, the F-35A would fly at higher altitudes than F-16 aircraft—the majority (95 percent) of the F-35A operations would occur above 5,000 feet AGL although existing flights by F-15E/SG aircraft would continue at the current rate and altitude; 3) supersonic flight would only occur above 10,000 feet MSL in the Jarbidge North and Owyhee North MOAs in areas that are not currently restricted (i.e., Duck Valley Indian Reservation), and above 30,000 feet MSL in the other ATCAAs; and 4) although the total number of supersonic flights and sonic booms occurring would increase from baseline, studies of supersonic noise on birds and mammals (Appendix C) indicate that animals tend to habituate to sonic booms and long term effects are not adverse.

MH3.7 Wetlands and Freshwater Aquatic Communities

MH3.7.1 Base

MH3.7.1.1 Affected Environment

No jurisdictional wetlands have been found on base. However, nine small isolated playas and several storage lagoons have been identified on the installation (see Figure MH3.6-1). Desert playas are open expanses that are periodically flooded to form playa lakes. These wetland areas and aquatic communities provide habitat for waterfowl species such as Canada geese (*Branta canadensis*), blue-winged teal (*Anas discors)*, bufflehead (*Bucephala albeola)*, and mallards (*Anas platyrhynchos)* as well as red-winged blackbirds (*Agelaius phoeniceus*) and loggerhead shrikes (*Lanius ludovicianus)* (Air Force 2004).

MH3.7.1.2 Environmental Consequences

No jurisdictional wetlands have been observed on Mountain Home AFB (Air Force 2004). However, nine small isolated playas are located on the installation. No wetlands occur within any areas designated for construction projects under any of the proposed scenarios. Therefore, construction activities under these scenarios would have no impact on wetlands or freshwater aquatic communities.

MH3.8 Threatened, Endangered, and Special Status Species/Communities

MH3.8.1 Base

MH3.8.1.1 Affected Environment

No federally listed threatened or endangered species have been observed on base. Three special status species occur on the base. These include burrowing owl (*Athene cunicularia*), long-billed curlew (*Numenius americanus*), and Davis' peppergrass (*Lepidium davisii*). The burrowing owl is a state protected, non-game species and a USFWS Bird of Conservation Concern. It inhabits dry, open grasslands, often times in urban highly disturbed areas. They nest in burrows excavated by mammals such as badgers, ground squirrels, or coyotes. Burrowing owls have been observed immediately adjacent to the flightline, in the northern portion near the Environmental Flight building, the southwestern areas adjacent to Mountain Home AFB exercise area, the retired Explosive Ordnance Disposal proficiency range, the golf course, and in an undeveloped lot in the center of the base (see Figure MH3.6-1).

The long-billed curlew is a state protected non-game species and a USFWS Birds of Conservation Concern. It prefers prairies, open shrub-steppe, and grassy wet meadows. On Mountain Home AFB, the long-billed curlews can be found near the golf course, rapid infiltration basin, and the annual grasslands near the north end of the flightline.

Davis' peppergrass is a rare plant categorized by the Idaho Native Plant Society as a Priority One species. It is a small perennial herbaceous forb found within a playa northeast of the hospital (Air Force 2004).

No special status communities occur on base.

MH3.8.1.2 Environmental Consequences

Impacts to potentially occurring threatened, endangered, or candidate species on Mountain Home AFB would be similar to those described within the terrestrial section (see Section MH3.6). That is, studies indicate that wildlife species, whether they are common or protected species, already occupying lands exposed to airfield noise are generally not affected by slight to moderate increases in ambient noise levels, as they have already habituated to periodic to frequent loud overflight noise. No federally listed species have been observed on base. As a result there would be no impacts to listed species from implementation of the proposed action. Three special status species occur on base; burrowing owl, long-billed curlew, and Davis' peppergrass. However, none of these species have been observed within the proposed construction area. Annual airfield operations at Mountain Home AFB are projected to increase under all scenarios. Noise from proposed construction and operations is not expected to affect the burrowing owl and long-billed curlew since they are likely accustomed to elevated noise levels associated with current aircraft and military operations. Military readiness operations are exempt from the prohibitions of the Migratory Bird Treaty Act, provided they do not result in a significant adverse effect on population of migratory bird species. Regardless, populations of burrowing owls would not be affected by the implementation of any of the three ACC scenarios.

MH3.8.2 Airspace

MH3.8.2.1 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, invertebrates and fish were excluded from review and analysis as they, too, would not likely be impacted by the proposed actions.

Three candidate species, the Great Basin population of the Columbia spotted frog (*Rana luteiventris*), the yellow-billed cuckoo (*Coccyzus americanus*), and the greater sage grouse (*Centrocercus urophasianus*) occur under the airspace.

The greater sage grouse is a candidate species. On March 23, 2010, the USFWS announced a 12-month finding on the petition to list the greater sage grouse, finding that the listing was warranted but precluded by higher priority species (USFWS 2010a). They announced that they will develop a proposed rule to list as their priorities allow. Greater sage grouse prefer large, relatively open and undisturbed sagebrush dominated communities. Breeding activity occurs in what is called a lek, which usually is found in open areas such as ridges, rocky knolls, or bare openings (Sage grouse Conservation Team 2004, Utah Division of Water Resources 2009).

The taxonomy of the yellow-billed cuckoo is debated, however most taxonomist separate it into two subspecies, eastern and western. The USFWS recognizes the yellow-billed cuckoos that occur in the western U.S. (generally west of the crest of the Rocky Mountains) as a Distinct Population Segment, and a candidate species. The yellow-billed cuckoo is found in disjunct fragments of dense riparian habitats, usually consisting of cottonwood and willow (Utah Division of Water Resources 2010).

The Great Basin population of the Columbia spotted frog, a federal candidate species is found under the airspace in eastern Oregon, southwestern Idaho, and northern drainages of Nevada. The Columbia spotted frog lives in spring seeps, meadows, marshes, ponds, and streams (USFWS 2010b).

MH3.8.2.2 Environmental Consequences

Impacts to potentially occurring threatened, endangered, or candidate species underlying Mountain Home AFB airspace would be similar to those described within the terrestrial section (see Section MH3.6.2). Analysis presented in Section MH3.6.2.2 for wildlife species underlying Mountain Home AFB training airspace would also apply to threatened and endangered species. Under the proposed action for Mountain Home AFB, the total annual number of operations in the associated airspace would increase 13 percent for ACC Scenario 1, 26 percent for ACC Scenario 2, and 39 percent for ACC Scenario 3. The F-35As would also fly higher than F-15E/SGs.

Overall, impacts to the yellow-billed cuckoo, Columbia spotted frog, and the greater sage grouse from the proposed change in subsonic and supersonic operations would not be adverse 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 majority (95 percent) of F-35A operations would occur above 5,000 feet AGL, although existing flights by F-15E/SG aircraft would continue at the current rate and altitude; 3) supersonic flight would only occur above 10,000 feet MSL in the Jarbidge North and Owyhee North MOAs, avoiding areas that are currently restricted (i.e., Duck Valley Indian Reservation) and above 30,000 feet MSL in the Paradise North and South, and Jarbidge and Owyhee South ATCAAs; and 4) although the total number of supersonic flights and sonic booms occurring would increase from baseline, studies of supersonic noise on birds and mammals indicate that animals tend to habituate to sonic booms and long term effects are not adverse.

MH3.9 Cultural and Traditional Resources

MH3.9.1 Base

MH3.9.1.1 Affected Environment

As defined in Chapter 3, section 3.10.2, the APE for Mountain Home AFB consists of all areas of ground disturbance associated with proposed construction or remodeling activities. Aircraft operations and the areas affected by noise levels 65 dB DNL and greater also fall under the APE and are evaluated for their potential to affect historic structures and districts where noise vibrations could adversely impact those types of resources. For airspace operational effects, only those cultural resources that would reasonably be affected by visual (overflights) and noise intrusions are considered. These include architectural resources; archaeological resources with standing structures, such as historic ranches, ghost towns, American Indian settlements; and traditional cultural properties. Prehistoric and historic archaeological sites lacking standing structures are not included as they are generally ground surface or even subsurface deposits that would not be affected by implementing the basing alternatives.

Archaeological Resources

Mountain Home AFB has been intensively surveyed for archaeological resources (Air Force 2006b). These surveys, as reported in the Mountain Home AFB Integrated Cultural Resource Management Plan (Air Force 2006b), have identified five sites on Mountain Home AFB proper, none of which are eligible for or listed in the NRHP. This data does not include Saylor Creek or Juniper Butte Ranges.

Architectural Resources

Several architectural surveys have been conducted at Mountain Home AFB to include all buildings 50 years old or older and have been evaluated for NRHP eligibility (Air Force 2006b) as well as Cold War-era structures built before 1990 (Air Force 2006a, 2006b, 2009). Five World War II structures (Buildings 201, 204, 205, 208, and 211) were found to be eligible for listing in the NRHP (Watts 1991). All of the structures are hangars and have birchwood type bowstring roof trusses. Their architectural integrity reflects their World War II origins. Four Cold War-era buildings at Mountain Home AFB, Buildings 291 (the Bomber Alert Facility), 4473, 4476, and 4478, have all been found eligible for listing in the NRHP. The Air Force also considers 18 additional buildings eligible for listing in the NRHP: 1329, 1330, 1331, 1332, 1333, 3000, 3002, 3003, 3004, 3005, 3006, 3007, 3008, 3009, 3010, 3011, 3012, and 3015.

Traditional Resources

No traditional resources are known from Mountain Home AFB. Given the extensive development on the base, the potential for undisturbed traditional cultural resources is extremely low (Air Force 2006b).

MH3.9.1.2 Environmental Consequences

ACC Scenario 1

No buildings or structures would be renovated or demolished under ACC Scenario 1. New construction (the new flight simulator facility and the new F-35A parts storage facility) would take place in the vicinity of NRHP-eligible Buildings 201, 204, and 205 (World War II-era hangars). However, this new construction would be in keeping with the overall military setting of Mountain Home AFB and would not have a visual impact on Buildings 201, 204, and 205. Therefore, there would be no adverse impacts to historic properties on Mountain Home AFB under ACC Scenario 1. In accordance with the 2009 Programmatic Agreement, Section 106 consultation was undertaken with letters sent to the Idaho, Nevada, and Oregon SHPOs, as well as six federally-recognized American Indian Tribes potentially having an interest in this proposal. All letters were delivered to the recipients and all three SHPOs concurred with the Air Force determination of no adverse effects within the APE. However, no responses were received from the six federally-recognized American Indian Tribes as of publication of this document.

ACC Scenario 2

Seven buildings and four hangars (201, 204, 205, and 208) would be renovated under ACC Scenario 2. One of these buildings, 211, and the four hangars are eligible for listing on the NRHP. The alterations planned for Building 211 would be to the interior of the lean-to part of the structure and would not be an adverse impact because the alterations would not alter the characteristics of Building 211 that make it NRHP-eligible. Nor would the electrical upgrades planned for Buildings 201, 204, 205, and 208 alter the characteristics of the buildings that make them eligible for listing in the NRHP. Building 211 and the hangars are NRHP-eligible based on their association with the World War II-era and the expansive birchwood type bowstring truss roof support systems that characterize the construction design of the period. Alterations and upgrades would not modify the roof support system.

New construction (the new flight simulator facility, the new F-35A parts storage facility, and the new maintenance group facility) and the addition to Building 1225 (weapons release shop) would take place in the vicinity of NRHP-eligible Buildings 201, 204, and 205 (World War II-era hangars), and Building 211. The new construction and addition would be in keeping with the overall military setting of Mountain Home AFB and would therefore not have a visual impact on Buildings 201, 204, 205, or 211. One structure, Building 1224 would be demolished. This building is not eligible for listing on the NRHP.

Since there are currently no NRHP listed or eligible archaeological sites on Mountain Home AFB, none would be affected under ACC Scenario 2. Therefore, there would be no adverse impacts to historic properties on Mountain Home AFB under ACC Scenario 2. In accordance with the 2009 Programmatic Agreement, Section 106 consultation was undertaken with letters sent to the Idaho, Nevada, and Oregon SHPOs, as well as six federally-recognized American Indian Tribes potentially having an interest in this proposal. All letters were delivered to the recipients and the three SHPOs concurred with the Air Force determination of no adverse effects within the APE. However, no responses were received from the six federally-recognized American Indian Tribes as of publication of this document.

ACC Scenario 3

Seven buildings and four hangars (201, 204, 205, and 208) would be renovated under this beddown scenario. One of these buildings, 211, and the four hangars are eligible for listing in the NRHP. As discussed under ACC Scenario 2, the alterations planned for Building 211 would be to the interior of the lean-to part of the structure and would not be an adverse impact because the alterations would not alter the characteristics of Building 211 that make it NRHP-eligible. The electrical upgrades planned for Buildings 201, 204, 205, and 208 also would not alter the characteristics of the buildings that make them eligible for listing in the NRHP.

New construction (the new flight simulator facility, the new F-35A parts storage facility, and the new maintenance group facility) and the addition to Building 1225 would take place in the vicinity of NRHP-eligible Buildings 201, 204, 205 (World War II-era hangars), and 211. This new construction and addition would be in keeping with the overall military setting of Mountain Home AFB and would therefore not have a visual impact on Buildings 201, 204, 205, or 211. The addition to Building 1225 (weapons release shop) will take place in the vicinity of NRHP-eligible Building 211. The new construction would also be in keeping with the overall military setting of Mountain Home AFB and would therefore not have a visual impact on Building 211. One structure, Building 1224, would be demolished. This building is not eligible for listing on the NRHP.

Since there are currently no NRHP listed or eligible archaeological sites on Mountain Home AFB, none would be affected under ACC Scenario 3. Therefore, there would be no adverse impacts to historic properties on Mountain Home AFB under ACC Scenario 3. In accordance with the 2009 Programmatic Agreement, Section 106 consultation was undertaken with letters sent to the Idaho, Nevada, and Oregon SHPOs, as well as six federally-recognized American Indian Tribes potentially having an interest in this proposal. All letters were delivered to the recipients and the three SHPOs concurred with the Air Force determination of no adverse effects within the APE. However, no responses were received from the six federally-recognized American Indian Tribes as of publication of this document.

MH3.9.2 Airspace

MH3.9.2.1 Affected Environment

Six NRHP-listed properties have been identified under Mountain Home AFB airspace: the Wickahoney Post Office and Stage Station, the Sheep Ranch Fortified House, Camp Three Forks, the Silver State Flour

Mill, the Gold Creek Ranger Station, and the Birch Creek Ranch Historic Rural District. In addition, many more eligible or potentially eligible cultural resources associated with the history of the region are likely to underlie airspace.

Two American Indian reservations underlie Mountain Home AFB-associated airspace. The Fort McDermitt Indian Reservation lies under Paradise North and South in Nevada and Oregon (Bureau of Indian Affairs 1998). Duck Valley Indian Reservation underlies the Owyhee North and South MOAs.

No formal traditional cultural properties have been identified under the airspace. However in previous studies, representatives of the Shoshone-Paiute Tribes have expressed concern regarding the potential interference in tribal ceremonies and rituals by noise and visual impacts of Air Force overflights; disturbance to the solitude of certain areas; and the possible adverse effects of aircraft noise on wildlife resources in the region (Air Force 2006b).

Mountain Home AFB offers to consult with local American Indian Tribes depending upon proposed activities. Consultations are conducted on a recurring basis, to include non-scheduled consultations when required. For this EIS, letters initiating government-to-government consultation were sent to the following American Indian groups informing them about the proposed project: Burns Paiute Tribe; Northwestern Band, Shoshone; Paiute-Shoshone Tribes of Fort McDermitt; and the Shoshone-Paiute Tribes of the Duck Valley Indian Reservation. None of these tribes responded to the initial letter. Additional government-to-government consultation letters were sent to these tribes directly from Mountain Home AFB in October/November 2012 (see Appendix B). To date, no responses were received; however, Mountain Home actively continues consultation efforts with Duck Valley Indian Reservation.

MH3.9.2.2 Environmental Consequences

There would be no adverse impacts to cultural resources due to the implementation of the proposed action. Aircraft operations in the airspace would increase between 13, 26, and 39, percent under ACC Scenarios 1, 2, and 3, respectively. These changes would be a continuation of existing operations within the area and would not result in a change in setting to any eligible or listed archaeological, architectural, or traditional cultural property.

Noise levels in all MOAs would increase under the three ACC Scenarios. An increase in subsonic noise of 2 dB L_{dnmr} would occur under ACC Scenario 3 in Jarbidge North and Owyhee North. Noise levels in all other MOAs would remain at 46 L_{dnmr} or below for any of the three ACC Scenarios. Supersonic noise would increase a maximum of 2 dB L_{dnmr} in Jarbidge North. Sonic booms would increase no more than 1 boom per day in Jarbidge North and Owyhee North. No damage to ghost towns or historic structures is anticipated because overpressures would not exceed current levels found with the F-15E/SGs using the airspace (2.5 psf). Impacts to structures would be considered minimal at this level of psf (Battis 1988, Haber and Nakaki 1989). Mountain Home AFB consulted with both the Nevada and Oregon SHPOs for the MHRC MOA airspace expansion and both SHPOs concurred that no historic properties (i.e., eligible for or listed on the NRHP) would be affected. Therefore, no adverse impacts to historic properties are anticipated.

Visual intrusions under the proposed action would be minimal and would not represent an increase over baseline conditions sufficient to cause adverse impacts to the settings of cultural resources. Due to the high altitude of the overflights, small size of the aircraft, and the high speeds, the aircraft would not be readily visible to observers on the ground. Indeed, at an altitude of 8,000 feet AGL, an F-35A would appear about 0.07 inches in size.

Use of ordnance and defensive countermeasures would occur in areas already used for these activities. Use of ranges would be the same as activities authorized and currently occurring there. No additional ground disturbance would occur under the airspace due to the proposed action. Flares deployed from the aircraft would not pose a visual intrusion either for the following reasons: flares are small in size and burn only for a few seconds and the high relative altitude of the flights would make them virtually undetectable to people on the ground. Overall, flares are unlikely to adversely affect cultural resources. Therefore, the introduction of material to archaeological sites or standing structures from the use of flares would not have an adverse effect on these resources.

Proposed use of the airspace would be similar to ongoing training operations. Given the current use of the airspace and the nature of the proposed future use of the project area, there would be no adverse effects to NRHP-eligible or listed archaeological resources, architectural resources, or traditional cultural properties.

MH3.10 Land Use

MH3.10.1 Base

The following section describes the existing conditions and examines the extent to which the beddown of the F-35A at Mountain Home AFB 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 MH3.10-1 provides a cross-reference between the Elmore County classifications and those used in the impact analysis.

Table MH3.10-1. Land Use Categories

County Land Use Classification	*EIS Land Use Classification*
Rural Residential	Residential
Commercial	Commercial
Light Industrial, Heavy Industrial	Industrial
Mountain Home AFB	Military
Air Base Hazard Zone, Agriculture	Open Space
No Data	Unclassified

MH3.10.1.1 Affected Environment

Mountain Home AFB covers approximately 6,844 acres of land. Approximately 20 to 25 percent of the base is developed with building, roads, runways and other facilities, with the most densely developed areas located in the central and northeastern portions of the base. Landscaped and disturbed areas account for approximately 25 percent of the base, while the remaining areas are open space. Open space areas consist of undeveloped fields, partially disturbed areas separating buildings and facilities, and disturbed shrubland communities.

General siting criteria have been established for land development and use at military airfields. For example, APZs, which address height restrictions, development density, and land use in and around military airports, are enforced to reduce the potential for aircraft-related hazards. Clear Zones are established at each end of a runway and are 3,000 feet wide by 3,000 feet long. The DoD requires that control of the land within each Clear Zone be acquired through purchase, lease, or easement to minimize exposure and prevent obstructions. Only agricultural land use occurs within the Clear Zones and APZs at Mountain Home AFB.

Existing Aircraft Noise and Land Use Compatibility Surrounding the Base

Mountain Home AFB is located approximately 50 miles southeast of Boise, Idaho in Elmore County. Owyhee County lies approximately 4 miles south of the base and the border of Ada County is about 7 miles northwest. The City of Mountain Home, which lies 8 miles northeast of the base, and Glenns Ferry, located approximately 30 miles southeast of the base, are the only two incorporated communities in Elmore County.

Land use areas most sensitive to noise typically include residential and commercial areas, public services, and areas associated with cultural and recreational uses. Noise measurements 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 (refer to MH3.2 for more details on DNL). DNL also considers an additional weighting for nighttime operations. DoD has established noise compatibility criteria for various land uses. According to these criteria, noise levels equal to or less than 65 dB DNL are compatible with land uses such as residences, transient lodging, and medical facilities.

The City of Mountain Home Comprehensive Plan (City of Mountain Home 2008) and the Elmore County Comprehensive Growth and Development Plan (Elmore County 2010) guide decisions regarding land use and growth surrounding the base. Elmore County is primarily rural with a large portion utilized for farming and timber production, with over 70 percent of the county owned by the federal government (USFWS, BLM, and DoD) (Elmore County 2004). Lands directly around Mountain AFB are generally open, agricultural, and low density residential, with a few commercial areas north of the base along Highway 67. A small residential subdivision, a small mobile home park, and mini warehouses are located immediately north of the field. The majority of population is located northeast of the base, outside the noise contour area.

Mountain Home AFB is located near several natural areas of importance, including the Snake River, Snake River Birds of Prey National Conservation Area, Bruneau River Scenic Area, and Bruneau Dunes State Park. The Snake River is located south of the base and is an important wildlife habitat, recreation area, and important for economic reasons such as power generation and source of water for irrigation.

The AICUZ program is a DoD program that addresses public health and safety through an analysis of aircraft noise, aircraft accident potential, and land use development in the areas surrounding military installations. The AICUZ program at Mountain Home AFB provides guidelines to address safety and noise issues in planning activities for the base and surrounding communities. It also provides the base and surrounding communities with guidelines to address safety and noise issues in planning. Mountain Home AFB published its latest AICUZ Study in 1998.

While Elmore County has not adopted AICUZ guidelines in the 2006 Comprehensive Plan, it has adopted an Air Base Hazard Zone to prevent encroachment while allowing the best possible use of private lands in this zone as long as private uses do not conflict with Air Base operations. Land use restrictions apply to this Air Base Hazard Zone area. Additionally, the Air Base Commercial Zone is located at the highway entrance to the Mountain Home (Elmore County 2010).

Table MH3.10-2 shows land use area measurements within the existing noise level contours. While only open/agricultural lands are exposed to noise levels of 65 dB DNL or greater a single farm residence occurs within the 70 to 75 dB DNL contour. No other sensitive receptors (schools, hospitals, or churches) are located in the off-base area currently affected by noise levels 65 dB DNL or above.

Table MH3.10-2. Off-Base Land Uses Affected by Noise Levels 65 dB DNL and Greater under Baseline

Land Use Category	***65-70 dB DNL***	***70-75 dB DNL***	***75-80 dB DNL***	***80-85 dB DNL***	***85+ dB DNL***	***TOTAL***
Residential	0	0	0	0	0	0
Commercial	0	0	0	0	0	0
Industrial	0	0	0	0	0	0
Public/Quasi Public	0	0	0	0	0	0
Recreational	0	0	0	0	0	0
Open/Agricultural	8,504	3,874	1,292	135	0	13,805
Unclassified	0	0	0	0	0	0
Total	**8,504**	**3,874**	**1,292**	**135**	**0**	**13,805**

MH3.10.1.2 Environmental Consequences

All proposed scenarios would require new facility construction. New facilities would be designed and sited to be compatible with the existing base master plan, airfield safety guidelines and planning documents. New 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, changes in noise conditions on- and off-base represent the focus of this analysis of impacts. Section MH3.2 (Noise) contains noise contour maps and detailed tables showing impacts by scenario.

The land use impact analysis compares the proposed noise contours for each scenario to baseline noise contours, which show the existing noise environment, and AICUZ contours, which may be used by Elmore County for planning purposes. The comparison of the proposed contours to the baseline contours shows potential change in noise conditions and land use compatibility (refer to Table

MH3.10-3 and Figures MH3.10-1, MH3.10-2, and MH3.10-3). The comparison of the proposed 65 dB DNL contour areas to the AICUZ noise contours and Elmore County's Air Base Hazard Zone illustrates the potential for the proposed action to affect land use planning activities (Table MH3.10-3 and Figure MH3.10-4).

Table MH3.10-3. Off-Base Land Uses Affected by Noise Levels 65 dB DNL and Greater under all ACC Scenarios

Land Use Category	*65-70 dB DNL*			*70-75 dB DNL*			*75-80 dB DNL*			*80-85 dB DNL*			*85+ dB DNL*			*Totals*		
	Baseline	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*
ACC Scenario 1																		
Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8,504	9,056	552	3,874	4,131	257	1,292	1,445	153	135	178	43	0	0	0	13,805	14,810	1,005
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**8,504**	**9,056**	**552**	**3,874**	**4,131**	**257**	**1,292**	**1,445**	**153**	**135**	**178**	**43**	**0**	**0**	**0**	**13,805**	**14,810**	**1,005**
ACC Scenario 2																		
Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8,504	9,658	1,154	3,874	4,409	535	1,292	1,602	310	135	222	87	0	0	0	13,805	15,891	2,086
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**8,504**	**9,658**	**1,154**	**3,874**	**4,409**	**535**	**1,292**	**1,602**	**310**	**135**	**222**	**87**	**0**	**0**	**0**	**13,805**	**15,891**	**2,086**
ACC Scenario 3																		
Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8,504	10,275	1,771	3,874	4,691	817	1,292	1,746	454	135	548	413	0	0	0	13,805	17,260	3,455
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**8,504**	**10,275**	**1,771**	**3,874**	**4,691**	**817**	**1,292**	**1,746**	**454**	**135**	**548**	**413**	**0**	**0**	**0**	**13,805**	**17,260**	**3,455**

Source: Wyle 2011 and U.S. Census Bureau 2010b.

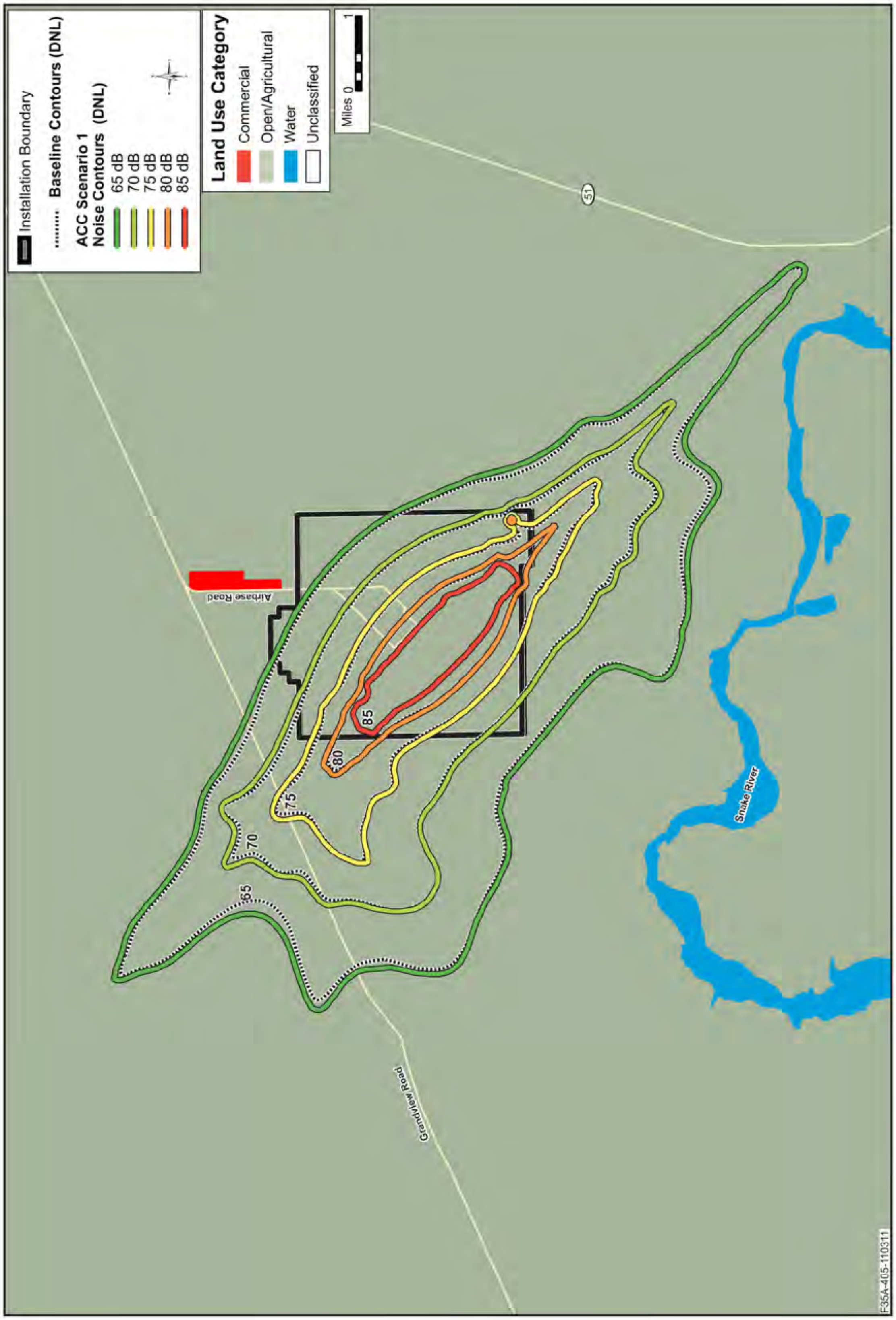


Figure MH3.10-1. Baseline Contours Compared to ACC Scenario 1 Contours Over Land Use Map

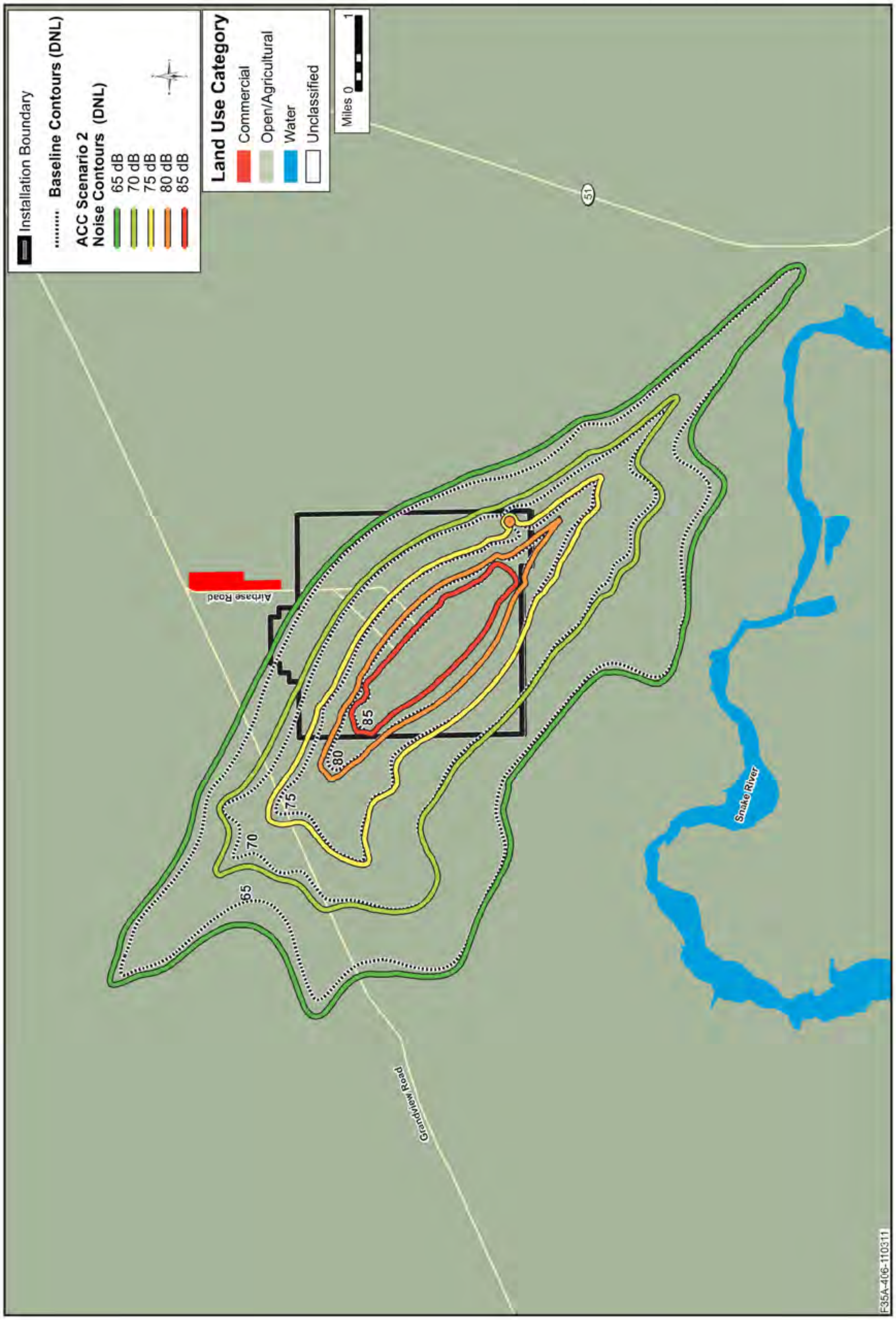


Figure MH3.10-2. Baseline Contours Compared to ACC Scenario 2 Contours Over Land Use Map

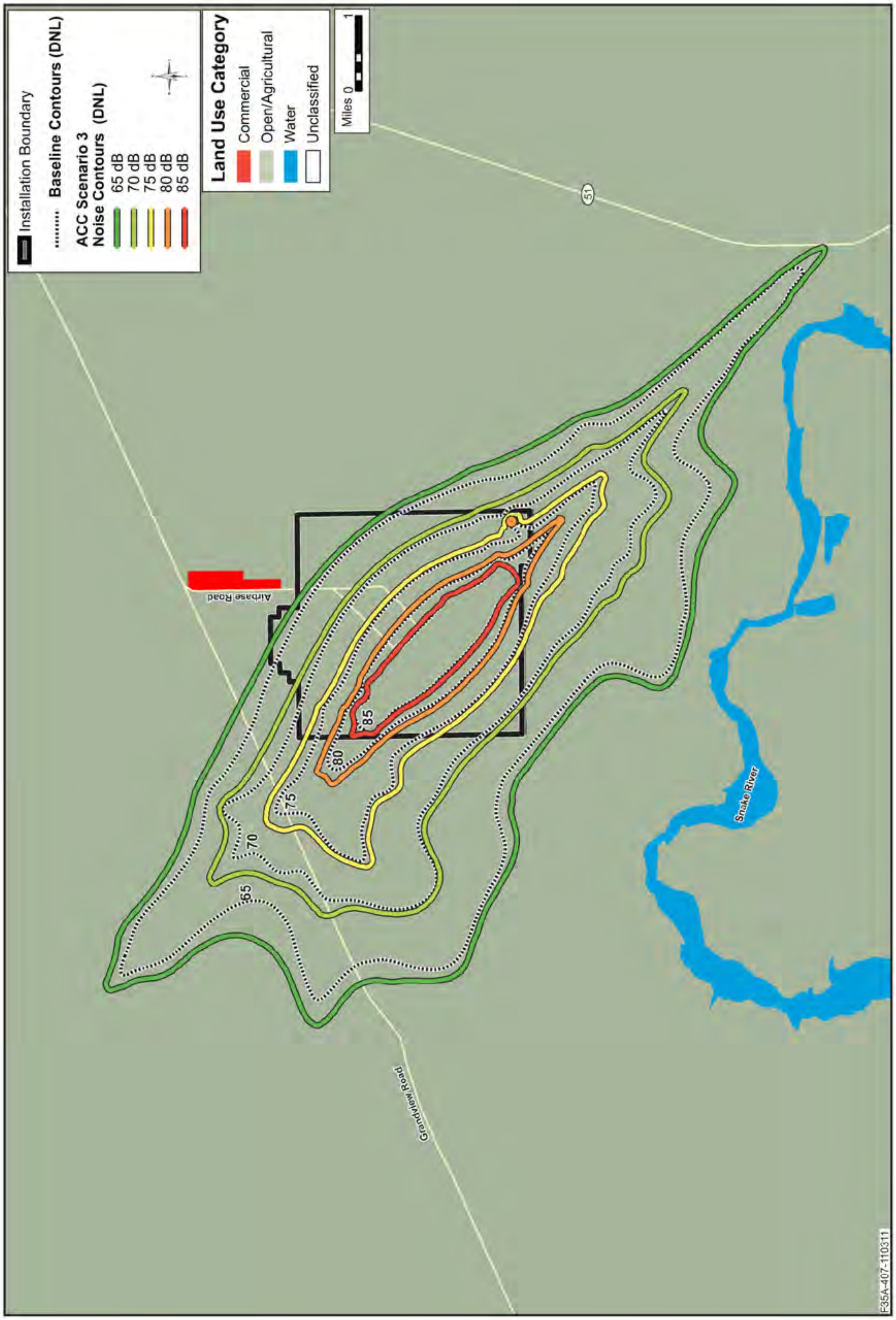


Figure MH3.10-4. Baseline Contours Compared to ACC Scenario 3 Contours Over Land Use Map

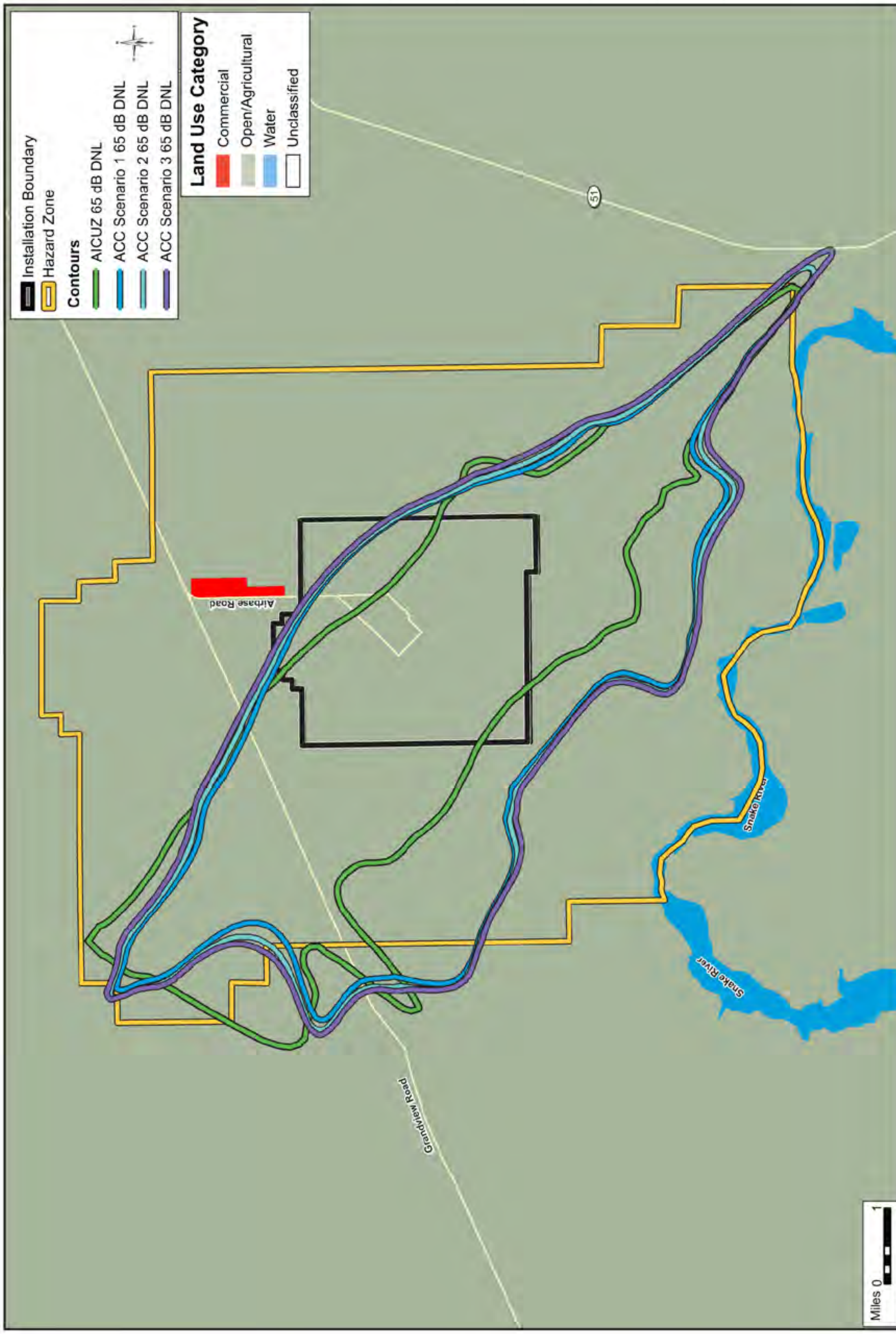


Figure MH3.10-3. Comparison of AICUZ Planning Contours to ACC Scenarios 1, 2, and 3 Contours Over Land Use Map

No areas zoned for residential, commercial, or industrial use occur within the region of impact under any beddown scenario and no conservation or scenic area would be affected by airfield noise above 65 dB DNL. The single farm residence would remain exposed to the same noise levels as under baseline conditions.

ACC Scenario 1

Under ACC Scenario 1, the overall area affected by noise 65 dB DNL or greater would increase by 1,005 acres (7 percent) when compared to baseline conditions (refer to Figure MH3.10-1). However, no areas zoned for residential, commercial, or industrial use occur within the areas affected by noise levels above 65 dB DNL. Therefore, the proposed action would result in no incompatible land use (refer to Table MH3.10-3).

Table MH3.10-4 provides a comparison of land use acreages that would be affected by noise levels equal to or greater than 65 dB DNL from the proposed action compared to the 65 dB DNL contour prepared as part of the AICUZ study. Figure MH3.10.2 shows the location of the AICUZ 65 dB DNL contour compared to those of the proposed scenarios. While ACC Scenario 1 results in a larger noise zone than represented by the AICUZ, the ACC Scenario 1 65 dB DNL contour differs only slightly from the existing condition. Both the existing contour area and the ACC Scenario 1 contour area for 65 dB DNL extend to the northwest, west, and southeast of the Airport Hazard Zone (refer to Figure MH3.10-4). These contour areas extend over areas of agricultural use and result in no land use incompatibilities.

Table MH3.10-4. Difference between AICUZ 65 dB DNL and Proposed Scenarios at Mountain Home AFB 65 dB DNL (in acres)

EIS Land Use Classification	*AICUZ*	*ACC Scenario 1*	*Difference*	*ACC Scenario 2*	*Difference*	*ACC Scenario 3*	*Difference*
Military	2,584	5,498	2,914	5,560	2,976	5,611	3,027
Open Space	13,630	14,809	1,179	15,891	2,261	16,988	3,358
Total	**16,214**	**20,307**	**4,093**	**21,451**	**5,237**	**22,599**	**6,385**

Source: Wyle 2011.

ACC Scenario 2

Under ACC Scenario 2, the overall area affected by noise 65 dB DNL or greater would increase by 2,086 acres (15 percent) when compared to baseline conditions (refer to Figure MH3.10-2). However, no areas zoned for residential, commercial, or industrial use occur within the areas affected by noise levels above 65 dB DNL. Therefore, the proposed action would result in no incompatible land use (refer to Table MH3.10-2). While ACC Scenario 2 results in a larger noise zone than represented by the AICUZ, the ACC Scenario 2 65 dB DNL contour is similar to the existing condition. Both the existing contour area and the ACC Scenario 2 contour area for 65 dB DNL extend to the northwest, west, and southeast of the Airport Hazard Zone (refer to Figure MH3.10-4). These contour areas extend over areas of agricultural use and result in no land use incompatibilities.

ACC Scenario 3

Under ACC Scenario 3, the overall area affected by noise 65 dB DNL or greater would increase by 3,455 acres (25 percent) when compared to baseline conditions (refer to Figure MH3.10-3). However, no areas zoned for residential, commercial, or industrial use occur within the areas affected by noise levels above 65 dB DNL. Therefore, the proposed action would result in no incompatible land use (refer to Table MH3.10-2).

While ACC Scenario 3 results in a larger noise zone than represented by the AICUZ, the ACC Scenario 3 65 dB DNL contour is similar to the existing condition. Both the existing contour area and the ACC Scenario 3 contour area for 65 dB DNL extend to the northwest, west, and southeast of the Airport Hazard Zone (refer to Figure MH3.10-4). These contour areas extend over areas of agricultural use and result in no land use incompatibilities.

MH3.10.2 Airspace

MH3.10.2.1 Affected Environment

The training airspace associated with Mountain Home AFB includes the Jarbidge North and South, Owyhee North and South, Paradise North and South, and Saddle MOAs located over southwestern Idaho, southeastern Oregon, and northern Nevada. Land under the airspace is primarily federally owned, with the BLM as the primary land manager. Areas located under the airspace are primarily undeveloped with very few residential areas present. Numerous dispersed ranches and several very small communities, however, occur including Paradise Valley and Orovada in Nevada, and Riddle, Idaho (Figure MH3.10-5).

Two American Indian reservations lie under the airspace, the Duck Valley Indian Reservation and the Fort McDermitt Indian Reservation (refer to Figure MH3.10-5). The northern half of the Duck Valley Indian Reservation is primarily ranches and dispersed homes and occurs under the Owyhee North airspace in Idaho. The majority of the reservation's inhabitants live in the southern half which is located in Nevada under Owyhee North and South MOAs. As noted previously in Section MH3.9, numerous restrictions apply to overflights of this reservation, including no flights below 15,000 feet AGL. The Fort McDermitt Indian Reservation is located in Oregon and Nevada, with half in Paradise North and half in Paradise South. The floor for this airspace is 3,000 AGL or 10,000 MSL, whichever is higher.

Under Jarbidge North, Juniper Butte Range underlies R-3204, approximately 45 miles south of Mountain Home AFB in Owyhee County. The range encompasses approximately 12,112 acres and is bordered to the east by the East Fork Bruneau Canyon and on the south by Juniper Butte. The entire range is considered an impact area; however, targets are only permitted in a 662-acre fenced off area in the center of the range (Air Force 2007c). Saylor Creek Range is also located under Jarbidge North about 16 miles southeast of Mountain Home AFB. The range is composed of lands withdrawn from the public domain or leased land from the state. Within Saylor Creek Range's exclusive use area, land use consists solely of target areas and support facilities, with more than half the acreage consisting of open space (Air Force 2007c).

Wilderness Areas and Wilderness Study Areas

The BLM, in accordance with Section 603(c) of the Federal Land Management Policy Act (FLMPA), reports to Congress on the federal lands under its management suitable for inclusion in the National Wilderness Preservation System. Inclusion of land into the National Wilderness Preservation System is intended to preserve areas in a primitive state that possess little evidence of human activity. The Wilderness Act of 1964 identified criteria for evaluating areas for wilderness characteristics and gave direction on how designated wilderness areas should be managed. The major factors evaluated for each WSA include wilderness qualities such as naturalness, size, solitude, and special features; additional wilderness quality factors include multiple resource benefits, balancing the geographic distribution of wilderness areas, diversity of natural systems, and manageability. Subject to certain exemptions, use of motor vehicles or other motorized equipment, landing of aircraft, and construction of structures and roads are prohibited in wilderness areas. Each federal agency is responsible for evaluating, nominating, managing, and protecting designated and potential wilderness areas within the lands they manage. Wilderness Areas under the airspace include Bruneau-Jarbidge Wilderness, Little Jacks Creek and Big Jacks Creek Wilderness, Owyhee River Wilderness, North Fork Owyhee, and Pole Creek Wilderness (refer to Table MH3.10-4). Numerous WSAs underlie the Saddle MOA airspace (Figure MH3.10-6).

The Omnibus Public Land Management Act of 2009 designated 517,000 acres of wilderness and 316 miles of wild and scenic rivers and “released” nearly 200,000 acres of wilderness study areas from the requirement be managed to protect wilderness characteristics (P.L. 111-11). All areas are located under the Owyhee and Paradise MOAs.

Several WSAs are located within the MHRC airspace (Figure MH3.10-5 and Table MH3.10-5). These include a small area of the North Fork of the Little Humboldt River WSA under Paradise South MOA and roughly one-quarter of the Little Humboldt River WSA under the Owyhee South MOA and the Rough Hills WSA under the Jarbidge South MOA. A narrow leg in the upper region of the Owyhee Canyon WSA in Oregon, called the Owyhee Canyon WSA has been withdrawn. The FAA does not restrict aircraft flights over WSAs (Air Force 2010).

Wild and Scenic Rivers

The Wild and Scenic Rivers Act (16 U.S. Code [USC] 1271-1287)—P.L. 90-542, approved October 2, 1968, (82 Stat. 906) established a National Wild and Scenic Rivers System and prescribed the methods and standards through which additional rivers may be identified and added to the system. Subtitle F of The Omnibus Public Land Management Act of 2009, Section 1504, Designation of Wild and Scenic Rivers, also has two reaches within the area under the airspace - the North Fork of the Owyhee River and the Owyhee River. Military activity over those locations is not precluded by the legislation and would not affect the use of the rivers.

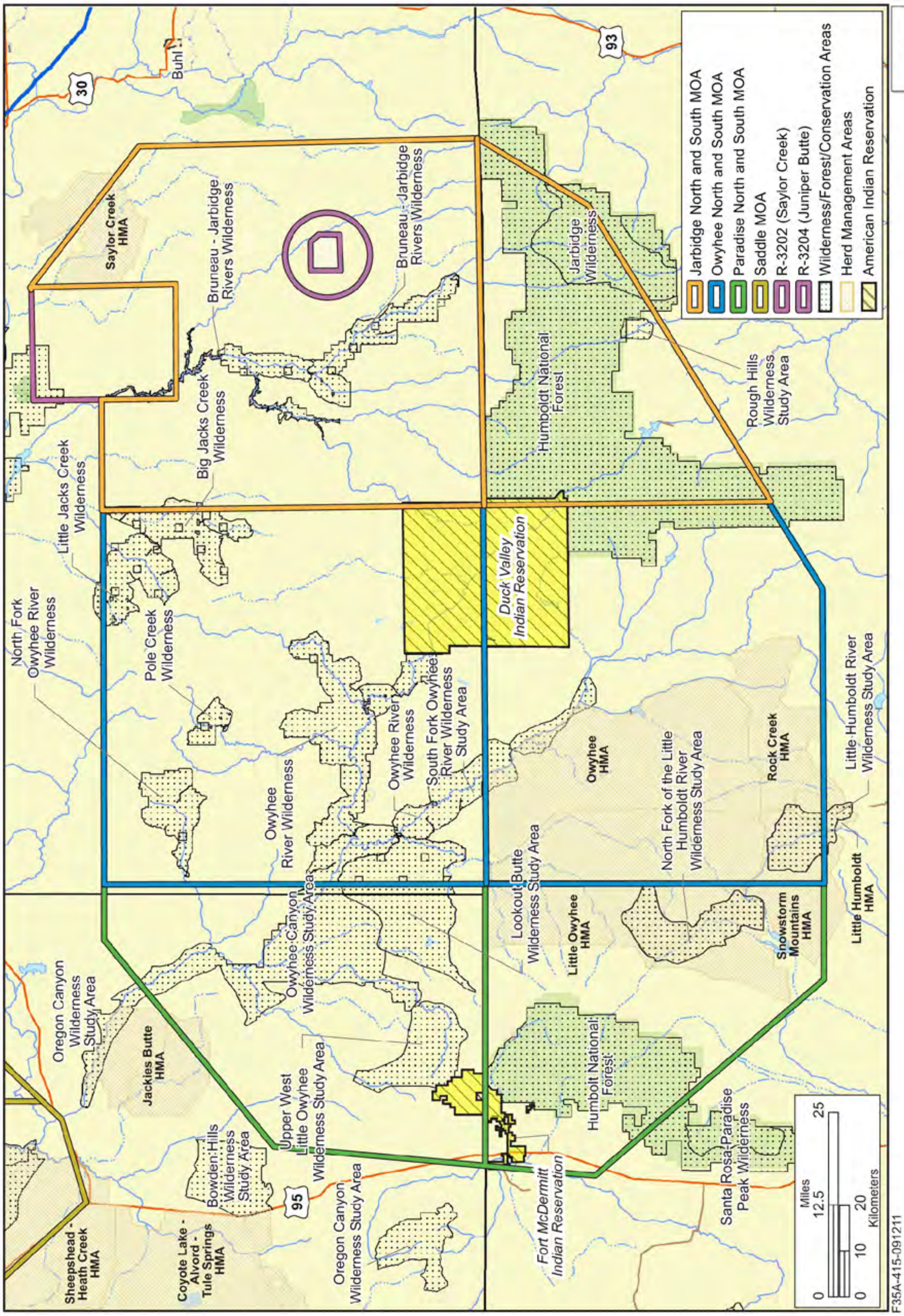


Figure MH3.10-5. Land Use Under Owyhee North and South, Paradise North and South, and Jarbidge North and South Airspace

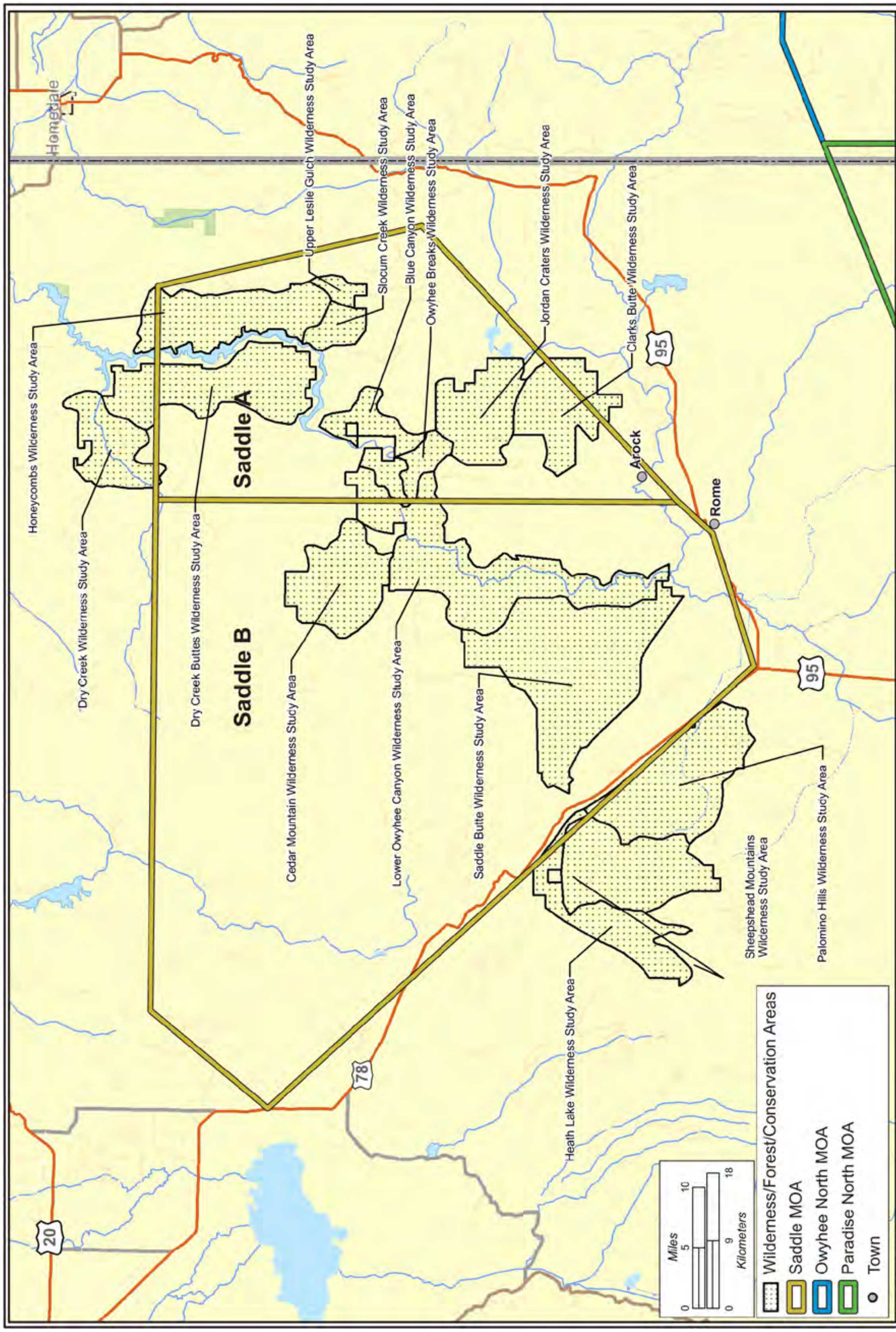


Figure MH3.10-6. Land Use Under Saddle A and B Airspace

Table MH3.10-5. Land Ownership under Training Airspace		
Agency	*Acres*	*Primary Special Use Areas*
Saddle		
Bureau of Land Management	1,011,152	Blue Canyon WSA, Clarks Butte WSA, Dry Creek WSA, Dry Creek Buttes WSA, Honeycombs WSA, Jordan Craters WSA, Lower Owyhee Canyon WSA, Owyhee Breaks WSA, Slocum Creek WSA, Upper Leslie Gulch WSA, Cedar Mountain WSA, Lower Owyhee Canyon WSA, Owyhee Breaks WSA, Palomino Hills WSA, Saddle Butte WSA, Sheepshead Mountains WSA
Bureau of Reclamation	14,026	-
Department of Energy	12,611	-
State	200,568	-
Private	177,649	-
Uncategorized	1,995	-
Total	**1,418,001**	**-**
Paradise		
Bureau of Land Management	1,482,700	Owyhee River Canyon WSA, Upper West Little Owyhee WSA, Lookout Butte WSA, Owyhee River Wilderness, Fort McDermitt Indian Reservation, North Fork of the Little Humboldt River WSA, Little Owyhee HMA, Snowstorm Mountains HMA
American Indian Reservations	24,779	Fort McDermitt Indian Reservation
Department of Energy	9,227	-
Forest Service	193,630	Humboldt NF
State of Oregon	68,124	-
State of Idaho	1,127	-
Private	115,372	-
Total	**1,894,959**	**-**
Saylor Creek (R-3202 High/Low)		
Bureau of Land Management	77,697	-
Department of Defense	102,977	-
State of Idaho	11,086	-
Private	88	-
Total	**191,848**	**-**
Owyhee		
Bureau of Land Management	2,302,391	North Fork Owyhee River WA, Owyhee River WA, Little Jacks Creek WA, Big Jacks Creek WA, Pole Creek WA, Owyhee River WA, South Fork Owyhee River WSA, Owyhee Canyon WSA, Little Humboldt River WSA, Little Owyhee HMA, Snowstorm Mountains HMA, Little Humboldt HMA, Rock Creek HMA, Owyhee HMA
American Indian Reservations	279,002	Duck Valley Indian Reservation
Forest Service	86,422	Humboldt NF
State of Idaho	132,301	-
Private	389,187	-
Total	**3,189,303**	**-**
Jarbidge		
Bureau of Land Management	1,475,330	Saylor Creek HMA, Big Jacks Creek WA, Bruneau-Jarbidge Rivers WA, Rough Hills WSA
American Indian Reservations	11,097	Duck Valley Indian Reservation
Bureau of Reclamation	3,190	-
Department of Defense	12,249	-
Forest Service	501,145	Humboldt NF, Jarbidge WA
State of Idaho	86,120	-
Private	201,381	-
Total	**2,290,512**	**-**

MH3.10.2.2 Environmental Consequences

This section describes the potential for aircraft noise under each ACC Scenario to result in changes to land use patterns, ownership, or management plans and policies under the airspace.

Standard flight rules require all pilots to avoid direct overflight of populated areas by 1,000 feet and people or structures by 500 feet in isolated areas. Furthermore, the FAA and DoD have identified and published avoidance criteria for specific aviation-related or noise sensitive areas. Aircraft overflights less than 15,000 fee AGL and all supersonic flights are prohibited over the Duck Valley Indian Reservation. Noise over the Duck Valley Indian Reservation would remain imperceptible from ambient noise levels.

Aircraft overflights can adversely affect the solitude of the wilderness experience for some individuals. While these noise impacts can intrude momentarily on the wilderness solitude, it does not change the basic wilderness characteristics of the area nor would it endanger future wilderness designation. While the F-35A would add more training operations, operations are at a higher altitude than aircraft currently training in the airspace and overflights are dispersed and transitory in nature.

The Omnibus Public Land management Act of 2009 (11) MILITARY OVERFLIGHTS does not restrict or preclude: A) low-level overflights of military aircraft over the areas designated as wilderness by this subtitle, including military overflights that can be seen or heard within the wilderness areas; B) flight testing and evaluation; or C) the designation or creation of new units of special use airspace, or the establishment of military flight training routes, over the wilderness areas (P.L. 111-11). Special use areas (i.e., Wild and Scenic Rivers, Wilderness Areas, WSAs, Wildlife Management Areas, and Research Natural Areas) would not be affected substantially by implementation of the proposed action.

ACC Scenario 1

Under ACC Scenario 1, daily operations in Mountain Home airspace units would increase by 13 percent overall. However, due to higher flight altitudes, noise levels in the Saddle, Paradise North, Paradise South, Owyhee South and Jarbidge South MOAs would remain less than 45 dB L_{dnmr}, a level that remains imperceptible from ambient noise levels.

Noise levels in Owyhee North would not change, but the number of sonic booms per month would increase by 9. In Jarbidge North, both subsonic and supersonic noise would increase imperceptibly by 1 dB to 65 dB L_{dnmr} and to 54 CDNL, respectively; and the number of sonic booms per month would increase by 9. Refer to Figure MH3.2-5 for an airspace map and tables comparing the potential noise impacts for each alternative.

ACC Scenario 2

Under ACC Scenario 2, daily operations in Mountain Home airspace units would increase by 26 percent overall. However, due to higher flight altitudes, noise levels in the Saddle, Paradise North, Paradise South, Owyhee South and Jarbidge South MOAs would remain less than 45 dB L_{dnmr}. Differences in noise levels would not be perceived ambient noise levels.

Subsonic noise levels in Owyhee North would increase by 1 dB L_{dnmr}, supersonic noise would increase 1 dB to 58 CDNL, and the number of sonic booms per month would increase by 15. In Jarbidge North, subsonic noise would increase by 1 dB to 65 dB L_{dnmr}, and supersonic noise would increase by 2 dB to 55 CDNL. The number of sonic booms per month would increase by 13. Refer to Figure MH3.2-5 for an airspace map and tables comparing the potential noise impacts for each alternative.

ACC Scenario 3

Under ACC Scenario 3, daily operations in Mountain Home airspace units would increase by 39 percent overall. However, due to higher flight altitudes, noise levels in the Saddle, Paradise North, Paradise South, Owyhee South and Jarbidge South MOAs would increase by not exceed 46 dB L_{dnmr}. Such an increase would not be perceived.

Subsonic noise levels in Owyhee North would increase by 2 dB to 66 L_{dnmr}, supersonic noise would increase by 1 dB to 58 CDNL, and the number of sonic booms per month would increase by 22. In Jarbidge North, subsonic noise would increase by 2 dB to 66 dB L_{dnmr}, and supersonic noise would increase by 2 dB to 55 CDNL. The number of sonic booms per month would increase by 13. Refer to Figure MH3.2-5 for an airspace map and tables comparing the potential noise impacts for each alternative.

In summary, under all alternatives, the increase in the number of sonic booms could result in annoyance to individuals living, working, and recreating under the airspace. Increased operations in Owyhee and Jarbidge North under ACC Scenarios 1 and 2 would result louder average noise, which in more urban areas would be considered incompatible with sensitive land uses. However, the probability of a specific point being flown over frequently per day would be low due to the random nature of flight within the airspace and the large area of land overflown. Other aircraft noise remains either within ambient noise levels or at levels generally considered compatible with designated land uses under the airspace.

The proposed action would not generate changes to the status or use of underlying lands, nor would it affect existing plans or policies implemented for land management. Neither changes to noise levels nor the frequency of sonic booms would result in changes to land use patterns, ownership, or management plans and policies. Resources and special use areas (i.e., Wild and Scenic Rivers, Wilderness Areas, WSAs, Wildlife Management Areas, and Research Natural Areas) would not be substantially affected by implementation of the proposed action. 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.

MH3.11 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 comparable data among the various locations.

MH3.11.1 Base

MH3.11.1.1 Affected Environment

Employment and Earnings

Information regarding employment and earnings is presented for Ada, Elmore, and Owyhee counties, whose economies are closely associated with activities at Mountain Home AFB. Comparisons are also presented for the state of Idaho. Data are from the U.S. Census Bureau and the U.S. Bureau of Economic Analysis.

In the region of Mountain Home AFB, the total civilian labor force increased from 177,913 in 2000 to 230,395 in 2010, an increase of approximately 30 percent. The largest contributions to employment in 2010 were made by educational services, health care, and social assistance (18 percent), retail trade (10 percent), and professional services (10 percent).

In Idaho, the total civilian labor force increased by 19 percent from 2000 to 2010. The largest employment sectors in 2010 were educational services, health care, and social assistance (21 percent), retail trade (12 percent), and manufacturing (10 percent).

Non-farm earnings in the three-county region totaled more than $12.9 billion in 2009. The major contributions were from government and government enterprises (19 percent), manufacturing (13 percent), and health care (11 percent). In Idaho, non-farm earnings totaled over $32.4 billion in 2009, with the major contributions made by government and government enterprises (20 percent), health care (12 percent), and manufacturing (11 percent) (U.S. Bureau of Economic Analysis 2010).

In 2008, the number of active duty military personnel stationed at Mountain Home AFB was 4,173, with an additional 908 civilian workers. Active duty military dependents totaled 5,321. The value of payrolls associated with government personnel at Mountain Home AFB reached over $226.5 million in 2009 (Air Force 2008). Total authorized personnel in 2010 were 4,491 (Air Force 2010).

Mountain Home AFB also purchases substantial quantities of goods and services from local and regional firms. In 2009, annual construction and procurement expenditures by the base were over $171 million. The Air Force estimates that the economic stimulus of Mountain Home AFB created approximately 1,583 secondary jobs in the civilian economy (Air Force 2008).

Population

As with *Employment and Earnings*, information describing population is presented for Ada, Elmore, and Owyhee counties. Comparisons are also presented with conditions for the state of Idaho. Demographic data are from the U.S. Census Bureau 2010 Census and the 2008-2010 American Community Survey 3-Year Estimates.

The three-county region's population increased by 27 percent between 2000 and 2010, reaching 430,929 in 2010. By comparison, the population of Idaho increased by 21 percent during the same period, reaching 1,567,582 in 2010 (U.S. Census 2010a, 2010b).

Approximately 83 percent of the 2010 population of the three counties resides in incorporated communities. These cities and towns range in size from Boise (with a population of 205,671) to Grand View (with a population of 452). The largest cities are Boise, Meridian (75,092 persons), and Mountain Home (14,206 persons). The City of Meridian more than doubled in population from 2000 to 2010 (215 percent), while Boise grew by 11 percent and Mountain Home grew by 27 percent. The population in Grand View remained essentially the same (U.S. Census Bureau 2010a, 2010b).

Housing

Detailed information regarding housing contained in the three-county region is from the 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.

There were 176,414 total housing units in the region in 2010, of which approximately 63 percent were owner-occupied. The vacancy rate for the region was approximately 7 percent (U.S. Census Bureau 2010b, 2010d). Over the period 2000-2010, the annual average number of building permits issued for residential units was 4,780. The number of units permitted on an annual basis varied from a high of 8,142 in 2005 to a low of 1,333 in 2010. The majority of these permits (about 86 percent) were for single-family homes (U.S. Census Bureau 2010c).

Of the active duty personnel assigned to Mountain Home AFB in 2008, approximately 33 percent reside on-base in government family and unaccompanied housing (Air Force 2008).

MH3.11.1.2 Environmental Consequences

ACC Scenario 1

Employment and Earnings

ACC Scenario 1 would result in an increase of 532 military personnel and 53 civilians. The proposed positions would represent approximately 13 percent of military and 6 percent of civilian employment at Mountain Home AFB, and less than 1 percent of the total civilian labor force in the region. The increase in positions would result in an annual increase in salaries of approximately $22.7 million. Total new salaries would result in less than 1 percent of total non-farm earnings in the region. Some of these earnings would be paid to taxes, and some would be saved and invested, but most would be spent on consumer goods and services in the region. This spending would represent final demand increases to numerous economic sectors.

On-going indirect impacts would total an estimated 240 jobs and an estimated $10.8 million in labor income. The jobs include full- and part-time positions, and the income includes both employee compensation and proprietors' income. These jobs—in addition to the primary impacts—would last as long as the personnel changes are in effect and the income would occur each year.

These employment impacts represent less than 1 percent of the 230,395 people in the region's civilian labor force in 2010 (U.S. Census Bureau 2010b). With 2010 unemployment rates averaging 7.7 percent in the region (Idaho Department of Labor 2010), it would be expected that many of the new jobs would be filled by this unemployed labor force. Other jobs would be filled by family members of the new personnel, by other regional workers taking second jobs, and by existing employees working extra hours. Therefore, secondary employment impacts would not be expected to result in in-migration to the region.

Additional taxes would accrue to the federal, state, and local governments as a result of this new economic activity. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would collect an additional $2.2 million annually, and Idaho and local governments would collectively gain $1.6 million annually.

The combined expenditures for military construction projects for this scenario would be $16.9 million in 2014. Total regional employment impacts from construction spending would total an estimated 218 full- and part-time jobs in 2014, including 124 direct construction jobs, plus 46 indirect jobs to support these construction activities, plus 48 induced jobs from regional purchases due to the increased earnings of impacted workers. Total labor income impacts in are estimated at $9.7 million.

Overall, the total represents less than 1 percent of the region's civilian labor force in 2010 and the construction employment represents less than 2 percent of the 11,687 total regional construction jobs in 2010 (U.S. Census Bureau 2010b). Therefore, the regional labor force should be able to absorb the short-term direct construction, indirect, and induced jobs as a result of this beddown scenario.

Additional taxes would accrue to the federal, state, and local governments as a result of the construction activities. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would collect an additional $1.7 million due to 2013 construction projects. In addition, Idaho and local governments would collectively gain $885,000 due to 2013 construction projects.

Population

Under ACC Scenario 1, personnel at Mountain Home AFB would increase by 585. Combined with their associated 822 dependents, the total regional population would increase by 1,407, or less than 1 percent, a minor change to regional population.

Housing

Under ACC Scenario 1, 585 additional personnel would be assigned to Mountain Home AFB over approximately 4 years; this would represent about 1.4 percent of the total owner-occupied and approximately 3 percent of the total renter-occupied housing stock, respectively, in the region. Given that the vacancy rate for the region is about 7 percent and the phased nature of the personnel influx, the short-term impacts to the regional housing market would be expected to be minor.

ACC Scenario 2

Employment and Earnings

ACC Scenario 2 would result in an increase of 1,064 military personnel and 106 civilians. The proposed positions would represent approximately 25 percent of military and 12 percent of civilian employment at Mountain Home AFB, and less than 1 percent of the total civilian labor force in the region. The increase in positions would result in an annual increase in salaries of approximately $45.3 million. Total new salaries would result in less than 1 percent of total non-farm earnings in the region. Some of these earnings would be paid to taxes, and some would be saved and invested, but most would be spent on consumer goods and services in the region. This spending would represent final demand increases to numerous economic sectors.

On-going indirect impacts would total an estimated 479 jobs and an estimated $21.6 million in labor income. The jobs include full- and part-time positions, and the income includes both employee compensation and proprietors' income. These jobs—in addition to the primary impacts—would last as long as the personnel changes are in effect and the income would occur each year.

These employment impacts represent less than 1 percent of the 230,395 people in the region's civilian labor force in 2010 (U.S. Census Bureau 2010b). With 2010 unemployment rates averaging 7.7 percent in the region (Idaho Department of Labor 2010), it would be expected that many of the new jobs would be filled by this unemployed labor force. Other jobs would be filled by family members of the new personnel, by other regional workers taking second jobs, and by existing employees working extra hours. Therefore, secondary employment impacts would not be expected to result in in-migration to the region.

Additional taxes would accrue to the federal, state, and local governments as a result of this new economic activity. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would collect an additional $4.3 million annually, and Idaho and local governments would collectively gain $3.1 million annually.

The combined expenditures for military construction projects for this scenario would total $36.4 million in 2014 and 2015. The peak year of impacts would be 2014. Total regional employment impacts from construction spending would total an estimated 376 full- and part-time jobs in 2014, including 214 direct construction jobs, plus 80 indirect jobs to support these construction activities, plus 82 induced jobs from regional purchases due to the increased earnings of impacted workers. Total labor income impacts in that peak year are estimated at $16.8 million.

Overall, the total represents less than 1 percent of the region's civilian labor force in 2008 and the construction employment represents about 3 percent of the 11,687 total regional construction jobs in 2008 (U.S. Census Bureau 2010b). Therefore, the regional labor force would be expected to absorb the short-term direct construction, indirect, and induced jobs as a result of this beddown scenario.

Additional taxes would accrue to the federal, state, and local governments as a result of the construction activities. According to the social accounting framework used for this analysis (Minnesota

IMPLAN Group 2010), the federal government would collect an additional $3.0 million due to peak year construction projects. In addition, Idaho and local governments would collectively gain $1.5 million due to 2014 construction projects.

Population

Under ACC Scenario 2, personnel at Mountain Home AFB would increase by 1,170. Combined with their associated 1,643 dependents, the total regional population would increase by 2,813, or less than 1 percent.

Housing

Under ACC Scenario 2, 1,170 additional personnel would be assigned to Mountain Home AFB over approximately 4 years; this would represent approximately 1 percent of the total owner-occupied and approximately 2 percent of the total renter-occupied housing stock, respectively, in the region. Given that the vacancy rate for the region is about 7 percent and the phased nature of the personnel influx, the short-term impacts to the regional housing market would be expected to be minor.

ACC Scenario 3

Employment and Earnings

ACC Scenario 3 would result in an increase of 1,596 military personnel and 159 civilians. The proposed positions would represent approximately 38 percent of military and 18 percent of civilian employment at Mountain Home AFB, and about 1 percent of the total civilian labor force in the region. The increase in positions would result in an annual increase in salaries of approximately $68.0 million. Total new salaries would result in less than 1 percent of total non-farm earnings in the region. Some of these earnings would be paid to taxes, and some would be saved and invested, but most would be spent on consumer goods and services in the region. This spending would represent increases to numerous economic sectors.

On-going indirect impacts would total an estimated 719 jobs and an estimated $32.5 million in labor income. The jobs include full- and part-time positions, and the income includes both employee compensation and proprietors' income. These jobs—in addition to the primary impacts—would last as long as the personnel changes are in effect and the income would occur each year.

These employment impacts represent less than 1 percent of the 230,395 people in the region's civilian labor force in 2010 (U.S. Census Bureau 2010b). With 2010 unemployment rates averaging 7.7 percent in the region (Idaho Department of Labor 2010), it would be expected that many of the new jobs would be filled by this unemployed labor force. Other jobs would be filled by family members of the new personnel, by other regional workers taking second jobs, and by existing employees working extra hours. Therefore, secondary employment impacts would not be expected to result in in-migration to the region.

Additional taxes would accrue to the federal, state, and local governments as a result of this new economic activity. According to the social accounting framework used for this analysis (Minnesota

IMPLAN Group 2010), the federal government would collect an additional $6.5 million annually, and Idaho and local governments would collectively gain $4.7 million annually.

The combined expenditures for military construction projects for this scenario would total $51.5 million in 2015. Total regional employment impacts from construction spending would total an estimated 680 full- and part-time jobs in 2015, including 393 direct construction jobs, plus 138 indirect jobs to support these construction activities, plus 149 induced jobs from regional purchases due to the increased earnings of impacted workers. Total labor income impacts in 2015 are estimated at $30.4 million.

Overall, the total represents less than 1 percent of the region's civilian labor force in 2010 and the construction employment represents about 6 percent of the 11,687 total regional construction jobs in 2010 (U.S. Census Bureau 2010b). With 2010 unemployment rates averaging 7.7 percent in the region (Idaho Department of Labor 2010), it would be expected that the regional labor force would absorb the short-term direct construction, indirect, and induced jobs as a result of ACC Scenario 3.

Additional taxes would accrue to the federal, state, and local governments as a result of the construction activities. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would collect an additional $5.4 million due to 2015 construction projects. In addition, Idaho and local governments would collectively gain $2.7 million due to 2015 construction projects.

Population

Under ACC Scenario 3, personnel at Mountain Home AFB would increase by 1,755. Combined with their associated 2,465 dependents, the total regional population would increase by 4,220, or about 1 percent.

Housing

Under ACC Scenario 3, 1,755 additional personnel would be assigned to Mountain Home AFB over approximately 4 years; this would represent less than 1 percent of the total housing units, and approximately 1.5 percent of the total owner-occupied and 3.3 percent of the total renter-occupied housing stock, respectively, in the region. Given that the vacancy rate for the region is about 7 percent and the phased nature of the personnel influx, the short-term impacts to the regional housing market would be expected to be minor.

MH3.12 Environmental Justice/Protection of Children

MH3.12.1 Base

MH3.12.1.1 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 any of the proposed actions. No analysis was conducted for airspace with less than 5 percent of the operations. See Section 3.1.3 for a further discussion of this approach.

Minority and Low-Income Populations

Mountain Home AFB is located in southwestern Idaho approximately 8 miles southwest of Mountain Home, Idaho in Elmore County. Ada and Owyhee Counties are located to the northeast and south of the Base, respectively. Table MH3.12-1 displays the total population, total minority population, percentage minority, total low-income population, low-income percentages, number of children, and the percentage of the population represented by children for the affected areas in the vicinity of Mountain Home AFB. This information is derived from the 2010 U.S. Census of Population, which is the latest source of information at the required level of detail.

Table MH3.12-1. Total Minority and Low-Income Populations in the Vicinity of Mountain Home AFB

Geographic Area	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]	*Children Under Age 18*	*Percent Children*
City of Mountain Home	14,206	2,387	16.8%	1,691	11.9%	3,964	27.9%
Elmore County	27,038	3,055	11.3%	3,190	11.8%	7,544	27.9%
Ada County	392,365	28,643	7.3%	43,945	11.2%	102,015	26.0%
Owyhee County	11,526	980	8.5%	2,858	24.8%	3,320	28.8%
State of Idaho	1,567,582	95,623	6.1%	224,164	14.3%	423,247	27.0%

Source: U.S. Census Bureau 2010b.
Note: [1]The 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 MH3.12-2 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 Mountain Home AFB with baseline noise greater than 65 dB DNL. Only three individuals and no minorities or low-income individuals are currently located under the Mountain Home AFB airfield contours with baseline noise greater than 65 dB DNL.

Table MH3.12-2. Total Baseline Population Minority and Low-Income Population Affected by Noise Greater than 65 dB DNL at Mountain Home AFB

Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	0	0	0	0	0
70 – 75	0	0	0	0	0
75 – 80	3	0	0	0	0
80 – 85	0	0	0	0	0
85+	0	0	0	0	0
Total	**3**	**0**	**0**	**0**	**0**

Source: U.S. Census Bureau 2010b.
Note: [1]The 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 2010, the number of children under the age of 18 living in Elmore County was approximately 7,544 (27.9 percent of the population) (see Table MH3.12-1). The City of Mountain Home has a similar percentage population of children (27.9 percent), while the state has a slightly lower percentage at 27 percent. The Mountain Home AFB on-base residences and a child care center are located in the northeast corner of the base. Currently, there is one primary school, two child care centers, Boise State University campus, and an education facility located on the northeast portion of the base. All of these are located within noise contours above 65 dB DNL. There are no off-base schools that are exposed to aircraft noise of 65 dB DNL or above. For a discussion of speech interference in the classroom, refer to Section MH3.2, Noise.

MH3.12.1.2 Environmental Consequences

For each scenario, noise levels of 65 dB DNL or greater were identified (see Section MH3.2, Noise). The affected population under these areas was determined using 2010 U.S. Census Bureau census block group data to calculate the total affected area in each block group to obtain a percentage used to achieve population estimates under each contour. As with the baseline conditions, no minority or low-income people or off-base schools would be affected by noise greater than 65 dB DNL under any of the scenarios. Schools and child care centers on-base that are currently affected by noise levels at 65 dB DNL or above, would continue to be affected at the same noise levels.

MH3.12.2 Airspace

MH3.12.2.1 Affected Environment

Under baseline conditions, noise levels in all of the airspace units remain below the threshold of 65 dB DNL, although both the Jarbidge North and Owyhee North reach 64 dB $L_{dnmr.}$ Nevertheless, population under these airspace units is very sparse, since the BLM manages most of the land and few residences exist. Data indicate that the population density for the lands under these two airspace units is roughly 1 person per 2 square miles. However, most of the area likely supports a much lower density because population "clusters" on the Duck Valley Indian Reservation which underlies the southern portions of Jarbidge North and Owyhee North airspace. The reservation contains approximately 1,200 residents, with about 20 percent (or 240) scattered throughout the area under these airspace units. Flight restrictions essentially exclude the reservation from overflights and limit the noise levels below those characteristic of the central portions of these airspace units. Despite adherence to these restrictions that reduce noise substantially on the reservation, ongoing issues with noise remain part of government-to-government consultation.

Ranges proposed for use under the proposed action include Saylor Creek and Juniper Butte in Idaho. As military ranges, residential land uses and populations are prohibited. As a result, minority and low-income populations are not present within these areas.

Areas located under the other airspace units consist primarily of undeveloped with very little residential areas present. However several very small communities occur including Paradise Valley and Orovada in Nevada. The Fort McDermitt Indian Reservation lies under the airspace as well.

Protection of Children

Since population density is extremely low in the airspace units over these areas, and they contain few small communities, the number of children exposed to aircraft is negligible. The few communities where most children would reside underlie Jarbidge South and Owyhee South airspace where noise levels do not exceed 45 dB L_{dnmr} and present no risk to health or safety.

MH3.12.2.2 Environmental Consequences

Section MH3.2 discusses noise levels within the training airspace. Noise levels would increase slightly and imperceptibly (no more than 2 dB L_{dnmr}) from baseline under all scenarios due to increased operations. However, noise levels in the Jarbidge North and Owyhee North would reach 65 dB L_{dnmr} under ACC Scenario 1 or 2 and 66 dB L_{dnmr} under ACC Scenario 3. Although both levels would attain the threshold for Environmental Justice impacts, neither is expected to disproportionately affect minorities or low-income populations. Overall population density is extremely low under these airspace units, so the potential for minority and low-income populations that exceed proportions from communities of comparison (U.S. Census Bureau 2000) is negligible. The few communities under the airspace lie in areas affected by lower noise levels of 45 dB L_{dnmr} or less. Outside the portion of the Duck Valley Indian Reservation overlain by this airspace, no documented minority or low-income clusters occur so these large areas would not have the appropriate populations. The areas of the reservation would not be disproportionately affected since restrictions on overflights and prohibition of supersonic flight would ensure noise levels remained below the 65 dB DNL threshold. Aircraft noise and its perceived effects would, however, likely remain a major issue for the Duck Valley Indian Reservation

As presented in Section MH3.3, emissions from aircraft operations were evaluated for operations below 3,000 feet AGL. 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 MH3.4. Consequently, no disproportionate or adverse impacts related to environmental justice are anticipated, nor would there be any special health or safety risks to children.

MH3.13 Community Facilities and Public Services

MH3.13.1 Base

MH3.13.1.1 Affected Environment

Potable Water

The public drinking water system for the City of Mountain Home is comprised of eight groundwater wells within the Bruneau Formation Aquifer that serve approximately 14,000 people. The wells are located in Elmore County, with locations in and around the City of Mountain Home, and a total pumping capacity of 12,300 gallons per minute (17.712 million gallons per day [mgd]) (City of Mountain Home 2011).

Mountain Home AFB relies solely on groundwater to supply its potable water. Potable water is acquired through six active base-owned groundwater wells that also tap into the Bruneau Formation Aquifer. Four additional groundwater wells on Mountain Home AFB are currently not in use. In addition, the installation has five water storage tanks that provide a total of 2.95 million gallons of available storage capacity (Mountain Home AFB 2005b). The water distribution system at Mountain Home AFB was originally built in 1943; it is estimated that over 50 percent of the water lines have been replaced with polyvinyl chloride pipe within the past 10 years. Additional water distribution lines will be replaced within the military family housing area as old units are replaced (Mountain Home AFB 2010). A recent Infrastructure Condition Assessment (Mountain Home AFB 2011a) rated Mountain Home's potable water infrastructure (distribution and storage) as adequate.

The maximum day demand for potable water at Mountain Home AFB ranged from 4.47 mgd in 2007 to 9.33 mgd in 2005 (average of 6.9 mgd for those two years). The available pumping capacity of the installation supply wells is approximately 10.7 mgd (Mountain Home AFB 2010). According to the Water Resources Sustainability Analysis report for Mountain Home AFB (2010), the regional aquifer beneath the installation (Bruneau Formation Aquifer) is currently being over-pumped throughout the region. Ground water levels in the regional aquifer (Bruneau Formation) beneath Mountain Home AFB have declined 50 to 60 feet during the past 35 years and current rates of water level decline range from about 1.5 to 2 feet per year. It is estimated that the existing water supply wells will support Mountain Home AFB water needs up to 30 years (Mountain Home AFB 2010). However, nitrate levels are expanding in the groundwater due to wastewater (in addition to chloride, sulfate, and traces of human pharmaceutical compounds) resulting in an increase in the number of abandoned wells on base. Nitrate levels in the base aquifer are higher than levels found in the surrounding communities, which indicates a local source (Mountain Home 2011b). A recent Infrastructure Condition Assessment (Mountain Home AFB 2011a) rated Mountain Home's potable water source as unsatisfactory. Mountain Home AFB is currently considering a number of measures to reduce irrigated areas, repair wastewater piping, and obtain other water sources.

Wastewater Treatment

The City of Mountain Home operates a waste water treatment plant composed of eight active lagoons which hold wastewater, totaling approximately 190 acres. The first four lagoons provide a majority of the treatment while the other four function primarily as storage (City of Mountain Home 2011). The treatment plant capacity is 1.7 mgd with a current utilization rate of 0.9 mgd. The city owns property necessary for expansion of the treatment plant, if required in the future (personal communication, Sheppard 2010).

Mountain Home AFB generates wastewater from sanitary, stormwater, and industrial processes. This effluent is currently treated at the installation's wastewater treatment and collection system, consisting of a pipeline collection system, a waste water treatment plant, 16 lift stations, and 11 septic tank systems. The wastewater treatment plant has a design flow of 0.85 mgd (850,000 gallons per day); the plant averages discharge of 450,000 gallons per day with peak days up to 650,000 gallons usually occurring during the summer. These discharges are regulated by a NPDES Permit (Permit No. ID-002764-2) and Idaho Solid Waste Management Rules (IDAPA 58.01.06). A recent Infrastructure Condition Assessment (Mountain Home AFB 2011a) rated Mountain Home's wastewater system as adequate with the exception of the collection piping. Significant improvements have been made to repair piping throughout the base; however, a 2010 study identified additional pipe mains and manholes that are deteriorating. The leaking associated with this deterioration has been identified as the source of high nitrate levels found in the groundwater used by the base (Mountain Home AFB 2011a).

Electric Power and Natural Gas

Electricity at Mountain Home AFB, the city of Mountain Home, and most of Elmore County is provided by Idaho Power Company. Idaho Power service territory covers approximately 24,000 square miles in southern Idaho and eastern Oregon, with an estimated population of one million. The all-time system peak demand was 3,214 megawatts, on June 30, 2008, and the all-time winter peak demand was 2,527 megawatts on December 10, 2009 (Idaho Power Company 2009).

Idaho Power Company provides power to Mountain Home AFB through two sources: the main source enters the installation from the northwest and an alternate source enters the installation from the northeast. Both incoming power sources terminate in a substation located near the installation water plant. A third power line enters the installation from the east and supplies power to the public school on the installation. The existing distribution system is approximately 90 percent overhead and 10 percent underground. Upgrades to the system will occur within the military family housing area as old units are replaced bringing the percent underground to 30 percent. The on-installation electrical distribution system was rated as adequate during a recent Infrastructure Assessment, with the exception of some of the underground distribution components which were rated as degraded. However, future installation development will be limited by the current configuration of the substation and its capability to physically support expansion without recommended upgrades (Mountain Home AFB 2006a).

Intermountain Gas Company distributes natural gas to the installation, the city of Mountain Home, and all of Elmore County serving approximately 305,000 residential, commercial, and industrial customers in southern Idaho. Based on a 2010 Intermountain Gas Company Annual Report, natural gas supplies are adequate to meet proposed demand for the next decade (Intermountain Gas Company 2010). The gas distribution system within Mountain Home AFB is owned and operated by the installation and consists of approximately 149,000 linear feet of gas mains/lateral lines on the main installation and 36,000 linear feet of gas mains/lateral lines in military family housing areas. A recent Infrastructure Condition Assessment (Mountain Home AFB 2011a) rated Mountain Home's natural gas distribution system as degraded. This assessment was due to aging buried steel pipe infrastructure and the number of leaks found during the last system survey (Mountain Home 2011b).

Solid Waste Management

Municipal solid waste at Mountain Home AFB is managed in accordance with the Solid Waste Management Plan for Mountain Home AFB 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.

Mountain Home AFB generates solid waste in the form of office trash, non-hazardous industrial wastes, normal municipal wastes, and construction debris. These nonhazardous solid wastes are collected in dumpsters located throughout the installation, picked up by a contractor, and delivered to Simco Road Regional Landfill. The Simco Road Regional Landfill is permitted to accept any Resource Conservation and Recovery Act (RCRA) non-hazardous residential, commercial and industrial waste streams including municipal solid waste, construction and demolition materials. The landfill currently has a permitted capacity of 210 million tons. The existing capacity is 200 million tons; however, Simco Road Regional Landfill is currently expanding to a permitted capacity of 420 million tons (King County 2009).

Mountain Home AFB previously disposed of solid waste generated at the installation at an on-base municipal solid waste landfill consisting of approximately 105 acres located in the southwestern corner of the installation. However, all on-base landfills were closed as of June 2009. In FY 2009, Mountain Home AFB generated 2,251.25 tons per year of municipal solid waste (personal communication, Binder 2010). A contractor collects curbside recyclables in the military family housing areas. The installation collects more than 1 million pounds of recyclable products per year.

Schools

Mountain Home AFB lies within the Mountain Home School District 193 service area. Schools within District 193 consist of one high school, one junior high school, one middle school, and three elementary schools, in addition to an elementary school on Mountain Home AFB. Total enrollment within District 193 for the 2010-2011 school year was 3,937 students. Personnel with school-aged children not attending the on-base elementary school attend classes within the Mountain Home School District 193 service area. The elementary school on the installation includes classes for Kindergarten through 4th grade. Total enrollment at the Mountain Home AFB elementary school was 361 for the 2009-2010 school year, down over 500 from historic numbers (personal communication, McMurtrey 2010).

Mountain Home School District 193 receives impact aid from the government for each child of a U.S. military family that attends school off-base. Mountain Home School District 193 received impact aid for years 2007, 2008, and 2011. The average impact aid for each dependent student with an active duty military parent who lived on Mountain Home AFB for the three year period was $2,648 (personal communication, Ogborn 2011).

MH3.13.1.2 Environmental Consequences

Under ACC Scenarios 1, 2, and 3, there would be an overall increase in the number of personnel and dependents located at Mountain Home AFB, as well as construction of the facilities associated with each of the three scenarios. Personnel and dependents would increase under ACC Scenarios 1, 2, and 3 by 13 percent, 26 percent, and 39 percent respectively when compared to the total authorized personnel currently at Mountain Home AFB. The increase in personnel and dependents under ACC Scenario 3 would represent, at a maximum, an increase of 1 percent for the Ada, Elmore, Owyhee county area, and, subsequently a 1 percent increase in demand for services.

For the range of community facilities and public services discussed below, the installation is required to proactively plan for and assess all specific infrastructure and utility requirements and other essential services to ensure that the proposed increase in personnel and their dependents would be accommodated under each proposed scenario. The installation routinely evaluates community facilities and services to account for fluctuations associated with new units assigned to the installation and the deployment of existing units. In addition, the installation identifies infrastructure or utility needs within the scope of each corresponding project. If particular projects require additional infrastructure or utilities, they are incorporated as a part of that project. This process ensures that any infrastructure or utility deficiencies are identified in the initial planning stages.

Potable Water

Water consumption would be expected to increase under ACC Scenarios 1, 2, and 3 as a result of the increase in personnel and it is assumed that population impacts will be incurred on and off base. As described in Section MH3.13.1.1, potable water is supplied to both the City of Mountain Home and Mountain Home AFB primarily from the Bruneau Formation Aquifer. According to a 2005 water use report by the U.S. Geological Survey (USGS), the average total domestic per capita use of potable water in 2005 was 187 gallons per day for the state of Idaho (Kenny *et al.* 2009). Therefore, with a maximum increase of 4,220 personnel and dependents (1,755 personnel and 2,171 military dependents, and 294 civilian dependents) under ACC Scenario 3, the maximum additional demand on water supply from the Bruneau Formation Aquifer is estimated to be 789,140 gallons per day (0.79 mgd). Though it is understood that 1,755 additional personnel would work on base during the day, it is assumed that the majority of their consumptive water use would occur at their place of residence.

According to the Water Resources Sustainability Analysis report for Mountain Home AFB (2010), the Bruneau Formation aquifer is currently being over-pumped throughout the region and the existing water supply wells will support Mountain Home AFB water needs up to 30 to 36 years (Mountain Home AFB 2010). However, Mountain Home AFB has developed a water management plan for landscape and irrigation in addition to implementing water efficiency best management practices to help address overdrafting of the regional aquifer, including: water metering, irrigation audits, new irrigation telemetry and controls, water efficient landscaping, plumbing fixtures replacement, conversion of industrial wash racks to low volume systems, treated wastewater reuse at the golf course, leak detection surveys, and compliance with EO 13514, *Federal Leadership in Environmental, Energy, and*

Economic Performance. EO 13514 requires federal facilities to reduce potable water consumption intensity by 2 percent annually through Fiscal Year 2020, or 26 percent by the end of Fiscal Year 2020 relative to the FY 2007 baseline.

The demand for water (e.g., if used as a Best Management Practice to control dust) could also increase during demolition and construction phases under all three scenarios. However, this increase would be temporary and intermittent and would not be expected to impact regional water supply.

Wastewater Treatment

Wastewater generation would be expected to increase under ACC Scenarios 1, 2, and 3 as a result of the increases in personnel, and it is assumed that population impacts would be realized on- and off-base. According to the USEPA, estimated average per capita wastewater flow typical of residential dwellings is 70 gallons per day (USEPA 2010). The maximum increase of 4,220 personnel and dependents would result in a maximum increase to the municipal waste water treatment plant of 295,400 gallons per day (0.30 mgd). The existing City of Mountain Home wastewater treatment system has adequate capacity to accommodate additional growth (personal communication, Sheppard 2010).

Electricity

Demand for electricity would be expected to increase under ACC Scenarios 1, 2, and 3 as a result of the increase in personnel, and the building space and facilities to be constructed would require additional electricity. However, any new facilities and additions associated with the three scenarios would be implemented with more energy efficient design standards and utility systems than are currently in place. In addition, construction projects would incorporate Leadership in Energy and Environmental Design and sustainable development concepts to achieve optimum resource efficiency, sustainability, and energy conservation. Therefore, average energy consumption would be expected to remain consistent or decrease compared to energy consumption associated with existing facilities.

According to the U.S. Department of Energy State Energy Consumption Estimates, the average annual electricity consumption for a U.S. residential home in 2008 was 11,040 kilowatt hours (U.S. Department of Energy 2010). Assuming each personnel member constitutes one household, an increase in 1,755 personnel under the maximum scenario (ACC Scenario 3) would increase electricity use at a maximum of approximately 19,375,200 kilowatt hours (19.37 gigawatt-hours) per year.

Construction activity associated with each of the scenarios would result in some temporary interruption of utility services during construction periods. These impacts would be temporary, occurring briefly during active construction periods. In addition, the demand for energy (primarily electricity) could increase slightly during demolition and construction phases. The energy supply at the installation and in the region is adequate and would not be affected by this temporary increase in demand. The existing utility systems are considered adequate to support the proposed facilities although some utilities extensions may be required to serve some of the proposed facilities.

Natural Gas

Natural gas consumption would be expected to increase under all three scenarios as a result of the increase in personnel. According to the Department of Energy, average residential consumption of natural gas within the U.S. in 2008 was 75,000 cubic feet (750 hundred cubic feet) per household (Department of Energy 2010). Assuming each personnel member constitutes one household, an increase in 1,755 personnel would increase capacity of natural gas use by approximately 1,316 hundred cubic feet. Though it is understood that 1,755 additional personnel would work on base during the day, it is assumed that the majority of their consumptive natural gas use would occur at their place of residence.

Solid Waste Management

The building space and facilities to be constructed would generate construction and demolition debris requiring landfill disposal. Proposed increases in personnel and equipment use would also contribute to an increase in solid waste generation. The solid waste generated under the three scenarios could result in impacts to solid waste management facilities in the area. However, sufficient capacity currently exists within the Simco Road Regional Landfill, given they are expanding to a permitted capacity of 420 million tons (King County 2009). Furthermore, compliance with the Mountain Home 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.

Off-installation contractors completing construction projects would be responsible for disposing of waste generated from construction activities. Contractors are required to comply with federal, state, local, and Air Force regulations for the collection and disposal of municipal solid waste from the installation. Much of this material can be recycled or reused, or otherwise diverted from landfills, per the Air Force Qualified Recycling Program (Air Force 2007d). All non-recyclable construction and demolition waste would be collected in a dumpster until removal off-site and would be hauled away by the contractor to Simco Road Regional Landfill.

Construction and demolition waste contaminated with hazardous waste, ACM, LBP, or other undesirable components would be removed by licensed contractors and disposed of in a local hazardous waste-permitted landfill in accordance with AFI 32-7042, *Waste Management* (2009), federal, state, and local laws and regulations (see also Section 3.15, Hazardous Materials and Waste).

Schools

The installation is required to plan for and assess all essential services to ensure that existing educational services can adequately accommodate the proposed increase of personnel and their dependents with implementation of each scenario. There would be an estimated increase of 958 school-aged children associated with the increase in personnel under ACC Scenario 3. The existing number of school-aged children associated with Mountain Home personnel is 694. The total enrollment at the Mountain Home AFB elementary school has decreased by 500 students from previous years; similar to the Mountain Home School District 193 service area which has also decreased for the 2009 to

2010 school year when compared with historical numbers (personal communication, McMurtrey 2010). The increase of 958 students under ACC Scenario 3 would be a 23 percent increase compared to the 2009 to 2010 school year, which included 4,089 students.

MH3.14 Ground Traffic and Transportation

MH3.14.1 Base

MH3.14.1.1 Affected Environment

Regional and Local Circulation

The primary roadway network that serves the city of Mountain Home and provides access to Mountain Home AFB includes Interstate (I-)84, its associated business loop (I-84B) through the city of Mountain Home, State Route (SR)-67 (Airbase Road/Grandview Road), SR-51, and various collector streets. I-84 carries the greatest amount of traffic volume in the area with an average daily traffic (ADT) between 12,500 and 20,000 vehicles in the vicinity of Mountain Home (Idaho Transportation Department [ITD] 2008a). This four-lane, limited access, divided highway traverses the City of Mountain Home along the northeast boundary of the city and is approximately 10 miles east of the base at its nearest point. Three exits along I-84 provide access to Mountain Home AFB: Exit 90, the I-84B business loop to West Mountain Home; Exit 95, U.S. Highway 20 to Mountain Home and Fairfield; and Exit 99, Bennett Road to East Mountain Home (ITD 2008a). I-84B provides a business loop through the central business district of Mountain Home and has an ADT volume of 5,000 (ITD 2008a). Both I-84 and I-84B have level of service (LOS) ratings of A (Air Force 2001), indicating no traffic problems.

SR 67 is a four-lane, undivided road that traverses northeast-southwest along the northern boundary of the base and leads directly to the Main Gate of Mountain Home AFB. For the majority of its span, SR 67 has a fairly low ADT volume between 3,000 and 4,000 (ITD 2008b). SR 51 runs parallel to the eastern boundary of the base and connects with SR 67 in the City of Mountain Home. At the point where these two roads meet, the ADT volume on SR 67 increases to 11,000 (ITD 2008a), as this is the primary access route from the City of Mountain Home to the base and an important business district road in Mountain Home. Both SR 67 and SR 51 have LOS ratings of A (Air Force 2001).

Circulation at Mountain Home AFB

The roadway network within Mountain Home AFB is essentially independent from the City of Mountain Home. The Main Gate is the primary entrance gate to the base and is accessed via SR 67 on Main Avenue. The Main Gate provides three inbound lanes for peak service times, while one lane is provided during off-peak periods. As of 2006, external stacking of vehicles on SR 67 had become a common occurrence during morning identification checks at the Main Gate, which has since been remodeled to address this issue (Mountain Home AFB 2006a). In addition, there is a secondary access gate off of SR 67 (the Grandview Gate) at the northwest corner of the base. This gate serves commercial and contractor vehicles and has helped to alleviate congestion issues at the Main Gate (Mountain Home AFB 2010).

Once commuters enter the base from SR 67, they must either merge right onto Aardvark Avenue or continue straight on Main Avenue, which transitions into Gunfighter Avenue. Aardvark Avenue and Gunfighter Avenue are the two major collector streets on the base. The remaining roads on the base form a small grid network of minor collectors. In general, traffic volumes on the base network are low and congestion is rare (Mountain Home AFB 2006a).

As per the 2006 General Plan, the following traffic-related construction projects have improved traffic flow in light of anticipated base development: widening of Gunfighter Avenue, realignment of the intersection of Chestnut Drive and Gunfighter Avenue with a four-way signal, and removal of the "Y" intersection of Gunfighter Avenue and Aardvark Avenue. Most buildings and facilities on the base have associated parking lots, with a total of 549 available parking spaces. Availability of parking spaces is not known to be an issue on the base (Mountain Home AFB 2006a).

MH3.14.1.2 Environmental Consequences

Construction activities would occur between FY 2014 and 2015 under all three scenarios and would take approximately 2 years to complete, resulting in approximately 2.81 acres of net new impervious surface and temporarily disturbing 11.39 acres under ACC Scenario 3. Construction equipment would be driven to proposed construction areas and would be kept on-site for the duration of the respective activity. Construction workers would drive daily in their personal vehicles to and from the construction site. In general, construction traffic would result in increases in the use of on-base roadways during construction activities; however, increases would be temporary and intermittent, occurring only during active construction periods.

Under ACC Scenario 1, authorized personnel would increase by 585 personnel, from 4,491 to 5,076, potentially generating up to 585 additional one way vehicle trips to and from the base during morning and evening peak periods. Assuming that each person makes two trips per day (not taking into consideration carpooling or other alternative modes of transportation or those personnel that live on base [and therefore would not access entrance gates or contribute to off-base traffic during peak hours]) and that all employees would be on the base at the same time, the implementation of ACC Scenario 1 would add an additional 1,170 trips onto the existing roadway network after the construction phase is complete. The proposed increase in personnel and associated travel demand would potentially increase peak period travel demand by 13 percent. The anticipated increase in traffic volume would exceed the primary screening criterion (11.8 percent) for the threshold of concern but it would not exceed the secondary criterion (26.7 percent) for the threshold of significance (see Chapter 3 Methodology, Section 3.15, Ground Traffic and Transportation). In addition, as described above, recent traffic-improvement construction projects in light of anticipated base development would help alleviate any potential congestion associated with higher traffic demands due to increases in personnel.

Under ACC Scenario 2, on-base personnel would increase by 1,170 personnel, from 4,491 to 5,661, potentially generating up to 1,170 additional vehicle trips to and from the base during morning and evening peak periods. Assuming that each person makes two trips per day (not taking into consideration carpooling or other alternative modes of transportation or those personnel that live on base [and therefore would not access entrance gates or contribute to off-base traffic during peak hours]) and that all employees would be on the base at the same time, the implementation of ACC Scenario 2 would add an additional 2,340 trips onto the existing roadway network after the construction phase is complete. The proposed increase in personnel and associated travel demand would potentially increase peak period travel demand by 26 percent. The anticipated increase in traffic volume would exceed the primary (11.8 percent) screening criteria for the threshold of concern, but would not exceed the secondary criterion (26.7 percent) for the threshold of significance (see Chapter 3 Methodology, Section 3.15, Ground Traffic and Transportation). In addition, as described above, recent traffic-improvement construction projects in light of anticipated base development would help alleviate any potential congestion associated with higher traffic demands due to increases in personnel.

Under ACC Scenario 3, on-base personnel would increase by 1,755 personnel, from 4,491 to 6,246, potentially generating up to 1,755 additional vehicle trips to and from the base during morning and evening peak periods. Assuming that each person makes two trips per day (not taking into consideration carpooling or other alternative modes of transportation or those personnel that live on base [and therefore would not access entrance gates or contribute to off-base traffic during peak hours]) and that all employees would be on the base at the same time, the implementation of ACC Scenario 3 would add an additional 3,510 trips onto the existing roadway network after the construction phase is complete. The proposed increase in personnel and associated travel demand would potentially increase peak period travel demand by 39 percent. The anticipated increase in traffic volume would exceed the primary (11.8 percent) and secondary (26.7 percent) screening criteria for the thresholds of concern and significance (see Chapter 3 Methodology, Section 3.15, Ground Traffic and Transportation). However, as described above, recent traffic-improvement construction projects in light of anticipated base development would help to reduce potential congestion associated with higher traffic demands due to increases in personnel associated with the three scenarios under this alternative.

MH3.15 Hazardous Materials and Waste

MH3.15.1 Base

MH3.15.1.1 Affected Environment

Hazardous Materials

Hazardous materials are used at Mountain Home AFB for aircraft operations support and maintenance, including petroleum, oils, and lubricants (POL) management and distribution (Mountain Home AFB 2008b). Types of hazardous substances found on Mountain Home AFB include hydraulic fluid, engine oil, JP-8 and other fuels, antifreeze and de-icing fluids, solvents, corrosive liquids, paints and adhesives, and contaminated solids.

Hazardous materials used by Air Force and contractor personnel on Mountain Home AFB are controlled through the Hazardous Materials Pharmacy Program (HAZMART) pollution prevention process (Mountain Home AFB 2011b). This process centralizes procurement, handling, storage, and issuing of hazardous materials and their turn-in, recovery, reuse, or recycling. The HAZMART process includes review and approval by Air Force personnel to ensure users are aware of exposure and safety risks. The Pollution Prevention Management Plan specifically outlines the goal of continuous hazardous material reduction across the installation, and effective management of the HAZMART substantially reduces the quantities of hazardous materials purchased (Mountain Home AFB 2010).

The HAZMAT Emergency Planning and Response Plan (Mountain Home AFB 2008b) 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 Guide (Red Plan) is contained within the Emergency Planning and Response Plan and is distributed to all generation areas for first responder emergency assistance.

Hazardous Waste

Mountain Home AFB is regulated as a large quantity hazardous waste generator under the RCRA. The Mountain Home AFB Hazardous Waste Management Plan (Mountain Home AFB 2011b) governs the Mountain Home AFB Hazardous Waste Management Program. There is one central accumulation site (less than 90 days storage area) and 155 satellite accumulation points near work locations. In addition, under AFI 32-7042, "Waste Management," Section 2.2, Mountain Home AFB has prepared a Waste Analysis Plan to describe procedures to identify all hazardous waste streams and those streams needing detailed hazardous waste determination (Mountain Home AFB 2011b).

Toxic Substances

Regulated toxic substances typically associated with buildings and facilities include asbestos, LBP, and poly-chlorinated biphenyls (PCBs). In coordination with the Asbestos Program Officer, qualified civil engineering personnel at Mountain Home AFB will determine the presence of ACM in facilities scheduled for maintenance, repair, minor construction, or demolition (Mountain Home 2008b). The Bioenvironmental Engineer Office is responsible for determining the presence of LBP prior to any construction activities. Materials, especially discarded oil products, may be screened for PCB contamination prior to disposal. Building 1296 is a PCB storage area (Mountain Home 2008b, c).

Environmental Restoration Program

Thirty-three ERP sites have been identified since the ERP began at Mountain Home AFB (Mountain Home AFB 2011). Unlimited Use/Unrestricted Exposure has been achieved for 25 closed ERP sites (FT-04, FT-05, FT-06, FT-07, DP-09, OT-10, SD-12, ST-13, RW-14, OT-15, OT-16, DP-18, ST-22, SD-24, SD-25, SS-26, SD-27, SS-28, SS-29, SS-30, ST-31, ST-32, ST-34, ST-35, and ST-39). Land use controls are in place at LF-01, LF-02, LF-03, and LF-23 to restrict access and ensure no digging or dumping within these areas occurs. The remedy for ERP Site ST-38, POL Yard Area, is protective of human health and is being monitored under a POL Risk Based Corrective Action. The selected remedy for OU-3, regional groundwater, Long-Term Monitoring for trichloroethene, is not protective of human health and the environment for UU/UE. Further action continues for bedrock vapor extraction in support of source removal for OU-3. Active sites include site ST-11, fuel vapor extraction under B Ramp (aircraft parking); FT-08, vapor extraction at a former fire training area to clean up soil contamination; and OU-3, long term monitoring of regional groundwater (personal communication, Roller 2011; Mountain Home AFB 2011c).

Under the on-base Military Munitions Response Program (MMRP), two former skeet ranges (1940s Skeet Range TS876 and 1970s Skeet Range TS877) and one former EOD proficiency range (ED879) were assessed. Soils were found to be contaminated with polynuclear aromatic hydrocarbons from clay pigeon debris and removal actions for contaminated soils are programmed at each skeet range. At the EOD proficiency range, subsurface investigation and removal action is needed to properly close the site. Also, under MMRP, two areas at the Saylor Creek Range buffer zone have been identified as requiring munitions debris removal. Under the Compliance Restoration Program, two former oil/water separator sites require further investigation and removal of contaminated soils (personal communication, Roller 2011; Mountain Home AFB 2011c).

In 1996, Mountain Home AFB began a phased redevelopment of its military family housing areas. The IDEQ was notified that during the construction phase of the housing areas, excavated soils were found to be contaminated with chlordane and/or heptachlor (and its epoxides), pesticide constituents both considered potentially hazardous waste. Concentrations of these pesticides were found to be above hazardous waste toxicity characteristics per Idaho DEQ *Rules* and *Standards for Hazardous Waste* (IDAPA 58.01.05) and *Idaho Water Quality Standards* (IDAPA 58.01.02). Mountain Home AFB entered into a Consent Order regarding compliance of these contaminated sites on July 15, 2009 with the Idaho DEQ pursuant to the Idaho Hazardous Waste Management Act of 1983 and the Environmental Protection and Health Act (Idaho DEQ 2009).

MH3.15.1.2 Environmental Consequences

Currently, 56 F-15E/SG aircraft are stationed at Mountain Home AFB and all 56 will continue to operate under all scenarios associated with the proposed action. All new F-35A aircraft would be added to current operations: ACC Scenario 1 adds 24 F-35As, Scenario 2 adds 48 F-35As, and Scenario 3 adds 72 F-35As. The maximum number of aircraft that would be in operation at Mountain Home AFB would not exceed the total of 128 F35As and F-15E/SGs. Operations would be expected to increase by 98 percent under ACC Scenario 3, the maximum scenario. Additionally, as part of the three scenarios of the proposed action, Buildings 196, 210, 211, 271, 277, 278, 1100, and 1225 would undergo some level of renovation or reconstruction, as well as various additions and alterations to other facilities as needed, including new military housing and support facilities. Table MH2.1-3 lists new construction that would occur for each of the three scenarios.

Hazardous Materials

Training activities and other functions are expected to remain similar between the F-35A and existing F-15E/SG aircraft. Additionally, the F-35A was designed to reduce the quantities and types of hazardous materials needed for maintenance of the F-35A and would be less than those currently used for maintenance of the F-15E/SG fleet. The major differences would be the omission of 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 for F-16 aircraft (personal communication, Luker 2010; Fetter 2008).

Under all scenarios, the hazardous substances used in support of the 56 based aircraft would not change from baseline conditions in continued support of these aircraft. However, since the F-35A would be added to the current mission, the use of hazardous materials for the F-35A would increase above the baseline conditions proportional to each scenario. Additionally, as a result of the proposed action, the use of aircraft at Mountain Home AFB is expected to increase over the current operational rate and, therefore, hazardous material quantities would also increase due to the 24, 48, or 72 additional aircraft that would be operated and serviced at Mountain Home AFB under ACC Scenarios 1, 2, and 3 respectively.

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

The F-35A replaces the hydrazine canister (currently used by the F-16s) with an integrated power package (basically a small jet engine) for use in emergency engine restart situations, thus eliminating the potential for hydrazine leaks.

Hazardous Waste

The types of hazardous waste streams generated by F-35A operations are expected to be less than they are for existing F-15E/SG aircraft because operations involving 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 in the F-35A are expected to be reduced, but baseline levels associated with the existing fleet of F-15s would remain the same. Therefore, the overall waste streams are expected to increase over the amounts currently generated in support of F-16 aircraft operations due the overall increase of number of aircraft.

The exact amounts of hazardous waste that would be generated under each scenario are unknown; however, under all scenarios Mountain Home AFB would continue to operate within its large quantity generator hazardous waste permit conditions. In addition, 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 Mountain Home AFB procedures prior to any renovation activities. Buildings 211, 277, 1100, and 1225 are known to contain both ACM and LBP (personal communication, Binder 2010). 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 Mountain Home AFB procedures. All LBP would be managed and disposed of in accordance with Toxic Substance Control Act, OSHA regulations, Idaho requirements (regarding site work practices for buildings with LBP), and established Mountain Home AFB procedures.

Environmental Restoration Program

Building 1225 and the proposed location for the new Squadron Operations Facility are located near ST-38, the POL Yard Area, which is currently being monitored under a POL Risk Based Corrective Action, and ST-11 an active site associated with Ramp B (aircraft parking) for fuel vapor extraction. Several closed ERP sites are near construction projects; however, no construction projects would occur on either active or closed ERP sites.

Building 1225 and the proposed location for the construction of the Squadron Operations Facility are within an area designated as a Potential Soil Contamination Hazard, as regulated under the Mountain Home AFB Consent Order (July 15, 2009) with the Idaho DEQ pursuant to the Idaho Hazardous Waste Management Act of 1983 and the Environmental Protection and Health Act. Any soil disturbance within these areas would follow the procedures outlined in the Consent Order, including placement of disturbed soils back in the original location or, if soil disposition is required, then soils must be tested for pesticides and disposed of in accordance with Mountain Home AFB procedures. If contaminated media (e.g., soil, groundwater) are encountered during the course of site preparation (e.g., clearing, grading) or site development (e.g., excavation for installation of building footers) for proposed construction activities, work would cease until Mountain Home AFB Program Managers establish an appropriate course of action for the construction project to ensure that federal and state agency notification requirements are met, and to arrange for agency consultation as necessary if existing ERP sites are affected. Also, prior to construction activities, the construction contractors would be notified of the nature and extent of known contamination so that they can inform their employees in advance of on-site activities and take appropriate precautions to protect health and safety, and to prevent the spread of contamination. The construction contractors would be responsible for ensuring their workers follow appropriate health and safety requirements. Under these conditions, the proposed action under any scenario would not adversely impact the environment through hazardous materials and waste generation or contamination.

MH4.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

MH4.1 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 Mountain Home AFB and training in associated airspace.

Mountain Home AFB is an active military installation that undergoes changes in mission and in training requirements in response to defense policies, current threats, and tactical and technological advances.

The base, like any other major institution (e.g., university, industrial complex), requires new construction, demolition of excess and out of date facilities, facility improvements, infrastructure upgrades, and maintenance and repairs. In addition, tenant organizations may occupy portions of the base, conduct aircraft operations, and maintain facilities. All of these actions (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

Mountain Home AFB has been a military installation since 1942. During this time, it has grown, been developed, and supported numerous kinds of aircraft. Past actions most relevant to assessment of the beddown of F-35As started in 1992. To support rapid deployment of a major force to trouble spots around the world, the Air Force established the 366th Wing (366 WG) at Mountain Home AFB. A new concept for peace-time basing, the 366 WG consisted of F-16, F-15C, F-15E/SG, and KC-135 aircraft that trained and fought together as a unit. Establishment of the 366 WG involved construction and modification of facilities on base, as well as addition of personnel. The 366 WG also increased operations in all of the MOAs associated with Mountain Home AFB to about 24,000 annually.

In 1996, the Air Force relocated the 34th Bomber Squadron and seven B-1B aircraft to Mountain Home AFB as part of the 366 WG (Air Force 1996). Associated with this addition, 573 personnel were added at the base and a total of $43 million dollars was spent for facility and infrastructure construction.

In 1998, the Air Force established the 12,000-acre Juniper Butte Range southeast of Mountain Home AFB (Air Force 1998a). This range, located within the Jarbidge MOA, enhanced the training capabilities of the 366 WG by providing increased realism, flexibility, and quality in training. Use of this range did not alter activities at the base, but did increase total operations in the reconfigured airspace to about 26,500 annually.

In 2002, the Air Force implemented force structure changes consisting of drawdowns of seven B-1 and six KC-135 aircraft and a beddown of six F-15E aircraft at Mountain Home AFB, and the 366th Wing became the 366 FW. These actions reduced operations at the airfield, operations in the airspace, and personnel at the base. As a result, noise levels decreased at the airfield and in the airspace, air emissions decreased, fewer low-altitude flights occurred, and the general potential for impacts declined.

The 2005 DoD Base Realignment and Closure Commission (BRAC) recommended realignment of aircraft for Mountain Home AFB. The final BRAC recommendations called for a departure of all Mountain Home AFB F-16 aircraft (18). At the same time, Mountain Home AFB also lost all F-15C aircraft (18), and gained 18 F-15E aircraft. These actions reduced the total inventory of aircraft from 60 to 42.

In 2007, the Air Force proposed to base a Republic of Singapore Air Force squadron of F-15SG aircraft at Mountain Home AFB. Under this action, the Republic of Singapore squadron of 10 F-15SG aircraft was co-located with Mountain Home AFB F-15E/SG aircraft for training support and flight operations with similar aircraft. This action and a proposal to add an additional four F-15SG aircraft in 2009 increased the total aircraft inventory at Mountain Home AFB to 56.

Recent changes in the MHRC and associated airspace include the Paradise MOA Expansion, which extended the eastern boundary of the Paradise MOA in Nevada to the east, and lowered the floor altitude from 14,500 feet MSL to 10,000 feet MSL or 3,000 feet AGL, whichever is higher. These changes provide additional high-altitude ATCAA airspace and lower altitude MOA airspace over prior airspace configurations. Overall, expansion of the ATCAAs atop the laterally extended MOAs provides substantially more training airspace for aircraft between 18,000 and 50,000 feet MSL.

In combination and sequence, these past actions created the current operational and environmental conditions for Mountain Home AFB and its associated training airspace. Despite the establishment of Juniper Butte Range, the general trend reflected reduced aircraft operations, lower noise and emission levels, and less potential for environmental consequences.

Incremental Impacts of the Proposed Action with Reasonably Foreseeable Future Actions

Just prior to the timeframe (2014 to 2020) for F-35A facility construction, Mountain Home AFB 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, planned for 2012 through 2013 include those listed in Table MH4.1-1. Other on-going maintenance and repair activities are also likely to occur at the base during this period.

Table MH4.1-1. Current and Reasonably Foreseeable Actions at Mountain Home AFB

Project Name/Description	*Approximate Area (acres)*	*New Impervious Surface (acres)*	*Year for Implementation*
Demolition of Building 291	0.47	0	2012-2013
Sitework Pavement	1.45	1.45	2012-2013
POV Parking	1.28	1.28	2012-2013
Loading Dock	1.23	1.23	2012-2013
B1211 Pavement Demolition	0.29	0	2012-2013
B1212 Pavement Demolition	0.26	0	2012-2013
B1325 Pavement Demolition	2.07	0	2012-2013
Construct Civil Engineering Contractor Yard (gravel)	0.20	0	2012-2013
Repair Taxiway A, Pavement Demolition	0.41	0	2012-2013
Repair Taxiway A, New Pavement	0.41	.41	2012-2013
Aircraft Shelter (54 shelters)	0	0	2012-2013
Demolition of CE Warehouse (Facilities 1207, 1208, 1209)	0.70	0	2012-2013
Demolition of Building 1300	0.66	0	2012-2013
Demolition of Building 1301	0.15	0	2012-2013
Demolition of Building 1351	0.15	0	2012-2013
Demolition of Building 1352	0.12	0	2012-2013
Demolition of Building 1354	0.17	0	2012-2013
Total	**35.13**	**15.31**	**-**

While Mountain Home is a growing city, no reasonably foreseeable actions are planned within the area potentially affected by beddown of the F-35A. Elmore County controls development and land use in the vicinity of the base to prevent encroachment.

Two additional actions are on-going National Environmental Policy Act (NEPA) actions and no decisions have been made to date: Air Education and Training Command’s F-35A Training proposal for the Idaho ANG at the Boise AGS and the Royal Saudi Air Force F-15SA beddown at Mountain Home AFB.

- For the F-35A Training proposal (Air Force 2011a), the Air Force proposes to base 72 or more F-35A aircraft at one or more locations, one of which could be the Boise AGS at Gowen Field in Idaho. Total airfield operations at Mountain Home AFB would increase by 21,272 (an increase of 65 percent) and airspace operations in the MHRC and associated airspace would increase by over 18,000 operations in the MOAs with the inclusion of 3 squadrons of F-35A aircraft at the Boise AGS. No construction or additions to personnel would occur at Mountain Home AFB under this proposal. The Boise AGS is not the preferred alternative for the proposed action.
- Under the Royal Saudi Air Force F-15SA proposal (Air Force 2011b), up to 18 F-15SAs would be based at Mountain Home AFB for the purpose of training members of the Royal Saudi Air Force from Saudi Arabia beginning in 2014. A total of 11,209 airfield operations would be added to current airfield use of 32,612 operations (a 34 percent increase) and 10,727 airspace operations added to the no-action operations of 33,400 (a 32 percent increase). Construction of facilities would add approximately 17 acres of net impervious surface, however, this would occur in previously disturbed areas of the base. A total of 487 additional military and civilian personnel would be added to current personnel at the base.

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 Mountain Home AFB and whether such a relationship would result in potentially additive impacts not identified when the proposed action is considered alone.

Past establishment of the 366 FW and the expansion and contraction of the aircraft inventory and airspace 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 consultation actions 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.

Water consumption would be expected to increase under these actions as a result in increases in personnel, operations, and construction. According to the Water Resources Sustainability Analysis report for Mountain Home AFB (2010c), the Bruneau Formation aquifer is currently being over-pumped throughout the region and the existing water supply wells will support Mountain Home AFB water needs up to 30 years (Mountain Home AFB 2011b). However, Mountain Home AFB has developed a water management plan for landscape and irrigation in addition to implementing water efficiency best management practices to help address overdrafting of the regional aquifer, including: water metering, irrigation audits, new irrigation telemetry and controls, water efficient landscaping, plumbing fixtures replacement, conversion of industrial wash racks to low volume systems, treated wastewater reuse at the golf course, leak detection surveys, and compliance with EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance.* EO 13514 requires federal facilities to reduce potable water consumption intensity by 2 percent annually through FY 2020, or 26 percent by the end of Fiscal Year 2020 relative to the FY 2007 baseline. In addition, the Alternate Water Supply Feasibility Study is currently being conducted to determine if the Snake River can provide potable and non-potable sources of water to augment existing Mountain Home AFB supplies (personal communication, Kendall 2011).

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.

AETC F-35A Training EIS. AETC's F-35A Training proposal could have a cumulative impact on the environment from additional airfield and airspace operations and resulting increase in noise if the Boise AGS were selected for beddown of 72 or more F-35A aircraft in conjunction with ACC's proposal to beddown F-35As at Mountain Home AFB. As the AETC aircraft would be based at the Boise AGS, there would be no interaction between the maintenance of aircraft for the AETC F-35A proposal and ACC's operational beddown at Mountain Home AFB. There would also be no interaction between construction and addition of personnel at Mountain Home AFB with the combination of both actions.

Under the AETC proposal, the F-35As from the Idaho ANG could conduct up to 21,272 annual operations at Mountain Home AFB, particularly pattern work and low approaches and departures. Combined with any ACC scenario under the proposed action, these activities would substantially increase operations at the base. When combined with ACC Scenario 3 (32,001 airfield operations), operations at the airfield would increase by 53,273 operations or 163 percent over the no-action alternative. Addition of this many operations would expand the area affected by 65 dB DNL or greater by 4,842 acres. However, little change would occur in the areas exposed to noise levels greater than 65 dB DNL from the noise levels associated with the proposed action alone (Figure MH4.1-1) and most of these changes would occur to the amount of land under the 65 dB DNL contours (Table MH4.1-2).

Table MH4.1-2. Off-Base Noise Levels from the Proposed Action and F-35A Training Operations Combined

Noise Level (dB DNL)	***No-Action (acres)***	***Cumulative (acres)***	***Change from No-Action (acres)***
65	8,504	11,211	**+2,707**
70	3,874	5,104	**+1,230**
75	1,292	1,974	**+682**
80	135	357	**+222**
85	0	1	**+1**
Total	**13,805**	**18,647**	**+4,842**

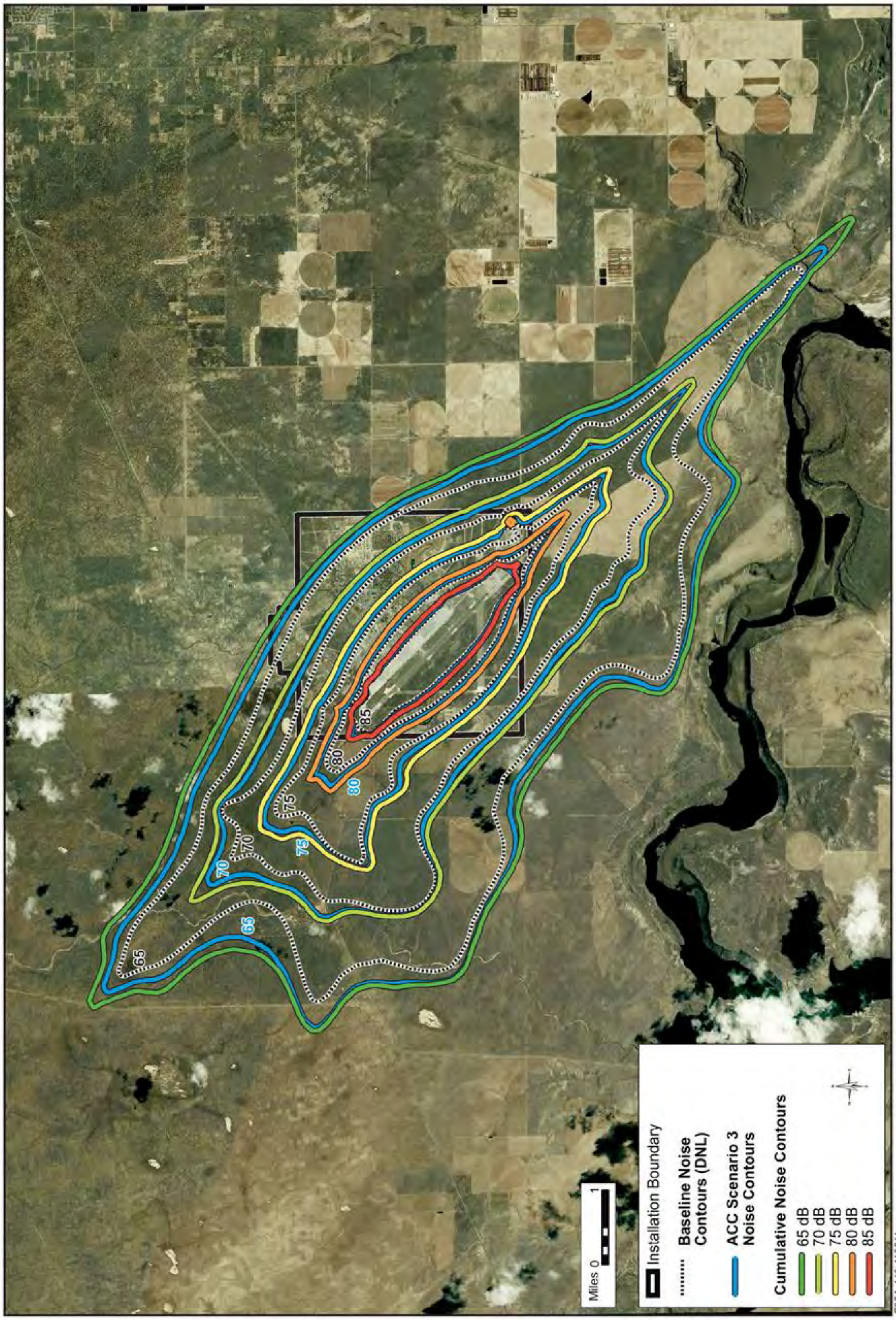


Figure MH4.1-1. Noise Levels around Mountain Home AFB from Cumulative Actions and No-Action

Like under the proposed action, open and agricultural lands tend to dominate in the area around the base, and only limited residences and population would be affected from the cumulative effects of both actions. These affected populations do not belong to either minority (including American Indians) or low income groups. This large increase in airfield operations would not adversely affect safety. Current airfield scheduling procedures prevent conflicts in the use of the airfield and airspace and these procedures would continue if both actions were to occur at Mountain Home AFB.

Use of the MHRC and associated airspace in southern Idaho would occur for both projects. With the addition of operational F-35As at Mountain Home AFB (up to 72 aircraft) and training F-35A aircraft from the Boise Air Terminal AGS (72 aircraft), total training operations by the Air Force would increase by approximately 31,000 (increasing 93 percent compared to the no-action alternative). Both F-35A squadrons would fly in similar ways and generally use higher altitudes (above 23,000 feet MSL). However, the training F-35As from the Idaho ANG would fly more at lower altitudes than the operational ACC F-35As. Conflicts in scheduling of airspace use and increased noise in the lands under the airspace could also result.

For subsonic noise, the maximum combined noise levels in the Jarbidge and Owyhee airspace would be 67 and 68 L_{dnmr}, respectively (Table MH4.1-3). All other noise levels would be less than 65 L_{dnmr} (from 45 to 53 L_{dnmr}). The noise increase of 3 to 4 dB would be perceptible under the Jarbidge North and Owyhee North MOAs, as would the 9 dB increase under the Saddle MOA. However, few people would be affected by the increase in noise as population is low in these areas. Increase in noise would not affect the Duck Valley Indian Reservation under the Owyhee North MOA as aircraft do not fly within 5 miles of Owyhee, NV and voluntarily do not fly below 15,000 feet AGL over the reservation.

Table MH4.1-3. Cumulative Subsonic Noise Levels—F-35A Training Proposal and F-35A Operational Beddown

Airspace Units	*No-Action (L_{dnmr})*	*Proposed F-35A AETC Training EIS-Boise ANG (3 Squadrons) (L_{dnmr})*	*Proposed F-35A Operational Beddown EIS (ACC Scenario 3) (L_{dnmr})*	*Cumulative Noise Levels (L_{dnmr})*	*Change from No-Action (dB)*
Jarbidge North	64	67	66	68	+4
Jarbidge South	<45	<45	<45	45	+4
Owyhee North	64	66	66	67	+3
Owyhee South	<45	<45	<45	45	+4
Paradise North	<45	<45	45	46	+5
Paradise South	<45	<45	45	46	+4
Saddle	<45	53	46	53	+9

Supersonic noise levels in the airspace in Jarbidge North and Owyhee North would increase by 3 to 4 dB (Table MH4.1-4). As with subsonic noise, the increase would be perceptible, however, few people would be affected. No change would occur to noise on the Duck Valley Indian Reservation.

In Jarbidge North under ACC Scenario 3 and with 72 F-35A aircraft under the AETC proposal, booms would increase, on average, by 59 booms per month, or about 134 percent over no action. In Owyhee North booms would, on average, increase by 55 per month, or about 130 percent over no action. These changes in the number of booms would be perceptible and likely cause annoyance in people underlying the airspace. No supersonic operations are permitted over the Duck Valley Indian Reservation at any time; therefore, there would be no increase in sonic booms with both proposals.

Overall, cumulative impacts from noise under the airspace due to the combination of both actions would be adverse, but would not reach the threshold for significance. All other impacts would be minimal.

Table MH4.1-4. Cumulative Supersonic Noise Levels and Sonic Booms— F-35A Training Proposal and F-35A Operational Beddown

Airspace Units	*No-Action*	*Proposed F-35A AETC Training EIS-Boise ANG (3 Squadrons)*	*Proposed F-35A Operational Beddown EIS (ACC Scenario 3)*	*Cumulative Noise Levels*	*Change from No-Action*
Jarbidge North					
CDNL	53	54	55	57	+4 dB
Booms per Month	44	53	66	103	+59
Owyhee North					
CDNL	57	57	58	60	+3 dB
Booms per Month	42	48	64	97	+55

Royal Saudi Air Force F-15SA Beddown. If both the F-35A operational beddown and F-15SA beddown actions were to occur, there would be substantial increases in the number of aircraft based at Mountain Home AFB, in airfield and airspace operations, and in personnel and construction. Eighteen F-15SA aircraft would be brought to Mountain Home AFB for the use of the Royal Saudi Air Force, and if ACC Scenario 3 were implemented under the F-35A operational beddown proposal, another 72 aircraft would be introduced, making 90 additional based aircraft for a total of 146, an increase in 143 percent over the no action. Issues related to adequate ramp space for aircraft and security along the flightline could occur if both actions were to take place. Maintenance of aircraft and disposal of hazardous materials and waste would occur in accordance with existing plans and procedures; therefore there would be no impacts due to an increase in aircraft at the base.

Construction under ACC Scenario 3 would affect 11 acres, while the Royal Saudi Air Force would affect 17 acres along the flightline. However, under both proposals the area would be previously disturbed and no impacts to undisturbed soils would occur. Given that the proposed F-35A construction and the Royal Saudi Air Force construction would 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. Construction of facilities for both actions would infuse over $177 million into the economy.

Personnel would increase by 2,242, or by 45 percent. However, neither action separately or together would negatively impact on-base or off-base housing, or community and infrastructure, since local services can adequately accommodate this number.

If both these actions were to occur, the number of operations performed at the airfield would increase by 43,210, an increase of 132 percent. Addition of these many operations would expand the area affected by 65 dB DNL or greater slightly, although it would be similar to noise contours produced by the F-35A aircraft alone, since the F-35A is a louder aircraft in general. As under the proposed action alone, open and agricultural lands tend to dominate in the areas around the base and only limited residences and population would be affected. These affected populations do not belong to either minority (including American Indians) or low income groups. The increase in airfield operations would not adversely affect safety. Current airfield scheduling procedures prevent conflicts in the use of the airfield and airspace and these procedures would continue if both actions were to occur at Mountain Home AFB.

With the addition of operational F-35As at Mountain Home AFB (up to 72 aircraft) and F-15SA aircraft, total training operations by the Air Force in the MHRC and associated airspace would increase by approximately 23,690 (increasing 71 percent compared to the no-action alternative). In general, F-35A squadrons would generally use higher altitudes (above 23,000 feet MSL) when compared to the F-15SA aircraft.

For subsonic noise, the maximum combined noise levels in the Jarbidge North and Owyhee North airspace would be 68 L_{dnmr} (Table MH4.1-5). All other noise levels would be less than 65 L_{dnmr} (from 46 to 48 L_{dnmr}). The noise increase of 4 dB would be perceptible under Jarbidge North and Owyhee North, however, although perceptible, noise levels in all other airspaces would be very low. Few people would be affected by the increase in noise in general as population is low in these areas. Increase in noise would not affect the Duck Valley Indian Reservation under Owyhee North as aircraft do not fly within 5 miles of Owyhee, Nevada and voluntarily do not fly below 15,000 feet AGL over the reservation.

Table MH4.1-5. Cumulative Subsonic Noise Levels from Royal Saudi Air Force and F-35A Operational Beddown

Airspace	*No-Action (L_{dnmr})*	*Proposed Royal Saudi Air Force 15SA EA (L_{dnmr})*	*Proposed F-35A Operational Beddown EIS (ACC Scenario 3) (L_{dnmr})*	*Cumulative Noise Levels (L_{dnmr})*	*Change from No-Action*
Jarbidge North	64	65	66	68	+4
Jarbidge South	<45	<45	<45	46	+1
Owyhee North	64	65	66	68	+4
Owyhee South	<45	<45	<45	46	+1
Paradise North	<45	<45	45	46	+1
Paradise South	<45	<45	45	47	+2
Saddle	<45	45	46	48	+3

Supersonic noise levels in the airspace in Jarbidge North and Owyhee North would increase by 4 to 5 dB (Table MH4.1-6). As with subsonic noise, the increase would be perceptible, however, few people would be affected. No change would occur to noise on the Duck Valley Indian Reservation.

In Jarbidge North under ACC Scenario 3 combined with the Royal Saudi Air Force proposal, booms would increase, on average, by 40 booms per month, or about 91 percent over no action. In Owyhee North, booms would, on average, increase by 39 per month, or about 87 percent over no action. These changes in the number of booms would be perceptible and likely cause annoyance in people underlying the airspace. No supersonic operations are permitted over the Duck Valley Indian Reservation at any time; therefore, there would be no increase in sonic booms with both proposals.

Table MH4.1-6. Cumulative Supersonic Noise Levels and Sonic Booms from Royal Saudi Air Force and F-35A Operational Beddowns					
Airspace	*No-Action*	*Proposed Royal Saudi Air Force F-15SA EA*	*Proposed F-35A Operational Beddown EIS (ACC Scenario 3)*	*Cumulative Noise Levels*	*Change from No-Action*
Jarbidge North					
CDNL	53	54	55	58	+5 dB
Booms per Month	44	54	66	84	+40
Owyhee North					
CDNL	57	58	58	61	+4 dB
Booms per Month	42	59	64	81	+39

Overall, cumulative impacts from noise under the airspace due to the combination of both actions could be adverse. All other impacts would be minimal.

Cumulative for All Actions

If the Royal Saudi Air Force beddown, the F-35A operational beddown at Mountain Home AFB, and the AETC F-35A training proposal were to all take place, airfield operations would increase 197 percent (an increase of 64,482 operations) above no action levels to a total of 97,094 operations. Noise levels at the airfield and surrounding areas under all actions would be similar to levels with the AETC F-35A training operations and ACC F-35A operational beddown operations combined (see Figure MH4.1-1). As discussed above, since open and agricultural lands tend to dominate in the area around the base, only limited residences and population would be affected. These affected populations do not belong to either minority (including American Indians) or low income groups. This large increase in airfield operations would not adversely affect safety, although scheduling all aircraft at the airfield may be difficult. Current airfield scheduling procedures prevent conflicts in the use of the airfield and airspace and these procedures would continue if all actions were to occur at Mountain Home AFB.

With the addition of operational F-35As at Mountain Home AFB (up to 72 aircraft), training F-35A aircraft from the Boise AGS (72 aircraft), and 18 F-15SA aircraft, total training operations by the Air Force would increase by approximately 42,000 (increasing 126 percent compared to the no-action alternative). Conflicts in scheduling of airspace use and increased noise in the lands under the airspace could also result.

Under all actions, the maximum combined subsonic noise levels in Jarbidge North and Owyhee North would be 69 dB L_{dnmr} and 68 dB L_{dnmr}, respectively (Table MH4.1-7). The maximum combined noise level in Saddle and Paradise would be 53 dB L_{dnmr} and 46 dB L_{dnmr}, respectively, and the maximum combined noise level in Jarbidge South and Owyhee South would remain at or below 46 dB L_{dnmr}. These levels would produce perceptible changes from baseline conditions. Few people would be affected by the increase in noise in general as population is low in these areas. However, increase in noise would not affect the Duck Valley Indian Reservation under Owyhee North as aircraft do not fly within 5 miles of Owyhee, Nevada and voluntarily do not fly below 15,000 feet AGL over the reservation.

Table MH4.1-7. Cumulative Subsonic Noise Levels from All Actions			
Airspace	***No-Action (L_{dnmr})***	***Cumulative Noise Levels (all actions) (L_{dnmr})***	***Change from No-Action (dB)***
Jarbidge North	64	69	+5
Jarbidge South	41	46	+5
Owyhee North	64	68	+4
Owyhee South	41	46	+5
Paradise North	41	46	+5
Paradise South	42	46	+4
Saddle	44	53	+9

Cumulative noise levels from supersonic activity in the airspace would increase by 4 dB CDNL in Owyhee North and by 5 dB CDNL in Jarbidge North (Table MH4.1-8). Sonic booms per day would increase by 167 percent beneath Owyhee North MOA (approximately 3 per day) and by 180 percent (3.6 per day) in Jarbidge North. These changes in the number of booms would be perceptible and likely cause annoyance in people underlying the airspace. No supersonic operations are permitted over the Duck Valley Indian Reservation at any time; therefore, there would be no increase in sonic booms or supersonic noise.

Table MH4.1-8. Cumulative Supersonic Noise Levels and Sonic Booms for All Actions			
Airspace	***No-Action***	***Cumulative Noise Levels***	***Change from No-Action***
Jarbidge North			
CDNL	53	58	+5 dB
Booms per Month	44	123	+79
Owyhee North			
CDNL	57	61	+4 dB
Booms per Month	42	112	+70

Overall, these changes in the noise levels would be perceptible. 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. Capacity of various MOAs to support combined operations safely may require further consideration. Higher levels of activity could add to the workload of air traffic controllers and generate a need for additional airspace management personnel.

MH4.2 Irreversible and Irretrievable 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 Mountain Home AFB are associated with construction impacts.

For Mountain Home AFB, 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, construction and renovation of base facilities would occur on up to approximately 11.39 acres of land previously disturbed and would consume limited amounts of material typically associated with interior renovations (wiring, insulation, windows, drywall) and exterior construction (concrete, steel, sand, brick). An undetermined amount of energy to conduct renovation, construction, and operation of these facilities would be expended and irreversibly lost. Renovations would generate minimal construction debris that would consume landfill space.

These construction and ground-disturbing activities would occur on previously disturbed lands and would not adversely impact wetlands or terrestrial communities. Irretrievable resource commitments are, therefore, confined to buildings associated with construction.

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 substantially affect environmental resources.

Shaw Air Force Base

How to Use This Document

Our goal is to give you a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the no-action alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement, or EIS, is shown below.

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

OVERALL PROPOSAL VOLUME I

PREFACE
Detailed Guide for Reading the Final EIS

CHAPTER 1
Purpose and Need for the Air Force F-35A Operational Beddown

CHAPTER 2
- Overview of the Proposed Action and Alternatives
- Alternative Identification Process
- Summary Comparison of the Proposed Action and Alternatives

CHAPTER 3
Resource Definition and Methodology

INFORMATION SPECIFIC TO EACH BASE VOLUME I

CHAPTER 4
Six Base-Specific Sections

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Section BR2.0 Base-Specific Project Details	**Section HL2.0** Base-Specific Project Details	**Section JX2.0** Base-Specific Project Details	**Section Mc2.0** Base-Specific Project Details	**Section MH2.0** Base-Specific Project Details	**Section SH2.0** Base-Specific Project Details
Section BR3.0 Affected Environment and Environmental Consequences	**Section HL3.0** Affected Environment and Environmental Consequences	**Section JX3.0** Affected Environment and Environmental Consequences	**Section Mc3.0** Affected Environment and Environmental Consequences	**Section MH3.0** Affected Environment and Environmental Consequences	**Section SH3.0** Affected Environment and Environmental Consequences
Section BR4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section HL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section JX4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section Mc4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section SH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

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Appendix C – Noise Modeling and Airspace Operations
Appendix D – Air Quality
Appendix E – Revised Draft EIS Public Comments and Responses

SH1.0 SHAW AIR FORCE BASE OVERVIEW

This section presents an overview of Shaw Air Force Base (AFB); the specifics of the proposed action as it relates to both the airfield and the associated airspace; construction required at the base; changes to personnel; state consultation and associated permits that would be required should Shaw AFB be selected as one of the beddown locations for the F-35A; and identified public and agency concerns with the proposal.

Shaw AFB is located approximately 10 miles west of the center of the City of Sumter and 35 miles east of the City of Columbia, in South Carolina (Figure SH1.0-1). Shaw AFB occupies 15,940 total acres and is comprised of three distinct properties: the main base, which is 3,395-acres; the Poinsett Electronic Combat Range (ECR) (12,521 acres located approximately 10 miles south of the main base); and the Wateree Recreation Area (24 acres located on the east side of Lake Wateree in Kershaw County, approximately 35 miles northwest of the main base) (Figure SH1.0-2).

Figure SH1.0-1. Location of Shaw AFB

Shaw AFB is home to the 20th Fighter Wing (20 FW), whose mission is to provide, protect, and sustain combat-ready air forces. A total of 72 F-16 aircraft are employed in support of the mission (Shaw AFB 2008a), that includes both air-to-ground and air-to-air roles. The 20 FW is the host unit at Shaw AFB, and operates the 55th, 77th, and 79th Fighter Squadrons. In the sections that follow, SH2.0 presents the base-specific description of the proposed action and the three beddown scenarios proposed at Shaw AFB. Section SH3.0 addresses baseline conditions and environmental consequences that could result if any of the three scenarios were implemented at Shaw AFB. Refer to Chapter 3 for a complete and detailed definition of resources and the methodology applied to identify potential impacts.

Figure SH1.0-2. Shaw AFB Boundary

Section SH4.0 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 any of the beddown scenarios were implemented at Shaw AFB.

SH2.0 SHAW AFB ALTERNATIVE (24, 48, AND 72 AIRCRAFT SCENARIOS)

The Shaw AFB F-35A beddown alternative includes three scenarios; the following presents the elements of these scenarios for the base in Section SH2.1 and the airspace in Section SH2.2.

SH2.1 Shaw AFB: Base

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

SH2.1.1 Aircraft Transition

Under the proposed action, 24 (Air Combat Command [ACC] Scenario 1), 48 (ACC Scenario 2), or 72 (ACC Scenario 3) aircraft would be based at Shaw AFB. The beddown would start in 2015 with delivery of the first F-35As to Shaw AFB. It would be complete by 2020, with delivery of the full complement of 24, 48 or 72 F-35As. The F-35A aircraft would replace the 72 F-16s at Shaw AFB. Timing of the F-16 drawdown would generally match the arrival of F-35As (Table SH2.1-1). However, for ACC Scenarios 1 and 2, the drawdown of F-16s could occur more quickly. At no time, however, would the combination of F-16s and F-35As on base exceed the final total of 72 aircraft. Shaw AFB also supports transient aircraft types and would continue to do so upon completion of the F-35A beddown.

SH2.1.2 Airfield Operations

Like existing F-16 units at Shaw AFB, the operational F-35A aircraft would be integrated into the Combat Air Forces (CAF). The CAF defends the homeland of the United States (U.S.) as well as deploys forces worldwide to meet threats and ensure the security of the U.S. To fulfill this role, the 20 FW must train as it would fight.

Shaw AFB currently supports 48,544 airfield operations including 45,094 (93 percent) by the 20 FW and 3,483 (7 percent) by transient aircraft. Shaw AFB averages 250 flying days per year. The U.S. Air Force (Air Force) anticipates that by 2019 under ACC Scenario 1 (24 F-35As), the F-35A would fly 10,667 operations at Shaw AFB; under ACC Scenario 2 (48 F-35As), the F-35A would fly 21,334 operations per year; and under ACC Scenario 3 (72 F-35As), the F-35A would fly 32,001 operations per year. Based on proposed requirements and deployment patterns, F-35A operational aircraft would fly additional operations during deployments, or at other locations for exercises or in preparation for deployments. In addition, each squadron could participate in remote training exercises. Some of these missions could involve ordnance delivery training or missile firing exercises (within the scope of existing National Environmental Policy Act [NEPA] documentation) at approved ranges such as the Nevada Test and Training Range near Nellis AFB, Utah Test and Training Range (UTTR), or Eglin AFB's overwater ranges in the Gulf of Mexico.

Under all three beddown scenarios, airfield operations would decrease. The proposed 10,667 F-35A annual airfield operations at Shaw AFB under ACC Scenario 1 would represent a decrease of 34,427 or 76 percent less than baseline F-16 levels, and 71 percent in total airfield operations (Table SH2.1-1). This decrease would occur under ACC Scenario 1 and 2 as a result of the reduction in based aircraft and because the F-35A would fly fewer airfield operations per aircraft with the F-35A. Under ACC Scenario 3, the number of based aircraft would remain the same, but the F-35 would fly fewer operations, particularly closed patterns. F-35As would employ similar departures and landing procedures as currently used by Shaw AFB F-16s. Due to differences in performance, the flight profiles and tracks for the F-35A would vary somewhat from those used by F-16s. With transition to 48 F-35A aircraft (ACC Scenario 2), the airfield operations would decrease by 23,760 or a decrease of 49 percent overall. Under ACC Scenario 3, total annual airfield operations would decrease by 13,093 operations or about 27 percent overall. Currently F-16s operate an average of 250 flying days per year; however, a standard planning format of 260 days was used to maintain consistency and make an equal comparison among the alternatives.

Table SH2.1-1. Shaw AFB Baseline F-16 and Proposed F-35A Operations

Baseline	***ACC Scenario 1***	***ACC Scenario 2***	***ACC Scenario 3***
F-16s	*24 F-35As*	*48 F-35As*	*72 F-35As*
45,094	10,667	21,334	32,001
Net Change	**-34,427**	**-23,760**	**-13,093**

F-35A operations would adhere to existing restrictions, avoidance procedures, and the quiet-hours program at Shaw AFB. The F-16s at Shaw AFB currently fly approximately 1.7 percent of their operations during environmental night (10:00 p.m. to 7:00 a.m.). The F-35A would be expected to fly about 0.6 percent during environmental night. Therefore, beddown of the F-35A would decrease total operations during environmental night under all scenarios.

SH2.1.3 Construction

To support proposed F-35A operations, additional infrastructure and facilities would be required at Shaw AFB (Table SH2.1-2) under each scenario (24, 48, or 72 aircraft). A total of up to nine demolition, construction, modification, or infrastructure improvement projects for each of the three scenarios would be undertaken beginning in 2014 (Figures SH2.1-1 through SH2.1-3). The primary difference between the three scenarios is the internal alteration of one Squadron Operations Facility per scenario (i.e., one for ACC Scenario 1; two for ACC Scenario 2; three for ACC Scenario 3).

Table SH2.1-2. Proposed Construction and Modifications for Shaw AFB			
Year	*Action*	*Total Affected Areas (acres)*	*New Impervious Surface (acres)*
ACC Scenario 1 (24 F-35As)			
2014	Construction of a new F-35A 6-Bay Flight Simulator	2.15	0.75
2014	Construction of a new F-35A 6-Bay Flight Simulator: roadways and new parking areas	0.89	0.89
2014	Internal alteration of 1 Squadron Operation Facility, Building 1610	0	0
2014	Internal alteration of 1 Aircraft Maintenance Unit (AMU), Building 1629	0	0
2014	Internal alteration of Parts Storage Facility (Building 1614)	0	0
2014	Alternative Location - New Parts Storage Facility	2.09	0.95
2014	Repair Hayman Igloo	0.35	0.02
2014	Addition and Alteration Various Facilities	0	0
2014	Design	0	0
Total	**Cost: $22,150,000**	**5.48**	**2.61**
ACC Scenario 2 (48 F-35As)			
2014	Construction of a new F-35A 6-Bay Flight Simulator	2.15	0.75
2014	Construction of a new F-35A 6-Bay Flight Simulator: roadways and new parking areas	0.89	0.89
2014	Internal alteration of 2 Squadron Operation Facilities, Buildings 1605 and 1606	0	0
2014	Internal alteration of 2 AMUs, Buildings 1627 & 1628	0	0
2014	Internal alteration of Parts Storage Facility (Building 1614)	0	0
2014	Alternative Location - New Parts Storage Facility	2.09	0.95
2014	Repair Hayman Igloo	0.35	0.02
2014	Addition and Alteration Various Facilities	0	0
2014	Design	0	0
Total	**Cost: $22,300,000**	**5.48**	**2.61**
ACC Scenario 3 (72 F-35AS)			
2014	Construction of a new F-35A 6-Bay Flight Simulator	2.15	0.75
2014	Construction of a new F-35A 6-Bay Flight Simulator: roadways and new parking areas	0.89	0.89
2014	Internal alteration of 3 Squadron Operation Facilities, Buildings 1605, 1606, and 1610	0	0
2014	Internal alteration of 3 AMUs, Buildings 1627, 1628, & 1629	0	0
2014	Internal alteration of Parts Storage Facility (Building 1614)	0	0
2014	Alternative Location - New Parts Storage Facility	2.09	0.95
2014	Repair Hayman Igloo	0.35	0.02
2014	Addition and Alteration Various Facilities	0	0
2014	Design	0	0
Total	**Cost: $22,450,000**	**5.48**	**2.61**

Figure SH2.1-1. Shaw AFB Construction Projects – ACC Scenario 1

Figure SH2.1-2. Shaw AFB Construction Projects – ACC Scenario 2

Figure SH2.1-3. Shaw AFB Construction Projects – ACC Scenario 3

All projects would begin in 2014. Regardless of the scenario, proposed construction, modification, repair, and infrastructure improvements would affect a total of 5.48 acres including 2.61 acres of new impervious surface and under all three scenarios disturbance to an additional 2.87 acres. Total affected area refers to the total area covered by the construction footprint of the proposed facilities, plus the surrounding lands where construction-related clearing and grading would occur. For those projects with internal alterations only, the proposed construction would be within an existing facility and therefore, no surrounding lands would be affected. Infrastructure upgrades, such as connecting new facilities to water and power systems, would also add to the affected areas on the base. The overall cost would be approximately $22,450,000 under the maximum beddown scenario (ACC Scenario 3), although the cost would not differ much among the scenarios.

SH2.1.4 Personnel Changes

Beddown of the F-35A operational aircraft at Shaw AFB would require sufficient and appropriately skilled military personnel to operate and maintain the new aircraft and to provide other necessary support services. For Shaw AFB, the F-35A personnel positions would be drawn from the equivalent positions associated with existing F-16 manpower authorizations. Shaw AFB currently supports 8,822 personnel authorizations including more than 1,500 Army positions. Under all three scenarios, personnel authorizations would decrease (Table SH2.1-3). Relative to total base personnel authorizations, decreases would range from 15 percent (ACC Scenario 1) to 2 percent (ACC Scenario 3). Base Operations Support (BOS) personnel, who add about 10 percent to the total military personnel, include civilian government employees and other military such as security police and administration. BOS personnel authorizations would add 53, 106, and 159 positions for the three ACC scenarios, respectively. Thus, the total positions for each scenario are 585, 1,170, and 1,755 under ACC scenarios 1, 2, and 3, respectively.

Table SH2.1-3. Proposed Military Personnel Changes: Shaw AFB

	Baseline	*ACC Scenario 1*	*ACC Scenario 2*	*ACC Scenario 3*
F-16s	1,905	-1,905	-1,905	-1,905
F-35A	0	532	1,064	1,596
BOS Personnel	N/A	53	106	159
Total Personnel	**1,905**	**585**	**1,170**	**1,755**
Net Change	**N/A**	**-1,320**	**-735**	**-150**

SH2.2 Training Airspace and Ranges

In Chapter 2, Section 2.1.2, Table 2-7, airspace units were identified that constitute baseline conditions. These would also represent conditions found under the no-action alternative as there have been no FAA changes to charted airspace used by the 20 FW. Neither the basing action nor alternative scenarios will require changes in special use airspace attributes, volume, or proximity; nor will changes be needed in the type and number of ordnance employed at the ranges.

SH2.2.1 Airspace Use

As the replacement for the F-16 fighter aircraft, the F-35As would conduct missions and training programs necessary to fulfill its multi-role responsibilities (refer to Chapter 2). The Air Force expects the F-35A would operate in the airspace currently associated with the base, but somewhat differently than the F-16 aircraft now using that airspace. These differences would derive from enhanced capabilities and changed requirements for the F-35A. All F-35A flight activities would take place in existing airspace, so no airspace modifications would be required.

The 20 FW of Shaw AFB uses several airspace units (Table SH2.2-1, and Figures SH2.2-1 through SH2.2-5 [following the table]). Airspace includes overland Military Operations Areas (MOAs), Restricted Areas, offshore Warning Areas and two additional overwater units, the Mid Atlantic Electronic Warfare Range (MAEWR) and a Special Operating Area (SOA). Chapter 2 provides definitions of these airspace units. The 20 FW currently uses this airspace for 95 percent of their operations. With beddown of the F-35As, operations would emphasize use of different airspace units and F-35A pilots would adapt training activities, as needed, in the existing airspace structure.

Table SH2.2-1. Shaw AFB Training Airspace[1]

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	5,000	To BNI 14,000
Bulldog	Bulldog MOA A/C	500 AGL	To BNI 10,000
	Bulldog MOA B	10,000	18,000
	Bulldog MOA D	500 AGL	17,000
	Bulldog MOA E	5,000 AGL	To BNI 10,000
	Bulldog B ATCAA	18,000	27,000
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-3007 A	Surface	To BNI 13,000

Table SH2.2-1. Shaw AFB Training Airspace[1]			
Training Area Name	*Airspace*	*Floor (feet MSL unless otherwise noted)**	*Ceiling (feet MSL unless otherwise noted)**
	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
	Neuse ATCAA A/B	18,000	23,000
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
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[2]	Surface	62,000
	W-161 B[2]	Surface	30,000
W-177	W-177 A[2]	Surface	50,000
	W-177 B[2]	Surface	30,000
SOA	W-134	4,500	Unlimited
	W-157 A	Surface	43,000
	W-158 A	Surface	43,000
	W-159 A	Surface	43,000
R-5314 (Dare County)	R-5314 A/B/D/E	Surface	20,500
	R-5314 C/F	500 AGL	20,500
	R-5314 H	500 AGL	10,000
	R-5314 J	1,000 AGL	6,000
	Phelps MOA A	6,000	18,000
	Phelps MOA B	10,000	18,000
	Phelps MOA C	15,000	18,000
MAEWR	W-122[2]	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
	Hatteras F MOA	3,000	To BNI 13,000

Source: Federal Aviation Administration (FAA) 2003.
Legend: MSL = mean sea level; AGL = above ground level; BNI = but not including all MOAs extend to 18,000 feet MSL unless otherwise noted.
Notes: *MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to the average sea level. The elevation of a mountain, for example, is marked by its highest point and is typically illustrated as a small circle on a topographic map with the MSL height shown in either feet or meters or both. Because aircraft fly across vast landscapes, where points above the ground can and do vary, MSL is used is denote the "plain" on which the floors and ceilings of special use airspace are established and the altitude at which aircraft must operate within that special use airspace.
[2]Supersonic flight authorized above 10,000 feet MSL

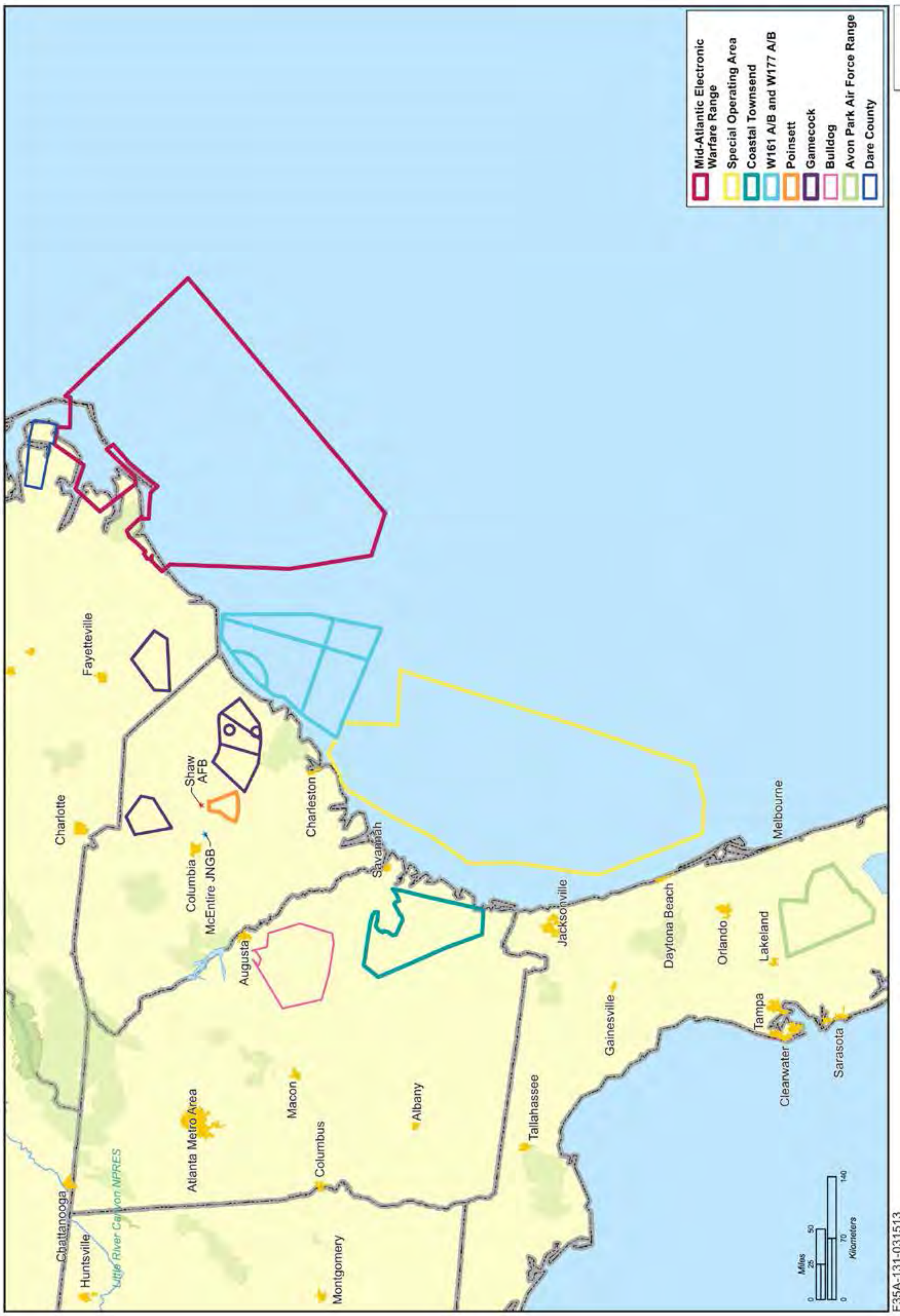

Figure SH2.2-1. Airspace Associated with Shaw AFB

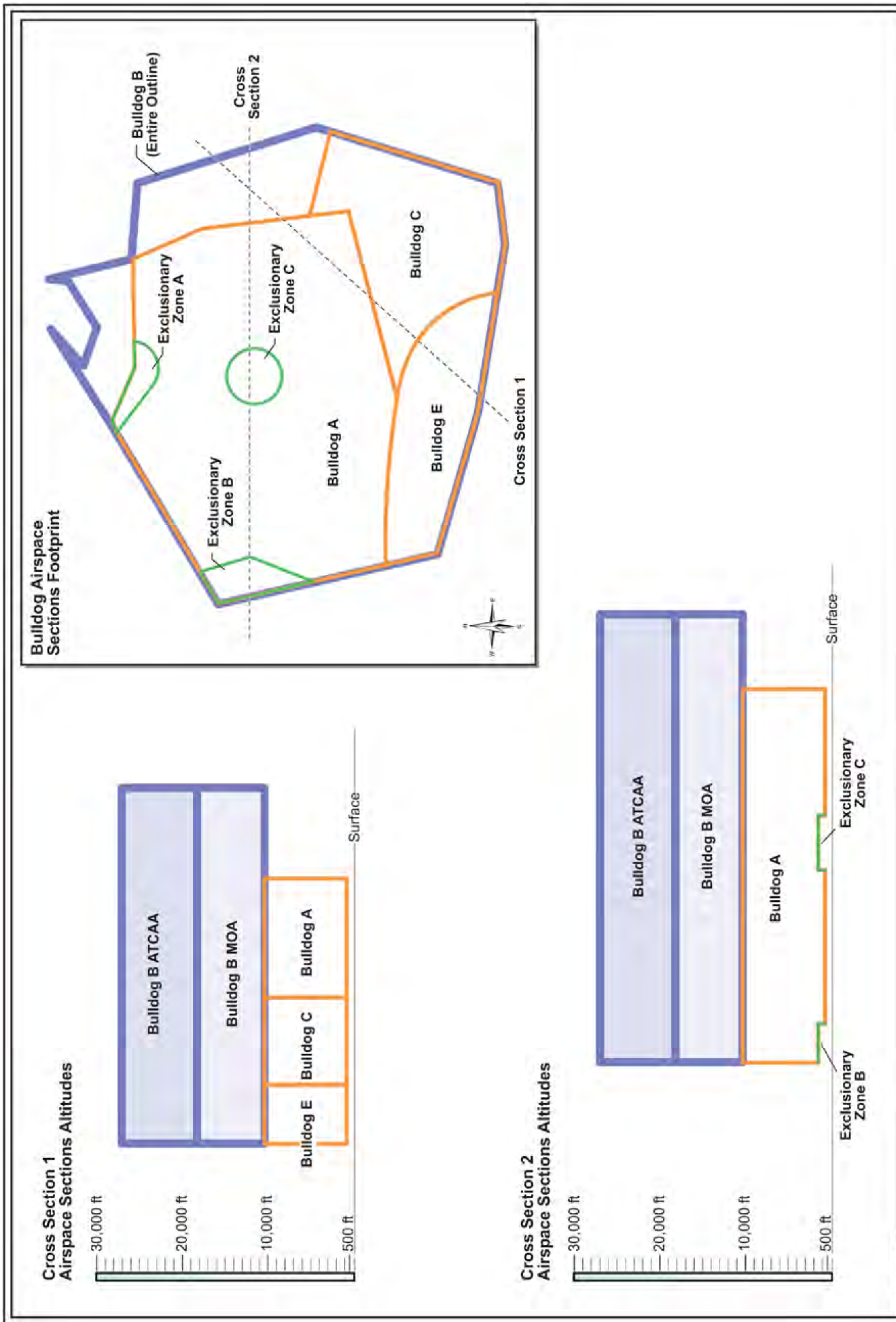

Figure SH2.2-2. Shaw AFB Associated Airspace Cross Sections: Bulldog

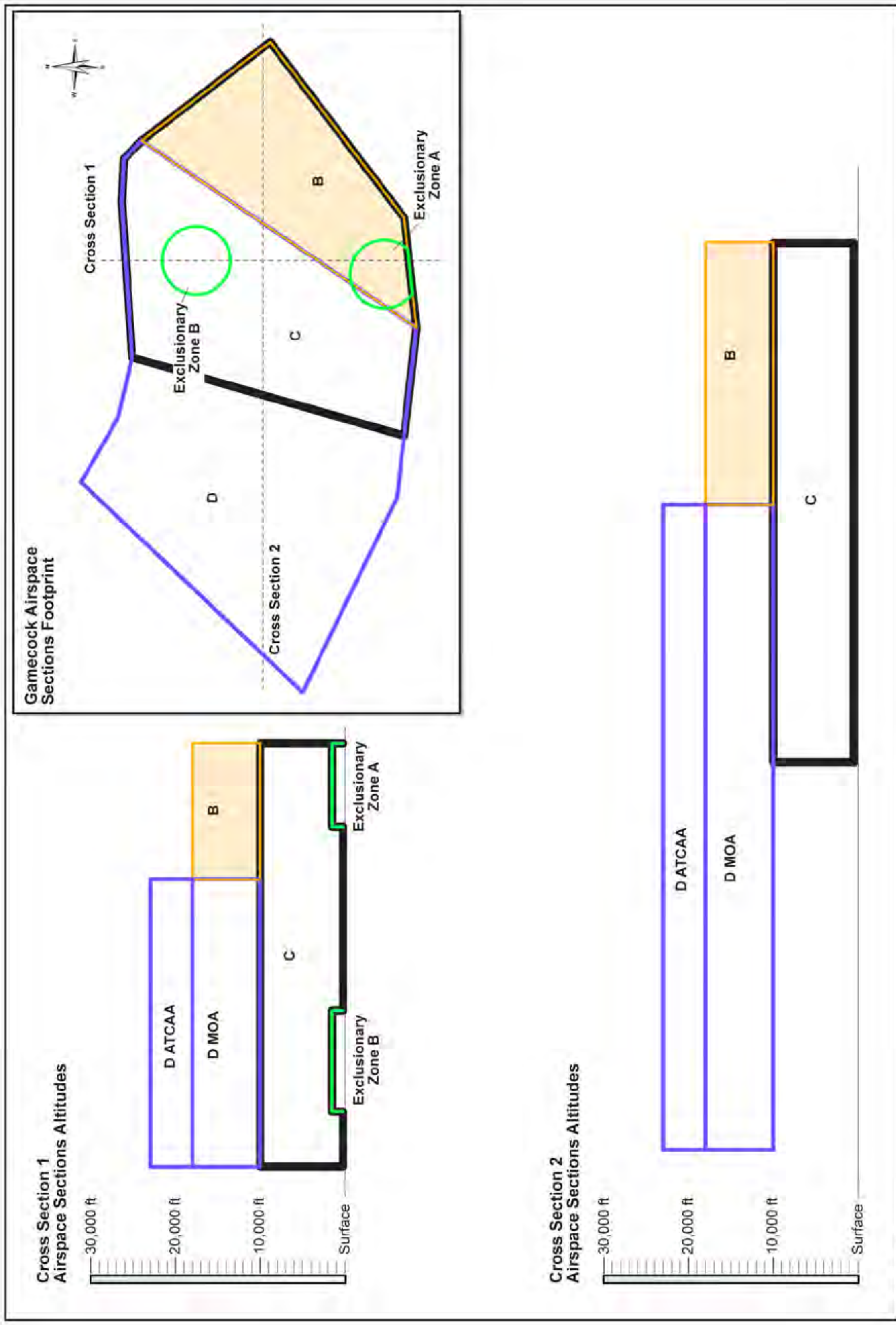

Figure SH2.2-3. Shaw AFB Associated Airspace Cross Sections: Gamecock

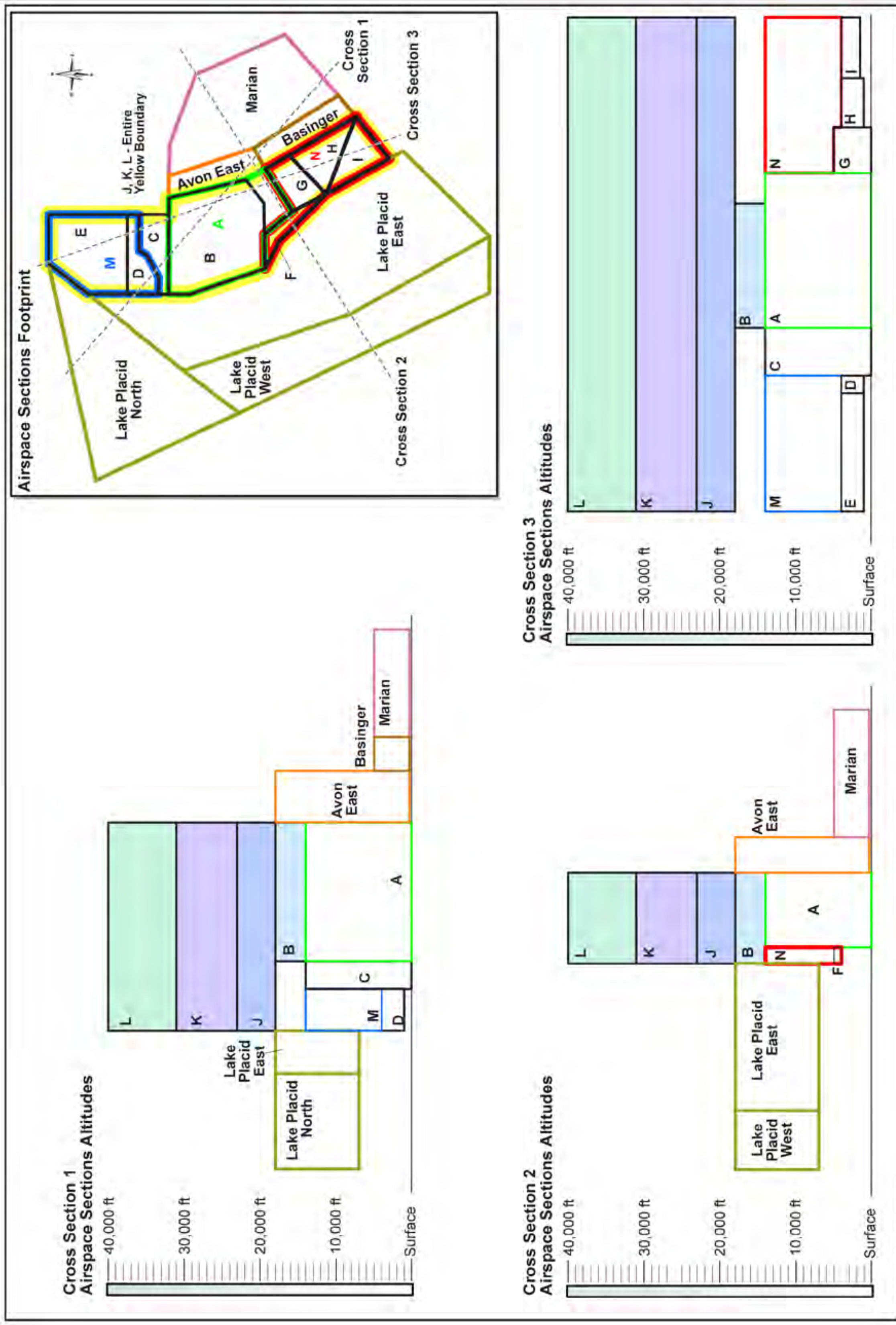

Figure SH2.2-4. Shaw AFB Associated Airspace Cross Sections: APAFR

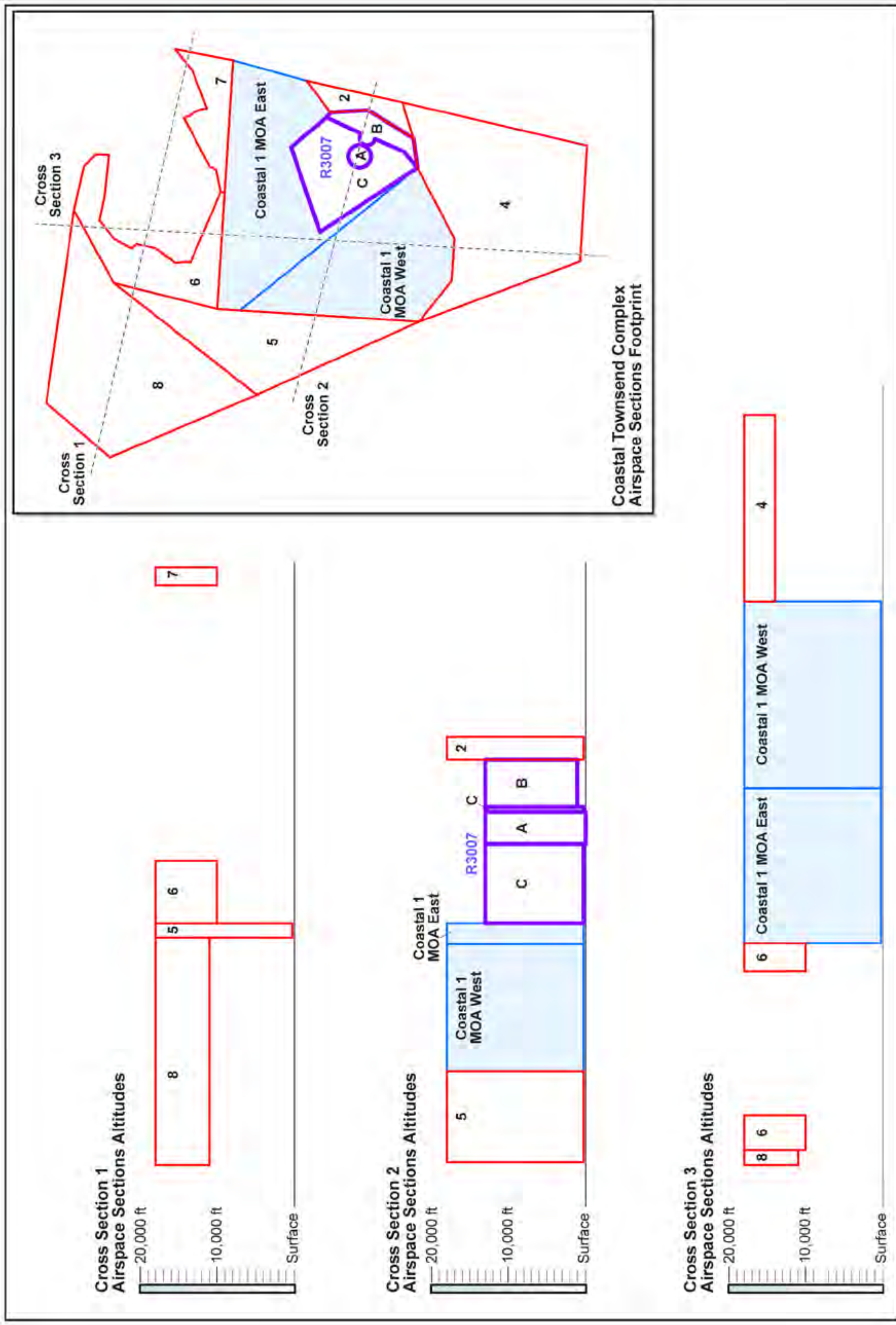

Figure SH2.2-5. Shaw AFB Associated Airspace Cross Sections: Coastal Townsend Complex

Bulldog and Gamecock form the main training areas for the 20 FW. Combined, operations in these two units account for 63 percent of total 20 FW activity. In contrast, Avon Park represents only 3.2 percent of the total use by the 20 FW. All airspace lies within the flight distance available during a standard daily training flight.

Although the F-35As would perform the missions of the F-16 aircraft, 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, and fewer supersonic events, and higher altitudes for supersonic flights.

The F-35A would fly more of the time at higher altitudes than the F-16 (Table SH2.2-2), 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 Air Traffic Control Assigned Airspace (ATCAAs) and at higher altitude regimes of the airspace. In contrast, the F-16s fly 70 to 80 percent below 23,000 feet MSL. Regardless of the altitude structure and percent use indicated in Table SH2.2-2, F-35 aircraft (as do existing military aircraft) would adhere to all established floors and ceilings of airspace units. For example, the floor of Coastal MOA 4 lies at 14,000 ft MSL, so the F-35A would not fly below that altitude in that airspace. Rather pilots would adapt training to this and other airspace units like the Bulldog MOAs A/C/D with lower floors.

Table SH2.2-2. Baseline and Proposed Altitude Distribution

Altitude (feet)	***Percentage of Use***		
	F-16		*F-35A*
	Air-to-Ground	Air-to-Air	Multi-role
500 –1,000 AGL	5%	5%	2%
1,000 –5,000 AGL	5%	10%	3%
5,000 –15,000 MSL	20%	15%	5%
15,000 –23,000 MSL	50%	40%	10%
>23,000 MSL	20%	30%	80%

At the conclusion of any of the beddown scenarios, total annual operations would vary relative to baseline levels in the airspace units due to shifts in F-35A activities (Table SH2.2-3). The need to accommodate the different training capabilities and requirements of the F-35As would distribute the operations in the various airspace units differently than under baseline conditions. For Bulldog, operations would decrease by 43 percent for ACC Scenario 1, 24 percent for ACC Scenario 2, and 6 percent for ACC Scenario 3. Operations in the Gamecock MOAs would decrease between 60 and 30 percent for ACC Scenarios 1 through 3. Operations in Coastal Townsend would decrease under ACC Scenario 1, remain unchanged under Scenario 2, but increase slightly in ACC Scenario 3. Avon Park, which receives minimal use already, would decrease to very low levels under all scenarios. As noted previously (Section 3.1.3), conditions in the Warning Areas, SOA, and the MAEWR would not change measurably from baseline so they are not analyzed further.

Table SH2.2-3. Comparison of ACC Scenarios – Airspace Operations						
Airspace Unit[1]	*Total Baseline[2]*	*F-16 Aircraft Baseline[3]*	*ACC Scenario*	*F-35A Operations*	*Net Change (Total)*	*Percent Change Total*
Bulldog	5,839	3,545	1	1,058	-2,487	-43%
			2	2,117	-1,428	-24%
			3	3,175	-370	-6%
Gamecock	2,848	2,127	1	423	-1,704	-60%
			2	847	-1,280	-45%
			3	1,270	-870	-30%
Coastal Townsend	3,216	425	1	212	-213	-7%
			2	423	-2	-0%
			3	635	+210	+7%
Poinsett	3,035	2,552	1	339	-2,213	-73%
			2	677	-1,875	-62%
			3	1,016	-1,536	-51%
APAFR	7,664	283	1	42	-241	-3%
			2	85	-198	-3%
			3	127	-156	-2%
Total[4]	**22,602**	**8,932**	**1**	**2,074**	**-6,858**	**-30%**
			2	**4,149**	**-4,783**	**-21%**
			3	**6,223**	**-2,709**	**-12%**

Notes:
[1]Excludes W-161/177, SOA, and MAEWR per rationale with Chapter 3.
[2]Baseline and no-action are the same for this alternative location.
[3]Includes only based F-16s from Shaw AFB.
[4]Totals 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 at Shaw AFB currently fly approximately 1.7 percent of their operations during environmental night (10:00 p.m. to 7:00 a.m.). The F-35A would be expected to fly about 0.6 percent of the time during environmental night. Because the percentage of night flying would decrease, the actual number of night operations would not exceed baseline levels. For example, the 20 FW F-16s conduct about 50 operations during environmental night annually. Despite increases in operations under ACC Scenarios 2 and 3, the F-35A would fly less than 40 total operations during environmental night.

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 training would be performed only in the overwater Warning Areas but not in overland airspace used by the 20 FW. All supersonic flight would be conducted above 15,000 feet MSL, with 90 percent occurring above 30,000 feet MSL. 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.

SH2.2.2 Ordnance Use and Defensive Countermeasures

Most air-to-ground training would be simulated, where nothing is released from the aircraft, and target scoring is done electronically. As was discussed in Chapter 2, section 2.1.2, however, the F-35A (like the F-16) is capable of carrying and employing several types of air-to-air and air-to-ground ordnance (including strafing) and pilots would need training in their use. As the Air Force currently envisions, the type and number of ordnance would not differ from that currently employed by the F-16s. F-35A pilots would only use ranges and airspace authorized (i.e., approved and analyzed by DoD [ranges] and charted by the FAA [airspace]) for the type of ordnance being employed and within the number already approved at a range and/or target. If in the future the Air Force identifies weapons systems that are either new or could exceed currently approved levels, appropriate NEPA documentation would need to occur prior to their employment.

Like the F-16, the F-35A would use 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 stealth characteristics, it is expected to use fewer defensive countermeasures 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 expenditures would match that of the 20 FWs F-16s on a per operation basis. 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 such use. Current restrictions on the amount or altitude of flare use would also apply. Under the proposed action, F-35As based at Shaw AFB would use up to 30,000 flares per year for 72 aircraft. Under ACC Scenarios 1 and 2, flare use would be proportionately less. The amount of flares used in each authorized airspace unit would be proportional to the number of operations conducted by the F-35As. Since operations in all but one airspace unit would decrease under all scenarios, annual flare use by F-35As would not increase. For Coastal Townsend under ACC Scenario 3, operations would increase by 210 annually. However, the 20 FW would not anticipate use of flares beyond baseline levels. 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.

SH2.3 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. Then changes to the baseline that are attributable to the proposed action are examined for each resource. Thus, the change (increase or decrease) in the resource at each installation can be compared for all alternative locations.

SH2.4 Permits, Agency Consultations, and Government-to-Government Consultation

Shaw AFB operates under agreements with a series of environmental permitting agencies for such resources as air, water, and cultural resources.

Permitting: The following section describes the permits that would typically be required for the proposed action and discusses whether they would be required under this particular 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 (USEPA's) *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, Shaw AFB 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 applicability 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. Because Shaw AFB is located in an attainment area for all criteria pollutants, no formal conformity applicability determination is required.
- Personnel conducting construction and/or demolition activities will strictly adhere to all applicable occupational safety requirements during construction activities.
- 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 is present, Shaw AFB 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. Other hazardous waste and material issues and permits will be addressed as needed.

Consultation. In January 2010, informal consultation was initiated with the South Carolina and Georgia State Historic Preservation Offices (SHPOs); however, no responses were received. In October 24, 2012, Section 106 of the National Historic Preservation Act (NHPA) consultation was re-initiated by the Air Force and letters sent to the two SHPOs notifying them that no response had been received from earlier correspondence regarding the proposed action. In April 2013, the Georgia SHPO concurred with the Air Force conclusion of no adverse effects in the Area of Potential Effect (APE) and in June 2013, the South

Carolina SHPO responded to the Revised Draft EIS, concurring with the Air Force determination of no adverse effects in the APE.

Government-to-Government. On November 27, 1999, the Department of Defense (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).

Project-specific government-to-government consultation was initiated in January 2010 when letters were sent to the two federally-recognized American Indian Tribes that potentially had interest in the proposal. The letters requested whether they had any issues or concerns with the Air Force proposal. No responses were received, nor were any submitted by the Tribes after they received copies of the Draft EIS in March 2012. Another letter was sent in October 2012, to both the Catawba Indian Nation and the East Band of Cherokee Indians, asking for a negative response with the proposed action. Despite numerous emails and phone calls in April and May 2013, no further responses were received (refer to Appendix B for specifics on consultation). As such, the Air Force has made the determination that there would be no adverse effects to the APE and therefore, according to 36 CFR 800.4(d)(1) *No historic properties affected*: "If the agency official finds that either there are no historic properties present or there are historic properties present but the undertaking will have no effect upon them as defined in § 800.16(i), the agency official shall provide documentation of this finding, as set forth in § 800.11(d), to the SHPO/THPO. The agency official shall notify all consulting parties, including Indian tribes and Native Hawaiian organizations, and make the documentation available for public inspection prior to approving the undertaking. (i) If the SHPO/THPO, or the Council if it has entered the Section 106 process, does not object within 30 days of receipt of an adequately documented finding, the agency official's responsibilities under Section 106 are fulfilled."

SH2.5 Public and Agency Concerns

SH2.5.1 Scoping

Scoping meetings were held February 1 through 4, 2010 in Sumter, Eastover, and Kingstree, South Carolina; and Augusta, Georgia. Because of the proximity of Shaw AFB and McEntire JNGB, 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 Joint National Guard Base (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), one 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 SH3.2-1)
- What would be the effect on wetlands from the use of the Poinsett Range? (see Chapter 3.8.2)
- How would the beddown of the F-35A aircraft affect local aviation and the local economy? (see Section SH3.1 for aviation and SH3.11.1.2)

SH2.5.2 Draft EIS Public Comment Period

Official notification of the F-35A Operational Basing Draft EIS public comment period began with the Notice of Availability (NOA) announcement on April 13, 2012 in the *Federal Register*. This marked the start of the 45-day review period which would end on June 1, 2012; however, the Air Force was requested to hold another hearing the first week of June. As a result, the public comment period was extended 19 more days to June 20, 2012. A notice was placed in the *Federal Register* on May 23, 2012 announcing this extension.

During the week of April 30, 2012, four hearings were held in Sumter, Eastover, and Kingstree, South Carolina and in Brunswick, Georgia. At the four hearings, a total of 39 people attended, with eight people expressing their support in the form of oral comments; two written comments were submitted and they too were in support of the basing action at McEntire JNGB. As mentioned in Chapter 1, during the 64-day comment period, a total of 934 written comments were received, of which four were associated with the Shaw AFB alternative. All expressed their support to base F-35As at Shaw AFB. No other issues were identified.

SH2.5.3 Revised Draft EIS Public Comment Period

The 45-day public comment period for the Revised Draft EIS began on May 31, 2013 when the NOA was published in the *Federal Register* (Appendix A). The Revised Draft EIS was circulated for review and comment to government agencies, local organizations, American Indian tribes, interested private citizens, and public libraries. Copies of the Revised Draft EIS were delivered by May 31, 2013 to 35 libraries and the entire two-volume document was posted on the Air Force website at www.accplanning.org for viewing electronically. On the same day (or as soon as possible given publication deadlines) as the NOA appeared in the *Federal Register*, the Air Force announced the availability of the Revised Draft EIS NOA in over 20 local newspapers.

There were 11,172 comments received in letter, note, email, and postcard format during the 45-day public comment period. Of these, 823 were in letter, handwritten note, and email format and 10,349 were postcard format. No general public comments were received associated with the basing action at Shaw AFB.

SH2.6 Differences Between the Draft EIS and the Final EIS

Following the Draft EIS, a Revised Draft EIS was published which included factual corrections, additional and/or supplemental information, and improvements or modifications to the analyses presented in the Draft EIS. The re-analysis included noise impacts to low-income and minority populations based on updated census data (not available when the 2012 Draft EIS was published) in the noise section (SH3.2) and environmental justice/protection of children (SH3.12); inserting documents incorporated by reference (SH2.7); adding mitigation measures (SH2.8); correcting typographical and grammatical errors, as needed; correcting mapping and labeling mistakes in text and figures throughout; inserting new or revised information, where applicable; and including responses to comments received during the Draft EIS public review period in Volume II, Appendix E.

In this Final EIS, several changes were made and include the following:

- In Chapter 3, Section 3.5, Figure 3-2 was revised to correctly portray the DoD clear zone as a square and Table 3-5 was added with F-16 and F-15 historic mishap data.
- Where applicable, Section SH2.4 and Appendix B were updated to reflect current status of agency and government-to-government consultations.
- Throughout the document, corrected typographical and grammatical errors in the text.
- Responded to Revised Draft EIS comments in Volume II, updated Appendix E.

SH2.7 Documents Incorporated by Reference

In accordance with CEQ regulations for implementing NEPA and with the intent of reducing the size of this document, the following material relevant to the proposed action at the alternative locations and basing scenarios is incorporated by reference and identified according to the alternative location. These documents are part of the administrative record and are available upon request.

Proposed Modernization and Expansion of Townsend Bombing Range (TBR) (USMC 2013). Final EIS published in March 2013. Documentation to expand TBR to accommodate weapons drop zones for multiple weapon systems at the range and in associated restricted airspace and MOAs. Airspace includes the Coastal 1/2 MOAs, Restricted Airspace R-3007A/B/C/D, and overlying ATCAAs.

Sustainable Ranges Report to Congress, Department of Defense (DoD 2012). April 2012. A report to Congress on the sustainability of all DoD ranges describing the training requirements and the existing range resources to meet these requirements.

Atlantic Fleet Active Sonar Training (Navy 2012). EIS/OEIS published in May 2012. Documentation for aircraft and naval operations in all East Coast overwater Warning Areas are evaluated.

U.S. Marine Corps East Coast F-35B Basing (USMC 2010). Final EIS and Record of Decision published in October and December 2010, respectively. Documentation addressing F-35B operations (as well as existing aircraft) in overland and overwater airspace as well as at ranges in Georgia, North Carolina, and South Carolina. Airspace includes overwater Warning Areas off the coasts of Virginia, North/South Carolina, Georgia, and Florida; Coastal 1/2/4/5 and Core MOAs; Restricted Airspace R-3007A/B/C/D, and R-3606A; and overlying ATCAAs. Operations at the Dare County and Townsend Bombing Ranges were also evaluated.

Airspace Training Initiative Final EIS (Air Force 2010). Published in June 2010. Documentation associated with airspace operations in the Bull Dog, Gamecock, Poinsett Military Operations Areas, Poinsett Range, and associated restricted airspace. Includes introduction of ground-based electronic threat emitters and chaff and flare deployment.

Navy Cherry Point Range Complex Final EIS/OEIS (Navy 2009a). Record of Decision signed June 2009. Documentation for aircraft and naval operations in overwater Warning Areas adjacent to North Carolina.

Jacksonville Range Complex Final EIS/OEIS (Navy 2009b). Record of Decision signed June 2009. Documentation for aircraft and naval operations in overwater Warning Areas adjacent to the east coasts of Florida, Georgia, as well as South and North Carolina.

Navy Undersea Warfare Training Range (Navy 2009c). Record of Decision signed July 2009. Documentation for aircraft and naval operations in overwater Warning Areas adjacent to the east coasts of Florida, Georgia, as well as South and North Carolina.

Modifications to Gamecock Alpha Military Operations Area EA (Air Force 2006). Finding of No Significant Impacts signed June 2006. Documentation for airspace modification to Gamecock MOAs and airspace operations.

Shaw AFB Chaff and Flare Final EA (Air Force 2003). Published in December 2003. Evaluation of impacts associated with chaff and flare deployment in the Bulldog and Gamecock MOAs.

SH2.8 Mitigation Measures

No other extra-ordinary mitigation measures are required beyond those prescribed under existing federal and state laws, regulations, and permit requirements. Refer to Chapter 2, section 2.6.1 for a description of measures being adopted, as best management practices and management actions, to minimize and/or avoid adverse impacts.

SH3.0 SHAW AFB AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

SH3.1 Airspace Management and Use

SH3.1.1 Base

SH3.1.1.1 Affected Environment

Shaw AFB is located in the east central part of South Carolina, approximately 35 miles east of the capital city of Columbia and approximately 20 miles east of McEntire JNGB. Shaw AFB is located within the city limits of Sumter and is 10 miles west of the city's center. Currently, the 20 FW at Shaw AFB flies and maintains 72 F-16 aircraft in the largest combat F-16 unit in the Air Force.

Shaw AFB has dual runways and ramp and taxiway access. Airspace currently supporting operations at Shaw AFB includes airspace immediately surrounding the field. Shaw AFB Approach Control provides air traffic control services within this airspace for arriving and departing aircraft. A total of over 48,000 operations were conducted at Shaw AFB under baseline conditions, including over 45,000 by the based F-16s. For many decades, aircraft based at Shaw AFB have flown in a local airspace environment that includes six regional or military airfields within a 30 nm area. No comments were received during the public scoping period revealing conflict with civil or commercial aviation.

SH3.1.1.2 Environmental Consequences

Beddown of one or more F-35A operational units at Shaw AFB would decrease the number of airfield operations conducted at the base from 71 percent to 27 percent, depending on the beddown scenario (Table SH3.1-1). With the F-35As, the 20 FW would be expected to average 260 flying days annually. Combined with the overall decrease in operations, this change would also reduce daily airfield operations. This decrease would not affect airspace management and use within the local air traffic environment. No changes to the Shaw AFB 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 SH3.1-1. Comparison of ACC Scenarios – Airfield Operations

Aircraft	*Baseline*	*ACC Scenario 1*	*ACC Scenario 2*	*ACC Scenario 3*
Based F-16	45,094	0	0	0
Transients[1]	3,450	3,450	3,450	3,450
F-35A	-	10,667	21,334	32,001
Total	**48,544**	**14,117**	**24,784**	**35,451**
Percent Change from Baseline	**-**	**-70.9%**	**-48.9%**	**-26.9%**

Source: Wyle 2010.
Note: [1]Includes F-15C, KC-135, C-21, A-10, and others.

SH3.1.2 Airspace

SH3.1.2.1 Affected Environment

The affected environment for Shaw AFB consists of MOAs, ATCAAs, and Restricted Areas (refer to Table SH2.2-2 and Figure SH2.2-1) which the F-35A would use on a continuing basis for training. Currently, the F-16s fly over 9,000 annual operations in the overland airspace units. Operations would continue in the overwater Warning Areas, 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 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.

As noted in Chapter 2, Section 2.1.2, F-35A aircraft would not use military training routes, either to access the special use airspace or conduct training. Due to their predominantly higher altitude missions, advanced electronics, and speed, the F-35As would use MOAs, ATCAAs, Restricted Areas, and Warning Areas.

SH3.1.2.2 Environmental Consequences

Selection of Shaw AFB for 24, 48, or 72 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 primary and occasional use in the analyzed airspace units, nor would it alter their normally scheduled times of use. Based on an average of 260 flight training days per year, for ACC Scenario 3 (the scenario with the most airspace operations), there would be an increase in daily average operations in the Shaw AFB-managed airspace from less than 2 operations per day to less than 3 daily operations in the Coastal MOA and Townsend Range (an increase of 7 percent).

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 (National Geospatial Intelligence Agency 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 aircraft (including military 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 23,000 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 20 FW and the FAA, as these 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 Shaw AFB 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 to 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 operations, no impacts to airspace use and management would be expected.

SH3.2 Noise

This section describes the noise environment under baseline conditions and then presents the potential impacts that could occur under the three scenarios. For purposes of this Environmental Impact Statement (EIS), the noise environment at Shaw AFB was modeled using NOISEMAP. The Air Force uses 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 Zones (AICUZ) program and 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] 2010b). The military NOISEMAP-generated contours are presented here. Specific detailed information on supplemental metrics (e.g., annoyance) is presented in Appendix C.

Both Sound Exposure Level (SEL) and Maximum Sound Level (L_{max}) metrics would apply to any beddown scenario. As shown in Table SH3.2-1, the SEL and L_{max} noise levels reflect conditions specific to flight activity at Shaw AFB 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 F-16 aircraft it is replacing.

Table SH3.2-1. SEL and L_{max} Comparison for Shaw AFB								
Condition	***Based F-16C*** [1, 2]				***F-35A*** [2, 3]			
	SEL (dBA)	*L_{max} (dBA)*	*Power (%NC)*	*Speed (kts)*	*SEL (dBA)*	*L_{max} (dBA)*	*Power (%ETR)*	*Speed (kts)*
Afterburner Assisted Take-off[4] (1,000 feet AGL)	**110**	**104**	104%	300	**118**	**115**	100%	300
Military Power Take-off (1,000 feet AGL)	**110**	**104**	104%	300	**118**	**115**	100%	300
Departure Holddown (6,000 MSL, 5,758 AGL)	**73**	**64**	90%	350-400	**85**	**77**	55%	300-400
Arrival (non-break, through 1,000 feet AGL, gear down)[5]	**88**	**82**	87%	180	**99**	**95**	40%	180
Overhead Break (downwind leg, 1,800 feet AGL, gear down)	**92**	**83**	92%	200	**94**	**88**	40%	200
Low Approach and Go (downwind leg, 1,800 feet AGL, gear down)	**92**	**83**	92%	200	**94**	**88**	40%	210
Re-entry Pattern (downwind leg, 1,300 feet AGL, gear up)	**90**	**83**	92%	300	**85**	**80**	30%	300
Radar Pattern (downwind leg, 1,300 feet AGL, gear up)	**94**	**85**	92%	250	**85**	**80**	30%	250

Shaw AFB nominal elevation = 242 feet MSL; Weather: 63°F, 67% Relative Humidity; SEL = Sound Exposure Level; L_{max} = Maximum (instantaneous) Sound Level; dBA = A-weighted decibel; NC = Engine core revolutions per minute; kts = knots; ETR = Engine thrust request.

Notes: All numbers are rounded.

[1]Modeled F-16C with F110-GE-100 engine.

[2]90 percent of all F-16 departures utilize afterburners, whereas only 5 percent of F-35 departures would utilize afterburner.

[3]Modeled with reference acoustic data for an F-35A (Air Force 2009a).

[4]Power reduced from Afterburner to military power prior to reaching 1,000 feet AGL.

[5]F-16C values reflect gear up conditions.

SH3.2.1 Base

SH3.2.1.1 Affected Environment

The data used for baseline noise conditions were derived from a 2004 noise evaluation and validated by the 20 FW in 2010. Under baseline, it was determined that on average there were 48,544 airfield operations flown annually at Shaw AFB. This total includes over 45,000 operations generated by the 20 FW F-16s and an additional 3,544 operations conducted by other based and transient military aircraft. Under baseline noise conditions, almost 98 percent (48,059) of operations occurred during environmental daytime hours (i.e., 7:00 a.m. to 10:00 p.m.) and about 2 percent (485) was generated during environmental nighttime (or between 10:00 p.m. to 7:00 a.m.). A 10-decibel (dB) penalty is applied to aircraft 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 SH3.2-1 shows the 65 to 85 dB contour bands, in 5-dB increments, for Shaw AFB baseline conditions. Departures and patterns of based F-16 aircraft from Runways 04L dominate the DNL to the northeast of the base. Based F-16 departures from Runway 22R dominate the DNL to the southwest of the base. Table SH3.2-2 presents noise exposure within each dB Day-Night Average Sound Level (DNL) contour band for off base acreage, population, representative receptors, and households.

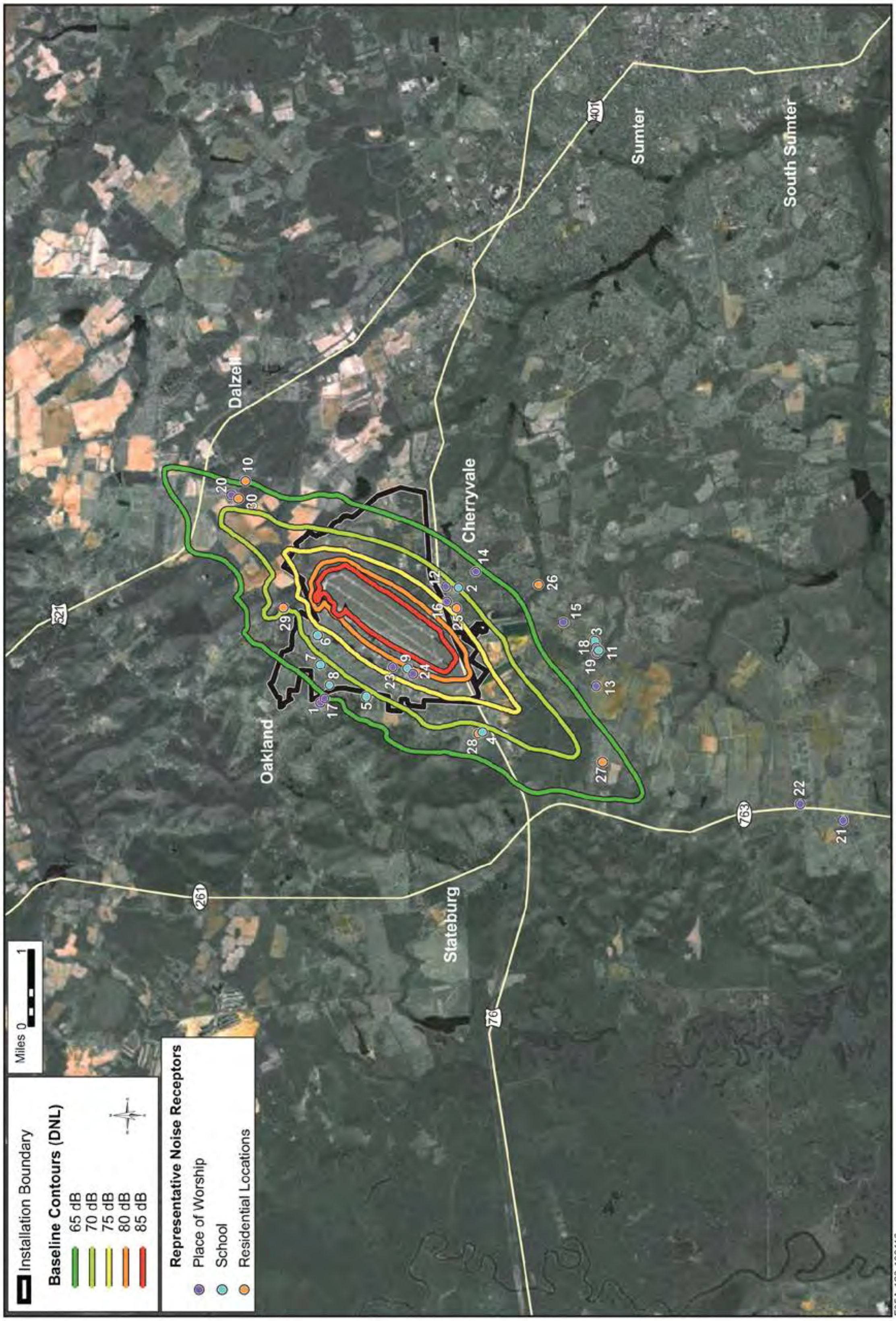

Figure SH3.2-1. Baseline Noise Conditions at Shaw AFB

Representative receptors include on- and 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 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).

Table SH3.2-2. Noise Exposure within Baseline Contours at Shaw AFB

Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*	*Receptors*[2]
65 – 70	3,464	2,415	816	10
70 – 75	1,404	1,075	357	5
75 – 80	208	276	90	3
80 - 85	7	19	5	0
85+	0	0	0	0
Total	**5,083**	**3,785**	**1,268**	**18**

Source: Wyle 2010 and U.S. Census Bureau 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]A portion of these receptors are on-base; refer to Figure SH3.2-1.

To determine the population counts by contour band, this analysis uses the U.S. Census block groups (from the American Community Survey, 5-year estimates) and assumes an even distribution of population within each block group under the respective contour band (U.S. Census Bureau 2010b).

Adopting this methodology gives a good estimate (i.e., more conservative) of the number of people who may be exposed to noise levels within the noise contour band. Where there are low or inconsistent population densities, actual houses were counted using aerial photographs (Google Earth 2013) and using the U.S. Census population multiplier for Sumter County of 2.6 people per household. Table SH3.2-2 presents noise exposure within each dB DNL contour band for off-base acreage, population, housing units, and representative receptors.

In total, exposure to noise levels within contour bands of 65 dB DNL and greater include an estimated 5,083 acres, 2,785 people, and 1,268 households. Table SH3.2-3 shows baseline decibel levels for representative receptors on and near Shaw AFB. Of the 30 total representative receptors, 20 are subject to noise levels of 65 dB DNL and greater. The 20 representative receptors include 7 schools, 7 places of worship, and 6 residential areas. Ten representative receptors are within areas subject to noise levels less than 65 dB DNL.

Table SH3.2-3. Baseline Decibel Levels at Representative Locations Near Shaw AFB

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
1	Oakland Primary School	School	<65
2	Cherryvale Elementary School	School	70
3	De Laine Elementary School	School	<65
4	Jack and Jill Nursery School	School	68
5	Central Carolina Technical College	School	69

Table SH3.2-3. Baseline Decibel Levels at Representative Locations Near Shaw AFB			
Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
6	High Hills School[1]	School	73
7	Shaw Heights Elementary School[1]	School	68
8	Child Care Center[1]	School	67
9	Education Center[1]	School	79
10	Dalzell Area	Residential	65
11	St. Michaels School	School	<65
12	Cherryvale Baptist Church	Worship	72
13	Greater Community Church	Worship	<65
14	Hickory Road Baptist Church	Worship	66
15	New Beginnings Assembly of God	Worship	<65
16	New Bethel Baptist Church	Worship	74
17	Korean American Presbyterian	Worship	65
18	Reese Chapel	Worship	<65
19	St. Michael AME Church	Worship	<65
20	Tirzah Presbyterian Church	Worship	68
21	Union Missionary Baptist Church	Worship	<65
22	Wedgefield Baptist Church	Worship	<65
23	Chapel Number 2[1]	Worship	77
24	Friendship Chapel[1]	Worship	78
25	Tiger Lane	Residential	73
26	Glen Street	Residential	<65
27	Squaw Valley Road/Shamrock Drive	Residential	68
28	Lost Creek Drive	Residential	67
29	Equinox Avenue/Dunlap Drive	Residential	71
30	Stamey Livestock Road/Frierson Road	Residential	68

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Located on Shaw AFB.

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. Baseline events per hour average 6.6 and 4.9 for windows open and closed, respectively. Since modeling accounts for outdoor noise levels only, these data are represented as NA75 L_{max} (windows closed) and NA65 L_{max} (windows open). NA means number of events above, so this analysis examined the events above 65 dB L_{max} and 75 dB L_{max}.

Table SH3.2-4. Baseline Indoor Speech Interference at Representative Locations Near Shaw AFB			
Location ID Number	*Receptor*	*Average Daily Indoor Events per Hour[1] Daytime (7:00 a.m. to 10:00 p.m.)*	
		Windows Closed	*Windows Open*
10	Dalzell Area	6	7
12	Cherryvale Baptist Church	6	7
13	Greater Community Church	5	7
14	Hickory Road Baptist Church	6	7
15	New Beginnings Assembly of God	5	6
16	New Bethel Baptist Church	6	7
17	Korean American Presbyterian	6	8
18	Reese Chapel	4	6
19	St. Michael AME Church	4	6
20	Tirzah Presbyterian Church	8	9
21	Union Missionary Baptist Church	1	1
22	Wedgefield Baptist Church	1	2
23	Chapel Number 2	6	8
24	Friendship Chapel	7	7
25	Tiger Lane	6	7
26	Glen Street	4	6
27	Squaw Valley Road/Shamrock Drive	6	7
28	Lost Creek Drive	6	7
29	Equinox Avenue/Dunlap Drive	7	8
30	Stamey Livestock Road/Frierson Road	8	9

Source: Wyle 2010 and U.S. Census Bureau 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Located on Shaw AFB.

Classroom Speech Interference

Because of the nature of activities in schools, different speech interference criteria are used. For schools, two additional classroom criteria have to be applied to evaluate if speech interference would inhibit classroom learning. When considering intermittent noise caused by aircraft overflights, guidelines for classroom interference indicate that an appropriate criterion is a limit on indoor background equivalent noise levels of 35 to 40 dB (equivalent noise level [L_{eq}]) and a limit on single events of 50 dB L_{max}. The 50 dB L_{max} for single events equates to outdoor L_{max} of 65 dB and 75 dB for windows open and closed, respectively. Thus, the number of annual average daily events whose L_{max} would be greater than or equal to 65 dB and 75 dB serve as the measure of potential classroom effects and are presented as NA65 L_{max} and NA75L_{max} for windows open and closed, respectively, on a per-hour basis. Because classrooms are in use during the day predominantly, these criteria are applied for aircraft operations occurring between 8:00 a.m. and 4:00 p.m. rather than between 7:00 a.m. and 10:00 p.m. for standard speech interference. Table SH3.2-5 presents the baseline classroom levels for the school receptors. All 10 of the schools, including the 2 on Shaw AFB, are exposed to noise levels that exceed the outdoor equivalent noise level of 60 dB L_{eq} over an 8-hour period.

Table SH3.2-5. Baseline Classroom Speech Interference for Schools Near Shaw AFB				
Location ID Number	*Receptor*	*Outdoor Equivalent Noise Level (L_{eq})*	*Number of Events Above a Maximum Outdoor Noise Level of 75 dB (NA75L_{max})*[1]	
			Windows Closed	*Windows Open*
1	Oakland Primary School	67	9	13
2	Cherryvale Elementary School	73	9	10
3	De Laine Elementary School	64	6	9
4	Jack and Jill Nursery School	72	10	10
5	Central Carolina Technical College	72	10	12
6	High Hills School[2]	77	10	13
7	Shaw Heights Elementary School[2]	72	11	12
8	Child Care Center[2]	71	10	13
9	Education Center[2]	83	10	11
11	St. Michaels School	65	5	9

Source: Wyle 2010 and U.S. Census Bureau 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Located on Shaw AFB.

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 SH3.2-6 lists the probabilities of indoor awakening from average daily nighttime (10:00 p.m. to 7:00 a.m.) events for the same representative residential locations, with probability of awakening ranging between 1 and 4 percent with windows closed and 3 and 6 percent with windows open.

Table SH3.2-6. Baseline Indoor Sleep Disturbance at Representative Locations Near Shaw AFB			
Location ID Number	*Receptor*	*Average Nightly (10:00 p.m. to 7:00 a.m.) Probability of Awakening (%)*[1]	
		Windows Closed	*Windows Open*
10	Dalzell Area	3%	4%
25	Tiger Lane	2%	4%
26	Glen Street	1%	3%
27	Squaw Valley Road/Shamrock Drive	3%	4%
28	Lost Creek Drive	3%	5%
29	Equinox Avenue/Dunlap Drive	3%	6%
30	Stamey Livestock Road/Frierson Road	4%	6%

Source: Wyle 2010 and U.S. Census Bureau 2010b.
Note: [1]Assumed 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 under noise contours greater than 80 dB DNL. Under baseline conditions, there are no residential areas on or adjacent to Shaw AFB 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 Shaw AFB. 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 analyses.

SH3.2.1.2 Environmental Consequences

ACC Scenario 1

Noise Exposure

ACC Scenario 1 involves beddown of 24 F-35A aircraft at Shaw AFB and drawdown of 72 F-16s. Proposed F-35A flight operations would total 10,667 annually. About two-thirds of these proposed operations would consist of departures and arrivals; the remaining one-third would involve pattern work in the vicinity of the airfield. F-35A flight operations, when added to other based and transient military aircraft (3,544 operations) would represent an annual 71 percent decrease from baseline. Figure SH3.2-2 depicts the noise contour bands, in 5-dB increments, resulting from ACC Scenario 1 at Shaw AFB. Baseline contours are also presented for comparison purposes.

Noise exposure in terms of estimated off-base acreage, population, households, and on- and off-base representative receptors is presented in Table SH3.2-7. When compared to baseline conditions, ACC Scenario 1 noise levels of 65 dB DNL and greater would affect 2,094 less acres, 2,165 fewer people, 730 less households, and 9 fewer receptors.

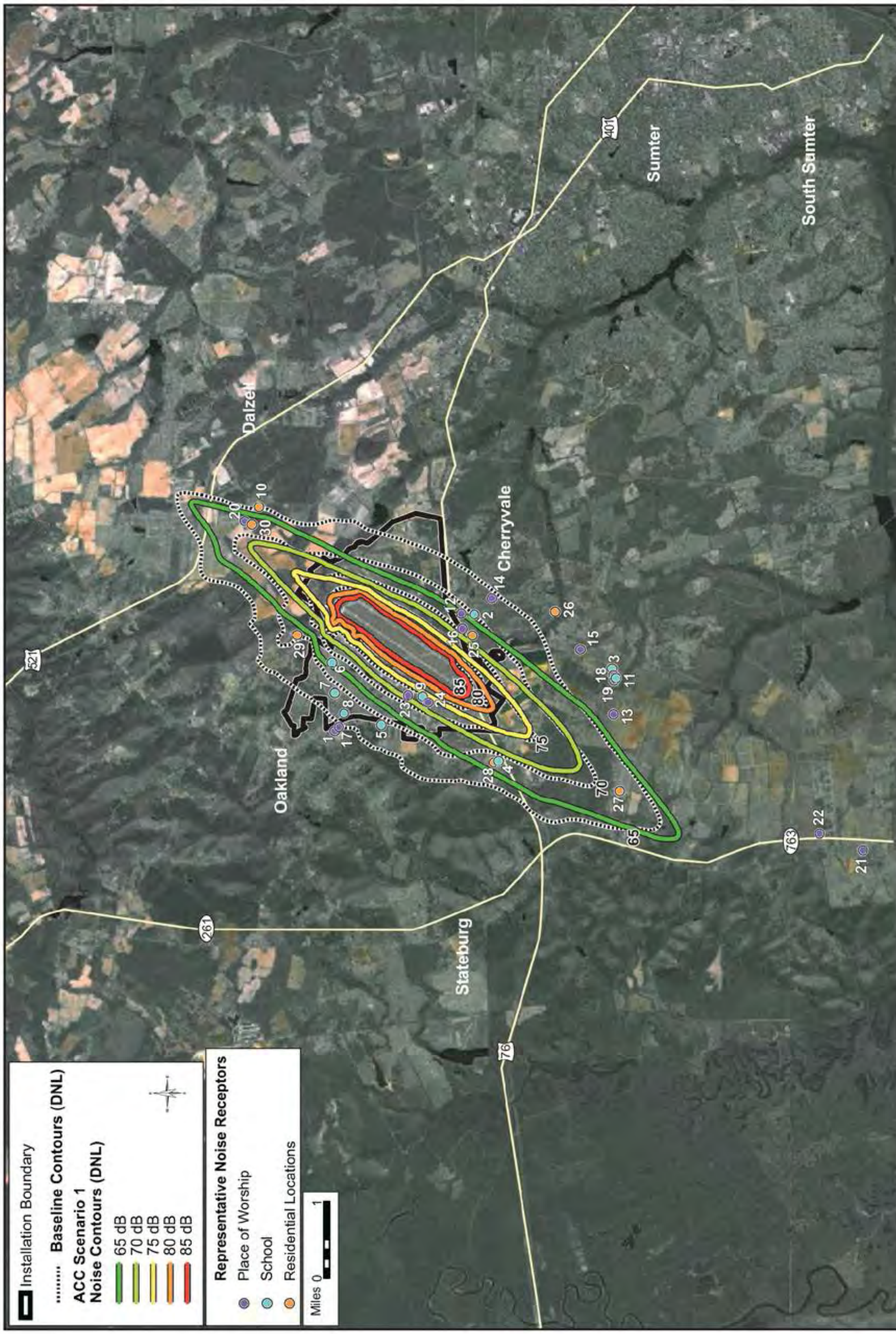

Figure SH3.2-2. ACC Scenario 1 Proposed Noise Contour Bands at Shaw AFB

Table SH3.2-7. Noise Exposure under ACC Scenario 1 for Shaw AFB Proposed/Baseline				
Contour Band (dB DNL)[1]	*Acreage*	*Population*	*Households*	*Receptors*[2]
65 – 70	2,176/3,464	1,119/2,415	381/816	8/11
70 – 75	701/1,404	407/1,075	131/357	3/6
75 – 80	112/208	78/276	22/90	0/3
80 – 85	0/7	16/19	4/5	0/0
85+	0/0	0/0	0/0	0/0
Total	**2,989/5,083**	**1,620/3,785**	**538/1,268**	**11/20**

Source: Wyle 2011, U.S. Census Bureau 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]A portion of these receptors are on-base; refer to Figure SH3.2-2.

Overall, the DNL contours would decrease relative to baseline by 1 to 7 dB except to the southwest of the base where the 65 dB DNL contours would extend further than the Baseline 65 dB DNL contour by approximately 1,800 feet. The most noticeable off-base reduction would be the general narrowing of the contours because the 24 F-35A would generate 78 percent fewer equivalent annual flight operations[1] than the based F-16 aircraft with most of the reduction in closed pattern operations. The second most noticeable feature of the DNL contours is that they increase more to the southwest than their increase to the northeast because 75 percent of the departures would continue to be from Runway 22 and because the F-35A is substantially nosier (by approximately 8 dB) than the F-16 on a single departure event basis. With the elimination of 24 F-16, departures generated by 24 F-35A aircraft from Runways 04L and 22R would dominate the DNL northeast and southwest of the base, respectively.

Decibel levels for representative receptors on and near Shaw AFB are provided in Table SH3.2-8. Under ACC Scenario 1, the reduced number of operations likewise reduces the number of receptors affected by 65 dB DNL or greater. As such, of the 20 exposed to noise levels 65 dB DNL and greater under baseline condition, 19 would experience reductions and 1 (#27) would remain the same at 68 dB DNL. Under ACC Scenario 1 there would be 11 representative receptors exposed to noise levels 65 dB DNL and greater, they include 3 schools (a reduction of 4 when compared to baseline), 5 places of worship (a reduction of 2), and 3 residential areas (3 less than baseline). Nineteen representative receptors would be exposed to noise levels less than 65 dB DNL under ACC Scenario 1.

[1] Equivalent annual flight operations equal daytime (7:00 a.m. to 10:00 p.m.) flight operations plus ten times the nighttime (10:00 p.m. to 7:00 a.m.) flight operations.

Table SH3.2-8. Decibel Levels under ACC Scenario 1 at Representative Locations near Shaw AFB Proposed/Baseline			
Location ID Number	***Receptor***	***Type***	***Decibel Level (dB DNL)***
1	Oakland Primary School	School	<65/<65
2	Cherryvale Elementary School	School	<65/70
3	De Laine Elementary School	School	<65/<65
4	Jack and Jill Nursery School	School	67/68
5	Central Carolina Technical College	School	<65/69
6	High Hills School[1]	School	66/73
7	Shaw Heights Elementary School[1]	School	<65/68
8	Child Care Center[1]	School	<65/67
9	Education Center[1]	School	74/79
10	Dalzell Area	Residential	<65/65
11	St. Michaels School	School	<65/<65
12	Cherryvale Baptist Church	Worship	65/72
13	Greater Community Church	Worship	<65/<65
14	Hickory Road Baptist Church	Worship	<65/66
15	New Beginnings Assembly of God	Worship	<65/<65
16	New Bethel Baptist Church	Worship	68/74
17	Korean American Presbyterian	Worship	<65/65
18	Reese Chapel	Worship	<65/<65
19	St. Michael AME Church	Worship	<65/<65
20	Tirzah Presbyterian Church	Worship	67/68
21	Union Missionary Baptist Church	Worship	<65/<65
22	Wedgefield Baptist Church	Worship	<65/<65
23	Chapel Number 2[1]	Worship	71/77
24	Friendship Chapel[1]	Worship	73/78
25	Tiger Lane	Residential	68/73
26	Glen Street	Residential	<65/<65
27	Squaw Valley Road/Shamrock Drive	Residential	68/68
28	Lost Creek Drive	Residential	66/67
29	Equinox Avenue/Dunlap Drive	Residential	<65/71
30	Stamey Livestock Road/Frierson Road	Residential	67/68

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Located on Shaw AFB.

Speech Interference

In terms of speech interference, Table SH3.2-9 enumerates the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour for receptors that generally would experience indoor maximum sound levels of at least 50 dB with windows closed and open. Under this scenario, the number of speech interfering events hour, across all receptors with windows closed, would range between 6 and 3 fewer events per hour than under baseline. With windows open, interfering events would also decrease and range between 1 and 6 fewer per hour when compared to baseline.

Table SH3.2-9. ACC Scenario 1 Indoor Speech Interference at Representative Locations at Shaw AFB					
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
10	Dalzell Area	2	2	-4	-5
12	Cherryvale Baptist Church	2	2	-4	-5
13	Greater Community Church	1	2	-4	-5
14	Hickory Road Baptist Church	2	2	-4	-5
15	New Beginnings Assembly of God	1	2	-4	-4
16	New Bethel Baptist Church	2	3	-4	-4
17	Korean American Presbyterian	2	2	-4	-6
18	Reese Chapel	1	2	-3	-4
19	St. Michael AME Church	1	2	-3	-4
20	Tirzah Presbyterian Church	2	3	-6	-6
21	Union Missionary Baptist Church	1	1	0	0
22	Wedgefield Baptist Church	1	1	0	-1
23	Chapel Number 2[2]	2	3	-4	-5
24	Friendship Chapel[2]	2	3	-5	-4
25	Tiger Lane	2	2	-4	-5
26	Glen Street	1	2	-3	-4
27	Squaw Valley Road/Shamrock Drive	2	2	-4	-5
28	Lost Creek Drive	2	2	-4	-5
29	Equinox Avenue/Dunlap Drive	2	3	-5	-5
30	Stamey Livestock Road/Frierson Road	2	3	-6	-6

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed). [2]Located on Shaw AFB.

Classroom Speech Interference

Table SH3.2-10 presents potential speech interference impacts for classrooms under ACC Scenario 1. Under this scenario, L_{eq} noise levels decrease for 10 schools and 1 remains the same; all would still exceed the L_{eq} of 60 dB. No schools would experience an increase in L_{eq} noise levels. Similarly, the number of events decreases in every case.

Table SH3.2-10. ACC Scenario 1 Classroom Speech Interference for Schools near Shaw AFB				
Location ID Number	*Receptor*	*Outdoor Equivalent Noise Level (L_{eq})*	*Number of Events Above a Maximum Outdoor Noise Level of 75 dB ($NA75L_{max}$)*[1]	
			Windows Closed	*Windows Open*
1	Oakland Primary School	60	3	3
2	Cherryvale Elementary School	67	3	3
3	De Laine Elementary School	63	2	3
4	Jack and Jill Nursery School	71	3	3
5	Central Carolina Technical College	66	3	4
6	High Hills School[1]	69	3	4
7	Shaw Heights Elementary School[1]	64	3	4
8	Child Care Center[1]	62	3	4
9	Education Center[1]	77	3	4
11	St. Michaels School	64	2	3

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Located on Shaw AFB.

Sleep Disturbance

Table SH3.2-11 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 2 percent. All residential areas would experience a decrease in the probability of awakenings, with probabilities declining by 1 to 5 percent.

Table SH3.2-11. ACC Scenario 1 Indoor Sleep Disturbance at Representative Locations at Shaw AFB

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
10	Dalzell Area	1%	1%	-2%	-3%
25	Tiger Lane	1%	1%	-1%	-3%
26	Glen Street	0%	1%	-1%	-2%
27	Squaw Valley Road/Shamrock Drive	1%	1%	-2%	-3%
28	Lost Creek Drive	1%	1%	-2%	-4%
29	Equinox Avenue/Dunlap Drive	1%	1%	-2%	-5%
30	Stamey Livestock Road/Frierson Road	1%	1%	-3%	-5%

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

Under ACC Scenario 1, no residential areas on or adjacent to Shaw AFB would be exposed to noise levels of 80 dB DNL and greater. Therefore, PHL is not an issue for ACC Scenario 2.

Occupational Noise

Current Air Force occupational noise exposure prevention procedures such as hearing protection and monitoring would be implemented under this scenario and comply with all applicable OSHA and Air Force occupational noise exposure regulations.

ACC Scenario 2

Noise Exposure

ACC Scenario 2 would involve beddown of 48 F-35A aircraft at Shaw AFB and drawdown of 72 F-16s. Proposed F-35A flight operations would total 21,334 annually. About two-thirds of these proposed operations would consist of departures and arrivals; the remaining one-third would involve closed pattern work in the vicinity of the airport. Proposed F-35A annual operations, when added to other military based and transient aircraft (3,544 total operations), would represent a 49 percent decrease from baseline.

Figure SH3.2-3 shows the 65 to 85 dB DNL contour bands for ACC Scenario 2. Baseline contours are also presented for comparison purposes. Table SH3.2-12 presents the noise exposure in terms of estimated off-base acreage, population, households, and on- and off-base representative receptors within each 5-dB DNL contour band. When compared to baseline conditions, ACC Scenario 2 noise levels of 65 dB

DNL and greater would affect 608 additional acres but 1,002 fewer people, 338 less households, and 3 less representative receptors.

Table SH3.2-12. Noise Exposure under ACC Scenario 2 for Shaw AFB Proposed/Baseline				
Contour Band (dB DNL)[1]	***Acreage***	***Population***	***Households***	***Receptors***[2]
65 – 70	3,909/3,464	1,732/2,415	584/816	10/11
70 – 75	1,389/1,404	801/1,075	273/357	4/6
75 – 80	362/208	209/276	63/90	3/3
80 – 85	31/7	41/19	11/5	0/2
85+	0/0	0/0	0/0	0/0
Total	**5,691/5,083**	**2,783/3,785**	**930/1,268**	**17/20**

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]A portion of these receptors are on-base; refer to Figure SH3.2-3.

Overall, the area encompassed by DNL contours 65 dB and greater would increase relative to baseline by approximately 1 to 3 dB. The 65 dB DNL contours would extend nearly 2 miles further to the southwest and approximately 0.5 miles further to the northeast compared to the extents of the 65 dB DNL contour under baseline conditions. The narrowing of the contours is due to the 48 F-35A aircraft generating 57 percent fewer equivalent annual flight operations than the based F-16 aircraft with most of the reduction in closed pattern operations. The second most noticeable feature of the DNL contours is that they increase more to the southwest than they increase to the northeast because 75 percent of the departures would continue to be from Runway 22 and because the F-35A is substantially noisier (by approximately 8 dB) than the F-16 on a single departure event basis. With the elimination of 72 F-16, departures generated by 48 F-35A aircraft from Runways 04L and 22R would dominate the DNL northeast and southwest of the base, respectively.

Table SH3.2-13 shows representative receptors by name, type, and decibel level compared to baseline conditions. Of the 20 exposed to noise levels 65 dB DNL and greater under baseline conditions, 17 would experience noise levels 65 dB DNL and greater; for 10 receptors there would be reductions in noise levels and for the other seven there would be increases of 1 to 2 dB DNL. Under ACC Scenario 2, of the 17 receptors exposed to noise levels 65 dB DNL and greater, 5 are schools (a reduction of 2 when compared to baseline), 6 places of worship (a reduction of 1), and 6 residential areas (no change from baseline).

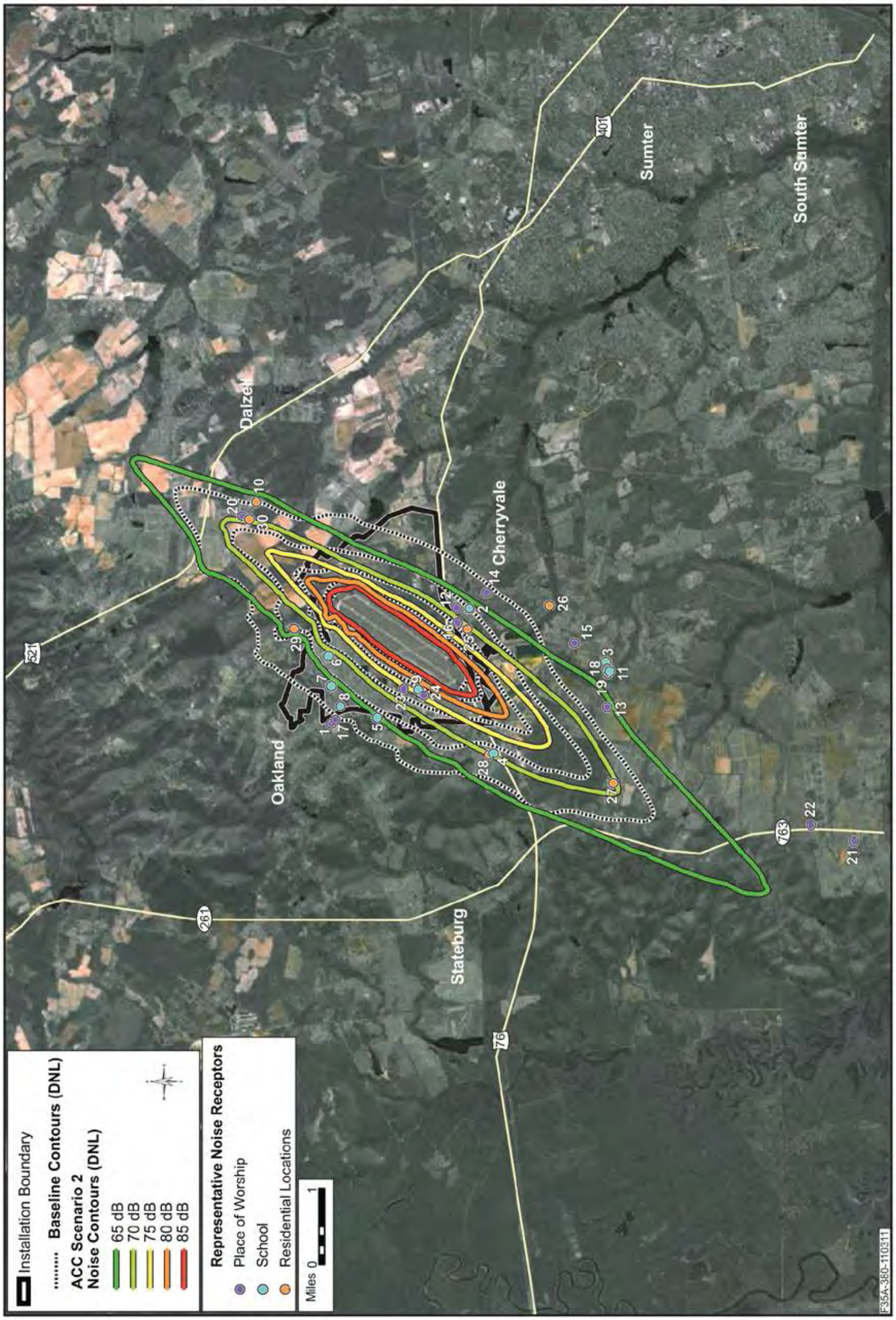

Figure SH3.2-3. ACC Scenario 2 Proposed Noise Contour Bands at Shaw AFB

Table SH3.2-13. Decibel Levels under ACC Scenario 2 at Representative Locations near Shaw AFB Proposed/Baseline			
Location ID Number	***Receptor***	***Type***	***Decibel Level (dB DNL)***
1	Oakland Primary School	School	<65/<65
2	Cherryvale Elementary School	School	67/70
3	De Laine Elementary School	School	<65/<65
4	Jack and Jill Nursery School	School	70/68
5	Central Carolina Technical College	School	65/69
6	High Hills School[1]	School	69/73
7	Shaw Heights Elementary School[1]	School	<65/68
8	Child Care Center[1]	School	<65/67
9	Education Center[1]	School	77/79
10	Dalzell Area	Residential	66/65
11	St. Michaels School	School	<65/<65
12	Cherryvale Baptist Church	Worship	68/72
13	Greater Community Church	Worship	66/<65
14	Hickory Road Baptist Church	Worship	<65/66
15	New Beginnings Assembly of God	Worship	<65/<65
16	New Bethel Baptist Church	Worship	71/74
17	Korean American Presbyterian	Worship	<65/65
18	Reese Chapel	Worship	<65/<65
19	St. Michael AME Church	Worship	<65/<65
20	Tirzah Presbyterian Church	Worship	69/68
21	Union Missionary Baptist Church	Worship	<65/<65
22	Wedgefield Baptist Church	Worship	<65/<65
23	Chapel Number 2[1]	Worship	74/77
24	Friendship Chapel[1]	Worship	76/78
25	Tiger Lane	Residential	70/73
26	Glen Street	Residential	<65/<65
27	Squaw Valley Road/Shamrock Drive	Residential	70/68
28	Lost Creek Drive	Residential	69/67
29	Equinox Avenue/Dunlap Drive	Residential	66/71
30	Stamey Livestock Road/Frierson Road	Residential	69/68

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Located on Shaw AFB.

Speech Interference

In terms of speech interference, Table SH3.2-14 enumerates the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour for representative receptors which generally would have indoor maximum sound levels of at least 50 dB with windows closed and open. With the exception of two locations, the number of speech interfering events would either remain similar to baseline conditions or decrease. For site #21, there would be 1 event more per hour with windows open and for site #22 there would be an increase of 1 event with windows closed.

Table SH3.2-14. ACC Scenario 2 Indoor Speech Interference at Representative Locations at Shaw AFB					
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
10	Dalzell Area				
12	Cherryvale Baptist Church	3	5	-3	-2
13	Greater Community Church	3	3	-2	-4
14	Hickory Road Baptist Church	3	4	-3	-3
15	New Beginnings Assembly of God	3	3	-2	-3
16	New Bethel Baptist Church	3	5	-3	-2
17	Korean American Presbyterian	4	4	-2	-4
18	Reese Chapel	2	3	-2	-3
19	St. Michael AME Church	2	3	-2	-3
20	Tirzah Presbyterian Church	4	5	-4	-4
21	Union Missionary Baptist Church	1	2	0	+1
22	Wedgefield Baptist Church	2	2	+1	0
23	Chapel Number 2[2]	4	5	-2	-3
24	Friendship Chapel[2]	4	5	-3	-2
25	Tiger Lane	3	4	-3	-3
26	Glen Street	3	3	-1	-3
27	Squaw Valley Road/Shamrock Drive	3	3	-3	-4
28	Lost Creek Drive	3	4	-3	-3
29	Equinox Avenue/Dunlap Drive	5	5	-2	-3
30	Stamey Livestock Road/Frierson Road	4	5	-4	-4

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Located on Shaw AFB.

Classroom Speech Interference

Table SH3.2-15 presents the potential speech interference impacts for classrooms under ACC Scenario 2. Relative to baseline conditions, L_{eq} noise levels would increase for three schools: by 3 dB L_{eq} at De Laine Elementary and by 2 dB L_{eq} at Jack and Jill Nursery and St. Michaels Schools. All other schools would be subject to no change or decreases. In terms of speech interference events, there would be decreases experienced by all schools with windows either open or closed.

Table SH3.2-15. ACC Scenario 2 Classroom Speech Interference for Schools near Shaw AFB				
Location ID Number	*Receptor*	*Outdoor Equivalent Noise Level (L_{eq})*	*Number of Events Above a Maximum Outdoor Noise Level of 75 dB ($NA75L_{max}$)[1]*	
			Windows Closed	*Windows Open*
1	Oakland Primary School	63	5	6
2	Cherryvale Elementary School	70	5	6
3	De Laine Elementary School	66	3	5
4	Jack and Jill Nursery School	74	5	5
5	Central Carolina Technical College	68	6	7
6	High Hills School[2]	72	6	7
7	Shaw Heights Elementary School[2]	67	6	7
8	Child Care Center[2]	65	6	7
9	Education Center[2]	80	7	7
11	St. Michaels School	67	3	5

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Located on Shaw AFB.

Sleep Disturbance

Table SH3.2-16 lists the probabilities of indoor awakening events for receptors, during daily average environmental nighttime hours, with windows closed and open. Under ACC Scenario 2, the percentage probability of awakening would range between 0 and 4 percent with windows closed and opened, respectively. All residential areas would experience a decrease in probability from baseline, except for no change with windows closed at Glen Street.

Table SH3.2-16. ACC Scenario 2 Indoor Sleep Disturbance at Representative Locations at Shaw AFB					
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
10	Dalzell Area	1%	2%	-2%	-2%
25	Tiger Lane	1%	2%	-1%	-2%
26	Glen Street	1%	1%	0%	-2%
27	Squaw Valley Road/Shamrock Drive	1%	2%	-2%	-2%
28	Lost Creek Drive	1%	2%	-2%	-3%
29	Equinox Avenue/Dunlap Drive	1%	2%	-2%	-4%
30	Stamey Livestock Road/Frierson Road	1%	2%	-3%	-4%

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

Under ACC Scenario 2, no residential areas on or adjacent to Shaw AFB are exposed to noise levels of 80 dB DNL and greater. Therefore, PHL is not an issue for this scenario.

Occupational Noise

Air Force occupational noise exposure prevention procedures such as hearing protection and monitoring would continue to be implemented under this scenario. These procedures would assure compliance with all applicable OSHA and Air Force occupational noise exposure regulations.

ACC Scenario 3

Noise Exposure

ACC Scenario 3 would beddown 72 F-35A aircraft at Shaw AFB and drawdown 72 F-16s. Proposed F-35A operations would average 32,001 annually. About two-thirds of these proposed operations would consist of departures and arrivals; the remaining one-third would involve pattern work in the vicinity of the airfield. Total annual F-35A operations generated by the 20 FW, in addition to other based and transient military aircraft (3,544 total operations), would represent a 27-percent decrease from baseline.

Figure SH3.2-4 shows noise contour bands proposed for ACC Scenario 3. Baseline contours are also presented for comparison purposes. Table SH3.2-17 presents noise exposure in terms of estimated off-base acreage, population, housing units, and on- and off-base representative receptors within each 5-dB DNL contour band. When compared to baseline conditions, ACC Scenario 3 noise levels of 65 dB DNL and greater would affect 3,151 additional acres and 3 more receptors, but 24 fewer people and 2 less households.

Table SH3.2-17. Off-Base Noise Exposure under ACC Scenario 3 for Shaw AFB Proposed/Baseline

Contour Band (DNL, dB)[1]	*Acreage*	*Population*	*Households*	*Receptors*[2]
65 – 70	5,531/3,464	2,267/2,415	771/816	11/11
70 – 75	2,001/1,404	1,068/1,075	364/357	9/6
75 – 80	618/208	345/276	109/90	3/3
80 – 85	84/7	68/19	19/5	0/0
85+	0/0	13/0	3/0	0/0
Total	**8,234/5,083**	**3,761/3,785**	**1,266/1,268**	**23/20**

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Exclusive of upper bound for all bands.
[2]A portion of these receptors are on-base; refer to Figure SH3.2-4.

Overall, the DNL contours would increase relative to baseline by approximately 5 dB with a narrowing of the contours up to 3 dB. The 65 dB DNL contours would extend nearly 1.5 miles further to the southwest and approximately 3 miles further to the northeast compared to the extents of the 65 dB DNL contours for baseline conditions. The narrowing of the contours would be due to the 72 F-35A aircraft generating 35 percent fewer equivalent annual flight operations than the based F-16 aircraft with the most of the reduction in closed pattern operations. The second most noticeable feature of the DNL contours is that they increase more to the southwest than they increase to the northeast because 75 percent of the departures would continue to be from Runway 22 and because the F-35A is substantially noisier (by approximately 8 dB) than the F-16 on a single departure event basis. With the elimination of 24 F-16 aircraft, departures generated by 72 F-35A aircraft from Runways 04L and 22R would dominate the DNL northeast and southwest of the base, respectively.

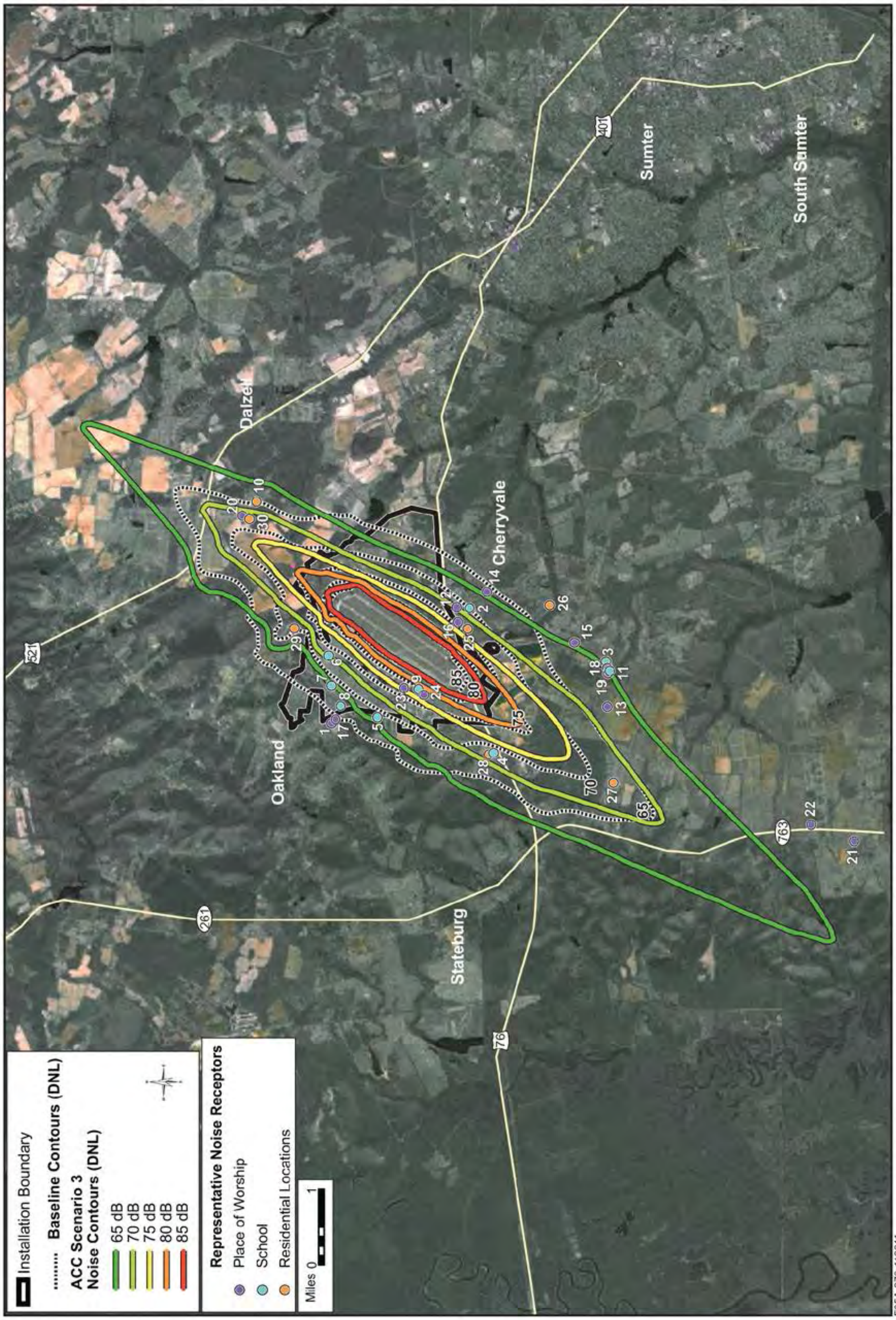

Figure SH3.2-4. ACC Scenario 3 Proposed Noise Contour Bands at Shaw AFB

Table SH3.2-18 shows representative receptors by name, type, and decibel level under ACC Scenario 3. When compared to baseline, there would be an increase of three receptors (23) exposed to noise levels 65 dB DNL and greater. Of these 23, four receptors (one school, two places of worship, and one residence) would experience no perceptible changes in noise levels when compared to baseline; ten receptors (five schools, three places of worship, and two residences) would experience decreases of 1 to 3 dB in noise levels; 12 receptors would experience increases of 2 to 4 dB in noise levels (three schools, five places of worship, and four residences); and for the four others there would be either decreases in noise levels to below 65 dB DNL or remain the same (#24).

Table SH3.2-18. Decibel Levels under ACC Scenario 3 at Representative Locations near Shaw AFB Proposed/Baseline

Location ID Number	*Receptor*	*Type*	*Decibel Level (dB DNL)*
1	Oakland Primary School	School	<65/<65
2	Cherryvale Elementary School	School	68/70
3	De Laine Elementary School	School	65/<65
4	Jack and Jill Nursery School	School	72/68
5	Central Carolina Technical College	School	67/69
6	High Hills School[1]	School	71/73
7	Shaw Heights Elementary School[1]	School	65/68
8	Child Care Center[1]	School	<65/67
9	Education Center[1]	School	78/79
10	Dalzell Area	Residential	68/65
11	St. Michaels School	School	65/<65
12	Cherryvale Baptist Church	Worship	70/72
13	Greater Community Church	Worship	68/<65
14	Hickory Road Baptist Church	Worship	<65/66
15	New Beginnings Assembly of God	Worship	65/<65
16	New Bethel Baptist Church	Worship	72/74
17	Korean American Presbyterian	Worship	<65/65
18	Reese Chapel	Worship	65/<65
19	St. Michael AME Church	Worship	65/<65
20	Tirzah Presbyterian Church	Worship	71/68
21	Union Missionary Baptist Church	Worship	<65/<65
22	Wedgefield Baptist Church	Worship	<65/<65
23	Chapel Number 2[1]	Worship	76/77
24	Friendship Chapel[1]	Worship	78/78
25	Tiger Lane	Residential	72/73
26	Glen Street	Residential	<65/<65
27	Squaw Valley Road/Shamrock Drive	Residential	72/68
28	Lost Creek Drive	Residential	71/67
29	Equinox Avenue/Dunlap Drive	Residential	68/71
30	Stamey Livestock Road/Frierson Road	Residential	71/68

Source: Wyle 2011 and U.S. Census Bureau 2010b. *Note:* [1]Located on Shaw AFB.

Speech Interference

In terms of speech interference, Table SH3.2-19 presents the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour for the representative receptors (which generally would have indoor maximum sound levels of at least 50 dB) with windows closed and open. Under ACC Scenario 3, almost all representative locations would either experience a decrease in or no change to the number of speech interfering events when compared to baseline. Only two locations, numbers 21 and 22, would experience increases—two more events per hour with windows open and one more per hour with windows closed.

Table SH3.2-19. ACC Scenario 3 Indoor Speech Interference at Representative Locations at Shaw AFB

Location ID Number	*Receptor*	*Average Daily Indoor Events per Hour[1] Daytime (7:00 a.m. to 10:00 p.m.)*			
		Windows Closed	*Windows Open*	*Change from Baseline*	
				Windows Closed	*Windows Open*
10	Dalzell Area	3	4	-3	-3
12	Cherryvale Baptist Church	5	7	-1	0
13	Greater Community Church	4	5	-1	-2
14	Hickory Road Baptist Church	4	6	-2	-1
15	New Beginnings Assembly of God	4	5	-1	-1
16	New Bethel Baptist Church	5	7	-1	0
17	Korean American Presbyterian	5	6	-1	-2
18	Reese Chapel	3	5	-1	-1
19	St. Michael AME Church	3	5	-1	-1
20	Tirzah Presbyterian Church	6	7	-2	-2
21	Union Missionary Baptist Church	2	3	+1	+2
22	Wedgefield Baptist Church	2	4	+1	+2
23	Chapel Number 2[2]	6	7	0	-1
24	Friendship Chapel[2]	6	7	-1	0
25	Tiger Lane	5	7	-1	0
26	Glen Street	4	5	0	-1
27	Squaw Valley Road/Shamrock Drive	4	5	-2	-2
28	Lost Creek Drive	5	5	-1	-2
29	Equinox Avenue/Dunlap Drive	7	7	0	-1
30	Stamey Livestock Road/Frierson Road	6	7	-2	-2

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Located on Shaw AFB.

Classroom Speech Interference

Table SH3.2-20 presents the potential speech interference impacts for classrooms under ACC Scenario 3. Under this scenario, noise levels at all 10 schools would exceed the equivalent outdoor noise level criteria but would not differ appreciably from baseline conditions. Relative to baseline conditions, the speech interfering events would decrease in all cases.

Table SH3.2-20. ACC Scenario 3 Classroom Speech Interference for Schools near Shaw AFB				
Location ID Number	***Receptor***	***Outdoor Equivalent Noise Level (L_{eq})***	***Number of Events Above a Maximum Outdoor Noise Level of 75 dB ($NA75L_{max}$)[1]***	
			Windows Closed	*Windows Open*
1	Oakland Primary School	64	8	9
2	Cherryvale Elementary School	72	7	9
3	De Laine Elementary School	68	4	7
4	Jack and Jill Nursery School	75	8	8
5	Central Carolina Technical College	70	8	10
6	High Hills School[2]	74	9	11
7	Shaw Heights Elementary School[2]	68	9	11
8	Child Care Center[2]	67	9	10
9	Education Center[2]	82	8	11
11	St. Michaels School	69	4	7

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Notes:
[1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).
[2]Located on Shaw AFB.

Sleep Disturbance

Table SH3.2-21 lists the probabilities of indoor awakening events for receptors, during daily average environmental nighttime hours, with windows closed and open. Under ACC Scenario 3, the percentage awakening would range between 1 and 3 percent with windows closed and open. All locations would either experience decreases or no change in the probability of awakenings.

Table SH3.2-21. ACC Scenario 3 Indoor Sleep Disturbance at Representative Locations at Shaw AFB					
Location ID Number	***Receptor***	***Average Nightly (10:00 p.m. to 7:00 a.m.)[1] Probability of Awakening (%)***			
		Windows Closed	*Windows Open*	*Change from Baseline*	
				Windows Closed	Windows Open
10	Dalzell Area	1%	2%	0%	-2%
25	Tiger Lane	2%	1%	0%	-1%
26	Glen Street	1%	1%	0%	-2%
27	Squaw Valley Road/Shamrock Drive	2%	3%	-1%	-1%
28	Lost Creek Drive	1%	2%	-2%	-3%
29	Equinox Avenue/Dunlap Drive	2%	2%	-1%	-4%
30	Stamey Livestock Road/Frierson Road	2%	3%	-2%	-3%

Source: Wyle 2011 and U.S. Census Bureau 2010b.
Note: [1]Assumed a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Potential for Hearing Loss

Under ACC Scenario 3, no residential areas on or adjacent to Shaw AFB would be exposed to noise levels of 80 dB DNL. Therefore, PHL is not an issue for this scenario.

Occupational Noise

Current Air Force occupational noise exposure prevention procedures such as hearing protection and monitoring would be implemented under this scenario and comply with all applicable OSHA and Air Force occupational noise regulations.

SH3.2.2 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 Shaw AFB beddown scenarios include airspace units throughout North Carolina, South Carolina, and Georgia. Proposed training activities would result from the replacement of F-16s with F-35As. As noted in section SH3.1, the 20 FW would operate the F-35As within existing MOA, overlying ATCAA, Warning Areas, restricted airspace, and ranges, performing similar types of combat training missions as currently flown. The noise analysis accounts for both subsonic noise and sonic booms in airspace authorized for supersonic flight. Subsonic noise is quantified by 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 ground (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 SH3.6 (Terrestrial Communities) for a discussion of noise impacts to wildlife.

SH3.2.2.1 Affected Environment

Subsonic Noise

Figure SH3.2-5 presents the baseline noise levels in Onset-Rate Adjusted Day-Night Average Sound Level (L_{dnmr}) for each of the airspace blocks proposed for use. Baseline levels for Gamecock, Coastal Townsend, Bulldog, and Avon Park are well below 65 dB DNL. At Poinsett, noise levels are 68 dB DNL.

Supersonic Noise

All supersonic flight is conducted more than 15 nautical miles (nm) away from land in the overwater Warning Areas. The 20 FW F-16s fly supersonic about 30 percent of total air combat training. These F-16 aircraft fly 20 percent of their supersonic events between 10,000 and 30,000 feet MSL, and 80 percent above 30,000 feet MSL. Since supersonic flight occurs in the Warning Areas, no detailed analysis was performed per Section 3.1.3.

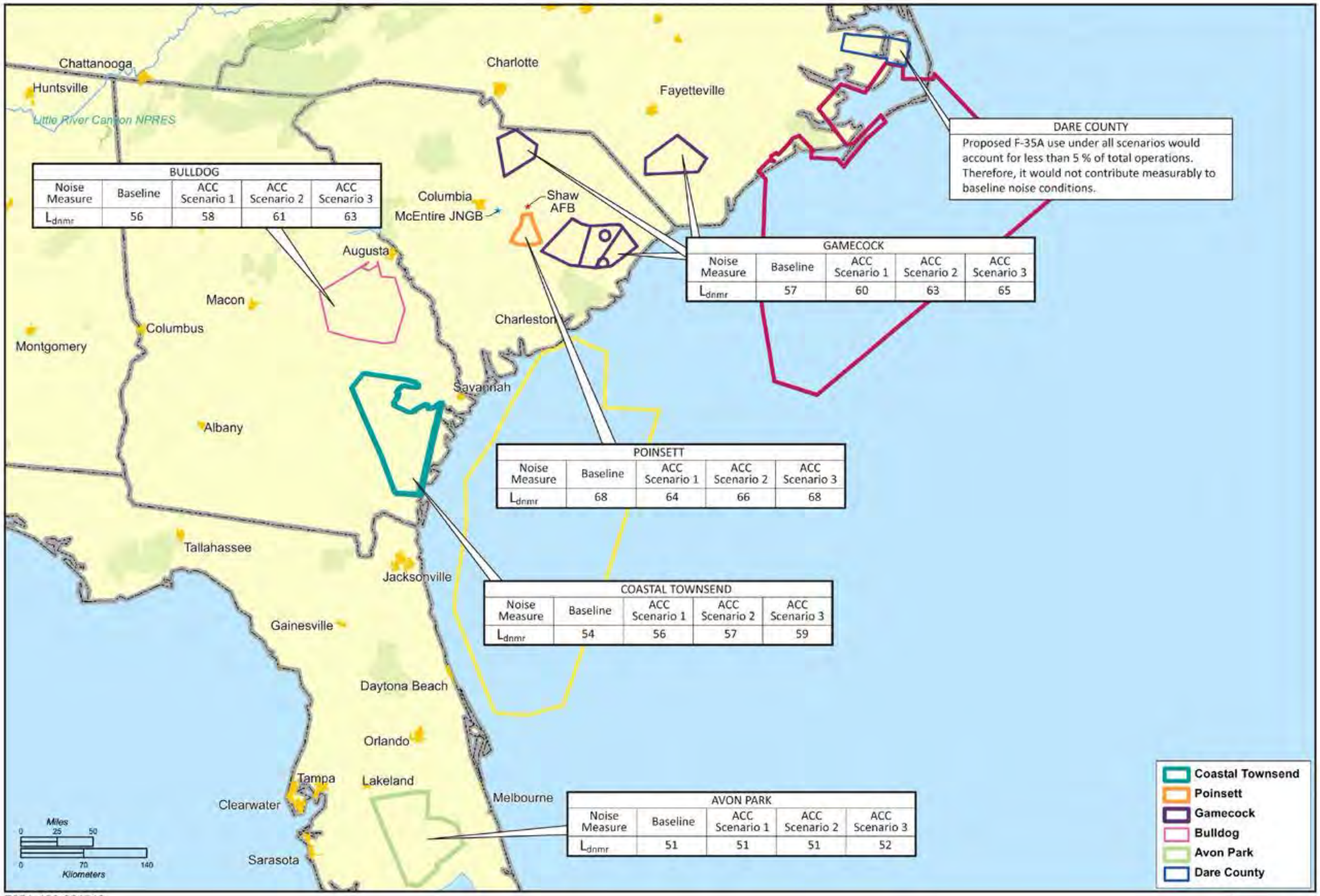

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Figure SH3.2-5. Baseline and Proposed Noise Environment for Airspace Used by Shaw AFB

SH3.2.2.2 Environmental Consequences

Although slight changes in noise levels would occur within 3 of the 4 airspace units, these would continue to remain below 65 dB L_{dnmr}. Subsonic noise levels would increase under all scenarios within the Bulldog, Gamecock, and Coastal Townsend airspace units. In ACC Scenario 1, the increase in noise would be perceptible only in Gamecock. For ACC Scenarios 2 and 3, the increases for all three units would exceed 3 dB and be perceptible. Poinsett subsonic noise levels would decrease under ACC Scenario 1 and 2, and remain the same as baseline under ACC Scenario 3. However, the areas beneath these airspace units support a low population density and dispersed small communities; these areas have been exposed to aircraft noise for many decades. By FAA regulation, the 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.

Supersonic Noise

For Shaw AFB, proposed supersonic activities would comprise about 10 percent of total air combat training, and all of these events would occur in overwater Warning Areas, more than 15 nm away from land. In contrast to the 20 FW F-16s, which fly supersonic about 30 percent of total air combat training, this represents a lower frequency of supersonic events. F-35A pilots would perform these events at higher altitudes than the F-16s, 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 operations and supersonic events than the F-16s with almost all occurring above 30,000 feet MSL, and all would occur over water and not over populations, these activities warrant no further detailed analysis. Section 3.1.3 provides additional rationale for this approach.

SH3.3 Air Quality

Emissions associated with operations at Shaw AFB include emissions of volatile organic compounds (VOCs) and nitrogen oxides (NO_x), both of which are precursors to ozone (O_3), as well as carbon monoxide (CO), sulfur dioxide (SO_2), 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 (PM_{10}). Emissions of lead (Pb) are not addressed because the affected areas contain no significant sources of this criteria pollutant, and operations at Shaw AFB would not result in substantial emissions of lead.

SH3.3.1 Base

SH3.3.1.1 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, SO_2, and directly-emitted PM_{10} and $PM_{2.5}$. For pollutants that undergo chemical reactions and interact within the atmosphere to form secondary pollutants, such as O_3 and its precursors NO_x and VOCs, and precursors of PM_{10} and $PM_{2.5}$, the affected environment is a larger regional area. The chemical transformations and interactions that create O_3 and secondary PM_{10} 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 Shaw AFB (refer to Section 3.4 for further discussion of mixing height).

Regional Environment

The affected environment for base-generated emissions includes Shaw AFB, the area surrounding the base where aircraft operate below 3,000 feet AGL, and the airspace overlying these areas and where aircraft train. Shaw AFB is located in Sumter County. This county lies within the Camden-Sumter Intrastate Air Quality Control Region (AQCR) (40 Code of Federal Regulations [CFR] 81.110) which includes Clarendon County, Kershaw County, Lee County, and Sumter County. Impacts of the proposed action were evaluated in the context of existing local air quality, baseline emissions at the base and in the region, and the relative contribution of the proposed action to regional emissions.

Air quality in the Camden-Sumter 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 SH3.3-1 summarizes the regional emissions (stationary and mobile) of criteria pollutants and precursor emissions for the AQCR.

Table SH3.3-1. Baseline Regional Emissions (tons per year)

	VOCs	*NO_x*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
Camden-Sumter Intrastate AQCR	21,639	10,451	102,756	1,886	22,341	4,579

Source: USEPA 2008.

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. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the No-Action Alternative and the Proposed Action alternatives have been quantified to the extent feasible in this EIS for information and comparison purposes only.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). 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 CO_2, which has a value of one. For example, under the USEPA's Mandatory Greenhouse Gas Reporting Rule, CH_4 has a GWP of 21, which means that it is considered to have a global warming effect 21 times greater than CO_2 on an equal-mass basis. Total GHG source emissions are often reported as a CO_2 equivalent (or CO_2e). The CO_2e 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

Shaw AFB is located in the east central part of South Carolina, approximately 35 miles east of the city of Columbia. The base is located within the city limits of Sumter, the seat of Sumter County, and is 10 miles west of the city's center.

The South Carolina DHEC has primary jurisdiction over air quality and sources of stationary source emissions at Shaw AFB. Stationary source emissions at the bases 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, fuel cell maintenance, abrasive blasting, woodworking, welding, landfills, ordnance disposal, and wastewater treatment. Calculations for all criteria pollutants demonstrate that maximum potential base-wide emissions from stationary sources are less than the Clean Air Act (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.

Although mobile sources are not considered under the CAA Title V Operating Permit program, they are a substantial component of the total installation emissions. Data in Table SH3.3-2 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 F-16 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 F-16 aircraft were also included in baseline calculations. Table SH3.3-2 summarizes these baseline emissions, which are based on flight profiles and engine maintenance runups developed as part of the noise analysis (Wyle 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 Air Conformity Applicability Model (ACAM) program

(Air Force 2002). Emission factors were derived from IERA Aircraft/Auxiliary Power Units/Aerospace Ground Support Equipment, except for CO_2, which were derived from Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling--Compression-Ignition. For CH_4 and N_2O 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. Refer to Appendix D for the concepts used in developing these emission estimates.

Table SH3.3-2. Baseline Emissions for Shaw AFB (2008)

Pollutants in Tons per Year						
CO	*NO_x*	*VOCs*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
834.98	346.18	118.99	97.64	61.63	56.48	126,624

Source: Air Force 2009b.
Note: [1]Measured in metric tons per year or mT/y.

SH3.3.1.2 Environmental Consequences

Air quality impacts within the affected environment were reviewed relative to federal, state, and local air pollution standards and regulations; 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.

ACC Scenario 1

ACC Scenario 1 would beddown 24 F-35A aircraft at Shaw AFB by replacing the current 72 F-16 aircraft. Under ACC Scenario 1, both construction and operational activities would result in air pollutant emissions.

Construction

Under ACC Scenario 1, construction would occur in calendar year 2014. 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 the 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). These data were used to estimate combustion emissions from the equipment. Proposed building and infrastructure demolition, as well as construction timeframes and disturbance footprints were used to determine fugitive dust emissions (i.e., PM).

Table SH3.3-3 summarizes proposed construction emissions associated with Shaw AFB ACC 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 ACC Scenario 1 construction activities would noticeably affect regional air quality.

Table SH3.3-3. Proposed Construction Emissions under ACC Scenario 1 at Shaw AFB

Construction Activity	***Pollutants in Tons per Year***					
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
2014						
Construction	2.26	2.08	0.26	0.24	3.01	0.41
Construction Crew POVs	2.35	0.12	0.15	0	0	0
Total 2013	**4.61**	**2.2**	**0.41**	**0.24**	**3.01**	**0.41**
Major Source Threshold	***250***	***250***	***250***	***250***	***250***	***250***

Operations

Air quality impacts from operations were determined by evaluating emissions associated with replacing 72 F-16 aircraft with 24 F-35A aircraft. Operational emissions sources generated under ACC 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 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 ACC Scenario 1 and no new building or facility construction would be introduced calling for new stationary sources and associated emissions. Table SH3.3-4 presents a summary of annual operational emissions generated under ACC Scenario 1 in comparison with baseline conditions.

Table SH3.3-4. Proposed Annual Operational Emissions under ACC Scenario 1 at Shaw AFB

Activity	***Pollutants in Tons per Year***						
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[1]
Aircraft	21.80	62.31	0.72	29.79	1.95	1.89	20,499
Engine Runups	0.48	0.08	0.01	0.12	0.00	0.00	83
AGE[2]	6.61	5.89	0.36	1.66	0.54	0.52	1,539
POVs	32.17	1.45	1.87	0.03	0.08	0.08	1,546
Total Annual ACC Scenario 1 Emissions	**61.05**	**69.74**	**2.96**	**31.61**	**2.57**	**2.50**	23,667
Baseline Annual Emissions	834.98	346.18	118.99	97.64	61.63	56.48	126,624
Net Change	***-773.93***	***-276.45***	***-116.03***	***-66.04***	***-59.05***	***-53.98***	***-102,957***
Major Source Threshold	***250***	***250***	***250***	***250***	***250***	***250***	-

Notes:
[1] $CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR 98, Subpart A, Table A-1) in metric tons per year.
[2] With 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 data indicate that beddown of 24 F-35A aircraft at Shaw AFB would result in net emission decreases relative to baseline conditions. Emissions therefore, would fall below the New Source Review threshold of 250 tons per year and would not substantially deteriorate air quality in the region. GHG emissions associated with construction and operational activities would incrementally decrease regional emissions of CO_2e.

ACC Scenario 2

ACC Scenario 2 would beddown 48 F-35A aircraft at Shaw AFB, replacing the existing 72 F-16. Under ACC Scenario 2, both construction and operational activities would result in emissions of air pollutants. Construction and operational emission assumptions are the same as those presented for ACC Scenario 1.

Construction

Table SH3.3-5 summarizes annual and total construction emissions associated with ACC Scenario 2. The data presented below indicate that projected annual construction emissions would not exceed 250 tons per year for any criteria pollutant. It is not anticipated, therefore, that implementing ACC Scenario 2 construction activities would noticeably affect regional air quality.

Table SH3.3-5. Proposed Annual Construction Emissions under ACC Scenario 2 at Shaw AFB

Construction Activity	*Pollutants in Tons per Year*					
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
2014						
Construction	3.49	1.66	0.35	0.18	2.26	0.31
Construction Crew POVs	1.45	0.56	0.13	0.06	0.75	0.1
Total 2013	**4.94**	**2.22**	**0.48**	**0.24**	**3.01**	**0.41**
Major Source Threshold	***250***	***250***	***250***	***250***	***250***	***250***

Operations

Air quality impacts associated with ACC Scenario 2 were determined by evaluating the net change in emissions associated with replacing 72 F-16 aircraft with 48 F-35A aircraft. Sources of operational emissions are the same as those presented under ACC Scenario 1. Table SH3.3-6 summarizes annual operational emissions proposed under ACC Scenario 2 compared to baseline conditions. As was done for ACC Scenario 1, stationary source emissions were assumed to remain unchanged.

Table SH3.3-6. Proposed Annual Operational Emissions under ACC Scenario 2 at Shaw AFB							
Activity	*Pollutants in Tons per Year*						
	CO	*NO_x*	*VOCs*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*	*CO_2e^1*
Aircraft	48.04	133.65	1.64	61.91	4.25	4.13	45,830
Engine Runups	0.96	0.16	0.02	0.24	0.01	0.01	166
AGE[2]	13.22	11.79	0.71	3.32	1.07	1.04	3,077
POVs	64.33	2.91	3.74	0.06	0.17	0.16	3,092
Total Annual ACC Scenario 2 Emissions	**126.55**	**148.51**	**6.12**	**65.54**	**5.50**	**5.34**	52,165
Baseline Annual Emissions	834.98	346.18	118.99	97.64	61.63	56.48	126,624
Net Change	***-708.43***	***-197.68***	***-112.87***	***-32.11***	***-56.12***	***-51.14***	***-74,459***
Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**-**

Notes:
[1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR 98, Subpart A, Table A-1) in metric tons per year.
[2]With 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 the beddown of 48 F-35A aircraft at Shaw AFB would result in net emission decreases for all listed criteria pollutants than are found under baseline conditions. Emissions therefore, would fall below the New Source Review threshold of 250 tons per year and would not substantially deteriorate air quality in the region if ACC Scenario 2 were implemented. While some aircraft operations could coincide with construction activities during the beddown process, it is not anticipated that this overlap would cause emissions to exceed *de minimis* levels or major source thresholds. For ACC Scenario 2 construction and operational activities would incrementally decrease regional emissions of CO_2e.

ACC Scenario 3

ACC Scenario 3 would base 72 F-35A aircraft, replacing the existing 72 F-16 aircraft at Shaw AFB. Under ACC Scenario 3, both construction and operational activities would result in air pollutant emissions. Construction and operational emission assumptions are the same as those presented for ACC Scenario 1.

Construction

Air quality impacts were determined by evaluating emissions associated with replacing 72 F-16s with 72 F-35A aircraft. ACC Scenario 3 construction would occur in calendar year 2014. As indicated in Table SH3.3-7 annual and total construction emissions associated with ACC Scenario 3 would not exceed 250 tons per year for any criteria pollutant. It is not anticipated, therefore, that implementing ACC Scenario 3 construction activities would noticeably affect regional air quality.

Table SH3.3-7. Proposed Annual Construction Emissions under ACC Scenario 3 at Shaw AFB						
Construction Activity	***Pollutants in Tons per Year***					
	CO	*NO_x*	*VOC*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
2014						
Construction	2.27	2.07	0.3	0.24	3.02	0.19
Construction Crew POVs	1.7	0.56	0.16	0.06	0.75	0.1
Total 2013	**3.97**	**2.63**	**0.46**	**0.3**	**3.77**	**0.29**
Major Source Threshold	***250***	***250***	***250***	***250***	***250***	***250***

Operations

Air quality impacts associated with ACC Scenario 3 were determined by evaluating the net change in emissions associated with replacing 72 F-16 aircraft with 72 F-35A aircraft. Sources of operational emissions are the same as those presented under ACC Scenario 1. Table SH3.3-8 summarizes annual operational emissions proposed under ACC Scenario 3 compared to baseline emissions. As was done for ACC Scenario 1, stationary source emissions were assumed to remain unchanged. While some aircraft operations could coincide with construction activities during the beddown process, it is not anticipated that this overlap would cause emissions to exceed *de minimis* levels or major source thresholds.

Table SH3.3-8. Proposed Annual Operational Emissions under ACC Scenario 3 at Shaw AFB							
Activity	***Pollutants in Tons per Year***						
	CO	*NO_x*	*VOCs*	*SO_x*[1]	*PM_{10}*	*$PM_{2.5}$*	*CO_2e*[2]
Aircraft	72.09	200.60	2.47	92.94	6.38	6.19	68,789
Engine Runups	1.44	0.24	0.04	0.36	0.01	0.01	249
AGE[2]	19.83	17.68	1.07	4.98	1.61	1.56	4,616
POVs	96.50	4.36	5.61	0.10	0.25	0.25	4,638
Total Annual ACC Scenario 3 Emissions	**189.85**	**222.88**	**9.18**	**98.38**	**8.26**	**8.01**	**78,292**
Baseline Annual Emissions	834.98	346.18	118.99	97.64	61.63	56.48	126,624
Net Change	***-645.13***	***-123.30***	***-109.81***	***0.73***	***-53.37***	***-48.47***	***-48,332***
Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**-**

Notes:
[1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 310)$, (40 CFR 98, Subpart A, Table A-1) in metric tons per year.
[2]With 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.

With the exception of SO_x, data indicate that beddown of 72 F-35A aircraft at Shaw AFB would result in net emission decreases when compared to baseline conditions. While emissions of SO_x would increase by less than 1 ton per year, this pollutant, as well as all others, would fall below the New Source Review threshold of 250 tons per year and would not noticeably affect air quality in the region if ACC Scenario 3 were implemented. ACC Scenario 3 construction and operational activities would incrementally decrease regional emissions of CO_2e.

Climate Change Adaptation

In addition to assessing the greenhouse gas emissions that would come from ACC Scenarios 1 through 3 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 also must identify 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 Shaw AFB, adaptation issues requiring evaluation and consideration could revolve around temperature changes, 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 ACC 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. Shaw AFB lies at an elevation of about 237 feet MSL and about 90 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 Shaw AFB.

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 Shaw AFB. 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. Shaw AFB 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.

SH3.3.2 Airspace

It is not anticipated that flight operations in special use airspace would affect regional air quality nor significantly alter existing GHG emissions under any 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) and thus take place above mixing height; third, as identified in Section SH3.3.1.2 replacing F-16 aircraft with F-35A aircraft would reduce pollutant emissions within the airfield environment for every criteria pollutant; and fourth, operations within the airspace would not appreciably change from those 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 any action scenario would not substantially deteriorate regional air quality. Implementation of any ACC Scenario would produce GHG emissions similar to those found under baseline conditions. 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.

SH3.4 Safety

Aircraft safety addresses Accident 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. The affected environment includes the airfield and airspace in which Shaw AFB aircraft operate.

APZs are established to delineate recommended surrounding land uses for the protection of people and property on the ground, as described in Chapter 3. At Shaw AFB, neither the Clear Zone nor the APZs include housing or other incompatible land uses. Rather, the land is primarily open and/or heavy industrial.

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).

SH3.4.1 Base

SH3.4.1.1 Affected Environment

The affected environment for safety includes the airfield at Shaw AFB and its immediate vicinity. Aircraft flight operations from Shaw AFB are governed by standard flight rules. Specific safety requirements are contained in base standard operating procedures and must be followed by all aircrews operating from the AFB (Shaw AFB Instruction 11-250, *Airfield Operations and Base Flying Procedures*) to ensure flight safety. In the last 10 years, there have been two reported Class A aircraft accidents at Shaw AFB, while over 238,000 airfield operations have been conducted, resulting in a mishap rate of 0.84 (AFSC 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 SH3.4-1 on the next page) (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).

Shaw AFB has an effective, on-going BASH program through which information and assistance is freely shared between airfield users and the local air traffic controllers. BASH-related accidents within Shaw AFB airfield environment are not uncommon and since 2007 have yielded 20 incidents with no Class A mishaps reported (personal communication, Gendreau 2010). These data reflect total strikes experienced by all users of the airspace, not just aircraft originating from Shaw AFB.

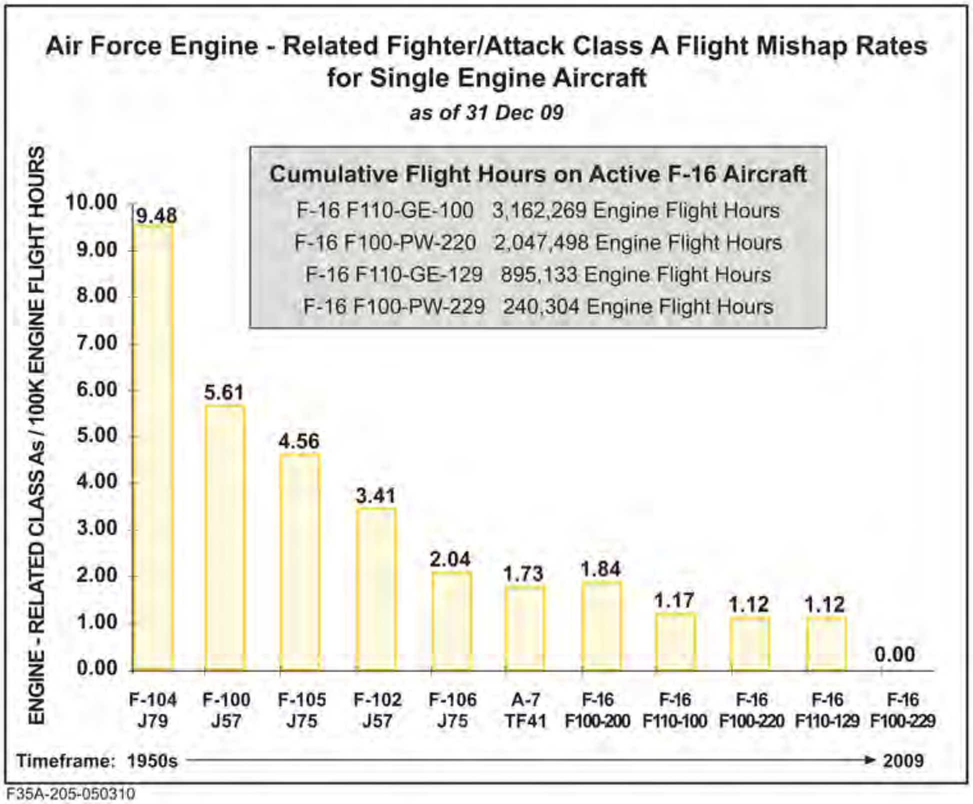

Figure SH3.4-1. Air Force Engine-Related Mishap Rates

Source: AFSC 2010.
Note: "Engine-related" excludes mishaps caused by Foreign Object Damage, BASH, or failure of support systems external to the engine (e.g., fuel starvation)

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.

SH3.4.1.2 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 life time) (AFSC 2009a).

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 projected 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 2012 are provided in Table SH3.4-1.

Table SH3.4-1. F-22A Class A Flight Mishap History

Year	*Class A*		*Destroyed*		*Fatal*		*Hours Flown per Year*	*Cumulative Flight Hours*
	Number of Mishaps	*Rate*[1]	*A/C*	*Rate*	*Pilot*	*All*		
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
FY10	0	0	0	0	0	0	24,675	94,519
FY11	1	6.54	1	6.54	1	1	15,289	109,808
FY12	3	11.32	0	0	0	0	26,507	136,315
Lifetime	**10**	**7.34**	**3**	**2.20**	**2**	**2**	**-**	**136,315**

Source: AFSC 2013.
Note: [1]Mishap rate is based on 100,000 hours of flight.
[2]One 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 F-16 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 F-16 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 new Air Force F-35A would use simulators extensively. Simulator training would include all facets of flight operations and comprehensive emergency procedures, which would minimize risk associated with mishaps due to pilot error. The sophistication and fidelity of current simulators and related computer programs are commensurate with advancements made in aircraft technology.

There would be a decrease in operations for ACC Scenarios 1, 2, and 3 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.

While the proposed decrease in airfield flight operations does lessen the potential for aircraft incidents, it is statistically modest. With two aircraft incidents occurring in the airfield vicinity during a 10-year period, the average number of aircraft incidents is one per every 5 years. Decreasing flight operations would decrease the potential number of aircraft incidents as shown in Table SH3.4-2, based on historical records. In addition, current airspace safety procedures discussed previously would continue to be implemented and additional airfield flight operations would adhere to established safety procedures.

TableSH3.4-2. ACC Scenarios 1 through 3 Comparison

Scenario	*Percentage Airfield Operations Change from Baseline*	*Number of Years Expected Between Aircraft Accidents at Shaw AFB*
1	-70.9%	8.5
2	-48.9%	7.5
3	-27.1%	6.3

Source: AFSC 2010a.

The F-35A will have the capability to dump fuel for emergency situation and would follow all procedures similar to those currently required by the F-16 aircraft.

SH3.4.2 Airspace

SH3.4.2.1 Affected Environment

The airspace directly associated with the proposed action at Shaw AFB includes Restricted Areas, Warning Areas, MOAs, and ATCAAs (see Figure SH2.2-1). The volume of airspace encompassed by the combination of airspace elements constitutes the affected environment for airspace safety. 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. 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 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 Shaw AFB training airspace are governed by FAA and Air Force standard flight rules. Additionally, under the Commander 20 FW, the Operations 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 ECR assets. Shaw AFB activity 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 two Class A mishaps of 20 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 Shaw AFB-managed airspace is governed by a minimum release altitude restriction of 5,000 feet MSL (approximately 4,500 feet AGL). Flares are not used in any Shaw AFB-managed 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 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 2007a).

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 Shaw AFB 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, not just aircraft from Shaw AFB.

SH3.4.2.2 Environmental Consequences

Under the proposed action, the decrease in F-35A airspace and range training operations the Shaw AFB training airspace (e.g., MOAs, Warning Areas) would incrementally decrease the potential for aircraft accidents or mishaps. Additionally, current airspace safety procedures would continue to be implemented and additional flight instructions 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 operations within Shaw AFB-managed airspace, impacts to aviation safety are considered to be negligible.

Under ACC Scenarios 1, 2, and 3, the F-35A would operate in the same airspace environment as the current aircraft, but with fewer operations. 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 current 20 FW aircraft. In addition, F-35A aircrews operating in the Shaw AFB-managed training airspace would be required to follow applicable procedures outlined in the 20 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, Shaw AFB, and McEntire JNGB F-16 aircraft deployed 80,000 flares annually in the Shaw AFB-managed airspace; the F-35A would likely deploy considerably fewer flares than F-16 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 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, under the 72 aircraft scenario 30,000 flares would be deployed annually within the 5,300 square-mile airspace. It is estimated that these areas contain 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 0.0016 per year. This probability would vary by exact location is calculated conservatively using the residual flare dimensions spread evenly across the area under the airspace, and may also by applied to structures, vehicles, and livestock. However, use of flares would remain less than in almost all airspace units due to reductions in operations. Actual potential for strikes would likewise decrease.

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.

SH3.5 Geology, Soils, and Water

SH3.5.1 Base

SH3.5.1.1 Affected Environment

Geology

Shaw AFB is located on the Atlantic coastal plain of South Carolina. This region is composed of Cretaceous to Quaternary age sedimentary rocks that cover a basement complex of Paleozoic age crystalline and Triassic age sedimentary rocks. These sedimentary formations create a wedge that thickens in a southeast direction. The base rock formations in the coastal plain are covered by a layer of sediments that increases in thickness nearer to the coast. Shaw AFB lies on approximately 700 feet of sediments which consist mainly of gravel, silt, sand, clay, and marl. There are no geologic faults in the vicinity of Shaw AFB (Shaw AFB 2007a).

Topography

Shaw AFB is situated in the Upper Coastal Plain physiographic region of South Carolina. The land on Shaw AFB is mostly level with some gentle slopes; however, steeper slopes occur adjacent to streams and drainage ways. Land elevation on Shaw AFB varies from approximately 200 to 330 feet MSL (Shaw AFB 2007a).

Soils

Land on Shaw AFB is mainly composed of seven different soil series. The soil series found on the installation are Orangeburg (0-10 percent slopes), Greenville (0-10 percent slopes), Lakeland (0-6 percent slopes), Troup (0-15 percent slopes), Lucy (0-6 percent slopes), Wagram (0-6 percent slopes), and Osier (nearly level slope). The Osier series is poorly drained, but all other soil series on the installation are well drained to excessively drained (Shaw AFB 2007a). All of the soils on Shaw AFB have a low to moderate erosion potential (NRCS 2010).

Surface Water

There are two naturally occurring surface water features on Shaw AFB: Long Branch and Spann Branch flow along the northeastern and northern boundaries of the base, respectively. There are also four man-made surface water features on Shaw AFB. These bodies of water include Chapel Pond, Memorial Lake, and the golf course ponds for holes #1 and #8. All of these ponds are maintained solely for recreation and aesthetics (Shaw AFB 2007a) (Figure SH3.5-1).

Groundwater

There are three aquifer systems in the vicinity of Shaw AFB. The shallow aquifer system is composed of unconsolidated sands and clays, varies from confined to unconfined depending on the location within the aquifer, and occurs at a depth of 10 to 100 feet below ground-level. The Black Creek aquifer system occurs approximately 200 feet below ground level and is composed of medium- to course-grained sands and gravels layered with clays. The Middendorf aquifer system occurs at depths of more than 325 feet below ground-level and is composed of fine- to course-grained sands that are inter-bedded with silts and clays. The Middendorf aquifer system is generally the deepest and most productive aquifer system in Sumter County. These aquifer systems are separated and confined by layers of clay (Shaw AFB 2007a). See Community Facilities and Public Services Section SH3.13 for more detailed information on capacity.

Floodplains

A small portion of Shaw AFB lies in the 100-year floodplain for Long Branch. The area of the base within the floodplain is designated as part of the runway Clear Zone. Land within the runway Clear Zone is operationally constrained from future development, so the construction limitations imposed by regulations involving floodplains are redundant (Shaw AFB 2007a).

SH3.5.1.2 Environmental Consequences

ACC Scenario 1

Under ACC Scenario 1, a total of 5.48 acres of land would be disturbed and a total of 2.61 acres of new impervious surface would be added to the base from the construction on areas that are currently undeveloped. Construction would take place in areas that have been previously disturbed. As such, geology, topography, and soils would not be adversely impacted by ACC Scenario 1. Stormwater impacts to surface water would be minimized using best management practices to prevent any erosion to exposed soils during construction (see Chapter 2, section 2.6.1 for a summary of these practices). There would be no impact to floodplains, surface water, or groundwater under ACC Scenario 1.

ACC Scenario 2

Similar to ACC Scenario 1, under ACC Scenario 2 a total of 5.48 acres of land would be disturbed and a total of 2.61 acres of new impervious surface would be added. Additional projects would be confined to internal construction in existing facilities. As with ACC Scenario 1, the area proposed for construction includes areas of the base that have been previously disturbed. Geology, topography, and soils would not be adversely impacted from the implementation of ACC Scenario 2. Stormwater impacts to surface water would be managed with best management practices for minimizing any erosion or pollution potential from stormwater runoff. No impacts to floodplains, surface water, or groundwater would occur under ACC Scenario 2.

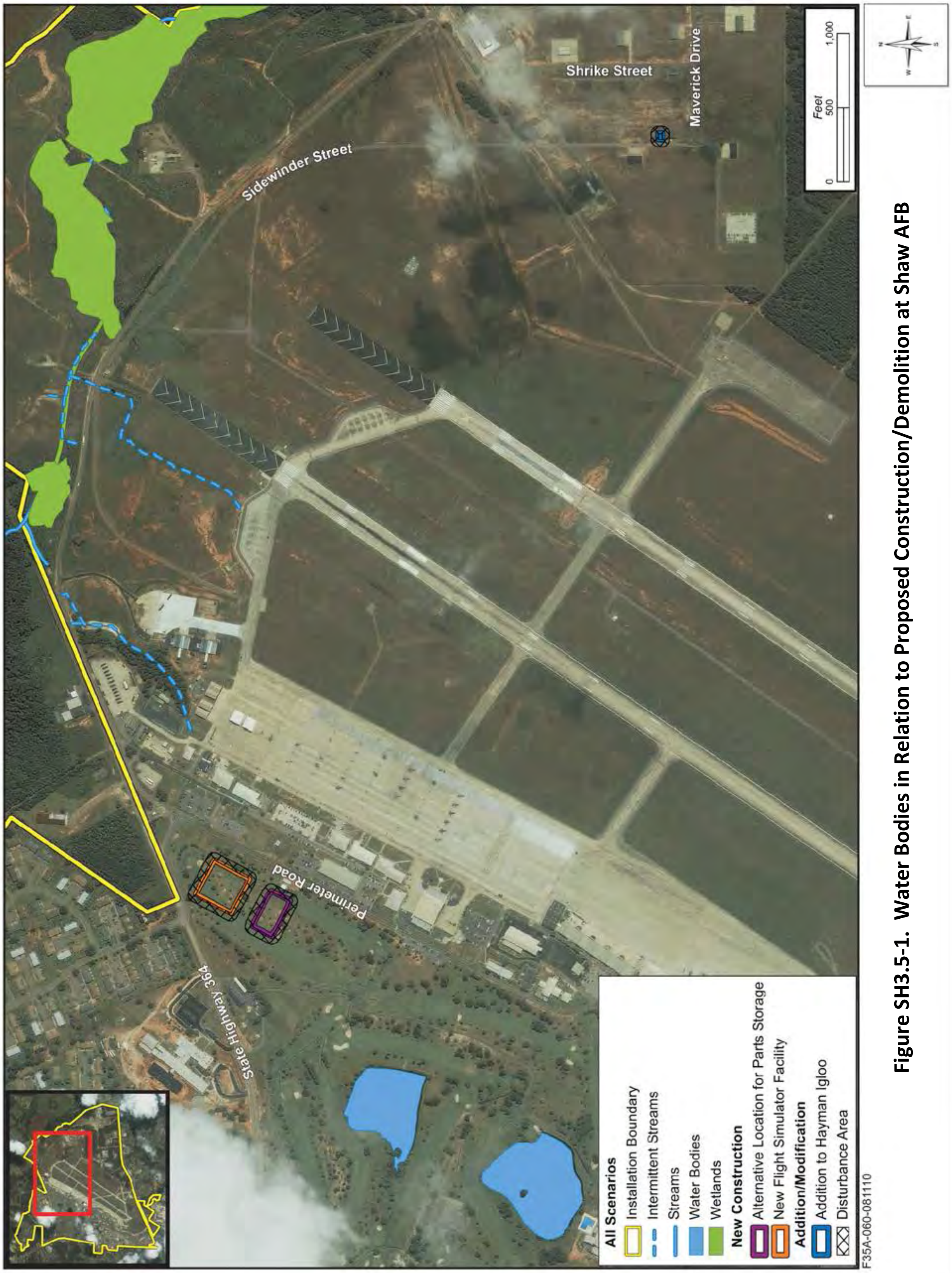

Figure SH3.5-1. Water Bodies in Relation to Proposed Construction/Demolition at Shaw AFB

ACC Scenario 3

Similar to ACC Scenarios 1 and 2, under ACC Scenario 3, a total of 5.48 acres of land would be disturbed and a total of 2.61 acres of new impervious surface would be added. Additional projects would be confined to internal construction in existing facilities. Proposed construction would take place on areas of the base that have been previously disturbed. There would be no adverse impacts to geology, topography, and soils from implementation of ACC Scenario 3. Stormwater impacts to surface water would be managed as described under ACC Scenario 2. No impacts to floodplains, surface water, or groundwater would occur from implementation of ACC Scenario 3.

SH3.6 Terrestrial Communities (Vegetation and Wildlife)

SH3.6.1 Base

SH3.6.1.1 Affected Environment

The majority of Shaw AFB is comprised of landscaped areas such as lawns, ornamental trees, or maintained open fields of grass. A few pockets of forest can be found on the installation, including woodlots comprised of oak/hickory forest (less than 1 percent) and pine plantations (13 percent). The pine plantations in the southeastern corner of Shaw AFB consist primarily of 25- to 35-year-old loblolly pine trees (*Pinus taeda*) (Air Force 2007a). Shaw AFB contains suitable habitats for a wide variety of fauna. Wildlife species known to occur or expected to occur on the base include mammals such as the eastern cottontail (*Sylvilagus floridanus*), Virginia opossum (*Didelphis virginiana*), white-tailed deer (*Odocoileus virginianus)*, feral pig (*Sus scrofa)*, coyote (*Canis latrans)*, and red fox (*Vulpes vulpes)*. Common birds include bobwhite quail *(Colinus virginianus*), wild turkey (*Meleagris gallopavo*), red-tailed hawk (*Buteo jamaicensis)*, red-shouldered hawk (*Buteo lineatus)*, blue jay (*Cyanocitta cristata)*, and American crow (*Corvus brachyrhyncos)*. Common reptiles include black racer (*Coluber constrictor)*, eastern fence lizard (*Sceloporus undulates)*, eastern garter snake (*Thamnophis sirtalis*), and timber rattlesnake (*Crotalus horridus*) (Air Force 2007a).

SH3.6.1.2 Environmental Consequences

Regardless of the scenario selected, implementation of the proposed action at Shaw AFB would involve the construction of three new facilities disturbing a total area of 5.48 acres, 2.61 acres of which would be new impervious surface. The proposed new construction would occur in an area that is currently developed as a golf course and is characterized by maintained grassy areas and sparse trees and provides minimal terrestrial habitat. As a result, impacts to vegetation from implementation of the proposed action would be minor.

Annual military operations at Shaw AFB are proposed to decrease with all scenarios. ACC Scenario 1 would result in a decrease of 34,427 operations. ACC Scenario 2 would result in a decrease of 23,760 operations. ACC Scenario 3 would result in a decrease of 13,093 operations. These decreases in total airfield operations would represent 70.9, 48.9, and 27.1 percent for ACC Scenarios 1, 2, and 3, 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 SH3.4).

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 F-16 aircraft, the number of times that an individual animal would be exposed and the area that would be affected would decrease with all scenarios.

SH3.6.2 Airspace

SH3.6.2.1 Affected Environment

The proposed airspace covers over 9,463 square miles of land within North Carolina, South Carolina and Georgia as well as 55,597 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. 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 and wild turkey. 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.

SH3.6.2.2 Environmental Consequences

No construction would occur beneath the training airspace; therefore, no impacts to vegetation would occur. Depending on the particular airspace unit, operations within the airspace would decrease from baseline an average of 30 percent for ACC Scenario 1; a decrease of 21 percent for ACC Scenario 2; and a decrease of 12 percent for ACC Scenario 3. Section SH3.4 (Safety) established that bird-aircraft strikes are currently rare in the airspace and would not be expected to change under the proposed action. The F-35A would fly predominantly above 5,000 feet AGL, which is above where 95 percent of strikes occur. In addition, current procedures for avoiding flight operations during periods of high concentrations of migratory birds (both in space and time) would continue. Adherence to the existing, effective BASH program would minimize the risk of bird-aircraft strikes (see Safety Section SH3.4).

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 conducted by F-16 aircraft and would occur within the same training areas. In addition, current restrictions on the amount or altitude of flare use would continue to apply. Ordnance delivery would only occur in ranges authorized for use; for JDAMs it would occur at Poinsett or at more remote ranges. As a result, ordnance and flare deployment associated with the proposed action would have no impact on terrestrial communities.

Overall, impacts to wildlife from proposed changes in airspace 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) generally speaking, the F-35A would fly at higher altitudes than F-16 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 (under ACC Scenario 3, overflights below 5,000 feet AGL would occur approximately 1 per day compared to 1.7 per day under baseline conditions); 3) no supersonic flights would occur over land due to the proposed action; and 4) average noise levels in the airspace would increase by 2 to 8 dB L_{dnmr} within the airspace units, but as these are currently used by F-16 fighter aircraft, wildlife should be habituated to the noise (see Section SH3.2 for more details on noise).

SH3.7 Wetland and Freshwater Aquatic Communities

SH3.7.1 Base

SH3.7.1.1 Affected Environment

According to an approximate jurisdictional wetland determination by the USACE in a letter dated 29 May 2009, approximately 44 acres of jurisdictional freshwater wetlands occur on Shaw AFB (refer to Figure SH3.5-1). These wetlands are primarily forested small stream wetlands or pond margin/stream head wetlands and are generally located along Long Branch near the northern boundary of the installation (20 FW 2007). The small stream wetlands are dominated by species such as red maple (*Acer rubrum*), ash (*Fraxinus* spp.), laurel oak (*Quercus laurifolia*), and hackberry (*Celtis occidentalis*). Pond margin/stream head wetlands are primarily located along the margins of three artificial ponds on the golf course (see Soil and Water Section SH3.5) and consist of species such as water-spider orchid (*Habenaria repens*), meadow beauty (*Rhexia* spp.), ludwigia (*Ludwigia* spp.), and smartweed (*Polygonum* spp.). These freshwater wetlands and surface water features could provide valuable habitat for song birds and small mammals, in addition to deer and geese (20 FW 2007). However, due to BASH concerns the wetlands are maintained so as to dissuade birds and wildlife.

SH3.7.1.2 Environmental Consequences

Approximately 44 acres of jurisdictional freshwater wetlands occur on Shaw AFB, in addition to some open surface water areas. However, no wetlands or freshwater aquatic communities occur within proposed construction areas associated with any of the proposed scenarios. Therefore, construction activities under these scenarios would have no impact on wetlands.

SH3.8 Threatened, Endangered, and Special Status Species/Communities

SH3.8.1 Base

SH3.8.1.1 Affected Environment

No federally protected species are known to occur at Shaw AFB. The least tern (*Sterna antillarum antillarum*), which is listed as threatened by the State of South Carolina is the only special status species known to occur at Shaw AFB (South Carolina DNR 2010). Several nesting locations have been documented along the South Carolina coastline and throughout the Coastal Plain of the state; however, least terns have also been documented along large river systems further inland (ACE Basin Species Gallery 2008). In 2008, 12 breeding pairs of least tern were documented on the roof of the Base Exchange, which is located to the south of the military family housing area (Shaw AFB 2009b). No special status communities occur on base.

SH3.8.1.2 Environmental Consequences

No effects to the state listed least tern would occur. The location of the proposed new buildings and renovation would not occur within protected habitat or affect the protected species. The Base Exchange, where the breeding least terns have been documented, is approximately 3,000 feet southwest from the nearest construction project, and therefore would be minimally impacted by construction. In addition, it is located close to the flightline, therefore accustomed to elevated noise levels.

Total annual operations at Shaw AFB are proposed to decrease by 70.9, 48.9, and 27.1 percent for ACC Scenarios 1, 2, and 3, respectively. While noise from an individual single event from the F-35A would be higher than F-16 aircraft, the number of times that an individual least tern would be exposed to aircraft noise would decrease with all scenarios. In addition, the least terns are likely accustomed to elevated noise levels associated with current aircraft and military operations. No special status species would be impacted by the proposed action.

SH3.8.2 Airspace

SH3.8.2.1 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 actions. Species included in the analysis of airspace currently are presented in Table SH3.8-1 and include four reptiles, one amphibian, nine birds, and five mammals. No critical habitat is located under the airspace.

Table SH3.8-1 Threatened, Endangered, and Special-Status Species/Communities That Occur or Potentially Occur under Airspace Associated with Shaw AFB

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

Sources: U.S. Fish and Wildlife Service (USFWS) 2010b; SCDNR 2010; USFWS 2010c.
Note: E= Endangered; T= Threatened; SA = Similarity of Appearance to a listed taxon; XN = Experimental Population; SSC = Species of Special Concern.

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.

SH3.8.2.2 Environmental Consequences

Overall, no effects to federally listed species would occur 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) Generally speaking, the F-35A would fly at higher altitudes than F-16 aircraft. The majority 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) No supersonic flights would occur over land due to the proposed action. 4) Average noise levels in the airspace would increase by 2 to 8 dB L_{dnmr} within the airspace units, but as these are currently used by F-16 fighter aircraft, wildlife should be habituated to the noise (see Section SH3.2 for more details on noise).

SH3.9 Cultural and Traditional Resources

SH3.9.1 Base

SH3.9.1.1 Affected Environment

As defined in Chapter 3, section 3.10.2, the APE for Shaw AFB consists of all areas of ground disturbance associated with proposed construction or remodeling activities. Aircraft operations and the areas affected by noise levels 65 dB DNL and greater also fall under the APE and are evaluated for their potential to affect historic structures and districts where noise vibrations could adversely impact those types of resources. For airspace operational effects, only those cultural resources that would reasonably be affected by visual (overflights) and noise intrusions are considered. These include architectural resources; archaeological resources with standing structures, such as historic districts, ghost towns, and American Indian settlements; and traditional cultural properties. Prehistoric and historic archaeological sites lacking standing structures are not included as they are generally ground surface or even subsurface deposits that would not be affected by implementing the basing alternatives.

Archaeological Resources

All of Shaw AFB has been surveyed for archaeological resources (Shaw AFB 2008). A total of eight archaeological sites have been identified on Shaw AFB. One archaeological site is eligible for listing in the NRHP (Shaw AFB 2008a).

Architectural Resources

A comprehensive architectural assessment of the remaining World War II-era structures at Shaw AFB was completed in 1996. Building 611, a hangar that dates to World War II and has important association with the aviation training mission of the airfield, is eligible for listing in the NRHP (Shaw AFB 2008a). No other structures were determined to be eligible for listing in the NRHP by the South Carolina SHPO (Shaw AFB 2008a). Shaw AFB is currently completing a Cold War architecture inventory to comply with

Section 110 of the NHPA (Shaw AFB 2008a). During this more recent study, Hangar 712 was recommended eligible for listing in the NRHP. The South Carolina SHPO concurred with this recommendation.

Traditional Resources

No formal surveys for traditional cultural resources or sacred sites have been conducted, nor have any tribes come forward and notified Shaw AFB of the presence of such sites (Shaw AFB 2008a). However, there are a number of federally recognized tribes with historical or ancestral ties to the area that is now Shaw AFB. Shaw AFB currently consults with the Catawba Indian Nation, the Eastern Band of Cherokee Indians, and the Poarch Creek Indians (Shaw AFB 2008a).

SH3.9.1.2 Environmental Consequences

The South Carolina SHPO responded to the October 2012 consultation letter requesting more information on the APE and effects therein. The revisions made in this section address these concerns. To date, no responses have been received from the Florida SHPO.

ACC Scenario 1

Under ACC Scenario 1, internal improvements would be made to buildings 1610 and 1629, and the Hayman Igloo would be repaired. Buildings 1610 and 1629 were built in 1992 and 2004 and the Hayman Igloo was constructed in 2008. None of these structures are considered eligible for listing in the NRHP because they are less than 50 years in age and are not Cold War resources of exceptional significance. No project actions would occur near the NRHP-eligible archaeological site. Both the South Carolina and Georgia SHPOs concurred that no adverse effects would occur within the APE. Therefore, no adverse impacts to historic properties would occur from implementing ACC Scenario 1. No Tribes identified properties of religious or cultural significance in the APE.

ACC Scenario 2

Under ACC Scenario 2, internal improvements would be made to buildings 1605, 1606, 1627, and 1628, and the Hayman Igloo would be repaired. Four of these buildings postdate the Cold War era: 1606 (built in 1992), 1627 (built in 2004), 1628 (built in 2006), and the Hayman Igloo (built in 2008). None of these structures are considered eligible for listing in the NRHP because they are less than 50 years in age and are not Cold War resources of exceptional significance. Building 1605 was constructed in 1956, but is not eligible for listing in the NRHP. No project actions would occur near the NRHP-eligible archaeological site. Both the South Carolina and Georgia SHPOs concurred that no adverse effects would occur within the APE. Therefore, there would be no adverse impacts to historic properties from implementing ACC Scenario 2. No Tribes identified properties of religious or cultural significance in the APE.

ACC Scenario 3

Under ACC Scenario 3, internal improvements would be made to buildings 1605, 1606, 1610, 1627, 1628, and 1629, and the Hayman Igloo would be repaired. Six of these buildings postdate the Cold War era: 1606 (built in 1992), 1610 (built in 1992), 1627 (built in 2004), 1628 (built in 2006), 1629 (built in 2004), and the Hayman Igloo (built in 2008). None of these structures are considered eligible for listing in the NRHP because they are less than 50 years in age and are not Cold War resources of exceptional significance. Building 1605 was constructed in 1956, but is not eligible for listing in the NRHP. No project actions would occur near the NRHP-eligible archaeological site. Therefore, there would be no impacts to historic properties from the proposed action under ACC Scenario 3. No Tribes identified properties of religious or cultural significance in the APE.

SH3.9.2 Airspace

SH3.9.2.1 Affected Environment

There are 111 NRHP-listed cultural resources located under the Shaw AFB airspace APE, including private residences, businesses, courthouses, depots, and churches, plantations, battle sites, historic districts, campgrounds, schools, farms, and a bottling plant. Additionally, there is the potential for unknown cultural resources (archaeological, architectural, or traditional) to be located under the airspace. No American Indian reservations underlie the airspace and no traditional cultural properties are known within this area.

A letter initiating government-to-government consultation was sent to Catawba Indian Nation informing them about the proposed project in January 2010. The Nation responded that they would like to be included in any consultation pursuant to the proposed project and was sent a copy of the Draft EIS in March 2012 and the Revised Draft EIS in May 2013. In June 2013, the Catawba Nation responded they had no further comments. To date, no further response was received from the Eastern Band of the Cherokee.

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.

SH3.9.2.2 Environmental Consequences

There would be no adverse impacts to cultural resources due to the implementation of the proposed action. Aircraft operations would decrease an average of 30 percent under ACC Scenario 1, 21 percent under ACC Scenario 2, and 12 percent for ACC Scenario 3. Noise would increase a maximum of 6, 7, and 8 dB in the Coastal Townsend, Bulldog, and Gamecock airspaces, respectively, under ACC Scenario 3 but would not exceed 65 dB L_{dnmr}. Noise levels would increase by 1 dB in the Avon Park airspace under ACC Scenario 3. Noise levels in the Poinsett airspace would remain the same under ACC Scenario 3. These changes would be a continuation of existing operations within the area and would not result in impacts to setting to any eligible or listed archaeological, architectural, or traditional cultural property. Use of ranges would be the same as activities authorized and currently occurring at the ranges (Poinsett, Avon Park

Visual intrusions under the proposed action would be minimal and would not represent an increase over baseline conditions sufficient to cause adverse impacts to the settings of cultural resources. Due to the high altitude of the overflights, small size of the aircraft, and the high speeds, the aircraft would not be readily visible to observers on the ground. Indeed, at an altitude of 8,000 feet AGL, an F-35A would appear about 0.07 inches in size.

Use of ordnance and defensive countermeasures would occur in areas already used for these activities. No additional ground disturbance would occur under the airspace due to the proposed action. Flares deployed from the aircraft would not pose a visual intrusion either for the following reasons: flares are small in size and burn only for a few seconds and the high relative altitude of the flights would make them virtually undetectable to people on the ground. Overall, flares are unlikely to adversely affect cultural resources. Therefore, the introduction of material to archaeological sites or standing structures from the use of flares would not have an adverse effect on these resources.

Proposed use of the airspace would be similar to ongoing training operations. Given the current use of the airspace and the nature of the proposed future use of the project area, there would be no adverse impact to NRHP-eligible or listed archaeological resources, architectural resources, or traditional cultural properties. Therefore, under all scenarios, no adverse effects to historic properties are expected from the proposed action.

SH3.10 Land Use

SH3.10.1 Base

The following section describes the existing conditions and examines the extent to which the beddown of the F-35A at Shaw AFB 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 SH3.10-1 provides a cross-reference between Sumter County classifications and those used in this EIS analysis.

Table SH3.10-1. Land Use Categories

City/County Land Use Classification	*EIS Land Use Classification*
General Residential, Planned Development, Residential Multi-Family District, Single Family Residential District	Residential
Limited Commercial, Neighborhood Commercial, Professional Office, Central Business District	Commercial
Heavy Industrial, Light Industrial Wholesale	Industrial
Public/Quasi Public	Public/Quasi Public
Shaw AFB	Military
Agricultural Conservation, Conservation Preservation	Open Space
No Data	Unclassified

SH3.10.1.1 Affected Environment

Shaw AFB's main cantonment area encompasses 3,343 acres. Land use at Shaw AFB is divided into 13 categories, with the largest land use being airfields, and commercial and medical making up the smallest land uses (Shaw AFB 2009b). The majority of the developed land uses occur north and west of the airfield. Support services and the runway are located in the center of Shaw AFB. The residential areas are located in the northwest portions of the installation. Open space and light development (e.g., munitions storage area and an outdoor recreation facility) are located in the eastern portion of Shaw AFB (Air Force 2008b).

General siting criteria have been established for land development and use at military airfields. For example, APZs, which address height restrictions, development density, and land use in and around military airports, are enforced to reduce the potential for aircraft-related hazards. Clear Zones are established at each end of a runway and are 3,000 feet wide by 3,000 feet long. The DoD requires that control of the land within each Clear Zone be acquired through purchase, lease, or easement to minimize exposure and prevent obstructions. Land use within a Clear Zone is restricted to utility lines, roadways, and limited agricultural uses. Current incompatible uses within the Clear Zone outside of the base include commercial, light and heavy industrial and agricultural uses (Air Force 2007b). Existing land uses within APZ I and APZ II include open space and heavy industrial use. Heavy industrial uses are conditionally compatible in APZ I (Shaw AFB 2006).

Existing Aircraft Noise and Land Use Compatibility Surrounding the Base

Land use activities most sensitive to noise typically include residential and commercial areas, public services, and areas associated with cultural and recreational uses. Noise measurements related to aircraft operations that define the area of noise impact are expressed in terms of DNL. The DNL represents the average annual day community noise exposure from aircraft operations during a 24-hour period over a year (refer to Section SH3.2, Noise for more details on DNL). DNL also considers an additional weighting for nighttime operations. 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.

Shaw AFB is located within the city limits of Sumter, approximately 10 miles west of the city center. Zoning around the base includes the local designations of heavy industrial and limited commercial zones. Varying degrees of residential densities are permitted around the base and general commercial businesses are permitted along the major roads. To the north, northwest, and southeast, residential developments surround the base. Commercial development occurs on the major roads, including U.S. Highways 76/3/78 and 521 and State Route (SR)-441.

Sumter County's 2030 Comprehensive Plan (Sumter County 2009) and Joint Compatible Land Use Study at Poinsett ECR (Robert and Company 2002) have been adopted by both the county and the City of Sumter. These documents describe land uses, identify encroachment areas, recommend modifications to the county zoning ordinance, address long-range infrastructure improvements, and describe growth trends for the area surrounding the airfield.

The 2001 AICUZ study for Shaw AFB was updated in 2007 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. However, the updated study (Air Force 2007b) was not released to the public.

Zoning areas surrounding the installation currently exposed to noise levels 65 dB DNL or higher consist of industrial, commercial, residential, and open space areas (Table SH3-10-2). Noise sensitive receptors (schools, hospitals and churches) potentially affected by the proposed action are discussed in detail in the Section SH3.2, Noise. A total of 282 acres of residential areas are currently exposed to noise levels between 65 and 70 dB DNL, with 64 acres exposed to noise levels between 70 and 75 dB DNL, and 6 acres within the 75 to 80 dB DNL contour band. Housing in areas exposed to noise of 70 dB DNL or greater is inconsistent with land use standards.

Table SH3.10-2. Off-Base Land Uses Affected by Noise Levels 65 dB DNL and Greater under all ACC Scenarios

Land Use Category	*65-70 dB DNL*			*70-75 dB DNL*			*75-80 dB DNL*			*80-85 dB DNL*			*85+ dB DNL*			*Totals*		
	Baseline	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*	*Baseline*	*Proposed*	*Acres Change*
ACC Scenario 1																		
Residential	282	43	-239	64	8	-56	6	0	-6	0	0	0	0	0	0	352	51	-301
Commercial	298	221	-77	161	56	-105	33	3	-30	0	0	0	0	0	0	492	280	-212
Industrial	858	445	-413	623	417	-206	168	106	-62	7	0	-7	0	0	0	1,656	968	-688
Public/Quasi Public	8	4	-4	5	1	-4	1	1	0	0	0	0	0	0	0	14	6	-8
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Open/Agricultural	2,015	1,463	-552	551	219	-332	0	2	2	0	0	0	0	0	0	2,566	1,684	-882
Unclassified	3	0	-3	0	0	0	0	0	0	0	0	0	0	0	0	3	0	-3
Total	**3,464**	**2,176**	**-1,288**	**1,404**	**701**	**-703**	**208**	**112**	**-96**	**7**	**0**	**-7**	**0**	**0**	**0**	**5,083**	**2,989**	**-2,094**
ACC Scenario 2																		
Residential	282	137	-145	64	25	-39	6	3	-3	0	0	0	0	0	0	352	165	-187
Commercial	298	339	41	161	141	-20	33	17	-16	0	3	3	0	0	0	492	500	8
Industrial	858	475	-383	623	467	-156	168	279	111	7	28	21	0	0	0	1,656	1,249	-407
Public/Quasi Public	8	8	0	5	1	-4	1	2	1	0	0	0	0	0	0	14	11	-3
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Open/Agricultural	2,015	2,950	935	551	755	204	0	61	61	0	0	0	0	0	0	2,566	3,766	1,200
Unclassified	3	0	-3	0	0	0	0	0	0	0	0	0	0	0	0	3	0	-3
Total	**3,464**	**3,909**	**445**	**1,404**	**1,389**	**-15**	**208**	**362**	**154**	**7**	**31**	**24**	**0**	**0**	**0**	**5,083**	**5,691**	**608**
ACC Scenario 3																		
Residential	282	290	8	64	40	-24	6	7	1	0	0	0	0	0	0	352	337	-15
Commercial	298	369	71	161	189	28	33	44	11	0	3	3	0	0	0	492	605	113
Industrial	858	423	-435	623	445	-178	168	405	237	7	81	74	0	0	0	1,656	1,354	-302
Public/Quasi Public	8	7	-1	5	4	-1	1	1	0	0	0	0	0	0	0	14	12	-2
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Open/Agricultural	2,015	4,442	2,427	551	1,323	772	0	161	161	0	0	0	0	0	0	2,566	5,926	3,360
Unclassified	3	0	-3	0	0	0	0	0	0	0	0	0	0	0	0	3	0	-3
Total	**3,464**	**5,531**	**2,067**	**1,404**	**2,001**	**597**	**208**	**618**	**410**	**7**	**84**	**77**	**0**	**0**	**0**	**5,083**	**8,234**	**3,151**

Source: Wyle 2011.

SH3.10.1.2 Environmental Consequences

All proposed scenarios would require new facility construction or modifications to existing facilities. New facilities would be designed and sited to be compatible with the existing base master plan, airfield safety guidelines, and planning documents. New 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 (Section SH3.4). Therefore, changes in noise conditions on and off base represent the focus of this analysis of impacts. 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 land use analysis compares the proposed noise contours for each scenario to: 1) baseline noise contours, which show the existing noise environment, and 2) the noise contours presented in the AICUZ, 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 (refer to Table SH3.10-2 and Figures SH3.10-1, SH3.10-2, and SH3.10-3) for all scenarios. 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 (Figure SH3.10-4 and Table SH3.10-3) for all scenarios.

Table SH3.10-3. Difference Between AICUZ 65 dB DNL and Proposed Scenarios 65 dB DNL in Acres

EIS Land Use Classification	*AICUZ*	*ACC Scenario 1*	*Difference*	*ACC Scenario 2*	*Difference*	*ACC Scenario 3*	*Difference*
Residential	308	51	-257	164	-144	337	29
Commercial	407	279	-128	500	93	605	198
Industrial	1,574	968	-606	1,248	-326	1,355	-219
Public/Quasi Public	13	6	-7	11	-2	12	-1
Recreation	0	0	0	0	0	0	0
Military	2,911	2,289	-622	2,611	-300	2,760	-151
Open Space	2,209	1,684	-525	3,766	1,557	5,926	3,717
Unclassified	0	0	0	0	0	0	0
Total	**7,422**	**5,277**	**-2,145**	**8,300**	**878**	**10,995**	**3,573**

Source: Wyle 2011.

Under ACC Scenario 1 and ACC Scenario 2, the lands designated for residential use affected by noise levels of 65 dB DNL or higher would decrease overall from baseline conditions (refer to Table SH3.10-2). Under these scenarios, no new residential land uses would be subject to incompatible noise levels per Federal Interagency Committee on Urban Noise Standards (FICUN) (Chapter 3, Table 3-3). For ACC Scenario 3, the overall acreage affected by increased noise levels would increase. Some areas zoned for residential use would become subject to incompatible noise levels.

Impacts to noise sensitive receptors (schools, hospitals and churches) from the proposed action are identified and discussed in detail in Section SH3.2, Noise.

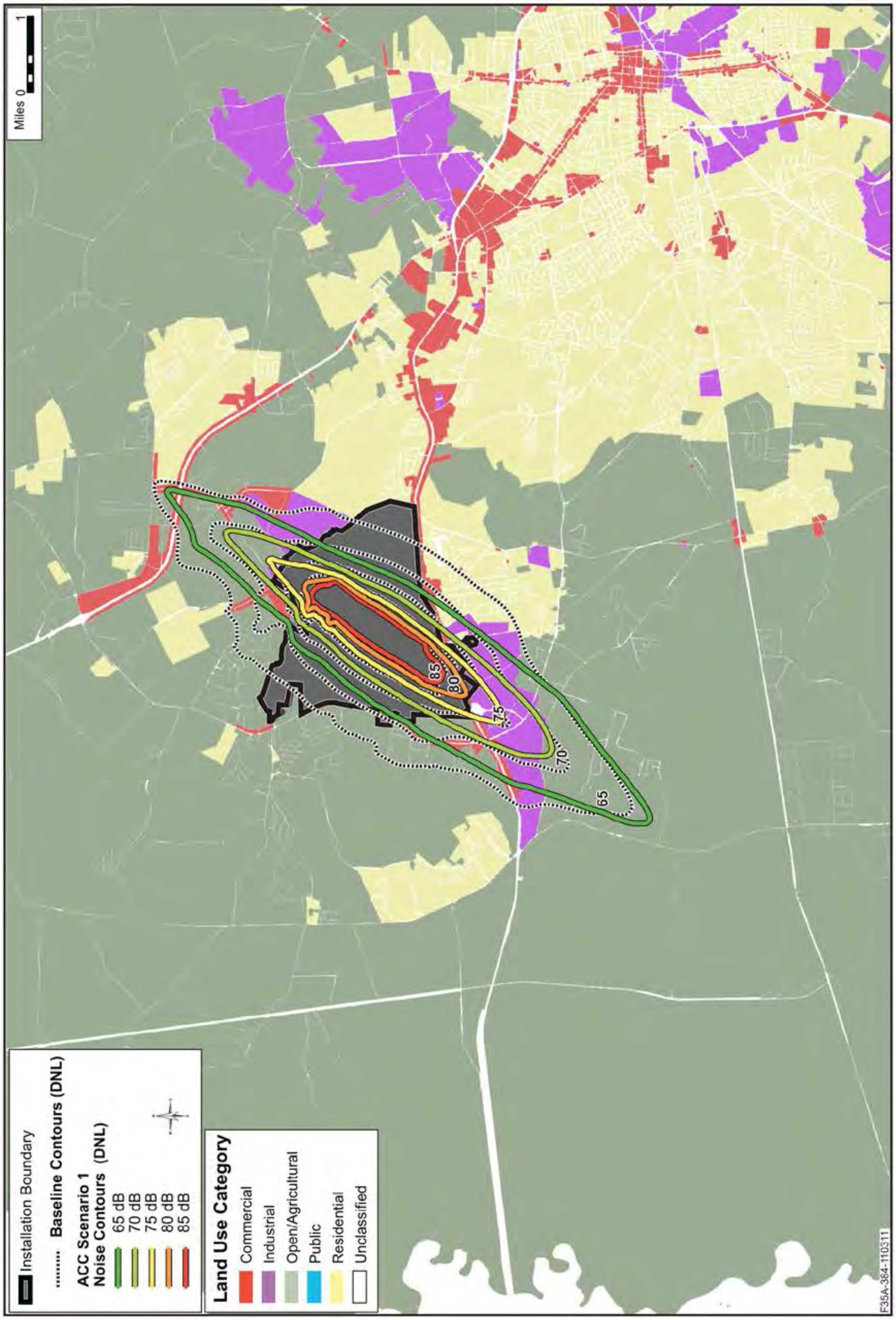

Figure SH3.10-1. Baseline Contours Compared to ACC Scenario 1 Contours Over Land Use Map

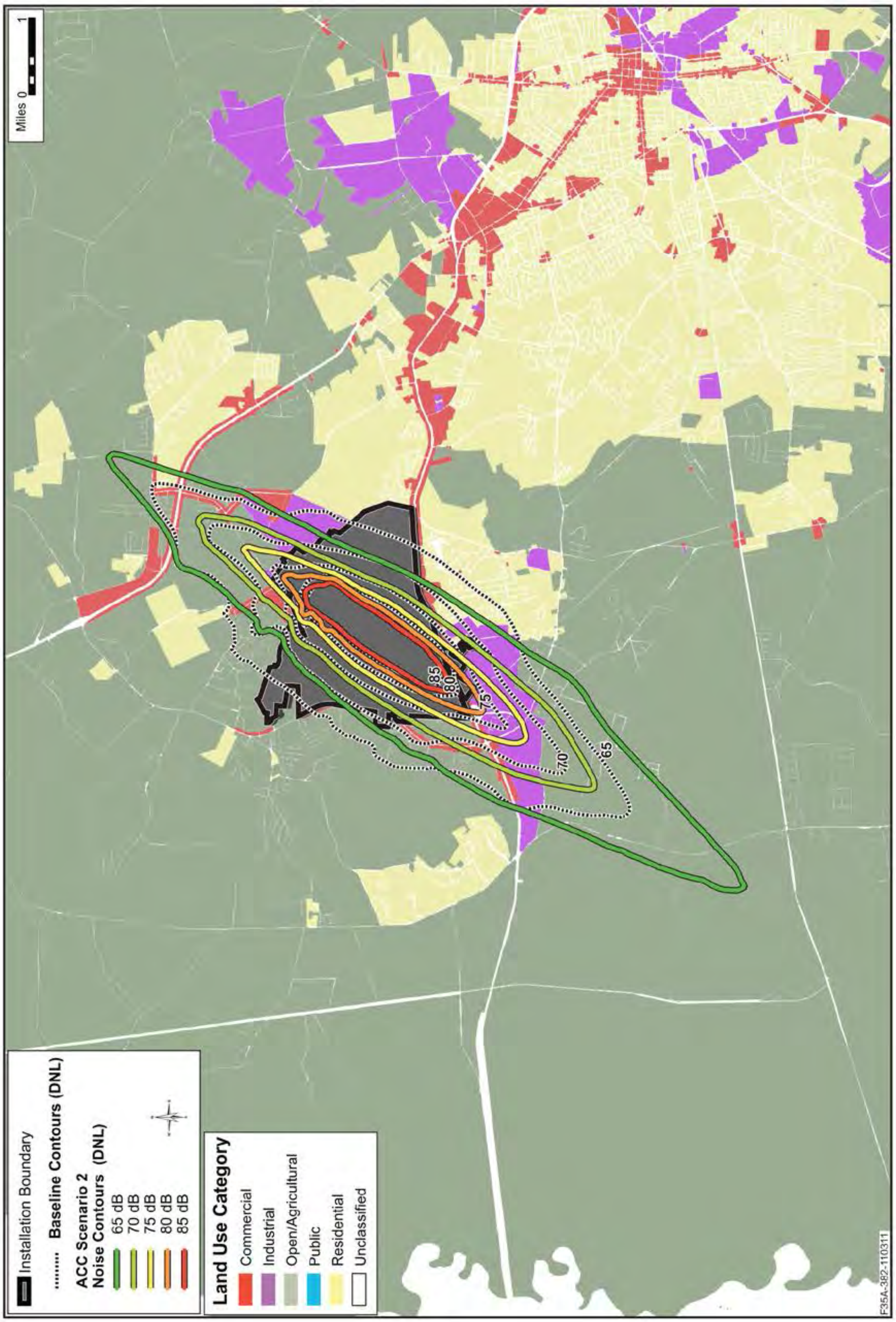

Figure SH3.10-2. Baseline Contours Compared to ACC Scenario 2 Contours Over Land Use Map

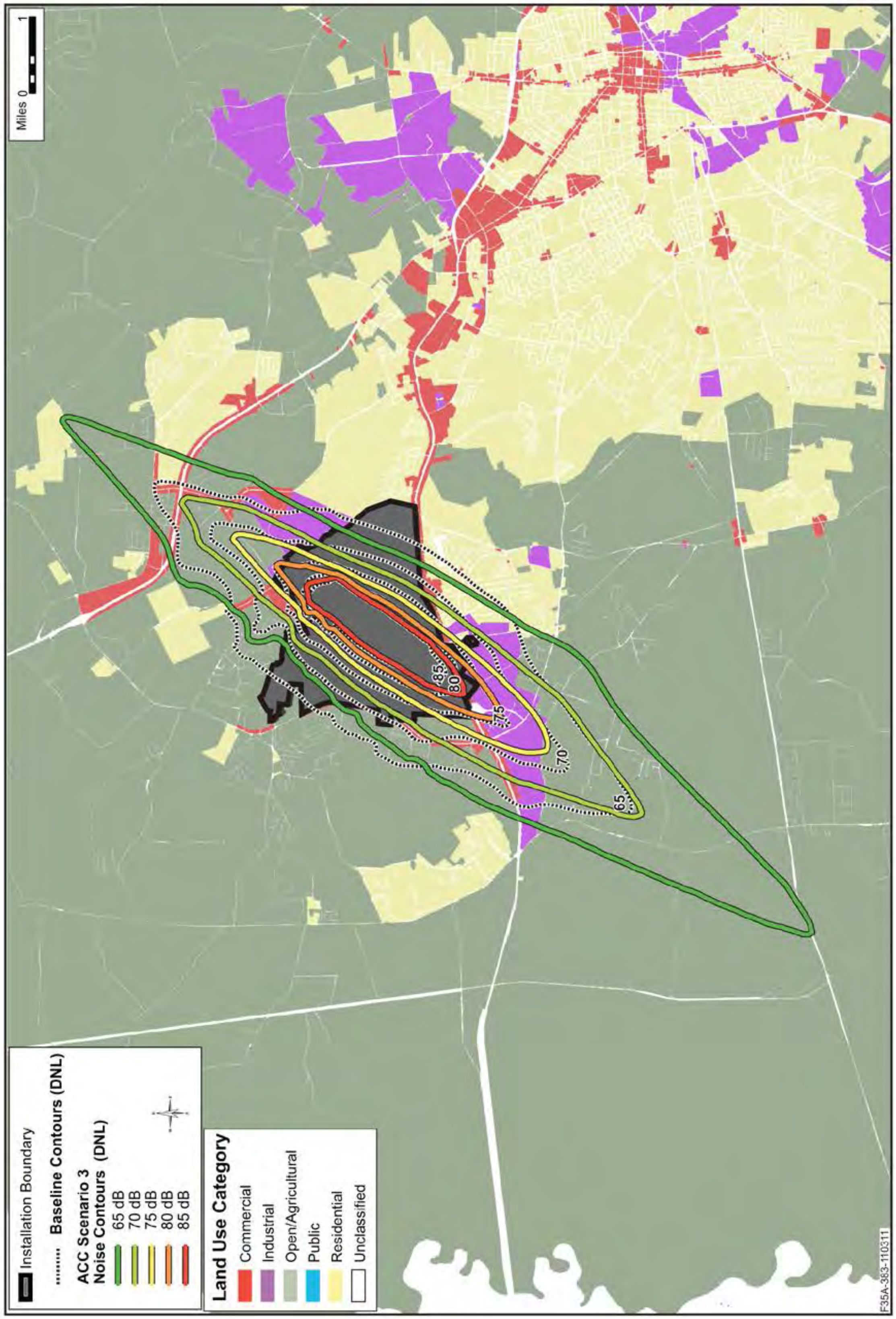

Figure SH3.10-3. Comparison of AICUZ Planning Contours to ACC Scenarios 1, 2, and 3 Over Land Use Map

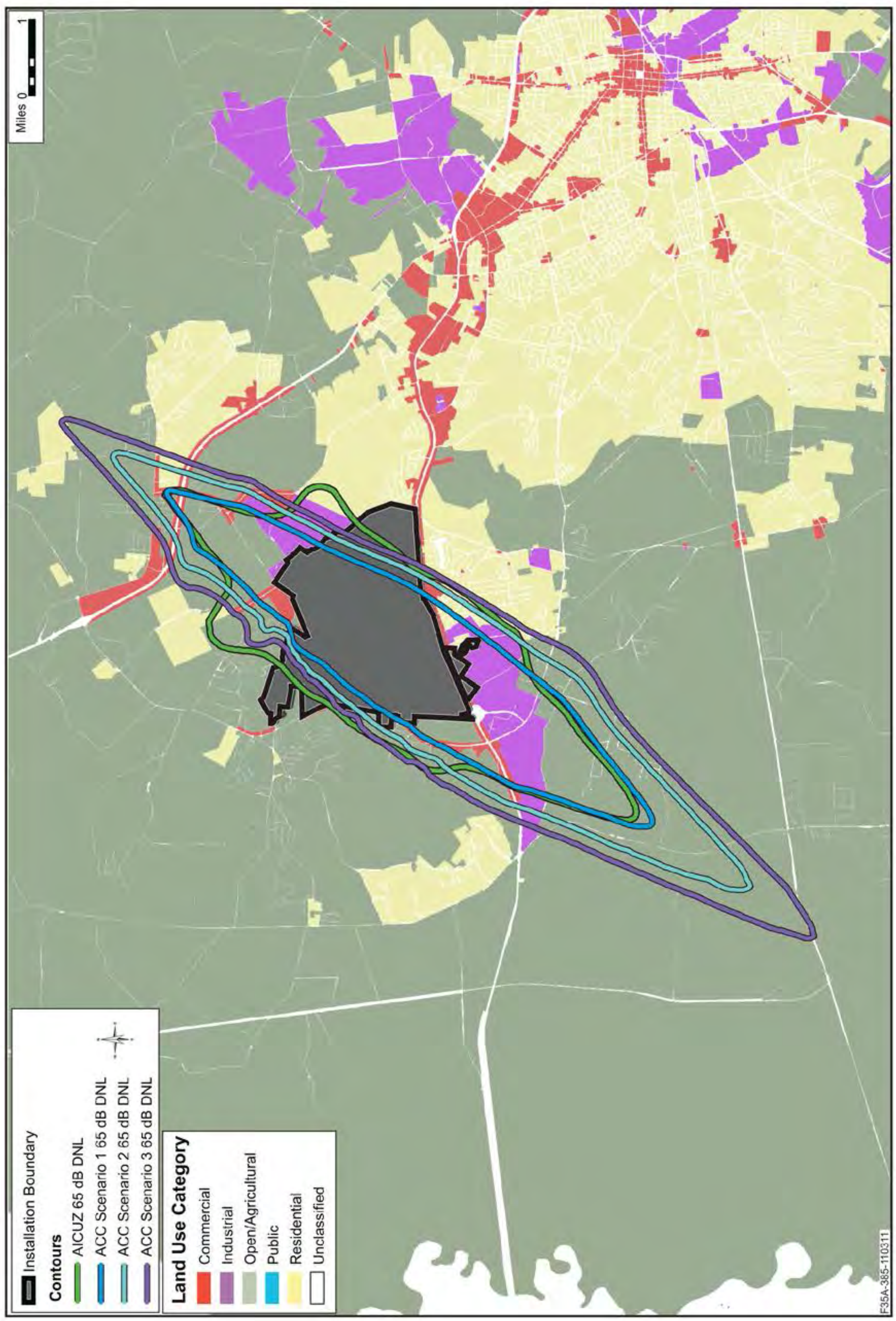

Figure SH3.10-4. Baseline Contours Compared to ACC Scenario 3 Contours Over Land Use Map

ACC Scenario 1

Under ACC Scenario 1, the decrease in airfield operations would result in an overall reduction in the areas affected by noise 65 dB DNL and above (see Section SH3.2, Noise). Residential areas would decrease by: 239 acres in the current 65 to 70 dB DNL contour area, by 56 acres in the current 70 to 75 dB DNL contour area, and by 6 acres the 75 to 80 dB DNL contour area. This would remove 301 acres of residential use from a currently incompatible situation by under FICUN standards (refer to Table SH3.10-2).

The area affected by noise levels equal to or greater than 65 dB DNL would remain smaller than the 65 dB DNL noise area established in the AICUZ. However, due to changes in aircraft operations, the contours would extend north of the AICUZ contour area over agriculture, commercial and residential areas, and south over agricultural use areas (refer to Table SH3.10-3 and Figure SH3.10-4), but overall residential acreage would decrease.

ACC Scenario 2

Under ACC Scenario 2, the total residential area affected by noise levels 65 dB DNL and above would decrease by 187 acres. As such, the total area considered incompatible under FICUN standards (refer to Table SH3.10-2) would also decrease by 187 acres. Only 165 acres of residential land use would be affected. However, more agricultural lands would be affected.

The area affected by noise levels equal to or greater than 65 dB DNL would expand outside the 65 dB DNL noise area established in the 2007 AICUZ. The contours would extend north of the AICUZ contour area over agriculture, commercial and residential areas, and south over agricultural use areas (refer to Table SH3.10-3 and Figure SH3.10-4), but overall residential acreage would decrease.

ACC Scenario 3

Under ACC Scenario 3, the total residential area affected by noise levels 65 dB DNL and above would decrease by a total of 15 acres and the total area considered incompatible under FICUN standards (refer to Table SH3.10-3) would likewise decrease by 15 acres. Affected agricultural lands would double, with all areas increasing by about 3,000 acres.

The area affected by noise levels equal to or greater than 65 dB DNL would expand outside the 65 dB DNL noise area established in the 2007 AICUZ. The contours would extend north of the AICUZ contour area over agriculture, commercial, and residential areas and south over agricultural use areas (refer to Table SH3.10-3 and Figure SH3.10-4). Residential acreage compared to the 2007 AICUZ would increase by 29 acres (9 percent) under ACC Scenario 3.

SH3.10.2 Airspace

SH3.10.2.1 Affected Environment

This section summarizes land uses underlying airspace identified for training activities under the proposed action. No lands occur under the Warning Areas. As illustrated in Figure SH2.2-1, Gamecock and Poinsett overlie lands in South Carolina, and Bulldog overlies lands in Georgia. Land use underlying these airspace units is primarily rural. Agricultural uses include crops and forestry, and 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 were also identified under the airspace. Special use areas occur on public lands with an area or management plan to protect scenic, historic, archaeological, scientific, biological, recreational, or other special resource values. Table SH3.10-4 summarizes land ownership and primary special use areas for each airspace complex.

Table SH3.10-4. Land Ownership and Special Use Areas under Training Airspace

Land Owner	*Acres*	*Special Use Areas*
Gamecock		
USFS	3,413	Francis Marion National Forest
DoD	29,374	US Army Reservation
State of North Carolina	9,169	-
Other	1,694,082	Waccamaw NWR
Total	**1,736,064**	**-**
Poinsett		
State of South Carolina	23,016	Manchester State Forest
Other	145,774	-
Total	**168,790**	**-**
Bulldog		
DoD	3,349	Fort Gordon Garrison
USFWS	126	Savannah NWR, Piedmont NWR
State of Georgia	6,454	Magnolia Springs State Park, George L. Smith State Park, Di-Lane Wildlife Management Area, The Ohoopee Dunes Natural Area
Other	1,479,020	-
Total	**1,488,949**	**-**
Coastal Townsend (without R-3005)		
DoD	32,212	Fort Stewart 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 Alatamaha State Park, Jerico River NA, Little Hogan Island NA, Richmond Hill WMA, Townsend WMA
Private	1,671,586	-
Total	**1,809,346**	**-**
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	**253,790**	**-**

The Gamecock airspace consists of Gamecock B, C, D, and I in South Carolina (refer to Figure 2.2-1). These airspaces primarily extend in altitude from a floor of 10,000 feet MSL to a ceiling of 18,000 feet MSL. However, Gamecock MOAs C and I have a floor of 100 feet 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 D MOA.

Special use areas include a portion of the Waccamaw National Wildlife Refuge (NWR) beneath the eastern corner of the Gamecock airspace (Figure SH3.10-5). 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 2010a). The refuge provides recreational opportunities such as hunting, fishing, and wildlife observation. Notably, the 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 airspace (refer to Figure SH3.10-5). 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.

The Poinsett airspace overlies portions of Sumter County. The area has several state-controlled parklands including Manchester State Forest (refer to Figure SH3.10-5). The Poinsett ECR is situated in the center of Manchester State Forest.

The Bulldog airspace ranges in altitude from 500 feet AGL to 18,000 feet MSL, and overlie 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 and nearly all the land is 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 MOA, is the largest city adjacent to the airspace. Special use areas under the Bulldog airspace include Magnolia Springs State Park in Millen County and George L. Smith State Park in Emanuel County (Figure SH3.10-6) (Georgia DNR 2010). 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 airspace. The Ohoopee River and Little Ohoopee River originate in Washington County and flow under the southwestern portion of Bulldog airspace. These rivers provide numerous recreational opportunities (Georgia River Network 2010). The Ohoopee Dunes Natural Area is in Emanuel County, near the City of Swainsboro.

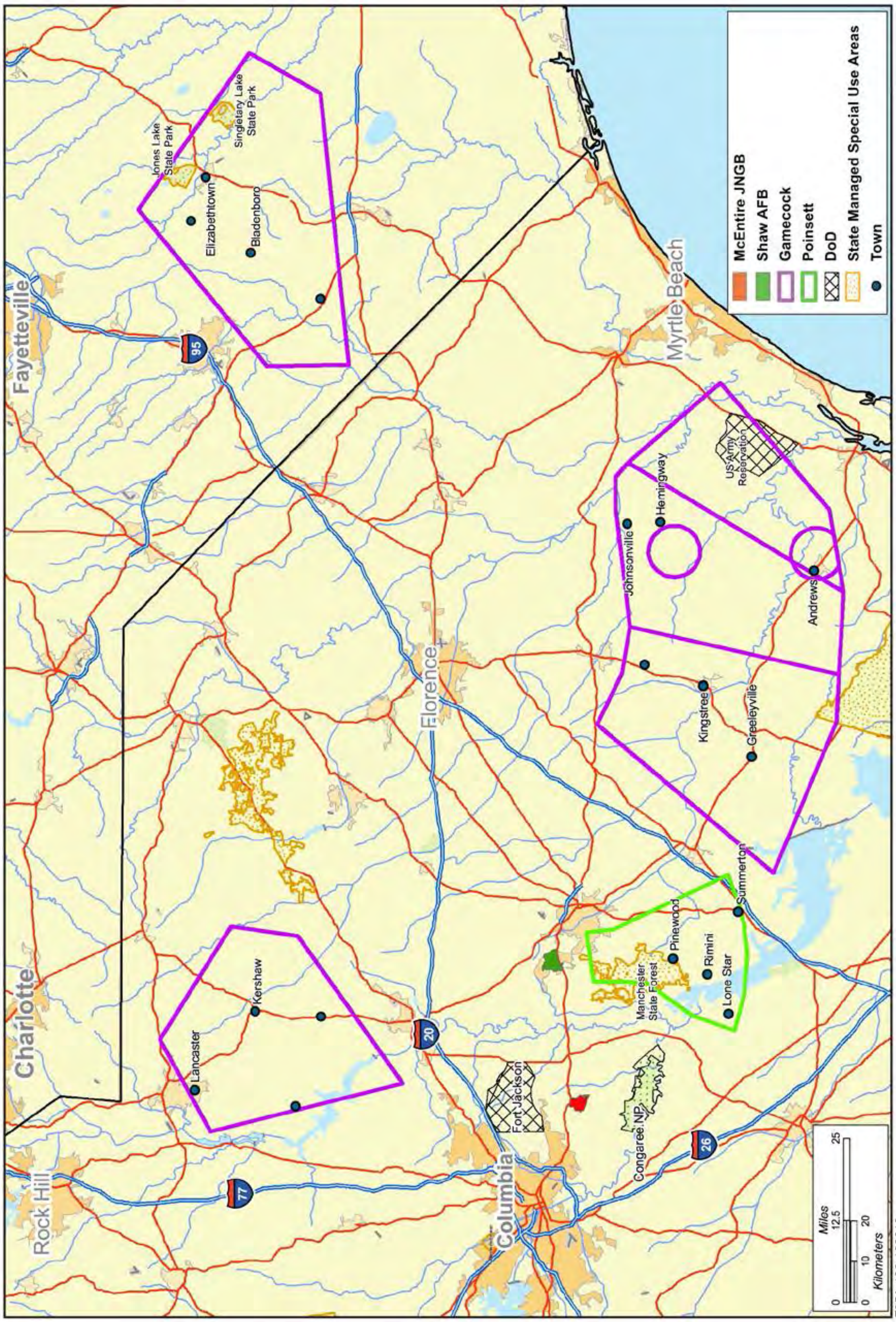

Figure SH3.10-5. Land Use Under Gamecock and Poinsett Airspace

The Coastal Townsend airspace is located 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 Pierce. 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 (Figure SH3.10-6).

The Avon Park Complex 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. The Avon Park Air Force Range is underneath the Avon Park Complex, which includes military use, hunting, camping, and wildlife habitat management. Special use areas under the Avon Park Complex 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.

SH3.10.2.2 Environmental Consequences

Under all 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. FAA 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. While general noise levels would increase, individual overflights occur at various altitudes and are dispersed and transitory in nature. 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.

ACC Scenario 1

Under ACC Scenario 1, operations in all airspace units would decrease. Noise levels in Poinsett would decrease perceptibly from 68 dB L_{dnmr} to 64 dB L_{dnmr}. The noise level of Gamecock would increase perceptibly from a baseline level of 57 dB L_{dnmr} to 60 dB L_{dnmr}. The noise level of Bulldog would increase from a baseline level of 56 dB L_{dnmr} to 58 dB L_{dnmr} and the noise level of Coastal Townsend would increase from a baseline level of 58 L_{dnmr} to 60 L_{dnmr}. The noise level of Avon Park would not change under this scenario. Given the increased altitude of the new aircraft and minimal increases in L_{dnmr} noise levels, the proposed action would not result in any generally perceptible changes in noise to areas located underneath the airspace utilized by Shaw AFB. In addition, the probability of overflight of a specific point 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. Therefore, changes to noise levels would not result in changes to ownership or management plans and policies.

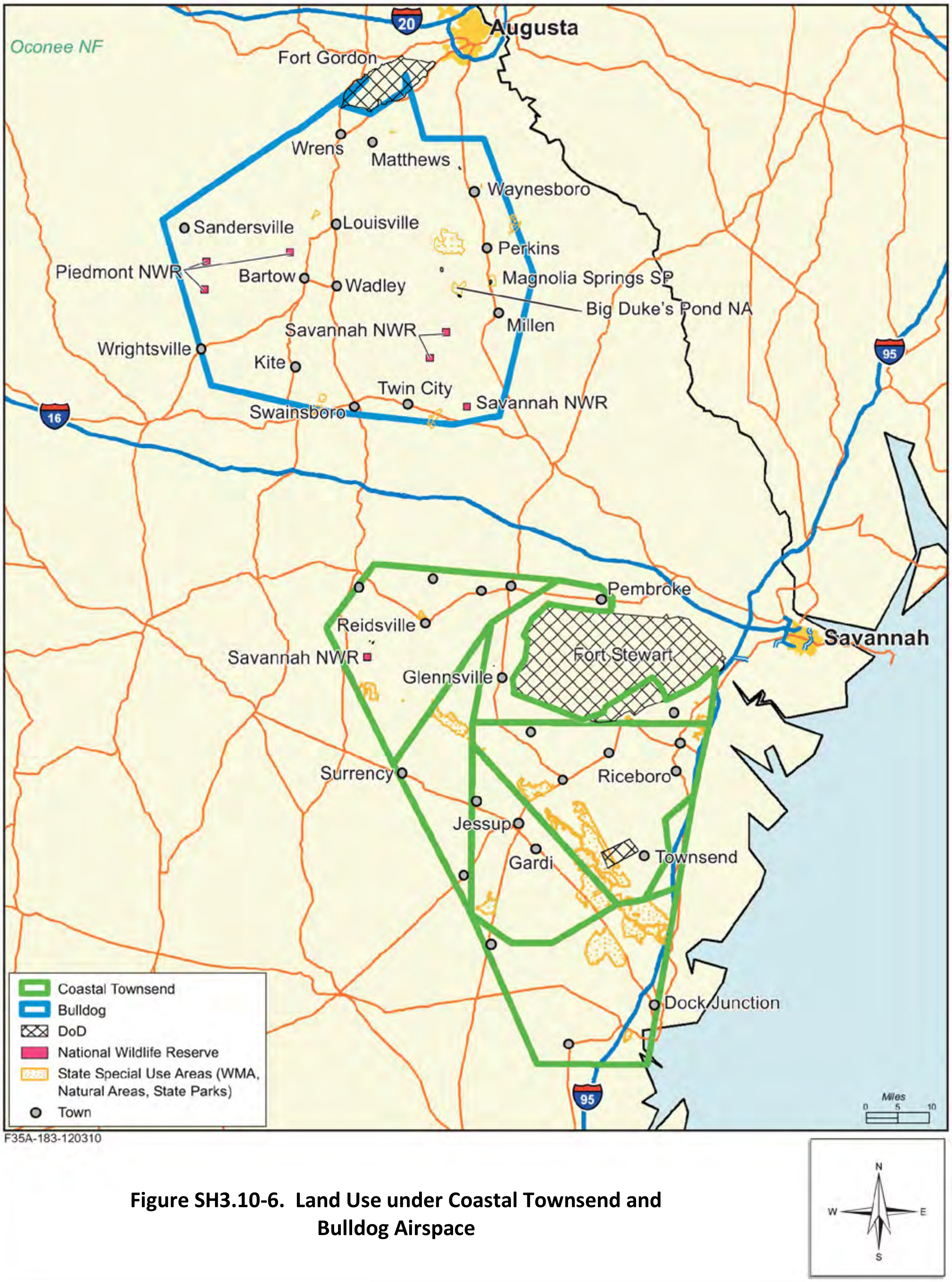

Figure SH3.10-6. Land Use under Coastal Townsend and Bulldog Airspace

ACC Scenario 2

Under ACC Scenario 2, operations in all airspace units decrease, except Coastal Townsend operations which would remain the same. Noise levels in Poinsett would decrease from 68 dB L_{dnmr} to 66 dB L_{dnmr}, an imperceptible change. The noise level of Avon Park would not change under this scenario. Special use areas only comprise approximately 6 percent of the total area underneath the airspace and they are currently overflown by F-16 aircraft. It is therefore expected that there would be no impact to the land use or special use areas underneath Coastal Townsend. As in ACC Scenario 1, the probability of recurring overflight of a specific point remains low. Perceptible increases in noise (≥3 dB) would occur for Gamecock, Coastal Townsend, and Bulldog.

ACC Scenario 3

Under ACC Scenario 3, operations in all airspace units would decrease, except Coastal Townsend which would increase by about one per day. With few operations, noise levels in Poinsett would remain the same as baseline. Noise levels in Bulldog, Gamecock, and Coastal Townsend would increase perceptibly. The noise level of Avon Park would increase imperceptibly from 51 dB L_{dnmr} to 52 dB L_{dnmr}. Special use areas only comprise approximately 6 percent of the total area underneath the airspace and they are currently overflown by F-16 aircraft. It is therefore expected that there would be no impact to the special use areas. As in the other Scenarios, the probability of recurring overflight of a specific point remains low. Changes to noise levels would not result in changes to land use patterns, ownership, or management plans and policies. Therefore, the proposed action would result in no incompatible land use.

SH3.11 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 comparable data among the various locations.

SH3.11.1 Base

SH3.11.1.1 Affected Environment

Employment and Earnings

Information regarding employment and earnings is presented for Sumter 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 Sumter County, the total civilian labor force increased from 44,776 in 2000 to 45,309 in 2010, an increase of approximately 1.2 percent. The largest contributions to employment in 2010 were made by educational services, health care, and social assistance (28 percent); retail trade (13 percent); and manufacturing (12 percent).

Non-farm earnings in Sumter County totaled more than $2.1 billion in 2009. The major contributions were from government and government enterprises (38 percent), manufacturing (15 percent), and health care (11 percent).

In South Carolina, the total civilian labor force increased by 14 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 active duty military personnel stationed at Shaw AFB was 6,211, with an additional 522 appropriated funded civilians, and 559 non-appropriated funded civilians in 2008. There were approximately 8,220 military dependents. The value of payrolls associated with government personnel at Shaw AFB reached over $282 million in 2008 (Air Force 2008b).

Shaw AFB also purchases substantial quantities of goods and services from local and regional firms. In 2008, annual construction and procurement expenditures by the base were more than $126 million. The Air Force estimates that the economic stimulus of Shaw AFB created approximately 2,265 secondary jobs in the civilian economy (Air Force 2008b).

Population

Information describing population is presented for Sumter County and the City of Sumter. 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.

The 2010 Sumter County population was 107,456, a 2 percent increase from 2000. 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

Of the active duty personnel assigned to Shaw AFB in 2008, approximately 19 percent reside on-base in government family and unaccompanied housing (Air Force 2008b). Detailed information regarding the housing contained in Sumter County is from the 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.

There were 46,011 total housing units in Sumter County in 2010, of which approximately 67 percent were owner-occupied. The vacancy rate for the county was approximately 12 percent (U.S. Census Bureau 2010b). Over the period 2000-2010, the annual average number of permits issued for residential housing units was 524 in Sumter County. The number of units permitted on an annual basis varied from a high of 916 in 2007 to a low of 294 in 2000. The majority of these permits (about 84 percent) were for single-family homes (U.S. Census Bureau 2010c).

SH3.11.1.2 Environmental Consequences

ACC Scenario 1

Employment and Earnings

ACC Scenario 1 would result in a decrease of 1,199 military personnel and 121 civilians. The positions would represent approximately 19 percent of existing military and 11 percent of civilian employment at Shaw AFB, and 3 percent of the total civilian labor force in Sumter County. The decrease in positions would result in an annual decrease in salaries of approximately $50.0 million. Total lost salaries would result in about 2 percent of total non-farm earnings in Sumter County.

This loss of regional spending would affect final demand in numerous economic sectors. On-going indirect impacts would result in an estimated 536 lost jobs and an estimated $23.0 million in reduced labor income. The jobs include full- and part-time positions, and the income includes both employee compensation and proprietors' income. These employment impacts represent about 1 percent of the 45,309 people in the region's civilian labor force in 2010 (U.S. Census Bureau 2010b). The long-term loss of the direct military and civilian, and associated secondary positions may result in an increase in the regional unemployment rate as laid-off employees seek new positions. The long-term loss of the direct and associated secondary positions would be partially offset in the short-term by the gain of jobs as a result of construction expenditures, as described below.

Federal, state, and local government tax revenues would decline as a result of this lost economic activity. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would lose approximately $3.7 million annually, and South Carolina and local governments would lose approximately $2.9 million annually. The loss of long-term tax revenues associated with the lost military and civilian positions would be partially offset by the short-term gain in tax revenues associated with construction expenditures.

The combined expenditures for proposed construction and modification projects for this beddown scenario would be $22.15 million during 2014 (refer to Section SH2.1.3 for more information). Total regional employment impacts from construction spending would total an estimated 247 full- and part-time jobs in 2014 including 172 direct construction jobs, 33 indirect jobs to support these construction activities, and 42 induced jobs from regional purchases due to the increased earnings of affected workers. Total labor income impacts are estimated at $10.8 million.

Overall, the total represents less than one percent of the region's civilian labor force in 2010 and the construction employment represents 8.6 percent of the 2,881 total regional construction jobs in 2010 (U.S. Census Bureau 2010b). Therefore, whereas the regional labor force would be able to absorb the indirect and induced jobs, it would be possible that some workers would move into the region in response to the direct job impacts in construction. Such impacts would be short-term though, and it would be expected that any construction workers who in-migrate would most likely leave the region for other opportunities when the construction projects are complete.

Additional taxes would accrue to the federal, state, and local governments as a result of the construction activities. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would collect an additional $1.6 million due to 2013 construction. In addition, South Carolina and local governments would collectively gain $788,000 due to 2013 construction projects.

Population

ACC Scenario 1 would result in a decrease of 1,320 positions if all of the military and civilian positions were reassigned. Under a conservative scenario, the employees would relocate from the region. Combined with their approximately 1,822 family members, this would represent approximately 3 percent of the Sumter County population. ACC Scenario 1 would result in a minor change to regional population.

Housing

ACC Scenario 1 would result in the loss of 1,320 positions. A conservative scenario would result in 1,320 housing units put up for sale at the same time as personnel relocate from the area. This would represent almost 3 percent of the total housing units in Sumter County. Housing impacts would be reduced, however, given that this beddown scenario would be phased over approximately 4 years, and it is unlikely that all military personnel would relocate at the same time or own homes. Further, not all civilian personnel would relocate.

Property values, as described in Appendix C, Section C2.7, are the result of multiple location and other variables. Property in the vicinity of airports and military airfields has been studied to determine if, and to what extent, aircraft noise could contribute to a discount in property values. The 1996 Fidell *et al*. study of two military facilities found indications that aircraft noise had no meaningful effect on residential property values. A 2003 study which combined the results of 33 airfield related property value studies estimated that a property could be discounted between 0.005 and 0.006 per dB DNL between the 65 dB DNL and 75 dB DNL noise contours. The property value discount above 75 dB DNL was not able to be defined based on study data but was estimated to be greater than the discount between 65 and 75 dB DNL (Nelson 2004).

ACC Scenario 2

Employment and Earnings

ACC Scenario 2 would result in a decrease of 667 military personnel and 68 civilians. The positions would represent about 11 percent of existing military and 6 percent of civilian employment at Shaw AFB, and about 2 percent of the total civilian labor force in Sumter County. The decrease in positions would result in an annual decrease in salaries of approximately $27.1 million. Total lost salaries would result in about 1 percent of total non-farm earnings in Sumter County.

This loss of regional spending would affect final demand in numerous economic sectors. On-going indirect impacts would result in an estimated 295 lost jobs and an estimated $12.7 million in reduced labor income. The jobs include full- and part-time positions, and the income includes both employee compensation and proprietors' income. These employment impacts represent less than 1 percent of the 45,309 people in the region's civilian labor force in 2010 (U.S. Census Bureau 2010b). The long-term loss of the direct and associated secondary positions may result in an increase in the regional unemployment rate as laid-off employees seek new positions. The long-term loss of the direct and associated secondary positions would be partially offset in the short-term by the gain of jobs as a result of construction expenditures, as described below.

Federal, state, and local government tax revenues would decline as a result of this lost economic activity. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would lose approximately $2.1 million annually, and South Carolina and local governments would lose approximately $1.6 million annually. The loss of long-term tax revenues associated with the lost military positions would be partially offset by the short-term gain in tax revenues associated with construction expenditures.

The combined expenditures for proposed construction and modification projects for this beddown scenario would be $22.3 million during 2014 (refer to Section SH2.1.3 for more information). Total regional employment impacts from construction spending would total an estimated 249 full- and part-time jobs in 2013 including 174 direct construction jobs, 33 indirect jobs to support these construction activities, and 42 induced jobs from regional purchases due to the increased earnings of affected workers. Total labor income impacts are estimated at $10.8 million.

Overall, the total represents less than 1 percent of the region's civilian labor force in 2010 and the construction employment represents 8.6 percent of the 2,881 total regional construction jobs in 2010 (U.S. Census Bureau 2010b). Therefore, whereas the regional labor force would be able to absorb the indirect and induced jobs, it would be possible that some workers would move into the region in response to the direct job impacts in construction. Such impacts would be short-term though, and it would be expected that any construction workers who in-migrate would most likely leave the region for other opportunities when the construction projects are complete.

Additional taxes would accrue to the federal, state, and local governments as a result of the construction activities. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would collect an additional $1.6 million due to 2014 construction. In addition, South Carolina and local governments would collectively gain $794,000 due to 2013 construction projects.

Population

ACC Scenario 2 would result in a decrease of 735 positions if all of the military and civilian positions were reassigned. Under a conservative scenario, the employees would relocate from the region. Combined with their approximately 1,014 family members, this would represent almost 2 percent of the Sumter County population. ACC Scenario 2 would result in a minor change to regional population.

Housing

ACC Scenario 2 would result in the loss of 735 positions. A conservative scenario would result in 735 housing units put up for sale at the same time as personnel relocate from the area. This would represent approximately 2 percent of the total housing units in Sumter County. Housing impacts would be reduced, however, given that this beddown scenario would be phased over approximately 4 years, and it is unlikely that all military personnel would relocate at the same time or own homes. Further, not all civilian personnel would relocate.

Property values, as described in Appendix C, Section C2.7, are the result of multiple location and other variables. Property in the vicinity of airports and military airfields has been studied to determine if, and to what extent, aircraft noise could contribute to a discount in property values. The 1996 Fidell *et al*. study of two military facilities found indications that aircraft noise had no meaningful effect on residential property values. A 2003 study which combined the results of 33 airfield related property value studies estimated that a property could be discounted between 0.005 and 0.006 per dB DNL between the 65 dB DNL and 75 dB DNL noise contours. The property value discount above 75 dB DNL was not able to be defined based on study data but was estimated to be greater than the discount between 65 and 75 dB DNL (Nelson 2004).

ACC Scenario 3

Employment and Earnings

ACC Scenario 3 would result in a decrease of 135 military personnel and 15 civilians. The positions would represent about 2 percent of existing military and 1 percent of civilian employment at Shaw AFB, and less than 1 percent of the total civilian labor force in Sumter County. The decrease in full-time positions would result in an annual decrease in salaries of approximately $4.3 million. Total lost salaries would result in less than 1 percent of total non-farm earnings in Sumter County.

This loss of regional spending would affect final demand in numerous economic sectors. On-going indirect impacts would result in an estimated 54 lost jobs and an estimated $2.4 million in reduced labor income. The jobs include full- and part-time positions, and the income includes both employee compensation and proprietors' income. These employment impacts represent less than 1 percent of the 45,309 people in the region's civilian labor force in 2010 (U.S. Census Bureau 2010b). The long-term loss of the direct and associated secondary positions may 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, as described below.

Federal, state, and local government tax revenues would decline as a result of this lost economic activity. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would lose approximately $382,000 annually, and South Carolina and local governments would lose approximately $279,000 annually. The loss of long-term tax revenues associated with the lost military positions would be partially offset by the short-term gain in tax revenues associated with construction expenditures.

The combined expenditures for proposed construction and modification projects for this beddown scenario would be $22.45 million during 2014 (refer to Section SH2.1.3 for more information). Total regional employment impacts from construction spending would total an estimated 250 full- and part-time jobs in 2014 including 175 direct construction jobs, 33 indirect jobs to support these construction activities, and 42 induced jobs from regional purchases due to the increased earnings of affected workers. Total labor income impacts are estimated at $11.0 million.

Overall, the total represents less than 1 percent of the region's civilian labor force in 2010 and the construction employment represents 8.7 percent of the 2,881 total regional construction jobs in 2010 (U.S. Census Bureau 2010b). Therefore, whereas the regional labor force would be able to absorb the indirect and induced jobs, it would be possible that some workers would move into the region in response to the direct job impacts in construction. Such impacts would be short-term though, and it would be expected that any construction workers who in-migrate would most likely leave the region for other opportunities when the construction projects are complete.

Additional taxes would accrue to the federal, state, and local governments as a result of the construction activities. According to the social accounting framework used for this analysis (Minnesota IMPLAN Group 2010), the federal government would collect an additional $1.6 million due to 2014 construction. In addition, South Carolina and local governments would collectively gain $800,000 due to 2013 construction projects.

Population

ACC Scenario 3 would result in a decrease of 150 positions if all of the military and civilian positions were reassigned. Under a conservative scenario, the employees would relocate from the region. Combined with their approximately 208 family members, this would represent less than 1 percent of the Sumter County population. ACC Scenario 3 would not result in a noticeable change to regional population.

Housing

ACC Scenario 3 would result in the loss of 150 positions. A conservative scenario would result in 150 housing units put up for sale at the same time as personnel relocate from the area. This would represent less than 1 percent of the total housing units. Housing impacts would be reduced, however, given that this beddown scenario would be phased over approximately 4 years, and it is unlikely that all military personnel would relocate at the same time or own homes. Further, not all civilian personnel would relocate.

Property values, as described in Appendix C, Section C2.7, are the result of multiple location and other variables. Property in the vicinity of airports and military airfields has been studied to determine if, and to what extent, aircraft noise could contribute to a discount in property values. The 1996 Fidell *et al*. study of two military facilities found indications that aircraft noise had no meaningful effect on residential property values. A 2003 study which combined the results of 33 airfield related property value studies estimated that a property could be discounted between 0.005 and 0.006 per dB DNL between the 65 dB DNL and 75 dB DNL noise contours. The property value discount above 75 dB DNL was not able to be defined based on study data but was estimated to be greater than the discount between 65 and 75 dB DNL (Nelson 2004).

SH3.12 Environmental Justice/Protection of Children

SH3.12.1 Base

SH3.12.1.1 Affected Environment

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.

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.

Minority and Low-Income Populations

Shaw AFB is located approximately 10 miles west of the center of the City of Sumter in Sumter County, South Carolina. Table SH3.12-1 displays the total minority and low-income populations and the proportional representation compared to total state population. This information is derived from the 2010 U.S. Census of Population, which is the latest source of information that is comparable at the required level of detail. Based on the 2010 data, 32 percent of the State of South Carolina’s population was composed of minorities and 17 percent were low-income populations. In Sumter County, however, 51 percent of the population was minority and 18 percent was considered low income. For the City of Sumter the proportion of the population considered minority was 55 percent in 2010; 20 percent of the city’s population was considered low income. Sumter County represents the primary area of comparison for this analysis since it encompasses the city, Shaw AFB, and additional areas potentially affected by aircraft noise.

Table SH3.12-1. Total Minority and Low-Income Populations Within the Vicinity of Shaw AFB							
Geographic Area	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]	*Children Under Age 18*	*Percent Children*
City of Sumter	40,524	22,167	54.7%	8,064	19.9%	10,496	25.9%
Sumter County	107,456	54,265	50.5%	19,664	18.3%	27,079	25.2%
South Carolina	4,625,364	1,461,615	31.6%	786,312	17.0%	1,068,459	23.1%

Source: U.S. Census Bureau 2010b.
Note: [1]The 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 SH3.12-2 displays the total, minority, and low-income populations and the proportional representation exposed to noise levels 65 dB DNL and greater at Shaw AFB under baseline. Out of the total population (107,456) of Sumter County, 3,785 individuals (or 3.5 percent) are subjected to noise levels 65 dB DNL and greater. Of the total population within noise contour bands 65 dB DNL and greater (3,785), 71 percent are considered minority and 19 percent are low-income populations. The proportion of both minority and low-income affected by noise levels 65 dB DNL and greater exceeds that found at both the county and state levels. Under baseline conditions there are disproportionate impacts to both minority and low-income populations when compared to county- and state-wide populations. However, when compared to the Sumter County total minority and low-income populations,—only 3.6 percent of minority and 3.7 percent of low-income populations are exposed to noise levels 65 dB DNL and greater, thereby reducing the scope of the disproportionate impact

Table SH3.12-2. Total Baseline Minority and Low-Income Population Affected by Noise Greater than 65 dB DNL at Shaw AFB					
Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	2,415	1,251	52%	461	19%
70 – 75	1,075	580	54%	208	19%
75 – 80	276	130	47%	56	20%
80 – 85	19	10	53%	3	16%
85+	0	0	0	0	0
Total	**3,785**	**1,971**	**71%**	**728**	**19%**

Source: U.S. Census Bureau 2010b.
Note: [1]The 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 2010, the number of children under the age of 18 living in the City of Sumter was 8,039 (22 percent of the population). Sumter County had 28 percent of the population under the age of 18 in 2000 (see Table SH3.12-1). Currently, there are seven schools and child care centers that are exposed to aircraft noise greater than 65 dB DNL.

SH3.12.1.2 Environmental Consequences

For each scenario, noise levels of 65 dB DNL or greater were identified (see Noise, Section SH3.2). Within the noise contour bands, the affected population was determined using 2010 Census Bureau census block group data. Table SH3.12-3 provides the proposed total population that would be affected for each of the scenarios by noise levels of 65 dB DNL and greater. When compared to baseline conditions, there would be reductions under all three scenarios in the number of people exposed to noise levels 65 dB DNL and greater. These reductions result from a shift in the noise contours to affect areas with less population.

Table SH3.12-3. Shaw AFB ACC Scenarios 1, 2, and 3 Projected Population Totals Affected by Noise Greater than 65 dB DNL

Noise Contour	*Baseline*	*ACC Scenario 1*	*ACC Scenario 2*	*ACC Scenario 3*
65 – 70	2,415	1,119	1,732	2,267
70 – 75	1,075	407	801	1,068
75 – 80	276	78	209	345
80 – 85	19	16	41	68
85+	0	0	0	13
Total	**3,785**	**1,620**	**2,783**	**3,761**

Source: U.S. Census Bureau 2010b.

ACC Scenario 1

Minority and Low-Income Populations

Table SH3.12-4 displays the affected population in the vicinity of Shaw AFB where noise levels greater than 65 dB DNL would occur under ACC Scenario 1. Out of the total population (107,456) of Sumter County, 1,620 individuals (or 1.5 percent) would be subjected to noise levels 65 dB DNL and greater generated at Shaw AFB. Of the total population (1,620) exposed to noise contour bands 65 dB DNL and greater, 48 percent would consist of minority and 20 percent would be low-income populations. Compared to baseline, this scenario would result in a marked reduction in affected minority populations and no appreciable change for low-income populations. Relative to state proportions, both minority and low-income populations exposed to noise levels 65 dB DNL and greater would be considered disproportionate under ACC Scenario 1. However, when compared to Sumter County total minority and low-income populations, only 1.6 percent of minority and 1.6 percent of low-income populations would be exposed to noise levels 65 dB DNL and greater, thereby reducing the magnitude of the disproportionate impact. Moreover, the total number of minority and low-income residents would decrease.

Table SH3.12-4. Total Minority and Low-Income Populations Affected by Noise Greater than 65 dB DNL under Shaw AFB ACC Scenario 1					
Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	1,119	574	51%	215	19%
70 – 75	407	219	54%	82	20%
75 – 80	78	46	59%	18	23%
80 – 85	16	8	50%	3	19%
85+	0	0	0	0	0
Total	**1,620**	**847**	**48%**	**318**	**20%**
Baseline Conditions	*3,785*	*1,971*	*71%*	*728*	*19%*

Source: U.S. Census Bureau 2010b.
Note: [1]The 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

Currently there are seven schools exposed to aircraft noise greater than 65 dB DNL. Under ACC Scenario 1, three schools would be exposed to aircraft noise greater than 65 dB DNL. For a discussion of speech interference in the classroom, refer to Section SH 3.2, Noise.

ACC Scenario 2

Minority and Low-Income Populations

Table SH3.12-5 displays the affected population in the vicinity of Shaw AFB where noise levels greater than 65 dB DNL would occur under ACC Scenario 2. Out of the total population (107,456) of Sumter County, 2,783 individuals (or 2.6 percent) would be subjected to noise levels 65 dB DNL and greater. Of the total population (2,783) within noise contour bands 65 dB DNL and greater, 53 percent would consist of minority and 20 percent would be low-income populations. Compared to baseline, this scenario would result in a marked reduction in affected minority populations and no appreciable change for low-income populations. Relative to county and state proportions, both minority and low-income populations exposed to noise levels 65 dB DNL and greater would be considered disproportionate under ACC Scenario 2. However, when compared to Sumter County total minority and low-income populations, only 2.7 percent of minority and 2.7 percent of low-income populations would be exposed to noise levels 65 dB DNL and greater. Additionally, the total number of minority and low-income residents would decrease. Both of these factors would reduce the magnitude of the disproportionate impact.

Table SH3.12-5. Total Minority and Low-Income Populations Affected by Noise Greater than 65 dB DNL under Shaw AFB ACC Scenario 2					
Noise Contour	***Total Population***	***Minority Population***	***Percent Minority***	***Low-Income Population***	***Percent Low-Income***[1]
65 – 70	1,732	922	53%	337	19%
70 – 75	801	401	50%	153	19%
75 – 80	209	122	58%	45	22%
80 – 85	41	24	59%	9	22%
85+	0	0	0	0	0
Total	**2,783**	**1,469**	**53%**	**544**	**20%**
Baseline Conditions	*3,785*	*1,971*	*71%*	*728*	*19%*

Source: U.S. Census Bureau 2010b.
Note: [1]The 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

Under ACC Scenario 2, five schools would continue to be exposed to aircraft noise greater than 65 dB DNL. For a discussion of speech interference in the classroom, refer to Section SH3.2, Noise.

ACC Scenario 3

Minority and Low-Income Populations

Table SH3.12-6 displays the affected population in the vicinity of Shaw AFB where noise levels greater than 65 dB DNL would occur under ACC Scenario 3. Out of the total population (107,456) of Sumter County, 3,761 individuals (or 4 percent) would be subjected to noise levels 65 dB DNL and greater. Of the total population (3,761) within noise contour bands 65 dB DNL and greater, 53 percent would be considered minority and 19 percent would be low-income populations. In comparison to baseline conditions, both of these proportions would be less under ACC Scenario 3. As with ACC Scenario 2, when ACC Scenario 3 proportional impacts to minority and low-income populations are compared to county and state proportions, there would be disproportionate effects. However, when compared to Sumter County total minority and low-income populations, only 3.7 percent of minority and low-income populations would be exposed to noise levels 65 dB DNL and greater. Additionally, the total number of minority and low-income residents affected by noise levels 65 dB DNL and greater would nearly be the same as found under baseline conditions. Both of these factors would reduce the magnitude of the disproportionate impact.

Table SH3.12-6. Total Minority and Low-Income Populations Affected by Noise Greater than 65 dB DNL under Shaw AFB ACC Scenario 3					
Noise Contour	*Total Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*[1]
65 – 70	2,267	1,198	53	439	19
70 – 75	1,068	539	50	204	19
75 – 80	345	195	57	72	21
80 – 85	68	41	60	16	24
85+	13	7	0	2	15
Total	**3,761**	**1,980**	**53%**	**733**	**19%**
Baseline Conditions	*3,785*	*1,971*	*71%*	*728*	*19%*

Source: U.S. Census Bureau 2010b.
Note: [1]The 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

Currently, there are seven schools that are exposed to aircraft noise greater than 65 dB DNL. Under ACC Scenario 3, eight schools would be exposed to aircraft noise greater than 65 dB DNL. For a discussion of speech interference in the classroom, refer to Section SH3.2, Noise.

SH3.12.2 Airspace

SH3.12.2.1 Affected Environment

Aircraft operating out of Shaw AFB train in airspace that overlies land in South Carolina, North Carolina, Florida, and Georgia. In general, land underlying these airspace units is rural in nature, with communities widely dispersed. Major portions of the lands, especially at Avon Park, Poinsett, and Coastal Townsend, consist of military ranges containing no populations.

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 Shaw AFB 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.

SH3.12.2.2 Environmental Consequences

No disproportionate impacts related to environmental justice are anticipated, nor would there be any increased health or safety risks to children. Section SH3.2 discusses noise levels within the training airspace. Noise levels would increase perceptibly (3 dB or greater) from baseline for Bulldog (ACC Scenarios 2 and 3), Gamecock (all scenarios), and Coastal Townsend (ACC Scenarios 2 and 3); for Poinsett, levels would fall below or match baseline and at Avon Park, noise would increase by 1 dB under ACC Scenario 3. However, average noise levels in all airspace except Poinsett and Gamecock under ACC Scenario 3 would remain well below 65 dB L_{dnmr}. In the Poinsett airspace, noise would remain unchanged at 68 dB L_{dnmr}. Since no disproportionate impacts to minority or low-income populations result under baseline conditions for Poinsett, none would occur with implementation of this scenario.

For Gamecock under ACC Scenario 3, noise levels would reach 65 dB L_{dnmr}, the threshold for assessing Environmental Justice impacts. Gamecock consists of several related airspace sub-units (MOAs) over North and South Carolina. Although the area under Gamecock tend to consist of rural lands with dispersed populations, densities for the affected counties range from about 50 to 175 persons per square mile. While these densities are driven up by larger communities within the counties but not under the airspace, they reflect sufficient population to warrant consideration for impacts. Review of county data reveals that minority and low-income populations occur in higher proportions than state or national levels. As such, the potential exists for disproportionate impacts to minority and low-income populations under the Gamecock airspace.

Higher altitudes and reduced operations flown by the F-35As would ameliorate impacts (if any) to children. As presented in Section SH3.3, 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 SH3.4.

SH3.13 Community Facilities and Public Services

SH3.13.1 Base

SH3.13.1.1 Affected Environment

Potable Water

Potable water on Shaw AFB is supplied by six wells within the installation that access the Black Creek Aquifers (Shaw AFB 2006b). These wells are capable of yielding up to 750 gallons per minute; however, two of them are non-operational. The remaining wells have a capacity to provide 2.4 million gallons per day, based on a 16-hour pumping day. The water is treated with chlorine, fluoride, and calcium at each well site prior to storage in one of three aboveground storage tanks. The total storage capacity for potable water is 900,000 gallons. Additionally, there are two ground-level storage tanks that provide

1,000,000 gallons of potable water to support the fire protection system (Shaw AFB 2010a). Currently, Shaw AFB demands 0.60 million gallons of water per day (personal communication, McKay 2010).

The base water supply also has two interconnections with the High Hills Rural Water Company and one interconnection with the City of Sumter Water System. These interconnections are rarely used and are intended for emergencies (Shaw AFB 2010a).

Wastewater Treatment

Shaw AFB discharges domestic and industrial wastewater to an on-base wastewater treatment plant. Five lift stations move the wastewater from the main cantonment and housing areas to the wastewater treatment plant where preliminary, secondary, and tertiary treatment processes are conducted. After treatment, the wastewater is then discharged into the Wateree River. The discharge is covered under NPDES General Permit SC0024970 for Stormwater Discharge from Industrial Activity. The wastewater treatment plant is designed to treat wastewater at a maximum flow of 1.2 million gallons per day. Currently, the flow is approximately 0.85 million gallons per day (Shaw AFB 2007).

Electric Power and Natural Gas

Shaw AFB purchases power from the Carolina Power and Light Company (a subsidiary of Progress Energy) and the Black River Electric Cooperative. Carolina Power and Light Company provides electricity to the main cantonment area and the majority of the housing area, and Black River Electric Cooperative supports the remaining housing and southeastern portion of the base. The total capacity of the base electrical system is 27.6 megawatts and FY 2007 consumption was approximately 61 percent at peak periods (Shaw AFB 2010a).

Natural gas is provided by South Carolina Pipeline via a 4-inch pipeline entering the base at the junction of Frierson Road and Sweeney Street. The capacity of the system is 150,000 cubic feet per day and is approximately 21.5 percent utilized (Shaw AFB 2010a).

Solid Waste Management

Solid waste is managed in accordance with the Shaw AFB Solid Waste Management Plan and guidelines specified in AFI 32-7042, *Waste Management* (2009). Various users at the installation generate solid waste in the form of office trash, nonhazardous industrial wastes, normal municipal waste, and construction debris. Currently, Shaw AFB generates an average of 30 tons of solid waste per month of which nearly 11 tons are recycled (personal communication, Johnson 2010). Construction and demolition waste that cannot be recycled is disposed of at Sumter County Construction and Demolition Landfill (South Carolina DHEC 2010a). Other municipal solid waste from the base is sent to the Lee County Municipal Solid Waste Landfill (Shaw AFB 2005). The Lee County Landfill accepts approximately 4,000 tons of solid waste (including construction and demolition waste) per day and has an expected remaining life of 15-17 years (South Carolina DHEC 2010b).

The base has a two-year recycling contract with Atlantic Coast Containers. The on-base recycling service is composed of two parts: military family housing and the industrial sector. Mixed recyclables are collected in the housing areas while only mixed paper and cardboard is collected in the industrial sector. Recyclables are stored at the Recycling Center before going off-base (Shaw AFB 2005).

Schools

There is one school district in Sumter County; within the county there are six elementary schools, two middle schools, and three high schools (Sumter County 2010). Two schools are located on-base: High Hills Elementary serving grades four and five and Shaw Heights Elementary. Enrollment in Sumter County schools has been on a steady decline for the past 6 years, falling from 5,401 in FY04 to 5,160 students in FY 2009 (Sumter County 2010).

SH3.13.1.2 Environmental Consequences

Under ACC Scenarios 1, 2, and 3, there would be an overall decrease in the number of personnel and dependents located at Shaw AFB. Under ACC Scenario 1, there would be a 15 percent decrease when compared with the total authorized personnel. Under ACC Scenario 2, there would be an 8 percent decrease, and under ACC Scenario 3 there would be a 2 percent decrease when compared with the total authorized personnel at Shaw AFB. 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 Shaw AFB and within the surrounding community or remain consistent with that of baseline conditions. Therefore, these scenarios are not addressed further within this section.

However, under all three scenarios, as a result of the proposed construction and internal alterations to existing facilities, there would be an increase of 2.6 acres of impervious surface. The building space and facilities to be constructed would generate construction and demolition debris requiring landfill disposal. Off-installation contractors completing construction projects would be responsible for disposing of waste generated from construction activities. Contractors are required to comply with federal, state, local, and Air Force regulations for the collection and disposal of municipal solid waste from the installation. Much of this material can be recycled or reused, or otherwise diverted from landfills, per the Air Force Qualified Recycling Program (Shaw AFB 2009b). All non-recyclable construction and demolition waste would be collected in a dumpster until removal off-site and would be hauled away by the contractor to Sumter County Construction and Demolition Landfill.

Construction and demolition waste contaminated with hazardous waste, ACM, LBP, or other undesirable components would be removed by licensed contractors and disposed of in a local hazardous waste-permitted landfill in accordance with AFI 32-7042, *Waste Management* (2009), federal, state, and local laws and regulations (see also Section SH3.16, Hazardous Materials and Waste).

SH3.14 Ground Traffic and Transportation

SH3.14.1 Base

SH3.14.1.1 Affected Environment

Regional and Local Circulation

Shaw AFB is located in Sumter County, South Carolina approximately 10 miles west of the City of Sumter and 35 miles east of the City of Columbia. Access to the base is considered excellent due to the adequacy of the regional highway system. The base is bound by U.S. Highway 76/378 to the south, SR 441 (Peach Orchard Road) to the west, Frierson Road to the north, and primarily wooded land to the east.

The divided, four-lane U.S. Highway 76/378 runs east-west and is the major arterial through the area with an average daily traffic (ADT) of approximately 20,000 (South Carolina Department of Transportation [DOT] 2008). A traffic study in 2008 found the highest hourly traffic volume on U.S. Highway 76/378, directly outside the base, to be during the evening peak hour between 6:00 p.m. and 8:00 p.m. This peak hour traffic volume was roughly 1,770 vehicles (NAVFAC 2009), resulting in a volume-to-capacity (V/C) ratio of 0.20 and a level of service (LOS) A. The north-south SR 441 is a two lane road with an ADT of approximately 8,500 (South Carolina DOT 2008). The west portion of Frierson Road traverses the base in a roughly east to west direction and is closed to through traffic. The east portion of the road is open to the public and has an ADT of about 4,000 (South Carolina DOT 2008).

There are four active security checkpoint gates that provide access to Shaw AFB: the Southwest (Main) Gate on Shaw Drive north of U.S. Highway 76/378; the Northwest Gate on Frierson Road near the intersection of SR 441; the Northeast Gate on Frierson Road near the eastern road closure; and the Southeast (Commercial) Gate that intersects with U.S. Highway 76/378, which is three lanes wide to provide for vehicle inspections. The Southwest, Northwest, and Northeast gates are open 24 hours a day and 7 days a week. The Southeast gate is only open during duty hours (Naval Facilities Engineering Command Southeast 2009).

Circulation at Shaw AFB

The main arterial roads through Shaw AFB are Shaw Drive (the primary on-base road), Rhodes Avenue, and Polifka Drive. The remainder of the circulation network within the base consists of minor collector roads. A traffic study conducted in 2006 (Shaw AFB 2007a) analyzed LOS ratings for certain on-base intersections and locations during peak-hour traffic. The study identified several road segments that had existing unsatisfactory LOS ratings of E or F. These movements and locations include: the westbound left-turning movement at the stop-sign-controlled Shaw Drive/Aiken Street intersection; the westbound left-turning movement at the signalized Shaw Drive/Polifka Drive intersection; the signalized Frierson Road/SR 441 intersection; and the northbound left-turning movement at the U.S. Highway 76/378 intersection with the entrance to the Southeast Gate. The study also noted that vehicle queuing is a problem at the Southwest Gate for vehicles entering in the mornings and exiting in the evenings and at the Northwest Gate for vehicles entering the base during the morning.

Recommendations for immediate improvements have been identified for the Southwest and Northwest gates and for the intersections of Shaw Drive with Polifka Drive and Aiken Street (Naval Facilities Engineering Command Southeast 2009, Shaw AFB 2007a). The Shaw AFB General Plan states that plans are currently in progress for improvements to Frierson Road and construction of a new gate at Rhodes Avenue. The Main Gate relocation and a new Southeast Gate were recently completed. No issues were identified with on-base parking in the Shaw AFB General Plan.

SH3.14.1.2 Environmental Consequences

Construction activities would begin in 2013 and would take approximately 2 years to complete, resulting in approximately 2.61 acres of net new impervious surface and disturbing 5.48 acres under all three scenarios. Construction equipment would be driven to proposed construction areas and would be kept on-site for the duration of the respective activity. Construction workers would drive daily in their personal vehicles to and from the construction site. In general, construction traffic would result in increases in the use of on-base roadways during construction activities; however, increases would be temporary and intermittent, occurring only during active construction periods.

Under ACC Scenario 1, on-base employment would decrease by 1,320 personnel, from 8,822 to 7,502, potentially reducing up to 1,320 one-way vehicle trips to and from the base during morning and evening peak periods. The proposed decrease in employment and associated travel demand would potentially decrease peak period travel demand by 15 percent. Therefore, this scenario would reduce ground traffic within the base and adjacent roadway network.

Under ACC Scenario 2, on-base employment would decrease by 735 personnel, from 8,822 to 8,087, potentially reducing up to 735 one-way vehicle trips to and from the base during morning and evening peak periods. The proposed decrease in employment and associated travel demand would potentially decrease peak period travel demand by 8 percent. Therefore, this scenario would reduce ground traffic within the base and adjacent roadway network.

Under ACC Scenario 3, on-base employment would decrease by 150 personnel, from 8,822 to 8,672, potentially reducing up to 150 vehicle trips to and from the base during morning and evening peak periods. The proposed decrease in employment and associated travel demand would potentially decrease peak period travel demand by 2 percent. Such a small decrease in traffic volume would have a minor effect on traffic flow and would be similar to that under baseline conditions.

SH3.15 Hazardous Materials and Waste

SH3.15.1 Base

SH3.15.1.1 Affected Environment

Hazardous Materials

Hazardous materials are used at Shaw AFB for aircraft training and maintenance operations, including petroleum, oil, and lubricants (POL) management and distribution. Types of hazardous substances found on Shaw AFB include: oil, Jet-A, jet fuel, diesel, gasoline, hydraulic fluid, hydrazine, paints, solvents, detergents, adhesives/sealants, lube oil, batteries, antifreeze, and de-icing chemicals (Zapata Engineering 2007, Shaw AFB 2009a). In addition, a hydrazine facility is operated in Building 1619 for the servicing of aircraft hydrazine systems; waste hydrazine is generally treated and thereby disposed of as a non-hazardous waste (Shaw AFB 2009a, Shaw AFB 2006a).

Hazardous materials used by Air Force and contractor personnel at Shaw AFB are controlled through the Hazardous Materials Management Process, including a Hazardous Material Pharmacy (HAZMART) and Environmental, Safety, and Occupational Health (ESOH-MIS) tracking system (Shaw AFB 2009b). This process centralizes procurement, handling, storage, and issuing of hazardous materials and their turn-in, recovery, reuse, or recycling (Shaw AFB 2009b, Shaw AFB 2006a).

The Shaw AFB Integrated Contingency Plan for Oil and Hazardous Substance Spill Prevention and Response (Shaw AFB 2009b) governs the Hazardous Materials Management Process and 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 (Shaw AFB 2009a) is used for first responder, emergency response and is attached to the Integrated Contingency Plan.

Hazardous Waste

Shaw AFB is regulated as a large quantity hazardous waste generator under the Resource and Conservation Recovery Act (RCRA). The Shaw AFB Hazardous Materials and Waste Integrated Management Plan (Shaw AFB 2009b) governs the Shaw AFB Hazardous Waste Management Program. There is one central accumulation point (less than 90 day storage area) and 21 Satellite Accumulation Points currently at Shaw AFB. In addition, Poinsett Range and Wateree Recreation Area are conditionally-exempt small quantity generators that ship any hazardous waste directly from the site. Shaw AFB recycles contaminated and used liquid petroleum products and absorbents, all lubricating fluids, scrap lead, lead-acid batteries, used oil and filters, shop rags, JP-8, and diesel filters. In 2006, approximately 34,320 pounds of hazardous wastes were generated and disposed of by the base in accordance with state and federal regulations (Shaw AFB 2009b).

Toxic Substances

Regulated toxic substances typically associated with buildings and facilities include asbestos and LBP. The asbestos management plan provides guidance for the identification of ACM and the management of asbestos wastes, disposed of at an off-base, permitted landfill (Shaw AFB 2009b). The LBP program is designed to establish management and organizational responsibilities and procedures for the identification and management of LBP hazards (Shaw AFB 2008b). An asbestos facility register, as well as the LBP program, is maintained by an Asbestos Operations Officer, who is appointed by the Base Civil Engineer.

Environmental Restoration Program

There are 31 ERP cleanup sites and two areas of concern on Shaw AFB and three ERP sites at the Poinsett ECR (Shaw AFB 2010b). As of September 2009, one ERP site is in the Remedial Investigation phase, 19 sites have No Further Response action planned, nine sites are closed with long-term monitoring, three sites are undergoing Remedial Action, and one site is at the Feasibility Study phase. Also included in the ERP are 92 closed solid waste management unit (SWMU) cleanup sites, 15 active SWMUs, and three administratively closed SWMUs with land-use controls. Any proposed action within the vicinity of an ERP site is required to be coordinated with the Shaw AFB ERP manager. There are no Military Munitions Response Program (MMRP) sites at Shaw AFB (personal communication, Salomon 2010).

SH3.15.1.2 Environmental Consequences

Currently, 72 F-16s are stationed at Shaw AFB. The total number of aircraft operational at the base would remain the same under ACC Scenario 3, substituting 72 F-35As for 72 F-16s. ACC Scenario 1 would base 24 F-35As and ACC Scenario 2 would base 48 F-35s. Total airspace operations would be expected to decrease by 52 percent under ACC Scenario 1, and 37 and 15 percent for ACC Scenarios 2 and 3, respectively. Additionally, as part of the proposed action, Buildings 1605, 1606, 1610, 1627, 1628, and 1629 would undergo some level of renovation or reconstruction, as well as various additions and alterations to other facilities as needed. The Parts Storage Facility would either be restored at Building 1614 or rebuilt on a new site, and the Hayman Igloo would be repaired. A new flight simulator and its associated infrastructure requirements would also be constructed.

Hazardous Materials

Training activities and other functions are expected to remain similar between the F-35A and F-16 aircraft. Additionally, the F-35A was designed to reduce the quantities and types of hazardous materials needed for maintenance of the F-35A and would be less than those currently used for maintenance of F-16 aircraft. The major differences 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 for F-16 aircraft (personal communication, Luker 2010; Fetter 2008).

Under all ACC scenarios, the elimination of the hazardous substances discussed above would reduce the overall amount and types of hazardous materials used, thus reducing the overall potential impacts to the environment. Additionally, the use of the aircraft is expected to decrease from the current operation rate, which may translate into a decreased need for aircraft maintenance and servicing operations.

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

The F-35A replaces the hydrazine canister (currently used by the F-16s) with an integrated power package (basically a small jet engine) for use in emergency engine restart situations, thus eliminating the potential for hydrazine leaks.

Hazardous Waste

The types of hazardous waste streams generated by F-35A operations are expected to be less than they are for F-16 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 in support of F-16 aircraft operations.

The exact amounts of hazardous waste that would be generated under each scenario are unknown; however, under all scenarios Shaw AFB would continue to operate within its large 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 Shaw AFB procedures. According to current ACM and LBP surveys, of the seven buildings selected for renovation, only Building 1614 is listed as containing ACM; LBP is not present in any of the buildings to be renovated (personal communication, Nauenburg 2010). 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 Shaw AFB procedures.

Environmental Restoration Program

At Shaw AFB, although three active ERP Operable Unit Sites (OU7, OU9, and OU13), one closed site, and three areas of other site investigations are located within proximity to the industrial section of the aircraft services area, neither upgrades to existing facilities nor future operations are expected to affect known ERP locations. In particular, OU7 and two adjacent site investigation areas are adjacent to, but do not overlap, the Parts Storage Building 1614. If ground-disturbing activities become necessary to implement the proposed action at Building 1614, a detailed study of the potential impacts on ERP sites in and around the proposed ground-disturbing locations would need to be assessed and mitigation measures implemented, as necessary.

SH4.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

SH4.1 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 Shaw AFB and training in associated airspace.

Shaw AFB is an active military installation that undergoes changes in mission and in training requirements in response to defense policies, current threats, and tactical and technological advances. The base, 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 base, conduct aircraft operations, and maintain facilities. All of these actions (i.e., mission changes, facility improvements, and tenant use) will continue to occur before, during, and after the proposed action it is implemented, regardless of which alternative is selected.

Past and Present Actions Relevant to the Proposed Action

Shaw AFB has been a military installation since 1941. 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 FW currently use these airspace units for training with defensive chaff and flares. Environmental analysis resulted in a Finding of No Significant Impact.

Incremental Impacts of the Proposed Action with Reasonably Foreseeable Future Actions

During the timeframe (2014) for F-35A facility construction, Shaw AFB 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 2014 through 2020 include those listed in Table SH4.1-1. Other on-going maintenance and repair activities are also likely to occur at the base during this period.

Table SH4.1-1. Current and Reasonably Foreseeable Actions at Shaw AFB			
Project Name/Description	*Approximate Area (acres)*[1]	*New Impervious Surface (acres)*	*Anticipated Year for Implementation*
Expand Building 912, Chapel	0.25	0.25	2015
Expand Building 1109 Communications Facility	0.76	0.76	2015
Construct Field Training Detachment Aircraft Maintenance Training Facility (off base)	0.90	0.90	2020
Construct Aircraft Maintenance Mobility Equipment/Storage Facility	0.25	0.25	2020
Expand Existing Munitions Storage Magazine (2 igloos)	0.14	0.14	2020
Construct new Arm/De-arm pad	4.66	4.66	2020
Total	**6.96**	**6.96**	-

Note:
[1]Approximate Area includes the proposed new building footprint plus the footprint of the proposed demolition (if applicable).

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

- Because Shaw AFB and McEntire JNGB 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.
- Shaw AFB and Jacksonville AGS both use the Coastal Townsend airspace. If both installations received F-35A aircraft, there could be a cumulative effect from training operations and increased noise under that airspace.

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 Shaw AFB 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 Shaw AFB 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 not fully analyzed at this time in separate environmental analyses, none of the future on-base construction actions 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 base 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.

F-35A Operational Beddown at Both Shaw AFB and McEntire JNGB. It is possible that under the F-35A beddown, both Shaw AFB and McEntire JNGB would receive up to 72 and 24 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 F-16 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 Shaw AFB 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 12 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 SH4.1-2. Cumulative Subsonic Noise from F-35A Beddowns at Shaw AFB and McEntire JNGB

Airspace Unit	*Baseline (L_{dnmr})*	*Proposed F-35A Operational Beddown at Shaw AFB (Scenario 3)*	*Proposed F-35A Operational Beddown at McEntire JNGB (Scenario 2)*	*Cumulative Noise Levels (L_{dnmr}) F-35A Shaw AFB + F-35A McEntire JNGB*	*Change from Baseline (dB)*
Bulldog	56	63	58	64	+8
Gamecock	57	65	59	66	+9
Coastal Townsend	54	64	61	66	+12
Poinsett	68	68	68	71	+3
APAFR	51	51	51	54	+3

F-35A Operational Beddown at Both Shaw AFB and Jacksonville AGS. If Jacksonville AGS were chosen as a beddown location for the F-35A in combination with Shaw AFB, then the two proposals would interact in the use of Coastal Townsend. There would be no intersection with construction, personnel, aircraft inventory, or use of any other airspace units. Subsonic noise levels at Coastal Townsend would increase by 7 dB L_{dnmr}. This increase would be perceptible and likely cause annoyance in people underlying the airspace. The maximum increase in noise levels under ANG Scenario 2 and ACC Scenario 3 would not exceed 65 L_{dnmr}. Neither installation would fly supersonic operations in these airspace units.

SH4.2 Irreversible and Irretrievable 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 period. Irreversible effects at Shaw AFB are associated with construction impacts.

For Shaw AFB, 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, construction and renovation of base facilities would occur on approximately 5.48 acres of land previously disturbed and would consume limited amounts of material typically associated with interior renovations (wiring, insulation, windows, drywall) and exterior construction (concrete, steel, sand, brick). An undetermined amount of energy to conduct renovation, construction, and operation of these facilities would be expended and irreversibly lost. Renovation of buildings would generate minimal construction debris that would consume landfill space.

These construction and ground-disturbing activities would occur on previously disturbed lands and would not adversely impact wetlands or terrestrial communities. Irretrievable resource commitments are, therefore, confined to buildings associated with construction.

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 substantially affect environmental resources.

Chapter 5

How to Use This Document

Our goal is to give you a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the no-action alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement, or EIS, is shown below.

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Synopsis of Purpose and Need and Proposed Action and Alternatives
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Purpose and Need for the Air Force F-35A Operational Beddown

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Above Ground Level (AGL). Altitude expressed in feet measured above the ground surface.

Accident Potential Zone (APZ). An area defined near a runway where accidents are likely to occur if they occur. APZs are normally 3,000 feet wide and extend 15,000 feet from the end of the runway but can curve with the flight tracks.

Aerospace Expeditionary Force (AEF). An AEF is a group of different types of aircraft with a mix of capabilities suited to the tasking deployed overseas. There are ten AEFs in the Air Force, and consist of wings or squadrons from multiple United States bases, and may operate as a unit or be integrated with existing forces overseas.

Aerospace Expeditionary Wing (AEW). An AEW is a mixed force of aircraft designed for crisis response early in a conflict.

Air Combat Command (ACC). The Air Force Command that operates combat aircraft assigned to bases within the contiguous 48 states, except those assigned to Air National Guard and the Air Force Reserve Command.

Air Force Instruction (AFI). Air Force Instructions enforcing United States laws and regulations.

Air Installations Compatible Use Zones (AICUZ). A land-use-planning program, used by the military, to protect the health, safety, and welfare of those living near military airfields while preserving the defense flying mission. AICUZ presents noise zones and APZs for military airfields and recommendations for compatible land use.

Air Quality Control Region (AQCR). An administrative unit for monitoring and controlling air quality in a specific region.

Air Traffic Control (ATC). The system used to safely direct aircraft in flight, using radar and controllers from both the Federal Aviation Administration and the military.

Air Traffic Control Assigned Airspace (ATCAA). Airspace of defined vertical and lateral limits, assigned by ATC, for the purpose of providing air traffic separation between the specified activities being conducted within the assigned airspace and other instrument flight rules air traffic.

Air-to-Air Training. Air-to-air training prepares aircrews to achieve and maintain air superiority over the battlefield and defeat enemy aircraft. Air-to-air training often includes some aircraft playing the role of adversaries, or enemy forces. Air-to-air training activities include advanced handling characteristics, air combat training, low-altitude air-to-air training, and air intercept training. This training also requires the use of defensive countermeasures.

Air-to-Ground Training. Air-to-ground training employs all the techniques and maneuvers associated with weapons use and includes low- and high-altitude tactics, navigation, formation flying, target acquisition, and defensive reaction. Training activities include surface attack tactics, different modes of weapons delivery, electronic combat training, and the use of defensive countermeasures.

Airfield Operation. An operation is one takeoff or one landing. Patterns count as two operations. An aircraft may perform several operations during a flight.

***Ambient Noise*.** Normal background noise for a location. Rural areas generally have a lower ambient noise level than urban areas.

Average Sortie Duration (ASD). A flying wing's total number of flying hours divided by the number of sorties that must be flown.

Bird/Wildlife-Aircraft Strike Hazard (BASH). An Air Force program to reduce the possibilities of bird or wildlife collisions with aircraft.

***Candidate Species*.** A species for which the United States Fish and Wildlife Service has sufficient information regarding that species' biological vulnerability and threat(s) to it to warrant a proposal to reclassify it as threatened or endangered.

***Class C Airspace*.** Airspace from the surface to 4,000 feet above the airport elevation surrounding those airports that have an operational control tower, are serviced by a radar approach control, and have a certain number of Instrument Flight Rules operations or passenger enplanements. Each pilot must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while within the airspace.

***Class D Airspace*.** Airspace from the surface to 2,500 feet above the airport elevation surrounding those airports that have an operational control tower. Unless otherwise authorized, each pilot must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while within the airspace.

***Class E Airspace*.** Controlled airspace that is not Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. Also in this class are federal airways, airspace beginning at either 700 or 1,200 feet AGL used to transition to/from the terminal or enroute environment, enroute domestic, and offshore airspace areas designated below 18,000 feet Mean Sea Level (MSL). Unless designated at a lower altitude, Class E airspace begins at 14,500 MSL over the United States, including that airspace overlying the water within 12 nm of the coast, up to, but not including, 18,000 feet MSL and the airspace above FL 600.

***Clean Air Act (CAA)*.** The CAA (42 U.S.C. 7401, *et seq.*) requires the U.S. Environmental Protection Agency to establish standards for common air pollutants that represent the maximum levels of background pollution considered safe, with an adequate margin of safety to protect the public health and safety.

Clear Zone (CZ). A CZ is a trapezoid, fan-shaped area extending 3,000 feet from the end of the runway. Clear zones measure 1,500 feet wide and their base at the end of the runway and 2,284 feet wide at their outer edge. Certain activities are prohibited in this area due to the risk of aircraft mishap.

Close Air Support (CAS). Air operations supporting ground forces.

Community Noise Equivalent Level (CNEL). The A-weighted acoustical energy during 24 hours with weightings of 5 dB for the evening hours (7:00 p.m. to 10:00 p.m.) and 10 dB for nighttime hours (10:00 p.m. to 7:00 a.m.).

Council on Environmental Quality (CEQ). The CEQ is an executive office of the president composed of three members appointed by the president, subject to approval of the senate. Members are to be conscious of and responsive to the scientific, economic, social, esthetic, and cultural needs of the nation and to formulate and recommend national policies to promote the improvement of the quality of the environment.

***Cultural Resources*.** Cultural resources are any prehistoric or historic district, site, or building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes.

Day-Night Average Sound Level (DNL). DNL is a noise metric combining the levels and durations of noise events and the number of events over an extended period. It is a cumulative average computed over a 24-hour period to represent the total noise exposure. DNL also accounts for the more intrusive nighttime noise by adding a 10 dB penalty for noise events after 10:00 pm and before 7:00 am. DNL is used at all U.S. airports with the exception of those in California, which use a similar metric.

***Decibel (dB)*.** A logarithmic sound measurement used to express the intensity of a sound wave. To mimic the human ears, non-linear sensitivity, and perception of different frequencies of sound, the spectral content is weighted. Environmental noise measurements are usually on an "A" weighted scale that filter out very low and high frequencies in order to replicate human sensitivity. In this document dB refers to "A" weighted measurements.

***Endangered Species*.** The Endangered Species Act (ESA) (16 U.S.C. 1531, *et seq.*) of 1973 defined the term "endangered species" to mean any species (including any subspecies of fish or wildlife or plant, and any distinct population segment of any species or vertebrate fish or wildlife which breeds when mature) that is in danger of extinction throughout all or a significant portion of its range.

***Environmental Justice*.** As defined by Presidential Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, review must be made as to whether an action disproportionately impacts minority and/or low-income population.

Environmental Night. The period between 10:00 p.m. and 7:00 a.m. when 10 dB is added to aircraft noise levels due to increased sensitivity to noise at night.

Geographic Information System (GIS). A geographic information system is a computer system that compiles, analyzes, and models information relevant to proposals that require environmental analysis. It is also a tool that assists decision-making by providing a visual depiction of complex data, customized for the situation and circumstances associated with the decision.

***Indirect Economic Impacts*.** As defined in the IMPLAN model, changes in purchases made between industries as they respond to the new demands of the directly affected industry.

***Induced Economics Impacts*.** As defined in the IMPLAN model, typically reflects changes in spending from households as income increases or decreases due to the changes in the directly affected industry.

Instrument Flight Rules (IFR). A standard set of rules that all pilots must follow when operating under conditions more stringent than visual flight rules. These conditions include operating an aircraft in clouds or above certain altitudes prescribed by Federal Aviation Administration regulations and operating in some locations, such as major civilian airports. ATC agencies ensure separation of all aircraft operating under IFR.

Maximum Sound Level (L_{max}). L_{max} is used to define peak noise levels. L_{max} is the highest sound level measured during a single noise event in which the sound level changes with time.

Mean Sea Level (MSL). Altitude or elevation expressed in feet referenced to the average elevation of the sea. For example, a field elevation of 26 feet above mean sea level would be expressed as "26 ft MSL" and an aircraft altitude of 1,200 feet above mean sea level would be expressed as "1,200 ft MSL."

Military Operations Area (MOA). Airspace below 18,000 feet MSL established to separate military activities from instrument flight rule traffic and to identify where these activities are conducted for the benefit of pilots using visual flight rules.

Military Training Route (MTR). An MTR is a corridor of airspace with defined vertical and lateral dimensions established for conducting military flight training at airspeeds in excess of 250 nautical miles/hour.

National Ambient Air Quality Standards (NAAQS). NAAQS are established by the USEPA for criteria pollutants that represent the maximum levels of background pollution that are considered safe, with an adequate margin of safety, to protect public health and safety.

National Environmental Policy Act (NEPA). The National Environmental Policy Act (42 U.S.C. 4321, *et seq.*) of 1969 directs federal agencies to take environmental factors into consideration in their decisions.

National Historic Preservation Act (NHPA). The NHPA (16 U.S.C. 470[f]) of 1966, as amended, established a program for the preservation of historic properties throughout the United States.

Nautical Mile (nm). A distance unit equal to 1.14 statute miles.

Onset-Rate Adjusted Monthly Day-Night Average Sound Levels (L_{dnmr}). L_{dnmr} is the measure used for subsonic aircraft noise in military airspace (MOAs or Warning Areas, ranges and routes). L_{dnmr} is the same as Day-Night Average Sound Level (DNL) but graphed to the busiest month of flight operations and accounts for the fact that when military aircraft fly low and fast, the sound starts from ambient to its maximum very quickly. Known as an onset rate, this effect can make noise seem louder due to the added "startle" effect. Penalties of up to 11 dB are added to account for this onset-rate.

Operational Test and Evaluation (OT&E). This Air Force activity is responsible for ensuring that all new equipment introduced into the Air Force team works properly. Equipment is tested in specially-designed operational scenarios as close to actual combat situations as possible. Tests are based on the requirements and mission profile of the equipment. This equipment is then evaluated to ensure that it is both operationally effective and operationally suitable, i.e., does it meet the job it is intended to undertake.

Ordnance. Any item carried by an aircraft for dropping or firing, including but not limited to, live or inert bombs, ammunition, air-to-air missiles, and flares.

See and Avoid. When weather conditions permit, pilots operating under instrument and visual flight routes are required to observe and maneuver to avoid other aircraft.

Sonic Boom. The very short duration (impulsive) noise created when an object exceeds the speed of sound.

Sortie. A sortie is a single flight by one aircraft, from takeoff to landing.

Sound Exposure Level (SEL). SEL is a composite metric that represents both the intensity of sound and its duration. SEL does not directly represent the sound level heard at any given time. Rather, it provides a measure of the net impact of an entire acoustic event. Mathematically, it represents the sound level of a constant sound that would, in one second, generate the same acoustic energy in the actual time varying noise events.

State Historic Preservation Officer (SHPO). The official or acting representative of the official who administers the state historic preservation program under provisions of NHPA Sections 101 and 106.

Threatened Species**.** A species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Visual Flight Rules (VFR)**.** A standard set of rules that all pilots, both civilian and military, must follow when not operating under instrument flight rules. These rules require that pilots remain clear of clouds and avoid other aircraft.

Visual Routes (VR)**.** Routes used by the military for conducting low-altitude, high-speed navigation, and tactical training. These routes are flown under VFR.

Warning Area**.** A Warning Area is one of the six types of special use airspace. Warning Areas generally begin 3 nm off the coast of the U.S. and contain activities that may be hazardous to non participating aircraft. These areas may contain a wide variety of aircraft and non-aircraft activities, such as aerial gunnery, bombing, aircraft carrier operations, surface and subsurface operations, naval gunfire, and missile shoots.

ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
μg/m^3	micrograms per cubic meter
20 FW	20^{th} Fighter Wing
125 FW	125^{th} Fighter Wing
158 FW	158^{th} Fighter Wing
169 FW	169^{th} Fighter Wing
366 AEW	366^{th} Aerospace Expeditionary Wing
366 FW	366^{th} Fighter Wing
366 WG	366^{th} Wing
388 FW	388^{th} Fighter Wing
419 FW	419^{th} Fighter Wing
ACAM	Air Conformity Applicability Model
ACC	Air Combat Command
ACM	asbestos-containing material
ADT	average daily traffic
AFB	Air Force Base
AFCEE	Air Force Center for Engineering and the Environment
AFI	Air Force Instruction
AFMC	Air Force Materiel Command
AFOSH	Air Force Occupational Safety and Health
AFRC	Air Force Reserve Command
AFSC	Air Force Safety Center
AGE	aerospace ground equipment
AGL	above ground level
AGS	Air Guard Station
AICUZ	Air Installation Compatible Use Zones
Air Force	U.S. Air Force
ALTRV	Altitude Reservation
AMA	Air Materiel Area
AMU	Aircraft Maintenance Unit
ANG	Air National Guard
APAFR	Avon Park Air Force Range
APE	Area of Potential Effects
APZ	Accident Potential Zone
AQCR	Air Quality Control Region
ARPA	Archaeological Resource Protection Act
ARTCC	Air Route Traffic Control Center
AT/FP	antiterrorism/force protection
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
BASH	Bird/Wildlife-Aircraft Strike Hazards
BLM	Bureau of Land Management
BMP	Best Management Practice
BOS	Base Operations Support
BRAC	Base Realignment and Closure
BSA	Basic Surface Attack
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAF	Combat Air Forces
CARB	California Air Resources Board
CAS	Close Air Support
CDNL	C-weighted DNL
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	equivalent carbon dioxide
CTOL	Conventional Take-Off and Landing
CV	Carrier Variant
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
DEC	Department of Environmental Conservation
DEP	Department of Environmental Protection
DEQ	Department of Environmental Quality
DERP	Defense Environmental Restoration Program
DHEC	Department of Health and Environmental Control
DNL	Day-Night Average Sound Level
DNR	Department of Natural Resources
DoD	Department of Defense
DoN	Department of the Navy
DOT	Department of Transportation
DWR	Division of Wildlife Resources
EA	Environmental Assessment
EADS	Eastern Air Defense Sector
ECR	Electronic Combat Range
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
ERP	Environmental Restoration Program
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FDE	Force Development Evaluation
FEMA	Federal Emergency Management Agency
FICUN	Federal Interagency Committee on Urban Noise Standards
FLANG	Florida Air National Guard
FLMPA	Federal Land Management Policy Act
FW	Fighter Wing
FY	Fiscal Year
GBU	guided bomb unit
GHG	greenhouse gas
GOV	government-owned vehicle
gpd	gallons per day
GPS	Global Positioning System
GSE	ground support equipment
GWP	global warming potential

HABS/HAER	Historic American Building Survey/ Historic American Engineering Record
HAP	hazardous air pollutant
HAZMART	Hazardous Materials Pharmacy Program
Hz	hertz
I-	Interstate
IAP	International Airport
IFR	Instrument Flight Rules
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
INM	Integrated Noise Model
ITD	Idaho Transportation Department
JAST	Joint Advanced Strike Technology
JDAM	Joint Direct Attack Munition
JEA	Jacksonville Electric Authority
JLUS	Joint Land Use Study
JNGB	Joint National Guard Base
JP	jet propellant
JSF	Joint Strike Fighter
kWh	kilowatt hour
LBP	lead-based paint
L_{dnmr}	Onset-Rate Adjusted Day-Night Average Sound Level
L_{eq}	equivalent noise level
L_{max}	Maximum Sound Level
LOS	Level of Service
MAEWR	Mid Atlantic Electronic Warfare Range
MBTA	Migratory Bird Treaty Act
mgd	million gallons per day
MHRC	Mountain Home Range Complex
MJU	Mobile Jettison Unit
mm	millimeter
MMRP	Military Munitions Response Program
MOA	Military Operations Area
MSL	mean sea level
MTR	Military Training Route
N_2O	nitrous oxide
NA	number of events above
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NDSD	North Davis County Sewer District
NEM	noise exposure map
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NIOSH	National Institute for Occupational Safety and Health
NIPTS	Noise Induced Permanent Threshold Shift
nm	nautical miles
NO_2	nitrogen dioxide
NOA	Notice of Availability
NOI	Notice of Intent
NORAD	North American Aerospace Defense Command
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
O_3	ozone
OHSPC	Oil and Hazardous Substance Pollution Control Plan
OSHA	Occupational Safety and Health Administration
OT&E	Operational Test and Evaluation
PA	Preliminary Assessment
PAA	Primary Aircraft Authorized
Pb	lead
PCB	poly-chlorinated biphenyl
PHL	Potential for Hearing Loss
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
POL	petroleum, oil, and lubricants
POV	privately-owned vehicle
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
psf	pound per square foot
RAP	Ready Aircrew Program
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROG	Reactive Organic Gases
RPZ	Runway Protection Zone
RSAF	Republic of Singapore Air Force
S&I	Safe and Initiation
SAT	Surface Attack Tactics
SCANG	South Carolina Air National Guard
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SOA	Special Operating Area
SO_x	sulfur oxides
SWMU	Solid Waste Management Unit
SR	State Route
STOVL	Short Take-Off, Vertical Landing
SUA	Special Use Airspace
SWPPP	Storm Water Pollution Prevention Plan
TCP	traditional cultural property
tpy	tons per year
TSCA	Toxic Substance Control Act
TSE	tactical support equipment
U.S.	United States

UDAQ	Utah Division of Air Quality
UFC	Unified Facilities Criteria
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agriculture
USDHHS	U.S. Department of Health and Human Services
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UTA	Unit Training Assembly
UTTR	Utah Test and Training Range
V/C	volume-to-capacity
VFR	Visual Flight Rule
VOA	Visual Flight Rule Operating Area
VOC	volatile organic compound
VTANG	Vermont Air National Guard
WS	Weapons School
WSA	Wilderness Study Area
WTI	Weapons and Tactics Instructor

Chapter 9

How to Use This Document

Our goal is to give you a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the no-action alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement, or EIS, is shown below.

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

OVERALL PROPOSAL
VOLUME I

PREFACE
Detailed Guide for Reading the Final EIS

CHAPTER 1
Purpose and Need for the Air Force F-35A Operational Beddown

CHAPTER 2
- Overview of the Proposed Action and Alternatives
- Alternative Identification Process
- Summary Comparison of the Proposed Action and Alternatives

CHAPTER 3
Resource Definition and Methodology

INFORMATION SPECIFIC TO EACH BASE
VOLUME I

CHAPTER 4
Six Base-Specific Sections

Burlington AGS	Hill AFB	Jacksonville AGS	McEntire JNGB	Mountain Home AFB	Shaw AFB
Section BR1.0 Proposed Action Overview	**Section HL1.0** Proposed Action Overview	**Section JX1.0** Proposed Action Overview	**Section Mc1.0** Proposed Action Overview	**Section MH1.0** Proposed Action Overview	**Section SH1.0** Proposed Action Overview
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Section BR4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section HL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section JX4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section Mc4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section SH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

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Appendix D – Air Quality
Appendix E – Revised Draft EIS Public Comments and Responses

Burlington
Air Guard Station

Burlington AGS

National and State Elected Officials

Prefix	First	Last	Title	City	State	Zip
The Honorable	Patrick	Leahy	United States Senate	Washington	DC	20510
The Honorable	Bernard	Sanders	United States Senate	Washington	DC	20510
The Honorable	Susan	Collins	United States Senate	Washington	DC	20510
The Honorable	Angus S.	King	United States Senate	Washington	DC	20510
The Honorable	Jeanne	Shaheen	United States Senate	Washington	DC	20511
The Honorable	Kelly	Ayotte	United States Senate	Washington	DC	20510
The Honorable	Kirsten	Gillibrand	United States Senate	Washington	DC	20510
The Honorable	Charles	Schumer	United States Senate	Washington	DC	20510
The Honorable	Peter	Welch	US Congressman - Vermont	Washington	DC	20515
The Honorable	Michael	Michaud	US Congressman - Maine	Washington	DC	20515
The Honorable	Carol	Shea-Porter	US Congressman - New Hampshire	Washington	DC	20515
The Honorable	Bill	Owens	US Congressman - New York	Washington	DC	20515
The Honorable	Maggie	Hassan	Governor of New Hampshire	Concord	NH	03301
The Honorable	Timothy	Ashe	State Senator, Chittenden District	Burlington	VT	05401
The Honorable	Philip	Baruth	State Senator, Chittenden District	Burlington	VT	05408
The Honorable	Viginia	Lyons	State Senator, Chittenden District	Williston	VT	05495
The Honorable	David	Zuckerman	State Senator, Chittenden District	Hinesburg	VT	05461
The Honorable	Sally	Fox	State Senator, Chittenden District	South Burlington	VT	05403
The Honorable	Diane	Snelling	State Senator, Chittenden District	Hinesburg	VT	05461
The Honorable	John	Patrick	State Senator, District 14	Augusta	ME	04333
The Honorable	Jeff	Woodburn	State Senator, District 1	Dalton	NH	03598
The Honorable	Patty	Ritchie	State Senator, District 48	Watertown	NY	13601
The Honorable	Joanna	Cole	State Representative, District 6-1	Burlington	VT	05408
The Honorable	Kurt	Wright	State Representative, District 6-1	Burlington	VT	05401
The Honorable	Jean	O'Sullivan	State Representative, District 6-2	Burlington	VT	05408
The Honorable	Jill	Krowinski	State Representative, District 6-3	Burlington	VT	05041
The Honorable	Curt	McCormack	State Representative, District 6-3	Burlington	VT	05041
The Honorable	Keisha	Ram	State Representative, District 6-4	Burlington	VT	05041
The Honorable	Christopher	Pearson	State Representative, District 6-4	Burlington	VT	05041
The Honorable	Johannah Leddy	Donovan	State Representative, District 6-5	Burlington	VT	05041
The Honorable	Suzi	Wizowaty	State Representative, District 6-5	Burlington	VT	05041
The Honorable	Barbara	Rachelson	State Representative, District 6-6	Burlington	VT	05401
The Honorable	Clement	Bissonnette	State Representative, District 6-7	Winooski	VT	05404
The Honorable	George	Cross	State Representative, District 6-7	Winooski	VT	05404
The Honorable	Michele Ferland	Kupersmith	State Representative, District 7-1	South Burlington	VT	05403
The Honorable	Ann	Pugh	State Representative, District 7-2	South Burlington	VT	05403
The Honorable	Helen	Head	State Representative, District 7-3	South Burlington	VT	05403
The Honorable	Maida	Townsend	State Representative, District 7-4	South Burlington	VT	05403
The Honorable	Matthew	Peterson	State Representative, District 92	Rumford	ME	04276
The Honorable	Ralph J.	Doolan	State Representative, District 1	Littleton	NH	03561
The Honorable	Linda	Massimilla	State Representative, District 1	Littleton	NH	03561
			Office of the Mayor	Burlington	VT	05401
Mr.	Carlo	Puiia	Town Manager	Rumford	ME	04276
Mr.	Fred	Moody	Town Manager	Littleton	NH	03561
The Honorable	Jeffrey	Graham	Mayor	Watertown	NY	13601

Burlington AGS

Federal-State Agencies

Prefix	First	Last	Title	Organization Name	City	State	Zip
Mr.	William	Flanagan	Manager	FAA - Eastern Region (NY)	Jamaica	NY	11434
	LaVerne	Reid	Manager	FAA - New England (VT, ME, NH)	Burlington	MA	01803
Mr.	Earle	Shettleworth	SHPO	Maine Historic Preservation Commission	Augusta	ME	04333
Ms.	Elizabeth	Muzzey	SHPO and Director	New Hampshire Division of Historical Resources	Concord	NH	03301
Mr.	James	Warren	SHPO	New York State Division for Historic Preservation	Waterford	NY	12188
Ms.	James	Duggan	SHPO	Vermont Division for Historic Preservation	Montpelier	VT	05620
Ms.	Donna	Bradstreet	SPOC (ME)	State Planning Office	Augusta	ME	04333
Ms.	Wendy	Gilman	Single Point of Contact	NH Office of Energy and Planning, Johnson Hall, 3rd Floor	Concord	NH	03301
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			Region 2, Office of Environmental Review	USEPA	New York	NY	10007
Mr.	Marvin	Moriatti	Northeast Region 5	USFWS	Hadley	MA	01035
Mr.	Danny	Pete		Natural Resources Conservation Service	Williston	VT	05495
Ms.	Judith	Ehrlich	Director of Operations	Division of Historic Preservation	Montpelier	VT	05620
Mr.	David K.	Mears	Commissioner	Vermont Department of Environmental Conservation, Commissioner's Office	Montpelier	VT	05620
Mr.	Pete	LaFlamme	Director	Vermont Department of Environmental Conservation, Watershed Management Division	Montpelier	VT	05620
Dr.	Wendy	Davis	Commissioner of Health	Vermont Department of Health	Burlington	VT	05402
Mr.	Wayne	Laroche	Commissioner	Vermont Fish & Wildlife Department	Waterbury	VT	05671
Mr.	John	Narowski	Environmental Services	Vermont Agency of Transportation	Montpelier	VT	05633
Ms.	Jeannine	McCrumb		Vermont Agency of Natural Resources, Policy Research and Planning	Montpelier	VT	05620
Ms.	Deb	Markowitz	Secretary	Vermont Agency of Natural Resources	Montpelier	VT	05620
			The Department of City Planning	Department of City Planning's Environmental Assessment and Review Division	New York	NY	10007

Burlington AGS
American Indian Tribes

Prefix	First	Last	Title	Organization Name	City	State	Zip
Mr.	Arnold L.	Printup	Tribal Historic Preservation Officer	St. Regis Mohawk Tribe	Akwesasne	NY	13655
Mr.	Randy	Hart	Chief	St. Regis Band of Mohawk Indians	Akwesasne	NY	13655
Ms.	Lana	Watt	Tribal Historic Preservation Officer	Seneca Nation	Salamanca	NY	14779
Mr.	Barry	Snyder, Sr.	President	Seneca Nation	Salamanca	NY	14779
Mr.	Robert	Dean	Tribal Historic Preservation Officer	Seneca Nation	Salamanca	NY	14779
Mr.	Jesse	Bergevin	Tribal Historic Preservation Officer	Oneida Indian Nation	Oneida	NY	13421
Mr.	Ray	Halbritter	Nation Representative	Oneida Indian Nation	Oneida	NY	13421
Ms.	Sherry	White	Tribal Historic Preservation Officer	Stockbridge-Munsee Tribal Historic Office	Bowler	WI	54416
Mr.	Clayton	Cleaves	Tribal Governor/Chief	Passamaquoddy Tribe - Pleasant Point Reservations	Perry	ME	04667
Mr.	Joseph	Socobasin	Chief	Passamaquoddy Tribe - Indian Township Reservations	Princeton	ME	04668
Mr.	Donald	Soctomah	Tribal Historic Preservation Officer	Passamaquoddy Tribe - Indian Township Reservations	Princeton	ME	04668
Mr.	Kirk	Francis	Chief	Penobscot Indian Nation	Indian Island	ME	04468
			Tribal Historic Preservation Officer	Penobscot Indian Nation	Indian Island	ME	04468
Mr.	Edward	Peter-Paul	Tribal Chief	Aroostook Band of Micmacs	Presque Isle	ME	04769
Ms.	Brenda	Commander	Tribal Chief	Houlton Band of Maliseet Indians	Littleton	ME	04730
Mr.	Luke	Willard	Chairman	Vermont Commission on Native American Affairs	St. Johnsbury	VT	05819
Ms.	April	St. Francis-Merril		St. Francis/Sokoki Abenaki, Band of the Missisquoi Abenaki	Swanton	VT	05488
Ms.	Nancy	Millette	Chief	Koasek Traditional Band of the Abenaki Nation	Newbury	VT	05060
Mr.	Paul	Pouliot	President	Cowasuck Band of the Pennacook-Abenaki People	Alton	NH	03890
Ms.	Dawn	Macie	c/o Mark Mitchell	The Clan of the Hawk	Brownington	VT	05860
Mr.	Clint	Halftown	Federal Representative and Chief. Council of	Cayuga Nation of New York	Seneca Falls	NY	13148
Ms.	Jeanie	Shenandoah	Council representative	Onondaga Nation	Nedrow	NY	13120
Mr.	Roger	Hill	Chief	Tonawanda Band of Senecas	Basom	NY	14013
Mr.	Leo	Henry	Chief	Tuscarora Nation	Lewiston	NY	14092

Burlington AGS
Interested Parties

Prefix	First	Last	Title	Organization Name	City	State	Zip
Mr.	Henry	Stokes		WCSPC - Winooski Coalition for a Safe and Peaceful Community	Winsooki	VT	05404
Mr.	Robert	McEwing		Burlington International Airport	South Burlington	VT	05403
Mr.	Charles	Hafter	City Manager	City of South Burlington	South Burlington	VT	05403
Mr.	Paul	Conner		City of South Burlington	South Burlington	VT	05403
				City of Burlington City Council	Burlington	VT	05401
Mr.	Greg	Brown		Chittenden County Regional Planning Commission	South Burlington	VT	05403
Mr.	David	White	Director of Planning	City of Burlington Planning and Zoning	Burlington	VT	05401
Mr.	Bill	Cooper		Country Club Estates	South Burlington	VT	05403
Mr.	Bruce	Chapell		Winooski Natural Resources Conservation District	Berlin	VT	05602
Ms.	Jennifer	Ely		Winooski Valley Park District	Burlington	VT	05408
Ms.	Heather	Kendrew	PE, Director of Maintenance, Engineering & Environmental	Burlington International Airport	South Burlington	VT	05403
Mr.	Kevin	Lavery			South Burlington	VT	05403
Mr.	Mark	Dickinson			South Burlington	VT	05404
Mr.	Dave	Barnes		William Smith Associates	Columbia	SC	29201
	George & Susan	McGergor			Sumter	SC	29105
Ms.	Jennifer	Caron			South Burlington	VT	05403
Mr.	David	Duff			Hammond	NY	13646
Ms.	Leona	Griffin			South Burlington	VT	05403
Ms.	Lynn Marie	Hunt			South Burlington	VT	05403
Mr.	Bryan	Hunt			South Burlington	VT	05403
Ms.	Anne	Morton			South Burlington	VT	05403
Ms.	Sheila	Reid			South Burlington	VT	05403
Mr.	Gary	Shepard			South Burlington	VT	05403
Mr.	Glenn	Sousa			South Burlington	VT	05408
Ms.	Ann	Williams			Center Lovell	ME	04016
	Terry	Zigmund			Winsooki	VT	05404
	Gary J.	Balaun			South Burlington	VT	05403

Burlington AGS

Scoping Meeting Attendees

First	*Last*	*Organization Name*	*City*	*State*	*Zip*
Winooski, VT: January 2010					
John	Rahiu		Burlington	VT	05401
Walter	Linck	NYS Adirondack Park Agency	Ray Brooke	NY	12977
Agnes	Clift		South Burlington	VT	05403
Tony	Augostine		Winooski	VT	05404
Rodney	Myers		Winooski	VT	05404
Linus	Leavens		South Burlington	VT	05403
Hank	Stokes		Burlington	VT	05401
Luke	Ahmann		Burlington	VT	05408
Bob	Melillo		Colchester	VT	05446
Greg	Wood		Burlington	VT	05401
Raymonde	Pirron		Winooski	VT	05404
Brian	LaMothe		Winooski	VT	05404
David	Elston		Winooski	VT	05404
Margaret	Valombo		South Burlington	VT	05403
Bobby	Riley		Winooski	VT	05404
Jason	Villemame		Colchester	VT	05440
Littleton, NH: January 2010					
S.A.	Lyon		Bethel	ME	04217
Ann	Williams		Lovell	ME	04016
John	Carter		Lovell	ME	04051
Sarah	Maynard		Jackson	NH	03846
Albert	King		Littleton	NH	03561
Alan	Smith		Littleton	NH	03561
Watertown, NY: January 2010					
Don	Canfield	Jefferson County Planning Dept.	Watertown	NY	13601
Andy	Nevin	Jefferson County Planning Dept.	Watertown	NY	13601
Cait	Schadock	IMNE - DRM - PWE	Fort Drum	NY	13602
Carl	McLaughlin	Fort Drum Regional Liason Org.	Watertown	NY	13601
David	Duff	Adirondack Citizen Rep.	Hammond	NY	13646
Fred	Tomaselli		Watertown	NY	13601

Burlington AGS

Public Hearings

First	Last	Organization Name	City	State	Zip
Burlington, VT: May 2012					
Martin	LaLonde	South Burlington School District	South Burlington	VT	05403
Phil	Murdock		Essex Junction	VT	05452
Robert	Florenza		Burlington	VT	05401
Joseph	Moore		Essex Junction	VT	05452
Larry	Williams		South Burlington	VT	05403
Frank	Cioffi	Greater Burlington Industrial Corp (GBIC)	Burlington	VT	05402
Joe	Randazzo		South Burlington	VT	05403
Terrence	Pomerleau	Pomerleau Real Estate	Burlington	VT	05401
Gabrielle	Meonier		South Burlington	VT	05403
Tuck	Cantrell		Williston	VT	05495
Kevin	Dwyer		Shelburne	VT	05482
Matthew B.	Powell		Williamstown	VT	05679
Howard	Pierce	PKL Corp	Charlotte	VT	05445
Seth	Bowden	GBIC	Burlington	VT	05401
Lisa	Ventriss	Vermont Business Roundtable	South Burlington	VT	05403
Curtis	Ventriss		South Burlington	VT	05403
Steve	Lambrecht	Kinderstart Preschool	Williston	VT	05495
Richard F.	Miller	158th FW	Middlosok	VT	05602
Brian	Lamothe		Winooski	VT	05104
Larry	Walker		St. George	VT	05495
Steve	Terry	GBIC	Middleburg	VT	05753
Sophie	Quest		South Burlington	VT	05403
Jen	Pizzagalli	GBIC	Shelburne	VT	05482
Chris	Carrigan	Vermont Chamber of Commerce	South Burlington	VT	05403
David W.	Provost		Williston	VT	05495
Bill	Paden		South Burlington	VT	05403
Roger	Bourassa		Colchester	VT	05446
Brad	Audrich		Essex Junction	VT	05452
Joe	Carton	Courtyard Burlington Harbor	Essex Junction	VT	05452
Chris	Lamothe		Winooski	VT	05904
Matt	Campbell		South Burlington	VT	05903
Brian	Cavanagh	Edlund Company	Huntington	VT	05462
Steve	Mark	Vermont Gas	South Burlington	VT	05903
Juliet	Buck		South Burlington	VT	05403
David	Ross	Veterans for Peace	South Burlington	VT	05401
Don	Rendall		South Burlington	VT	05403
David	Bradbury		Stowe	VT	05072
Michael	Cassidy	Cassidy Properties	South Burlington	VT	05403
Gregory	Eplerwood		Burlington	VT	05401
Doug	Brooks		Burlington	VT	05408
David C.	Jones		Jericho	VT	05465
Yorini	Lindyantara		South Burlington	VT	05403
Paul	Fleckenstein		Burlington	VT	05401
David	Worfheim		Jericho	VT	05465
Curtis	Carter	GBIC	Jericho	VT	05465
Ken	Boyd		South Burlington	VT	05402
Henry	Harder		Shelburne	VT	05482
Rebecca	Braczewski		Westford	VT	05494
Dan	Feeney		Burlington	VT	05401
Scott	Baldwin		Burlington	VT	-
Pete	Crevier		South Burlington	VT	05402

Burlington AGS

Public Hearings

First	Last	Organization Name	City	State	Zip
Linus J.	Leavens		South Burlington	VT	-
Peter	Garritano		Shelburne	VT	05482
Monica	Farrington		South Burlington	VT	05403
Mark R.	Neagley	Neagley and Chase Const. Co	South Burlington	VT	-
Glenn	Wright				-
Mark R.	Abrams		South Burlington	VT	05403
Sharon	Busher		Burlington	VT	-
Marie	Agan		Milton	VT	05468
Larry L.	Jackson		Williston	VT	05495
John	Rahill		Burlington	VT	-
Mark	Renkert		South Burlington	VT	-
Dan	Cypress		Winooski	VT	-
Mike	Obrien		Winooski	VT	-
Sarah	Robinson		Winooski	VT	-
Colin	Robinson		Winooski	VT	-
Ann	Zuccardy		Huntington	VT	-
Gene	Palombo		South Burlington	VT	-
Darren	Adams		Milton	VT	05468
John	Cee		South Burlington	VT	-
James	Randall		Essex Junction	VT	05452
Scott	Baldwin		Burlington	VT	05401
Robin	Lloyd-Miller		Burlington	VT	05408
Murray and Bernice	Edelstein		South Burlington	VT	05403
Charlene	FitzPatrick	Mayfair Park	South Burlington	VT	05403
Rich	Carlson		South Burlington	VT	05403
June	Dobbins	Vermont Chamber of Commerce	Eden Mills	VT	05653
Richard	Kramer		Shelburne	VT	05482
Joel	Baird		Burlington	VT	05401
Robert	Letouruean		Essex Junction	VT	05452
Timothy	Brisson		South Hero	VT	05486
David M.	Holmes		South Burlington	VT	05403
Dhrur	Gulati		Essex Junction	VT	05452
Robin	Worn		Huntington	VT	05462
Louis	Simoneau		South Burlington	VT	05403
William A.	Donahue		Bolton Valley	VT	05477
Sally	Fox		South Burlington	VT	05402
Judy	Kearns	The Other Paper	South Burlington	VT	05403
Lois	Price	The Other Paper	South Burlington	VT	05403
Anna K.	Johnston		South Burlington	VT	05403
Andrew	Anderson		Plattsburgh	NY	12901
Clarence C.	Morris		South Burlington	VT	05403
Jason	Guyette		Swanton	VT	05488
Bob	Kiss		Burlington	VT	05401
Richard	Bream		Jericho	VT	05465
Georga	Maille		South Burlington	VT	05403
Don	Rendall		South Burlington	VT	05403
Tina	Deep		Milton	VT	05468
James	McNamara		Burlington	VT	05408
Joan	MacKenzie		Essex Junction	VT	05452
Tony	Marek		Underhill	VT	05489
Dwight	Rolston		Colchester	VT	05446
Eugene	Humphrey		Milton	VT	05468

Burlington AGS

Public Hearings

First	Last	Organization Name	City	State	Zip
Daniel	Stanilons		South Burlington	VT	05403
Sandra	Borgen	State of Vermont Aviation Program	South Burlington	VT	05403
Rick	Hubbard		South Burlington	VT	-
Christina	Walsh		Williston	VT	05495
Helen	Riehle	South Burlington City Council	South Burlington	VT	05403
Eric	Loiselle		Williston	VT	05495
Sandra	Dooley		South Burlington	VT	05403
Sheri	Senesac	Senesac Concrete Cutting Inc.	Colchester	VT	05446
Tammy	Bushell	Bushell Construction	Ferrisburgh	VT	05456
James	Phelps		Colchester	VT	05446
Albert R.	Kaupp Jr.		South Burlington	VT	05403
John Jay	Buckley		South Burlington	VT	05403
John	Douglas		Burlington	VT	05401
Richard	Varney		South Burlington	VT	05403
Mark	Duchaine		Shelburne	VT	05482
Mason	Coleman		Bristol	VT	05443
Heather	Kendrew	Burlington International Airport	South Burlington	VT	05403
Kathleen	Schneider		Winooski	VT	05404
Kristin	Welch		Colchester	VT	05446
George	Mench		South Burlington	VT	05403
Geraldine	Prulin		South Burlington	VT	05403
Ephraim	Schwartz		South Burlington	VT	05403
Peter	Taylor		South Burlington	VT	05403
David	Lustgarten		Burlington	VT	05408
Kathy	Lavoie		Swanton	VT	05488
Kelly	Colling		Fairfax	VT	05454
John	Wilking		South Burlington	VT	05403
Deborah	Winters	GBIC	Swanton	VT	05488
James	Leddy		South Burlington	VT	05403
William F.	Wolford		South Burlington	VT	05403
Bert	Thompson	Veterans for Peace	Johnsen	VT	05656
James Marc	Leas		South Burlington	VT	05403
Laura	Caputo		Burlington	VT	05408
Bill	Stuono		South Burlington	VT	05403
Tom	Clavelle		Shelburne	VT	05482
Brian	Grenon II		Colchester	VT	05446
L.M.	Holmes		Burlington	VT	05401
David	Weinstien	Senator Bernie Sanders	Burlington	VT	05401
John P.	Tracy	Senator Leahy Office	Burlington	VT	-
Corey	Mack		Winooski	VT	05404
Janice	Schwartz		South Burlington	VT	05403
David	Deslauriers Sr.		South Burlington	VT	05403
Steve	Trono		South Burlington	VT	05403
Tiki	Archambeau		Burlington	VT	05401
Bud	Etherton		South Burlington	VT	05403
Rosanne	Greco	South Burlington City Council	South Burlington	VT	05403
Bruce	Bailey		Richmond	VT	05477
Alison	Etherton		South Burlington	VT	05403
Nick	Hinge		Burlington	VT	-
Earl	Brown		Essex Junction	VT	05452
Maida F.	Townsend		South Burlington	VT	05403
John	Floyd		South Burlington	VT	05403

Burlington AGS
Public Hearings

First	*Last*	*Organization Name*	*City*	*State*	*Zip*
Dan	Rissacher		Huntington	VT	05462
Eva	Diner		South Burlington	VT	05403
James	Becker		Milton	VT	05468
Justin	King	Walsh Electric Supply	Essex Junction	VT	05452
Roger	Deshaies	Fletcher Allen Healthcare	Williston	VT	05495
Frederick A.	Dusablon		Bune	VT	05408
Marc	Estrin		Burlington	VT	05401
Craig	Adams		Milton	VT	05468
Meaghan	Emery		South Burlington	VT	05403
Perry	Sporn		Burlington	VT	05401
Tim	Baechle		South Burlington	VT	-
John	Neuhauser	St. Michaels College President	Colchester	VT	05439
Kelly	Devine	Burlinton Business Association	Burlington	VT	05401
Brian	Savage	Vermont State Representative	Swanton	VT	05488
Tom	Salmon	State of VT Office of the State Auditor	Montpelier	VT	05633
Alex	MacLeon	Gov. Peter Shumlin	Peacham	VT	05862
Patricia	Coates	Office of Congressman Welch	Burlington	VT	05401
Littleton, NH: April 2012					
Robea	Blechl	Caledonia-record	Littleton	NH	03561
Albert	King		Littleton	NH	03561
Winston	Currier		Monroe	NH	03771
Roger	Simmons	White Mountain National Forest	Chipton	NH	03223
Watertown, NY: May 2012					
Robert	Blank		Carthage	NY	13619
Farmington, ME: June 2012					
John	Daly		Lowell	MA	01851
Mike	Wells		Wilton	ME	04294
David	Guernsey		Kingfield	ME	04947
Douglas	Topper		Mason	ME	04217
Tom	Mauzaka	Western Maine Matters	Strong	ME	04983
Tom	Eastler		Farmington	ME	04938
Lloyd	Griscom		Phillips	ME	04966
Anstiss	Morrill		Farmington	ME	04940
Emily	Ecker	Western Maine Matters	Woodstock	ME	04219
Seabury	Lyon	Western Maine Matters	Bethel	ME	04217
Kirsten B.	Burbank	Sandy River Land Trust	Salem TWP	ME	04983
Nancy	Portson	Rangeley Lakes Heritage Trust	Madrid	ME	04966
Ben	Godsoe	High Peaks Alliance	West Farmington	ME	04938
Ken	Ziglar		Phillips	ME	-
Cathy	Mattson		Roxbury	ME	04275
Bill	Crandall	The Opportunity Center of North Franklin County Inc.	Farmington	ME	04938
Joanne	Dunlap		Rangeley	ME	04978
Suzanne	Dunham		Greenwood	ME	04255
Emerrill	Kelley		Oxford	ME	04270
John	Calloway		Avom	ME	04966
Greg	Davis	Franklin Journal	Wilton	ME	04294
Joan U.	Small		Farmington	ME	04938
Melanie	Farmer		Temple	ME	04984
Emery Goff and	Bill Carhart		Farmington	ME	04938
Conrad	Heeschen		Wilton	ME	04294

Burlington AGS

Public Hearings

First	Last	Organization Name	City	State	Zip
BJ	Bangs		Phillips	ME	04966
Sylvia	Lambert	Western Maine Matters	Phillips	ME	04966
Jarrod S.	Crockett		Bethel	ME	04217
Paul	Caruso		Phillips	ME	04966
Matthew J.	Peterson		Rumford	ME	04276
Douglas	Rawlings		Chesterville	ME	04938
Rick and Nancy	Matson		Farmington	ME	04938
Burlington, VT: Summer 2012					
Loretta	Marriott		South Burlington	VT	05403
Miriam	Boyle		Burlington	VT	05408
Jon	Montan	St. Law Co Planning Office	Canton	NY	13617
Casey	Baczewski		Essex Junction	VT	05452
Ursula J.	Toutant		South Burlington	VT	05403
Clarence C.	Morris		South Burlington	VT	05403
Christopher	Wheeland		Winooski	VT	05404
Anna K.	Johnson		South Burlington	VT	05403
Matthew C.	Schwarzman		East Fairfield	VT	05448
Caroline	Bergeron		Winooski	VT	05404
David	Duff		Hammond	NY	13646
Linus	Leavens		South Burlington	VT	05403
Emery and Bill	Carhart		Farmington	ME	06935
Mr. and Mrs. Maurice	Seguin		South Burlington	VT	05403
Elizabeth R.	Mench		South Burlington	VT	05403

Burlington AGS

Libraries

Organization Name	Address	City	State	Zip
Fletcher Free Library	235 College Street	Burlington	VT	05401
Winooski Memorial Library	1 Main Street #33	Winooski	VT	05404
Rumford Public Library	56 Rumford Avenue	Rumford	ME	04276
Littleton Library	92 Main Street	Littleton	NH	03561
South Burlington Public Library	540 Dorset Street	South Burlington	VT	05403
Roswell P. Flower Memorial Library	229 Washington Street	Watertown	NY	13601
Watertown Library	29 Washington Street	Watertown	NY	13601

Hill
Air Force Base

Hill AFB

National and State Elected Officials

Prefix	First	MI	Last	Title	City	State	Zip
Nevada							
The Honorable	Harry		Reid	Senator	Washington	DC	20510
The Honorable	Dean		Heller	Senator	Washington	DC	20510
The Honorable	Brian		Sandoval	Governor of Nevada	Carson City	NV	89701
The Honorable	Dean	A	Rhodes	State Senator	Tuscarora	NV	89834
The Honorable	Mark		Amodei	U.S. Congressman, District 2	Washington	DC	20510
The Honorable	Jon		Hickman	Mayor of Ely	Ely	NV	89301
The Honorable	Chris	J.	Johnson	Mayor of Elko	Elko	NV	89801
The Honorable	Emily		Carter	Mayor pro Tempore of West	West Wendover	NV	89883
Utah							
The Honorable	Orrin	G.	Hatch	Senator	Washington	DC	20510
The Honorable	Mike		Lee	Senator	Washington	DC	20510
The Honorable	Rob		Bishop	U.S. Congressman	Washington	DC	20510
The Honorable	Jim		Matheson	U.S. Congressman	Washington	DC	20510
The Honorable	Jason		Chaffetz	U.S. Congressman	Washington	DC	20510
The Honorable	Gary	R.	Herbert	Governor of Utah	Salt Lake City	UT	84114
The Honorable	John	L	Valentine	State Senator, District 14	Orem	UT	84097
The Honorable	Peter	C.	Knudson	State Senator, District 17	Brigham City	UT	84302
The Honorable	Stuart	C.	Reid	State Senator, District 18	Ogden	UT	84401
The Honorable	Scott	K.	Jenkins	State Senator, District 20	Plain City	UT	84404
The Honorable	Jerry	W.	Stevenson	State Senator, District 21	Layton	UT	84041
The Honorable	Stuart		Adams	State Senator, District 22	Layton	UT	84040
The Honorable	Daniel	R.	Liljenquist	State Senator, District 23	Bountiful	UT	84010
The Honorable	Brad	L.	Dee	State Representative, District 11	Ogden	UT	84405
The Honorable	Paul		Ray	State Representative, District 13	Clearfield	UT	84089
The Honorable	Curtis		Oda	State Representative, District 14	Clearfield	UT	84089
The Honorable	Brad	R.	Wilson	State Representative, District 15	Kaysville	UT	84037
The Honorable	Stephen	G.	Handy	State Representative, District 16	Layton	UT	84040
The Honorable	Julie		Fisher	State Representative, District 17	Fruit Heights	UT	84037
The Honorable	Derek	E.	Brown	State Representative, District 49	Salt Lake City	UT	84171
The Honorable	Ralph		Becker	Mayor of Salt Lake City	Salt Lake City	UT	84114
The Honorable	Steve		Curtis	Mayor of Layton	Layton	UT	84041
The Honorable	Matthew	R.	Godfrey	Mayor of Ogden City	Ogden	UT	84401

Hill AFB

Federal and State Agencies

Prefix	First	MI	Last	Title	Organization Name	City	State	Zip
Mr.	Skip		Canfield	Clearinghouse Coordinator	Nevada Division of Lands	Carson City	NV	89701
Ms.	Patricia		Erwin	District Ranger	U.S. Forest Service	Ely	NV	89301
Mr.	Robert		Williams	State Supervisor	U.S. Fish and Wildlife Service, Nevada Ecological Field Office	Reno	NV	89502
Mr.	Ron		Wenker	State Director	Bureau of Land Management State Office	Reno	NV	89502
Mr.	Wayne		Nastri	Regional Administrator	USEPA, Region IX Office of the Regional Administrator	San Francisco	CA	94105
				NEPA Compliance and Review Program	USEPA, Region 8	Denver	CO	80202
Mr.	Willie	R.	Taylor	Director	Office of Environmental Policy and Compliance U.S. Department of the Interior	Washington	DC	20240
					Bureau of Reclamation	Carson City	NV	89701
					USDA Forest Service - Ruby Mtn/Jarbidge Ranger Stations	Wells	NV	89835
					U.S. Forest Service - Humboldt/Toiyabe National Forest	Elko	NV	89801
Ms.	Pam		Wilcox		State of Nevada, Division of Lands	Carson City	NV	89701
Mr.	Steven		Arenson	Regional Environmental Officer	Air Force Western Regional Environmental Office	San Francisco	CA	94105
Ms.	Tamra		Hawthorne	Elko Wilderness Director	Bureau of Land Management - Elko	Elko	NV	89801
Mr.	Norman	M.	Rockwell	Civil Engineer	Bureau of Land Management - Elko District Office	Elko	NV	89801
Mr.	Cameron		Dingman	Unit Aviation Manager	Bureau of Land Management-Elko Field Office	Elko	NV	89801
Ms.	Helen		Hankins	Field Office Manager	Bureau of Land Management-Elko Field Office	Elko	NV	89801
Mr.	Dave		Pattsaretti	Assistant Field Director	Bureau of Land Management-Elko Field Office	Elko	NV	89801
	Leo		Drozdoff	Administrator	Nevada Division of Env Protection State of Nevada, Capitol Complex	Carson City	NV	89701
					Nevada Division of Emergency Management	Carson City	NV	89711
					Nevada Department of Wildlife	Elko	NV	89801
Mr.	Kenneth		Mayer	Director	Nevada Department of Wildlife Reno Headquarters	Reno	NV	89512
					Division of Water Planning	Carson City	NV	89701
					National Trust for Historic Preservation Western Region (Nevada)	San Francisco	CA	94103
	Ronald	M.	James		Nevada State Historic Preservation Office	Carson City	NV	89701
	Richard		Currit		Wyoming State Historic Preservation Office	Cheyenne	WY	82002
Ms.	Alice		Baldrica		State Historic Preservation Office	Carson City	NV	89701
Ms.	Rebecca		Palmer		State Historic Preservation Office	Carson City	NV	89701
	Cornelia	L.	Keatinge	Program Analyst	Advisory Council on Historic Preservation	Lakewood	CO	80228

Federal and State Agencies-2

Hill AFB

Federal and State Agencies

Prefix	*First*	*MI*	*Last*	*Title*	*Organization Name*	*City*	*State*	*Zip*
	Wilson	G.	Martin		Utah State Historical Society	Salt Lake City	UT	84101
Ms.	Lori		Hunsaker	Deputy SHPO	Utah State History Office	Salt Lake City	UT	84101
					U.S. Fish and Wildlife Service	Salt Lake City	UT	84119
					Utah Department of Natural Resources	Salt Lake City	UT	84114
					U.S. Bureau of Land Management	Salt Lake City	UT	84101
					U.S. Forest Service	Salt Lake City	UT	84109
					U.S. Department of Agriculture (APHIS)	Salt Lake City	UT	84126

Federal and State Agencies-3

Hill AFB

American Indian Tribes

First	*MI*	*Last*	*Title*	*Organization Name*	*City*	*State*	*Zip*
Lori		Bear Skiby	Chairwoman	Skull Valley Band of Goshute Indians	Grantsville	UT	84029
Rupert		Steele	Chairman	Confederated Tribes of the Goshute Indian Reservation	Ibapah	UT	84034
Brian		Cassadore	Chairperson	Te-Moak Tribe of Western Shoshone	Elko	NV	89801
Julie		Stevens	Chairperson	Wells Band Council	Wells	NV	89835
Mike		Lajeunesse	Chairman	Eastern Shoshone Tribe	Fort Washakie	WY	82514
Kim		Harjo	Chairperson	Northern Arapaho Tribe	Fort Washakie	WY	82514
George		Gholson	Chairman	Timbisha Shoshone Tribe	Bishop	CA	93514
Barbara		Durham	THPO	Timbisha Shoshone Tribe	Bishop	CA	93514
Troy	A.	Ralstin	Executive Director	Ute Mountain Ute Tribe	Towaoc	CO	81334
E.T. Bud		Moran	Chairman	Confederated Salish & Kootenai Tribes of the Flathead Reservation	Pablo	MT	59855
May		Preston	President	San Juan Southern Paiute Tribe	Tuba City	AZ	86045
Arlen		Quetawki Sr.	Governor	Pueblo of Zuni	Zuni	NM	87327
Ben		Shelly	President	Navajo Nation	Window Rock	AZ	86515
LeRoy		Shingoitewa	Chairman	Hopi Tribe	Kykotsmovi	AZ	86039
Jeanine		Borchardt	Chairwoman	Paiute Indian Tribe	Cedar City	UT	84720
Cedric		Black Eagle	Chairman	Crow Tribe of Montana	Crow Agency	MT	59022
			Chairperson	Ute Indian Tribe	Fort Duchesne	UT	84026
			Director	White Mesa Ute Council	Blanding	UT	84511
Willie		Sharp Jr.	Chairman	Blackfeet Tribe	Browning	MT	59417

American Indian Tribes-4

Hill AFB

Scoping Meetings

First	Last	Organization Name	City	State	Zip
Ogden, UT: January 2010					
Joe	Dougherty	Desert News			-
Buddy	Elliott		Roy	UT	84067
Pat	Condon		Ogden	UT	84403
Ben	Bell		Plain City	UT	84404
Sandy	Kester	Senator Orrin Hatch	Ogden	UT	84401
Jodi	Holmgren		South Ogden	UT	84405
Evan	Gabrielson		Riverton	UT	84065
Craig	Dearden	Weber County Commissioner	Ogden	UT	84401
Brigit	Pack		Ogden	UT	84401
Jim	Stavrakakis		Ogden	UT	84401
David	Schmitz		Ogden	UT	84401
Weston	Saunders		Kaysville	UT	84037
John	Bizzell		Layton	UT	84041
Michael	Poff	South Weber City Council	South Ogden	UT	84405
Brian	Minster		South Ogden	UT	84403
Layton, UT: January 2010					
Peter	Matson	Layton City	Layton	UT	84041
Bill	Wright	Layton City	Layton	UT	84041
Rick	Mayfield	Utah Defense Alliance	Kaysville	UT	84037
Barry	Flitton	Layton City Council	Layton	UT	84040
Carolyn	Sharp		Ogden	UT	84403
Cary	Fisher		Clearfield	UT	84015
Kent	Suiser	Davis County Commission	Farmington	UT	84025
Jamie	Nagle	Mayor of Syracuse	Syracuse	UT	84075
Chad	Bangerter	Mayor of Sunset	Sunset	UT	84015
Don	Wood	Mayor of Clearfield	Clearfield	UT	84015
Jay and Evelyn	Dayley		Layton	UT	84041
Larry	Scleuble		Mardell	VA	20015
Jim	Thomas		New Cumberland	PA	17070
Mike	Bouwhuis	Top of Utah Military Affairs	Kaysville	UT	84037
Dave	Weaver		Layton	UT	84040
Robert	Sleight		Layton	UT	84041
Ken	Cox		Farmington	UT	84107
Steven	Carroll		Layton	UT	84040
Steven	Mueller		Harrisville	UT	84404
Rupert	Steele		Taylorsville	UT	84123
Brandon	Strong	Top of Utah Military Affairs	Layton	UT	84040
Scott	Tletcher		Clearfield	UT	84015
David	Irving		Layton	UT	84041
Jim	Mallock		Layton	UT	84041
Don	Berube		Layton	UT	84040
Gerald	Gibtro		Layton	UT	84041
Mario	Moreno		Layton	UT	84041
Len	Arave		North Salt Lake	UT	84054
Ben	Hurt		Layton	UT	84041
Gary	Hale		Layton	UT	84040

Hill AFB

Scoping Meetings

First	*Last*	*Organization Name*	*City*	*State*	*Zip*
Steve	Curtis	Mayor of Layton	Layton	UT	84040
Greg	Gilbone		Layton	UT	84040
Callao, UT: February 2010					
Susan	Claridge		Wendover	UT	84083
Brian	Allen		Dugway	UT	84022
John	Rail		Callao	UT	84083
West Wendover, NV: January 2010					
Christine	Steele	Goshute Reservation	Ibapah	UT	84034
Matt	Hei		Battle Mountain	NV	89820
Walt	Sanders		Wendover	NV	89883

Hill AFB

Public Hearings

First	Last	Organization Name	City	State	Zip
Layton, UT: May 2012					
Jore	Francis	Layton City Councilmember	Layton	UT	84041
Lawrence	Wright	Centerville City Council	Centerville	UT	84014
Mike	LeBaron	Clearfield City Council	Clearfield	UT	84015
Donna	McAleer	Candidate 1st Congressional District	Park City	UT	84098
Walter & Joan	Saeger Jr.	Utah Air Force Association	Layton	UT	84040
Sandy	Kester	Senator Orrin Hatch	Ogden	UT	84401
Scott	Paxman	Weber Basin Water Co.	Layton	UT	84040
Heather	Barney	Senator Orrin Hatch	Salt Lake City	UT	84105
Scott	Lunt	Davis Conference Center	Layton	UT	84041
Lowenda	Downs	Davis County	Farmington	UT	84025
Gerald	Hasty		Layton	UT	84041
Peter	Matson	Layton City	Layton	UT	84041
Bill	Wright	Layton City	Layton	UT	84041
Brett	Millburn	Davis County	Centerville	UT	84014
Curtis	Oda		Clearfield	UT	84089
Charles	Trentelman	Standard-Examiner	Ogden	UT	84412
Peter	Samore	KSL	Salt Lake City	UT	84101
Barry	Burton	Davis County Planning	Clinton	UT	84015
Cathy	Grahm	Falcons	Ogden	UT	84403
Tage	Flint	Utah Defense Alliance	Layton	UT	84040
Steve	Rush	Utah Defense Alliance	Layton	UT	84040
Rick	Mayfield	Military Installation Defense Authority	Fruit Heights	UT	84037
Earl	Hibberd		Clearfield	UT	84015
Ogden, UT: May 2012					
C. David	Correll		Ogden	UT	84403
Jim	Stavrakakis	Action Investments	Ogden	UT	84401
Louis	Cooper		Huntsville	UT	84317
Kearston	Cutrubus	388th FW	Roy	UT	84067
Rulon	Dye		Uintah	UT	84405
Susan S.	Davis	Questar Gas	Bountiful	UT	84010
Roy	Stewart		Roy	UT	84067
West Wendover, NV: May 2012					
Madeline	Greymountain	Confederated Tribes of Goshute	Ibapah	UT	84034
Matthew	Plant	Ely Shoshone Tribe	Ely	NV	89301

Hill AFB

Libraries

Organization Name	*Address*	*City*	*State*	*Zip*
Davis County Library - North Branch Library	562 S 1000 E	Clearfield	UT	84015
Davis County Library - Central Branch	155 N. Wasatch Dr.	Layton	UT	84041
Davis County Library - Syracuse - Northwest Branch	1875 S. 2000 W.	Syracuse	UT	84075
Salt Lake City Public Library	210 E 400 S	Salt Lake City	UT	84111
Weber County Library - Southwest Branch Library	1950 W 4800 S	Roy	UT	84067
Weber County Library - North Branch Library	475 E 2600 N	Ogden	UT	84414
Weber County Library - Main	2464 Jefferson Ave	Ogden	UT	84401
West Wendover Branch Library	590 Camper Drive	West Wendover	NV	89883

Jacksonville
Air Guard Station

Jacksonville AGS

National and State Elected Officials

Prefix	*First*	*Last*	*Title*	*City*	*State*	*Zip*
The Honorable	Marco	Rubio	Senator	Washington	DC	20510
The Honorable	Bill	Nelson	Senator	Washington	DC	20510
The Honorable	Saxby	Chambliss	Senator	Washington	DC	20510
The Honorable	Johnny	Isakson	Senator	Washington	DC	20510
The Honorable	Jack	Kingston	US Congressman, GA 1st District	Washington	DC	20510
The Honorable	Ander	Crenshaw	US Congressman, FL 4th District	Washington	DC	20510
The Honorable	Corrine	Brown	US Congresswoman, FL 3rd District	Washington	DC	20510
The Honorable	Daniel	Webster	US Congressman, FL 8th District	Washington	DC	20510
The Honorable	Clifford	Stearns	US Congressman, FL 6th District	Washington	DC	20510
The Honorable	Dennis	Ross	US Congressman, FL 12th District	Washington	DC	20510
The Honorable	Thomas	Rooney	US Congressman, FL 16th District	Washington	DC	20510
The Honorable	Nathan	Deal	Governor of Georgia	Atlanta	GA	30334
The Honorable	Rick	Scott	Governor of Florida	Tallahassee	FL	32399
The Honorable	Aaron	Bean	State Senator, District 4	Jacksonville	FL	32207
The Honorable	John	Thrasher	State Senator, District 6	St. Augustine	FL	32092
The Honorable	Dorothy L.	Hukill	State Senator, District 8	Port Orange	FL	32127
The Honorable	Audrey	Gibson	State Senator, District 9	Jacksonville	FL	32202
The Honorable	Darren	Soto	State Senator, District 14	Kissimmee	FL	34741
The Honorable	Denise	Grimsley	State Senator, District 21	Sebring	FL	33870
The Honorable	William	Ligon, Jr.	State Senator, District 3	Brunswick	GA	31525
The Honorable	Charles E.	Van Zant	State Representative, District 19	Palatka	FL	32177
The Honorable	John	Wood	State Representative, District 41	Winter Haven	FL	33880
The Honorable	Ben	Albritton	State Representative, District 56	Bartow	FL	33830
The Honorable	Cary	Pigman	State Representative, District 55	Sebring	FL	33870
The Honorable	Janet	Adkins	State Representative, District 11	Fernandina Beach	FL	32034
The Honorable	Mia	Jones	State Representative, District 14	Jacksonville	FL	32218
The Honorable	Reggie	Fullwood	State Representative, District 13	Jacksonville	FL	32202
The Honorable	Charles	McBurney	State Representative, District 16	Jacksonville	FL	32202
The Honorable	Lake	Ray	State Representative, District 12	Jacksonville	FL	32216
The Honorable	Ronald	Renuart	State Representative, District 17	Ponte Vedra Beach	FL	32082
The Honorable	Jeff	Chapman	State Representative, District 167	Brunswick	GA	31523
Mayor	Alvin	Brown	Mayor of Jacksonville	Jacksonville	FL	32202
Mayor	Hugh	Hodge	Mayor of Darien	Darien	GA	31305
Mayor	Sharon	Schuler	Mayor-Commissioner Avon Park	Avon Park	FL	33825
Mayor	George	Hensley	Mayor of Sebring	Sebring	FL	33870
Mayor	Michael	Carter	Mayor-Commissioner Lake Wales	Lake Wales	FL	33853
Mayor	Vernon	Myers	Mayor-Commissioner Palatka	Palatka	FL	32177

Jacksonville AGS

Federal and State Agencies

First	*Last*	*Title*	*Organization Name*	*City*	*State*	*Zip*
Dean	Stringer	Manager - FAA	FAA - Orlando Airports District Office (FL)	Orlando	FL	32822
Frederick	Gaske	SHPO and Division Director	Florida Division of Historical Resources	Tallashassee	FL	32399
Lauren	Milligan	SPOC (FL)	Florida State Clearing House - Florida Department of Env. Protection	Tallahassee	FL	32399
			Agency for Health Care Administration	Tallahassee	FL	32308
			Agency for Persons with Disabilities	Tallahassee	FL	32399
			Agency for Workforce Innovation	Tallahassee	FL	32399
			Attorney General	Tallahassee	FL	32399
			Auditor General	Tallahassee	FL	32399
			Department of Business and Professional Regulation	Tallahassee	FL	32399
			Department of Community Affairs	Tallahassee	FL	32399
			Department of Environmental Protection & Natural Resources	Tallahassee	FL	32399
			Department of Financial Services	Tallahassee	FL	32400
			Department of Health	Tallahassee	FL	32401
			Department of Law Enforcement	Tallahassee	FL	32308
			Department of Management Services	Tallahassee	FL	32399
			Department of Military Affairs	St Augustine	FL	32084
			Department of Revenue	Tallahassee	FL	32399
			Department of State	Tallahassee	FL	32400
			Department of Transportation	Tallahassee	FL	32399
			Department of Veterans' Affairs	Tallahassee	FL	32399
			Dept of Agriculture and Consumer Services	Tallahassee	FL	32400
			Florida Legislature	Tallahassee	FL	32399
			Florida Supreme Court	Tallahassee	FL	32400
			Public Service Commission	Tallahassee	FL	32399
			Florida Association of Soil & Water Conservation Districts	Newberry	FL	32669
			Florida Division of Forestry	Tallahassee	FL	32399

Federal and State Agencies-2

Jacksonville AGS

Federal and State Agencies

First	*Last*	*Title*	*Organization Name*	*City*	*State*	*Zip*
			Florida Fish & Wildlife Conservation Commission	Tallahassee	FL	32399
			Environmental Protection Agency	Atlanta	GA	30303
			Southern Regional Extension Forestry	Athens	GA	30602
			USDA Forest Service	Tallahassee	FL	32303
			Southern Regional Office	Atlanta	GA	30367
			USDA Natural Resources Conservation Service	Gainesville	FL	32606
			US Fish & Wildlife Service	Atlanta	GA	30345
			Big Cypress National Preserve	Ochopee	FL	34141
			Everglades National Park	Homestead	FL	33034
			Administrative Office of the Courts	Atlanta	GA	30334
			Atlanta Regional Commission	Atlanta	GA	30327
			Department of Community Health	Atlanta	GA	30303
			Department of Economic Development	Atlanta	GA	30308
			Georgia Office of Homeland Security	Atlanta	GA	30316
			Georgia Department of Labor	Atlanta	GA	30303
			Department of Natural Resources	Atlanta	GA	30304
			Department of Public Safety	Atlanta	GA	30371
			Department of Transportation	Atlanta	GA	30308
			Georgia Forestry Commission	Dry Branch	GA	31020
			Georgia Professional Standards Commission	Atlanta	GA	30303
			Georgia Regional Transportation Authority	Atlanta	GA	30303
			Georgia Soil and Water Conservation Commission	Athens	GA	30603
			Georgia State Financing and Investment Commission	Atlanta	GA	30334
			Georgia Technology Authority	Atlanta	GA	30334
			Governor's Office of Consumer Affairs	Atlanta	GA	30334
			Office of the Attorney General	Atlanta	GA	30334
			Public Service Commission	Atlanta	GA	30334

Jacksonville AGS

Federal and State Agencies

First	Last	Title	Organization Name	City	State	Zip
			Georgia Dept of Human Services Division of Family & Children Services	Atlanta	GA	30303

Jacksonville AGS

American Indian Tribes

First	MI	Last	Title	Organization Name	City	State	Zip
James	E.	Billie	Chairman	Seminole Tribe of Florida	Hollywood	FL	33024
Paul		Backhouse	Tribal Historic Preservation Officer	Seminole Tribe of Florida	Hollywood	FL	33024

Jacksonville AGS

Scoping Meetings

First	Last	Organization Name	City	State	Zip
Brunswick, GA: February 2010					
Raymond	McGanus		Brunswick	GA	31525
Fred	Pierson		Hampton	VA	23669
Brian	Leverette		Townsend	GA	31331
Donald	Holmes		Brunswick	GA	31520
Ed	Dennis		St. Simons Island	GA	31522
Tricia	Reynolds	Coastal Regional Commission	Brunswick	GA	31520
Steve	Brian	Glynn County Airport Commission	Brunswick	GA	31525
Lawrence	Eaddy	165th Airlift Wing	Garden City	GA	31408
Jacksonville, FL: February 2010					
Donald	Harris		Jacksonville	FL	32226
Len	Scullion		St. Marys	GA	31558
Rachel	Simpler		Jacksonville	FL	32256
John	Grissett		Jacksonville	FL	32218
Kelvis	Alleing		Jacksonville	FL	32218
Ashley	Cook	Senator LeMieux's office	Jacksonville	FL	32207
Bob	Buehn	City of Jacksonville - City Hall	Jacksonville	FL	32202
Steve	Stewart	HDR, Inc.	Jacksonville	FL	32202
Harrison	Conyers	City of Jacksonville - City Hall	Jacksonville	FL	32202
Joe	Blunt		Jacksonville	FL	32277
Sherrie	Porter	Congressman Cliff Stearns	Orange Park	FL	32043
John	Campbell		Jacksonville	FL	32205
Sylvester	Bolden		Jacksonville	FL	32215
Greg	Timoney	NAVFAC SE EV 21 - NAS JAX	Jacksonville	FL	32212
Avon Park, FL: February 2010					
Maureen	McKenna		Sebring	FL	33872
Helen	Sears	CFRPC	Bartow	FL	33530
Melanie	Bond		Wauchula	FL	333873
Ron	Riedel	MacDill AFB	Avon Park	FL	33825
Tod	Zechiel	23 WG DETI OLA/CEUN	Avon Park	FL	33825
Virginia	Spencer		Sebring	FL	33875
Aiyana	Baida	Highlands Today - Media	Sebring	FL	33870
Bill	Frankenberger		Avon Park	FL	33825
Lake Wales, FL: February 2010					
W. Renee	Taylor		Lake Wales	FL	33859
Azard	Baksh		Lake Wales	FL	33853
Ron	Borchers		Mulberry	FL	33860
Palatka, FL: February 2010					
Allan	Brown		Palatka	FL	32177
Scott	Pike		Green Cove Springs	FL	32043

Jacksonville AGS

Public Hearings

First	*Last*	*Organization Name*	*City*	*State*	*Zip*
Jacksonville, FL: May 2012					
Russell	Byrd	MCAS Beaufort			-
Rodney	McFadden	MCAS Beaufort	Beaufort	SC	29902
Kim	Fleming		Cape Carteret	NC	28584
Katie	Ross	U.S. Senator Bill Nelson	Jacksonville	FL	32207
Palatka, FL: May 2012					
Mark	Ritchie	Putnam County Planning and Development	Palatka	FL	32177
Floyde	Becker		East Palatka	FL	32131

Jacksonville AGS

Libraries

Organization Name	*Address*	*City*	*State*	*Zip*
Highlands Regional Library - City of Jacksonville	1826 Dunn Avenue	Jacksonville	FL	32218
Ida Hilton Public Library	1105 Northway	Darien	GA	31305
Avon Park Public Library	100 N. Museum Avenue	Avon Park	FL	33825
Lake Wales Public Library	290 Cypress Gardens Lane	Lake Wales	FL	33853
Palatka Public Library	601 College Road	Palatka	FL	32177

Mountain Home Air Force Base

Mountain Home AFB

National and State Elected Officials

Prefix	First	Last	Title	City	State	Zip
The Honorable	James	Risch	Senator	Washington	DC	20510
The Honorable	Michael	Crapo	Senator	Washington	DC	20510
The Honorable	Ron	Wyden	Senator	Washington	DC	20510
The Honorable	Jeff	Merkley	Senator	Washington	DC	20510
The Honorable	Mike	Simpson	Congressman	Washington	DC	20515
The Honorable	Raul	Labrador	Congressman	Washington	DC	20515
The Honorable	Greg	Walden	Congressman	Washington	DC	20515
The Honorable	C.L. "Butch"	Otter	Governor of Idaho	Boise	ID	83720
The Honorable	Brian	Sandoval	Governor of Nevada	Carson City	NV	89701
The Honorable	John	Kitzhaber	Governor of Oregon	Salem	OR	97301
Col. Retired	William	Ritchie	Special Assistant, Military Affairs	Mountain Home	ID	83647
	Ted	Ferrioli	State Senator, District 30	Salem	OR	97301
The Honorable	Richard	Wills	State Representative, District 23	Glenns Ferry	ID	83623
The Honorable	Pete	Nielsen	State Representative, District 23	Mountain Home	ID	83647
The Honorable	John	Ellison	Nevada State Assembly, District 33	Elko	NV	89803
The Honorable	Cliff	Bentz	State Representative, District 60	Salem	OR	97301
The Honorable	David H.	Bieter	Mayor of Boise	Boise	ID	83702
Mayor	Greg	Lanting	Mayor of Twin Falls	Twin Falls	ID	83303
Mayor	Thomas G.	Rist	Mayor of Mountain Home	Mountain Home	ID	83647
Mayor	Tammy M.	Payne	Mayor of Grandview	Grand View	ID	83624
			Mountain Home City Council	Mountain Home	ID	83647
			Elmore County Commissioners	Mountain Home	ID	83647
			Elko County Commissioners	Elko	NV	89801
			Humboldt County Commissioners	Winnemucca	NV	89445
			Malheur County Commissioners	Vale	OR	97918

Elected Officials-1

Mountain Home AFB

Federal and State Agencies

First	Last	Title	Organization Name	City	State	Zip
Aden	Seidlitz	Boise District Manager	BLM Boise District	Boise	ID	83705
Ken	Miller	District Manager	BLM Elko District Office	Elko	NV	89801
Charles	Kim		BLM Military Liaison	Carson City	NV	89701
Jack G.	Peterson	BLM Military Liasion	BLM State Office	Boise	ID	83709
Dave	Henderson	District Manager	BLM Vale District Office	Vale	OR	97918
Gene	Seidlitz	District Manager	BLM Winnemucca District Office	Winnemucca	NV	89445
Ed	Monnig	Forest Supervisor	Humboldt-Toiyabe National Forest	Sparks	NV	89431
Randall	Smith		Idaho Fish and Game	Jerome	ID	83338
Cal	Groen	Director	Idaho Fish and Game - Headquarters	Boise	ID	83712
Tom	Montoya	District Ranger	Mountain City Ranger District	Elko	NV	89801
			Nevada Department of Wildlife, Elko	Elko	NV	89801
			Nevada Department of Wildlife, Winnemucca	Winnemucca	NV	89445
		Federal Activities Program Manager	Nevada Fish and Wildlife Office	Reno	NV	89502
		Clearinghouse Coordinator	Nevada State Clearinghouse Department of Administration	Carson City	NV	89701
Eric	Rickerson	Acting Wildlife Diversity Program Manager	Oregon Department of Fish & Wildlife	Salem	OR	97303
Gar	Abbas	District Ranger	Ruby Mountain/Jarbidge Ranger District	Wells	NV	89835
Terrie	Jarell	Acting District Ranger	Santa Rosa Ranger District	Winnemucca	NV	89445
Jeff	Foss		Snake River Fish and Wildlife Office	Boise	ID	83709
Michelle	Pirzadeh	Acting Regional Administrator	USEPA - Region 10	Seattle	WA	98101
Robin	Thorson	Regional Director	USFWS - Pacific Region 1	Portland	OR	97232
Gary	Miller	Field Supervisor	USFWS La Grande Field Office	La Grande	OR	97850
Ren	Lohoefener	Acting Regional Director	USFWS Northwest Regional Office	Portland	OR	97232
Bill	Baker	Twin Falls District Manager	BLM Jarbidge Field Office	Twin Falls	ID	83301
Janet	Gallimore	Idaho State Historic Preservation Officer	Idaho State Historical Society	Boise	ID	83712
Susan	Haylock	Oregon State Historic Preservation Officer	Oregon Parks and Recreation Dept, State Historic Preservation Office	Salem	OR	97301

Mountain Home AFB

Federal and State Agencies

First	Last	Title	Organization Name	City	State	Zip
Craig	Gehrke	Regional Director	The Wilderness Society	Boise	ID	83702
Katie	Fite	Biodiversity Director	Western Watersheds Project	Boise	ID	83701

Mountain Home AFB

American Indian Tribes

First	*Last*	*Title*	*Organization Name*	*City*	*State*	*Zip*
Nathan	Small	Chairman	Shoshone-Bannock Tribes	Fort Hall	ID	83203
Jason	Walker	Chairman	Northwestern Band, Shoshone	Brigham City	UT	84302
Terry	Gibson	Chairman	Shoshone-Paiute Tribes of Duck Valley	Owyhee	NV	89832
Billy	Bell	Chairman	Paiute-Shoshone Tribes of Fort McDermitt	McDermitt	NV	89421
Dianne	Teeman	Chairperson	Burns Paiute Tribe	Burns	OR	97720

Mountain Home AFB

Interested Parties

Prefix	*First*	*Last*	*Organization Name*	*City*	*State*	*Zip*
Mr.	Charles	Cooper	Ada County Fish and Game League	Boise	ID	83704
			Idaho Conservation League	Boise	ID	83701
			Idaho Rivers United	Boise	ID	83701
	Jessica	Ruehrwein	The Sierra Club	Boise	ID	83702
Mr.	Brian	Goller		Boise	ID	83712

Mountain Home AFB

Scoping Meetings

First	Last	Organization Name	City	State	Zip
Grand View, ID: February 2010					
Joe	Merrick		Bruneau	ID	83604
George	Hyer	Owyhee County Commissioner	Homedale	ID	83628
Bob	Bennett		Mountain Home	ID	83647
Nelda	Reed		Caldwell	ID	83605
Arlie	Shaw	Elmore County	Mountain Home	ID	83647
Donna	Bennett	Farmer/Rancher	Grand View	ID	83624
Bill	Richey	State of Idaho	Mountain Home	ID	83647
Joe	Rodriguez	Elmore County	Mountain Home	ID	83647
Tyler	Peterson		Boise	ID	83705
George	Porter		Bruneau	ID	83604
James	Johnson		Grand View	ID	83624
Bob	Swenson		Grand View	ID	83624
Tom	Payne		Grand View	ID	83624
John	Marshall		Mountain Home	ID	83647
Jerry	Hoagland	Owyhee County	Murphy	ID	83650
Boise, ID: February 2010					
Jim	Paulson	Ada County Association of Realtors	Boise	ID	83709
Oscar	Paulson	Retired USAF	Boise	ID	-
Bruce	Wong	Retired USAF	Boise	ID	83713
Don	Dietrich	Department of Commerce	Boise	ID	83720
Mark	Gier	CSHQA	Boise	ID	83702
Andrea	Zollweg		Boise	ID	83713
Dick	Jacobson		Eagle	ID	83616
John	Collins		Boise	ID	83713
Gloria	Mabbutt	Department of Commerce	Boise	ID	83720
Twin Falls, ID: February 2010					
Robert	Werner		Twin Falls	ID	83301
Nate	Poppno	Times News	Twin Falls	ID	83301
Lee	Heider	Twin Falls Vice Mayor	Twin Falls	ID	83301
Jake	Brackett		Rogerson	ID	83302
Rusty	Gideon	USAF Retired	Hazelton	ID	83335
Mountain Home, ID: February 2010					
Beth	Reed	Resident	Mountain Home	ID	83647
Roy D.	Newer II	Resident	Mountain Home	ID	83647
Ronald	Whitesel	Resident	Mountain Home	ID	83647
John	Root	Dept. of Idaho Disabled Vets	Tipanuk	ID	83647
Alfred	Rathbun	Resident	Mountain Home	ID	83647
Warren	Bauer	Resident	Mountain Home	ID	83647
Lila	Appleton		Mountain Home	ID	83647
Jim	Olds		Mountain Home	ID	83647
Alena	Fetters		Mountain Home	ID	83647
James	Withrow	Resident	Mountain Home	ID	83647
Mickey	Stockwell	Resident	Mountain Home	ID	83647
Marna	Snyder	AF Reserve	Mountain Home	ID	83647
Ken	Robertson		Mountain Home	ID	83647

Mountain Home AFB

Scoping Meetings

First	Last	Organization Name	City	State	Zip
Chuck	Whipple		Mountain Home	ID	83647
Justin	Baldwin	MHFD	Mountain Home	ID	83647
Brenda	Ellis	City Hall	Hammett	ID	83627
Sook	Bunton		Mountain Home	ID	83647
Jesse	Lee		Mountain Home	ID	83647
Alvin	Powers		Mountain Home	ID	83647
Jeff	Priest	Resident	Mountain Home	ID	83647
Phil	Gridley	Mtn. Home City Fire Chief	Mountain Home	ID	83647
Rick	Harvel	Resident	Mountain Home	ID	83647
Larry	Toberlin	Resident/Retired	Mountain Home	ID	83647
Robert	Benbough	USAF Retired	Mountain Home	ID	83647
Connie	Cruser	Elmore County Commerce	Mountain Home	ID	83647
Joe	Mc Neal	Former Mayor	Mountain Home	ID	83647
Herb	Meyr	Lt. Col. USAF	Mountain Home	ID	83647
Bill	Darkes	City Employee	Mountain Home	ID	83647
Daryl	Hinton	Resident	Mountain Home	ID	83647
Ray	Liercke	Resident	Mountain Home	ID	83647
John	Fainham	Resident	Mountain Home	ID	83647
Brandon	Wakefield	Resident	Mountain Home	ID	83647
Ann	Payne	Resident	Mountain Home	ID	83647
Fred	Busing	Resident	Mountain Home	ID	83647
Gordon	Henn	Resident	Mountain Home	ID	83647
S.	Martinez	Resident	Mountain Home	ID	83647
Tom	Rosecke		Mountain Home	ID	83647
David	Marlett		Mountain Home	ID	83647
Judy	Mayne		Mountain Home	ID	83647
Rich	Sykes	Chamber Board Member	Mountain Home	ID	83647
Wayne	Shepherd	Resident	Mountain Home	ID	83647
Tim	Sloan	Resident	Mountain Home	ID	83647
Gene	Smith		Mountain Home	ID	83647
Jeff	Broock		Mountain Home	ID	83647
Doug	Dougal	Resident	Mountain Home	ID	83647
Barbara	Dorio	Resident	Mountain Home	ID	83647
Albert	Clement	Department of Labor	Mountain Home	ID	83647
Gene	Palmer	Resident	Mountain Home	ID	83647
Shane	Zenner	Military Affairs Committee	Mountain Home	ID	83647
Mark	Wetherell	Resident	Mountain Home	ID	83647
Mary	Tucker	Resident	Mountain Home	ID	83647
Mari	Young	Resident	Mountain Home	ID	83647
Bob	Roberts	Resident	Mountain Home	ID	83647
Dennis	Belt	Resident	Mountain Home	ID	83647
Brian	Orban	Mountain Home News	Mountain Home	ID	83647
Tiffany	Belt		Mountain Home	ID	83647
Debra	Brito		Mountain Home	ID	83647

Mountain Home AFB

Public Hearings

First	*Last*	*Organization Name*	*City*	*State*	*Zip*
Grand View, ID: May 2012					
Ted	Thompson		Mountain Home	ID	83647
Boise, ID: May 2012					
Bree	Wells		Boise	ID	83705
Chuck	Thomas		Boise	ID	83709
Alden B.	Carpender		Boise	ID	83709
Ray	Schmitz		Boise	ID	83702
Brad	Bolicek		Boise	ID	83706
Josh	Thomas	Shoshone-Paiute Tribes	Nampa	ID	83651
Chuck	Howard		Caldwell	ID	83607
Judy	Voth		Boise	ID	83706
Mountain Home, ID: May 2012					
Rick	Checketts		Mountain Home	ID	83647
Mike	Buckner		Mountain Home	ID	83647
Ken	Everett		Mountain Home	ID	83647
Sue	Liercke		Mountain Home	ID	83647
Barbara	Checketts		Mountain Home	ID	83647
Lt Col Herb	Meyr	USAF Ret	Mountain Home	ID	83647
Kim	Heinen	Veterans United	Mountain Home	ID	83647
Jane	Jetler		Mountain Home	ID	83647
Ron	Monasterio		Mountain Home	ID	83647
Wendy	Furtado		Boise	ID	83705

Mountain Home AFB

Libraries

Organization Name	*Address*	*City*	*State*	*Zip*
Twin Falls Public Library	201 4th Avenue East	Twin Falls	ID	83301
Mountain Home Public Library	790 North 10th East	Mountain Home	ID	83647
Mountain Home AFB Library	Bldg 2427, 520 Phantom Ave.	Mountain Home AFB	ID	83648
Boise Public Library	715 S. Capitol Blvd.	Boise	ID	83702
Bruneau District Library	32073 Ruth St.	Bruneau	ID	83604
Eastern Owyhee Co. Library	1520 Boise Avenue, P.O. Box 100	Grand View	ID	83624
Malheur County Library	388 SW 2nd Avenue	Ontario	OR	97914
Elko County Library	720 Court Street	Elko	NV	89801
Humboldt County Library	85 East Fifth Street	Winnemucca	NV	89445

Shaw/McEntire Joint National Guard Base

Shaw AFB/McEntire JNGB

National and State Elected Officials

Salutation	***First***	***Last***	***Title***	***Organization Name***	***City***	***State***	***Zip***
The Honorable	Saxby	Chambliss	Senator	State of Georgia	Washington	DC	20510
The Honorable	Johnny	Isakson	Senator	State of Georgia	Washington	DC	20510
The Honorable	Lindsay	Graham	Senator	State of South Carolina	Washington	DC	20510
The Honorable	Tim	Scott	Senator	State of South Carolina	Washington	DC	20510
The Honorable	Lynn	Westmoreland	Congressman	GA 3rd District	Washington	DC	20515
The Honorable	John	Barrow	Congressman	GA 12th District	Washington	DC	20515
The Honorable	Mark	Sanford	Congressman	SC 1st District	Washington	DC	20515
The Honorable	Mick	Mulvaney	Congressman	SC 5th District	Washington	DC	20515
The Honorable	James E.	Clyburn	Congressman	SC 6th District	Washington	DC	20510
The Honorable	Nathan	Deal	Governor of Georgia	Governor of Georgia	Atlanta	GA	30334
The Honorable	Nikki	Haley	Governor of South Carolina	Governor of South Carolina	Columbia	SC	29201
The Honorable	Kevin L.	Johnson	State Senator	SC Senate, District 36	Manning	SC	29102
The Honorable	Jimmy C.	Bales	State Representative	SC House, District 80	Eastover	SC	29044
The Honorable	G. Murrell	Smith	State Representative	SC House, District 67	Sumter	SC	29151
Mayor	Larry	Morgan	Mayor of Louisville	Mayor of Louisville	Louisville	GA	30334
Mayor	Deke	Copenhaver	Mayor of Augusta	Mayor of Augusta	Augusta	GA	30901
Mayor	Joseph T.	McElveen Jr.	Mayor of Sumter	Mayor of Sumter	Sumter	SC	29150
Mayor	Ricky	Burrows	Mayor of Kingstree	Mayor of Kingstree	Kingstree	SC	29556
Mayor	Geraldene	Robinson	Mayor of Eastover	Mayor of Eastover	Eastover	SC	29044
Chairman	Larry	Blanding	Chairman	Sumter County Council	Sumter	SC	29151

Elected Officials-1

Shaw AFB/McEntire JNGB

Federal and State Agencies

First	*Last*	*Title*	*Organization Name*	*City*	*State*	*Zip*
Sandy	Tucker	Field Office Superviser	USFWS - North Georgia Field Office	Athens	GA	30606
Cindy	Dohnr	Regional Office	USFWS	Atlanta	GA	30345
		NEPA Program Office	USEPA, Region 4	Atlanta	GA	30303
James	Setser		GA DNR	Atlanta	GA	30334
Barbara	Jackson	SPOC (GA)	Georgia State Clearinghouse	Atlanta	GA	30334
Robert	Brooks	Coastal GA Field Office	USFWS	Athens	GA	30606
Tim	Hall	Charleston Field Supervisor	USFWS	Charleston	SC	29407
		Clemson Field Supervisor	USFWS	Clemson	SC	29634
Scott	Serritt	Manager - FAA	Atlanta Airports District Office (GA)	College Park	GA	30337
Jean	Manhiemer	SPOC (SC)	South Carolina State Clearinghouse Office of State Budget	Columbia	SC	29201
Rebekah	Brobrasko	SHPO (SC)	State Historic Preservation Office	Columbia	SC	29223
Paul A.	Sandifer	Director	South Carolina / DNR	Columbia	SC	29201
Frank	Wilcox	State Administrative Officer	South Carolina DNR	Columbia	SC	29201
		Commanding Officer	Environmental Division (S4)	Beaufort	SC	22904
Shelly	Wilson	Federal Facilities Liason	SCDHEC	Columbia	SC	29201
Tracy	Swartout	Superintendent	Congaree National Park	Hopkins	SC	29061

Shaw AFB/McEntire JNGB

American Indian Tribes

First	Last	Title	Organization Name	City	State	Zip
Bill	Harris	Chairperson	Catawba Indian Nation	Rock Hill	SC	29730
Bryan	Hall	SCMD Tribal Liaison	SC Military Dept	Eastover	SC	29044
Wenonah	Haire		Tribal Historic Preservation Officer	Rock Hill	SC	29730

Shaw AFB/McEntire JNGB

Scoping Meetings

First	Last	Organization Name	City	State	Zip
Sumter, SC: February 2010					
Gary	Mixon		Sumter	SC	29150
Cliff and Vicki	Goodwin		Sumter	SC	29150
John T.	Jones, Jr.		Sumter	SC	29150
Ike	McLeese	Greater Columbia Chamber of Commerce	Columbia	SC	29201
Deron	McCormick	City of Sumter	Sumter	SC	29151
Tom	Bochette		Wedgefield	SC	29168
Talmadge	Tobias		Sumter	SC	29150
Laurel	Petrus	SC DHEC	Columbia	SC	29201
Tom	Olsen		Sumter	SC	29150
Kathy	Coger		Columbia	SC	29230
James	Moyon		Sumter	SC	29153
Nelson	McLeod		Elgin	SC	29045
Kevin	Wong		Arlington	VA	22202
Greer	Blackudder		Sumter	SC	29150
Guy	Chapura		Sumter	SC	29154
Joe	Bowes		Columbia	SC	29229
David	Askins		Sumter	SC	29150
Ray	Reich		Sumter	SC	29154
Mike and Cheryl	Baker		Sumter	SC	29150
Jonathan W.	Bryan		Sumter	SC	29150
Justin and Amanda	Lane		Sumter	SC	29154
Ian	MacRae		Sumter	SC	29154
Charley and Dianne	Boulware		Sumter	SC	29150
Eastover, SC: February 2010					
Jay	Smith	Wilbursmith Associates	Columbia	SC	29202
James R.	Bolin		Hopkins	SC	29061
Bundy	Carter		Eastover	SC	29044
Donna	Neslitt		Columbia	SC	29209
Helen	Tole		Columbia	SC	29223
Chris	Campbell		Eastover	SC	29044
Larry	Koester		Eastover	SC	29044
Luke	Lanham		Eastover	SC	29044
Laurin	Groover		Columbia	SC	29205
David	Sexton		Columbia	SC	29209
Ted	Chalgren		Irmo	SC	29063
Dave	Barnes	Wilbursmith Associates	Eastover	SC	29044
Billy	Abrams	Radisson Hotel Columbia	Columbia	SC	29210
Elizabeth	Shypherd		Columbia	SC	29209
Mark P.	Kays		Gadsden	SC	29052
Bob	Livingston		West Columbia	SC	29171
Jennifer	Dowden	Richland County Government			-
Bill	Tolleson		West Columbia	SC	29169
Melvin E.	Lanham	Lanham Properties, Inc.	Eastover	SC	29044

Shaw AFB/McEntire JNGB

Scoping Meetings

First	*Last*	*Organization Name*	*City*	*State*	*Zip*
Augusta, GA: February 2010					
Carl and Kellie	Gibbs		Martinez	GA	30907
James	Bosley		Columbia	SC	29209
Alex	Monroe		Hephzibah	GA	30815
Wayne	Frazier	Glenn Hills HS	Augusta	GA	30906
Kingstree, SC: February 2010					
John Yancey	McGill	SC State Senate	Kingstree	SC	29556

Shaw AFB/McEntire JNGB

Public Hearings

First	*Last*	*Organization Name*	*City*	*State*	*Zip*
Sumter, SC: April 2012					
Michael	Baker	SAFE/FCU	Sumter	SC	29150
Eugene R.	Baten	Sumter County Council	Sumter	SC	29150
Dewitt	Walker Jr.		Sumter	SC	29150
Talmadge	Tobias	Summit Realty	Sumter	SC	29150
Tyler	Dunlap	Summit Realty	Sumter	SC	29153
Eastover, SC: May 2012					
Malcolm S.	Harris		Columbia	SC	29204
Ralph	Guyton		Columbia	SC	29209
Gary R.	Hallmark	Shaw AFB 20 CES/CEAO	Shaw AFB	SC	29152
Michael T.	Dotson	McEntire JNGB	Columbia	SC	29229
Kingstree, SC: May 2012					
Grier	Brackwelder	Sumter Chamber of Commerce	Sumter	SC	29154

Shaw AFB/McEntire JNGB

Libraries

Organization Name	*Address*	*City*	*State*	*Zip*
Eastover Branch Public Library	608 Main Street	Eastover	SC	29044
Louisville Public Library	306 E. Broad Street	Louisville	GA	30434
Richland County Public Library	1431 Assembly Street	Columbia	SC	29201
Sumter County Library (Mr. Robert Harden)	111 North Harvin Street	Sumter	SC	29150
Shaw AFB Library	451 Johnson St # 405	Shaw AFB	SC	29152
Williamsburg County Library	215 N. Jackson Street	Kingstree	SC	29556
East Central Georgia Regional Library	902 Greene Street	Augusta	GA	30901