Final
United States Marine Corps
F-35B East Coast Basing
Environmental Impact Statement (EIS)

October 2010

Volume I: Final EIS

How this Document is Organized

Our goal is to provide you with a reader-friendly document that presents an in-depth, accurate analysis of the Proposed Action, the alternative basing locations, the No Action Alternative, and their potential environmental consequences. Organization of this two-volume Final Environmental Impact Statement, or Final EIS, is shown below.

VOLUME I: FINAL EIS ORGANIZATION

PREFACE
Department of Defense Joint Strike Fighter Program
Program Environmental Analysis Approach

EXECUTIVE SUMMARY
Synopsis of Chapters 1 and 2
Comparison of Environmental Consequences

CHAPTER 1
Purpose and Need for the East Coast Basing of the F-35B

CHAPTER 2
Proposed Action
Alternative Identification Process
Description of Action Alternatives and No Action Alternative
Airspace and Range Operations

CHAPTER 3
Resource Definitions

CHAPTER 4
MCAS Beaufort Affected Environment and Environmental Consequences

CHAPTER 5
MCAS Cherry Point Affected Environment and Environmental Consequences

CHAPTER 6
Airspace, Ranges, and Auxiliary Landing Field Environmental Consequences

CHAPTER 7
Cumulative Impacts

CHAPTER 8
Other NEPA Considerations

CHAPTER 9
List of Preparers and Contributors

CHAPTER 10
References Cited

VOLUME II: APPENDICES

A Federal Register Notices, Agency Correspondence, and Mailing List
B Cooperating Agency Correspondence
C Resource Methodology
D Noise Background Information, and Modeling Calculations and Results
E Air Quality Modeling Calculations and Results
F Socioeconomic Methodology
G Coastal Consistency Determinations
H Acronyms, Abbreviations, and Glossary of Terms
I Comments on the Draft EIS and Responses

Final

United States Marine Corps
F-35B East Coast Basing
Environmental Impact Statement (EIS)

Volume I: Final EIS

October 2010

Printed on recycled paper.

FINAL
ENVIRONMENTAL IMPACT STATEMENT
FOR THE EAST COAST BASING OF THE F-35B

October 2010

Lead Agency for the EIS: Department of the Navy
Cooperating Agency: United States Air Force
Title of Proposed Action: U.S. Marine Corps East Coast Basing of the F-35B
Designation: Final

ABSTRACT

This Environmental Impact Statement (EIS) was prepared by the Department of the Navy (DoN) and the United States Marine Corps (Marine Corps) in accordance with the National Environmental Policy Act (NEPA) of 1969, 42 United States Code §§ 4321-4374, as implemented by the Council on Environmental Quality regulations, 40 Code of Federal Regulations (CFR), Parts 1500-1508, DoN NEPA regulations 32 CFR 775, Marine Corps Order P5090.2A (with Changes 1, 2), and the Marine Corps Environmental Compliance and Protection Manual. The Proposed Action addressed in this EIS includes: 1) basing of 11 operational F-35B Joint Strike Fighter squadrons (up to 176 aircraft), and a Pilot Training Center (PTC) (40 aircraft) on the East Coast of the United States; 2) construction, demolition, and/or modifications of airfield facilities and infrastructure necessary to accommodate and maintain the 13 total F-35B squadrons; 3) changes to personnel to accommodate squadron staffing; and 4) conducting F-35B readiness and training operations to attain and maintain proficiency in the operational employment of the F-35B and special exercise operations. The F-35B aircraft would replace 84 legacy F/A-18A/B/C/D Hornet and 68 AV-8B Harrier aircraft in the Second Marine Air Wing (2d MAW). Each operational squadron would consist of up to 16 F-35B aircraft; the PTC would support two Fleet Replacement Squadrons (FRS) with 20 aircraft per FRS. This EIS addresses several basing alternatives: 1) (the preferred alternative) three operational squadrons and two FRSs at Marine Corps Air Station (MCAS) Beaufort in South Carolina, and eight operational squadrons at MCAS Cherry Point in Havelock, North Carolina; 2) two FRSs at MCAS Beaufort and 11 operational squadrons at MCAS Cherry Point; 3) eight operational squadrons at MCAS Beaufort and three operational squadrons and 2 FRSs at MCAS Cherry Point; and 4) 11 operational squadrons at MCAS Beaufort and two FRSs at MCAS Cherry Point. Regardless of which basing alternative is ultimately selected, the Marine Corps would conduct F-35B training and readiness operations within Department of Defense-managed airspace and DoN/Marine Corps training ranges located on the East Coast including: 1) Townsend Bombing Range in southeast Georgia with associated Restricted Airspace (R-3007) and the Coastal Military Operations Areas (MOAs) 1 East and West, 2, 4, and 5; 2) Bombing Targets 9 and 11 and associated Core MOA and Restricted Airspace (R-5306) overlying and adjacent to the coast of North Carolina; and 3) overwater Warning Areas (W-) off the coasts of North and South Carolina, Georgia, and Florida (W-72, W-122, W-134, W-157, W-158, W-159, W-161, and W-177). This EIS evaluated the potential environmental impacts to the following resource areas: airfields and airspace; noise; air quality; hazardous materials, toxic substances, hazardous waste, and contaminated sites; safety; land use; socioeconomics; environmental justice/protection of children; community services; utilities and infrastructure; transportation and ground traffic; biological resources; geology, topography, and soils; water resources; cultural and traditional resources; and coastal zone management.

Point of Contact: Ms. Linda Blount
Naval Facilities Engineering Command, Mid-Atlantic
Environmental Planning & Conservation Division, Code EV21
9742 Maryland Avenue
Z-144, First Floor
Norfolk, VA 23511
Telephone: 757-341-0491

PREFACE

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, $1 trillion program was initiated in the early 1990s to provide the premier strike fighter aircraft to the U.S. Marine Corps (Marine Corps), Navy, and Air Force, as well as international partners, through at least 2040. With all of the military services facing attrition of aging legacy aircraft, the DoD established and is implementing the JSF program.

Efforts by individual military services to develop replacement aircraft began in the late 1980s. By 1993, the DoD merged these efforts under one common JSF program dedicated to respond to the high cost of tactical aviation, the need to deploy fewer types of aircraft to reduce acquisition and operating costs, and 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 strike fighter and designed to replace legacy aircraft. In 1996, the DoD awarded and Congress approved competitive contracts to develop JSF prototypes. In 2001, Lockheed-Martin was awarded the contract to develop the JSF. Overall, the program aims to produce over 2,400 JSF aircraft.

As many of the military services’ legacy aircraft approach the limits of their expected 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 to the battlefield of the future. The JSF has been 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 military services. The conventional takeoff and landing variant for the Air Force, the F-35A, will replace F-16s and A-10s, and is designed to operate from U.S. Air Force Auxiliary Landing Fields and expeditionary airfields (EAFs). The short takeoff and vertical landing variant, or the F-35B, for the Marine Corps will replace AV-8B and F/A-18A/C/D aircraft and is designed to operate from amphibious assault general purpose and multi-purpose type ships, EAFs, and conventional aircraft carriers. The F-35C carrier variant will replace the Navy’s F/A-18A/C/D and is designed to operate from conventional carriers. By combining the capabilities of several existing Marine Corps, Navy, and Air Force legacy fighter aircraft into the capabilities of 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 Marine Corps, Navy, and Air Force. In turn, the services are implementing both joint and military service-specific basing and training programs.

Program Environmental Analysis Approach

The following JSF basing and training programs represent federal actions requiring analysis under the National Environmental Policy Act (NEPA). While development and manufacturing of the JSF comprise an overall program, each military service would operate a unique F-35 variant with different mission requirements, training regimes, basing locations, impacts, and transition schedules. Moreover, the different military services operate under their own command organizations and structures that influence the fielding and siting of the aircraft. Where reasonable and logical, the services plan to adopt joint basing and training, especially in the earlier stages of the program. However, each military service is preparing its own NEPA documentation for basing and operating their variant of the F-35 aircraft. Importantly, the military 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.

Marine Corps Actions

- Environmental Assessment (EA) for Temporary Basing of an Interim Pilot Training Center (PTC) for F-35B, Marine Corps Air Station Yuma, Arizona. Completed in 2009 and addressed temporary basing of a PTC from 2010 through 2013.
- EIS for the East Coast Basing of the U.S. Marine Corps JSF F-35B. Ongoing and addresses basing of F-35B aircraft on the East Coast.
- EIS for the West Coast Basing of the U.S. Marine Corps JSF F-35B. Ongoing and addresses basing of F-35B aircraft on the West Coast.

Joint Actions

- EIS for the Implementation of the Base Realignment and Closure (BRAC) 2005 Decisions and Related Actions at Eglin Air Force Base (AFB), Florida (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. Ongoing and supplements the 2009 Final EIS.
- Final EA/Overseas EA (OEA) for the F-35 JSF Initial Operational Test and Evaluation at Edwards AFB. Completed in 2009 and entails basing 20 F-35 aircraft at Edwards AFB and conducting pilot training and proficiency flight test in the airspace of eight test ranges from mid-2010 to mid-2014.
- JSF System Development and Demonstration Developmental Test Program Final EA/OEA. Completed in January 2007. Analyzed impacts of the developmental test and evaluation 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, Nevada. Anticipated completion in 2010. Addresses Air Force F-35A-specific basing for follow-on testing and weapons school programs.
- EIS for U.S. Air Force, Air Combat Command, F-35A Operational Basing. On-going and addresses basing of operational (i.e., combat) aircraft at AFBs across the U.S.
- EIS for U.S. Air Force, Air Education and Training Command, Beddown of Training F-35A Aircraft. On-going and addresses basing aircraft for follow-on pilot training at AFBs in the U.S.

Navy Actions

- EIS for Nationwide Homebasing of Navy F-35C aircraft. Planned to start in 2010 and will address potential impacts of basing Navy operational F-35Cs at air stations in the U.S.

TABLE OF CONTENTS

VOLUME I: EIS TABLE OF CONTENTS

Section **Page**

FIGURES LIST

TABLE LIST

Table **Page**

VOLUME II: APPENDICES

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The Department of the Navy (DoN) has prepared this Environmental Impact Statement (EIS) to assess the potential environmental impacts of basing the F-35B Lightning II Joint Strike Fighter (JSF) (hereinafter referred to as the F-35B) on the East Coast of the United States (U.S.). The F-35B, as the "next generation" aircraft and future of Marine Corps aviation, would replace the legacy F/A-18A/C/D (F/A-18) Hornet and AV-8B Harrier aircraft in the Second Marine Air Wing (2d MAW) currently based at Marine Corps Air Station (MCAS) Beaufort, South Carolina (SC) and MCAS Cherry Point, North Carolina (NC) (Figure ES-1).

This EIS has been prepared in accordance with the 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) Parts 1500-1508, DoN NEPA regulation 32 CFR 775, and Marine Corps Order P5090.2A (with Changes 1, 2), Marine Corps Environmental Compliance and Protection Manual.

An F-35B taking off

The Proposed Action (detailed in Chapter 2 of this EIS) includes: 1) basing 11 operational squadrons and a Pilot Training Center (PTC) (composed of two Fleet Replacement Squadrons [FRS]) at East Coast installations to replace the F/A-18 and AV-8B legacy aircraft; 2) constructing, demolishing, and/or modifying airfield facilities and infrastructure to accommodate the F-35B squadrons; 3) personnel changes in support of the F-35B basing; and 4) conducting F-35B flight operations in existing airspace and on current ranges to ensure pilots attain and maintain combat-ready status. Specifically, this EIS addresses the following basing alternatives:

- **Alternative 1 –** Three operational squadrons and PTC at MCAS Beaufort and eight operational squadrons at MCAS Cherry Point.
- **Alternative 2 –** The PTC at MCAS Beaufort and 11 operational squadrons at MCAS Cherry Point.
- **Alternative 3 –** Eight operational squadrons at MCAS Beaufort and three operational squadrons and PTC at MCAS Cherry Point.
- **Alternative 4 –** Eleven operational squadrons at MCAS Beaufort and PTC at MCAS Cherry Point.

Regardless of which basing alternative is ultimately selected, the Marine Corps would conduct F-35B training and readiness operations within Department of Defense (DoD)-managed airspace and training ranges located on the East Coast. The training areas consist of core airspace and ranges which would

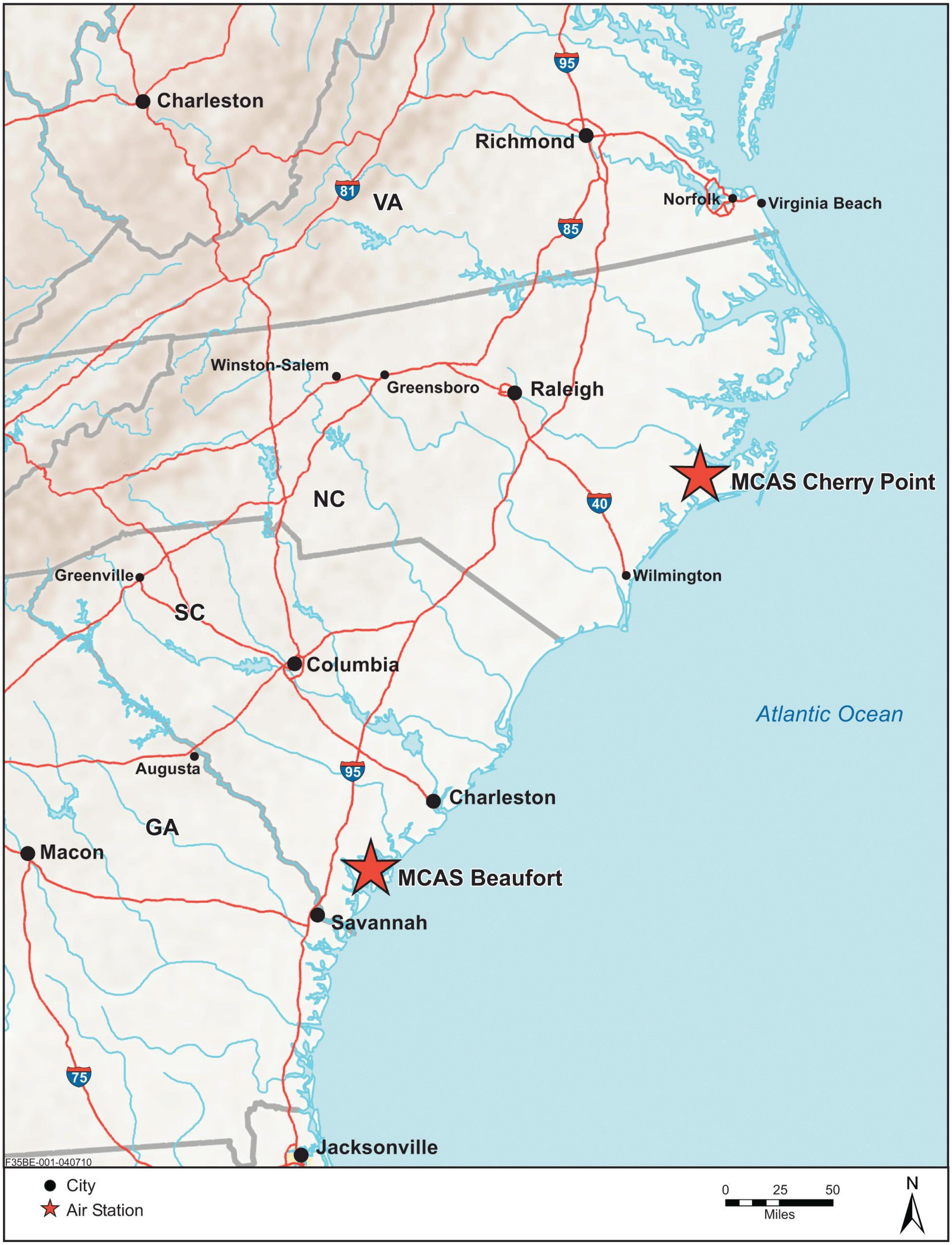


Figure ES-1 Regional Map of Air Stations receive substantial use by the F-35Bs on a daily basis. As is the case with existing legacy aircraft, F-35B squadrons would deploy to the West Coast for large force exercises, live ordnance training, and Precision Guided Munitions training that cannot be conducted on East Coast ranges.

ES.1 Purpose of and Need for the Proposed Action

The need for the Proposed Action is to replace aging legacy aircraft and integrate the operational and pilot training F-35B squadrons into the existing Marine Corps command and organizational structure. This action would also ensure that the Marine Corps could take advantage of the aircraft's major improvements and support associated training and readiness requirements. The purpose of the Proposed Action is to efficiently and effectively maintain combat capability and mission readiness as the Marine Corps faces increased deployments across a spectrum of conflicts, and a corresponding increased difficulty in maintaining an aging legacy aircraft inventory. Another factor driving the need for replacement is attrition of AV-8B and F/A-18 aircraft, which is due to service life thresholds and no manufacturing of new AV-8B or F/A-18 aircraft.

ES.2 Proposed Action and Alternatives

The Proposed Action would base up to 11 operational F-35B squadrons (176 aircraft) and 1 PTC (with two FRSs) (40 aircraft) on the East Coast. The new F-35Bs would replace seven squadrons of F/A-18 legacy aircraft at MCAS Beaufort (84 authorized aircraft) and four squadrons of AV-8B aircraft at MCAS Cherry Point (68 authorized aircraft). Section 2.2 of the EIS presents the rationale for identification of MCAS Beaufort and MCAS Cherry Point as basing locations. The Marine Corps developed four split-siting alternatives for basing the East Coast operational and PTC squadrons (Table ES-1). The split-siting alternatives allow for utilization of capacity that will be created with the replacement of the F/A-18 squadrons at MCAS Beaufort and the replacement of the AV-8B squadrons at MCAS Cherry Point. In addition, this EIS analyzes the No Action Alternative.

Table ES-1 Squadron Numbers by Air Station and Alternatives

Alternative	MCAS Beaufort	MCAS Cherry Point
1	3 Operational Squadrons and PTC (2 FRSs)	8 Operational Squadrons
2	PTC (2 FRSs)	11 Operational Squadrons
3	8 Operational Squadrons	3 Operational Squadrons and PTC (2 FRSs)
4	11 Operational Squadrons	PTC (2 FRSs)

The split-siting alternatives allow for utilization of capacity created with the replacement of the F/A-18 squadrons at MCAS Beaufort and the replacement of the AV-8B squadrons at MCAS Cherry Point. The split-siting alternatives range from a minimum of 40 aircraft in a PTC (two FRSs) to a maximum of 176 aircraft in 11 operational squadrons. Regardless of the alternative chosen, existing squadrons of F/A-18s at MCAS Beaufort and the AV-8B squadrons at MCAS Cherry Point would be removed; however, the disposition of these legacy aircraft remains unknown at this time and will be evaluated under NEPA, as appropriate.

The following sections describe the components of the alternatives carried forward for detailed analysis including proposed aircraft loading, personnel changes, facility requirements, airfield operations, and operations in military training airspace and ranges.

ES.2.1 Aircraft Replacement/Transition

A total of 216 F-35B aircraft are proposed to replace the 152 authorized Marine Corps F/A-18s and AV-8Bs (Table ES-2). The East Coast F-35B aircraft transition would occur between 2014 and 2023 (Figure ES-2). During this same period, existing Marine Corps East Coast F/A-18 and AV-8B operational squadrons would be deactivated. Marine Corps F-35B pilot training would continue at the Joint Integrated Training Center at Eglin Air Force Base; however, to meet future training requirements and increased numbers of pilots, an additional F-35B PTC would be established on the East Coast. The AV-8B FRS training squadron, currently based at MCAS Cherry Point, would be deactivated approximately 3 years prior to the deactivation of the AV-8B squadrons. Construction and demolition would begin in 2011 to ensure that the facilities and infrastructure (i.e., hangars, maintenance areas, and training facilities) are completed in time to support aircraft transition starting in 2014.

Table ES-2 Authorized and Projected Aircraft Loading

Aircraft Type	Authorized	Alternative 1	Alternative 2	Alternative 3	Alternative 4
MCAS Beaufort					
F/A-18	84[a]	0	0	0	0
F/A-18 (Navy)	24	0[b]	0[b]	0[b]	0[b]
C-12	1	1	1	1	1
F-35B	NA	*88*	*40*	*128*	*176*
TOTAL	**109**	**89**	**41**	**129**	**177**
MCAS Cherry Point					
AV-8B	68	0	0	0	0
EA-6B[c]	26	0	0	0	0
KC-130	15	15	15	15	15
F/A-18E/F (Navy)	24	24	24	24	24
UC-35	2	2	2	2	2
HH-46	3	3	3	3	3
C-9	2	2	2	2	2
F-35B	*NA*	*128*	*176*	*88*	*40*
TOTAL	**140**	**174**	**222**	**134**	**86**

Source: USMC 2009a, 2009d; DoN 2003a.

Notes: [a]Includes one squadron in cadre status.

[b]One Navy squadron is dis-established (but aircraft are still authorized) and another F/A-18 squadron will have moved by the time the first F-35B arrives at MCAS Beaufort; therefore, they were not included in the alternatives (AvPlan 2010).

[c]Marine Corps plans (AvPlan 2010) for the complete drawdown of EA-6Bs by 2020. For purposes of this EIS, the end state of 2023 was assumed for F-35B basing because the EA-6Bs and AV-8Bs will have transitioned out of the Marine Corps inventory at MCAS Cherry Point.

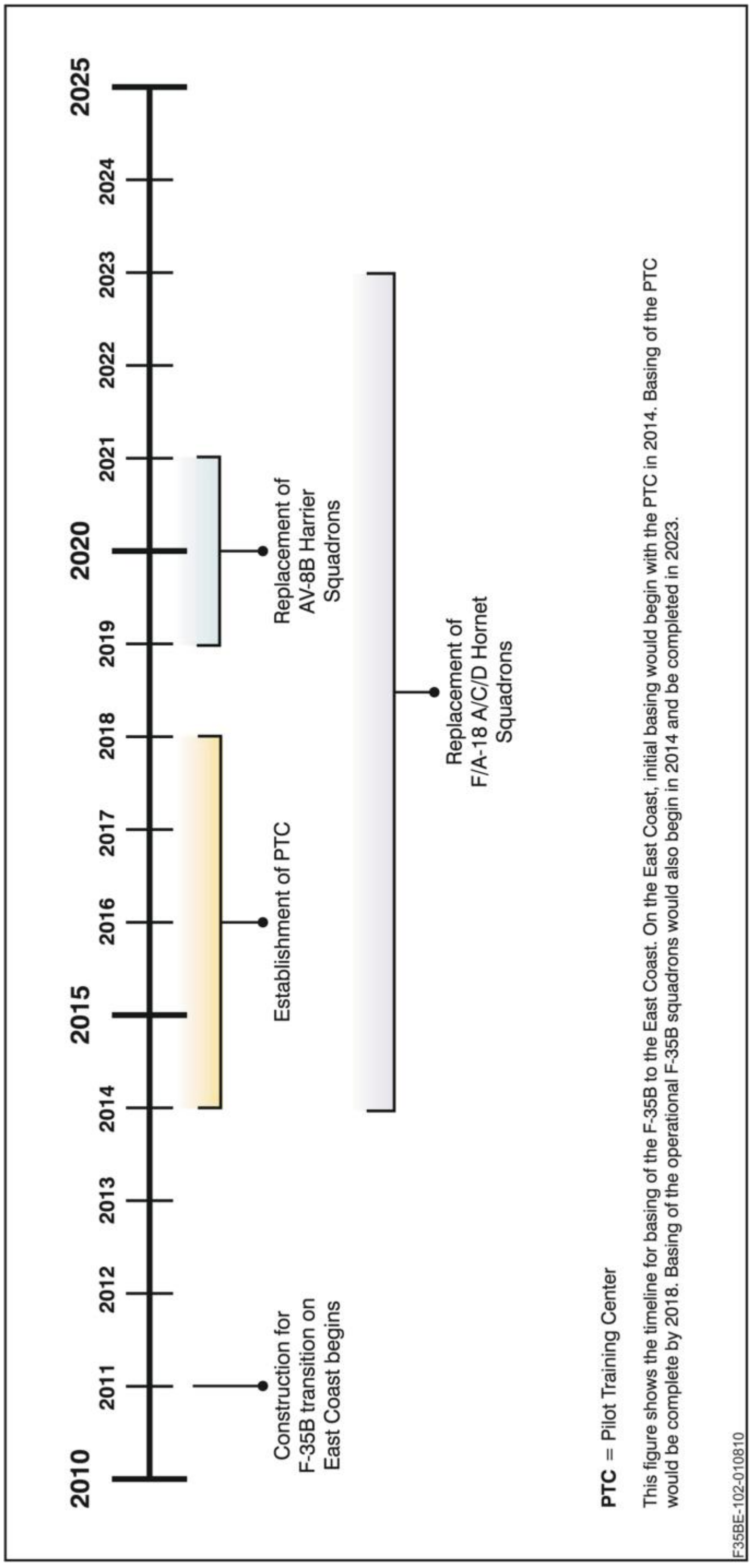


Figure ES-2 Transition Timeline for the F-35B East Coast Basing

ES.2.2 Personnel Changes

Military personnel proposed for each of the basing alternatives is provided in Table ES-3. These estimates include the additional 78 pilots associated with the PTC on an annual basis; of these 78, there would be 66 PTC pilots at the Air Station at any given time. Changes in civilian and contractor personnel associated with the introduction of the F-35B are anticipated under all alternatives; however, the number of these non-military personnel is continually changing as the aircraft and its systems evolve. The Marine Corps, therefore, has not included these non-military personnel changes because they cannot be predicted with any fidelity at this time. Once the data have more fidelity and it becomes evident that these numbers constitute a substantial change from existing conditions, the Marine Corps will undertake the appropriate level of environmental documentation to determine potential impacts.

Table ES-3 Proposed Changes in Military Personnel

Alternative	Officers		Enlisted		TOTAL Military Personnel	
	Authorized	Proposed	Authorized	Proposed	Authorized	Proposed
MCAS Beaufort						
1	229	203	1,592	1,390	1,821	1,593
2	229	122	1,592	538	1,821	660
3	229	216	1,592	2,272	1,821	2,488
4	229	297	1,592	3,124	1,821	3,421
MCAS Cherry Point						
1	115	216	1,179	2,272	1,294	2,488
2	115	297	1,179	3,124	1,294	3,421
3	115	203	1,179	1,390	1,294	1,593
4	115	122	1,179	538	1,294	660

ES.2.3 Facility and Infrastructure Requirements

While basing the F-35B would require certain infrastructure to support training and operational requirements, utilizing existing infrastructure to the extent feasible comprises a fundamental underpinning of the Proposed Action. Where existing infrastructure cannot meet the needs of the Proposed Action, the Marine Corps recognizes the requirement to construct new or modify existing infrastructure and facilities.

The amount and nature of infrastructure needed for F-35B basing would vary with the number and type of squadrons (e.g., operational, PTC, or a mix of both) assigned to a particular Air Station. In turn, construction and demolition of the infrastructure also depends on aircraft distribution and the capability of an existing basing location to accommodate the squadrons. To evaluate existing infrastructure, the Marine Corps performed installation-specific construction and modification assessments for each basing alternative. The following includes detailed descriptions of the proposed facility and infrastructure projects at each Air Station under the four action alternatives.

ES.2.3.1 MCAS Beaufort Facility Requirements

Proposed construction and demolition projects for each alternative are included in Table ES-4; construction disturbance areas and cost details are outlined in Table ES-5.

Table ES-4 Infrastructure Requirements at MCAS Beaufort

Alternative	Construction and Demolition Requirements	
1 (Preferred)	• Demolish Hangars 414, 416, and 728 • Construct five new hangar modules • Construct ground support equipment maintenance and storage areas • Construct aviation armament and engine shops • Construct Marine Air Group (MAG) Headquarters • Construct Recycling/Hazardous Waste Facility	• Construct PTC training/instruction/ simulation facility • Construct an Amphibious Assault Ship (LHD/LHA) Training Facility • Construct vertical landing (VL) pads • Construct/modify airfield pavement • Construct Cryogenics Facility • Complete Security Upgrades
2	• Demolish Hangars 414 and 416 • Construct two new hangar modules • Construct ground support equipment maintenance and storage areas • Construct aviation armament and engine shops • Construct MAG Headquarters • Construct Recycling/Hazardous Waste Facility	• Construct PTC training/instruction/ simulation facility • Construct a LHD/LHA Training Facility • Construct VL pads • Construct/modify airfield pavement • Construct Cryogenics Facility • Complete Security Upgrades
3	• Demolish Hangars 414, 416, 418, and 729 • Construct eight new hangar modules • Construct ground support equipment maintenance and storage areas • Construct rinse facility • Construct MAG Headquarters • Construct Recycling/Hazardous Waste Facility	• Construct aviation armament and engine shops • Construct a LHD/LHA Training Facility • Construct VL pads • Construct non-PTC simulator facility • Construct/modify airfield pavement • Construct Cryogenics Facility • Complete Security Upgrades
4	• Demolish Hangars 414, 416, 418, 728, and 729 • Construct 11 new hangar modules • Construct ground support equipment maintenance and storage areas • Construct rinse facility • Construct aviation armament and engine shops • Construct MAG Headquarters • Construct Recycling/Hazardous Waste Facility	• Construct a LHD/LHA Training Facility • Construct VL pads • Construct non-PTC simulator facility • Construct/modify airfield pavement • Construct Cryogenics Facility • Complete Security Upgrades • Construct two Bachelor Enlisted Quarters (BEQs)

Table ES-5 New Construction and Estimated Costs at MCAS Beaufort

Alternatives	Proposed Projects												
	Airfield Pavement/ Parking Apron	Aircraft Hangar(s)[a]	PTC Training/ Instruction/ Simulator Facility[b]	Ground Support Equipment Maintenance and Storage Areas	VL Pads	LHD/LHA Training Facility	Security Upgrades	MAG Headquarters	Non-PTC Simulator Facility	Cryogenics Facility	Recycling/Hazardous Waste Facility	BEQs	TOTAL
Alternative 1													
Area Disturbed (acres)[c]	9.2	16.8	5.0	2.2	5.6	33.3	21.8	2.9	N/A	1.8	2.3	N/A	**100.9**
Vegetation Loss (acres)[d]	0	5.8	5.0	1.6	1.1	30.9	7.2	2.9	N/A	1.8	2.3	N/A	**58.6**
Cost (millions dollars)[e]	50.9	261.2	46.5	10.4	21.1	13.9	15.2	10.5	N/A	3.5	3.9	N/A	**$437.1**
Alternative 2													
Area Disturbed (acres)[c]	0.5	5.8	5.0	2.2	4.5	33.3	21.8	2.9	N/A	1.8	2.3	N/A	**80.1**
Vegetation Loss (acres)[d]	0	5.8	5.0	1.6	1.1	30.9	7.2	2.9	N/A	1.8	2.3	N/A	**58.6**
Cost (millions dollars)[e]	48.4	105.2	46.5	10.4	21.1	13.9	15.2	10.5	N/A	3.5	3.9	N/A	**$278.6**
Alternative 3													
Area Disturbed (acres)[c]	9.9	25.7	N/A	4.5	5.6	33.3	21.8	2.9	2.0	1.8	2.3	N/A	**109.8**
Vegetation Loss (acres)[d]	0	0	N/A	3.3	1.1	30.9	7.2	2.9	2.0	1.8	2.3	N/A	**51.5**
Cost (millions dollars)[e]	62.7	424.8	N/A	22.1	21.1	13.9	15.2	10.5	33.1	3.5	3.9	N/A	**$610.8**
Alternative 4													
Area Disturbed (acres)[c]	10.6	40.4	N/A	6.2	5.6	33.3	21.8	2.9	2.0	1.8	2.3	11.5	**138.4**
Vegetation Loss (acres)[d]	0	0	N/A	4.6	1.1	30.9	7.2	2.9	2.0	1.8	2.3	0	**52.8**
Cost (millions dollars)[e]	77.6	567.5	N/A	30.6	21.1	13.9	15.2	10.5	33.1	3.5	3.9	45.0	**$821.9**

Source: USMC 2009d.

Notes: [a]Incudes demolition of existing hangar, access apron and peripheral taxiways, modifications to existing parking apron for sun shades, M-Bit pad, and high temperature concrete where applicable. Follow-on environmental analyses and associated decision documents would be completed for a borrow pit once specific project details are known.

[b]The PTC would not be established at MCAS Beaufort under Alternatives 3 and 4, only a non-PTC simulator facility would be built under these two alternatives.

[c]The total includes total areas disturbed due to clearing, grading, and construction equipment storage (i.e., laydown area); access roads and entrances; as well as associated parking areas and landscaping activities.

[d]Vegetation loss refers to forested undeveloped land only; other types of vegetation, such as grasslands, are excluded from the estimates shown.

[e]Estimates shown are in 2011 dollars, include both demolition and construction costs, and may not add up exactly due to rounding.

Alternative 1 (Preferred Alternative) – Three Operational Squadrons and PTC

Figure ES-3 provides the site layouts for proposed new airfield-associated construction and demolition as well as the proposed sites for support facilities. A total of 100.9 acres, which includes 58.6 acres of trees, would be disturbed to accommodate the projects proposed under Alternative 1. Disturbed acreage includes areas exposed to clearing and grading activities, construction equipment and material storage (i.e., laydown) areas, access roads and entrances, landscaping, as well as parking areas for government- and privately-owned vehicles.

Alternative 2 – The PTC

Figure ES-4 provides the site layouts for proposed new airfield-associated construction and demolition activities as well as proposed sites for support facility construction. Under this alternative, 80.1 acres would be disturbed, of which 58.6 acres are currently forested.

Alternative 3 – Eight Operational Squadrons

Under Alternative 3, 109.8 acres would be disturbed, of which 51.5 acres are forested. Figure ES-5 provides both the proposed sites for new airfield-associated construction and demolition activities and the sites proposed for new support facility construction.

Alternative 4 – Eleven Operational Squadrons

Under Alternative 4, 138.4 acres, of which 52.8 acres are forested, would be disturbed. Figure ES-6 provides the site layouts for proposed new airfield-associated construction and demolition activities as well as presents new support facility construction. Under this alternative, two BEQs with 300 man spaces each would be constructed to support the increased housing requirement for enlisted personnel (Figure ES-7).

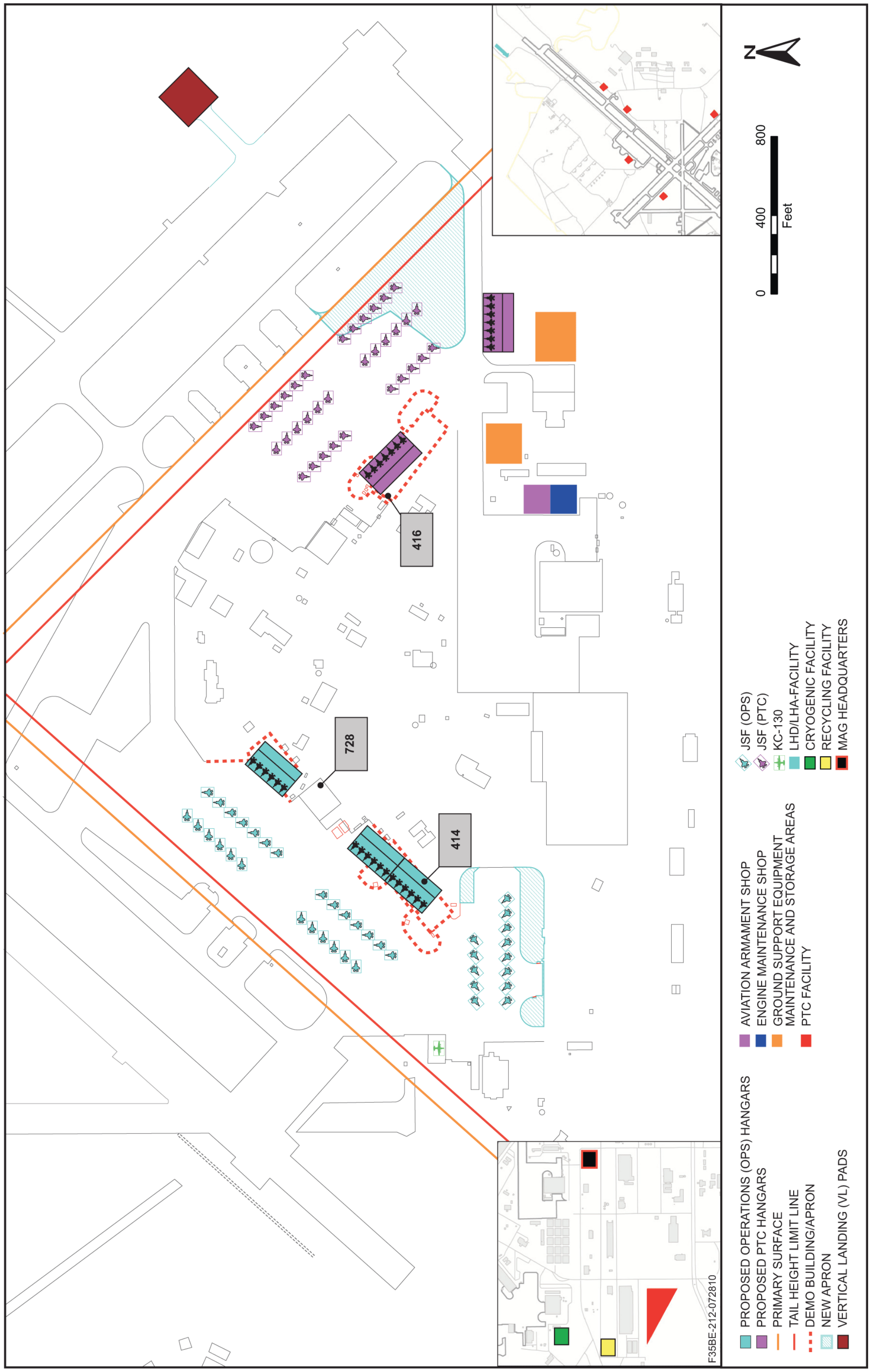


Figure ES-3 MCAS Beaufort Proposed Flightline Construction and Support Facilities under Alternative 1

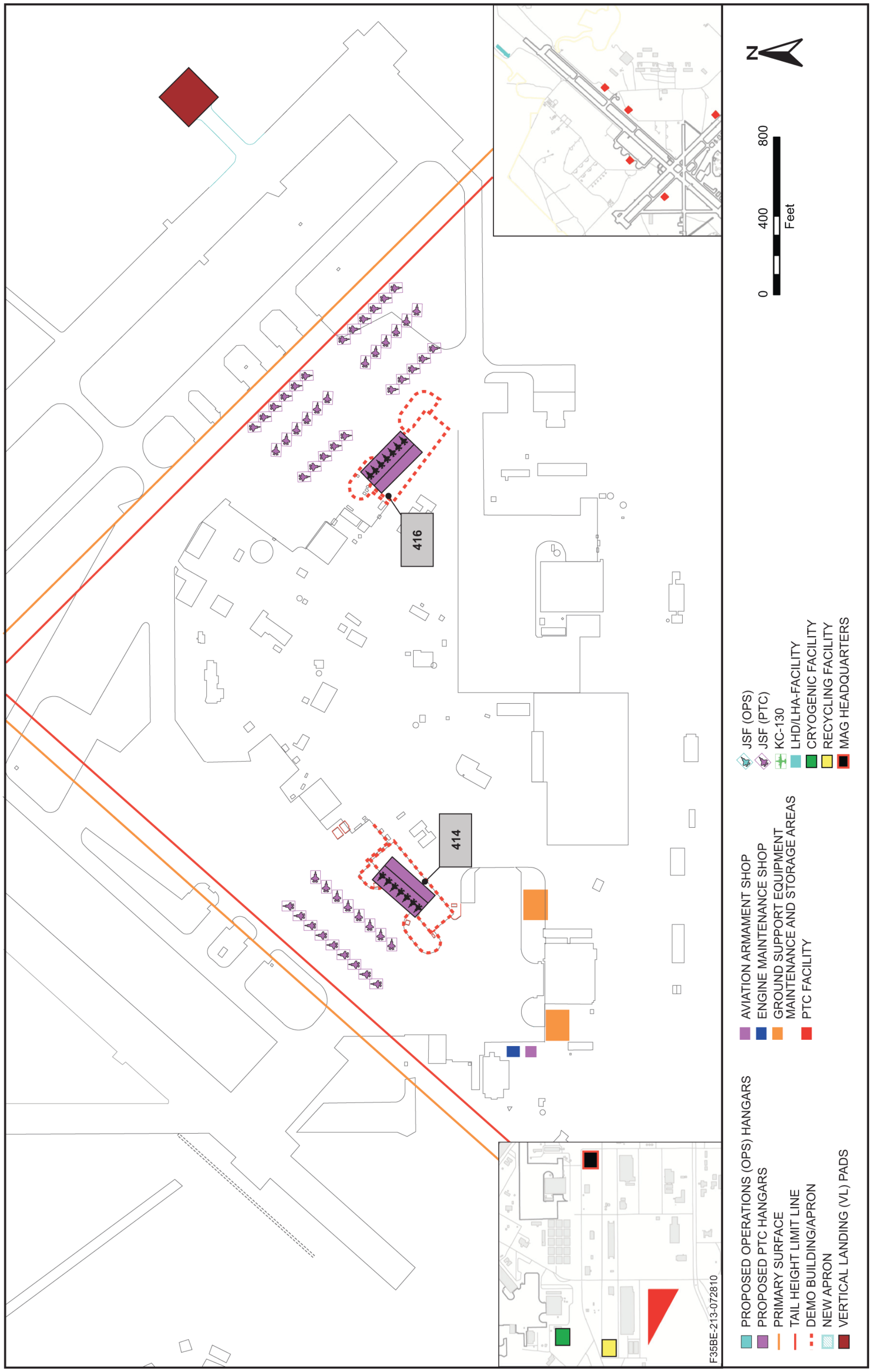


Figure ES-4 MCAS Beaufort Proposed Flightline Construction and Support Facilities under Alternative 2

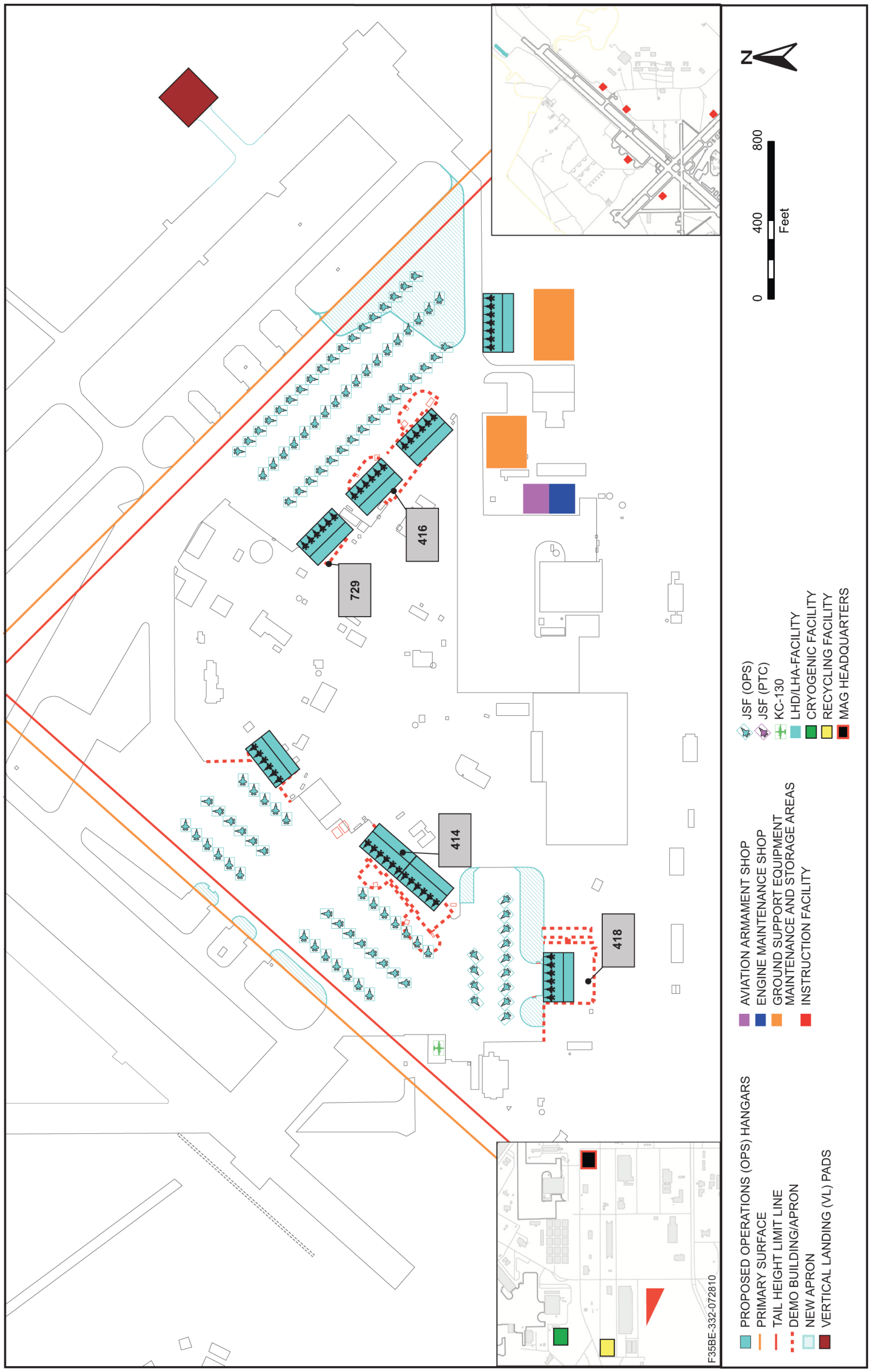


Figure ES-5 MCAS Beaufort Proposed Flightline Construction and Support Facilities under Alternative 3

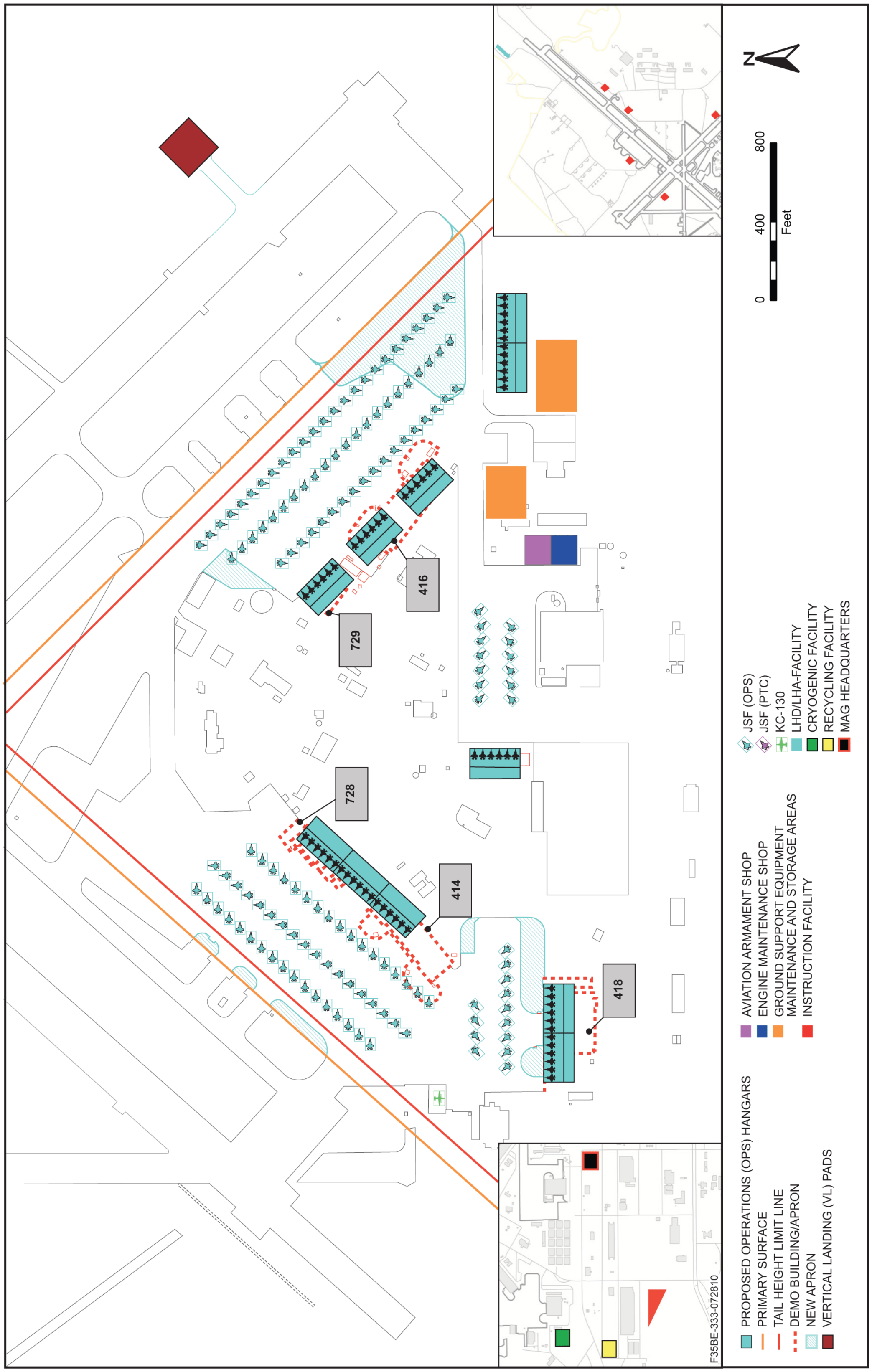


Figure ES-6 MCAS Beaufort Proposed Flightline Construction and Support Facilities under Alternative 4

Figure ES-7 Proposed BEQ Facilities at MCAS Beaufort under Alternative 4

ES.2.3.2 MCAS Cherry Point Facility Requirements

Proposed construction and demolition projects for each alternative is included in Table ES-6, and proposed project details are outlined in Table ES-7.

Table ES-6 Infrastructure Requirements at MCAS Cherry Point

Alternative	Construction and Demolition Requirements	
1 (Preferred)	• Demolish Hangars 131, 1665, 1667, 1700, and 1701 • Construct eight new hangar modules • Demolish existing Air Traffic Control Tower (ATCT) and construct new ATCT • Construct aviation armament and engine shops • Upgrade VL pads • Construct non-PTC simulator facility • Complete Security Upgrades	• Demolish existing and construct new Air Operations (Ops) building • Construct/modify airfield pavement, arm/de-arm pads • Demolish existing MAG Headquarters and paraloft building and construct MAG Headquarters • Reconstruction of tower, LHD/LHA deck, and apron addition at Marine Corps Auxiliary Landing Field (MCALF) Bogue
2	• Demolish Hangars 131, 1665, 1667, 1700, and 1701 • Construct 11 new hangar modules • Demolish existing ATCT and construct a new ATCT • Demolish existing Air Ops building and construct new Air Ops building • Construct/modify airfield pavement, arm/de-arm pads, and extended fuel lines and pits • Construct rinse facility	• Upgrade VL pads • Construct non-PTC simulator facility • Construct aviation armament and engine shops • Demolish existing MAG Headquarters and paraloft building and construct MAG Headquarters • Reconstruction of tower, LHD/LHA deck, and apron addition at MCALF Bogue • Construct community support facilities • Construct two BEQs • Complete Security Upgrades
3	• Demolish Hangars 131, 1665, 1667, 1700, and 1701 • Construct five new hangar modules • Demolish existing ATCT and construct new ATCT • Construct aviation armament and engine shops • Upgrade VL pads • Demolish existing Air Ops building and construct new Air Ops building	• Construct/modify airfield pavement • Construct arm/de-arm pads • Construct PTC training/instruction/simulation facility • Demolish existing MAG Headquarters and paraloft building and construct MAG Headquarters • Reconstruction of tower, LHD/LHA deck, and apron addition at MCALF Bogue • Complete Security Upgrades
4	• Demolish Hangars 131 and 1700 • Construct two new hangar modules • Demolish existing ATCT and construct new ATCT • Construct aviation armament and engine shops • Upgrade VL pads • Demolish existing Air Ops building and construct new Air Ops building	• Construct/modify airfield pavement • Construct arm/de-arm pads • Construct PTC training/instruction/simulation facility • Demolish existing MAG Headquarters and paraloft building and construct MAG Headquarters • Reconstruction of tower, LHD/LHA deck, and apron addition at MCALF Bogue • Complete Security Upgrades

Table ES-7 New Construction and Estimated Costs at MCAS Cherry Point

Alternatives	Proposed Projects														
	Arfield Pavement/ Parking Apron	Aircraft Hangar(s)	Rinse Facility	PTC training/ instruction/ Simulator Facility[a]	Ground Support Equipment Maintenance and Storage Areas	Arm/De-arm Pads	ATCT and Air Operations Relocation	MAG Headquarters	Non-PTC Simulator Facility	VL Pads	Aviation Armament Shop	MCALF Bogue Improvements[b]	Community Support Facilities[c]	BEQs	TOTAL
Alternative 1															
Area Disturbed (acres)[d]	7.6	25.7	N/A	N/A	3.6	8.2	1.6	0.8	1.6	22.0	0.4	41.3	N/A	N/A	**112.8**
Vegetation Loss (acres)[e]	0	0	N/A	N/A	0	0	0	0	0	0	0	0	N/A	N/A	**0**
Cost (millions dollars)[f]	32.2	375.0[g]	N/A	N/A	22.1	7.5	25.0	10.0	40.0	5.0	2.0	17.5	N/A	N/A	**536.3**
Alternative 2															
Area Disturbed (acres)[d]	49.2	25.7	0.2	N/A	3.6	8.2	1.6	0.8	1.6	22.0	0.4	41.3	46.7	5.0	**206.3**
Vegetation Loss (acres)[e]	0	0	0	N/A	0	0	0	0	0	0	0	0	26.8	0	**26.8**
Cost (millions dollars)[f]	77.3	510.0[g]	0.5	N/A	22.1	7.5	25.0	10.0	44.8[h]	5.0	2.0	17.5	52.5	42.0	**816.2**
Alternative 3															
Area Disturbed (acres)[d]	7.6	16.8	N/A	5.0	3.6	8.2	1.6	0.8	N/A	22.0	0.4	41.3	N/A	N/A	**107.3**
Vegetation Loss (acres)[e]	0	0	N/A	0	0	0	0	0	N/A	0	0	0	N/A	N/A	**0**
Cost (millions dollars)[f]	25.5	225.0	N/A	52.3	22.1	7.5	25.0	10.0	N/A	5.0	2.0	17.5	N/A	N/A	**391.9**
Alternative 4															
Area Disturbed (acres)[d]	7.6	5.8	N/A	5.0	3.6	8.2	1.6	0.8	N/A	22.0	0.4	41.3	N/A	N/A	**96.3**
Vegetation Loss (acres)[e]	0	0	N/A	0	0	0	0	0	N/A	0	0	0	N/A	N/A	**0**
Cost (millions dollars)[f]	14.8	90.0	N/A	52.3	22.1	7.5	25.0	10.0	N/A	5.0	2.0	17.5	N/A	N/A	**246.2**

Source: USMC 2009d.

Notes: [a]The PTC would not be established at MCAS Cherry Point under Alternatives 1 and 2, only a non-PTC simulator facility would be built.
[b]Includes reconstruction of tower and LHD deck, apron addition, and airfield overlay at MCALF Bogue.
[c]Includes construction of a Marine Corps Community Services (MCCS) 7-Day Store, Fitness Center, Chow Hall, and Access/Duffy Road improvements.
[d]The total includes total areas disturbed due to clearing, grading, and construction equipment storage (i.e., laydown area); access roads and entrances; as well as associated parking areas and landscaping activities.
[e]Vegetation loss refers to forested undeveloped land only; other types of vegetation, such as grasslands, are excluded from the estimates shown.
[f]Estimates shown are in 2011 dollars, include both demolition and construction costs, and may not add up exactly due to rounding.
[g]Includes construction of a parking garage for Alternatives 1 and 2 only.
[h]Includes $4.8 million for fuel pits and 1.4 acres of extended lines for Alternative 2 only.

Alternative 1 (Preferred Alternative) – Eight Operational Squadrons

Figure ES-8 provides the site layouts for proposed new airfield-associated construction and demolition, as well as the proposed sites for support facilities. Under this alternative, 112.8 acres (none of which are forested) would be disturbed to accommodate the projects proposed under Alternative 1. Disturbed acreage includes areas exposed to clearing and grading activities, construction equipment and material storage (i.e., laydown) areas, access roads and entrances, landscaping, as well as parking areas for government- and privately-owned vehicles.

Alternative 2 – 11 Operational Squadrons

Figure ES-9 provides the site layouts for new airfield-associated construction and demolition activities and indicates new support facility construction proposed under Alternative 2. Two BEQs would be constructed to accommodate the increased housing need for enlisted personnel (Figure ES-10). In addition, community support facilities, including construction of a MCCS 7 day store, fitness center, and chow hall, in addition to Access/Duffy Road improvements, would be needed to accommodate the increased personnel. Under this alternative, 206.3 acres would be disturbed, which includes up to 26.8 acres of vegetation loss.

Alternative 3 – Three Operational Squadrons and PTC

For Alternative 3, Figure ES-11 indicates proposed new airfield-associated facility construction and demolition activities as well as the site layouts for proposed new support facilities (including the PTC training, instruction, and simulation facility) (USMC 2009d). While no forested areas would be removed, 107.3 acres of previously disturbed areas would be impacted.

Alternative 4 – The PTC

In total, 96.3 acres (none are forested) would be disturbed to implement this alternative. Figure ES-12 presents the proposed new airfield-associated construction and demolition activities as well as the site layouts for proposed new support facilities (including the PTC training, instruction, and simulation facility) (USMC 2009d).

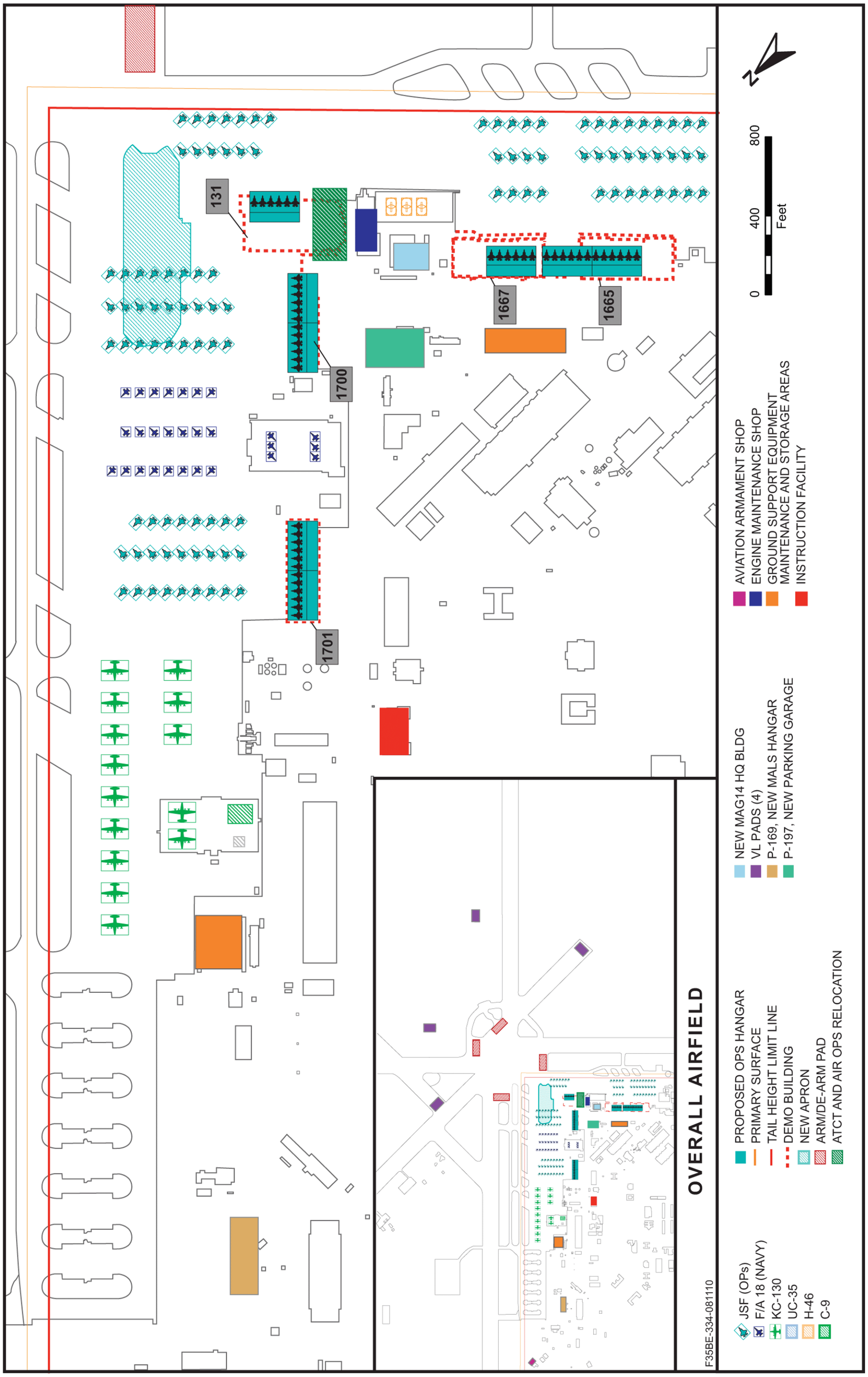


Figure ES-8 MCAS Cherry Point Proposed Flightline Construction and Support Facilities under Alternative 1

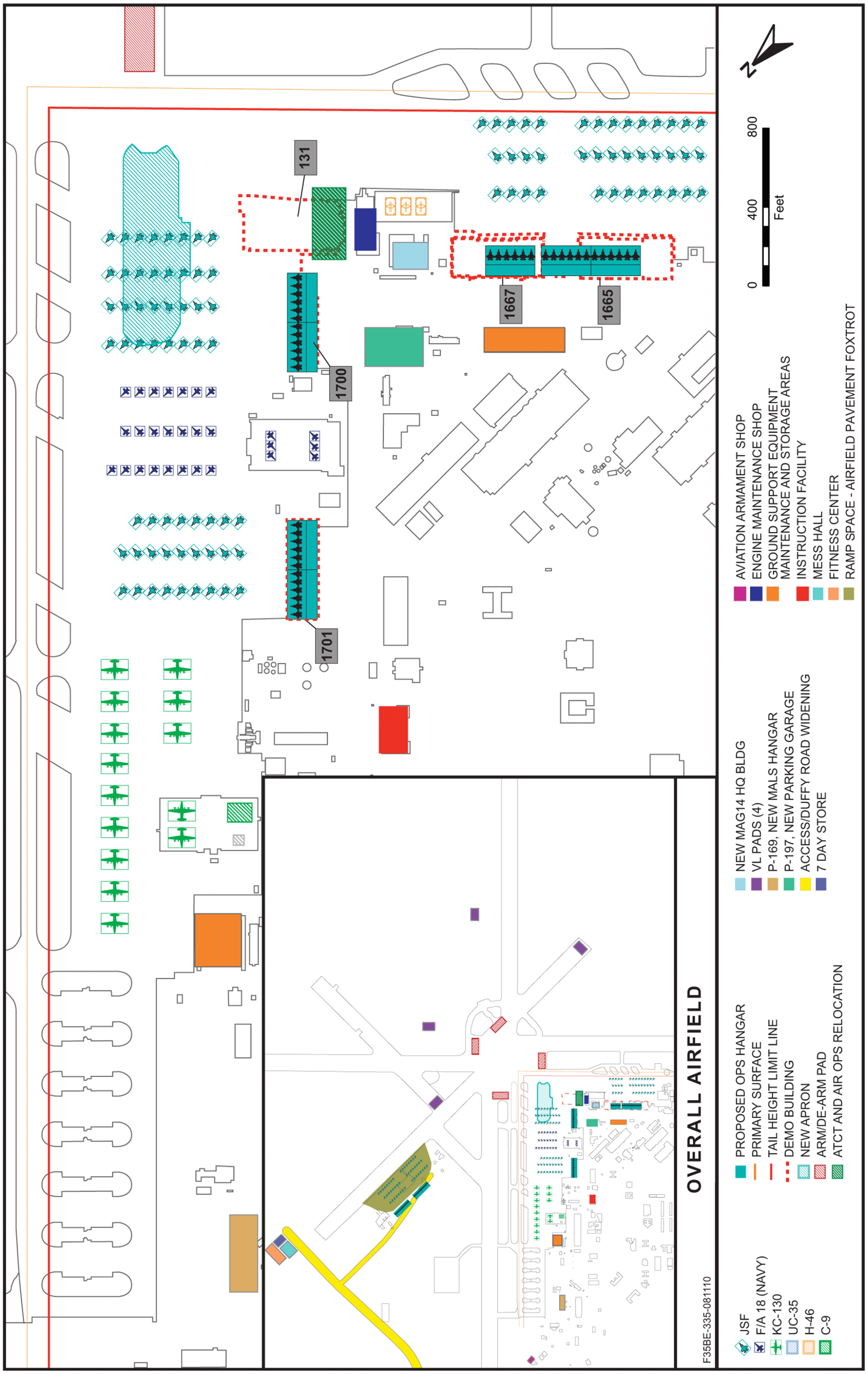


Figure ES-9 MCAS Cherry Point Proposed Flightline Construction and Support Facilities under Alternative 2

Figure ES-10 Proposed BEQ Facilities at MCAS Cherry Point under Alternative 2

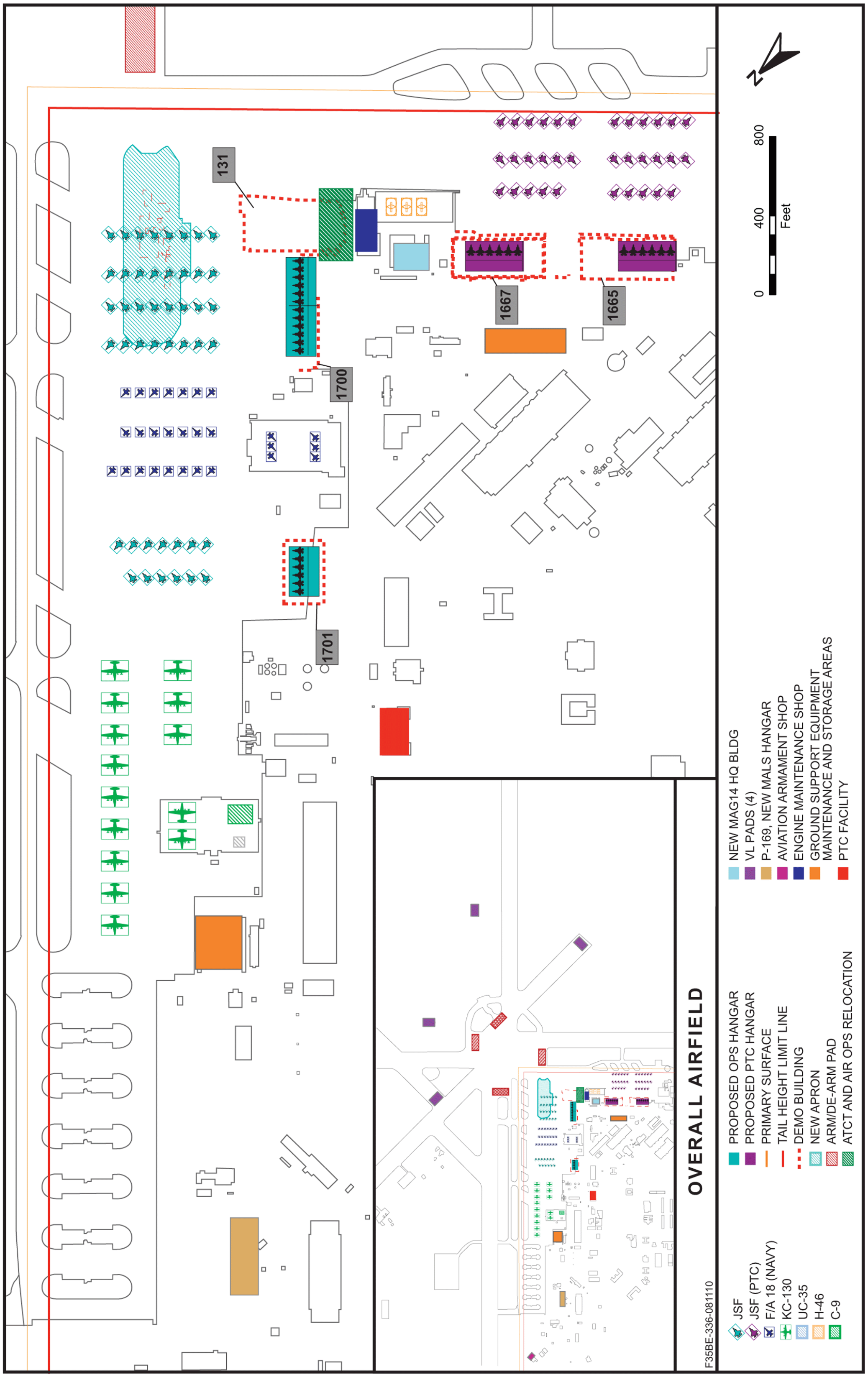


Figure ES-11 MCAS Cherry Point Proposed Flightline Construction and Support Facilities under Alternative 3

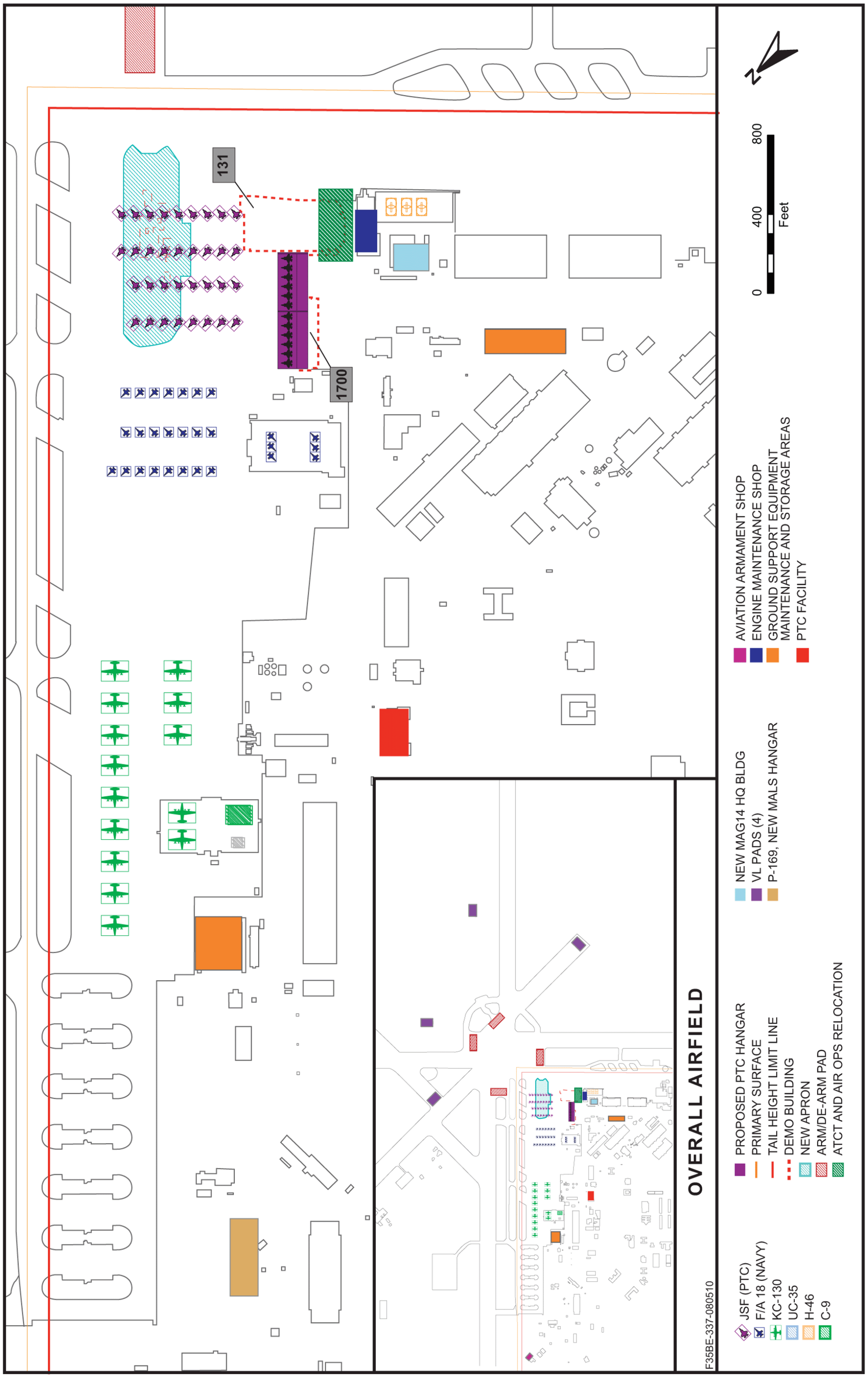


Figure ES-12 MCAS Cherry Point Proposed Flightline Construction and Support Facilities under Alternative 4

ES.2.4 Airfield Operations

To provide the training that ensures combat readiness, the F-35B would conduct operations in several types of areas: 1) an Air Station airfield, 2) airfield to practice amphibious vessel and aircraft carrier arrivals and departures, 3) training ranges, and 4) airspace. All these types of flight operations would occur at East Coast locations.

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.[1] A *sortie* consists of a single military aircraft from takeoff through 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. A sortie can include more than one *operation*. The term *operation* can apply to both airfield and airspace activities. At an airfield, an operation consists of a single aircraft movement such as a landing or takeoff, or closed pattern. For airspace and ranges, an operation comprises the use of one airspace unit by one aircraft. Each time a single aircraft flies in a different airspace unit, one operation is counted for that unit. As a subset of operations, the term *event* is used to define specific training elements (e.g., ordnance delivery). More than one event may be performed during the use of an airspace unit. During a single sortie, an aircraft may fly in several airspace units and produce a number of operations and events. An aircraft could conduct two operations during one sortie, for example, with one operation in Townsend Bombing Range (TBR) in Georgia for ordnance delivery, and one in the Coastal Military Operations Area (MOA) for an air-to-air combat engagement event. For these reasons, numbers of operations and events may exceed total sorties, and they are not additive to one another.

ES.2.4.1 MCAS Beaufort Airfield Operations

Runway use at MCAS Beaufort is driven by the number and type of squadrons proposed at the Air Station. Table ES-8 provides authorized airfield operations found under baseline conditions and compares these to operations proposed for each alternative.

ES.2.4.2 MCAS Cherry Point Airfield Operations

Airfield use at MCAS Cherry Point would depend upon the number of squadrons based at the Air Station. Table ES-9 provides the proposed approximate number of airfield operations by alternative compared to operations as they were last authorized, reported, and published in the 2003 Record of Decision to base F/A-18E/F at MCAS Cherry Point.

---

[1] The terms sortie and operation derive from Navy and Air Force Air Installation Compatible Use Zone processes. Event is a term of common usage in describing aviation training.

Table ES-8 Authorized and Proposed Airfield Operations at MCAS Beaufort

Aircraft Category	Authorized	Proposed by Alternative			
		1	2	3	4
Based F/A-18 Airfield Operations					
F/A -18 Departures	12,834	0	0	0	0
F/A-18 Arrivals	12,834	0	0	0	0
F/A-18 Pattern Work	30,184	0	0	0	0
Subtotal F/A-18 [a]	***55,852***	0	0	0	0
Other Based and Transient Aircraft	6,149	6,149	6,149	6,149	6,149
Authorized Total	**62,001**	6,149	6,149	6,149	6,149
Proposed F-35B Airfield Operations					
F-35B Departures	N/A	32,293	23,437	23,616	32,472
F-35B Arrivals	N/A	32,293	23,437	23,616	32,472
F-35B Pattern Work	N/A	35,294	30,664	12,347	16,978
Subtotal F-35B	N/A	***99,881***	***77,538***	***59,579***	***81,921***
Other Based and Transient Aircraft	N/A	6,149	6,149	6,149	6,149
PROPOSED TOTAL ANNUAL AIRFIELD OPERATIONS	**N/A**	**106,030**	**83,687**	**65,728**	**88,070**
Change Relative to Authorized	N/A	*+44,029*	*+21,686*	*+3,727*	*+26,069*

Source: USMC 2003; 2009d.
Note: [a]Reflects operations generated by nine F/A-18C/D squadrons, seven of which are Marine Corps and two of which are Navy squadrons. Since the Navy squadrons will have moved by the time the first F-35B arrives at MCAS Beaufort, they are not included in the alternatives (USMC 2009d).

Table ES-9 Authorized Baseline and Proposed Airfield Operations at MCAS Cherry Point

Aircraft Category	Authorized	Proposed by Alternative			
		1 (Preferred)	2	3	4
Based AV-8B Airfield Operations					
AV-8B Departures	9,625	0	0	0	0
AV-8B Arrivals	9,617	0	0	0	0
AV-8B Pattern Work	39,173	0	0	0	0
Subtotal AV-8B	***58,415***	0	0	0	0
Other Based and Transient Aircraft	37,011[a]	28,019[b]	28,019[b]	28,019[b]	28,019[b]
Authorized Total	**95,426**	28,019[b]	28,019[b]	28,019[b]	28,019[b]
Proposed F-35B Airfield Operations					
F-35B Departures	N/A	23,616	32,472	32,293	23,437
F-35B Arrivals	N/A	23,616	32,472	32,293	23,437
F-35B Pattern Work	N/A	8,129	11,178	31,889	28,840
Subtotal F-35B	*N/A*	***55,361***	***76,122***	***96,475***	***75,714***
Other Based and Transient Aircraft	28,019[b]	28,019[b]	28,019[b]	28,019[b]	28,019[b]
PROPOSED TOTAL ANNUAL AIRFIELD OPERATIONS	**N/A**	**83,380**	**104,141**	**124,494**	**103,733**
Change Relative to Authorized	N/A	*-12,046*	*+8,715*	*+29,068*	*+7,258*

Sources: DoN 2003a, 2003b; USMC 2008c, 2009c.
Note: [a]Other based aircraft include the EA-6Bs, KC-130J, and two proposed Navy F/A-18 E/F Squadrons.
[b]By the time the F-35Bs would be based at the Air Station, the Marine Corps plans to drawdown the EA-6Bs to reduce operations by 8,992 from what are found under baseline/authorized airfield operations.

ES.2.4.3 Auxiliary Landing Field Operations

Under the Proposed Action, no new auxiliary, expeditionary, or outlying landing fields would be required in order to base and operate F-35B aircraft. However, the Marine Corps does maintain and utilize an existing MCALF where F-35B landing field practice would occur (see Section 2.3.4 in the EIS for more detail). The majority of F-35B operations at MCALF Bogue would be generated by MCAS Cherry Point aircraft, replacing existing authorized AV-8B operations. Table ES-10 presents and includes all proposed airfield operations anticipated under the four alternatives, and compares these numbers to those authorized under baseline conditions.

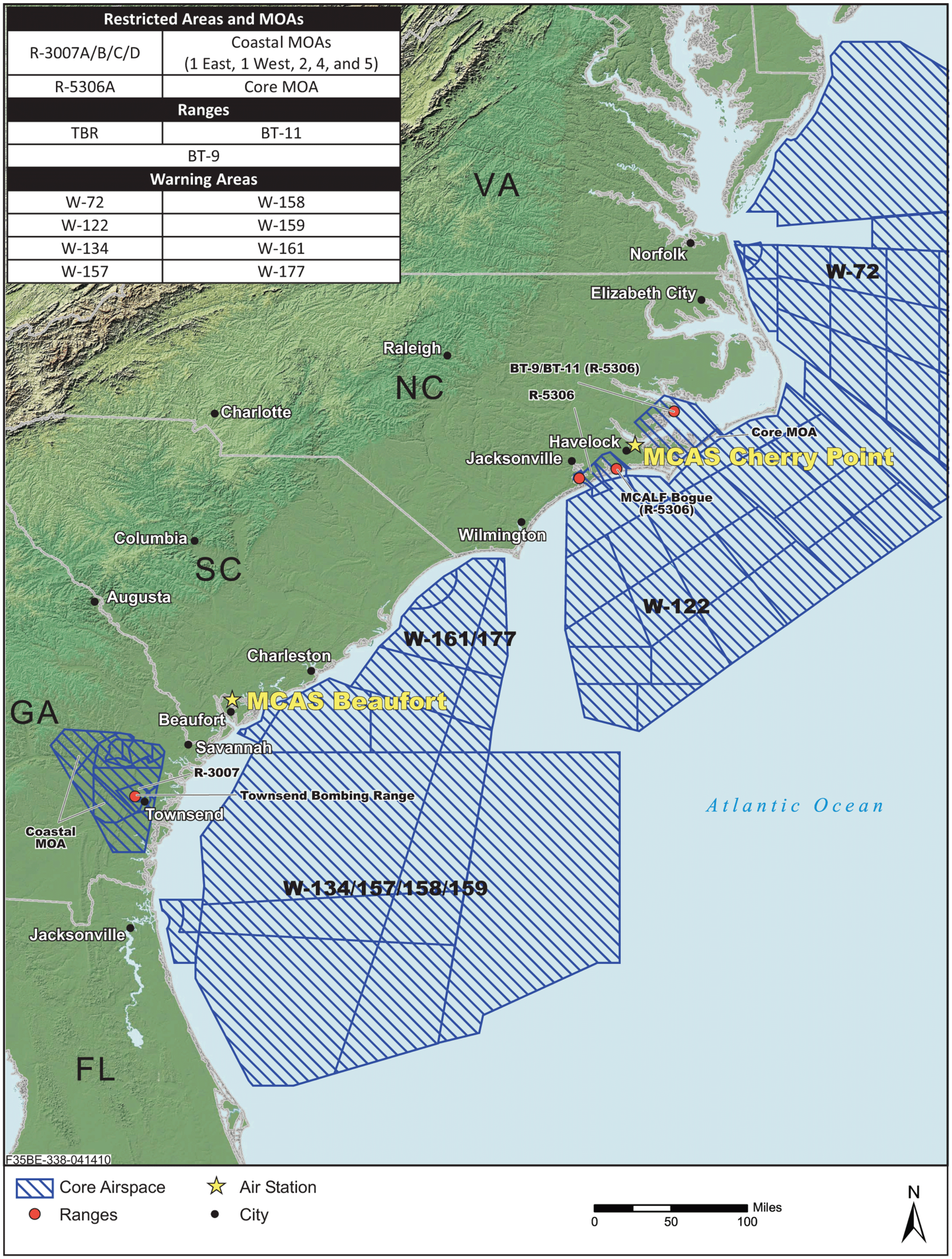
Table ES-10 Authorized Baseline and Proposed Airfield Operations at MCALF Bogue[a]

Aircraft Category	Authorized	Proposed by Alternative			
		1	2	3	4
AV-8B Departures	664	0	0	0	0
AV-8B Arrivals	664	0	0	0	0
AV-8B Pattern Work	13,888	0	0	0	0
Subtotal AV-8B	***15,216***	0	0	0	0
Other Transient Aircraft	1,179	1,179	1,179	1,179	1,179
Authorized Total	**16,395**	**1,179**	**1,179**	**1,179**	**1,179**
Proposed F-35B (Operational and Training Squadrons) Operations					
F-35B Departures	N/A	583	802	675	456
F-35B Arrivals	N/A	583	802	675	456
F-35B Pattern Work	N/A	4,218	5,800	3,406	1,824
Total F-35B	**N/A**	**5,385**	**7,404**	**4,755**	**2,736**
Other Transient Aircraft	1,179	1,179	1,179	1,179	1,179
Proposed Total	**N/A**	**6,564**	**8,583**	**5,934**	**3,915**
Change Relative to Authorized	N/A	*-9,831*	*-7,812*	*-10,461*	*-12,480*

Source: USMC 2009d.
Note: [a]Numbers have been updated from the Draft EIS to correct typographical errors; however, the acoustical analysis presented in the Draft EIS reflects the correct number of airfield operations.

Through evaluation of the available training and readiness program for the F-35B, the Marine Corps identified existing ranges and airspace for F-35B operational and PTC training. These existing ranges and airspace fall into two categories: 1) *core use* and 2) *occasional use*. Airspace and ranges defined as core areas would receive substantial use by the F-35Bs on a daily basis. Figure ES-13 depicts the core use airspace and ranges anticipated to receive substantial F-35B use from MCAS Beaufort and Cherry Point.

Under the Proposed Action, the F-35B would take the place of legacy aircraft currently training within eight warning areas. The Marine Corps determined that activities in these airspace units did not warrant further detailed analysis in this EIS for several reasons. First, any training activities by the F-35B would



ES-13 East Coast Core Airspace and Ranges be dispersed throughout an enormous volume of airspace spanning the East Coast from Maryland to Florida, so any effects would be likewise dispersed. Second, the Marine Corps anticipates no new types of operations as a result of basing the F-35B. Lastly, few operations would occur below 5,000 feet above ground level (AGL), thereby minimizing noise levels and aircraft emissions that could potentially affect recreational activities, commercial fishing, other human-generated activities, marine wildlife, or regional air quality.

Occasional use airspace and ranges used by MCAS Beaufort or MCAS Cherry Point would generally receive only infrequent use by the F-35Bs. Ranges like Poinsett Electronic Combat Range (Air Force) and Fort Stewart Training Areas (Army) are managed by other DoD commands and receive priority scheduling for their training purposes. The Marine Corps could only expect to gain occasional use for these reasons. In military training routes (MTRs), the F-35B does not require as much low altitude training as legacy aircraft and thus would not need as much time training in these types of airspace. In addition, most of the over-land MOAs are too small in size and do not have the adequate depth (floor to ceiling altitudes) to support the space needed for the F-35Bs to train like they will fight; therefore, it is not anticipated that operations within these occasional use airspace units would make a perceptible change to the number and type of operations they currently experience by legacy F/A-18 and AV-8B aircraft.

From time to time, legacy aircraft venture across the continental U.S. to conduct operations beyond core use areas. The F-35B is expected to do the same. While predominant F-35B operations would occur in the airspace, ranges, and auxiliary landing fields identified as core use, the F-35B would not be limited to using only those areas. The F-35B may conduct operations in other Special Use Airspace (SUA), on other ranges, and at other airfields within the nationwide SUA, auxiliary landing fields, Air Traffic Control Assigned Airspace, Warning Area, and MTR network. In accordance with CEQ guidance, however, those operations will be so widespread and so infrequent that no further study is warranted in this EIS.

Although the F-35B would perform the missions of legacy F/A-18 and AV-8B aircraft, they represent a different aircraft with different capabilities, and would fly somewhat differently. The following highlights some of the operational parameters of the F-35B under the Proposed Action.

- Use of Higher Altitudes – The F-35B would conduct training at higher altitudes than the legacy aircraft, operating above 5,000 feet AGL more than 99 percent of the time.
- Combined Use of Existing Airspace – The F-35B would conduct training missions requiring the combination of existing airspace units rather than single units.
- Ordnance Delivery Training – The F-35B would train with live and inert bombs only at ranges and targets authorized for the particular events and weapons; principally TBR in Georgia (primarily by MCAS Beaufort based aircraft) and Bombing Targets (BTs) 9 and 11 (primarily by MCAS Cherry Point aircraft).

- Defensive Countermeasure Flares - F-35B pilots would employ defensive countermeasure flares during some training flights to practice avoiding threats. Flare use would occur only in authorized airspace and follow all range regulations to ensure complete and safe combustion of the flare.
- Supersonic Flight - To train with the full capabilities of the aircraft, the F-35B would perform supersonic flights in airspace already approved for such operations.

Under any combination of aircraft basing in the four alternatives, the F-35B would use the existing airspace and ranges. Table ES-11 presents these data in comparison to baseline operations in the airspace.

***Table ES-11 Airspace and Range Operations Under the Baseline and Proposed Action*[a, b]**

Airspace/Range	Total Baseline Legacy Aircraft Operations[c]	Total Proposed F-35B Operations by Alternative				Net Change from Baseline by Alternative			
		1	2	3	4	1	2	3	4
Core MOA	1,149	1,149	1,149	1,149	0	*0*	*0*	*0*	*-1,149*
R-5306A	5,130	4,461	6,133	5,320	3,648	*-669*	*+1,003*	*+190*	*-1,482*
R-5306A (BT-9)	828	828	828	828	828	*0*	*0*	*0*	*0*
R-5306A (BT-11)	1,987	4,461	6,133	5,320	3,648	*+2,474*	*+4,146*	*+3,333*	*+1,661*
R-5306C	813	813	813	813	813	*0*	*0*	*0*	*0*
R-5306D	759	759	759	759	759	*0*	*0*	*0*	*0*
R-3007A/B/C/D	2,018	5,320	3,648	4,461	6,133	*+3,302*	*+1,630*	*+2,443*	*+4,115*
Coastal 1 East MOA	1,464	5,320	3,648	4,461	6,133	*+3,856*	*+2,184*	*+2,997*	*+4,669*
Coastal 1 West MOA	1,490	5,320	3,648	4,461	6,133	*+3,830*	*+2,158*	*+2,971*	*+4,643*
Coastal 2 MOA	1,509	5,320	3,648	4,461	6,133	*+3,811*	*+2,139*	*+2,952*	*+4,624*
Coastal 4 MOA	1,076	1,076	1,076	1,076	1,076	*0*	*0*	*0*	*0*
Coastal 5 MOA	369	5,320	3,648	4,461	6,133	*+4,951*	*+3,279*	*+4,092*	*+5,764*

Sources: Data validated by HQMC 2010.

Notes: [a]Sortie-operations are not additive and are unique to each particular SUA unit.

[b]Numbers have been updated from the Draft EIS to correct typographical errors; however, the acoustical analysis presented in the Draft EIS reflects the correct number of airfield operations.

[c]Baseline operations include those undertaken by legacy aircraft operating in the SUA, authorized and analyzed in previous NEPA documentation.

ES.3 No Action Alternative

Analysis of the No Action Alternative provides a benchmark that enables decision makers to evaluate the environmental consequences of the proposed basing alternatives. CEQ regulations at 40 CFR 1502.14(d) require that a No Action Alternative must be evaluated. No action means that the proposed action would not be implemented. Thus, baseline conditions would remain unchanged.

Under the No Action Alternative, the Marine Corps would not provide any facilities or functions to support the basing or operation of the F-35B operational squadrons or PTC on the East Coast. There would be no transition of F-35B personnel on the East Coast and no new construction or modification to support the F-35B, or F-35B operations. The F/A-18 and AV-8B squadrons would continue to be used by the 2d MAW. Legacy aircraft operations at each Air Station would continue at approximately current levels. The Marine Corps would continue to repair and operate the existing aircraft at greater expense as the F/A-18 and AV-8B aircraft continue to deteriorate until the end of their useful life.

Congress has legislated that the F-35B be acquired to replace the F/A-18 and AV-8B currently used by the Marine Corps. A No Action decision would further delay the implementation of Congressional directives, would negatively affect the overall program for integrating the F-35B into the Marine Corps, and would delay the fielding of the F-35B for operations and deployment. The No Action Alternative neither meets the need nor the purpose of this Proposed Action but is carried forward as a baseline from which to compare the impacts of the Proposed Action and any action alternatives.

ES.4 Preferred Alternative and Environmentally Preferred Alternative

The Marine Corps selected Alternative 1 as the Preferred Alternative: three operational and two FRS PTC squadrons at MCAS Beaufort and eight operational squadrons at MCAS Cherry Point. This basing option best meets the purpose and need and balances environmental impacts with mission requirements.

CEQ regulations at 40 CFR 1505.2(b) also require that an environmentally preferable alternative be identified, which for this EIS would be the No Action Alternative. While this alternative would have impacts, it would not introduce any new impacts different from those found now within the affected environment. The No Action Alternative, however, would not meet the purpose and need of the Proposed Action.

ES.5 Environmental Consequences

Tables ES-12, ES-13, and ES-14 below provide a summary of potential impacts relative to each action alternative and the No Action alternative at MCAS Beaufort, MCAS Cherry Point, and within the airspace and ranges, respectively.

ES.6 Organization of the EIS

The Executive Summary provides a summary of the basing proposal and alternatives. It also presents the potential environmental impacts related to each action alternative and the No Action Alternative, and where applicable, includes proposed mitigation measures. Chapter 1 provides the purpose and need for the Proposed Action and discusses the public involvement and scoping process. Chapter 2 describes the Proposed Action and alternatives, including a detailed discussion of the alternatives development process. In Chapter 3, definitions of the resources being analyzed as part of the EIS are presented. Environmental impacts of the alternatives are assessed for each Air Station in Chapter 4 (MCAS Beaufort) and Chapter 5 (MCAS Cherry Point); potential impacts to ranges and airspace, and MCALF Bogue are presented in Chapter 6. Chapter 7 provides an analysis of cumulative impacts; Chapter 8 covers other NEPA considerations; Chapter 9 lists the preparers and contributors of this document; and Chapter 10 provides the references cited and personal communications with subject matter experts. The Appendices provide supplemental information. Appendix A provides a copy of the Notice of Intent, agency correspondence, and the mailing list. Appendix B provides cooperating agency correspondence. Appendix C provides the resource methodology. Appendix D provides the noise methodology and modeling. Appendix E provides the air quality modeling. Appendix F provides the socioeconomic methodology. Appendix G provides a copy of the Coastal Consistency Determination. Acronyms, abbreviations, and a glossary of terms are provided in Appendix H. Appendix I contains copies of all comments received during the official review and comment period (May 28 through July 12, 2010). These comments were numbered, relevant issues bracketed, and a matrix provided to record Marine Corps responses to the relevant comments.

ES.7 Public Comment on the EIS

The U.S. Environmental Protection Agency published a Notice of Availability in the *Federal Register* for the Draft EIS on May 28, 2010. The Draft EIS was circulated for review and comment to government agencies, local organizations, Native American tribes, and interested private citizens; was available for general review in public libraries in the communities affected by the action; and was available online on the project website located at http://www.usmcJSFeast.com.

A Notice of Public Meetings ran in the *Federal Register* on May 26, 2010. The public meeting notice supplied the dates, times, and locations of the five public meetings held in North Carolina, South Carolina, and Georgia. The 45-day public comment period ended on July 12, 2010 and included five public meetings in North Carolina, South Carolina, and Georgia in June 2010. Specifically, meetings were held on June 15, 2010 in Havelock, NC; June 16, 2010 in Emerald Isle, NC; June 17, 2010 in Bayboro, NC; June 22, 2010 in Beaufort, SC; and June 24, 2010 in Ludowici, Georgia. In total, 1,065 people attended these meetings.

At the meetings and during the comment period, a total of 1,267 commenters, which included 2 federal agencies, 7 state agencies, 10 elected officials, 48 organizations, and 1,200 individuals, submitted comments. All comments are available on the project website, http://www.usmcjsfeast.com, are included on a CD with each copy of the Final EIS, and form part of the project record. They were all evaluated and relevant issues bracketed for response.

Changes to this Final EIS were based on comments received during the public comment period and include factual corrections, additions to existing information, and improvements or modifications to the analyses presented in the Draft EIS. None of the changes between the Draft EIS and Final EIS resulted in substantive changes to the Proposed Action, alternatives, or the associated environmental consequences of the Proposed Action. Please refer to Appendix I to locate any comment that was submitted and how it was addressed. The majority of comments supported basing the F-35B at MCAS Beaufort and MCAS Cherry Point. There were, however, recurrent comments regarding the preferred alternative, noise, construction/basing timeline, requesting development of an Auxiliary Landing Field, environmental justice, PTC pilot operations, socioeconomics, utilities and infrastructure, air emissions, community services, biological resources, and safety.

Table ES-12 Comparison of Environmental Consequences – MCAS Beaufort

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Airfields and Airspace	• Annual airfield operations would increase 44,029 from baseline • F-35B operations would follow established local approach and departure patterns to avoid air traffic congestion	• Annual airfield operations would increase 21,686 from baseline • F-35B operations would follow established local approach and departure patterns to avoid air traffic congestion	• Annual airfield operations would increase 3,727 from baseline • F-35B operations would follow established local approach and departure patterns to avoid air traffic congestion	• Annual airfield operations would increase 26,069 from baseline • F-35B operations would follow established local approach and departure patterns to avoid air traffic congestion	• Baseline conditions would persist
Noise	• Net increase of 1,690 in people exposed to 65 decibels (dB) Day-Night Average Sound Level (DNL) or greater • Net increase of 498 housing units exposed to 65 dB DNL or greater • Net increase of 203 acres exposed to 65 dB DNL or greater • Net increase of 1,208 acres of land uses within Noise Zone II over land use categories; however, no change to land uses anticipated • Net increase of 470 acres for land uses within Noise Zone III over land use categories; however, no change to land uses anticipated • No residential areas at risk for Potential Hearing Loss (PHL); however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile Noise Induced Permanent Threshold Shift (NIPTS) would be lower for those without 40	• Net increase of 708 in people exposed to 65 dB DNL or greater • Net increase of 180 housing units exposed to 65 dB DNL or greater • Net decrease of 1,657 acres exposed to 65 dB DNL or greater • Net increase of 951 acres of land uses within Noise Zone II over land use categories; however, no change to land uses anticipated • Net decrease of 742 acres for land uses within Noise Zone III over land use categories; however, no change to land uses anticipated • No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above	• Net increase of 137 in people exposed to 65 dB DNL or greater • Net increase of 9 housing units exposed to 65 dB DNL or greater • Net decrease of 2,752 acres exposed to 65 dB DNL or greater • Net increase of 2,350 acres of land uses within Noise Zone II over land use categories; however, no change to land uses anticipated • Net decrease of 2,635 acres for land uses within Noise Zone III over land use categories; however, no change to land uses anticipated • No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above	• Net increase of 1,249 in people exposed to 65 dB DNL or greater • Net increase of 366 housing units exposed to 65 dB DNL or greater • Net decrease of 604 acres exposed to 65 dB DNL or greater • Net increase of 2,497 acres of land uses within Noise Zone II over land use categories; however, no change to land uses anticipated • Net decrease of 1,176 acres for land uses within Noise Zone III over land use categories; however, no change to land uses anticipated • No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above	• Baseline conditions would persist

Table ES-12 Comparison of Environmental Consequences – MCAS Beaufort

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
	years of daily exposure to average noise levels of 80 dB DNL and above				
Air Quality	• Regional attainment status would not be altered, nor would emissions represent a regional significance • Construction impacts would be below regulatory thresholds for all air pollutants • Mobile source emissions would decrease except for Nitrogen Oxides (NO_x) and Sulfur Oxides (SO_x), which would increase • No net change to stationary source emissions	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist
Hazardous Materials, Toxic Substances, and Hazardous Waste	• Established procedures for the management of hazardous materials and hazardous waste would be followed during the demolition of older structures and construction of new facilities • Primers containing cadmium and chromium would be discontinued • Hangars 414 and 416 contain asbestos containing materials (ACM), which would be removed and properly disposed • Lead-based paint (LBP) would be managed and disposed of properly	• Same as Alternative 1 except only Hangar 414 would be demolished	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist

Table ES-12 Comparison of Environmental Consequences – MCAS Beaufort

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Hazardous Materials, Toxic Substances, and Hazardous Waste	• Old aviation gasoline piping is located west of Hangar 414; soils excavated would be segregated and sampled prior to disposal • The existing hazardous waste storage facility would be demolished and a new hazardous waste storage facility constructed; Resource Conservation and Recovery Act Part B permit would be modified as necessary				
Safety	• Airfield operations would increase over baseline levels; however, it is not anticipated that the mishap rate would introduce increased safety risks • Proposed construction and demolition activities would be consistent with established Accident Potential Zones (APZs) • Clear Zones would be established for the LHD/LHA Training Facility • None of the proposed construction or demolition projects are located within any of the Explosive Safety Quantity Distance (ESQD) arcs; no impacts are anticipated to ordnance storage areas, established safety arcs, or to explosive safety plans and procedures as a result of basing the F-35B	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist

Table ES-12 Comparison of Environmental Consequences – MCAS Beaufort

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Safety	• No unique or unusual construction risks are posed; construction workers would follow Occupational Safety and Health Administration (OSHA) requirements				
Land Use	• Proposed on-Station construction and operations consistent with existing and proposed on-Station land use • Proposed LHD/LHA Training Facility would result in lands set aside for Clear Zones • Alternative would not result in land use conflicts with off-Station land uses	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1, except two new BEQs would be constructed at a site that would be compatible for such development	• Baseline conditions would persist

Table ES-12 Comparison of Environmental Consequences – MCAS Beaufort

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Socioeconomics	• 5 percent decrease in Air Station workforce • Less than 1 percent decrease of region of influence (ROI) population • Reduction in military personnel would result in long-term loss of $9.9 million in annual payroll income • Expenditure of $437.1 million over 5 years for construction projects at the Air Station • Peak year of construction would create 1,242 jobs resulting in $53.3 million in labor income offsetting negative impacts from loss of military positions • Increase in for-sale listings in ROI with loss of military personnel would result in short-term impact to housing market	• 24 percent decrease in Air Station workforce • 2 percent decrease of ROI population • Reduction in military personnel would result in long-term loss of $54.3 million in annual payroll income • Expenditure of $278.6 million over 5 years for construction projects at the Air Station • Peak year of construction would create 858 jobs resulting in $36.8 million in labor income offsetting negative impacts from loss of military positions • Increase in for-sale listings in ROI with loss of military personnel would result in short-term impact to housing market, but greater than Alternative 1	• 14 percent increase in Air Station workforce • 1 percent increase of ROI population • Increase of military personnel would result in increase of $30.5 million annual payroll income • Expenditure of $610.8 million over five years for construction projects at the Air Station • Peak year of construction would create 1,741 jobs resulting in $74.7 million in labor income • Increased demand for housing in ROI but demand could be met by current stock	• 34 percent increase in Air Station workforce • 3 percent increase in ROI population • Increase of military personnel would result in increase of $75.0 million in annual payroll income • Expenditure of $821.8 million over five years for construction projects at the Air Station • Peak year of construction would create 2,419 jobs resulting in $107.1 million in labor income • Increased demand for housing in ROI but demand could be met by current stock	• Baseline conditions would persist
Environmental Justice/ Protection of Children	• No disproportionate low-income or minority populations impacted by noise levels greater than 65 dB DNL • No schools be exposed to average noise levels of 65 dB DNL and greater • No safety or health risks introduced to impact children	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist

Table ES-12 Comparison of Environmental Consequences – MCAS Beaufort

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Community Services	• Net reduction of 228 personnel and 409 dependents • Decrease in school age children by 119 • Overall decreased demand for community services	• Net reduction of 1,161 personnel and 2,177 dependents • Decrease in school age children by 633 • Overall decreased demand for community services	• Net gain of 667 personnel and 1,291 dependents • Increase in school age children by 375, adequate capacity exists • Overall increased demand for community services	• Net gain of 1,600 personnel and 3,058 dependents • Increase in school age children by 889, adequate capacity exists • Overall increased demand for community services	• Baseline conditions would persist
Utilities and Infrastructure	• Decrease in operational-related water consumption and wastewater discharge by military personnel by 2,964 gallons per day (gpd) • Decrease in residential water consumption and wastewater discharge by military personnel and dependents by 44,144 gpd • Annual decrease in solid waste by 434 tons • One time increase in construction and demolition (C&D) debris of 11,038 tons; adequate landfill capacity available	• Decrease in operational-related water consumption and wastewater discharge by military personnel by 15,093 gpd • Decrease in residential water consumption and wastewater discharge by military personnel and dependents by 231,323 gpd • Annual decrease in solid waste by 2,263 tons • One time increase in C&D debris of 9,278 tons; adequate landfill capacity available	• Increase in operational-related water consumption and wastewater discharge by military personnel by 8,671 gpd; adequate capacity available • Increase in residential water consumption and wastewater discharge by military personnel and dependents by 135,689 gpd; adequate capacity available • Annual increase in solid waste by 1,322 tons; adequate landfill capacity available • One time increase in C&D debris of 15,669 tons; adequate landfill capacity available	• Increase in operational-related water consumption and wastewater discharge by military personnel by 20,800 gpd; adequate capacity available • Increase in residential water consumption and wastewater discharge by military personnel and dependents by 322,799 gpd; adequate capacity available • Annual increase in solid waste by 3,150 tons; adequate landfill capacity available • One time increase in C&D debris of 17,873 tons; adequate landfill capacity available	• Baseline conditions would persist
Ground Traffic and Transportation	• Average Daily Trips would decrease by approximately 456 • Construction impacts could cause gate delays; but would be temporary in nature	• Average Daily Trips would decrease by approximately 2,322 impacts could cause gate delays; but would be temporary in nature	• Average Daily Trips would increase by approximately 1,334 • Gate delays could occur during peak hours, but rerouting of traffic through the four entry gates could alleviate delays • Construction impacts could cause gate delays; but would be temporary in nature	• Average Daily Trips would increase by approximately 3,200 • Gate delays could occur during peak hours, but rerouting of traffic through the four entry gates could alleviate delays • Construction impacts could cause gate delays; but would be temporary in nature	• Baseline conditions would persist

Table ES-12 Comparison of Environmental Consequences – MCAS Beaufort

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Biological Resources	• Construction would occur along flight line predominately on previously disturbed or developed areas; permanent loss of up to 58.6 acres of noncontiguous loblolly and slash pine forest • Short-term impacts from construction disturbance to terrestrial wildlife, but would not constitute a threat to any species or ecological community; no long-term impacts to wildlife due to noise • No long-term impacts to migratory birds anticipated • No impacts to special status species	• Same as Alternative 1	• Same as Alternative 1 except there would be a permanent loss of up to 51.5 acres of noncontiguous loblolly and slash pine forest	• Same as Alternative 1 except there would be a permanent loss of up to 52.8 acres of noncontiguous loblolly and slash pine forest	• Baseline conditions would persist
Geology, Topography, and Soils	• Minimal grading required due to flat topography • No impacts to geology from construction or demolition • Short-term impacts to soils from construction activities, but impacts would be minimized through standard erosion and sedimentation control procedures	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist

Table ES-12 Comparison of Environmental Consequences – MCAS Beaufort

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Water Resources	• Construction and demolition activities are not anticipated to impact surface water or stormwater due to use of standard erosion and sedimentation controls • No impacts to groundwater • No impacts to wetlands • The LHD/LHA Training Facility, with an approximate 33-acre footprint, would be located within the 100-year floodplain (only 3 acres would be developed)	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist
Cultural Resources	• None of the buildings designated for demolition under this Alternative is eligible for National Register of Historic Places listing • Any inadvertent discovery made during construction would follow the procedures outlined in the Air Station's Integrated Cultural Resources Management Plan • The City of Beaufort's Historic District would not be affected	• Same as Alternative 1)	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist

Table ES-12 Comparison of Environmental Consequences – MCAS Beaufort

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Coastal Zone Management	• Loss of up to 58.6 acres of non-contiguous pine forest along the flightline • The LHD/LHA Training Facility, with an approximate 33-acre footprint, would be located entirely within the 100-year floodplain (only 3 acres would be developed for the training facility) • All other actions associated with the Alternative would have no impacts to the management of the coastal zone	• Same as Alternative 1	• Same as Alternative 1 except there would be a permanent loss of up to 51.5 acres of noncontiguous pine forest	• Same as Alternative 1 except there would be a permanent loss of up to 52.8 acres of noncontiguous pine forest	• Baseline conditions would persist

Table ES-13 Comparison of Environmental Consequences – MCAS Cherry Point

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Airfields and Airspace	• Annual airfield operations would decrease 12,046 from baseline • F-35B operations would follow established local approach and departure patterns to avoid air traffic congestion	• Annual airfield operations would increase 8,715 from baseline • F-35B operations would follow established local approach and departure patterns to avoid air traffic congestion	• Annual airfield operations would increase 29,068 from baseline • F-35B operations would follow established local approach and departure patterns to avoid air traffic congestion	• Annual airfield operations would increase 8,307 from baseline • F-35B operations would follow established local approach and departure patterns to avoid air traffic congestion	• Baseline conditions would persist
Noise	• Net increase of 3,380 acres in total area exposed to 65 dB DNL and greater noise levels • Net population increase of 1,657 for those exposed to 65 dB DNL or greater noise levels • Net increase of 194 more housing units exposed to 65 dB DNL or greater noise levels • Exposure to greater than 65 dB DNL noise levels to Havelock Elementary, Middle, and High Schools; Roger Bell Elementary School; and G.A. Barden Elementary School, would remain unchanged from baseline conditions • Net increase of 2,547 acres in Noise Zone II noise levels over land use categories; however, no change to land uses anticipated • Net increase of 1,255 acres in Noise Zone III noise levels over land use categories; however, no change to land uses anticipated	• Net increase of 5,814 acres in total area exposed to 65 dB DNL and greater noise levels • Net population increase of 2,637 for those exposed to 65 dB DNL or greater noise levels • Net increase of 476 more housing units exposed to 65 dB DNL or greater noise levels • Havelock Middle School would experience increased noise levels when compared to baseline conditions • Net increase of 3,443 acres in Noise Zone II noise levels over land use categories; however, no change to land uses anticipated • Net increase of 2,280 acres in Noise Zone III noise levels over land use categories; however, no change to land uses anticipated	• Net increase of 6,736 acres in total area exposed to 65 dB DNL and greater noise levels • Net population increase of 3,179 for those exposed to 65 dB DNL or greater noise levels • Net increase of 661 more housing units exposed to 65 dB DNL or greater noise levels • Havelock Middle and High Schools, as well as Roger Bell Elementary School and G.A. Barden Elementary School would experience increased noise levels when compared to baseline conditions • Net increase of 2,591 acres in Noise Zone II noise levels over land use categories; however, no change to land uses anticipated • Net increase of 4,021 acres in Noise Zone III noise levels over land use categories; however, no change to land uses anticipated	• Net increase of 5,019 acres in total area exposed to 65 dB DNL and greater noise levels • Net population increase of 2,379 for those exposed to 65 dB DNL or greater noise levels • Net increase of 372 more housing units exposed to 65 dB DNL or greater noise levels • Havelock Middle and High Schools, as well as Roger Bell Elementary School would experience increased noise levels when compared to baseline conditions • Net increase of 1,955 acres in Noise Zone II noise levels over land use categories; however, no change to land uses anticipated • Net increase of 2,992 acres in Noise Zone III noise levels over land use categories; however, no	• Baseline conditions would persist

Table ES-13 Comparison of Environmental Consequences – MCAS Cherry Point

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Noise	• No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above	• No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above	• No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above	change to land uses anticipated • No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above	
Air Quality	• Regional attainment status would not be altered, nor would emissions represent a regional significance • Construction impacts would be below regulatory thresholds for all air pollutants • Mobile source emissions would decrease except for NO_x and SO_x, which would increase • No net change to stationary source emissions	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist
Hazardous Materials, Toxic Substances, and Hazardous Waste	• Established procedures for the management of hazardous materials and hazardous waste would be followed during the demolition of older structures and construction of new facilities • Primers containing cadmium and chromium would be discontinued • Surveys would be conducted for presence of ACM and LBP; all ACM would be removed and	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist

Table ES-13 Comparison of Environmental Consequences – MCAS Cherry Point

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Hazardous Materials, Toxic Substances, and Hazardous Waste	properly disposed of and LBP would be managed and properly disposed • Operating Unit (OU)1 and OU14 are not expected to be impacted since the alternative activities are consistent with existing controls and selected remedies at these two sites • OU1 would have no effect on squadron operations • Construction contractor(s) would need to review and adhere to the land use controls for any new construction occurring within OU14				
Safety	• Airfield operations would decrease; no increased safety risks for aircraft incidents are anticipated • The proposed construction and demolition activities would be consistent with established guidelines for working within APZs and no new Clear Zones would be established • None of the proposed construction or demolition projects is located within existing ESQD arcs; no impacts are anticipated to ordnance storage areas, established safety arcs, or to explosive safety plans and procedures as a result of F-35B basing	• Same as Alternative 1, except airfield operations would increase; however, no increased safety risks for aircraft incidents are anticipated	• Same as Alternative 1, except airfield operations would increase; however, no increased safety risks for aircraft incidents are anticipated	• Same as Alternative 1, except airfield operations would increase; however, no increased safety risks for aircraft incidents are anticipated	• Baseline conditions would persist

Table ES-13 Comparison of Environmental Consequences – MCAS Cherry Point

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Safety	• No unique or unusual construction risks are posed; construction workers would follow OSHA requirements				
Land Use	• Proposed on-Station construction and operations consistent with existing and proposed on-Station land use • Alternative would not result in land use conflicts with off-Station land uses	• Same as Alternative 1, with the exception that construction of new BEQs would occur at a site compatible for such development	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist
Socioeconomics	• 8.5 percent increase in Air Station workforce • 2 percent increase of ROI population • Increase in military personnel would result in a long-term gain of $57.4 million in annual payroll income • Expenditure of $571.7 million over 7 years for construction projects on the Air Station • Peak year of construction would create 1,649 jobs resulting in $58.4 million in labor income • Increased demand for housing in ROI would result in short-term impact to housing market	• 15 percent increase in Air Station workforce • 4 percent increase of ROI population • Increase in military personnel would result in long-term gain of $101.5 million in annual payroll income • Expenditure of $851.1 million over 7 years for construction projects on the Air Station • Peak year of construction would create 2,804 jobs resulting in $99.3 million in labor income • Increased demand for housing in ROI would result in short-term impact to housing market; greater demand than Alternative 1	• 2 percent increase in Air Station workforce • Less than 1 percent increase of ROI population • Increase of military personnel would result in Increase of $17.4 million in annual payroll income • Expenditure of $374.5 million over 7 years for construction projects on the Air Station • Peak year of construction would create 1,198 jobs resulting in $42.4 million in labor income Increased demand for housing in ROI • Demand could be met by current housing stock	• 5 percent decrease in Air Station workforce • 1 percent decrease of ROI population • Reduction of military personnel would result in long-term loss of $26.7 million in annual payroll income • Expenditure of $228.8 million over 7 years for construction projects on the Air Station • Peak year of construction would create 793 jobs resulting in $28.1 million in labor income offsetting negative impacts from loss of military positions • Increase in for-sale listings in ROI with loss of military personnel would result in short-term impact to housing market	• Baseline conditions would persist

Table ES-13 Comparison of Environmental Consequences – MCAS Cherry Point

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Environmental Justice/ Protection of Children	• No disproportionate impacts to low-income populations due to airfield noise • No disproportionate safety or health impacts would occur to minority and low-income populations due to construction or demolition activities • No safety or health risks introduced to impact children during construction or due to aircraft operational activities • Noise-level conditions would not change from the five schools already exposed under baseline conditions	• Same as Alternative 1 except noise levels would remain similar in four of the five schools exposed under baseline conditions; noise increase at this one school has the potential to be a noticeable, but not substantial impact to children	• Same as Alternative 1 except noise levels would remain similar in one of the five schools exposed under baseline conditions; noise increase at the other four schools has the potential to be a noticeable, but not substantial impact to children	• Same as Alternative 1 except noise levels would remain similar in two of the five schools exposed under baseline conditions; noise increase at the other three schools has the potential to be a noticeable, but not substantial impact to children	• Baseline conditions would persist
Community Services	• Net gain of 1,194 personnel and 2,323 dependents • Increase in school age children by 675; adequate capacity exists • Overall increase in demand for community services	• Net gain of 2,127 personnel and 4,090 dependents • Increase in school age children by 1,189; adequate capacity exists • Overall increase in demand for community services	• Net gain of 299 personnel and 623 dependents • Increase in school age children by 181; adequate capacity exists • Overall increase in demand for community services	• Net reduction of 634 personnel and 1,144 dependents • Decrease in school age children by 333 • Overall decrease in demand for community services	• Baseline conditions would persist
Utilities and Infrastructure	• Increase in water consumption and wastewater discharge by military personnel by 15,522 gpd • Increase in water consumption and wastewater discharge by military personnel and dependents by 243,728 gpd • Annual increase in solid waste of 2,373 tons per year (TPY) • One time increase in C&D debris of 29,246 tons	• Increase in water consumption and wastewater discharge by military personnel by 27,651 gpd • Increase in water consumption and wastewater discharge by military personnel and dependents by 430,838 gpd • Annual increase in solid waste of 4,201 TPY	• Increase in water consumption and wastewater discharge by military personnel by 3,887 gpd • Increase in water consumption and wastewater discharge by military personnel and dependents by 63,895 gpd • Annual increase in solid waste of 617 TPY	• Decrease in water consumption and wastewater discharge by military personnel by 8,242 gpd • Decrease in water consumption and wastewater discharge by military personnel and dependents by 123,215 gpd	• Baseline conditions would persist

Table ES-13 Comparison of Environmental Consequences – MCAS Cherry Point

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Utilities and Infrastructure		• One time increase in C&D debris of 29,998 tons	• One time increase in C&D debris of 29,127 tons	• Annual decrease in solid waste of 1,211 TPY • One time increase in C&D debris of 14,754 tons	
Ground Traffic and Transportation	• Average Daily Trips would increase by approximately 2,388 • Roadway capacity is sufficient to accommodate additional trips • Slocum Road maximum capacity restriction of 10,000 passengers per day due to explosive safety limitations could be exceeded	• Average Daily Trips would increase by 4,254 • Roadway capacity is sufficient to accommodate additional trips • Slocum Road maximum capacity restriction of 10,000 passengers per day due to explosive safety limitations could be exceeded	• Average Daily Trips would increase by 598 • Roadway capacity is sufficient to accommodate additional trips • Slocum Road maximum capacity restriction of 10,000 passengers per day due to explosive safety limitations could be exceeded	• Average Daily Trips would decrease by approximately 1,268 •	• Baseline conditions would persist
Biological Resources	• Construction and demolition would take place within the grass buffer or in areas previously disturbed • Short-term impacts from construction disturbance to terrestrial wildlife, but would not constitute a threat to any species or ecological community; no long-term impacts to wildlife due to noise • No long-term impacts to migratory birds • No impacts to special status species	• Same as Alternative 1 except there would be a loss of 26.8 acres of vegetation from construction of community support facilities	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist

Table ES-13 Comparison of Environmental Consequences – MCAS Cherry Point

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Geology, Topography, and Soils	• Minimal grading required due to flat topography • No impacts to geology from construction or demolition • Short-term impacts to soils, but impacts would be minimized through standard construction erosion and sedimentation control procedures	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist
Water Resources	• Construction and demolition activities are not anticipated to impact surface water or stormwater due to use of standard erosion and sedimentation controls • No impacts to groundwater, wetlands, or floodplains	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist
Cultural Resources	• No impacts from construction or demolition to archaeological or architectural resources • No consultation with the State Historic Preservation Office required as no structures that would be demolished are associated with a significant historical property	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist
Coastal Zone Management	• No impacts to coastal zone or coastal resources	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist

Table ES-14 Comparison of Environmental Consequences – Airspace, Ranges, and Auxiliary Landing Field

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Airspace Use and Management	• Operations would remain similar to baseline conditions in Core MOA, R-5306A (BT-9); R-5306C/D; and Coastal 4 MOA. They would increase in R-5306A (BT-11); R-3007A/B/C/D; and Coastal 1 East/West/2/5. Operations would decrease in R-5306A • No impacts to civilian and commercial aircraft operations • No change in airspace management • MCALF Bogue use would decrease from baseline conditions	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist
Noise	• Noise levels in SUA would generally increase, with greatest increase occurring in Coastal MOAs • For MCALF Bogue, there would be a net increase of 1,580 acres, a net decrease of 17 housing units, and no population change for those exposed to 65 dB DNL or greater noise levels • No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and	• Same as Alternative 1 except for MCALF Bogue, there would be a net increase of 519 acres, 155 housing units, and 230 people exposed to 65 dB DNL or greater noise levels	• Same as Alternative 1 except for MCALF Bogue, there would be a net increase of 508 acres, 32 housing units, and 154 people exposed to 65 dB DNL or greater noise levels	• Same as Alternative 1 except for MCALF Bogue, there would be a net decrease of 245 acres, 251 housing units, and 488 people exposed to 65 dB DNL or greater noise levels	• Baseline conditions would persist

Table ES-14 Comparison of Environmental Consequences – Airspace, Ranges, and Auxiliary Landing Field

Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	No Action Alternative
Noise	10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above				
Air Quality	• Regional attainment status would not be altered, nor would emissions be regionally significant • All mobile emissions would decrease, except for SO_x	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist
Land Use	• Proposed on-Station construction and operations consistent with existing and proposed on-Station land use • Alternative would not result in land use conflicts with off-Station land uses	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist
Safety	• No impacts to safety	• Same as Alternative 1	• Same as Alternative 1	• Same as Alternative 1	• Baseline conditions would persist

1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The United States Marine Corps (Marine Corps) proposes to base and operate 11 operational squadrons[1] and a Pilot Training Center (PTC) (a PTC is composed of 2 Fleet Replacement Squadrons) of F-35B Lightning II Joint Strike Fighters (JSFs), hereinafter referred to as the F-35B, on the East Coast of the United States (U.S.). The F-35B aircraft would replace legacy F/A-18A/C/D[2] Hornet and AV-8B Harrier aircraft in the Second Marine Aircraft Wing (2d MAW) currently based at Marine Corps Air Station (MCAS) Beaufort, South Carolina (SC) and MCAS Cherry Point, North Carolina (NC). This Environmental Impact Statement (EIS) analyzes the potential environmental consequences of aircraft transition, new construction and demolition of infrastructure, personnel changes, and aircraft operations associated with basing and operating the F-35B at East Coast Air Stations and existing regional training areas.

The F-35B, as the "next generation" aircraft, represents the future of Marine Corps tactical aviation. In addition to its short takeoff and vertical landing (STOVL) capability, the F-35B provides advanced technology and incorporates the mission capabilities of the current Marine Corps platforms—the F/A-18 and the AV-8B—within a single airframe. On the East Coast, the Marine Corps plans to transition from the legacy aircraft to the F-35B over a 9-year time frame (13-year time frame if facility construction is taken into account).

The F-35B represents a new aircraft for the Marine Corps, with new and different capabilities compared to the legacy aircraft it replaces. This EIS incorporates the most current and best available information for F-35B training operations based on requirements outlined in the preliminary F-35B Training Readiness Manual. Use of best available information provides the public, agencies, and decision makers with the ability to evaluate the consequences of the Proposed Action in accordance with the Council on Environmental Quality (CEQ) regulations (specifically 40 Code of Federal Regulations [CFR] 1502.22). As the F-35B program moves forward, the Marine Corps will monitor its implementation, identify new potential environmental effects, evaluate results in relation to the new information in order to determine if reduction or mitigation of new potential consequences is required, and inform the public of substantive changes.

The Marine Corps has prepared this EIS in accordance with the National Environmental Policy Act (NEPA) of 1969; CEQ guidance implementing NEPA (40 CFR Parts 1500-1508); Department of Navy (DoN) regulations implementing NEPA (32 CFR 775); and Marine Corps Order P5090.2A (with Changes 1, 2), Marine Corps Environmental Compliance and Protection Manual.

[1] One of these operational squadrons would eventually be designated as a reserve squadron under the 4th MAW. To allow Marine Corps aviation to maintain flexibility, however, the reserve squadron is being evaluated as an operational unit for purposes of this EIS.
[2] There are several variants of the Hornet; however, for this EIS, the F/A-18 designation is used for all variants. A specific model (A, C, D, E, or F) is called out when specificity is needed.

1.1 Legacy and F-35B Aircraft Comparisons

Comparison of the legacy F/A-18 and AV-8B aircraft to the F-35B demonstrates both the increase in capabilities and versatility of the new aircraft (Figure 1-1). The F/A-18, a multi-role fighter and attack aircraft that employs conventional fixed-wing takeoffs and landings, was first introduced to the Marine Corps in 1983. While the F/A-18 offers supersonic speed with large payload capacity, and certain components have been updated throughout the years, the F/A-18s are approaching the end of their useful life. The AV-8B is a vertical/short takeoff and landing jet, introduced to the Marine Corps in 1985 to fulfill the Marine Corps' need for a light ground attack aircraft. However, the AV-8B cannot achieve supersonic speeds and the aircraft's design limits its utility against the array of modern threats.

In contrast, the F-35B is a highly advanced, stealth, supersonic, multi-role strike-fighter aircraft with STOVL technology that enables the aircraft to takeoff and land from conventional runways, amphibious ships, aircraft carriers, and expeditionary airfields. The F-35B is the world's first operational supersonic STOVL aircraft with a combat radius (i.e., the distance it can fly to a conflict, undertake a mission, and return to the home Air Station) greater than that of the aircraft it replaces. By combining the STOVL of the AV-8B with the speed, range, and payload capacity of the F/A-18, the F-35B can perform the missions of both aircraft.

1.2 Purpose of and Need for the Proposed Action

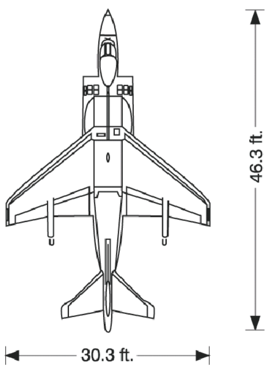
The need for the Proposed Action is to replace aging legacy aircraft and integrate the operational and pilot training F-35B squadrons into the existing Marine Corps command and organizational structure. This action would also ensure that the Marine Corps could take advantage of the aircraft's major improvements and support associated training and readiness requirements. The purpose of the Proposed Action is to efficiently and effectively maintain combat capability and mission readiness as the Marine Corps faces increased deployments across a spectrum of conflicts, and a corresponding increased difficulty in maintaining an aging legacy aircraft inventory (USMC 2008a). Another factor driving the need for replacement is attrition of AV-8B and F/A-18 aircraft, which is due to service life thresholds and no manufacturing of new AV-8B or F/A-18 aircraft.

1.3 Public Involvement

1.3.1 Overview of NEPA and Public Involvement Process

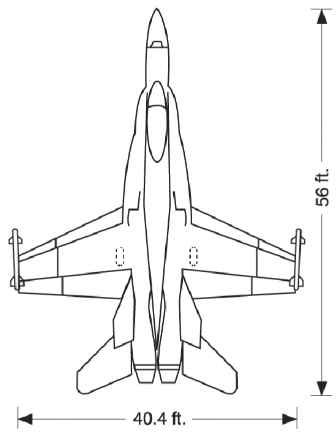
NEPA, CEQ regulations, and the DoN's implementing regulations (40 CFR Parts 1500-1508 and 32 CFR 775, respectively) require the Marine Corps to consider the potential environmental consequences of its Proposed Action early and concurrent with the initial project planning stages. An EIS documents the detailed study of these potential environmental consequences of the Proposed Action, and cumulative impacts.

AV-8B Harrier
Year Entered Fleet: 1985



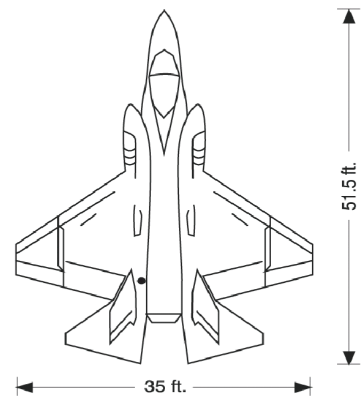
- Mission: strike
- Vertical/short takeoff/landing
- Non-stealthy
- Maximum airspeed: high subsonic
- Combat radius: 450 nm
- Ordnance: 9,000 pounds
- Crew: 1 pilot

F/A-18A/C/D Hornet
Year Entered Fleet: 1983



- Mission: fighter/attack
- Conventional takeoff/landing
- Non-stealthy
- Maximum airspeed: high subsonic to supersonic
- Combat radius:
  - Threshold: approximately 400 nm
  - Objective: approximately 575 nm
- Ordnance: 13,700 pounds
- Crew: 1 or 2 pilots depending on aircraft model

F-35B Joint Strike Fighter
To Enter Fleet: 2012



- Mission: fighter/attack
- Vertical/short takeoff/landing
- Advanced stealth capabilities
- Maximum airspeed: high subsonic to supersonic
- Combat radius:
  - Threshold: approximately 450 nm
  - Objective: approximately 550 nm
- Ordnance: 18,000 pounds
- Crew: 1 pilot

Note:
Subsonic: Below Mach 1.0 (761.5 miles per hour at sea level)
Supersonic: Greater than Mach 1.0

Aircraft renditions are proportional to each other in scale

Advantages of F-35B

- ***Operational Capacity.*** Achieve a top speed of approximately 1,200 miles per hour, fly at altitudes of more than 50,000 feet (ft) above mean sea level, and reduce dependence on aerial refueling with a combat radius of 450 - 550 nautical miles (nm).
- ***Stealth.*** Incorporates stealth technology and an internal weapons bay, and presents a minimized radar signature that reduces radar threats and enhances survivability.
- ***Ordnance.*** Employs a wide variety of munitions, including the Joint Direct Attack Munitions.
- ***Avionics.*** Uses data links, satellite communications, and a broad suite of next-generation sensors, radars, and targeting systems to provide exceptional target identification, tracking, and weapons-delivery accuracy.
- ***Affordability.*** Requires dramatically less logistical support to operate and deploy anywhere in the world, thereby reducing costs by 20 to 30 percent.

F35BE-058-092110

Figure 1-1 AV-8B, F/A-18, and F-35B Comparison

When preparing an EIS, the Marine Corps 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 Marine Corps 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. Public 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 of 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 may be supported by detailed technical studies, including noise, air quality, and socioeconomic analyses that are summarized in the Draft EIS.
- **Draft EIS Notice of Availability (NOA) and Notice of Public Meeting (NOPM).** A formal notice, placed in the *Federal Register* by the U.S. Environmental Protection Agency (USEPA), announces that the Draft EIS is available for review by the public and Federal, State and local agencies. Following the NOA, the Marine Corps announces the dates, times, and locations of the public meetings in the *Federal Register* as well. Both the NOA and NOPM announcements are also published in local newspapers.
- **Public Comment Period.** Federal, State, and local agencies and members of the public are invited to provide comments on the Draft EIS. Public meetings are held to provide an opportunity for members of the public to comment on the Draft EIS. Oral comments recorded by a stenographer, written comments, and those submitted through the project website are also accepted throughout this 45-day period.
- **Final EIS.** The Final EIS documents the comments received on the Draft EIS and includes a response to all relevant comments. Responses may include modifying or developing new alternatives to the Proposed Action; supplementing, improving, or modifying the analyses; and factual corrections. As a result, portions of the EIS have been updated due to public comment, as well as new information.
- **Final EIS NOA.** A formal notice placed in the *Federal Register* by the USEPA and advertisements run in local newspapers to announce that the Final EIS is available for public review.

- **Record of Decision (ROD).** A formal ROD, reached on the Proposed Action by the Assistant Secretary of the Navy (Energy, Installations, and Environment), or his/her designee, is published in the *Federal Register.* A notice of ROD availability is also announced in local newspapers.

1.3.2 Scoping Process

The public scoping period for this EIS began on January 15, 2009 with publication of the NOI in the *Federal Register* (USMC 2009a). During the week of January 19, 2009, notification letters were mailed to Federal, State, and local agencies; elected officials; non-governmental organizations; and interested individuals (Appendix A provides a copy of the NOI, a sample notification letter, and notification mailing list). Newspaper advertisements announcing the intent to prepare an EIS and hold public scoping meetings were published in several local daily and weekly newspapers. These advertisements were run in the weeks preceding each of the scheduled public scoping meetings.

Six public scoping meetings were held between February 3, 2009 and February 12, 2009 in communities potentially affected by aircraft operations in North Carolina, South Carolina, and Georgia. A total of 450 people attended the meetings and the Marine Corps received 287 written comments. There were 170 comments entered on the project website (www.usmcJSFeast.com), 92 written comments received at the scoping meetings, and 25 comments submitted through the mail during the 30-day scoping period. A majority of the comments expressed support for the proposal. Issues and concerns included noise, impacts to property values, aircraft safety, and potential effects to the quality of life due to aircraft operations. These concerns, as well as other issues, were considered during the development of this EIS.

1.3.3 Public Comment Period

The public comment period began on May 28, 2010 with the official NOA published in the *Federal Register*; a NOPM ran in the *Federal Register* on May 26, 2010. The Draft EIS was circulated for review and comment to government agencies, local organizations, American Indian tribes, interested private citizens, and public libraries between May 28 and July 12, 2010 (Appendix A). The Draft EIS was also available for general review on the project website at http://www.usmcjsfeast.com.

The public meeting notice supplied the dates, times, and locations of the five public meetings held in North Carolina, South Carolina, and Georgia. The 45-day public comment period ended on July 12, 2010 and included three public meetings held in North Carolina from June 15 through 17, 2010; a meeting held on June 22, 2010 in Beaufort, SC; and one in Ludowici, Georgia (GA) on June 24, 2010. Over 1,065 people attended these five meetings, at which 332 written comments were received and 48 oral comments given to the on-site stenographers. In addition, 651 comments were submitted electronically via the project website, and 236 comments were mailed through the U.S. Postal Service.

All comments are available on the project website, http://www.usmcjsfeast.com, are included on a CD with each copy of the Final EIS, and form part of the project record. Comments received were reviewed and reflected, as appropriate, in this Final EIS, with responses to all substantial comments published in Volume II, Appendix I of this Final EIS. Where necessary, portions of the Final EIS have been updated based on comments received during the public comment period, including factual corrections, additions to existing information, and improvements or modifications to the analyses presented in the Draft EIS. The majority of comments supported basing the F-35B at MCAS Beaufort and MCAS Cherry Point. There were, however, recurrent comments regarding the preferred alternative, noise, construction/basing timeline, requesting development of an Auxiliary Landing Field, environmental justice, PTC pilot operations, socioeconomics, utilities and infrastructure, air emissions, community services, biological resources, and safety.

1.3.4 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 is being incorporated by reference. If any of these actions have the potential to introduce cumulative impacts, they are addressed in Chapter 7.

- EIS, West Coast Basing of the U.S. Marine Corps JSF F-35B. Draft published May 2010.
- EIS, Nationwide Homebasing of Navy F-35C Aircraft. On-going.
- EIS, U.S. Air Force, Air Combat Command (ACC), F-35A Operational Basing. On-going.
- EIS, U.S. Air Force, Air Education and Training Command, Beddown of Training F-35A Aircraft. On-going.
- EIS, Marine Corps Grow the Force Initiative at Marine Corps Base (MCB) Camp Lejeune, MCAS New River, and MCAS Cherry Point, NC. Marine Corps Installations East, MCB Camp Lejeune. ROD signed January 22, 2010.
- EIS/Overseas EIS (OEIS), Navy Undersea Warfare Training Range. ROD signed July 31, 2009.
- EIS/OEIS, Navy Cherry Point Range Complex. ROD signed June 8, 2009.
- EIS/OEIS, Jacksonville Range Complex. ROD signed June 8, 2009.
- Environmental Assessment (EA), MCB Camp Lejeune/MCAS New River Range Operations, Onslow and Jones Counties, NC. Finding of No Significant Impact (FONSI) signed February 13, 2009.
- EA, MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, NC. FONSI signed February 11, 2009.
- EIS/OEIS, Atlantic Fleet Active Sonar Training. ROD signed January 23, 2009.
- EA, Temporary Basing of an Interim PTC for F-35B, MCAS Yuma, Arizona. FONSI signed September 10, 2009.

- EA, U.S. Marine Corps and U.S. Navy Operations at Townsend Bombing Range (TBR), GA. FONSI signed October 3, 2008.

1.3.5 Other Relevant Environmental Documents

The following environmental documents are relevant to the basing of the F-35B, but are not directly connected to the Proposed Action.

- Supplemental EIS to the Final EIS for the Implementation of the Base Realignment and Closure (BRAC) 2005 Decisions and Related Actions at Eglin Air Force Base (AFB), Florida (FL). On-going.
- EIS, F-35A Force Development Evaluation Program and a Weapons School at Nellis AFB, Nevada. On-going.
- EIS, Proposed Implementation of the BRAC 2005 Decisions and Related Actions at Eglin AFB, FL. ROD signed February 5, 2009.
- EA/Overseas EA (OEA), F-35 JSF Initial Operational Test and Evaluation at Edwards AFB, California. FONSI signed October 1, 2009.
- EA, Proposed Military Operations Areas in Eastern North Carolina. MCAS Cherry Point, Havelock, NC. June 2003. Written reevaluation prepared in 2007 with Federal Aviation Administration. FONSI signed January 29, 2008.
- EA, Training Facility Improvements at Marine Corps Outlying Landing Field Atlantic. FONSI signed June 27, 2007.
- EA, Combat Vehicle Operators Training Course, MCAS Cherry Point, NC. FONSI signed June 21, 2007.
- EA, Construction and Operation of Digital Airport Surveillance Radar in Eastern North Carolina. Joint FONSI signed April 25, 2007 and May 3, 2007.
- EA, Bombing Target-11 Target Improvements. FONSI signed February 27, 2007.
- EA/OEA, JSF System Development and Demonstration Developmental Test Program. FONSI signed January 2007.
- EA, BRAC A/OA-10 Beddown at Moody AFB, GA. ACC, Langley AFB, Virginia (VA). FONSI signed September 12, 2006.
- EA, Modifications to Gamecock Alpha Military Operations, Pope AFB, NC. ACC, Langley AFB, VA. FONSI signed June 19, 2006.
- Supplemental EA, Proposed Coastal Airspace Complex, Georgia Air National Guard (ANG). FONSI signed December 20, 2005.
- EIS, Bogue Inlet Channel Erosion Response Project, Carteret and Onslow Counties, NC. ROD signed September 15, 2004.

- EIS, Introduction of F/A-18E/F (Super Hornet) Aircraft to the East Coast of the U.S. ROD signed September 4, 2003.
- EIS, Introduction of the V-22 to the 2nd MAW in Eastern North Carolina. ROD signed December 22, 1999.
- EIS, Proposed Wing Conversion and Airspace Modification, Georgia ANG. Andrews AFB, Maryland. ROD signed January 3, 1996.

1.4 Lead and Cooperating Agencies

The Marine Corps is the action proponent for the East Coast F-35B basing proposal and is the lead agency for the preparation of this EIS. The Air Force is a cooperating agency; as defined in 40 CFR section 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 Air Force was invited to cooperate because it has responsibility, along with the ANG, for managing and scheduling a portion of training airspace and ranges (e.g., TBR, GA) proposed for use in East Coast F-35B training. Appendix B presents the relevant correspondence exchanged between the Marine Corps and Air Force.

1.5 Relevant Statutes, Executive Orders, and Permits

In accordance with CEQ NEPA regulations (40 CFR Parts 1500-1508), the Marine Corps has prepared this EIS concurrently with environmental impact analyses and related surveys and studies required by the Fish and Wildlife Coordination Act (16 U.S. Code [USC] 661 *et seq*.), the National Historic Preservation Act (NHPA) of 1966 (16 USC 470 *et seq*.), the Endangered Species Act (ESA) of 1973 (16 USC 1531 *et seq*.), and other environmental laws, regulations, and Executive Orders (EOs) outlined by environmental resource in Table 1-1.

Table 1-1 Major Federal Environmental Statutes, Regulations, and Executive Orders Applicable to Federal Projects

Environmental Resources	Statute, Regulation, or Executive Order
Air Quality	Clean Air Act of 1970 (Public Law [PL] 95-95), as amended in 1977 and 1990 (PL 91-604); USEPA, Subchapter C-Air Programs (40 CFR Parts 52-99); and 40 CFR Part 63, National Emissions Standards for Hazardous Air Pollutants.
Noise	Noise Control Act of 1972 (PL 92-574) and Amendments of 1978 (PL 95-609); and USEPA, Subchapter G, Noise Abatement Programs (40 CFR Parts 201-211).
Geology and Soils	National Pollutant Discharge Elimination System (NPDES) Construction Activity General Permit (40 CFR Parts 122-124).
Water Resources	Federal Water Pollution Control Act of 1972 (PL 92-500) and Amendments; Clean Water Act (CWA) of 1977 (PL 95-217); NPDES Construction Activity General Permit (40 CFR Parts 122-124); NPDES Industrial Permit and NPDES Municipal Separate Storm Sewer System Permit; CWA 40 CFR 112 Spill Prevention Control and Countermeasure; USEPA, Subchapter D-Water Programs (40 CFR Parts 100-145); Water Quality Act of 1987 (PL 100-4); USEPA, Subchapter N-Effluent Guidelines and Standards (40 CFR Parts 401-471); Safe Drinking Water Act of 1972 (PL 95-923) and Amendments of 1986 (PL 99-339); and USEPA, National Drinking Water Regulations and Underground Injection Control Program (40 CFR Parts 141-149).
Biological Resources	Migratory Bird Treaty Act of 1918; Fish and Wildlife Coordination Act of 1958 (PL 85-654); Sikes Act of 1960 (PL 86-97) and Amendments of 1986 (PL 99-561) and 1997 (PL 105-85 Title XXIX); ESA of 1973 (PL 93-205) and Amendments of 1988 (PL 100-478); Fish and Wildlife Conservation Act of 1980 (PL 96-366); Lacey Act Amendments of 1981 (PL 97-79); and Responsibilities of Federal Agencies to Protect Migratory Birds (EO 13186).
Wetlands and Floodplains	Section 401 and 404 of the Federal Water Pollution Control Act of 1972 (PL 92-500); USEPA, Subchapter D, Water Programs 40 CFR Parts 100-149 (105 ref); Floodplain Management-1977 (EO 11988); Protection of Wetlands-1977 (EO 11990); Emergency Wetlands Resources Act of 1986 (PL 99-645); and North American Wetlands Conservation Act of 1989 (PL 101-233).
Cultural Resources	NHPA (16 USC 470 *et seq.*) (PL 89-865) as amended; Protection and Enhancement of the Cultural Environment-1971 (EO 11593); Indian Sacred Sites-1966 (EO 13007); American Indian Religious Freedom Act of 1978 (PL 94-341); Antiquities Act of 1906; American Indian Religious Freedom Act of 1979 (PL 96-95); Native American Graves Protection and Repatriation Act of 1990 (PL 101-601); Protection of Historic Properties (36 CFR 800); Preserve America (EO 13287); and Archeological Resources Protection Act (PL 96-95; 16 USC 470).
Hazardous and Toxic Substances and Waste	Resource Conservation and Recovery Act of 1976 (PL 94-5800), as Amended by PL 100-582; USEPA, subchapter I-Solid Wastes (40 CFR Parts 240-280); Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 USC 9601) (PL 96-510); Toxic Substances Control Act (PL 94-496); USEPA, Subchapter R-Toxic Substances Control Act (40 CFR Parts 702-799); Federal Insecticide, Fungicide, and Rodenticide Control Act (40 CFR Parts 162-180); Emergency Planning and Community Right-to-Know Act (40 CFR Parts 300-399); Federal Compliance with Pollution Control Standards-1978 (EO 12088), Superfund Implementation (EO 12580); Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition (EO 13101); Greening the Government Through Efficient Energy Management (EO 13123); and Greening the Government Through Leadership in Environmental Management (EO 13148).
Socioeconomics	Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898); and Protection of Children from Environmental Health Risks and Safety Risks (EO 13045).

1.6 Organization of this EIS

In Volume I, the Executive Summary provides a summary of the basing proposal and alternatives. It also presents the potential environmental impacts related to each action alternative and the No Action Alternative, and where applicable, includes proposed mitigation measures. Chapter 1 provides the purpose of and need for the Proposed Action and discusses the public involvement and scoping process. Chapter 2 describes the Proposed Action and alternatives, including a detailed discussion of the alternatives development process. In Chapter 3, definitions of the resources being analyzed as part of the EIS are presented. Environmental impacts of the alternatives are assessed for each Air Station in Chapter 4 (MCAS Beaufort) and Chapter 5 (MCAS Cherry Point); potential impacts to ranges and airspace, and Marine Corps Auxiliary Landing Field Bogue are presented in Chapter 6. Chapter 7 provides an analysis of cumulative impacts; Chapter 8 covers other NEPA considerations; Chapter 9 lists the preparers and contributors of this document; and Chapter 10 provides the references cited and personal communications with subject matter experts.

The Appendices (Volume II) provide supplemental information. Appendix A provides a copy of the Notice of Intent, agency correspondence, and the mailing list. Appendix B provides cooperating agency correspondence. Appendix C presents the analytical methodology for all resources. Appendix D includes a background on noise, and the data used in modeling and the results. Appendix E presents air quality modeling calculations and results. Appendix F outlines the socioeconomic modeling results. Appendix G provides a copy of the Coastal Consistency Determinations for MCAS Beaufort and MCAS Cherry Point. Acronyms, abbreviations, and a glossary of terms are found in Appendix H.

Appendix I contains copies of all the comments received during the official period (May 28 through July 12, 2010). These comments were numbered, relevant issues bracketed, and a matrix provided to record Marine Corps responses to the relevant comments. Changes to this Final EIS were based on comments received during the public comment period and include factual corrections, additions to existing information, and improvements or modifications to the analyses presented in the Draft EIS. None of the changes between the Draft EIS and Final EIS resulted in substantive changes to the Proposed Action, alternatives, or the associated environmental consequences of the Proposed Action. More information on how to find comments and how they were categorized is detailed in Appendix I.

1.7 Clarifications and Changes to the EIS

Public and agency comments on the Draft EIS revealed the need to clarify or enhance certain information on a few topics in the Final EIS. These clarifications and enhancements merely improved the accuracy and thoroughness of the analysis presented in the Draft EIS, but did not alter any conclusions regarding the nature or magnitude of impacts on any resources. In addition, changes to Military Construction projects, military personnel numbers, and relocation of the Amphibious Assault Ship

(LHD/LHA) Training Facility at MCAS Beaufort have been made, as well as minor editorial and typographical corrections. Changes and clarifications presented in the Final EIS include the following:

- Information on public comment meetings and the public comment period has been added in Section 1.3.3 and Appendix I.
- Additional Military Construction projects were added to Sections 2.3.2.3 and 2.3.3.3. Subsequent air quality modeling, socioeconomic analysis, and solid waste analysis were completed. Please refer to Sections 4.4.2/5.4.2, 4.8.2/5.8.2, and 4.11.2/5.11.2, respectively.
- Additional military personnel were added to Sections 2.3.2.2, 2.3.2.3. Specifically, the EIS reflects the addition of 78 pilots associated with the Pilot Training Center (PTC) per year, with 66 PTC pilots on the Air Station at any given time. Subsequent analysis was completed for socioeconomics, community services, utilities and infrastructure, transportation and ground traffic. Please refer to Sections 4.8.2/5.8.2, 4.10.2/5.10.2, 4.11.2/5.11.2, and 4.12.2/5.12.2, respectively.
- The LHD/LHA Training Facility was relocated at MCAS Beaufort. Subsequent analysis was completed for noise, safety, land use, environmental justice/protection of children, water resources, and coastal zone management. Please refer to Sections 4.3.2, 4.6.2, 4.7.2, 4.9.2, 4.15.2, and 4.17.2, respectively.
- A Coastal Consistency Determination was sent to the South Carolina Department of Health and Environmental Control, Office of Ocean and Coastal Resource Management for concurrence on July 23, 2010. A Negative Determination was sent to the North Carolina Department of Environment and Natural Resources on August 10, 2010. The results of these consultations are included in Section 4.17.2, Section 5.17.2, and Appendix G.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

The Marine Corps proposes to base and operate 13 squadrons of F-35B aircraft on the East Coast of the United States (U.S.). The F-35B is a next generation, stealth, supersonic, multi-role fighter aircraft that would replace legacy Marine Corps air fleets of F/A-18s and AV-8Bs. Specifically, the proposal would base and operate up to 11 F-35B operational squadrons (which includes one Reserve squadron) with up to 16 aircraft per squadron and a Pilot Training Center (PTC) (composed of two Fleet Replacement Squadrons [FRSs]) with up to 20 aircraft per squadron. The Proposed Action involves the following:

- Replacing seven operational F/A-18 squadrons and four AV-8B legacy aircraft squadrons (three operational squadrons and one FRS) with the F-35B;
- Establishing a PTC with two F-35B FRSs;
- Conducting training to meet the requirements in the F-35B operational and PTC manuals;
- Transitioning associated military personnel; and
- Constructing and demolishing facilities and infrastructure needed to base and operate both the operational F-35B squadrons and PTC.

2.2 Alternatives Identification Process

This section describes the process used to develop alternatives to achieve the purpose and need for replacing legacy F/A-18 and AV-8B aircraft on the East Coast with the F-35B. A primary consideration of this process is to ensure the transition to the F-35B proceeds in a manner that effectively maintains the existing combat capability and mission readiness of Marine Corps aviation. With a goal of identifying feasible alternative basing locations to fulfill the purpose and need for the Proposed Action, the Marine Corps first examined all the requirements for basing the F-35B. Using requirements such as training, infrastructure, and airspace needs, the Marine Corps evaluated candidate basing alternatives relative to the following considerations:

- proximity and access to operational training ranges and airspace (consistent with the Radius Study) to permit F-35B aircraft to complete combat and training missions without refueling (USMC 2008b); and
- mission compatibility to support the Marine Corps command and control organizational structure, as well as sufficient capacity in the airfield environment (i.e., infrastructure such as airfields, associated airspace, and/or land) to support the F-35B basing.

2.2.1 Considerations and Evaluation Process

Using the considerations and evaluation process, the Marine Corps initially identified and assessed candidate basing alternatives. Then, employing a narrowing approach, the process arrived at reasonable alternatives for basing the F-35B. As described below, each of the considerations addresses different elements of the purpose and need.

2.2.1.1 Proximity and Access to Airspace and Training Ranges

To ensure mission readiness, the Marine Corps needs its aviation units to conduct required training at appropriate ranges and airspace. Both the proximity of and the access to the ranges and airspace are important factors in identifying basing locations for the F-35B (per the Radius Study, USMC 2008b). Of equal importance, the ranges and airspace must provide the capacity for the F-35B to conduct all required functions and missions assigned to Marine Corps aviation, including:

- ***Offensive Air Support:*** air operations that deliver firepower against enemy ground forces for the destruction or neutralization of installations, equipment, and personnel.
- ***Anti-Air Warfare:*** air operations required to destroy, or reduce to an acceptable level, the enemy air and missile threat.
- ***Electronic Warfare:*** military actions involving the use of electromagnetic energy to determine, exploit, reduce, or prevent hostile use of the electromagnetic spectrum and actions which retain friendly use of the electromagnetic spectrum.
- ***Aerial Reconnaissance:*** the acquisition of intelligence information employing visual observation and/or sensors in air vehicles.
- ***Control of Aircraft and Missiles:*** the synthesis of a multitude of tasks that integrates the other functions of Marine Corps aviation, allows them to be conducted simultaneously, and provides the command-and-control interface with the other elements of Marine Corps forces.

Currently, legacy F/A-18 and AV-8B aircraft perform these same five functions and operate out of East Coast bases that provide access to air-to-air, air-to-ground, and close-air-support (CAS) ranges and airspace. The proximity of these bases to training areas permits the aviators to train efficiently and effectively maximizing time in transit. The East Coast F-35B squadrons would need the same type of access to specific training areas, airspace, and ranges located in proximity to the basing location or locations. Although not yet fully developed, the preliminary training and readiness program for the F-35B will include a variety of training activities and specific events designed to hone the aviator's skills in every aspect of these missions. Certain types of training require a higher frequency of operations than others, and some ranges and/or airspace can be utilized to meet multiple training mission requirements.

Thus, the basing of F-35B operational squadrons must ensure proximity and access to ranges and airspace that enable high utilization in fulfilling multiple required training events.

Accessible airspace designed and prioritized to support other missions, Department of Defense (DoD) or otherwise, cannot ensure that F-35B units within range will be able to meet their training and readiness requirements. In identifying these ranges and airspace units, the process needed to simultaneously consider the maximum distance from a base to ranges and the ability of those ranges to support multiple types of training. To determine the maximum distance that a basing alternative should be located from the major training areas that would be used by the East Coast F-35B squadrons, the Marine Corps conducted a *Training Range to Homebase Radius Study* (hereinafter Radius Study) (USMC 2008b).

In the Radius Study, the maximum distance from a base to the major training areas was determined to be the distance the F-35B aircraft could travel to a training range, complete an approximate 40-minute training mission, and return to the base without refueling. A 40-minute training mission would provide pilots with sufficient time to perform one or more training requirements from the Training and Readiness Manual at a range or in the airspace. The Marine Corps created representative mission profiles, which described the aircraft configuration (e.g., external ordnance or no external ordnance), airspeed, altitude, and the flight activities (e.g., start/taxi/takeoff, climb to altitude, activity on the training range, and landing) and associated fuel usage for each mission. These missions fall into three major categories: air-to-air, air-to-ground, and CAS. The fuel remaining in the aircraft after accounting for the activities to perform the mission equated to the fuel available for transit between the range and base plus a requisite emergency reserve. Assuming use of approved flight routes and procedures, and transit under no-wind conditions, the Marine Corps calculated the maximum distance an air station could be from the training areas to support each type of mission (Table 2-1). This calculation accounted for differences in flight routes among mission types, effects of weapons and fuel loads, and variation in arrival and departure procedures.

The Radius Study yielded the following conclusions:

- The maximum distances to CAS and air-to-air training areas are the limiting factor in defining the search region for basing alternatives. The CAS mission type requires the greatest fuel consumption rate and allows for the shortest round trip transit.
- Air-to-ground training cannot discriminate a basing location since air-to-ground training requires expenditure of the least amount of fuel. In addition, most complexes supporting air-to-ground training also offer CAS training, which has the highest fuel expenditure.
- For scheduling flexibility and training range availability, access to more than one training range per mission type offers added operational benefits.

Table 2-1 F-35B Fuel Usage and Maximum Transit Distance

Flight Activity	Fuel Usage (pounds [lbs])		
	Air-to-Air	Air-to-Ground	CAS
Start/taxi/takeoff	1,116	1,116	1,116
Climb to altitude	961	1,019	936
Activity on range	5,614	4,384	4,734
Approach/landing	980	982	1,024
Emergency reserve	2,000	2,000	2,000
Total Fuel Usage for Mission Profile	**10,671**	**9,501**	**9,810**
SUMMARY ANALYSIS			
Total Fuel in Aircraft (lbs)	14,031	14,031	14,031
Total Fuel Remaining for Transit (lbs)	3,360	4,530	4,221
Fuel Consumption Rate (lbs per nautical mile [nm])	11.31	11.42	14.83
Fuel Available for Round-Trip Transit (nm)	297	396	284
Maximum Distance from Air Station to Training Area (nm)	**149**	**198**	**142**

Sources: USMC 2008b, 2008c.

Based on the need to train for the CAS mission, the Marine Corps defined the maximum allowable one-way unrefueled distance to ranges as 142 nm. This distance was increased to 150 nm to allow for variations in departure and arrival procedures from a base (USMC 2008b).

In the next step of the Radius Study, the Marine Corps considered five major training complexes, as identified by the 2d Marine Aircraft Wing (MAW), in the region and their attributes. Evaluation of attributes focused on the ability of the ranges to provide training in all three categories. Table 2-2 summarizes the results of this evaluation and identifies five range complexes.

Table 2-2 Major Training Ranges and Capabilities

Range	Air-to-Air	Air-to-Ground	CAS
Bombing Target 9 (BT-9), BT-11, and associated Restricted Area (R-) 5306A	No	Yes	Yes
Navy Dare County Range and R-5314	No	Yes	Yes
Marine Corps Base (MCB) Camp Lejeune Target Area and R-5306D	No	Yes	Yes
Townsend Bombing Range (TBR) and R-3007	No	Yes	Yes
Warning Areas (W-) 72, 122, 134, 157, 158, 159, 161, 177	Yes	No	No

Source: USMC 2008b.

After this range identification exercise, the Radius Study identified the 150-nm radii around the three different types of ranges. Air-to-air ranges had 150-nm blue circles drawn around them while air-to-ground and CAS ranges had 150-nm red circles drawn around them (Figure 2-1) (USMC 2008b). To be considered a candidate base, each potential candidate basing location must lie within at least one red and one blue radius circle. As the results demonstrate (Table 2-3), 13 candidate sites were identified.

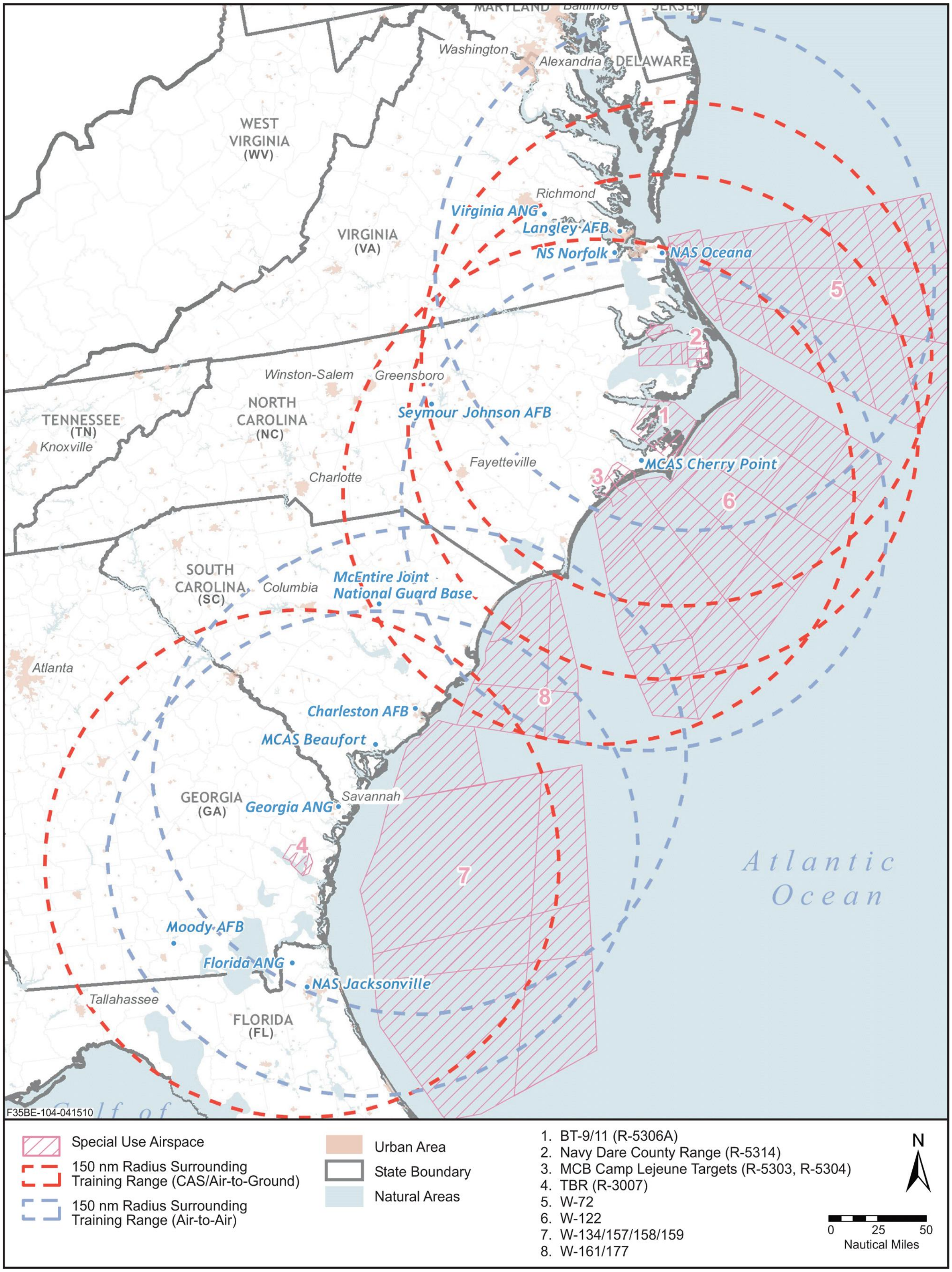


Figure 2-1 East Coast Candidate Bases for F-35B Based on Radius Study

Table 2-3 Candidate Sites for Basing the Marine Corps F-35B

Candidate Locations	Within 150 nm of Ranges and Airspace with CAS and Air-to-Air Capabilities
Marine Corps Air Station (MCAS) Cherry Point, Havelock, North Carolina (NC)	Yes
MCAS Beaufort, Beaufort, South Carolina (SC)	Yes
Seymour Johnson Air Force Base (AFB), NC	Yes
Naval Air Station (NAS) Oceana, Virginia Beach, Virginia (VA)	Yes
Naval Station (NS) Norfolk, Norfolk, VA	Yes
Langley AFB, Hampton, VA	Yes
Virginia Air National Guard (ANG) at Richmond International Airport, VA	Yes
NAS Jacksonville, Florida (FL)	Yes
McEntire Joint National Guard Base (JNGB), Eastover, SC	Yes
Charleston AFB at Charleston International Airport, Charleston, SC	Yes
Georgia ANG Base at Savannah/Hilton Head International Airport, Georgia (GA)	Yes
Moody AFB, Valdosta, GA	Yes
Florida ANG at Jacksonville International Airport, FL*	Yes

Source: USMC 2008b.
Note: *Added following completion of the Radius Study.

2.2.1.2 Mission Compatibility and Sufficient Capacity

Mission Compatibility

The Marine Corps is assigned the unique defense mission of being able to field, on short notice, a self-sufficient air and ground combat force trained to fight as an integrated team, under a single command of the Marine Air Ground Task Force (MAGTF). The MAGTF is the fundamental organizational structure upon which the operational effectiveness of the Marine Corps is founded and consists of four elements: 1) a Command Element, 2) an Aviation Combat Element, 3) a Ground Combat Element, and 4) a Logistics Combat Element. As stated in *Installations 2020*, Marine Corps installations are located to support the maximum integration of the MAGTF elements, grouped around the Marine Expeditionary Force, and centered on the major ground bases, training ranges, and maneuver areas (USMC 2001). The ability to train as a MAGTF represents a fundamental requirement of Marine Corps readiness, providing the operational and tactical synergy to produce a flexible, effective, and feared force on the battlefield (USMC 2008b).

Proximity to other MAGTF elements enhances F-35B integration for ongoing mission assignments and deployments. Integration with other components of the existing command and organizational structure ensures mission capable status during the transition. The MAGTF must be ready to deploy during the F-35B transition period and seamlessly integrate these new aircraft into the deployment rotation cycle.

Since the Marine Corps would need to maintain a mix of F/A-18, AV-8B, and F-35B squadrons on the East Coast during this transition period, utilizing existing command and organizational structure enhances efficiencies by providing continuity in personnel, management, logistics, and institutional knowledge. The Marine Air Group (MAG) Headquarters, Marine Aviation Logistics Squadrons (MALS), Marine Wing Support Squadrons (MWSS), and Headquarters and Headquarters Service Squadrons are the backbone to supporting flight operations at the air station level.

Without these organic supporting strengths, the squadron is a singular unit that is very reliant on external support or augmentation from the parent MAG to maintain its readiness. For example, whenever a MAG is deployed the MALS goes with it as an integrated warfighting unit. If an aircraft squadron is based where there is no associated MAG and MALS support, there would be the need to set up new maintenance and supply support that an existing MALS provides. Locating an aircraft squadron at a location without MAG support would not meet the need of effectively integrating within the existing command and control structure.

The other, smaller (in size), but no less critical element is the Marine Air Command and Control detachments that are co-located with each MAG Headquarters. These detachments are the link into the MAGTF command and control structure that enable the MAGTF commander to control his units and serve as the link between the Air and Ground fight.

Sufficient Capacity

Infrastructure Capacity. Note worthy basing sites would have existing infrastructure compatible with the proposed F-35B mission and operations. Prior rounds of Base Realignment and Closure (BRAC) decisions consolidated units to maintain groupings of “like-aircraft” (as is the case at Joint Base Charleston) in order to foster synergistic readiness support. Aircraft with similar missions or support requirements were realigned at single sites to increase maintenance efficiencies and improve overall military value. As a result of these prior BRAC decisions, today, air stations supporting non-conventional fighter jet basing and training offer many of the facilities that can be reutilized to support the F-35B. Utilizing existing infrastructure to the extent feasible provides for a more efficient and effective transition of the F/A-18 and AV-8B squadrons to the F-35B. Use of such existing facilities also is consistent with the overall policy of the DoD and the Marine Corps regarding installation management and support, as outlined in documents such as the *Defense Installations Strategic Plan* (DoD 2007) and the Marine Corps *Installations 2020* (USMC 2001).

In meeting the needs of the Proposed Action, basing should also improve supportability by consolidating logistics activities at fewer locations, thereby reducing costs and time for maintenance and the new F-35B security requirements. Although new construction would be required to support the F-35B at any proposed location, installations offering many existing facilities, such as fueling areas, runways, and parking aprons already provide a distinct advantage for basing. In particular, installations already supporting non-conventional fighter jets with their operations and support facilities, aligned to efficiently support fighter jet requirements, would need less development and construction than other air stations supporting other missions. Therefore, this evaluation considered each installation in relation to its ability to meet operational capabilities, current aircraft inventory and mission, the effect of the mission on infrastructure, and the potential operational disruption resulting from the degree of necessary infrastructure changes to support the Marine Corps non-conventional fighter jet mission.

Nominal Airfield and Airspace Constraints. A facility should have minimal airfield and airspace constraints in order to ensure the F-35B operational squadrons and the PTC can meet the requirements of their training and readiness manuals without negatively impacting their combat readiness or quality of life. The ultimate goal of Marine Aviation is to attain the highest possible combat readiness to support the MAGTF, while at the same time preserving and conserving our Marines and equipment. Training and readiness manuals represent the collaborative effort of subject matter experts. They design training standards to maximize the full combat capabilities of the aircraft and its crew in order so that they are ready, relevant, and fully capable of supporting the MAGTF commander. Airfield and overlying airspace constraints, such as airfield delay and congestion, pattern demand, and airspace delay and congestion, hinder a crews' ability to meet the training requirements set forth in their training and readiness manuals and negatively impact their combat readiness. Airfield and overlying airspace constraints also result in an impact to an individual Marine's quality of life by increasing the amount of time, beyond the nominal, to complete the requirements in the training and readiness manuals.

Airfield Compatibility. The Marine Corps could not maintain expected mission readiness if required to continuously alter normal flight requirements to accommodate compatibility concerns. Concentrated conventional fighter jet operations are largely incompatible with F-35B short takeoff and vertical landing (STOVL) non-conventional fighter jet operations. Conventional fighter jets (such as the F-15, F-16, and F-22) operate throughout the tower and radar patterns at speeds exceeding STOVL fighter jets (such as the AV-8B and F-35B) speeds by 50 to 60 knots. Faster aircraft also require increased turning radii. While this disparity can be overcome in small numbers, locating the proposed number of F-35B aircraft with squadrons of F-15, F-16, and/or F-22 aircraft would unacceptably constrain all air operations. When a faster aircraft is following a slower aircraft, every pattern spacing decision must be increased to ensure appropriate runway spacing at the time the second aircraft reaches the runway. This gives the slower aircraft time to fly the full pattern, use the runway, and exit or fly upwind and turn out of the way. The sizes of tower and radar patterns would increase their normal size and reduce the number of aircraft the Control Tower and/or Radar Controller may permit to enter at any given time. Controlling a pattern full of faster and slower aircraft would lead to confusion and operational hazards. To compensate, departure delays would be increased and touch and go operations would be limited (tower and radar). Combining conventional fighter jet operations with STOVL operations would increase sequencing complexity, create higher probability of wave offs and delays, extend tower and radar pattern lengths, and decrease the expectation for all aircraft to successfully complete a given training day.

2.2.2 Alternatives Not Carried Forward for Further Detailed Analysis

As a result of the evaluations, 11 candidate bases did not meet all considerations to be carried forward for further analysis (Table 2-4).

Table 2-4 Comparison of F-35B Basing Requirements to Candidate Base for the F-35B

Candidate Basing Locations	Proximity and Access to Airspace and Training Ranges	Mission Compatibility/Sufficient Capacity		
		Potential Infrastructure Capacity	*Nominal Airfield and Airspace Constraints*	*Airfield Compatibility*
Seymour Johnson AFB, NC	Yes	Yes	No	No
NAS Oceana, Virginia Beach, VA	Yes	No	No	Yes
NS Norfolk, Norfolk, VA	Yes	No	No	No
Langley AFB, Hampton, VA	Yes	No	No	No
Virginia ANG at Richmond International Airport, VA	Yes	Yes	No	No
McEntire JNGB, Eastover, SC	Yes	Yes	No	No
Charleston AFB at Charleston International Airport, SC	Yes	No	No	No
Moody AFB, Valdosta, GA	Yes	No	No	No
Georgia ANG Base at Savannah/Hilton Head International Airport, GA	Yes	No	No	No
NAS Jacksonville, FL	Yes	No	No	No
Florida ANG at Jacksonville International Airport, FL*	Yes	Yes	No	No

Source: USMC 2008b.
Note: *Added following completion of the Radius Study.

Seymour Johnson AFB, NC

Seymour Johnson AFB comprises 3,200 acres in Goldsboro, NC. It is home to the 4th Fighter Wing under command and control of the U.S. Air Force's Air Combat Command (ACC). The 4th Fighter Wing flies the multi-role, all-weather F-15E at the single runway. The Air Force Reserve's 916th Air Refueling Wing (flying KC-135Rs) is also a tenant at the base (Air Force 2010). Seymour Johnson AFB has insufficient capacity due to the airfield incompatibility caused by the current conventional aircraft based at this location.

NAS Oceana, VA

NAS Oceana occupies 5,783 acres within the limits of Virginia Beach, VA. Approximately, 10,000 military and civilian personnel are stationed at or employed by the Air Station. NAS Oceana is home to nine Navy F/A-18C/D fleet squadrons (139 aircraft) and nine Navy F/A-18E/F Super Hornet squadrons (160 aircraft), including an FRS. Additionally, one F/A-18 adversary squadron, four C-9 Skytrain aircraft, and six T-34 trainer aircraft are based at NAS Oceana. Overall, NAS Oceana would not be capable of supporting both the existing Navy mission and the addition of a new F-35B Marine Corps mission. First, no developable land is available for new hangars that would not interfere with line-of-sight from Air Traffic Control Tower (ATCT) to runway. Second, requirements for an amphibious assault ship (LHD/LHA) landing strip and three vertical landing (VL) pads could not be met at NAS Oceana. Specifically, NAS Oceana does not have the capacity to support substantial increases in Field Carrier Landing Practice (FCLP) operations and the runway markings required for FCLP operations would be incompatible with runway markings required for the Navy’s aircraft carrier (CVN) operations. While it is possible to move the FCLP markings further down the runway, it would interfere with runway arresting gear and would accelerate the deterioration of the asphalt portion of the runway. Third, and finally, while NAS Oceana could accommodate construction of the required three VL pads, it does not have sufficient overlying airfield airspace to preclude scheduling conflicts with existing operations (personal communication, Keys 2010a).

NS Norfolk, VA

NS Norfolk occupies approximately 3,400 acres of land in the city of Norfolk, VA. There are 54,000 military personnel assigned ashore and on ships at NS Norfolk. In addition, there are 11,000 civilians employed at the Air Station. NS Norfolk does not support non-conventional jet fighter aircraft but rather is home to the Navy’s E-2C/D Hawkeye and Advanced Hawkeye squadrons, C-2 reserve squadrons, C-9s and C-12s, as well as various helicopter squadrons, including MH-60S Knighthawks and SH-60F/HH-60H Seahawks, and hosts other transient military aircraft.

According to the Naval Aviation Enterprise Global Shore Infrastructure Plan (September 2008): large concentrations of fixed-wing squadrons should not be based with large concentrations of rotary-wing squadrons, unless the airspace can be divided so as to segregate the respective operations. NS Norfolk does not currently have a large concentration of fixed-wing aircraft and therefore does not need to separate the overlying airspace. If the F-35B were based there, NS Norfolk would need to separate the airspace. Separation of airspace, however, could not be effectively divided due to the proximity of the heliport to the single runway as well as proximity to Norfolk International Airport's approach and departure flight tracks (personal communication, Keys 2010b).

Langley AFB, Hampton, VA

Langley AFB covers approximately 2,900 acres in the city of Hampton, VA. The base employs over 12,000 military and civilian personnel, is home to the 1st Fighter Wing, and is the headquarters for the U.S. Air Force ACC (Air Force 2009a). The 1st Fighter Wing supports 40 F-22As and 18 F-15Cs. In 2007, the 192nd Fighter Wing of the Virginia ANG, formerly stationed at Richmond International Airport, moved to Langley AFB to train with the 1st Fighter Wing (Air Force 2006a, 2006b, 2010). Due to airfield incompatibility resulting from current conventional aircraft, Langley AFB could not accommodate the basing of Marine Corps F-35B squadrons.

Virginia ANG at Richmond International Airport, VA

This publicly-owned and managed airport is located about 7 miles (mi) southeast of Richmond, VA. The airport covers about 1,600 acres, is the busiest in central Virginia, and supports nine commercial airlines. Originally, it was home to the 165th Fighter Wing of the Virginia ANG who flew F-15Es (Richmond International Airport 2009). Since 2007, however, the Wing has moved to Langley AFB and started flying the F-22As. Currently, the airport does not support a jet fighter mission and as a publicly-owned airport devoted to commercial traffic, there would be facility and airfield constraints that would reduce the capability of this airfield to host the F-35B. Typically, an ANG unit uses a public airport on an infrequent basis and allows for compatible use between military and commercial aircraft organizations. F-35B active-duty units would utilize the airfield on a daily basis and, therefore, be incompatible with its current high-operational commercial use (Richmond International Airport 2009).

McEntire JNGB, Eastover, SC

McEntire JNGB lies about 12 mi east of Columbia, SC, is approximately 2,400 acres in size, and supports 550 full-time personnel. The personnel complement increases to 1,300 one weekend per month as National Guard units mobilize for training. The JNGB is home to the South Carolina ANG and the 169th Fighter Wing (F-16s); the primary resident unit on the base. An Army National Guard aviation unit is also based there with its associated helicopter aircraft and 400 part-time personnel, who train every other weekend (McEntire JNGB 2009). Although there is space available for infrastructure expansion, in order to accommodate the F-35Bs substantial build out would be required along the flightline and related support facilities (equivalent to constructing an entire new air station) to relocate and consolidate similar functions. Additionally, there are potential mission incompatibilities between the F-35B and existing based aircraft that could result in disruption of F-35B training activities.

Charleston AFB (Joint Base Charleston) at Charleston International Airport, SC

Charleston AFB covers approximately 3,700 acres in North Charleston, SC. The Base supports about 7,000 active duty and Air Reserve Component military and civilian personnel. The Air Force Mobility Command’s 437th Airlift Wing is based there and has four operational groups consisting of 21 squadrons and one wing staff directorate in support of C-17 aircraft. The Base also is home to the 315th Airlift Wing of the Air Force Reserve Command. The mission of both active-duty and reserve wings is to provide airlift of troops and passengers, military equipment/supplies, cargo, and medical evacuation services either by air drop or by airfield landings. The Base shares runways with the Charleston International Airport for commercial airline operations on the south side of the airfield and general aviation aircraft operations on the east side (Charleston AFB 2009). As a result of the 2005 BRAC decision, Charleston AFB stood up the 628th Air Base Wing in January 2010 and became Joint Base Charleston, supporting the integrated operations of the Air Mobility Command and Air Force Reserve Command (Air Force 2010). Because of the total number of military and commercial operations, there are mission incompatibilities that would make basing the F-35B infeasible.

Moody AFB, Valdosta, GA

Moody AFB covers over 5,000 acres (main base) in Valdosta, GA. Approximately 4,000 active-duty military and civilian personnel are stationed at or employed by the Base. Moody AFB is home to the 23rd Wing and is under the command and control of ACC. Aircraft based at Moody AFB includes the fixed-winged A-10Cs and HC-130P/N Combat Kings and rotary-wing HH-60 Pave Hawks (Air Force 2006b, 2010). Because there are no existing Marine Corps facilities and infrastructure from which to expand from as well as there being mission incompatibilities between basing squadrons with a Marine Corps mission versus an air combat command mission, basing Marine Corps F-35Bs would be infeasible at this time.

Georgia ANG at Savannah/Hilton Head International Airport, Garden City, GA

Savannah/Hilton Head International Airport is about 3,600 acres in size and lies 7 mi northwest of the City of Savannah, GA. The airport operates commercial and civilian aircraft and is also home to the Georgia ANG, 165th Airlift Wing flying C-130H aircraft that are maintained and operated by more than 1,000 military and civilian personnel. The Wing’s mission includes airlift, airdrop, and aeromedical evacuation (Savannah IAP 2009). There are no jet fighters based at this site. The Combat Readiness Training Center is also located at the airport and is one of four such training facilities in the nation. The mission of the Combat Readiness Training Center is to provide combat aircrew training for Air Combat Maneuvering Instrumentation (Air Force 2010). The existing aircraft and type of operations pose incompatibilities with the F-35B mission at this joint use airport.

NAS Jacksonville, Jacksonville, FL

NAS Jacksonville encompasses nearly 4,000 acres along the St. John’s River and employs 23,000 active-duty and civilian personnel. NAS Jacksonville is currently home to both fixed-wing and rotary-wing aircraft, hosting several aircraft wings and tenants, including Patrol and Reconnaissance Wing Eleven, a Helicopter Maritime Strike Wing Atlantic Detachment, Patrol Squadron (VP)-30, and the U.S. Customs Service. The aircraft primarily flown by these units include P-3Cs, SH-60s, MH-60s, and C-130s.

The Navy is replacing the P-3Cs with the new P-8A Multi-Mission Maritime Aircraft (MMA) and NAS Jacksonville will be the base for the East Coast contingent of MMA based on a Record of Decision (ROD) published in the *Federal Register* on January 2, 2009 (DoN 2009a). NAS Jacksonville is to receive five Fleet squadrons and the FRS for the P-8A MMA, totaling 42 aircraft.

Because of both facility and airspace scheduling constraints resulting from the basing of P-8A MMA, as well as continuing to support continuing missions, NAS Jacksonville would not have the capacity to accommodate the basing of the Marine Corps F-35B squadrons. Specifically, its single useable runway would limit the maximum number of operations the field could support, as well as the flexibility when dealing with different aircraft types and flight characteristics. In order to support increased operations, construction of a parallel runway would likely be necessary and require extensive demolition and relocation of current infrastructure. In addition, there is no land available for the construction of new hangars that would not interfere with line-of-sight from air traffic control tower to the runway. Moreover, there is insufficient ramp area to support F-35B while accommodating existing and additional fixed-wing and rotary-wing aircraft (personal communication, Keys 2010c).

Florida ANG at Jacksonville International Airport, FL

This publicly-owned and managed airport is located about 11 mi north of downtown Jacksonville. The airport covers about 8,480 acres and supports eight commercial airlines. As at Richmond International Airport, the primary use of the airport is to support commercial flights, with the secondary use being support for the Florida ANG F-15E mission. As an airport devoted to commercial and ANG traffic, there would be mission incompatibilities to host the type (non-conventional aircraft) and number of F-35B aircraft being proposed for basing (Jacksonville International Airport 2002). Additionally, in order to accommodate the F-35Bs substantial build out would be required along the flightline for all operational and related support facilities as well as for community support facilities (equivalent to constructing an entire new air station).

2.3 Action Alternatives Carried Forward for Detailed Analysis

With these criteria in mind—proximity and access to training airspace and ranges, mission compatibilities, integration into existing command and control structures, and sufficient infrastructure—MCAS Beaufort and MCAS Cherry Point stand out as basing locations that best support the purpose and need of the Proposed Action.

MCAS Beaufort is located in Beaufort, SC and encompasses approximately 6,900 acres. The Air Station meets the distance criteria for ranges with CAS, air-to-ground, and air-to-air capabilities. Because legacy aircraft will be taken out of the Marine Corps inventory, this Air Station will have the existing infrastructure and capacity to accommodate the F-35B. The Air Station is also home to MAG-31 and associated support commands. This MAG is reinforced by the MWSS, Headquarters, and Headquarters Services Squadron is composed of a total of 1,061, all of whom provide considerable augmentation to the Air Station and allow MAG-31 and its squadrons to execute expeditionary operations in support of operational deployments.

MCAS Cherry Point is located in Havelock, NC and comprises 11,567 acres. The Air Station is home to the 2d MAW, including MAG-14, Marine Air Control Group 28, Marine Wing Support Group 27, and the support commands. Approximately 15,600 personnel are stationed or employed at the Air Station, operating primarily AV-8B, EA-6B, and KC-130 aircraft. MCAS Cherry Point meets the distance criteria for ranges with CAS, air-to-ground, and air-to-air capabilities. Because legacy aircraft will be taken out of the Marine Corps inventory, this Air Station will have most of the existing airfield infrastructure and capacity to accommodate the F-35B.

Both Air Stations are in vicinity to ranges with CAS, air-to-ground, and air-to-air capabilities. They are also part of the existing MAGTF command and control structure and can take advantage of existing airfield, airspace, and infrastructure capacity as well as future capacity. Most importantly, the Air Stations are currently aligned to support non-conventional fighter jet missions (MCAS Beaufort supports legacy F/A-18s and MCAS Cherry Point supports legacy AV-8Bs) and can seamlessly integrate the F-35Bs into their operational and training missions. Therefore, the Marine Corps determined to carry these basing locations forward for further analysis in this Environmental Impact Statement (EIS) (Figure 2-2).

The Marine Corps developed four split-siting alternatives for basing the operational and PTC squadrons at these two Air Stations. The split-siting alternatives allow for utilization of capacity that will be created with the replacement of the F/A-18 squadrons at MCAS Beaufort and the replacement of the AV-8B squadrons at MCAS Cherry Point. In addition, this EIS analyzes the No Action Alternative. Depending on the Air Station, basing alternatives range from a minimum of 40 aircraft in a PTC (two FRSs) to a maximum of 176 aircraft in 11 operational squadrons (Table 2-5). Regardless of the alternative chosen,

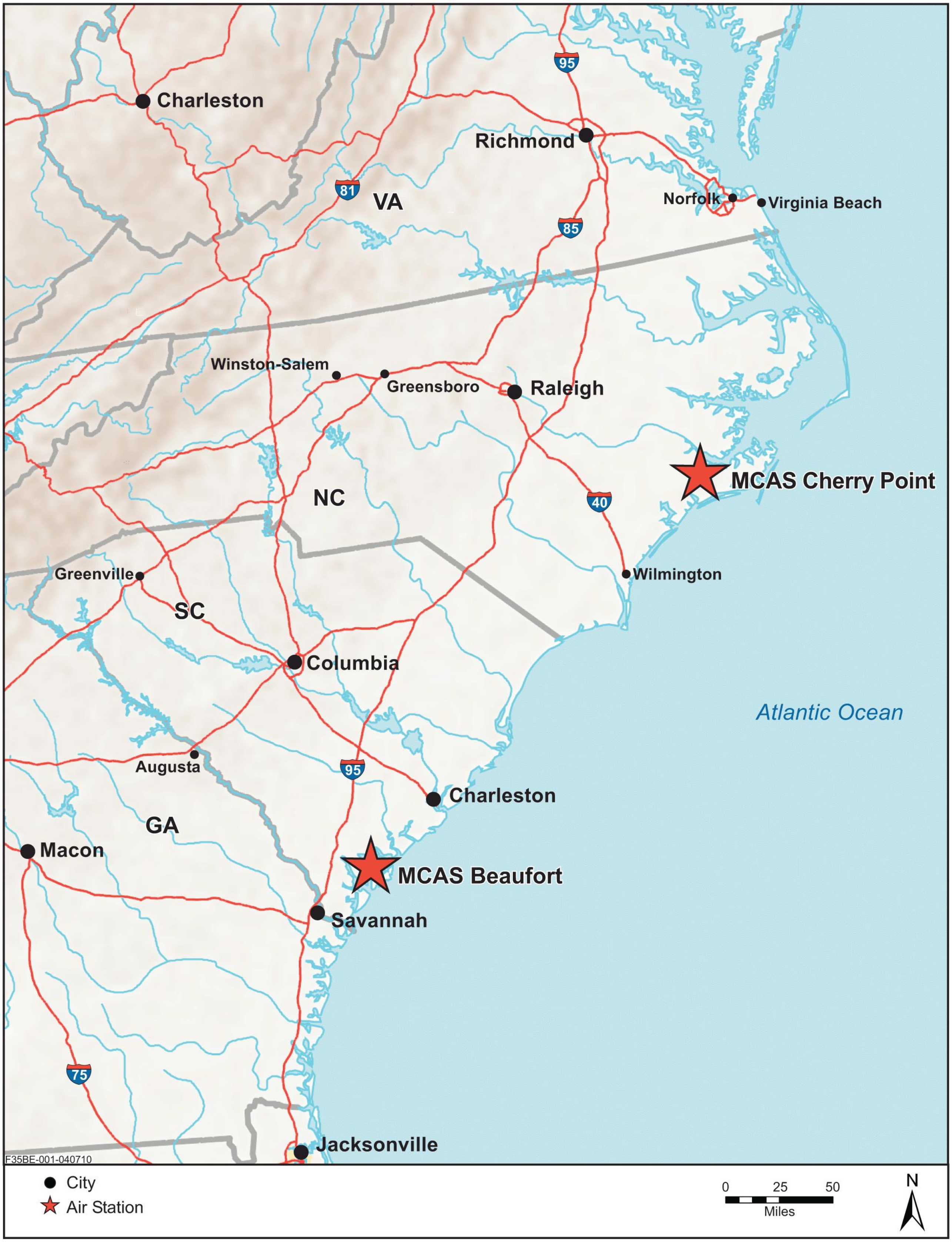


Figure 2-2 Site Vicinity Map

the existing squadrons of F/A-18s at MCAS Beaufort and the AV-8B squadrons at MCAS Cherry Point would be phased out. Therefore, the Proposed Action could result in a net decrease of aircraft at a given Air Station, depending on the alternative selected.

Table 2-5 Squadron Numbers by Air Station and Alternatives

Alternative	MCAS Beaufort	MCAS Cherry Point
1	3 Operational and PTC (2 FRSs)	8 Operational Squadrons
2	PTC (2 FRSs)	11 Operational Squadrons
3	8 Operational Squadrons	3 Operational and PTC (2 FRSs)
4	11 Operational Squadrons	PTC (2 FRSs)

The No Action Alternative, also defined as the baseline, reflects conditions at the time prior to implementing F-35B basing on the East Coast. This approach accounts for already authorized or reasonably expected sets of conditions, particularly in relation to aircraft basing and operations such as the F/A-18E/F Navy squadrons and the drawdown of EA-6Bs at MCAS Cherry Point.

The following sections present an overview of the Proposed Action that describes the commonalities of all action alternatives in relation to aircraft replacement and transition, facility and infrastructure requirements, personnel changes, and aircraft operations. Subsequent sections detail each of the split-siting alternatives at MCAS Beaufort (Section 2.3.2) and MCAS Cherry Point (Section 2.3.3), including all components of the Proposed Action.

2.3.1 Common Elements of the Proposed Action

This section describes the components of the Proposed Action that would occur under all alternatives without regards to location. Elements of the Proposed Action specific to MCAS Beaufort and MCAS Cherry Point are discussed in Sections 2.3.2 and 2.3.3, respectively.

2.3.1.1 Aircraft Replacement/Transition

Under the Proposed Action, seven F/A-18 operational squadrons (one of which is in cadre status), three AV-8B operational squadrons, and one AV-8B training squadron would be replaced by the F-35B. The seven operational F/A-18 squadrons are authorized 12 aircraft each for a total of 84 aircraft. Authorized aircraft refers to the number of aircraft assigned to a particular unit. The actual number of aircraft may vary over the years due to offsite maintenance requirements, deployments, or when a squadron is put into cadre status. Cadre status means that the unit still exists in Marine Corps organizational structure but the aircraft and personnel may be assigned to different units other than the one at the home air station. Squadrons in cadre status, however, can be filled with personnel and aircraft at any time and, therefore, are accounted for in the authorization for the home air station on a continual basis. The three operational AV-8B squadrons are authorized 14 aircraft each, and the AV-8B FRS is authorized 26 aircraft for a total of 68 aircraft. Table 2-6 lists the Marine Corps authorized East Coast F/A-18 and AV-8B aircraft.

Table 2-6 Authorized East Coast Marine Corps Legacy Aircraft

Type of Squadron	Number of Aircraft per Squadron	Number of Aircraft Squadrons	TOTAL LEGACY AIRCRAFT
MCAS Beaufort Marine Corps Legacy Aircraft			
F/A-18 Operational	12	7	84
MCAS Cherry Point Marine Corps Legacy Aircraft			
AV-8B Operational	14	3	42
AV-8B FRS	26	1	26
		TOTAL LEGACY AIRCRAFT	**152**

The East Coast F-35B aircraft transition would occur between 2014 and 2023 (Figure 2-3). A total of 216 F-35B aircraft are proposed to replace the 152 authorized Marine Corps F/A-18s and AV-8Bs (Table 2-7). During this same period, existing Marine Corps East Coast F/A-18 and AV-8B operational squadrons would be deactivated (HQMC 2010). A portion of Marine Corps F-35B pilot training would continue to be trained at the Joint Integrated Training Center at Eglin AFB (Air Force 2009b).

Table 2-7 Proposed F-35B Squadrons and Aircraft

Type of Squadron	Number of F-35B Aircraft per Squadron	Number of Proposed F-35B Aircraft Squadrons	Number of Proposed F-35B Aircraft
Operational	16	11	176
Fleet Replacement	20	2	40
		TOTAL F-35B AIRCRAFT	**216**

However, to meet the remaining training requirements for increased numbers of pilots for all F-35B squadrons, an additional F-35B PTC (with two FRS squadrons) would be established on the East Coast. The AV-8B training squadron, currently based at MCAS Cherry Point, would be deactivated approximately 3 years prior to the deactivation of the AV-8B squadrons (USMC 2009b). Construction and demolition would need to begin in 2011 to ensure that the facilities and infrastructure (i.e., hangars, maintenance areas, and training facilities) are completed in time to support the training requirements starting in 2014.

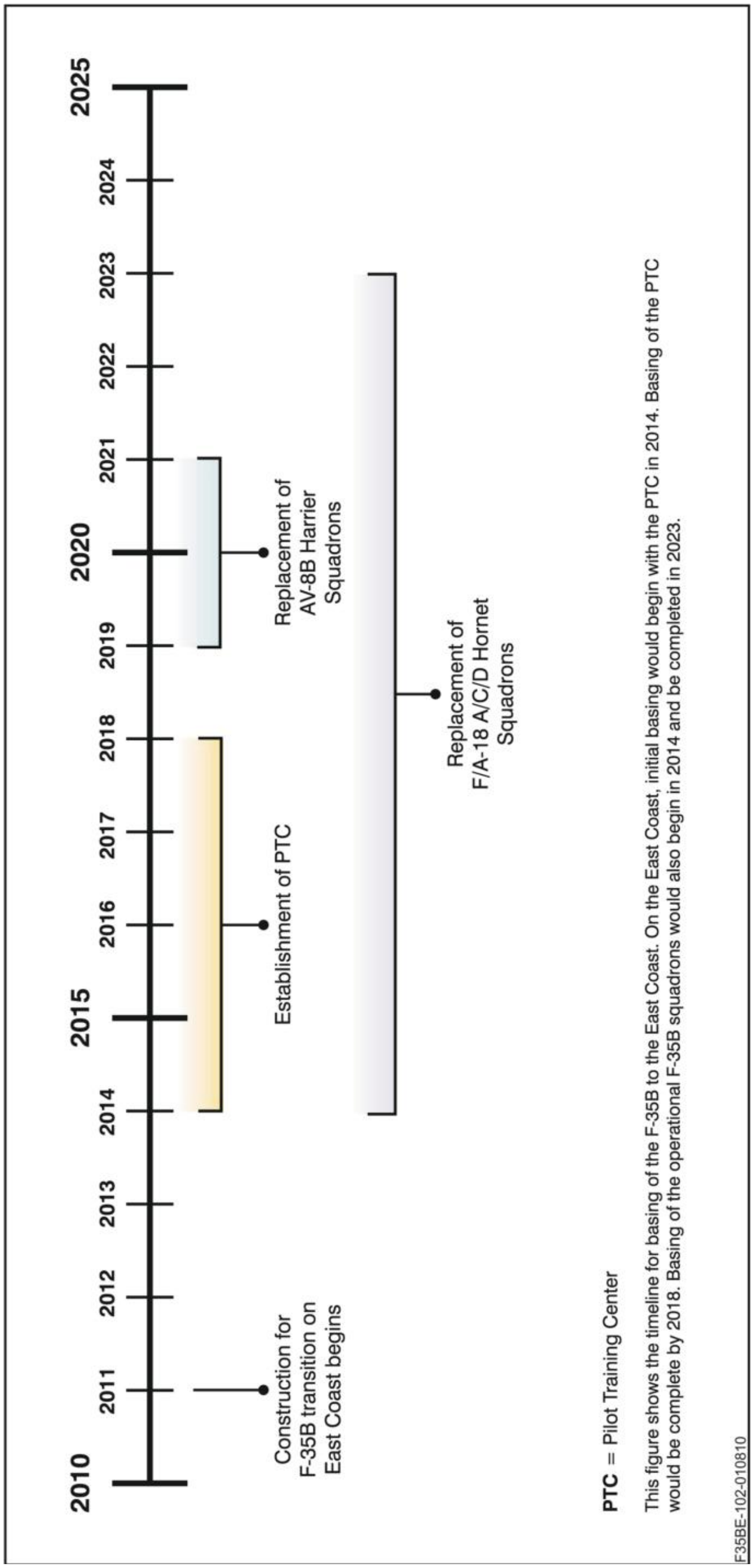


Figure 2-3 Transition Timeline for the F-35B East Coast Basing

2.3.1.2 Personnel Changes

Under baseline conditions, the six operational and one cadre status F/A-18 squadrons at MCAS Beaufort have an authorized strength of 1,821 military personnel, which includes 229 officers and 1,592 enlisted personnel. At MCAS Cherry Point, the one AV-8B FRS and three AV-8B operational squadrons have an authorized total strength of 1,294 military personnel, which includes 115 officers and 1,179 enlisted personnel. The total authorized military personnel are 3,115, which includes 344 officers and 2,771 enlisted personnel (Table 2-8). When the existing legacy aircraft squadrons transition to F-35B squadrons, each operational squadron would be assigned an authorized strength of 311 military personnel and each FRS would be assigned an authorized strength of 297 military personnel. Under the Proposed Action, 11 operational and 2 FRSs would be established for a total of 485 officers and 3,662 enlisted personnel. This represents an increase of 1,032 military personnel (141 officers and 891 enlisted personnel) from authorized military personnel (Table 2-8). Note that this increase in military personnel includes the additional 78 PTC pilots associated with the PTC per year, with 66 PTC pilots on the Air Station at any given time.

Table 2-8 Authorized[a] and Proposed[b] Military Personnel by Squadron

Squadron		Military Personnel		
Type	**Number**	**Officers**	**Enlisted**	**TOTAL AUTHORIZED**
Authorized Military Personnel at MCAS Beaufort				
F/A-18 Operational (VMFA)	4	100	896	996
F/A-18 Operational (VMFA-AW)	3	129	696	825
Authorized Military Personnel MCAS Cherry Point				
AV-8B Operational	3	81	858	939
AV-8B FRS	1	34	321	355
TOTAL EAST COAST AUTHORIZED MARINE CORPS MILITARY PERSONNEL	**11**	**344**	**2,771**	**3,115**
Proposed Military Personnel per Squadron				
F-35B Operational Squadron	11	27	284	3,421
F-35B FRS	2	94	269	726
TOTAL PROPOSED ON EAST COAST	**13**	**485**	**3,662**	**4,147**

Sources: USMC 2008a; USMC 2008b, DoN 2003a, DoN 2003b; Wirth 2008.
Key: VMFA = Marine Fighter/Attack; AW = All Weather.
Notes: [a]Authorized personnel refers to the number of personnel assigned to a unit; due to attrition or cases when a squadron is put into cadre status, the actual number of personnel at any air station may vary over the years. Please refer to the Glossary (Appendix H) for additional information.
[b]Based on establishing 11 operational and 2 FRSs.

2.3.1.3 F-35B Operations

To base and operate the F-35B, an air station needs to have the appropriate type of airfield, airspace, and training ranges available. Based on currently available information including initial training and readiness plans, the Marine Corps developed data on the nature, frequency, and location of proposed F-35B operations. These data account for the F-35Bs capabilities, its designated missions, and operations currently performed by legacy F/A-18 and AV-8B aircraft. As the F-35B program matures, the training approach will evolve and changes to the operations would likely alter use of airfields and airspace. Such changes may drive a need to modify or add to training ranges or airspace. Any associated actions would be addressed under appropriate environmental documentation.

This EIS uses several terms to describe different components of aircraft flying activities. The following are definitions and an overview of the type of airfields and operations, as well as training airspace and range activities.

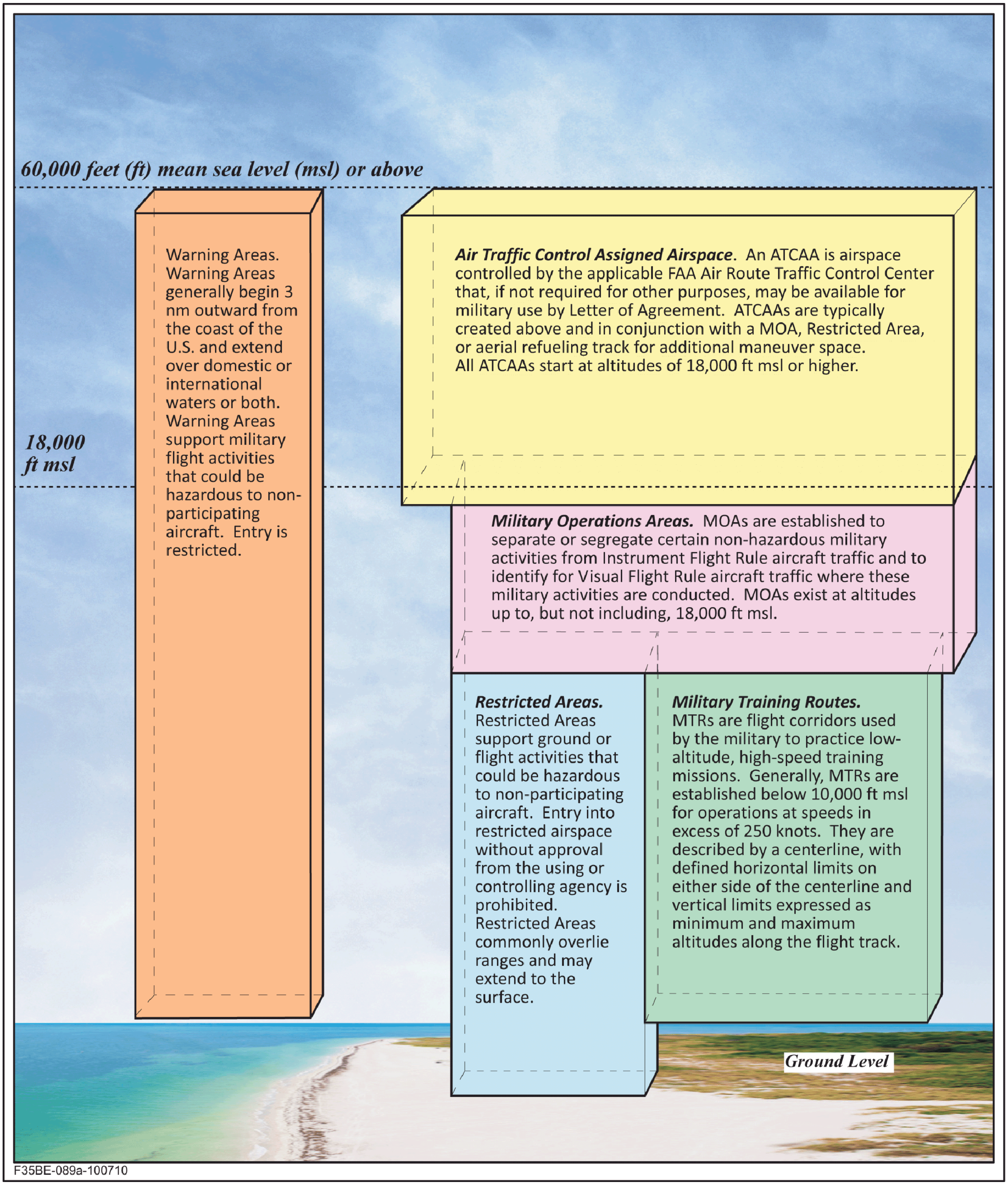
- ***Airfield Operations.*** Airfield operations include those that occur along runways, at landing pads, and within overlying airspace. An airfield operation is a single movement or individual flight in the air station airfield or airspace environment, such as one takeoff or one landing. Types of airfield operations include, but are not limited to:
  - **Departures.** A departure involves an aircraft taking off to a local training area, a non-local training area, or as part of a training maneuver (i.e., touch-and-go). The F-35B would conduct conventional and short takeoff departures.
  - **Arrivals.** An arrival involves aircraft returning and landing from a local training area, a non-local training area, or as part of a training maneuver (i.e., touch-and-go). The F-35B can employ conventional arrivals, but its STOVL capabilities make several forms of landings and arrivals possible. This operation can involve slow, rolling vertical, and VLs. The following defines the basic types of arrivals.
    - o *Straight-In/Full-Stop:* When performing this operation, an aircraft lines up to the runway centerline, descends gradually, lands, stops, and then taxis off the runway.
    - o *Overhead Break Arrival:* This event consists of an expeditious arrival using Visual Flight Rules. An aircraft rapidly approaches the runway at around 300 to 350 knots and about 1,500 feet (ft) above ground level (AGL). Approximately halfway down the runway, the aircraft performs a 180-degree turn to enter the landing pattern. Once established in

the pattern, the aircraft lowers landing gear and flaps and performs a 180-degree descending turn to land on the runway.

- **Closed Patterns**. The F-35B would conduct touch-and-go, ground controlled approach, and other patterns in the airfield environment. Pattern work would include conventional and STOVL operations which add increasingly more rigorous demands on the pilots. Touch-and-go and ground control approach would represent the most common closed pattern events.
    - *Touch-and-Go*. An aircraft lands and takes off on a runway without a full stop. After touching down, the pilot immediately engages full power and takes off again. The touch-and-go is counted as two operations because the landing counts as one operation and the takeoff represents another.
    - *Ground Control Approach*. Air traffic controllers guide aircraft to a landing to practice arrivals under all weather conditions.
- **Field Carrier Landing Practice.** The F-35B needs to conduct specific training operations on land to prepare for flight operations when deployed aboard ships at sea. These ships and carriers have different flight-deck configurations and optical landing systems. This on-land training, called FCLP, therefore requires differing touchdown points on a runway that has available the marking, in-deck lighting, communications, shipboard optical landing system, and air traffic control facilities to mimic the situations found on LHDs/LHAs and CVNs. Such an LHD/LHA Training Facility for FCLP training is found at or in close vicinity to the air stations.

- ***Training Airspace and Range Activities.*** To conduct the broad array of training necessary for combat readiness, F-35B pilots must have access to adequate training ranges and airspace. Ranges comprise land areas supporting targets, simulated threats, communications, scoring systems, and other facilities. Special Use Airspace (SUA) is airspace designated by the Federal Aviation Administration (FAA) with a defined vertical and lateral limit where military activity or unusual flight conditions may occur. Its designation serves to alert non-participating aircraft to this military activity. SUA includes Restricted Areas, Military Operations Areas (MOAs), and over-water Warning Areas. SUA-related airspace includes Air Traffic Control Assigned Airspace (ATCAA) and military training routes (MTRs). Though not all inclusive, Figure 2-4 depicts and defines typical SUA and SUA-related airspace proposed for F-35B use.

Proposed operations would fall into three broad categories: continuation training designed to ensure pilots remain proficient in the fundamental operations of the F-35B; tactical training designed to teach F-35B pilots the tactical employment of the aircraft in combat; and integrated training designed to teach pilots how to integrate F-35B operations with other Marine Corps or joint air and ground assets. Table 2-9 (on the following page) describes the primary training activities the F-35B is expected to perform in the airspace and at the ranges. Integrated training performed by the F-35B would conduct these types of activities as individual aircraft, as part of small groups (e.g., 2 versus [vs.] 2), and in larger exercises.



Note: These examples are not inclusive of all types of SUA.

Figure 2-4 Special Use Airspace Examples

Table 2-9 Proposed Training Activities Required for the F-35B[a]

Activity	Tasks
Aircraft Handling Characteristics	G-force awareness, maneuverability, break turns, high angle of attack maneuvering, acceleration maneuvering, gun tracking, offensive and defensive positioning, aerial refueling, and stall recovery
Basic Fighter Maneuvers	Recognize all offensive/defensive weapons situations, defeat enemy weapons employment, G-force awareness, offensive/defensive maneuvering, visual missile defense, beyond visual defense, maneuvering for weapons use, defensive countermeasures use
Air-to-Ground	Single to multiple aircraft, low to high altitude tactical weapons delivery and escape maneuvers (day and night)
Air-to-Air	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
Close Air Support	CAS is air action by fixed- and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces
Low Altitude Training	1 or 2 aircraft offensive and defensive operations at low altitude, G-force awareness at low altitude, handling, turns, tactical formations, navigation, threat awareness, defensive response, defensive countermeasure, missile defense, combat air patrol against low/medium altitude adversaries
Tactical Intercepts	2 vs. 4 and 4 vs. 6 tactical intercepts, G-force awareness, electronic countermeasures, lead and formation flying
Dissimilar Air Combat Tactics	Multi-aircraft and multi-adversary (involving dozens of aircraft) 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
Mission Employment	Multi-aircraft and multi-adversary (involving dozens of aircraft) composite strike force exercise (day and night), systems check, air refueling, strike force defense and escort, air intercepts, electronic countermeasures, combat air patrol, defense against composite force, bomber intercepts, defensive countermeasure use
Ordnance Delivery	Single to multiple aircraft attacking a wide range of ground targets using different ingress and egress methods, delivery tactics, ordnance types, angles of attack, combat scenarios

Note: [a]While this table is not all inclusive, it portrays typical types of training activities.

Although the F-35B would perform the missions of the legacy F/A-18 and AV-8B aircraft, it represents a different aircraft with different capabilities, and would fly somewhat differently. An important aspect of these differences centers on altitude profiles. Because of its stealth and other capabilities, the F-35B would conduct training at higher altitudes than legacy aircraft. The altitude range for F-35B training is 300 feet (ft) AGL to 50,000 ft msl, with the greatest portion (67 percent) spent at altitudes above 15,000 ft msl. Moreover, the F-35Bs would fly above 5,000 ft AGL more than 99 percent of the time. This would produce a substantial decrease (between 40 and 90 percent) in the amount of time flown at lower (below 5,000 ft AGL) altitudes, compared to the F/A-18s and AV-8Bs. The Marine Corps anticipates that low altitude training (lower than 5,000 ft AGL) would primarily occur within core airspace and ranges. Table 2-10 provides the estimated altitude profile for the F-35B aircraft.

Table 2-10 Estimated Altitude Profile for the F-35B

Altitude Band (ft)	Percent Time Used
300 to 5,000 AGL	<1%
5,000 AGL to 10,000 msl	7%
10,000 msl to 15,000 msl	26%
15,000 msl to 25,000 msl	48%
25,000 msl to 50,000 msl	19%

F-35B training would include numerous types of events involving air-to-ground ordnance delivery. Such training would include high explosive (HE) and inert ordnance ranging in size from 25 to 2,000 lbs. HE ordnance is identical to that used in combat. Inert ordnance contains no explosives, but may contain a small spotting charge (about the size of a shotgun shell) to assist in scoring the event and providing feedback to the pilot. Both HE and inert ordnance can include laser guidance or other guidance features such as on the Guided Bomb Unit (GBU)-12 and Joint Direct Attack Munitions GBU-32. Ordnance delivery training would only occur at existing ranges and target areas authorized to permit these activities and accommodate the particular type of ordnance (DoN 2009b, DoN 2009c, USMC 2009c). Under the Proposed Action, F-35B pilots would conduct ordnance delivery training within R-5306A over BT-9 and BT-11 and in R-3007 above TBR. At all three ranges, ordnance delivery would not differ, nor exceed existing levels of use as presented in the Environmental Assessment (EA) for MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, NC (USMC 2009c), and the EA for U.S. Marine Corps and U.S. Navy Operations at TBR, GA (MCAS Beaufort 2008a).

In addition, F-35B pilots would use defensive countermeasure flares during some of their training flights. When ignited, defensive training flares burn for a short period (3.5 to 5 seconds) at approximately 2,000 degrees Fahrenheit. Flares burn out after falling approximately 400 ft. Since the burn temperature exceeds the exhaust heat of an aircraft engine, it attracts and decoys heat-seeking weapons and sensors targeted on the aircraft. A common flare ignites as it is ejected from the dispenser and the flare consumes some or nearly all of the wrapping material around the flare. Although the design of the flare cartridges for the F-35B has not been finalized at this time, the Marine Corps anticipates the flares would function similar to flares in legacy aircraft. Flare use would occur only in authorized airspace and would follow all range regulations, including altitude and fire restrictions. Flare use would be limited in the amount and types already authorized by the aforementioned National Environmental Policy Act (NEPA) documentation (USMC 2009c).

With its superior capabilities, the F-35B is capable of supersonic flights, which greatly enhances a pilot's success in engaging the enemy and evading threats. Under the Proposed Action, the Marine Corps would conduct supersonic operations only in Warning Areas authorized for such activities and at FAA-approved altitudes in other airspace. The amount and nature of supersonic activity would correlate to specific aircraft missions, and not all F-35B missions would involve supersonic flight.

The following sections describe the authorized and proposed aircraft loading, personnel, facility requirements (e.g., hangars, aircraft apron parking, storage areas, and maintenance facilities), and airfield operations for MCAS Beaufort (2.3.2) and MCAS Cherry Point (2.3.3). Section 2.3.3 also includes authorized conditions and proposed operations and activities for Marine Corps Auxiliary Landing Field (MCALF) Bogue (a landing airfield primarily used by aircraft operating out of MCAS Cherry Point). Section 2.3.4 presents authorized and proposed operations and activities within training airspace and ranges.

2.3.2 MCAS Beaufort

Under baseline conditions, MCAS Beaufort supports seven operational F/A-18 squadrons (one of which is in cadre status) under the 2d MAW with a total of 84 F/A-18 aircraft and one C-12 aircraft. The Air Station conducts approximately 62,001 annual flight operations, with the majority generated by the resident F/A-18 Marine Corps squadrons. The Air Station also hosts two Navy F/A-18 squadrons; however, one squadron is currently dis-established and not in operation. In addition, it is anticipated that the Navy will move the other F/A-18 squadron from MCAS Beaufort by the time the first F-35B arrives. The two Navy F/A-18 squadrons, therefore, were not included in the action alternatives (USMC 2009d). The Marine Corps has determined that Alternative 1 is the Preferred Alternative that would best meet the purpose and need to establish F-35B aircraft on the East Coast.

2.3.2.1 Aircraft Replacement/Transition

Baseline MCAS Beaufort authorized and proposed aircraft loading is presented in Table 2-11 for each alternative.

Table 2-11 MCAS Beaufort Authorized and Proposed Aircraft Loading

Aircraft Type	Authorized	Proposed by Alternative			
		1 (Preferred)	2	3	4
F/A-18	84[a]	0	0	0	0
F/A-18 (Navy)	24[b]	0[b]	0[b]	0[b]	0[b]
C-12	1	1	1	1	1
F-35B	*N/A*	*88*	*40*	*128*	*176*
TOTAL	**109**	**89**	**41**	**129**	**177**

Source: USMC 2009d.
Notes: [a]Includes one squadron in cadre status.
[b]Refer to Section 2.3.2 above for status of Navy F/A-18 squadrons.

2.3.2.2 Personnel Changes

The estimated net change in military personnel for each of the basing alternatives at MCAS Beaufort directly associated with the introduction of the F-35B is provided in Table 2-12. This estimate includes the additional 78 PTC pilots associated with the PTC per year, with 66 of those PTC pilots at MCAS Beaufort at any given time. Proposed numbers of dependents associated with proposed military personnel is included in Table 2-13. Changes in civilian and contractor personnel associated with the introduction of the F-35B are anticipated under all alternatives; however, the number of these non-military personnel is continually changing as the aircraft and its systems evolve. As such, the Marine Corps has not included these non-military personnel changes because they cannot be predicted with any fidelity at this time. Once the data have more fidelity and it becomes evident that these numbers constitute a substantial change from existing conditions, the Marine Corps will undertake the appropriate level of environmental documentation to determine potential impacts.

Table 2-12 Proposed Changes in Military Personnel at MCAS Beaufort[a]

Alternative	Officers			Enlisted			TOTAL MILITARY PERSONNEL		
	Authorized	Proposed	*Net Change*	Authorized	Proposed	*Net Change*	Authorized	Proposed	*Net Change*
1 (Preferred)	229	203	*-26*	1,592	1,390	*-202*	1,821	1,593	*-228*
2	229	122	*-107*	1,592	538	*-1,054*	1,821	660	*-1,161*
3	229	216	*-13*	1,592	2,272	*+680*	1,821	2,488	*+667*
4	229	297	*+68*	1,592	3,124	*+1,532*	1,821	3,421	*+1,600*

Note: [a]Because the numbers of civilian and contractor personnel (and dependents) are not definitive; they were not included in the analysis.

Table 2-13 Estimated Change in Dependents at MCAS Beaufort[a]

Alternative	Dependents		
	Existing	Proposed	*Net Change*
1 (Preferred)	3,423	3,014	*-409*
2	3,423	1,246	*-2,177*
3	3,423	4,714	*+1,291*
4	3,423	6,481	*+3,058*

Note: [a]Calculated using multipliers from Marine Corps Demographics, 10 August in USMC 2007a. Does not include civilian and contractor personnel and their dependents.

2.3.2.3 Facility Requirements

Facility requirements under each alternative were identified in the Concept Development Plan for the East Coast Introduction of the F-35B (USMC 2009d). Proposed construction and demolition projects for each alternative are included in Table 2-14. New project construction disturbance areas and cost details for all alternatives are outlined in Table 2-15 and shown in Figures 2-5 through 2-8.

Table 2-14 Infrastructure Requirements at MCAS Beaufort

Alternative	Construction and Demolition Requirements	
1 (Preferred)	• Demolish Hangars 414, 416, and 728 • Construct five new hangar modules • Construct ground support equipment maintenance and storage areas • Construct aviation armament and engine shops • Construct MAG Headquarters • Construct Recycling/Hazardous Waste Facility	• Construct PTC training/instruction/ simulation facility • Construct a LHD/LHA Training Facility • Construct VL pads • Construct/modify airfield pavement • Construct Cryogenics Facility • Complete Security Upgrades
2	• Demolish Hangars 414 and 416 • Construct two new hangar modules • Construct ground support equipment maintenance and storage areas • Construct aviation armament and engine shops • Construct MAG Headquarters • Construct Recycling/Hazardous Waste Facility	• Construct PTC training/instruction/ simulation facility • Construct a LHD/LHA Training Facility • Construct VL pads • Construct/modify airfield pavement • Construct Cryogenics Facility • Complete Security Upgrades
3	• Demolish Hangars 414, 416, 418, and 729 • Construct eight new hangar modules • Construct ground support equipment maintenance and storage areas • Construct rinse facility • Construct MAG Headquarters • Construct Recycling/Hazardous Waste Facility	• Construct aviation armament and engine shops • Construct a LHD/LHA Training Facility • Construct VL pads • Construct non-PTC simulator facility • Construct/modify airfield pavement • Construct Cryogenics Facility • Complete Security Upgrades
4	• Demolish Hangars 414, 416, 418, 728, and 729 • Construct 11 new hangar modules • Construct ground support equipment maintenance and storage areas • Construct rinse facility • Construct aviation armament and engine shops • Construct MAG Headquarters • Construct Recycling/Hazardous Waste Facility	• Construct a LHD/LHA Training Facility • Construct VL pads • Construct non-PTC simulator facility • Construct/modify airfield pavement • Construct Cryogenics Facility • Complete Security Upgrades • Construct two Bachelor Enlisted Quarters (BEQs)

Table 2-15 New Construction and Estimated Costs at MCAS Beaufort

Alternatives	Proposed Projects												
	Airfield Pavement/ Parking Apron	Aircraft Hangar(s)[a]	PTC Training/ Instruction/ Simulator Facility[b]	Ground Support Equipment Maintenance and Storage Areas	VL Pads	LHD/LHA Training Facility	Security Upgrades	MAG Headquarters	Non-PTC Simulator Facility	Cryogenics Facility	Recycling/Hazardous Waste Facility	BEQs	TOTAL
Alternative 1													
Area Disturbed (acres)[c]	9.2	16.8	5.0	2.2	5.6	33.3	21.8	2.9	N/A	1.8	2.3	N/A	**100.9**
Vegetation Loss (acres)[d]	0	5.8	5.0	1.6	1.1	30.9	7.2	2.9	N/A	1.8	2.3	N/A	**58.6**
Cost (millions dollars)[e]	50.9	261.2	46.5	10.4	21.1	13.9	15.2	10.5	N/A	3.5	3.9	N/A	**$437.1**
Alternative 2													
Area Disturbed (acres)[c]	0.5	5.8	5.0	2.2	4.5	33.3	21.8	2.9	N/A	1.8	2.3	N/A	**80.1**
Vegetation Loss (acres)[d]	0	5.8	5.0	1.6	1.1	30.9	7.2	2.9	N/A	1.8	2.3	N/A	**58.6**
Cost (millions dollars)[e]	48.4	105.2	46.5	10.4	21.1	13.9	15.2	10.5	N/A	3.5	3.9	N/A	**$278.6**
Alternative 3													
Area Disturbed (acres)[c]	9.9	25.7	N/A	4.5	5.6	33.3	21.8	2.9	2.0	1.8	2.3	N/A	**109.8**
Vegetation Loss (acres)[d]	0	0	N/A	3.3	1.1	30.9	7.2	2.9	2.0	1.8	2.3	N/A	**51.5**
Cost (millions dollars)[e]	62.7	424.8	N/A	22.1	21.1	13.9	15.2	10.5	33.1	3.5	3.9	N/A	**$610.8**
Alternative 4													
Area Disturbed (acres)[c]	10.6	40.4	N/A	6.2	5.6	33.3	21.8	2.9	2.0	1.8	2.3	11.5	**138.4**
Vegetation Loss (acres)[d]	0	0	N/A	4.6	1.1	30.9	7.2	2.9	2.0	1.8	2.3	0	**52.8**
Cost (millions dollars)[e]	77.6	567.5	N/A	30.6	21.1	13.9	15.2	10.5	33.1	3.5	3.9	45.0	**$821.9**

Source: USMC 2009d.

Notes: [a]Incudes demolition of existing hangar, access apron and peripheral taxiways, modifications to existing parking apron for sun shades, M-Bit pad, and high temperature concrete where applicable. Follow-on environmental analyses and associated decision documents would be completed for a borrow pit once specific project details are known.

[b]The PTC would not be established at MCAS Beaufort under Alternatives 3 and 4, only a non-PTC simulator facility would be built under these two alternatives.

[c]The total includes total areas disturbed due to clearing, grading, and construction equipment storage (i.e., laydown area); access roads and entrances; as well as associated parking areas and landscaping activities.

[d]Vegetation loss refers to forested undeveloped land only; other types of vegetation, such as grasslands, are excluded from the estimates shown.

[e]Estimates shown are in 2011 dollars, include both demolition and construction costs, and may not add up exactly due to rounding.

Alternative 1 (Preferred Alternative) – Three Operational Squadrons and PTC

Figure 2-5 provides the site layouts for proposed new airfield-associated construction and demolition as well as the proposed sites for support facilities (USMC 2009d). A total of 100.9 acres, which includes 58.6 acres of trees, would be disturbed to accommodate the projects proposed under Alternative 1. Disturbed acreage includes areas exposed to clearing and grading activities, construction equipment and material storage (i.e., laydown) areas, access roads and entrances, landscaping, as well as parking areas for government- and privately-owned vehicles**.**

Alternative 2 – The PTC

Figure 2-6 provides the site layouts for proposed new airfield-associated construction and demolition activities as well as proposed sites for support facility construction (USMC 2009d). Under this alternative, 80.1 acres would be disturbed, of which 58.6 acres are currently forested.

Alternative 3 – Eight Operational Squadrons

Under Alternative 3, 109.8 acres would be disturbed, of which 51.5 acres are forested. Figure 2-7 provides both the proposed sites for new airfield-associated construction and demolition activities and the sites proposed for new support facility construction (USMC 2009d).

Alternative 4 – Eleven Operational Squadrons

Under Alternative 4, 138.4 acres, of which 52.8 acres are forested, would be disturbed. Figure 2-8 provides the site layouts for proposed new airfield-associated construction and demolition activities as well as presents new support facility construction (USMC 2009d). Under this alternative, two BEQs with 300 man spaces each would also be constructed to accommodate the increased housing requirement for enlisted personnel (Figure 2-9).

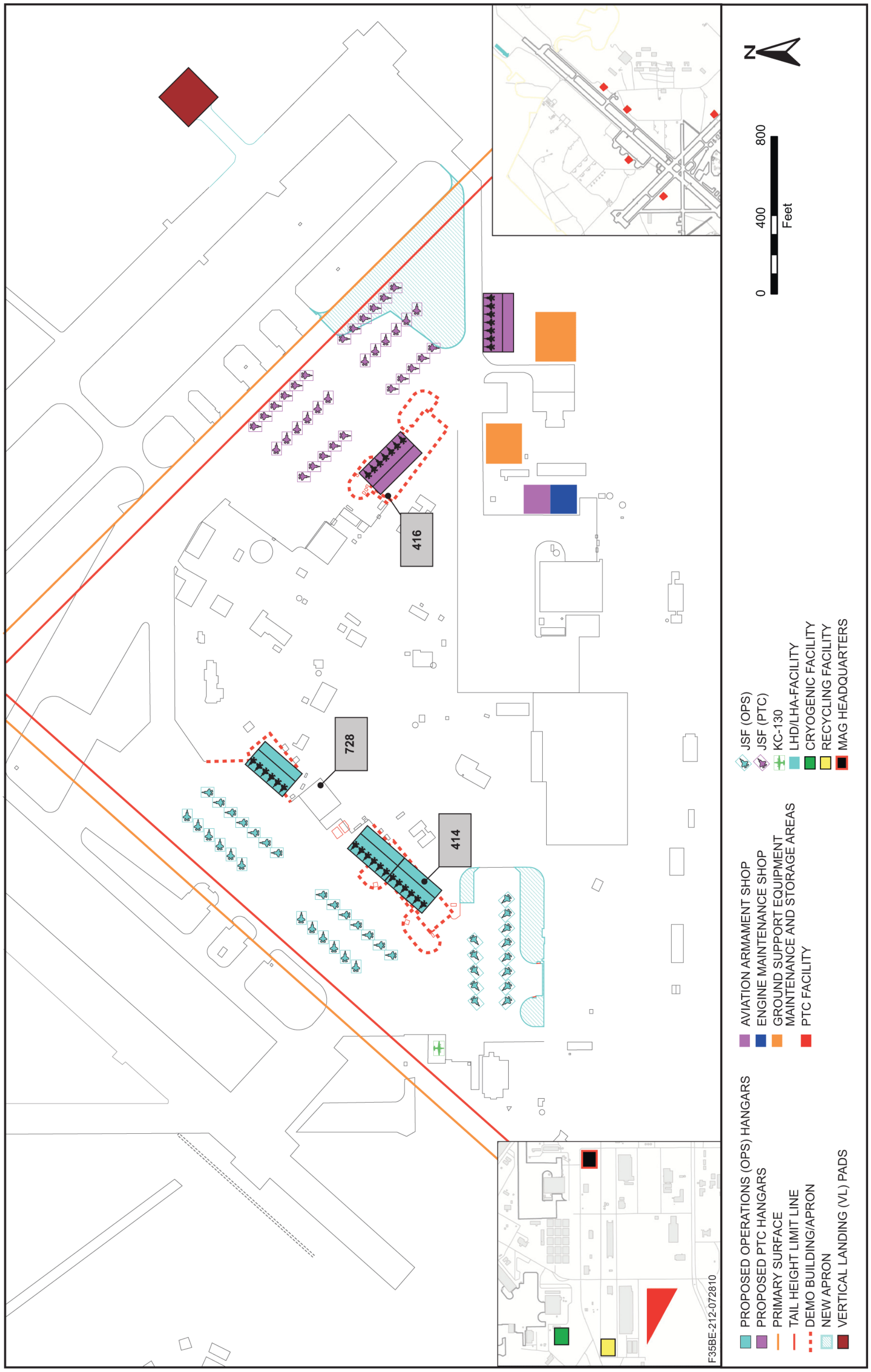


Figure 2-5 Alternative 1 (Preferred Alternative) Proposed Aircraft Flightline and Support Facility Construction at MCAS Beaufort

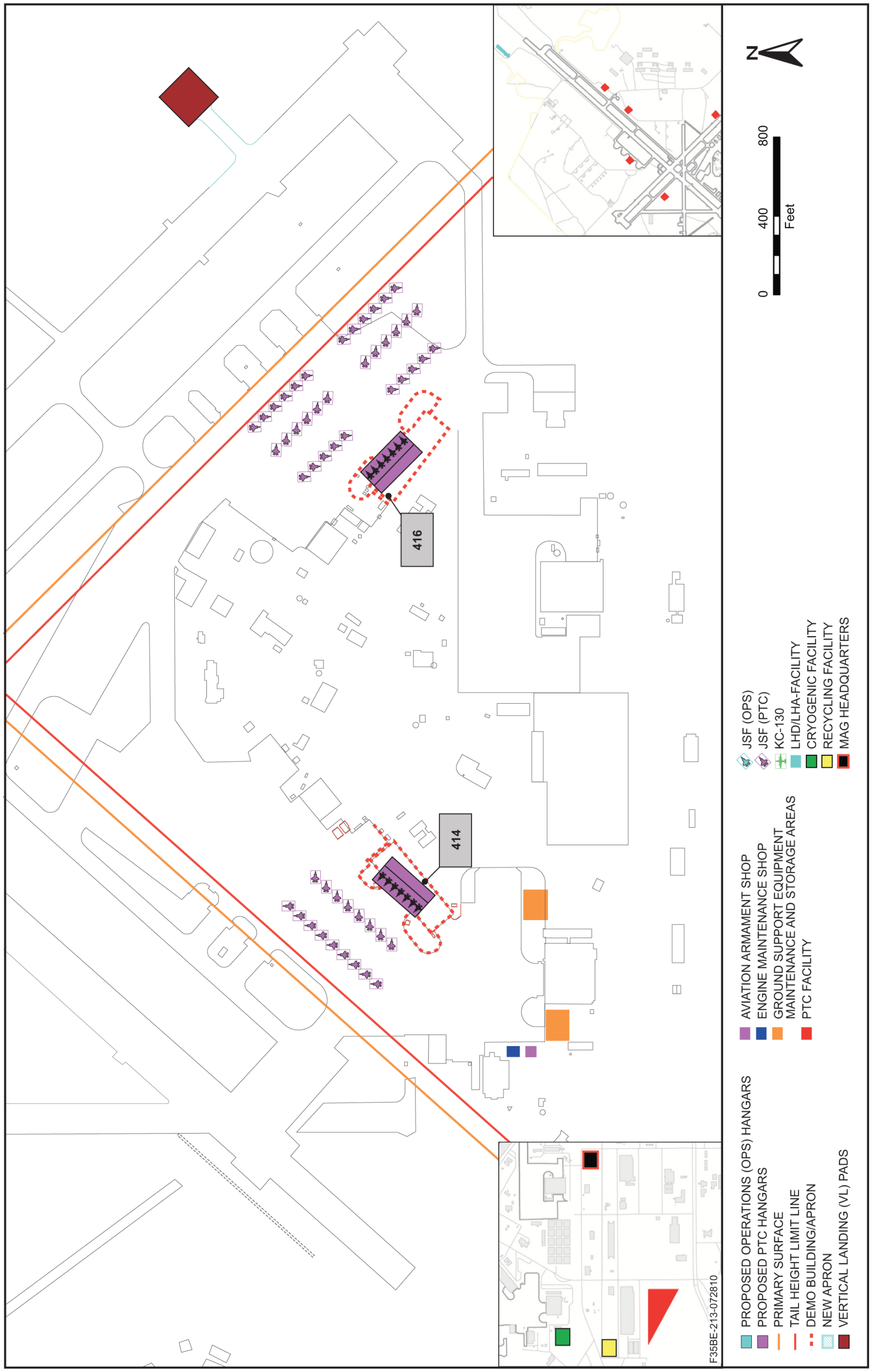


Figure 2-6 Alternative 2 Proposed Aircraft Flightline and Support Facility Construction at MCAS Beaufort

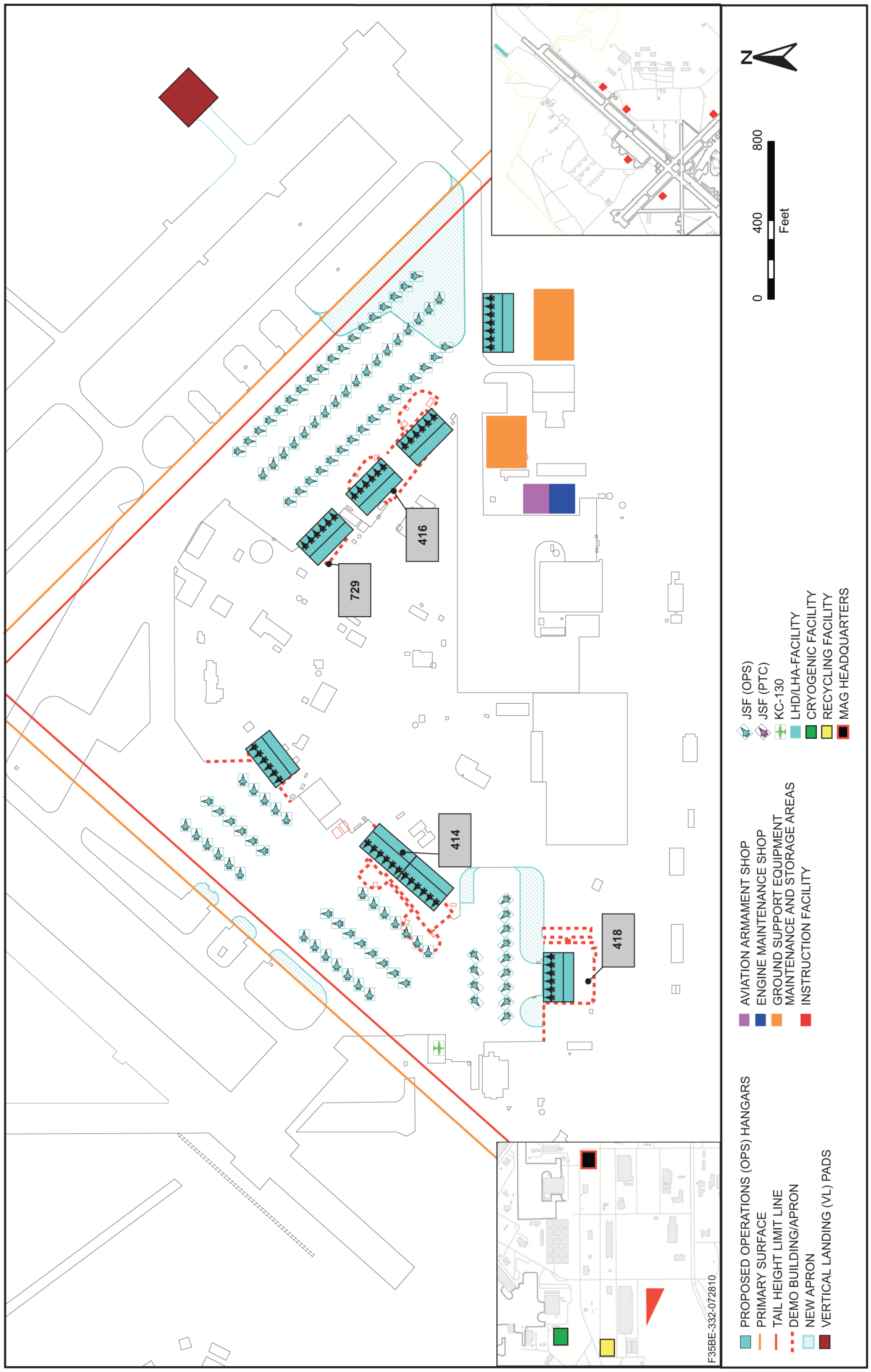


Figure 2-7 Alternative 3 Proposed Aircraft Flightline and Support Facility Construction at MCAS Beaufort

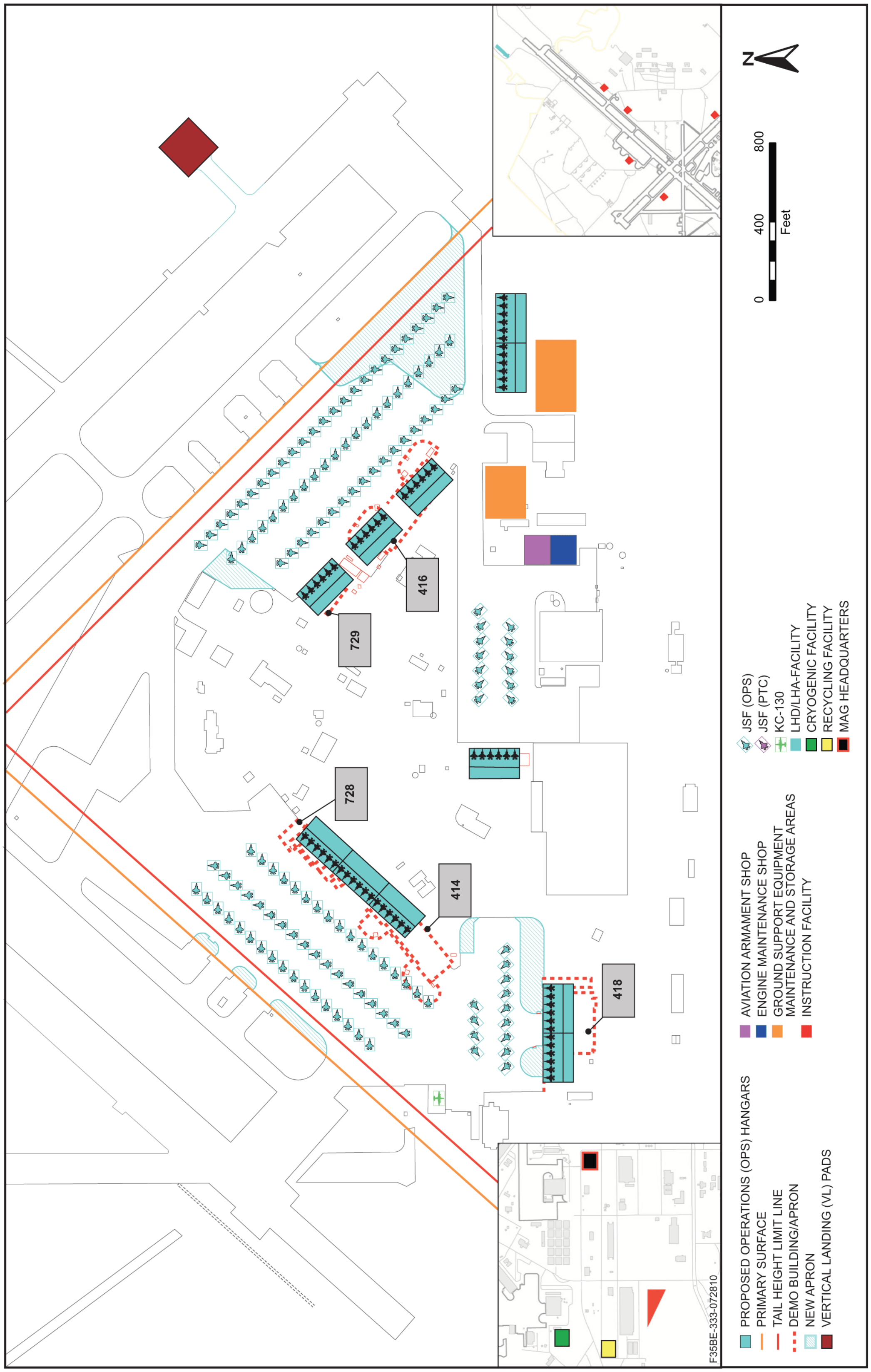


Figure 2-8 Alternative 4 Proposed Aircraft Flightline and Support Facility Construction at MCAS Beaufort

Figure 2-9 Proposed BEQ Facilities at MCAS Beaufort under Alternative 4

2.3.2.4 Airfield Operations

Airfield use at MCAS Beaufort depends on the number of squadrons based at the Air Station. Table 2-16 provides authorized airfield operations found under baseline conditions and compares these to operations proposed for each alternative (USMC 2003).

Table 2-16 Authorized and Proposed Airfield Operations at MCAS Beaufort

Aircraft Category	Authorized	Proposed by Alternative			
		1 (Preferred)	2	3	4
Based F/A-18 Airfield Operations					
F/A -18 Departures	12,834	0	0	0	0
F/A-18 Arrivals	12,834	0	0	0	0
F/A-18 Pattern Work	30,184	0	0	0	0
Subtotal F/A-18[a]	***55,852***	0	0	0	0
Other Based and Transient Aircraft	6,149	6,149	6,149	6,149	6,149
Authorized Total	**62,001**	6,149	6,149	6,149	6,149
Proposed F-35B Airfield Operations					
F-35B Departures	N/A	32,293	23,437	23,616	32,472
F-35B Arrivals	N/A	32,293	23,437	23,616	32,472
F-35B Pattern Work	N/A	35,294	30,664	12,347	16,978
Subtotal F-35B	N/A	***99,881***	***77,538***	***59,579***	***81,921***
Other Based and Transient Aircraft	N/A	6,149	6,149	6,149	6,149
PROPOSED TOTAL ANNUAL AIRFIELD OPERATIONS	**N/A**	**106,030**	**83,687**	**65,728**	**88,070**
Change Relative to Authorized	N/A	*44,029*	*21,686*	*3,727*	*26,069*

Source: USMC 2003; 2009d.

Note: [a]Reflects operations generated by nine F/A-18C/D squadrons, seven of which are Marine Corps and two of which are Navy squadrons (DoN 2003c). Since the Navy squadrons will have moved by the time the first F-35B arrives at MCAS Beaufort, they are not included in the alternatives (USMC 2009d).

2.3.3 MCAS Cherry Point

MCAS Cherry Point, located in the City of Havelock, NC, supports (as baseline) one training and three operational AV-8B squadrons, one KC-130 tanker squadron, four EA-6B squadrons, two F/A-18E/F squadrons, and an Unmanned Aerial Vehicle squadron, for a total of approximately 140 aircraft. The Marine Corps has determined that Alternative 1 is the Preferred Alternative that would best meet its purpose and need to establish F-35B aircraft on the East Coast.

2.3.3.1 Aircraft Replacement/Transition

There are 95,426 flight operations conducted annually at the Air Station, with the majority being generated by AV-8B squadrons. The baseline authorized aircraft loading and proposed aircraft loading under each alternative are shown in Table 2-17.

Table 2-17 MCAS Cherry Point Authorized and Proposed Aircraft Loading

Aircraft Type	Authorized	Proposed by Alternative			
		1 (Preferred)	2	3	4
AV-8B	68	0	0	0	0
EA-6B[a]	26	0	0	0	0
KC-130	15	15	15	15	15
F/A-18E/F (Navy)	24	24	24	24	24
UC-35	2	2	2	2	2
HH-46	3	3	3	3	3
C-9	2	2	2	2	2
F-35B	*N/A*	*128*	*176*	*88*	*40*
TOTAL	**140**	**174**	**222**	**134**	**86**

Sources: USMC 2009b, 2009d; DoN 2003a.
Notes: [a]Marine Corps AvPlan 2010 plans for the complete drawdown of EA-6Bs by 2020. For purposes of this EIS, the end state of 2023 was assumed for F-35B basing because the EA-6Bs and AV-8Bs will have transitioned out of the Marine Corps inventory at MCAS Cherry Point.

2.3.3.2 Personnel Changes

The estimated net change in military personnel for each of the basing alternatives at MCAS Cherry Point directly associated with the introduction of the F-35B is provided in Table 2-18. This estimate includes the additional 78 PTC pilots associated with the PTC per year, with 66 of those PTC pilots at MCAS Cherry Point at any given time.

Table 2-18 Proposed Changes in Military Personnel at MCAS Cherry Point[a]

Alternative	Officers			Enlisted			Total Military Personnel		
	Authorized	Proposed	*Net Change*	Authorized	Proposed	*Net Change*	Authorized	Proposed	*Net Change*
1 (Preferred)	115	216	*+101*	1,179	2,272	*+1,093*	1,294	2,488	*+1,194*
2	115	297	*+182*	1,179	3,124	*+1,945*	1,294	3,421	*+2,127*
3	115	203	*+88*	1,179	1,390	*+211*	1,294	1,593	*+299*
4	115	122	*+7*	1,179	538	*-641*	1,294	660	*-634*

Note: [a]Because the numbers of civilian and contractor personnel (and dependents) are not definitive; they were not included in the analysis.

Proposed numbers of dependents associated with proposed military personnel is included in Table 2-19. Changes in civilian and contractor personnel associated with the F-35B introduction are anticipated under all alternatives; however, the number of these non-military personnel is continually changing as the aircraft and its systems evolve. As such, the Marine Corps, therefore, has not included these non-military personnel changes because they cannot be predicted with any fidelity at this time. Once the data have more fidelity and it becomes evident that these numbers constitute a substantial change from existing conditions, the Marine Corps will undertake the appropriate level of environmental documentation to determine potential impacts.

Table 2-19 Estimated Change in Dependents at MCAS Cherry Point[a]

Alternative	Dependents		
	Existing	Proposed	*Net Change*
1 (Preferred)	2,391	4,714	*+2,323*
2	2,391	6,481	*+4,090*
3	2,391	3,014	*+623*
4	2,391	1,247	*-1,144*

Note: [a]Calculated using multipliers from Marine Corps Demographics, 10 August in USMC 2007a; does not include civilian and contractor personnel and their dependents.

2.3.3.3 Facility Requirements

Facility requirements under each alternative were identified in the Concept Development Plan for the East Coast Introduction of the F-35B (USMC 2009d). Proposed construction and demolition projects for each alternative are included in Table 2-20. In addition to these projects, security upgrades will be required. Once details of these upgrades are known, the appropriate level of environmental analyses and associated decision documents would be completed. New project construction disturbance areas and cost details for all alternatives are outlined in Table 2-21 and shown in Figures 2-10 through 2-13.

Table 2-20 Infrastructure Requirements at MCAS Cherry Point

Alternative	Construction and Demolition Requirements	
1 (Preferred)	• Demolish Hangars 131, 1665, 1667, 1700, and 1701 • Construct eight new hangar modules • Demolish existing ATCT and construct new ATCT • Construct aviation armament and engine shops • Upgrade VL pads • Construct non-PTC simulator facility	• Demolish existing and construct new Air Operations (Ops) building • Construct/modify airfield pavement, arm/de-arm pads • Demolish existing MAG Headquarters and paraloft building and construct MAG Headquarters • Reconstruction of tower and LHD/LHA deck and addition of apron (MCALF Bogue)
2	• Demolish Hangars 131, 1665, 1667, 1700, and 1701 • Construct eleven new hangar modules • Demolish existing ATCT and construct a new ATCT • Demolish existing Air Ops building and construct new Air Ops building • Construct/modify airfield pavement, arm/de-arm pads, and extended fuel lines and pits • Construct rinse facility	• Upgrade VL pads • Construct non-PTC simulator facility • Construct aviation armament and engine shops • Demolish existing MAG Headquarters and paraloft building and construct MAG Headquarters • Reconstruction of tower and LHD/LHA deck and addition of apron (MCALF Bogue) • Construct community support facilities • Construct two BEQs
3	• Demolish Hangars 131, 1665, 1667, 1700, and 1701 • Construct five new hangar modules • Demolish existing ATCT and construct new ATCT • Construct aviation armament and engine shops • Upgrade VL pads • Demolish existing Air Ops building and construct new Air Ops building	• Construct/modify airfield pavement • Construct arm/de-arm pads • Construct PTC training/instruction/simulation facility • Demolish existing MAG Headquarters and paraloft building and construct MAG Headquarters • Reconstruction of tower and LHD/LHA deck and addition of apron (MCALF Bogue)
4	• Demolish Hangars 131 and 1700 • Construct two new hangar modules • Demolish existing ATCT and construct new ATCT • Construct aviation armament and engine shops • Upgrade VL pads • Demolish existing Air Ops building and construct new Air Ops building	• Construct/modify airfield pavement • Construct arm/de-arm pads • Construct PTC training/instruction/simulation facility • Demolish existing MAG Headquarters and paraloft building and construct MAG Headquarters • Reconstruction of tower and LHD/LHA deck and addition of apron (MCALF Bogue)

Table 2-21 New Construction and Estimated Costs at MCAS Cherry Point

Alternatives	Proposed Projects														
	Airfield Pavement/ Parking Apron	Aircraft Hangar(s)	Rinse Facility	PTC training/ instruction/ Simulator Facility[a]	Ground Support Equipment Maintenance and Storage Areas	Arm/De-arm Pads	ATCT and Air Operations Relocation	MAG Headquarters	Non-PTC Simulator Facility	VL Pads	Aviation Armament Shop	MCALF Bogue Improvements[b]	Community Support Facilities[c]	BEQs	TOTAL
Alternative 1															
Area Disturbed (acres)[d]	7.6	25.7	N/A	N/A	3.6	8.2	1.6	0.8	1.6	22.0	0.4	41.3	N/A	N/A	**112.8**
Vegetation Loss (acres)[e]	0	0	N/A	N/A	0	0	0	0	0	0	0	0	N/A	N/A	**0**
Cost (millions dollars)[f]	32.2	375.0[g]	N/A	N/A	22.1	7.5	25.0	10.0	40.0	5.0	2.0	17.5	N/A	N/A	**$536.3**
Alternative 2															
Area Disturbed (acres)[d]	49.2	25.7	0.2	N/A	3.6	8.2	1.6	0.8	1.6	22.0	0.4	41.3	46.7	5.0	**206.3**
Vegetation Loss (acres)[e]	0	0	0	N/A	0	0	0	0	0	0	0	0	26.8	0	**26.8**
Cost (millions dollars)[f]	77.3	510.0[g]	0.5	N/A	22.1	7.5	25.0	10.0	44.8[h]	5.0	2.0	17.5	52.5	42.0	**$816.2**
Alternative 3															
Area Disturbed (acres)[d]	7.6	16.8	N/A	5.0	3.6	8.2	1.6	0.8	N/A	22.0	0.4	41.3	N/A	N/A	**107.3**
Vegetation Loss (acres)[e]	0	0	N/A	0	0	0	0	0	N/A	0	0	0	N/A	N/A	**0**
Cost (millions dollars)[f]	25.5	225.0	N/A	52.3	22.1	7.5	25.0	10.0	N/A	5.0	2.0	17.5	N/A	N/A	**$391.9**
Alternative 4															
Area Disturbed (acres)[d]	7.6	5.8	N/A	5.0	3.6	8.2	1.6	0.8	N/A	22.0	0.4	41.3	N/A	N/A	**96.3**
Vegetation Loss (acres)[e]	0	0	N/A	0	0	0	0	0	N/A	0	0	0	N/A	N/A	**0**
Cost (millions dollars)[f]	14.8	90.0	N/A	52.3	22.1	7.5	25.0	10.0	N/A	5.0	2.0	17.5	N/A	N/A	**$246.2**

Source: USMC 2009d.

Notes: [a]The PTC would not be established at MCAS Cherry Point under Alternatives 1 and 2, only a non-PTC simulator facility would be built.

[b]Includes reconstruction of tower and LHD deck, apron addition, and airfield overlay at MCALF Bogue.

[c]Includes construction of a Marine Corps Community Services (MCCS) 7-Day Store, Fitness Center, Chow Hall, and Access/Duffy Road improvements.

[d]The total includes total areas disturbed due to clearing, grading, and construction equipment storage (i.e., laydown area); access roads and entrances; as well as associated parking areas and landscaping activities.

[e]Vegetation loss refers to forested undeveloped land only; other types of vegetation, such as grasslands, are excluded from the estimates shown.

[f]Estimates shown are in 2011 dollars, include both demolition and construction costs, and may not add up exactly due to rounding.

[g]Includes construction of a parking garage for Alternatives 1 and 2 only.

[h]Includes $4.8 million for fuel pits and 1.4 acres of extended lines for Alternative 2 only.

Alternative 1 (Preferred Alternative) – Eight Operational Squadrons

Figure 2-10 provides the site layouts for proposed new airfield-associated construction and demolition as well as the proposed sites for support facilities are indicated (USMC 2009d). Under this alternative, 112.8 acres (none of which are forested) would be disturbed to accommodate the projects proposed under Alternative 1. Disturbed acreage includes areas exposed to clearing and grading activities, construction equipment and material storage (i.e., laydown) areas, access roads and entrances, landscaping, as well as parking areas for government- and privately-owned vehicles.

Alternative 2 – Eleven Operational Squadrons

Figure 2-11 provides the site layouts for new airfield-associated construction and demolition activities and indicates new support facility construction proposed under Alternative 2 (USMC 2009d). Two BEQs would be constructed to accommodate the increased housing need for enlisted personnel. The BEQs would be constructed at a previously disturbed location, already identified for future BEQ development (Figure 2-12). In addition, community support facilities, including construction of a MCCS 7 day store, fitness center, and chow hall, in addition to Access/Duffy Road improvements, would be needed to accommodate the increased personnel. Under this alternative, 206.3 acres would be disturbed, which includes up to 26.8 acres of vegetation loss.

Alternative 3 – Three Operational Squadrons and PTC

For Alternative 3, Figure 2-13 indicates proposed new airfield-associated facility construction and demolition activities as well as the site layouts for proposed new support facilities (including the PTC training, instruction, and simulation facility) (USMC 2009d). While no forested areas would be removed, 107.3 acres of previously disturbed areas would be impacted.

Alternative 4 – The PTC

In total, 96.3 acres (none are forested) would be disturbed to implement this alternative. Figure 2-14 presents the proposed new airfield-associated construction and demolition activities as well as the site layouts for proposed new support facilities (including the PTC training, instruction, and simulation facility) (USMC 2009d).

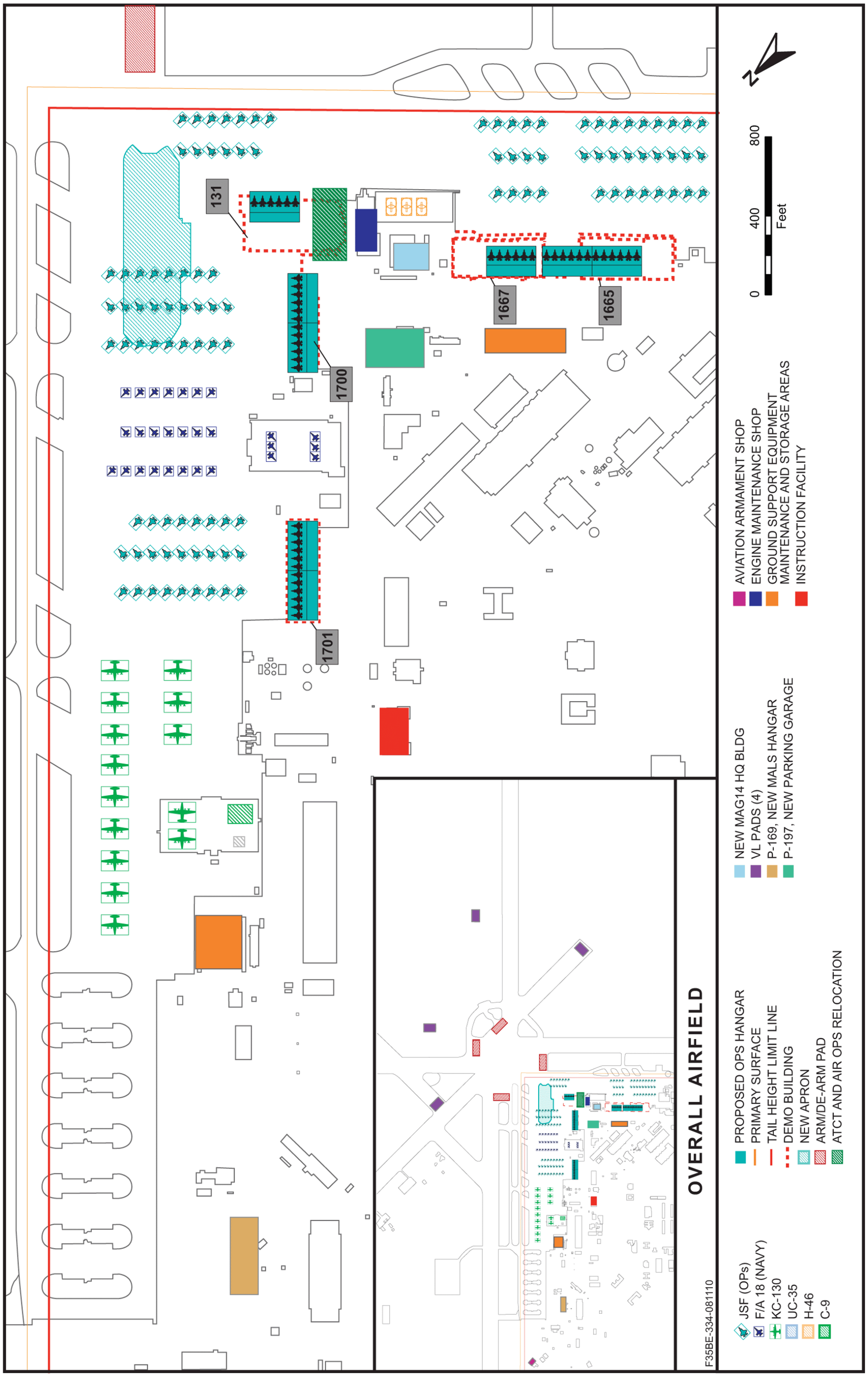


Figure 2-10 Alternative 1 (Preferred Alternative) Proposed Aircraft Flightline and Support Facility Construction at MCAS Cherry Point

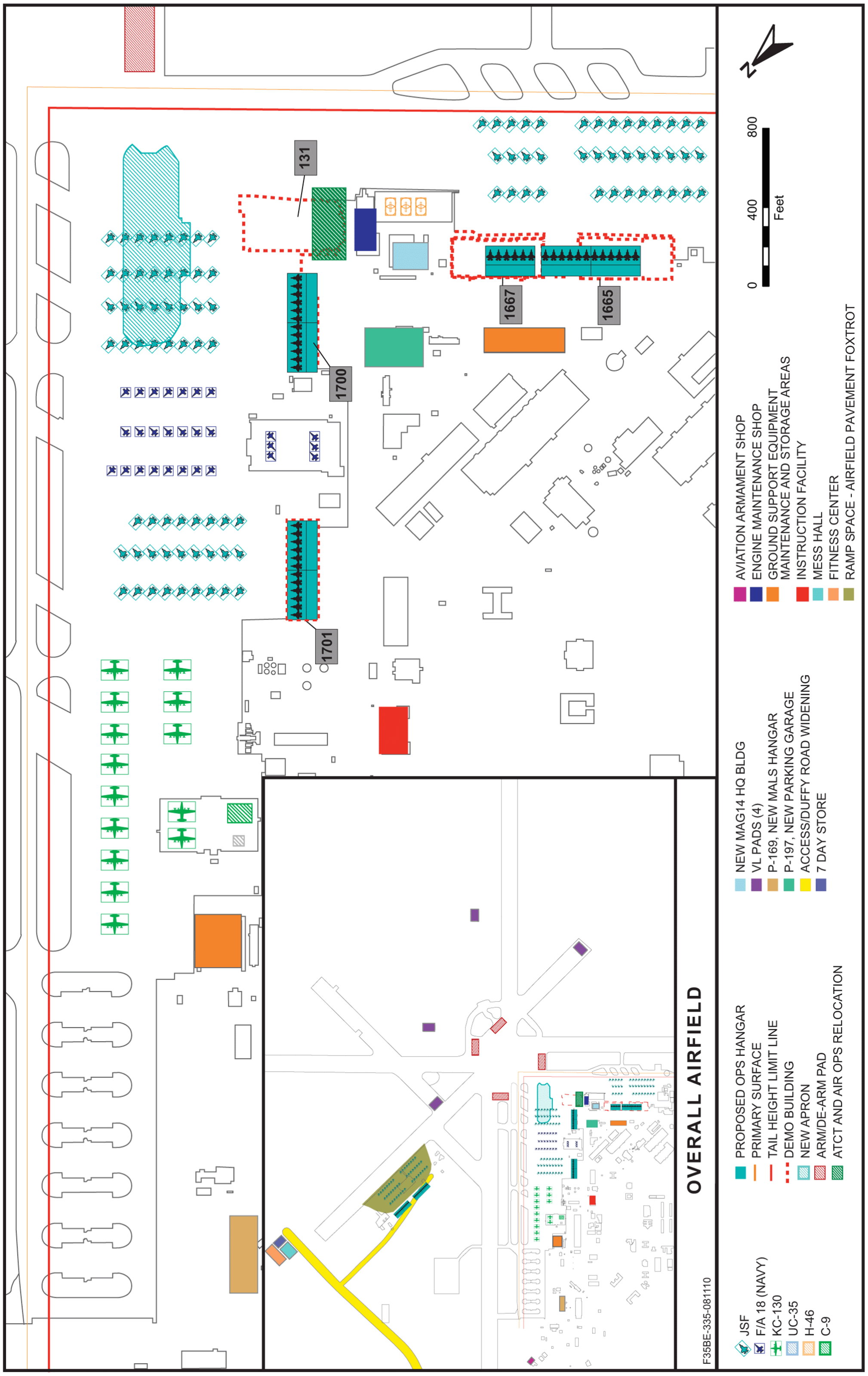


Figure 2-11 Alternative 2 Proposed Aircraft Flightline and Support Facility Construction at MCAS Cherry Point

Figure 2-12 Alternative 2 Proposed BEQ Facilities at MCAS Cherry Point

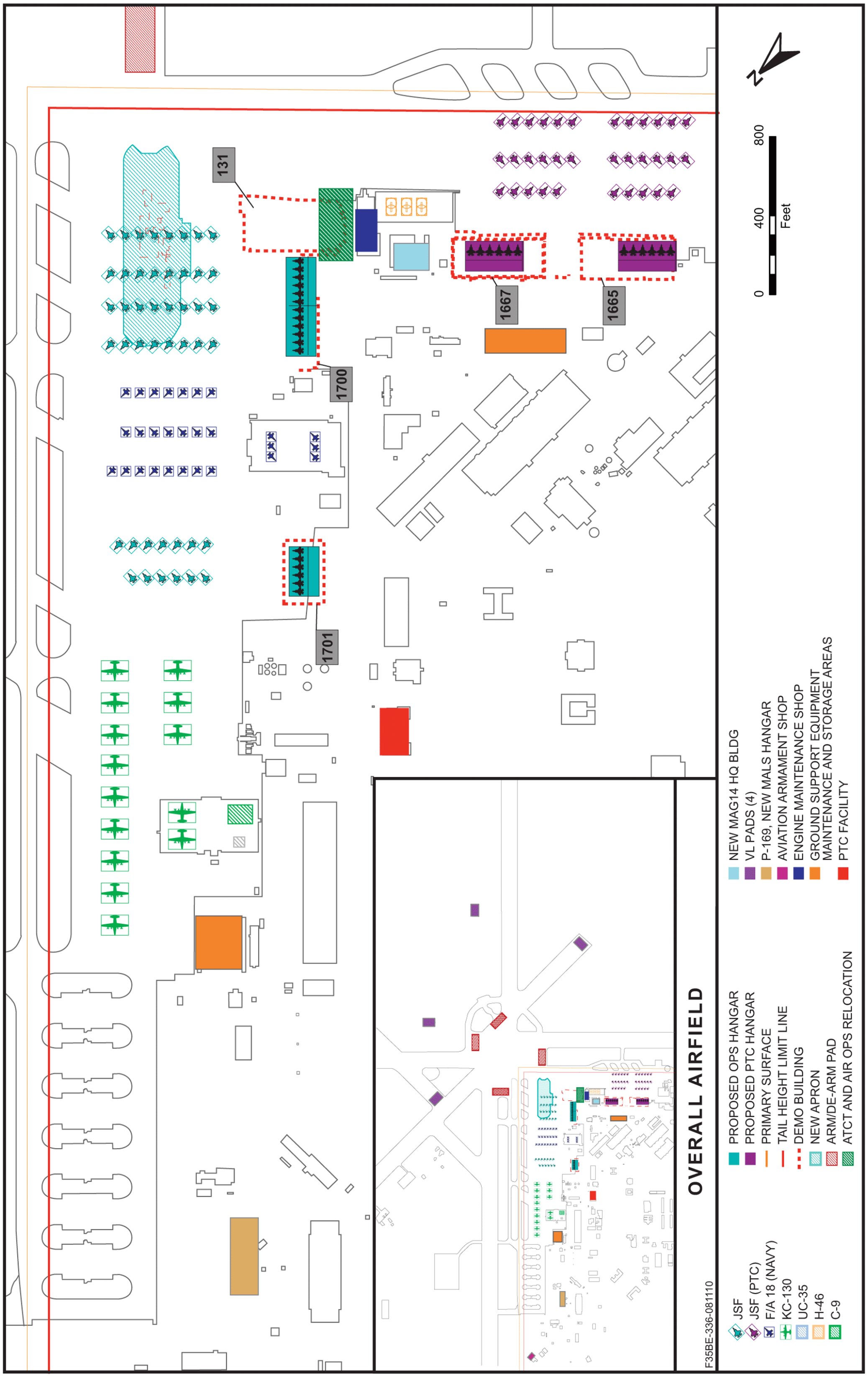


Figure 2-13 Alternative 3 Proposed Aircraft Flightline and Support Facility Construction at MCAS Cherry Point

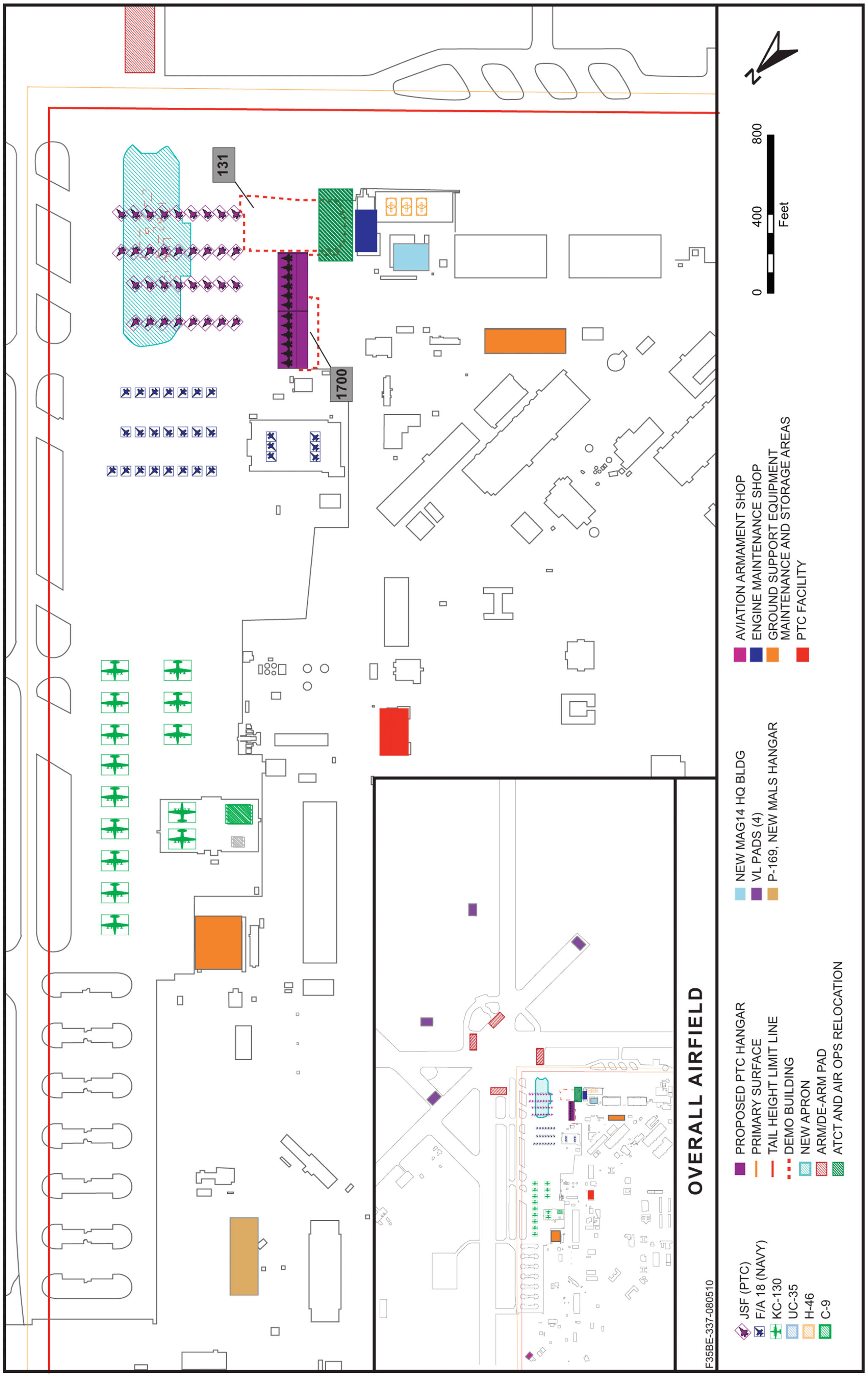


Figure 2-14 Alternative 4 Proposed Aircraft Flightline and Support Facility Construction at MCAS Cherry Point

2.3.3.4 Airfield Operations

Airfield use at MCAS Cherry Point depends upon the number of squadrons based at the Air Station. Table 2-22 provides the proposed approximate number of airfield operations by alternative compared to operations as they were last authorized, reported, and published in the 2003 ROD to base F/A-18E/F at MCAS Cherry Point (DoN 2003b).

Table 2-22 Authorized Baseline and Proposed Airfield Operations at MCAS Cherry Point

Aircraft Category	Authorized	Proposed by Alternative			
		1 (Preferred)	2	3	4
Based AV-8B Airfield Operations					
AV-8B Departures	9,625	0	0	0	0
AV-8B Arrivals	9,617	0	0	0	0
AV-8B Pattern Work	39,173	0	0	0	0
Subtotal AV-8B	***58,415***	0	0	0	0
Other Based and Transient Aircraft	37,011[a]	28,019[b]	28,019[b]	28,019[b]	28,019[b]
Authorized Total	**95,426**	28,019[b]	28,019[b]	28,019[b]	28,019[b]
Proposed F-35B Airfield Operations					
F-35B Departures	N/A	23,616	32,472	32,293	23,437
F-35B Arrivals	N/A	23,616	32,472	32,293	23,437
F-35B Pattern Work	N/A	8,129	11,178	31,889	28,840
Subtotal F-35B	*N/A*	***55,361***	***76,122***	***96,475***	***75,714***
Other Based and Transient Aircraft	28,019[b]	28,019[b]	28,019[b]	28,019[b]	28,019[b]
PROPOSED TOTAL ANNUAL AIRFIELD OPERATIONS	**N/A**	**83,380**	**104,141**	**124,494**	**103,733**
Change Relative to Authorized	N/A	*-12,046*	*8,715*	*29,068*	*8,307*

Sources: DoN 2003a, 2003b; USMC 2008c, 2009d.

Note: [a]Other based aircraft include the EA-6Bs, KC-130J, and two proposed Navy F/A-18E/F Squadrons.

[b]By the time the F-35Bs would be based at the Air Station, the Marine Corps plans to drawdown the EA-6Bs to reduce operations by 8,992 from what are found under baseline/authorized airfield operations.

2.3.4 Auxiliary Landing Field Operations

Under the Proposed Action, no new auxiliary, expeditionary, or outlying landing fields would be required in order to base and operate F-35B aircraft. However, the Marine Corps does maintain and utilize an existing MCALF, where F-35B landing field practice would occur (Figure 2-15). The majority of F-35B operations at MCALF Bogue would be generated by MCAS Cherry Point aircraft, replacing existing authorized AV-8B operations.

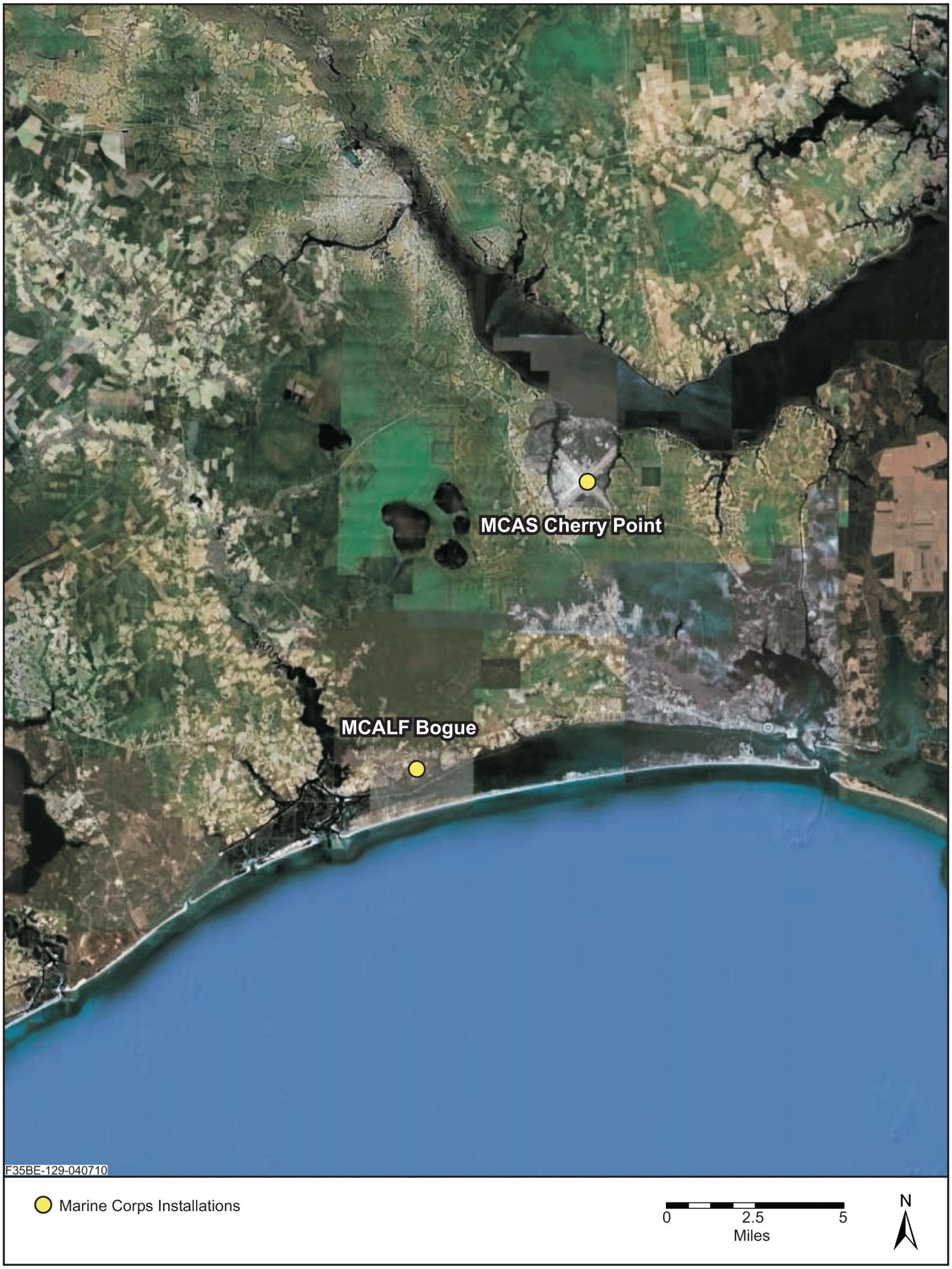


Figure 2-15 MCALF Bogue in relation to MCAS Cherry Point

Table 2-23 presents and includes all proposed airfield operations anticipated under the four alternatives, and compares these numbers to those authorized under baseline conditions.

Table 2-23 Authorized Baseline and Proposed Airfield Operations at MCALF Bogue[a]

Aircraft Category	Authorized	Proposed by Alternative			
		1 (Preferred)	2	3	4
AV-8B Departures	664	0	0	0	0
AV-8B Arrivals	664	0	0	0	0
AV-8B Pattern Work	13,888	0	0	0	0
Subtotal AV-8B	***15,216***	0	0	0	0
Other Transient Aircraft	1,179	1,179	1,179	1,179	1,179
Authorized Total	**16,395**	**1,179**	**1,179**	**1,179**	**1,179**
Proposed F-35B (Operational and Training Squadrons) Operations					
F-35B Departures	N/A	583	802	675	456
F-35B Arrivals	N/A	583	802	675	456
F-35B Pattern Work	N/A	4,218	5,800	3,406	1,824
Total F-35B	**N/A**	**5,385**	**7,404**	**4,755**	**2,736**
Other Transient Aircraft	1,179	1,179	1,179	1,179	1,179
Proposed Total	**N/A**	**6,564**	**8,583**	**5,934**	**3,915**
Change Relative to Authorized	N/A	*-9,831*	*-7,812*	*-10,461*	*-12,480*

Source: USMC 2009d.
Note: [a]Numbers have been updated from the Draft EIS to correct typographical errors; however, the acoustical analysis presented in the Draft EIS reflects the correct number of airfield operations.

2.3.5 Proposed F-35B Airspace and Range Operations

Achieving combat readiness through realistic, quality training is an essential requirement for basing the F-35B aircraft. To meet this goal, F-35B pilots must perform training in military airspace with the necessary horizontal and vertical dimensions (refer to Figure 2-4). They also need to train over ranges that offer targets and other assets providing air-to-ground training, particularly ordnance delivery and CAS. Most importantly, the selected basing alternatives need to be located in close enough proximity to maximize training time and minimize transit time to and from the basing locations. As detailed in Section 2.2.1, proximity and access to these airspace units and ranges are essential requirements for the Proposed Action.

Under the Proposed Action, a set of fundamental elements arising from the particular needs and capabilities of the F-35B aircraft would apply to use of airspace and ranges. These elements, as detailed below, reflect both similarities and differences with legacy F/A-18 and AV-8B aircraft operations.

2.3.5.1 Elements of Operations in Airspace and Ranges

Despite the new, extensive capabilities of the F-35B, the Marine Corps has not identified a need to modify or expand existing airspace. Rather, the F-35B would use the currently available airspace units and ranges within 150 nm of MCAS Beaufort and MCAS Cherry Point. Regardless of the basing alternative, the same airspace and ranges would be used for F-35B training.

Due to the F-35B capabilities, the Marine Corps anticipates that operations would use combinations of adjacent airspace units for training missions. By scheduling and flying in adjacent Restricted Areas, MOAs, ATCAAs, and Warning Areas, F-35B pilots would train like they fight. The Marine Corps expects to continue updating F-35B training and readiness requirements and associated plans to reflect lessons learned from deployment exercises and through continued training experience. As with all new aircraft systems F-35B training requirements are continually evolving. At some point in the future, the Marine Corps may identify additional training areas and airspace necessary for applying the aircraft's capabilities to ever-changing missions. Such requirements have not been identified nor defined, and therefore are not ripe for assessment in this EIS. Should new requirements emerge, the Marine Corps will evaluate the environmental impacts under NEPA and other relevant authorities.

2.3.5.2 Core and Occasional Use Ranges and Airspace

Through evaluation of the available training and readiness program for the F-35B, the Marine Corps identified existing ranges and airspace for F-35B operational and PTC training (HQMC 2010). These existing ranges and airspace fall into two categories: 1) *core use* and 2) *occasional use*. Airspace and ranges defined as core areas would receive substantial use by the F-35Bs on a daily basis. Figure 2-16 depicts the core use airspace and ranges anticipated to receive substantial F-35B use from MCAS Beaufort and Cherry Point. Each of these core units is described in this section; impacts are presented in Chapter 6.

Two Warning Areas are typically used by aircrews from MCAS Cherry Point: W-72 and -122; both SUA are controlled by Department of Navy Fleet Area Control and Surveillance, and located within the Virginia Capes Operations Area (OPAREA). The types of training operations conducted in W-72 include AW flight training, unmanned aerial vehicle flights, refueling, test flights, rocket and missile firing, bombing, Fleet training, independent unit training, anti-submarine warfare, aircraft carrier, ship and submarine operations, and anti-air and surface gunnery. Conventional ordnance is permitted in this Warning Area (DoN 2009a). Operational training conducted in W-122 includes AW flight training, refueling, rocket and missile firing, bombing, fleet training, independent unit training, anti-submarine and aerial warfare, and surface gunnery. HE ordnance (up to 2,000-lb net explosive weight) is permitted within this airspace unit (DoN 2009b). Charleston OPAREA manages W-134, -161, and -177 and the Jacksonville OPAREA manages W-157, -158, and -159. Training operations within the six units are the same as those found in W-72 and W-122 (DoN 2009c).

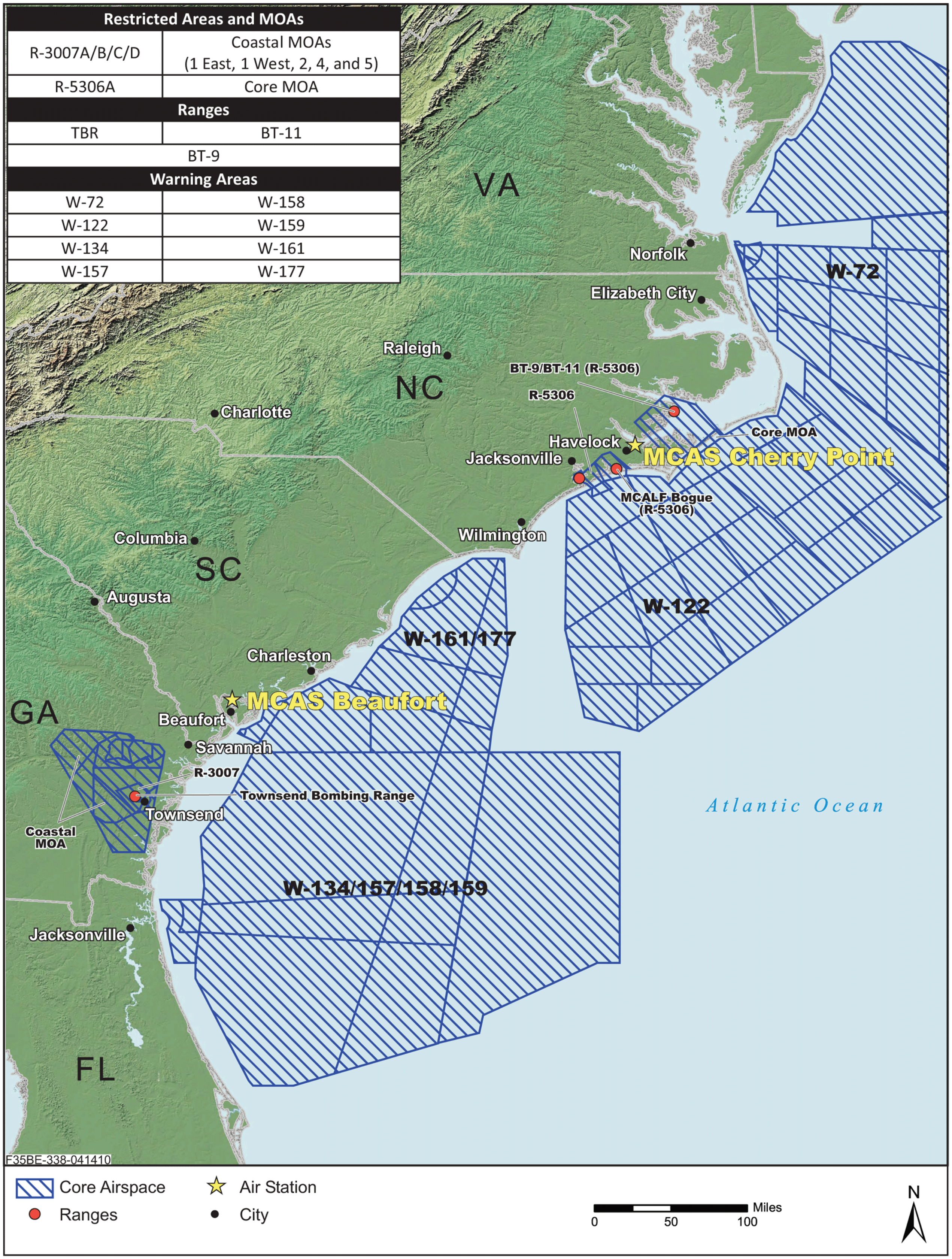


Figure 2-16 East Coast Core Airspace and Ranges

While Warning Areas are designated as core airspace units, for purposes of this EIS, they are not carried forward for further analysis. The Marine Corps made this decision due to the following reasons: 1) any F-35B training activities would be dispersed throughout an enormous volume of airspace spanning the East Coast from Maryland to Florida, so any effects would be likewise dispersed; 2) no new types of operations are anticipated as a result of basing the F-35B, therefore it is unlikely that conflicts with civilian or commercial aircraft would occur; 3) few operations would occur below 5,000 ft AGL, thereby minimizing noise levels and aircraft emissions that could potentially affect recreational activities, commercial fishing, other human-generated activities, marine wildlife, or regional air quality; and 4) no changes in the number or types of ordnance used at the ranges would occur.

Occasional use airspace and ranges used by MCAS Beaufort or MCAS Cherry Point would generally receive only infrequent use by the F-35Bs. Ranges like Poinsett Electronic Combat Range (Air Force) and Fort Stewart Training Areas (Army) are managed by other DoD commands and receive priority scheduling for their training purposes. The Marine Corps could only expect to gain occasional use for these reasons. In MTRs, the F-35B does not require as much low altitude training as legacy aircraft and thus would not need as much time training in these types of airspace. In addition, most of the over-land MOAs are too small in size and do not have the adequate depth (floor to ceiling altitudes) to support the space needed for the F-35Bs to train like they will fight; therefore, it is not anticipated that operations within these occasional use airspace units would make a perceptible change to the number and type of operations they currently experience by legacy F/A-18 and AV-8B aircraft.

From time to time, legacy aircraft venture across the continental U.S. to conduct operations beyond core use areas. The F-35B is expected to do the same. While predominant F-35B operations would occur in the airspace, ranges, and auxiliary landing fields identified as core use, the F-35B would not be limited to using only those areas. The F-35B may conduct operations in other SUA, on other ranges, and at other airfields within the nationwide SUA, auxiliary landing fields, ATCAA, Warning Area, and MTR network. In accordance with Council on Environmental Quality (CEQ) guidance, however, those operations will be so widespread and so infrequent that no further study is warranted in this EIS.

While the East Coast F-35B squadrons would conduct the majority of their training and combat readiness operations within existing East Coast military training areas, some large force exercises (such as combined live-arms training) can only be conducted at existing DoD ranges on the West Coast. As is the case with existing legacy aircraft, F-35B squadrons would deploy to the West Coast for large force exercises, live ordnance training, and Precision Guided Munitions (PGM) training that cannot be conducted on East Coast ranges.

For these exercises and PGM training, East Coast F-35B squadrons would travel to West Coast facilities. When squadrons go to another location to obtain required training, they are considered deployed and labeled transient at the location. For example, squadrons that are currently from MCAS Beaufort and/or

MCAS Cherry Point travel to the West Coast to participate in exercises; when these units are deployed they are accounted for as "transient" (i.e., visiting aircraft) within the airfield and airspace associated with that installation where training occurs. F-35B squadrons from East Coast Air Stations would be similarly accounted for as transients when deployed to an airfield and airspace other than their own. These operations by transient aircraft are accounted for in NEPA documentation at those locations. The F-35B West Coast Basing action EIS accounts for sorties conducted by these deployed units as transient aircraft at the Bob Stump Training Range Complex in California and Arizona (USMC 2010a).

2.3.5.3 Operations Use Levels

Tables 2-24 though 2-27 present the proposed core use airspace and range operations in comparison to baseline authorized operations for Alternatives 1 through 4, respectively. The percent of operations occurring below 5,000 ft msl would be the same for all alternatives as indicated in Table 2-10. In all tables, environmental day operations represent those activities that take place between 7:00 a.m. and 10:00 p.m. and environmental night operations are those that occur between 10:00 p.m. and 7:00 a.m.

Table 2-24 Baseline Authorized and Proposed Core Use Airspace and Range Operations Alternative 1[a, b]

Airspace/Range	Baseline Operations			Proposed Operations			Change in Operations
	Day	Environmental Night[c]	TOTAL	Day	Environmental Night[b]	TOTAL	*Net Change from Baseline*
MOAs							
Coastal 1 East MOA	1,245	219	1,464	5,294	26	5,320	*+3,856*
Coastal 1 West MOA	1,267	223	1,490	5,294	26	5,320	*+3,830*
Coastal 2 MOA	1,283	226	1,509	5,294	26	5,320	*+3,811*
Coastal 4 MOA	915	161	1,076	915	161	1,076	*0*
Coastal 5 MOA	314	55	369	5,294	26	5,320	*+4,951*
Core MOA	1,107	42	1,149	1,107	42	1,149	*0*
Restricted Airspace							
R-3007A/B/C/D	1,715	303	2,018	5,294	26	5,320	*+3,302*
R-5306A	5,068	62	5,130	4,419	42	4,461	*-669*
R-5306A (BT-9)	806	22	828	806	22	828	*0*
R-5306A (BT-11)	1,926	61	1,987	4,419	42	4,461	*+2,474*
R-5306C	812	1	813	812	1	813	*0*
R-5306D	645	114	759	645	114	759	*0*

Sources: Data validated by HQMC 2010.

Notes: [a]Sortie-operations are not additive and are unique to each particular SUA unit.

[b]Numbers have been updated from the Draft EIS to correct typographical errors; however, the acoustical analysis presented in the Draft EIS reflects the correct number of airfield operations.

[c]Environmental night is defined as the time between 10:00 p.m. and 7:00 a.m. Noise modeling weighs aircraft operations occurring during this time at a heavier level than those outside this timeframe.

Table 2-25 Baseline Authorized and Proposed Core Use Airspace and Range Operations Alternative 2[a, b]

Airspace/Range	Baseline Operations			Proposed Operations			Change in Operations
	Day	Environmental Night[c]	TOTAL	Day	Environmental Night[b]	TOTAL	*Net Change from Baseline*
MOAs							
Coastal 1 East MOA	1,245	219	1,464	3,637	11	3,648	*+2,184*
Coastal 1 West MOA	1,267	223	1,490	3,637	11	3,648	*+2,158*
Coastal 2 MOA	1,283	226	1,509	3,637	11	3,648	*+2,139*
Coastal 4 MOA	915	161	1,076	915	161	1,076	*0*
Coastal 5 MOA	314	55	369	3,637	11	3,648	*+3,279*
Core MOA	1,107	42	1,149	1,107	42	1,149	*0*
Restricted Airspace							
R-3007A/B/C/D	1,715	303	2,018	3,637	11	3,648	*+1,630*
R-5306A	5,068	62	5,130	6,076	57	6,133	*+1,003*
R-5306A (BT-9)	806	22	828	806	22	828	*0*
R-5306A (BT-11)	1,926	61	1,987	6,076	57	6,133	*+4,146*
R-5306C	812	1	813	812	1	813	*0*
R-5306D	645	114	759	645	114	759	*0*

Sources: Data validated by HQMC 2010.

Notes: [a]Sortie-operations are not additive and are unique to each particular SUA unit.

[b]Numbers have been updated from the Draft EIS to correct typographical errors; however, the acoustical analysis presented in the Draft EIS reflects the correct number of airfield operations.

[c]Environmental night is defined as the time between 10:00 p.m. and 7:00 a.m. Noise modeling weighs aircraft operations occurring during this time at a heavier level than those outside this timeframe.

Table 2-26 Baseline Authorized and Proposed Core Use Airspace and Range Operations Alternative 3[a, b]

Airspace/Range	Baseline Operations[a]			Proposed Operations			Change in Operations
	Day	Environmental Night[c]	TOTAL	Day	Environmental Night[b]	TOTAL	*Net Change from Baseline*
MOAs							
Coastal 1 East MOA	1,245	219	1,464	4,419	42	4,461	*+2,997*
Coastal 1 West MOA	1,267	223	1,490	4,419	42	4,461	*+2,971*
Coastal 2 MOA	1,283	226	1,509	4,419	42	4,461	*+2,952*
Coastal 4 MOA	915	161	1,076	915	161	1,076	*0*
Coastal 5 MOA	314	55	369	4,419	42	4,461	*+4,092*
Core MOA	1,107	42	1,149	1,107	42	1,149	*0*
Restricted Airspace							
R-3007A/B/C/D	1,715	303	2,018	4,419	42	4,461	*+2,443*
R-5306A	5,068	62	5,130	5,294	26	5,320	*+190*
R-5306A (BT-9)	806	22	828	806	22	828	*0*
R-5306A (BT-11)	1,926	61	1,987	5,294	26	5,320	*+3,333*
R-5306C	812	1	813	812	1	813	*0*
R-5306D	645	114	759	645	114	759	*0*

Sources: Data validated by HQMC 2010.

Notes: [a]Sortie-operations are not additive and are unique to each particular SUA unit.

[b]Numbers have been updated from the Draft EIS to correct typographical errors; however, the acoustical analysis presented in the Draft EIS reflects the correct number of airfield operations.

[c]Environmental night is defined as the time between 10:00 p.m. and 7:00 a.m. Noise modeling weighs aircraft operations occurring during this time at a heavier level than those outside this timeframe.

Table 2-27 Baseline Authorized and Proposed Core Use Airspace and Range Operations Alternative 4[a, b]

Airspace/Range	Baseline Operations			Proposed Operations			Change in Operations
	Day	Environmental Night[c]	TOTAL	Day	Environmental Night[b]	TOTAL	*Net Change from Baseline*
MOAs							
Coastal 1 East MOA	1,245	219	1,464	6,076	57	6,133	*+4,669*
Coastal 1 West MOA	1,267	223	1,490	6,076	57	6,133	*+4,643*
Coastal 2 MOA	1,283	226	1,509	6,076	57	6,133	*+4,624*
Coastal 4 MOA	915	161	1,076	915	161	1,076	*0*
Coastal 5 MOA	314	55	369	6,076	57	6,133	*+5,764*
Core MOA	1,107	42	1,149	0	0	0	*-1,149*
Restricted Airspace							
R-3007A/B/C/D	1,715	303	2,018	6,076	57	6,133	*+4,115*
R-5306A	5,068	62	5,130	3,637	11	3,648	*-1,482*
R-5306A (BT-9)	806	22	828	806	22	828	*0*
R-5306A (BT-11)	1,926	61	1,987	3,637	11	3,648	*+1,661*
R-5306C	812	1	813	812	1	813	*0*
R-5306D	645	114	759	645	114	759	*0*

Sources: Data validated by HQMC 2010.

Notes: [a]Sortie-operations are not additive and are unique to each particular SUA unit.

[b]Numbers have been updated from the Draft EIS to correct typographical errors; however, the acoustical analysis presented in the Draft EIS reflects the correct number of airfield operations.

[c]Environmental night is defined as the time between 10:00 p.m. and 7:00 a.m. Noise modeling weighs aircraft operations occurring during this time at a heavier level than those outside this timeframe.

2.3.5.4 Transit to and from the Airspace and Ranges

The F-35B would not routinely use MTRs to access the airspace and ranges from MCAS Beaufort or MCAS Cherry Point. Rather, upon departing the Air Station and their air traffic control system, the pilots would, as with any other aircraft, follow a flight plan using the FAA enroute system. Such routings are dictated by air traffic in the area and controlled by the FAA. In order to maximize available fuel for training, the pilots commonly climb to higher altitudes to transit to a range or airspace unit. On return to the Air Station, the same pattern would apply.

2.4 No Action Alternative

Analysis of the No Action Alternative provides a benchmark that enables decision makers to evaluate the environmental consequences of the proposed basing alternatives. CEQ regulations at 40 Code of Federal Regulations (CFR) 1502.14(d) (Alternatives including the proposed action) require that a No Action Alternative be evaluated. No action means that the Proposed Action would not be implemented and that baseline conditions would remain unchanged.

Under the No Action Alternative, the Marine Corps would not provide any facilities or functions to support the basing or operation of F-35B operational squadrons or PTC on the East Coast. There would be no transition of F-35B personnel on the East Coast and no new construction or modification to support the F-35B, or F-35B operations. The F/A-18 and AV-8B squadrons would continue to be used by the 2d MAW. Legacy aircraft operations at each Air Station would continue at approximately current levels. The Marine Corps would continue to repair and operate the existing aircraft at greater expense as the F/A-18 and AV-8B aircraft continue to deteriorate until the end of their useful life.

Congress has legislated that the F-35B be acquired to replace the F/A-18 and AV-8B currently used by the Marine Corps. A No Action decision would further delay the implementation of Congressional directives, would negatively affect the overall program for integrating the F-35B into the Marine Corps, and would delay the fielding of the F-35B for operations and deployment. The No Action Alternative neither meets the need or purpose of this Proposed Action, but is carried forward as a baseline from which to compare the impacts of the Proposed Action and any action alternatives.

2.5 Preferred Alternative and Environmentally Preferable Alternative

2.5.1 Preferred Alternative

The Marine Corps selected Alternative 1 as the Preferred Alternative: three operational and two FRS PTC squadrons at MCAS Beaufort and eight operational squadrons at MCAS Cherry Point. This basing option best meets the purpose and need of the Proposed Action, and balances environmental impacts with mission requirements.

2.5.2 Environmentally Preferable Alternative

The CEQ regulations at 40 CFR 1505.2(b) also require that an environmentally preferable alternative be identified, which for this EIS would be the No Action Alternative. While this alternative would have impacts, it would not introduce any new impacts than those presented under the affected environment. The No Action Alternative, however, would not meet the purpose and need of this proposal. A comparative matrix of the environmental impacts of each alternative is provided in the Executive Summary. This matrix presents summary data on impacts relative to baseline conditions.

3.0 RESOURCE DEFINITION

3.0 RESOURCE DEFINITIONS

3.1 Introduction

3.1.1 Analytical Approach

The National Environmental Policy Act (NEPA) directs agencies to focus an Environmental Impact Statement (EIS) on potentially significant resources and issues affected by a proposed 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., Marine Corps) 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. The analysis in this EIS considers the baseline conditions of the affected environment and compares those to conditions that might occur should the Marine Corps implement either one of the action alternatives or No Action Alternative. This EIS focuses on those resources that would be affected by the proposed basing and operation of F-35B squadrons at Marine Corps Air Station (MCAS) Beaufort, MCAS Cherry Point, and in regional core airspace.

3.1.2 Affected Environment

The Proposed Action includes four components that directly affect MCAS Beaufort and MCAS Cherry Point: aircraft replacement/transition, facility requirements, personnel changes, and airfield operations. Existing airspace and ranges proposed for use by the F-35B aircraft also form part of the affected environment. As indicated previously in Chapter 2, airspace and ranges defined as core use are the focus of analysis; occasional use airspace and ranges receive minimal attention, and only for specific issues. Table 3-1 defines the resources associated with each affected area. As this table reveals, the types of resources affected by the Proposed Action's four components are the same for MCAS Beaufort and MCAS Cherry Point; however, the scope and nature of the effects may differ. In contrast, only certain components have the potential to affect resources in the airspace or at the ranges. While this EIS considers all resource topics for all areas, it emphasizes those resources affected by the Proposed Action and only mentions briefly those resources that are not affected.

3.1.3 Definition of Baseline

Baseline conditions provide a benchmark against which an agency measures the potential impacts of the alternatives. Differences in the conditions between baseline and the alternatives reflect the magnitude and intensity of impacts relative to the various resources analyzed. The NEPA document must define the baseline conditions and timing of the action. Establishing baseline 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 discussed in Chapter 2, the different components of the action (i.e. aircraft replacement/transition, facility requirements, personnel changes, airfield operations) would start at different times. Construction of East Coast facilities would begin in 2011.

Table 3-1 Resources and Potentially Affected Areas

EIS Resource Section Designations / Resource Area	MCAS Beaufort				MCAS Cherry Point				Non-Air Station Airspace and Ranges			
	Aircraft Transition	Construction	Personnel Changes	Airfield Operations	Aircraft Transition	Construction	Personnel Changes	Airfield Operations	Aircraft Transition	Construction	Personnel Changes	Airfield Operations
4.2/5.2-Air Station Airfield and Associated Airspace	Yes	No	No	Yes	Yes	No	No	Yes	No	N/A	N/A	Yes
4.3/5.3 Noise	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	N/A	N/A	Yes
4.4/5.4 Air Quality	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	N/A	N/A	Yes
4.5/5.5 Hazardous Materials, Toxic Substances, Hazardous Waste, and Contaminated Sites	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	N/A	N/A	No
4.6/5.6 Safety	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	N/A	N/A	Yes
4.7/5.7 Land Use	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	N/A	N/A	Yes
4.8/5.8 Socioeconomics	No	Yes	Yes	No	No	Yes	Yes	No	No	N/A	N/A	No
4.9/5.9 Environmental Justice	No	No	No	Yes	No	No	No	Yes	No	N/A	N/A	Yes
4.10/5.10 Community Services	No	Yes	Yes	No	No	Yes	Yes	No	No	N/A	N/A	No
4.11/5.11 Utilities and Infrastructure	Yes	Yes	Yes	No	Yes	Yes	Yes	No	No	N/A	N/A	No
4.12/5.12 Transportation and Ground Traffic	No	Yes	Yes	No	No	Yes	Yes	No	No	N/A	N/A	No
4.13/5.13 Biological Resources	No	Yes	No	Yes	No	Yes	No	Yes	No	N/A	N/A	Yes
4.14/5.14 Geology, Topography, and Soils	No	Yes	No	No	No	Yes	No	No	No	N/A	N/A	No
4.15/5.15 Water Resources	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	N/A	N/A	No
4.16/5.16 Cultural and Traditional Resources	No	Yes	No	Yes	No	Yes	No	Yes	No	N/A	N/A	Yes
4.17/5.17 Coastal Zone Management	No	Yes	No	No	No	Yes	No	No	N/A	N/A	N/A	N/A

Notes: Yes = the resource may potentially be affected.
No = the resource is not expected to be affected.
N/A = the resource is not applicable.

Initial basing would start with the Pilot Training Center in 2014 and should be complete by 2018. Aircraft transition of the operational F-35B squadrons would start in 2014 on the East Coast and is estimated to be completed by 2023.

Operations within training ranges and airspace would begin when the first F-35B aircraft is based at an Air Station. Therefore, since activities under each of the alternatives would not begin at either MCAS

Beaufort or MCAS Cherry Point until 2011, the baseline employed for this EIS consists of the conditions reasonably foreseeable at that time, i.e., in 2011 when proposed construction is scheduled to begin. Such conditions would exclude other non-Joint Strike Fighter (JSF) related actions not yet authorized, although under analysis in separate NEPA documentation. Refer to Chapter 7, Cumulative Impacts, for a discussion of reasonably foreseeable projects and their NEPA documentation status.

3.1.4 Resources Not Carried Forward for Further Analysis

Recreational resources, as well as aesthetics and visual resources were not carried forward for further analysis because it is anticipated that the alternatives would have no effect on these resources. A description of the respective resource and explanation for the resource not being carried forward for further analysis is provided below.

Recreational resources encompass those indoor and outdoor recreational activities that take place away from the residence of the participant. Factors that influence recreational experiences include opportunities (i.e., type and number of facilities) and settings (i.e., municipal park versus wilderness area). Under each alternative, the following is not anticipated: changes in personnel numbers that could impact the availability of indoor or outdoor recreational facilities, changes to the type of recreational pursuits currently found both on and off Station, or change any of the recreational settings found within the airfield environment, underlying training airspace (there are increases to airspace operations but at higher altitudes than currently found), or those found adjacent to existing ranges (there would be no increases in the type or amount of operations and ordnance use than is currently authorized and analyzed within Marine Corps and Navy environmental documentation). Therefore, this resource category was not carried forward for further analysis.

Aesthetic and visual resources are defined as the natural and manufactured features that constitute an area's aesthetic qualities. These features form the overall impression that an observer receives of an area, including its landscape character. Landforms, water surfaces, vegetation, and manufactured features are considered distinctive elements of an area's visual character if they are inherent to the function and structure of the landscape. Generally, any activity that has the potential to alter the quality or distinguishable characteristic of the perceived environment may be considered as having an effect on the visual resources of that area.

Sensitivity levels are a measure of the concern for the scenic values of a landscape that the public (users) have. Public lands are given a high, medium, or low sensitivity level by considering the type of user, amount of use, public uses, adjacent land uses, and special management or research objectives. MCAS Beaufort and MCAS Cherry Point are considered low visual sensitivity areas and have low visual quality. Low sensitivity views include typical urban or suburban areas, agricultural and farming areas, industrial or commercial developments, and other areas that do not contain unique or historic resources typical of medium or high visual sensitivity areas. For this reason, visual and aesthetic resources were not carried forward for further analysis.

3.1.5 Organization of this Chapter

Since the affected area consists of three distinct locations – MCAS Beaufort, MCAS Cherry Point, and remote airspace and ranges – this EIS presents descriptions of baseline conditions and potential impacts for each location separately (i.e., Chapters 4, 5, and 6, respectively). However, the basic definitions for resources would remain the same for all three areas, and to lessen redundancies, the definitions of each of the resources are provided below. In addition, the affected environment and Region of Influence (ROI) is identified below in general terms and specifically in the resource sections of MCAS Beaufort, MCAS Cherry Point, and MCALF Bogue (including airspace and ranges) in Chapters 4, 5, and 6, respectively. Information regarding the analytical methodology used in determining potential impacts to each resource area is provided in Appendix C.

3.2 Airfields and Associated Airspace

Airspace management is defined as the direction, control, and handling of flight operations in the "navigable airspace" that overlies the geopolitical borders of the United States (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 it includes airspace needed to ensure safety in the takeoff and landing of aircraft (49 USC Section 40102). The Federal Aviation Administration (FAA) is responsible for developing plans and policies for using navigable airspace, for designating use of the airspace necessary to ensure aircraft safety, and ensuring its efficient use through regulations or orders (49 USC Section 40103(b); FAA Order JO 7400.2G [with changes 1, 2, and 3]). Special Use Airspace (SUA) identified for military and other governmental activities is charted and published by the National Aeronautical Charting Office in accordance with FAA Order JO 7400.2G 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. To determine how the National Airspace System can best be structured to address all user requirements, 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 7400.2G.

The two categories of airspace or airspace areas are regulatory and non-regulatory. Within these two categories there are four types of airspace: Controlled, Uncontrolled, Special Use, and Other. 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 (VFR) flights in accordance with the airspace classification (FAA 2004). 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.

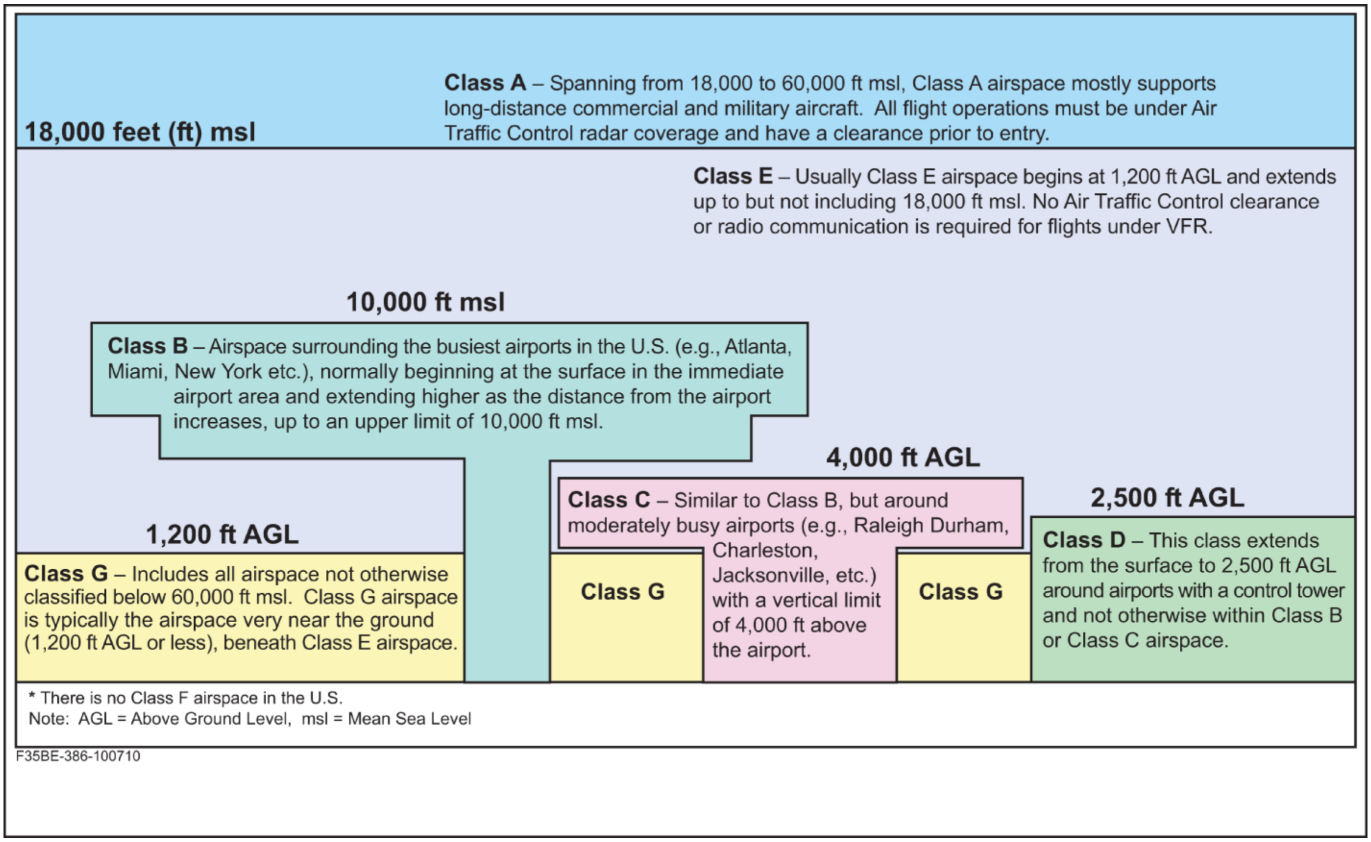


Figure 3-1 Schematic of Airspace Classes

SUA is airspace of defined dimensions where military activities can operate and have boundaries to limit access by non-participating aircraft (see Figure 2-4). Types of SUA include: Prohibited Areas, Restricted Areas, Military Operations Areas (MOAs), Warning Areas, Alert Areas, and Controlled Firing Areas.

Other airspace includes advisory areas, temporary flight limitations, areas designated for parachute jump operations, Military Training Routes, Aerial Refueling Tracks, National Security Areas, and Air Traffic Control Assigned Airspace (ATCAA). 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 Air Route Traffic Control Center.

The affected environment is the airfield that supports aircraft takeoffs, landings, and pattern operations. It also includes airspace where aircraft operations occur over the Air Station, adjacent airspace where flight tracks are flown in association with the airfield, and special use airspace in which training takes place.

3.3 Noise

For the Proposed Action, many components may generate noise and warrant analysis in this EIS. The predominant noise sources consist of aircraft operations, both at and around the airfields, 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 generally represents a transitory and negligible contribution to the average noise level environment. The Federal government supports conditions free from noise that threaten human health and welfare and the environment. Response to noise varies, depending on the type and characteristics of the noise, distance between the noise source and whoever hears it (the receptor), receptor sensitivity, and time of day.

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 defined as unwanted or annoying sound that interferes with or disrupts normal human activities. Although exposure to very high noise levels can cause hearing loss, the principal human response to noise is annoyance (see Appendix D.3.1). The response of different individuals to similar noise events is diverse and is influenced by the type of noise, perceived importance of the noise, its appropriateness in the setting, time of day, type of activity during which the noise occurs, and sensitivity of the individual. While aircraft are not the only sources of noise in an urban or suburban environment, they are, nevertheless readily identified by their noise output and are typically given special attention in this EIS. Additional background information on noise, including its effect on many facets of the environment, is provided in Appendix D.

Within the noise sections (Sections 4.3, 5.3, and 6.2), noise levels generated within the airfield and airspace environment are presented and impacts to land use categories and sensitive receptors evaluated. Because the Census is conducted every 10 years, and the 2010 Census data are not yet available, population and housing units were estimated based on 2000 Census block data to ensure the results of the analysis were comparable across the alternative locations. Census blocks are areas bounded on all sides by visible features (e.g., streets, roads, streams, and railroad tracks) and by invisible boundaries (e.g., city, town, township, and county limits, property lines, and short, imaginary extensions of streets and roads). A census block is the smallest geographic entity for which the Census Bureau collects and tabulates 100-percent decennial census data, including population and housing unit data.

To further define the number of people and housing units affected by noise, the Marine Corps determined the proportion of acres found within each contour band and then applied this proportion to the census block. The population and housing unit estimates by contour band were performed using U.S. Census block data and a methodology that assumed an even distribution of population and housing units within each block under the respective contour bands. This methodology provided only an estimate of the number of people and housing units, but was needed because the U.S. Census block-level data, while being the finest resolution available, are of a size comparable to that of the 1-dB contour band width.

More recent Census sources may be used in this document. However, these references were used to provide definitions of terms, or for housing, employment, or population trends. More recent data could not be used to calculate potential noise impacts because the analysis needed to ensure that results were comparable across the entire analytical area.

Land Uses. Impact analysis of noise on land use categories focuses on those areas affected by airfield noise as defined by the Air Installation Compatible Use Zone Program (AICUZ). This Program was established in the early 1970s by the Department of Defense (DoD) to balance the need for aircraft operations with community concern over aircraft noise and accident potential. The goals of the Program are to protect the health, safety, and welfare of those living and working near military airfields and to preserve the military flying mission. The AICUZ study analyzes aircraft noise, accident potential, land use compatibility, and operational procedures, and it provides recommendations for compatible development near air installations. The land uses that are most sensitive to noise typically include residential and commercial areas, public services, and areas associated with cultural sensitivities and recreational activities. Table 3-2 provides the definitions for the land use categories used in this EIS.

Table 3-2 Land Use Categories and Definitions

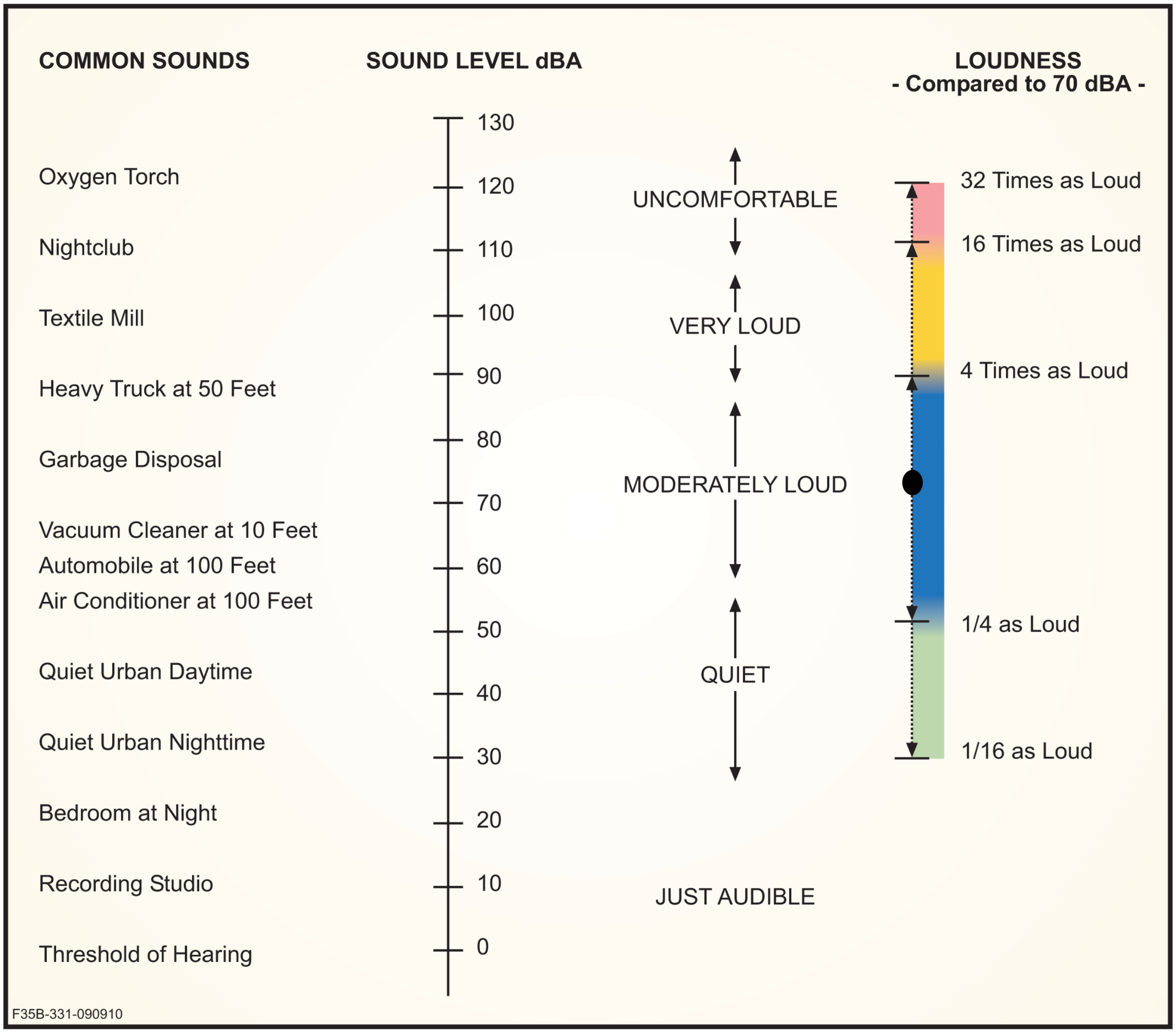
Land Use Category	Definition
Rural/Agriculture	All currently undeveloped land and rural areas used for agricultural purposes.
Low Density Residential	An area of low density development, typically single-family homes.
Medium Density Residential	An area of medium density development, typically a mix of single-family homes, multi-family homes, and apartment buildings.
Urban	An area of high density development that includes multi-family homes, apartment buildings, and mixed-use commercial, retail, and office space.
Commercial	Includes commercial uses such as a neighborhood shopping district or shopping areas anchored by large retail stores.
Light Industrial	Includes business parks, product assembly, distribution centers, major utility facilities, and light and heavy industrial uses.
Lands with Marine Corps Restrictive Easements	Both publicly and privately preserved lands.
Public/Quasi Public	Land owned by the Federal Government, State Government, or Military.

Sensitive Receptors. Under the AICUZ Program, three Noise Zones are identified for community compatibility purposes. Noise Zone I includes areas exposed to noise levels less than 65 decibels (dB) using averaged sound levels that occur during the day and night (or DNL). Zone I is generally considered compatible with all types of sensitive receptors such as schools, hospitals, parks, and churches. Zone II comprises those areas exposed to noise levels of 65 to 75 dB DNL. Exposure to noise within this area is normally compatible with activities such as industrial, manufacturing, transportation, and resource production (e.g., industrial parks, factories, and highways). Noise Zone III are those areas exposed to noise levels greater than 75 dB DNL. Land uses such as schools are considered incompatible. Within the AICUZ Program, areas found within Noise Zones II and III are identified for compatibility with aircraft operations and recommendations are made regarding land use controls. For purposes of this analysis, census block data were used to identify housing units and populations exposed to noise levels 80 dB DNL and greater. Since 2000 Census data were used to ensure results of the analysis were comparable across alternative locations, Geographic Information System data and Air Station specific knowledge were used to ensure the results reflect current conditions, such as closures of military family housing communities.

In accordance with DoD guidelines (DoD 2010a), this EIS also used other noise metrics and analyses to supplement the DNL evaluations. They include analyses of speech interference and Potential Hearing Loss (PHL). The potential for off-Station residential speech interference is presented in terms of numbers of events at or above a specified Noise threshold (abbreviated “NA”). The analysis for PHL considers people’s long-term exposure to noise levels of 80 dB DNL or greater. United States Environmental Protection Agency (USEPA) Guidelines for Noise Impact Analysis (USEPA 1982) provide guidance for uniform methods of noise impact assessment. Section 2.3.1 of the USEPA Guidelines specifically addresses the criteria and procedures for assessing the noise-induced hearing loss (or PHL) in terms of the Noise-Induced Permanent Threshold Shift (NIPTS), a quantity that defines the permanent change in hearing level, or threshold, caused by exposure to noise. Numerically, the NIPTS is the change in threshold averaged over the frequencies 0.5, 1, 2, and 4 kilohertz that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with the exposure beginning at an age of 20 years. A grand average of the NIPTS over time (40 years) and hearing sensitivity (10 to 90 percentiles of the exposed population) is termed the Average NIPTS (Appendix D.3 provides detailed information on these supplemental metrics).

Noise may also affect animal species through disruption of nesting, foraging, migrating, and/or other habitual movements and life cycle activities; these are presented in the Biological Resources sections (4.13 and 5.13) and at Appendix D.3.8. Impacts due to aircraft operations in training airspace and ranges are presented in Chapter 6.

Modeling Overview. Noise and sound are expressed in dB, which is a logarithmic unit. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. 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) (Figure 3-2). 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.



Sources: Derived from *Handbook of Noise Control*, Harris 1979, and FICAN 1997.

Figure 3-2 Typical A-Weighted Sound Levels of Common Sounds

All sounds have a spectral content, meaning their magnitude or level changes with frequency, where frequency is measured in cycles per second or hertz. 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 are usually on an "A-weighted" (dBA) 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. "C-weighting" (dBC), is typically applied to low frequency, impulsive sounds such as sonic boom or ordnance detonation.

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), and DNL. Single noise events are designated in L_{max} and

SEL, whereas DNL is a time-averaged metric that describes the cumulative noise environment in a 24-hour period. DNL accounts for all the single-event noise levels occurring in a specified period and takes into consideration the increased human sensitivity to noise at night by applying a 10-dB penalty to nighttime events (i.e., those occurring between 10:00 p.m. and 7:00 a.m. [or environmental nighttime]). The Onset-Rate Adjusted Monthly variant of DNL, denoted as L_{dnmr}, is specifically used to describe aircraft noise exposure from operations within SUA. C-weighted DNL, denoted CDNL or dBC DNL, is specifically used to describe noise exposure from ordnance activity and sonic booms. Each descriptor, along with other noise metrics, is described in more detail at Appendix D.2.

Noise impact analyses used the following modeling parameters common to all three airfields:

- Detailed F-35B flight operations by type of operation and DNL time periods were derived from data provided and approved by the Marine Corps, and are based on best available estimates of the training syllabus for this new aircraft.
- Marine Corps flight tracks and profiles were developed specifically for F-35B operations based on training syllabi in development for the operational and Fleet Replacement Squadrons (HQMC 2010).

The Marine Corps provided F-35B maintenance run-up data. General run-ups would be limited to in-frame, low-power maintenance activities on the flightline (see Appendix D.5 and D.6 for operational input and data assumptions). DoD acoustic models used for aircraft noise analysis are semi-empirical. That is, they begin with noise levels that are measured from each aircraft type. These reference noise levels are then used to compute the noise that propagates into the community. Aircraft noise varies with speed, power, and configuration, so reference noise data must be collected under a variety of conditions while the aircraft is in flight and during ground run-up. Because these data are the foundation of the noise analysis, they are conducted systematically under controlled conditions. An aircraft must be scheduled for and dedicated to the measurements for several days. At least a dozen, and often several dozen, microphones are employed. Noise data are collected on instrumentation-quality recorders. Aircraft flight path and operating parameters are recorded, synchronized with the acoustic readings. Weather conditions are included, and the acoustical properties of the ground at the test site are measured. The sound recordings are then analyzed and processed into the source format required for the models.

Such an acoustical measurement program was conducted on an F-35A (test article AA-1) at the Air Force Flight Test Center (AFFTC) at Edwards Air Force Base (AFB) in California in 2008 (JSF Program Office & Lockheed Martin 2009). The results of the Edwards AFB measurements were compiled into the reference acoustic database for the NOISEMAP computer model which, in turn, was used for the EIS noise analyses. Naval Air Station (NAS) Patuxent River, where test articles of the F-35B aircraft are conducting developmental flights, is too restrictive and currently unavailable for conducting a proper acoustic measurement program. Noise from other non-JSF test activities and variations in terrain (i.e., trees, water, and peculiar man-made structures) surrounding the NAS complicate acoustic data collection. Acoustic testing is programmed for the AFFTC when the short takeoff vertical landing (STOVL) F-35B aircraft become available later in the JSF test program.

The 2008 acoustic data collected at Edwards AFB are the best available reference acoustic data for the F-35 series and meet the analytical needs of the Marine Corps EIS. All three F-35 aircraft variants use the same engine and share common flight characteristics. They are operationally the same in conventional flight and airfield operations, in particular in departure, approach, and Instrument Flight Rule (IFR) closed pattern. While the test article AA-1 could not perform the entire flight envelope planned for the F-35B (i.e., STOVL operations), the required flight profile parameters of engine power settings, altitudes, and speeds for STOVL-type operations were obtained from computer simulations of the F-35B (Wyle 2009). Final modeling incorporated adjustments to these flight profiles to comply with local airfield course rules, and were used to generate an accurate representation of anticipated noise exposure from forecast operations that support the required training and unit readiness posture.

The affected environment for this resource is the area that would be affected by noise generated from aircraft operating at the three airfields, along flight tracks within the vicinity of the airfields, within special use airspace, and above training ranges.

3.4 Air Quality

Pollutants are defined as three general types: 1) criteria, 2) toxic, and 3) hazardous compounds. Criteria and toxic pollutants have national and/or State ambient air quality standards; hazardous pollutants are State regulated.

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), suspended particulate matter (PM) less than or equal to 10 and 2.5 microns in diameter (PM_{10} and $PM_{2.5}$), 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 of air [$\mu g/m^3$] or milligrams per cubic meter of air [mg/m^3]) 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, volatile organic compounds (VOCs), and oxides of nitrogen (NO_x), which are considered precursors for O_3), are the pollutants for which emissions are evaluated to control the level of O_3 in the ambient air.

As mentioned above, NAAQS represent maximum acceptable concentrations that generally may not be exceeded more than once per year, and the annual standards may never be exceeded. The NAAQS are shown in Table 3-3 (on the following page). In South Carolina, the Department of Health and Environmental Control is responsible for monitoring air quality and reporting to the USEPA. In North Carolina, the Department of Environment and Natural Resources is responsible for monitoring air quality.

Other Air Quality Considerations

Sources of emissions evaluated in this EIS include aircraft operations, construction and construction vehicles, dust generated by land clearing, and personally owned vehicles. For aircraft operations, taxiing, maintenance, and flying are all examined.

Construction Emissions. Factors used to derive the construction source emissions were obtained from *Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling* (USEPA 2004a); *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling—Compression-Ignition* (USEPA 2004b); *Nonroad Engine and Vehicle Emission Study—Report* (USEPA 1991); *Exhaust Emission Factors for Nonroad Engine Modeling—Spark-Ignition* (USEPA 2005a); *Conversion Factors for Hydrocarbon Emission Components* (USEPA 2005b); *Comparison of Asphalt Paving Emission Factors* (CARB 2005); *WRAP Fugitive Dust Handbook* (WRAP 2006); *Analysis of the Fine Fraction of Particulate Matter in Fugitive Dust* (MRI 2005); and *Mobile 6.2.03* (USEPA 2003).

Table 3-3 National Criteria Pollutant Standards

Pollutant	Averaging Time	National Standards [a]	
		Primary [b,c]	Secondary [b,d]
O_3	8-hour	0.075 ppm	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 ppm	Same as primary
	1-hour	0.1 ppm	—
SO_2	Annual	0.03 ppm	—
	24-hour	0.14 ppm	—
	3-hour	—	0.5 ppm (1,300 μg/m^3)
	1-hour	75 ppb	—
PM_{10}	Annual	—	—
	24-hour	150 μg/m^3	Same as primary
$PM_{2.5}$	Annual	15 μg/m^3	Same as primary
	24-hour	35 μg/m^3	Same as primary
Pb	Rolling 3-month period	0.15 μg/m^3	Same as primary

Source: USEPA 2009a.

Notes:

[a] Standards other than the 1-hour O_3, 24-hour PM_{10}, 24-hour $PM_{2.5}$, and those based on annual averages are not to be exceeded more than once per year.

[b] Concentrations are expressed first in units in which they were promulgated. Equivalent units are given in parenthesis.

[c] 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.

[d] Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

Aircraft Emissions. Data used to calculate emissions from F-35B operations were obtained from the JSF Program Office in charge of design and development of the F-35. Engine time in modes, taxi time, approach, and departure parameters from the test F-35A aircraft were used to estimate emissions, since the F-35B engine is still in the developmental stage and no operational data are available (personal communication, Luker 2009). For the Marine Corps Air Facility Quantico and Naval Air Station Patuxent River F-35B environmental analyses, Karnes2 flight profiles were used to identify engine fuel flow rates, engine power setting, airspeed, altitude, and times in mode for each mode of operation in the profile. Emission indices for criteria pollutants were then derived based on F-35A test data collected during engine testing conducted by the Air Force. The F-35B air emissions profile appear to differ from the F-35A emissions, which is likely due to different assumptions on F-35B and F-35A training flight profiles, use of afterburners, extent of engine run-ups, and other operational variations.

Operational data used to calculate proposed F-35B emissions were obtained from the Marine Corps (data validated by HQMC Aviation, 2010). Following the approach used in the *Final EIS for the Introduction of the F/A-18E/F (Super Hornet) Aircraft to the East Coast of the United States* (DoN 2003a), standard fighter aircraft ground support equipment (GSE) was used and were based on DoN's 2000 *Final Report for Emission Testing on Ground Support Equipment at Naval Air Stations*. These are the best data available because the F-35B GSE is still in the research and development stage and emission indices have not been determined for any F-35B-specific GSE.

Greenhouse Gas Emissions. Greenhouse gases (GHGs) trap heat in the atmosphere. GHG emissions occur from natural processes as well as human activities. Accumulation of GHGs in the atmosphere helps regulate the earth's temperature. Scientific evidence suggests a trend of increasing global temperature over the past century may be related to an increase in GHG emissions from human activities. The climate change connected to global warming and its associated ecological changes may produce negative economic and social consequences across the globe.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide. 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, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis. Total GHG emissions from a source 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 (USEPA 2009b).

On a national scale, Federal agencies are addressing GHG emissions by reductions mandated in Federal laws and Executive Orders (EO). This includes EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* signed in October 2009 (Federal Register 2009). In an effort to reduce energy consumption, reduce dependence on petroleum, and increase the use of renewable energy resources in accordance with the goals set by EO 13514 and the Energy Policy Act of 2005, the Marine Corps has implemented a number of renewable energy projects (Federal Register 2009). The types of projects currently in operation include thermal and photovoltaic solar systems, geothermal power plants, and wind generators. The Marine Corps continues to promote and install new renewable energy projects.

In addition, on October 30, 2009, the USEPA published 40 Code of Federal Regulations (CFR) Part 98, which requires mandatory reporting of GHGs from large GHG emitters, fossil fuel suppliers, and industrial gas suppliers. In general, the threshold for reporting is 25,000 metric tons or more of carbon dioxide equivalent per year. The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not individually significant enough to have an appreciable or measurable effect on climate change. Therefore, the impact of proposed GHG emissions to climate change is discussed in the context of cumulative impacts in Chapter 7 of this EIS, and Appendix E provides data on the assumptions used and calculations applied.

The affected environment comprises the counties in which emissions would be generated from activities associated with aircraft operations and maintenance, demolition/construction, and vehicle commuting.

3.5 Hazardous Materials, Toxic Substances, Hazardous Waste, and Contaminated Sites

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 installation during the course of site development and construction activities; for toxic and hazardous wastes generated as a result of construction and demolition activities; and for encounters 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-35B aircraft operations and maintenance.

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. 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 laws administered by the U.S. Occupational Safety and Health Administration (OSHA), USEPA, and U.S. Department of Transportation (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; DOT regulations categorize substances in terms of their safety in transportation; and USEPA regulations categorize substances in terms of protection of the environment and public health.

With regard to environmental impacts, hazardous substances are regulated under several Federal programs administered by the USEPA, including the 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 which is not excluded from regulation as a hazardous waste under 40 CFR 261.4(b) and exhibits any of the characteristics (ignitability, corrosivity, reactivity, and 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. 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). 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).

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.

Activities at MCAS Beaufort and MCAS Cherry Point 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 MCAS Beaufort and MCAS Cherry Point have procedures in place for purchase, receiving, use, reuse, recycle, and final disposal of hazardous materials used on the installations. Specific details of the procedures are provided in the Air Station's respective section of this EIS. Such substances are not handled at Marine Corps Auxiliary Landing Field [MCALF] Bogue.

Toxic Substances. The promulgation of TSCA (40 CFR Parts 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).

ACMs have been classified as a hazardous air pollutant by USEPA in accordance with Section 112 of the Clean Air Act. Surveys would be conducted for ACMs, as required by 40 CFR 61.145, during the design phase of projects and prior to modification, demolition, or relocation of any structures.

LBP may also be present in buildings or other facilities that would be modified or demolished as part of each alternative. Similar to ACMs, LBP surveys would be conducted during project design phase and prior to any structural modification, demolition, or relocation. 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.

Contaminated Sites. Potential hazardous waste contamination areas are being investigated as part of the Defense Environmental Restoration Program (DERP). As part of DERP, the DoD has created the Installation Restoration Program (IRP) and the Military Munitions Response Program (MRP). These programs were instituted to satisfy the requirements of CERCLA and RCRA for former and current hazardous waste sites.

The hazards associated with historic ranges include military waste munitions that were improperly disposed and unexploded munitions rounds. The DoN initiated the MRP in response to DERP guidance released in September 2001. The MRP is designed to clean up discarded military munitions, unexploded ordnance, and their chemical residues at closed historic ranges and munitions disposal sites. The MRP is modeled after the IRP and is implemented using the process developed for cleanup under CERCLA legislation. This program must also address the unique explosive safety hazards associated with munitions and explosives and human health risks posed by munitions constituents at Navy and Marine Corps locations not designated as operational ranges.

The affected environment for this resource includes the facilities where hazardous and/or toxic materials and wastes are generated and disposed of, as well as where contaminated sites would be disturbed. For purposes of this analysis that includes the Air Stations and facilities (outside installation boundaries) approved for disposal of these substances.

3.6 Safety

The Marine Corps practices Operational Risk Management as outlined in Marine Corps Order (MCO) 3500.27A. 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 and environmental health analysis contained in the respective sections addresses issues related to the health and well-being of both military personnel and civilians living on or in the vicinity of MCAS

Beaufort, MCAS Cherry Point, and training airspace areas. Specifically, this section provides information on hazards associated with aviation safety (aircraft mishaps or accidents, Accident Potential Zones [APZs], Bird/Wildlife Aircraft Strike Hazard [BASH]), and explosive safety.

Aircraft Mishaps are classified as A, B, or C (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; the rates are typically calculated per 100,000 flying hours. Table 3-4 provides definitions of how mishaps are categorized.

Table 3-4 Aircraft Mishap Definitions

Classification	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 time from work beyond day/shift when injury occurred

Source: General Accounting Office 1998.

Emergency and Mishap Response involves the procedures and equipment needed to react to mishaps on or off the Air Station. Elements of this response include rescue, fire suppression, security, and investigation.

Accident Potential Zones are established at airfields to delineate recommended surrounding land uses for the protection of people and property on the ground. APZs define the areas in the vicinity of an 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. The standard Clear Zone is a trapezoidal area that extends 3,000 ft from the end of a runway and has the highest probability of being impacted by a mishap. APZ I, which typically extends 5,000 ft from the end of the Clear Zone, has a lower mishap probability; and APZ II, which typically extends 7,000 ft from the end of APZ I, has the lowest mishap probability of the three zones.

Bird/Wildlife Aircraft Strike Hazards. Bird/wildlife aircraft strikes and the hazards they present form another safety concern for aircraft operations. According to the International Civil Aviation Organization, approximately 90 percent of all bird strikes occur on or in the vicinity of airports during takeoff, landing, and associated phases (ICAO 1999, 2001; FAA 2009). In the U.S., approximately 59 percent of bird strikes occur at less than 100 ft and approximately 9 percent of bird strikes occur above 3,000 ft (FAA 2009). The Marine Corps order implementing the BASH program is MCO P5090.2A, *Environmental Compliance and Protection Manual*. MCO P5090.2A requires implementing a program to reduce the potential for collisions between birds or other animals and aircraft.

Explosive Safety. Ordnance storage operations must be conducted in a manner that (1) provides the maximum possible protection to personnel and property, both inside and outside the Air Station, from the damaging effects of potential accidents, (2) limits the exposure of a minimum number of persons, for a minimum time, to the minimum amount of ammunition and explosives consistent with safe and efficient operations, and (3) complies with ammunition and explosives safety standards (primarily DoD 6055.9-STD, *DoD Ammunition and Explosive Safety Standards*). One of the principal means of meeting these objectives is through the establishment of Explosive Safety Quantity Distance (ESQD) arcs. ESQD arcs determine the distance between ordnance storage and handling facilities and inhabitable areas. This includes public travel routes (public roads and roads on a military installation that are used routinely by the general public for through traffic, navigable streams, or passenger railroads). Ammunition and bulk explosives are stored in magazines specifically designed, sited, and designated for this purpose. A magazine's ESQD arc is calculated by the type and amount of ordnance stored in that magazine. ESQD requirements and permissible storage capacities are established by Naval Sea Systems Command and approved by DoD Explosives Safety Board.

Construction Safety. Human health and safety issues associated with construction are generally found with traffic and the potential for accidents involving pedestrians and vehicles, as well as safety of personnel involving land uses within or adjacent to the construction zones. All construction and demolition activities are required to be performed in accordance with all Federal regulations, including applicable OSHA requirements.

The affected environment includes areas exposed to demolition and construction activities. It also comprises facilities where aircraft maintenance takes place, in the airfields and overlying airspace where aircraft conduct flight operations (including arrival, departure, and pattern activities), and in airspace and ranges where training occurs.

3.7 Land Use

Land use often refers to human modification of land for residential or economic purposes. The attributes of land use include general land use and ownership, special use land areas, and land management plans. Land use is regulated by management plans, policies, regulations, and ordinances (i.e., zoning) that determine the types of uses that are allowable or to protect specially-designated or environmentally-sensitive uses.

The land use discipline is interrelated with other resource areas including noise, socioeconomics, and cultural resources. The impact analysis for land use focuses on those areas affected by airfield operations and safety footprint as defined by the AICUZ Program. The AICUZ Program was established in the early 1970s by the DoD to balance the need for aircraft operations with community concern over aircraft noise and accident potential. The Program goals are to protect the health, safety, and welfare of those living and working near military airfields and to preserve the military flying mission. The AICUZ study analyzes aircraft noise, accident potential, land use compatibility, and operational procedures, and provides recommendations for compatible development near installations supporting aircraft operations. As was outlined above, noise impacts to sensitive land uses are presented in the noise sections (4.3 and 5.3). Within the land use sections (4.7 and 5.7), airfield safety footprints are identified (per AICUZ Program parameters) and are categorized into three APZs. Refer to Section 3.6, Safety, for more information on APZs.

Given how land use is evaluated, the affected environment includes the Air Stations and MCALF Bogue, as well as the cities and counties in which these installations are found.

3.8 Socioeconomics

Socioeconomics describes the basic attributes and resources associated with the human environment, particularly population, housing, and economic activity. Economic activity typically encompasses employment, personal income, and industrial growth. The project area for socioeconomics is defined as the area in which the principal effects arising from implementation of the alternatives are likely to occur. Each alternative has the potential to cause socioeconomic impacts to the communities around the Air Stations through changes or relocation of personnel.

Within the socioeconomic sections (Sections 4.8 and 5.8), Census and other source data are used to define terms, as well as for analyzing housing, employment, or population trends. Wherever possible, the most recent trend data were used; however, because the analysis needed to ensure results were comparable across the entire analytical area (i.e., three geographically separate areas), older data may have used. Appendix F describes in more detail the methodology used for this EIS analysis.

The ROI for socioeconomics includes those cities and counties impacted by construction and employment revenue as well as in communities where personnel increases and/or decreases would occur.

3.9 Environmental Justice/Protection of Children

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 a 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 alternatives.

In 1997, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks (Protection of Children)* was issued to identify and address 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 breathe more air in proportion to their body weight than adults; children's behavior patterns may make them more susceptible to pollution and accidents because they are less able to protect themselves; and children's size and weight may diminish their protection from standard safety features.

Within the environmental justice sections (Sections 4.9 and 5.9), Census and other source data were used to define terms, as well as for analyzing demographic or population trends. Wherever possible, the most recent trend data were used; however, because the analysis needed to ensure results were comparable across the entire analytical area (i.e., three geographically separate areas), older data may have been used.

As was noted above, environmental justice analysis addresses the characteristics of race, ethnicity, and poverty status for populations residing in areas potentially affected by the Proposed Action. Therefore, in this EIS the ROI is the city and county in which the alternatives are proposed.

3.10 Community Services

Community Services include health services, security services, fire protection, and education services. Housing for MCAS Beaufort and MCAS Cherry Point are discussed separately in Sections 4.8 and 5.8, respectively. These sections describe the range of community facilities within the vicinity of MCAS Beaufort and MCAS Cherry Point potentially affected by implementation of the four action alternatives. As such, the affected environment includes the city/town and county in which the Air Station is located and where personnel associated with the Proposed Action would live and work.

3.11 Utilities and Infrastructure

Infrastructure refers to the system of public works, such as utilities, that provide the underlying framework for a community or installation. Infrastructure components and utilities to be discussed include potable water, wastewater, electricity and telecommunications, and solid waste.

In regards to potable water, EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* requires a 2-percent annual reduction in potable water intensity by Fiscal Year 2020 (FY20). In addition, water management strategies, including the use of water-efficient and low-flow fixtures, must be implemented and 95 percent of all new contracts must require the use of water-efficient products. EO 13514 also requires that all new construction comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* (Guiding Principles). This includes reducing potable water consumption by a minimum of 50 percent over water consumed by conventional means.

In regards to energy, EO 13514 also requires that existing buildings be managed to reduce energy consumption, all new Federal buildings that enter the planning process in 2020 are designed to achieve zero-net-energy standards by 2030, and that 95 percent of all new contracts include products that are energy-efficient.

In regards to solid waste, EO 13514 requires promotion of pollution prevention and elimination of waste through source reduction; diverting at least 50 percent of non-hazardous solid waste, excluding construction and demolition (C&D) debris, by the end of FY15; diverting at least 50 percent of C&D materials and debris by the end of FY15; and increasing diversion of compostable and organic material from the waste stream.

Similar to Community Services, the affected environment for utilities and infrastructure resources includes the city/town and county in which the Air Station is located and where personnel associated with the Proposed Action would live and work.

3.12 Transportation and Ground Traffic

Transportation and ground traffic include vehicle movement throughout a road and highway network. Roadways are classified into one of three types according to the function each serves in moving traffic: arterial highways, collector roadways, and local streets. Arterial highways and interstates serve the movement of traffic regionally and between population and activity centers with a minimal level of access to adjacent properties. Collector roadways serve the movement of traffic from population and activity centers and funnel them onto arterial highways with a moderate level of access to adjacent properties. Local roadways provide access to adjacent properties and move traffic onto collector and arterial roadways.

EO 13514 requires the advancement of regional and local integrated planning through participation in regional transportation planning and recognizing existing community transportation infrastructure. In addition, the EO requires that the planning process for new facilities include consideration of sites that are pedestrian friendly, near existing employment centers, and accessible to public transit.

The affected environment for this resource is the local and regional transportation networks that provide access to MCAS Beaufort and MCAS Cherry Point. Neither MCALF Bogue nor training airspace would affect ground traffic or transportation; refer to Section 3.2 for airspace transportation discussion.

3.13 Biological Resources

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. Plant associations are referred to generally as vegetation, and animal species are referred to generally as wildlife. Habitat can be defined as the resources and conditions present in an area that support a plant or animal. Although the existence and preservation of biological resources are intrinsically valuable, these resources also provide aesthetic, recreational, and socioeconomic values to society. This analysis focuses on species or vegetation types that are important to the function of the ecosystem, are of special societal importance, or are protected under Federal or State law or statute.

For purposes of this EIS, these resources are divided into four major categories: vegetation, wildlife, and special status species.

Vegetation includes terrestrial plant communities and constituent plant species. Wetlands and special status plant species may be mentioned as relevant to the overall vegetation of the affected environment, but these categories are discussed in more detail in separate sections.

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.

***Birds*, ** both migratory and most native-resident bird species, are protected under the Migratory Bird Treaty Act (MBTA), and their conservation by Federal agencies is mandated by EO 13186 (*Migratory Bird Conservation*). The MBTA prohibits the taking, killing, or possessing of migratory birds unless permitted by regulation. In 2003, the National Defense Authorization Act was signed and gave the Secretary of the Interior authority to prescribe regulations to exempt the Armed Forces from the incidental taking of migratory birds during authorized military readiness activities. The final rule authorizing the DoD to take migratory birds in such cases include a requirement that the Armed Forces must cooperate with the U.S. Fish and Wildlife Service (USFWS) to develop and implement conservation measures to minimize or mitigate adverse effects of activities.

Special Status Species are defined as 1) Federally-listed plant and animal species and their habitats that are protected under the Endangered Species Act (ESA); and 2) other special-status species, including State-listed species that are not Federally listed and other species of special concern indentified by State and Federal agencies.

Specific to MCAS Beaufort, State-listed species are protected under South Carolina's Nongame and Endangered Species Conservation Act and at MCAS Cherry Point they are protected under North Carolina's Plant Protection Conservation Act and North Carolina's ESA. Other protected species include State-specific species of special concern, rare species, unusual species, or a watch-list species. The focus of the analysis is on the Federally- and State-listed or candidate threatened and endangered species, per MCO P5090.2a, change 2. 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. Refer to Sections 4.13 and 5.13 for a list of special-status species at MCAS Beaufort and MCAS Cherry Point, respectively.

The affected environment includes areas affected by aircraft-generated noise and ground disturbance from construction/demolition activities. Since none of these activities would affect marine species, they are not evaluated in detail in this EIS.

3.14 Geology, Topography, and Soils

Geological resources are defined as the topography, geology, and soils of a given area. The geology of an area includes bedrock materials and mineral deposits. Topography describes the physical surface characteristics of the land such as slope, elevation, and general surface features. Soil refers to unconsolidated earthen materials overlying bedrock or other parent material and is described in this EIS in terms of drainage potential, and erosion and flooding potential. The affected environment for this resource is limited to lands disturbed by demolition and construction activities.

3.15 Water Resources

Water resources include surface water, stormwater, groundwater, wetlands, and floodplains. The Clean Water Act (CWA) of 1977 (Public Law [PL] 95-217), the Safe Drinking Water Act of 1972 (PL 93-523) and Amendments of 1986 (PL 99-339), and the Water Quality Act of 1987 (PL 100-4) are the primary Federal laws protecting the nation’s waters including lakes, rivers, aquifers, and wetlands.

In addition to the overarching Federal laws, several applicable regulations and permits are in place to protect the quantity and quality of water resources in the U.S. These include the National Pollutant Discharge Elimination System Construction Activity General Permit (40 CFR Parts 122-124); Industrial Permit; Municipal Separate Storm Sewer System Permit; USEPA, Subchapter D-Water Programs (40 CFR 100-145); and USEPA, Subchapter N-Effluent Guidelines and Standards (40 CFR Parts 401-471).

Surface water includes streams, rivers, lakes, and reservoirs. Water bodies that do not meet their intended uses are included on the impaired waters list, referred to as the 303(d) list, and are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality standard. The TMDL process establishes the allowable pollutant loadings or other quantifiable parameters for a water body based on the relationship between pollutant sources and in-stream water quality conditions. This allows water-quality based controls to be developed to reduce pollution and to restore and maintain water quality.

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. Non-point source pollution is pollution of surface-water and groundwater resources by diffuse sources. Point source pollution is pollution produced by a single, identifiable point source.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* requires a 2-percent annual reduction in potable, industrial, landscaping, and agricultural water intensity by FY20. In addition, the EO 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 ft 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.

Groundwater includes the water resources potentially available for consumption. Water quality describes the chemical and physical composition of water as affected by natural conditions and human activities.

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 U.S. Army Corps of Engineers (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 United States, 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 Corps of Engineers 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 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: 1) marine, 2) estuarine, 3) riverine, 4) lacustrine, or 5) palustrine. They are further classified by subsystems and classes based on substrate material and flooding regime, or vegetation.

- **Marine System –** Open ocean overlying the continental shelf including high energy shorelines such as beaches and rocky headlands.
- **Estuarine System –** Deepwater 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.
- **Riverine System –** Freshwater rivers and their tributaries along with most associated wetlands.
- **Lacustrine System –** Open freshwater wetlands situated in topographic depressions with less than 30 percent vegetative cover and greater than 20 acres in size.
- **Palustrine System –** All non-tidal freshwater wetlands dominated by trees, shrubs, and persistent emergent vegetation.

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 particular flood. For example, a flood that has a 1-percent chance of occurring in any 1 year is considered a 100-year flood.

The affected environment for this resource is limited to lands disturbed by demolition and construction activities and potentially affected by aircraft maintenance and operations.

3.16 Cultural and Traditional Resources

Cultural resources are prehistoric, 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. The National Historic Preservation Act (NHPA) (as amended [16 USC 470 *et seq*.]) defines historic properties as prehistoric and historic sites, buildings, structures, districts, or objects in or eligible for inclusion on the National Register of Historic Places (National Register), as well as artifacts, records, and remains related to such properties. Additionally, some categories of cultural resources are protected under the Archeological Resource Protection Act (16 USC 470aa-470mm; PL 96-95 and amendments), the Native American Graves Protection and Repatriation Act (PL 101-601; 25 USC 3001-3013), and the American Indian Religious Freedom Act (PL 95-341; 42 USC 1996 and 1996a). Procedures for complying with Section 106 of the NHPA, that directs Federal agencies to take into account the effect of a Federal undertaking on a historic property, are outlined in the Advisory Council on Historic Preservation’s regulations, "Protection of Historic Properties" (36 CFR 800). NHPA and Section 106 compliance, as well as DoD Instruction 4710.02, guide American Indian consultation regarding cultural significance of potential religious and sacred artifacts and places (16 USC 470a [a][6][A] and [B]).

The affected environment encompasses areas where demolition and construction activities could impact cultural resources. These areas include facilities of historic interest within the installations, historic districts outside Air Station boundaries, as well as American Indian Tribes Federally-recognized as having historic interests.

3.17 Coastal Zone Management

Coastal zone discussion specifically refers to compliance with the Coastal Zone Management Act (CZMA) of 1972 (16 USC 1451, *et seq*., as amended). In accordance with Section 307 of the CZMA and 15 CFR 930 subpart C, Federal agency activities affecting a land or water use or natural resource of a State's coastal zone must be consistent to the maximum extent practicable with the enforceable policies of the State's coastal management program.

CZMA policy is implemented through State coastal zone management programs. Activities on Federal lands are subject to CZMA Federal consistency requirements if the activity could affect any land, water, or natural resource of the coastal zone, including reasonably foreseeable effects. For a proposed activity that would affect coastal resources, a Federal Coastal Consistency Determination is required. A Federal Coastal Consistency Determination is a determination supported by findings that a proposed activity in or affecting the resources of a coastal zone complies with, and would be conducted in a manner that is consistent to the maximum extent practicable with, the State's coastal zone enforceable policies unless ". . . full consistency is prohibited by existing law applicable to the Federal government." A Negative Determination would be prepared for a proposed activity that does not have the potential to affect the State's coastal zone or any of the coastal resources. Appendix G provides copies of coastal consistency determinations for both Air Stations.

The affected environment is defined as areas where land disturbance and/or development would affect state coastal zones.

4.0 MCAS BEAUFORT AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

4.1 MCAS BEAUFORT

Chapter 4 provides the baseline conditions of the affected environment (or the particular area that would be impacted by the alternatives). Each resource is presented with a discussion of the potential impacts the four action alternatives and No Action Alternative would have if implemented at Marine Corps Air Station (MCAS) Beaufort.

Table 4.1-1 outlines the primary elements that drive potential impacts associated with the Proposed Action. These elements include proposed F-35B aircraft numbers and projected airfield operations, construction disturbance areas, estimated construction costs, and projected net change in military personnel and dependents according to alternative. The projected net change in military personnel and dependents includes 78 additional pilots associated with the Pilot Training Center (PTC). Under Alternatives 1 and 2, 66 of the 78 PTC pilots would be annually based at MCAS Beaufort. Changes in civilian and contractor personnel associated with the introduction of the F-35B are anticipated under all alternatives; however, the number of these non-military personnel is continually changing as the aircraft and its systems evolve. As such, the Marine Corps has not included these non-military personnel changes because they cannot be predicted with any fidelity at this time. Once the data have more fidelity and it becomes evident that these numbers constitute a substantial change from existing conditions, the Marine Corps will undertake the appropriate level of environmental documentation to determine potential impacts.

Table 4.1-1 MCAS Beaufort Proposed Action Alternative Elements

Elements	Alternative 1 (Preferred)	Alternative 2	Alternative 3	Alternative 4
F-35B Proposed Aircraft Loading	88	40	128	176
F-35B Proposed Airfield Operations	99,881	77,538	59,579	81,921
MCAS Beaufort Total Proposed Aircraft Loading	89	41	129	177
MCAS Beaufort Total Airfield Operations	106,030	83,687	65,728	88,070
Construction Disturbance (acres)[a]	100.9	80.1	109.8	138.4
Estimated Construction Costs ($ millions)	$437.1	$278.6	$610.8	$821.9
Net Change in Proposed Military Personnel	*-228*	*-1,161*	*+667*	*+1,600*
Net Change in Proposed Dependents	*-409*	*-2,177*	*+1,291*	*+3,058*

Notes: [a] The total includes areas disturbed due to clearing, grading, and construction equipment storage (i.e., laydown area); access roads and entrances; as well as associated parking areas and landscaping activities.

4.2 Airfield and Associated Airspace

4.2.1 Affected Environment (Baseline Conditions)

The affected environment includes the runways, taxiways, pads, and overlying airspace that aircraft use to takeoff, land, and conduct other types of local operations. MCAS Beaufort has two runways for arrival and departure of air traffic. The primary runway is Runway 5/23; Runway 14/32 is the secondary crosswind runway (Figure 4.2-1). Primary Runway 5/23 is 12,202-feet (ft) long and 200 ft wide, is oriented northeasterly/southwesterly, is the calm-wind runway, and supports 75 to 80 percent of flight operations.

MCAS Beaufort provides airport control tower services to all aircraft operating below 2,500 ft Above Ground Level (AGL) within a 5-mile (mi) radius of the Air Station. Approach and departure control and enroute services are provided to aircraft operating within the airspace delegated to MCAS Beaufort by the Federal Aviation Administration (FAA).

Aircraft operating to and from Hilton Head Airport, Beaufort County Airport, and Ridgeland Airport are provided positive control, separation, and sequencing while operating under Instrument Flight Rules. Additionally, arriving Visual Flight Rule aircraft are provided with basic radar services into the Air Station. MCAS Beaufort also provides containment control to tactical aircraft using the Beaufort Military Operations Areas, Warning Area 74, and the Beaufort Special Air Refueling Airspace. Table 4.2-1 shows the baseline daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) airfield operations at MCAS Beaufort as documented in the Air Installation Compatible Use Zone *(*AICUZ) for MCAS Beaufort (USMC 2003). One transport aircraft (UC-12B) is stationed at MCAS Beaufort and the other aircraft operations are associated with visiting or transitory units. The total annual aircraft operations fluctuate in response to the dynamic nature of influencing factors such as deployments, training requirements, and special exercises. For example, in 1994 there was a high of approximately 72,100 total aircraft operations with a low of about 44,500 in 1999 (USMC 2003).

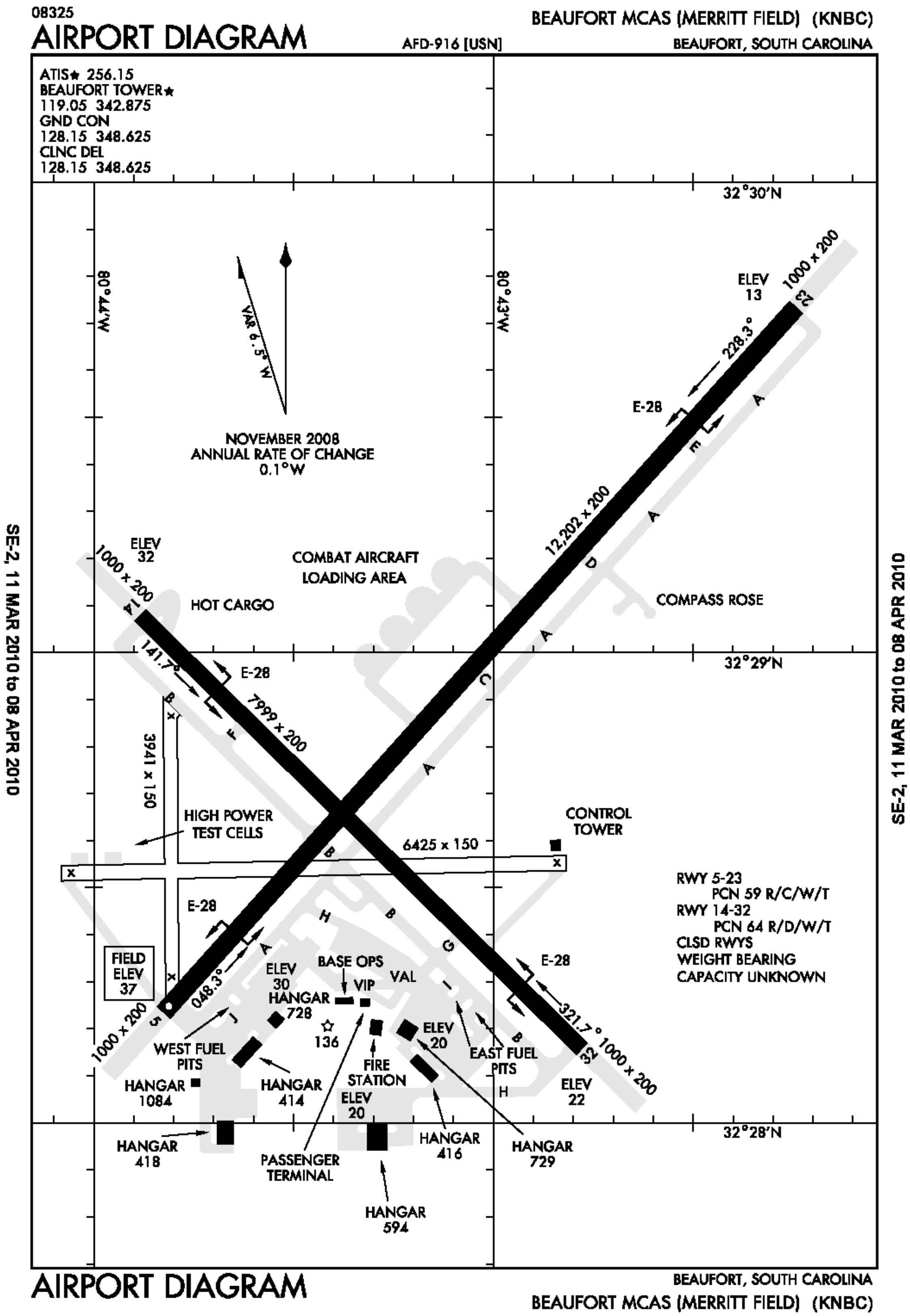


Figure 4.2-1 MCAS Beaufort Airfield Environment

The majority of baseline operations at MCAS Beaufort are pattern operations (see Table 4.2-1), which includes touch-and-go, Field Carrier Landing Practice (FCLP), and ground-controlled approach (GCA) patterns. Refer to Appendix H for a glossary of definitions.

Table 4.2-1 MCAS Beaufort Annual Baseline Operations

F/A-18			
Airfield Operation	**Day**	**Night**	**Total**
Departures	12,705	129	12,834
Arrivals	11,534	1,300	12,834
Patterns	27,964	2,220	30,184
F/A-18 Subtotal	*52,203*	*3,649*	*55,852*
Other Fixed Wing[a]			
Departures	1,190	130	1,320
Arrivals	1,150	170	1,320
Patterns	2,737	233	2,970
Other Fixed Wing Subtotal	*5,077*	*533*	*5,610*
Rotary Wing (Helicopters)			
Departures	107	11	118
Arrivals	96	22	118
Patterns	280	23	303
Other Helicopter Subtotal	*483*	*56*	*539*
TOTAL ANNUAL AIRFIELD OPERATIONS	**57,763**	**4,238**	**62,001**

Source: USMC 2003.
Note: [a]Fixed-wing aircraft include minor operations from C-12s, transient use by other jets such as AV-8Bs, and transport aircraft such as C-17s.

4.2.2 Environmental Consequences

Impacts under the alternatives are:

- Alternative 1, MCAS Beaufort annual airfield operations would increase from 62,001 to 106,030 total operations.
- Alternative 2, annual airfield operations would increase to 83,687 total operations.
- Alternative 3, annual airfield operations would increase to 65,728 total operations.
- Alternative 4, annual airfield operations would increase to 88,070 total operations.

The F-35B would operate in an airfield environment similar to the current operational environment and would follow established local approach and departure patterns.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Therefore, baseline conditions would remain unchanged.

4.2.3 Summary Comparison of Alternatives

Table 4.2-2 presents a summary of the impacts by alternative for airfield and associated airspace.

Table 4.2-2 Summary Comparison of Airfield Operations by Alternative

Alternative	Environmental Consequences
Alternative 1	• Annual airfield operations would increase by 44,029 from baseline • F-35B operations would continue to follow established local approach and departure patterns to avoid air traffic congestion
Alternative 2	• Annual airfield operations would increase by 21,686 from baseline • F-35B operations would continue to follow established local approach and departure patterns to avoid air traffic congestion
Alternative 3	• Annual airfield operations would increase by 3,727 from baseline • F-35B operations would continue to follow established local approach and departure patterns to avoid air traffic congestion
Alternative 4	• Annual airfield operations would increase by 26,069 from baseline • F-35B operations would continue to follow established local approach and departure patterns to avoid air traffic congestion
No Action Alternative	• Baseline conditions would persist

4.3 Noise

4.3.1 Affected Environment (Baseline Conditions)

Refer to Section 3.3 and Appendix D for resource and modeling definitions as well as the methodology. It is the Marine Corps policy to adhere to all FAA regulations and Office of the Chief of Naval Operations Instructions (OPNAVINST) regarding minimum safe altitudes and noise abatement. Marine Corps personnel are sensitive to the effects of noise on the Air Station and surrounding communities, and continue to take all steps necessary to reduce aircraft noise impacts on the general population.

Noise complaints are received by MCAS Beaufort's Public Affairs Office where they are logged, and information is collected from the caller concerning the time and location of the complaint. MCAS Beaufort analyzes the complaint by reviewing the information with Station Air Traffic Control, to determine if there is a correlation between operations out of MCAS Beaufort and the geographic area. In 2007, five complaints were received and in 2008 (the latest information available), 18 complaints were received (personal communication, Mack 2010).

The baseline noise environment used for MCAS Beaufort modeling are those recorded in the February 2003 AICUZ Report (USMC 2003). Annual baseline flight operations total 62,001 (refer to Section 2.3.2.4). Of this total, 55,852 or 90 percent involve F/A-18 aircraft (USMC 2003). Aircraft operations associated with the one C-12 transport plane and transient (i.e., visiting) aircraft comprise the remaining 10 percent. Average busy day operations were used to best reflect the operational demands at the airfield. In addition, the noise modeling only evaluated two-engine F/A-18 operations since this aircraft represented 90 percent of the annual operations and defines the noise environment at the Air Station. The remaining 10 percent of flight operations would not change the airfield Day-Night Average Sound Level (DNL) environment. Of the total modeled operational activity, 93.5 percent occur during environmental daytime hours (7:00 a.m. to 10:00 p.m.) and 6.5 percent during environmental nighttime, or between 10:00 p.m. and 7:00 a.m. (USMC 2003).

Several measures for noise levels were done for purposes of this analysis. Single noise events are designated in Maximum Sound Level (L_{max}) and Sound Exposure Level (SEL). L_{max} comprises the highest sound level measured during a single aircraft overflight. This is an instantaneous sound level, occurring for a fraction of a second. The SEL metric is a single-number representation of a noise energy dose. It takes into account the effect of both the duration and intensity of a noise event. During an aircraft flyover, it would take into account the noise levels produced during the onset and recess period of the flyover. Because an individual overflight takes seconds and L_{max} occurs instantaneously, SEL forms the best metric to compare noise levels from overflights. Table 4.3-1 provides both the SEL and L_{max} sound levels for representative types of aircraft operating out of MCAS Beaufort and MCAS Cherry Point. The F-35B estimates are included in Table 4.3-1 to serve as a comparison.

Table 4.3-1 Representative A-Weighted Instantaneous SEL and L_{max} Levels at Various Altitudes

Operation Type	Altitude (ft AGL)	AV-8B[a]				F/A-18E/F			
		SEL (dBA)	L_{max} (dBA)	Power (%RPM)	Speed (knots)	SEL (dBA)	L_{max} (dBA)	Power (%NC)	Speed (knots)
Departure (Conventional)	2,000	104	97	113.5	300	109	103	95	300
Departure (Short Takeoff)	2,000	104	97	113.5	250	NA	NA	NA	NA
Non-Break Arrival[b] (Conventional)	1,000	102	94	85	125	114	108	85	130
Overhead Arrival (Initial Approach)	1,500	93	89	85	350	94	88	80	300
Touch and Go[b] (Downwind Leg)	1,000	103	96	90	150	113	107	84	130
FCLP[b] (Downwind Leg)	600	107	101	90	150	NA	NA	NA	NA
GCA Box (Downwind Leg)	1,600	97	91	93	250	99	91	82	250

Operation Type	Altitude (ft AGL)	F/A-18C/D				C-17			
		SEL (dBA)	L_{max} (dBA)	Power (%NC)	Speed (knots)	SEL (dBA)	L_{max} (dBA)	Power (EPR)	Speed (knots)
Departure (Conventional)	2,000	110	100	96.5	275	91	82	1.3	175
Departure (Short Takeoff)	2,000	NA	NA	NA	NA	NA	NA	NA	NA
Non-Break Arrival[b] (Conventional)	1,000	106	100	85	136	98	91	1.25	160
Overhead Arrival (Initial Approach)	1,500	98	92	88	300	NA	NA	NA	NA
Touch and Go[b] (Downwind Leg)	1,000	108	102	87	136	NA	NA	NA	NA
FCLP[b] (Downwind Leg)	600	111	107	87	136	NA	NA	NA	NA
GCA Box (Downwind Leg)	1,600	88	83	81	235	86	80	1.1	230

Operation Type	Altitude (ft AGL)	F-35B[c]			
		SEL (dBA)	L_{max} (dBA)	Power (%ETR)	Speed (knots)
Departure (Conventional)	2,000	110	106	100	300
Departure (Short Takeoff)[d]	535[d]	125	123	100	290
Non-Break Arrival[b] (Conventional)	1,000	107	102	55	170
Overhead Arrival (Initial Approach)	1,500	89	84	35	300
Touch and Go[b] (Downwind Leg)	1,000	107	102	55	150
FCLP[b] (Downwind Leg)	600	111	107	55	150
GCA Box (Downwind Leg)	1,600	93	87	43	250

Notes: Weather: 64.2 F, 61.2% Relative Humidity (based on the average of modeled conditions for MCAS Beaufort and Cherry Point). NA=Does not apply to operation type. Engine Unit of Power: RPM—Revolutions Per Minute; NC—Engine Core RPM; EPR—Engine Pressure Ratio; and ETR—Engine Thrust Ratio; dBA-A-weighted decibel (dB).

[a]Modeled with reference acoustics data for an AV-8B with the F402-RR-408 engine (measured at Naval Air Weapons Station China Lake, September 2006).

[b]NoiseMap Flight noise file lower limit for "Approach" power setting is 86.1%NC. Landing gear and flaps down.

[c]Modeled with acoustics data for an F-35A (measured at Edwards Air Force Base, October 2008).

[d]Altitude for F-35B short takeoff determined by using the equivalent flight path distance of a conventional departure reaching 2,000 ft AGL.

Figure 4.3-1 presents baseline noise levels within the 65 to 85 dB DNL contours, in 5 dB increments. Table 4.3-2 lists the noise exposure both on and off the Air Station in terms of acreage (excluding bodies of water), population, and housing units within each DNL contour band. Housing units include 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.

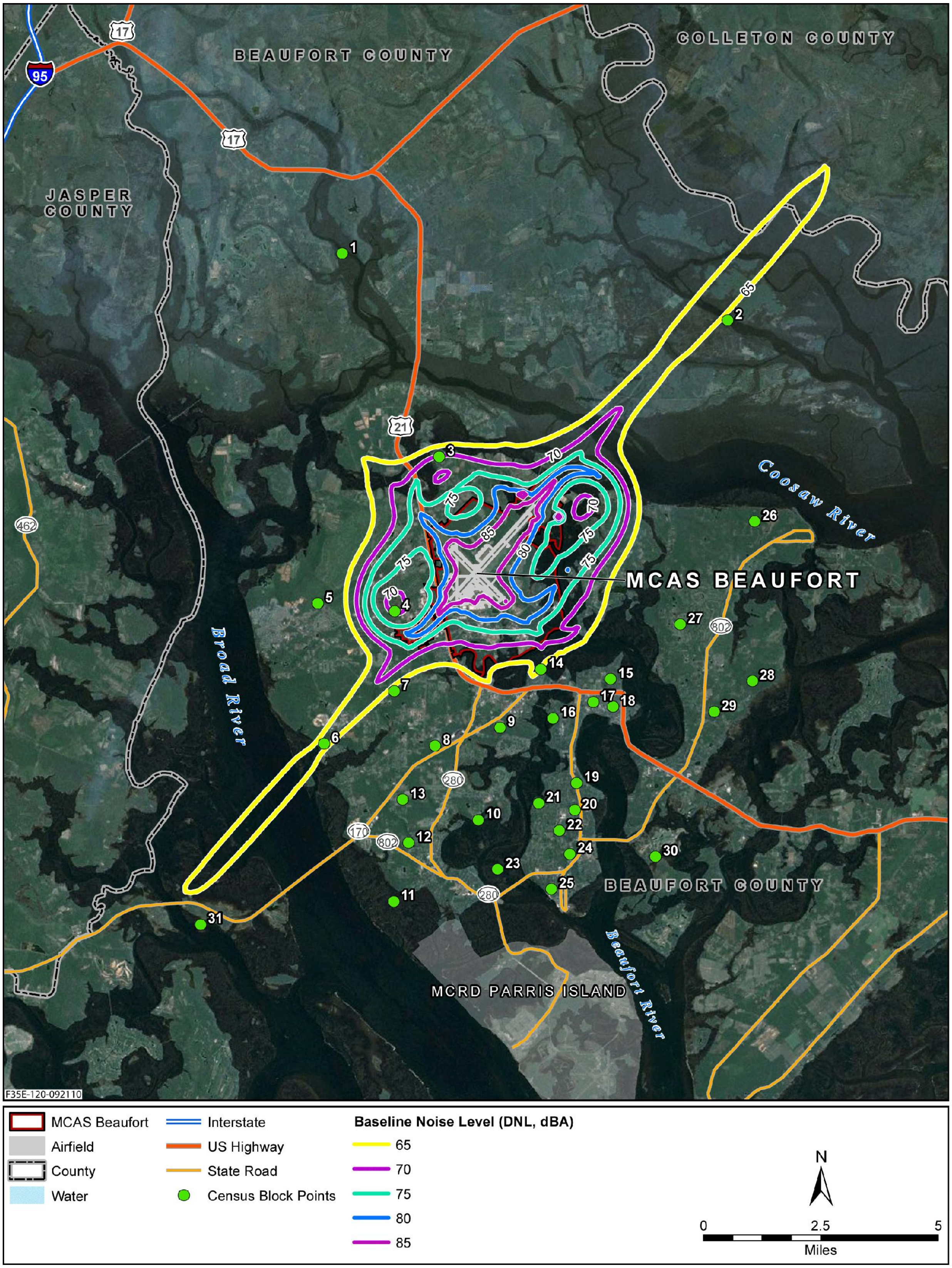


Figure 4.3-1 MCAS Beaufort Baseline Aircraft Noise Contours

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 who share living quarters (U.S. Census Bureau 2010).

Table 4.3-2 MCAS Beaufort Baseline Aircraft Noise Conditions On and Off Station

Contour Band (dB DNL)[a]	Acres[b]			Population[b]			Housing Units[b]		
	On	Off	TOTAL	On	Off	TOTAL	On	Off	TOTAL
65-70	350	6,856	7,206	360	2,391	2,751	85	811	896
70-75	420	2,375	2,795	253	1,242	1,495	28	402	430
75-80	1,964	3,135	5,099	930	1,316	2,246	96	414	510
80-85	1,316	179	1,495	559	80	639	0	30	30
85+	1,412	9	1,421	39	0	39	0	1	1
Subtotal	***5,462***	***12,554***	**18,016**	***2,141***	***5,029***	**7,170**	***209***	***1,658***	**1,867**

Notes:
[a]Exclusive of upper bound for all bands.
[b]Excludes bodies of water.

As presented in Section 3.3, population and housing units were determined by identifying the proportional area (using proportions based on census block data) of the noise contour bands and then applying these proportions to ascertain the number of people and units within each DNL contour band. Because the Census is conducted every 10 years, and the 2010 Census data are not yet available, population and housing units were estimated based on 2000 Census block data. This approach assures that the analyses are comparable across the three airfields. References to more recent Census sources may be used in this document. However, these references were used for defining terms, or for housing, employment, or population trends. Again, more recent data were not used as they would not be comparable across the three distinct geographic alternative locations.

As presented above, census blocks were used for the analyses; blocks are areas bounded on all sides by visible features (e.g., streets, roads, streams, and railroad tracks) and by invisible boundaries (e.g., city, town, township, and county limits, property lines, and short, imaginary extensions of streets and roads). A census block is the smallest geographic entity for which the Census Bureau collects and tabulates 100-percent decennial census data, including population and housing unit data. To further define the number of people and housing units affected by noise, the Marine Corps determined the proportion of acres found within each contour band and then applied this proportion to the census block. Using this proportional approach, it was found that under baseline conditions, 7,170 people and 1,867 housing units within 18,016 acres of land are exposed to noise levels greater than 65 dB DNL. While there are an estimated 598 people exposed to noise levels greater than 80 dB DNL on Station, these population numbers are a function of the proportional calculations and are not located within residential units.

In terms of land uses, Table 4.3-3 provides specific categories within Noise Zones II and III. The total acres listed in this table differ from those listed in Table 4.3-2 because not all land use categories are reported in Table 4.3-3. Refer to Section 3.3 for definitions of land use categories listed in the following table. Under baseline, 1,786 acres supporting low density residential areas (i.e. sensitive land uses) are found within Noise Zone III. Low density residential land uses would be considered incompatible under the AICUZ Program guidelines. The goal of these guidelines is to minimize noise sensitive uses within moderate or high noise areas.

Table 4.3-3 Land Uses (in acres) Occurring within Noise Zone Contour Bands at MCAS Beaufort

Land Use Category[a]	Noise Zone II (DNL)		Zone II Subtotal	Noise Zone III (DNL)			Zone III Subtotal
	65-70	70-75		75-85	80-85	>85	
Rural/Agriculture	975	6	981	0	0	0	0
Low Density Residential	2,250	1,596	3,846	1,660	122	4	1,786
Medium Density Residential	21	0	21	0	0	0	0
Urban	17	0	17	0	0	0	0
Commercial	28	23	51	66	15	0	81
Light Industrial	110	212	322	759	3	0	762
Lands with Marine Corps Restrictive Easements[b]	497	39	536	90	0	0	90
Public	4	0	4	44	22	5	71
MCAS Beaufort	350	420	770	1,964	1,316	1,412	4,692
TOTAL	**4,252**	**2,296**	**6,548**	**4,583**	**1,478**	**1,421**	**7,482**

Source: USMC 2003.
Notes:
[a]Refer to Section 3.3 for definition of land use categories.
[b]Total acreages under easement are current as of Spring 2010.

There are no schools that would be exposed to average noise levels of 65 dB DNL and greater under baseline conditions.

To evaluate Potential Hearing Loss (PHL), baseline conditions were determined. Per Department of Defense (DoD) policy, analysis of PHL considers a person's long-term exposure to noise levels of 80 dB DNL or greater.

In 1972, the National Institute for Occupational Safety and Health (NIOSH) published a criteria document with a recommended exposure limit of 85 dBA 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). On the Air Station, workers, including aircraft maintainers along the flightline and employees within the industrialized area adjacent to the runways, are exposed to noise during the work day. Compliance with Occupational Safety and Health Administration (OSHA) regulations, DoD Instruction 6055.12, *Hearing Conservation Program*; Navy Environmental Health Center Technical Manual [TM] 6260.51.99-2, *Navy Medical Department Hearing Conservation Program Procedures*; Chief of Naval Operations Instruction 5100.23G, *Navy Safety and Occupational Health Program Manual*; and Marine Corps Order 6260.1E, *Marine Corps Hearing Conservation Program* would minimize the potential for hearing loss. In addition, the Navy and Marine Corps Public Health Center and Air Station Safety Office monitor military and civilian personnel as part of their Hearing Conservation Program. Per TM 6260.51.99-2, the Hearing Conservation Program consists of the following five elements:

1. Noise measurement and exposure analysis to identify noise hazardous areas or sources and the personnel exposed.
2. Engineering control of noise levels to reduce the potential hazard to the maximum extent feasible.
3. Periodic hearing testing of all military and civilian personnel at risk (i.e., those routinely exposed to sound levels greater than 84 dB over an 8-hour time-weighted average) will be considered at risk to monitor the effectiveness of the program, and enable timely audiologic and medical evaluation of those personnel who demonstrate significant hearing loss or threshold shift.
4. Recommendations for use of hearing protective devices as an interim measure pending effective engineering controls.
5. Education 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.

The number of off-Station people at risk for PHL is indicated in Table 4.3-4. This table reflects the number of people exposed to noise at and above 80 dB DNL, in 1-dB increments, and the associated average Noise Induced Permanent Threshold Shift (NIPTS) and 10th percentile NIPTS (refer to Section 3.3 and at Appendix D.3.4 for detailed information on this metric). In the assessment of PHL, the use of DNL to characterize noise exposure provides a conservative assessment of hearing loss risk as DNL includes a 10-dB weighting factor for environmental nighttime operations between 10:00 p.m. and 7:00 a.m. (local time). The population counts by contour band were performed using Census block population and a methodology that assumes an even distribution of population within each block under the respective contour bands. This methodology provides only an estimate of the number of people who may be exposed, but was used because Census block-level data, while being the finest resolution available, are of a size comparable to that of the 1-dB contour band width and may only be partially located under any individual band. Finally, the 10th percentile NIPTS values are included to provide an assessment of PHL for the population most sensitive to noise, defined as the top 10 percent of the population. According to the U.S. Environmental Protection Agency (USEPA) Levels (USEPA 1974) and Criteria (USEPA 1973) documents, changes in hearing levels of less than 5 dB are generally not considered noticeable or significant.

Table 4.3-4 MCAS Beaufort Baseline PHL Estimates

Contour Band (dB DNL)	Baseline Residential Population	Avg. NIPTS (dB)[a, b]	10th Percentile NIPTS (dB)[a, b]
80-81	25	3.0	7.0
81-82	21	3.5	8.0
82-83	17	4.0	9.0
83-84	12	4.5	10.0
84-85	5	5.5	11.0
85-86	0	6.0	12.0
86-87	0	7.0	13.5
87-88	0	7.5	15.0
88-89	0	8.5	16.5
89-90	0	9.5	18.0

Source: [a]National Academy of Sciences 1977.
Note: [b]Rounded to the nearest 0.5 dB.

Within MCAS Beaufort boundaries, there are no residential areas found within the 80 dB and greater DNL noise contour bands. However, under baseline conditions there are communities off Station that are exposed to 80 dB DNL and greater noise levels. As presented in Table 4.3-4, it is estimated that there are a minimum of 25 people within the 80 to 81 dB DNL contour band affected by a 3.0 dB average NIPTS. A maximum of 5 people within the 84 to 85 dB DNL contour band are affected by a 5.5 dB average NIPTS. No other populations are found above the 85 dB DNL contour band.

Other generators of noise, such as general vehicle traffic, and other maintenance and landscaping activities, are a common ongoing occurrence at the Air Station. While these sources may contribute to the overall noise environment, they would not appreciably change under any of the action alternatives; therefore, these sources are not included in the noise analyses.

4.3.2 Environmental Consequences

The noise evaluation for all alternatives used the methodology presented in Section 3.3 and Appendix C and the modeling parameters, assumptions and data input supplied at Appendix D.5 and D.6. Please note that under all four alternatives, 99 percent of F-35B operations would occur during environmental daytime hours (7:00 a.m. to 10:00 p.m.) and 1 percent from 10:00 p.m. to 7:00 a.m. (or environmental nighttime hours).

Alternative 1 (Preferred Alternative)

Under MCAS Beaufort Alternative 1, three operational squadrons and the PTC (composed of two Fleet Replacement Squadrons [FRSs] with up to 88 F-35B aircraft), would be based at MCAS Beaufort. Projected F-35B flight operations would increase to 99,881 (see Table 2-16). When these projected operations are added to other based and transient aircraft (operations already conducted under baseline conditions), airfield operations would total 106,030. Figure 4.3-2 presents projected

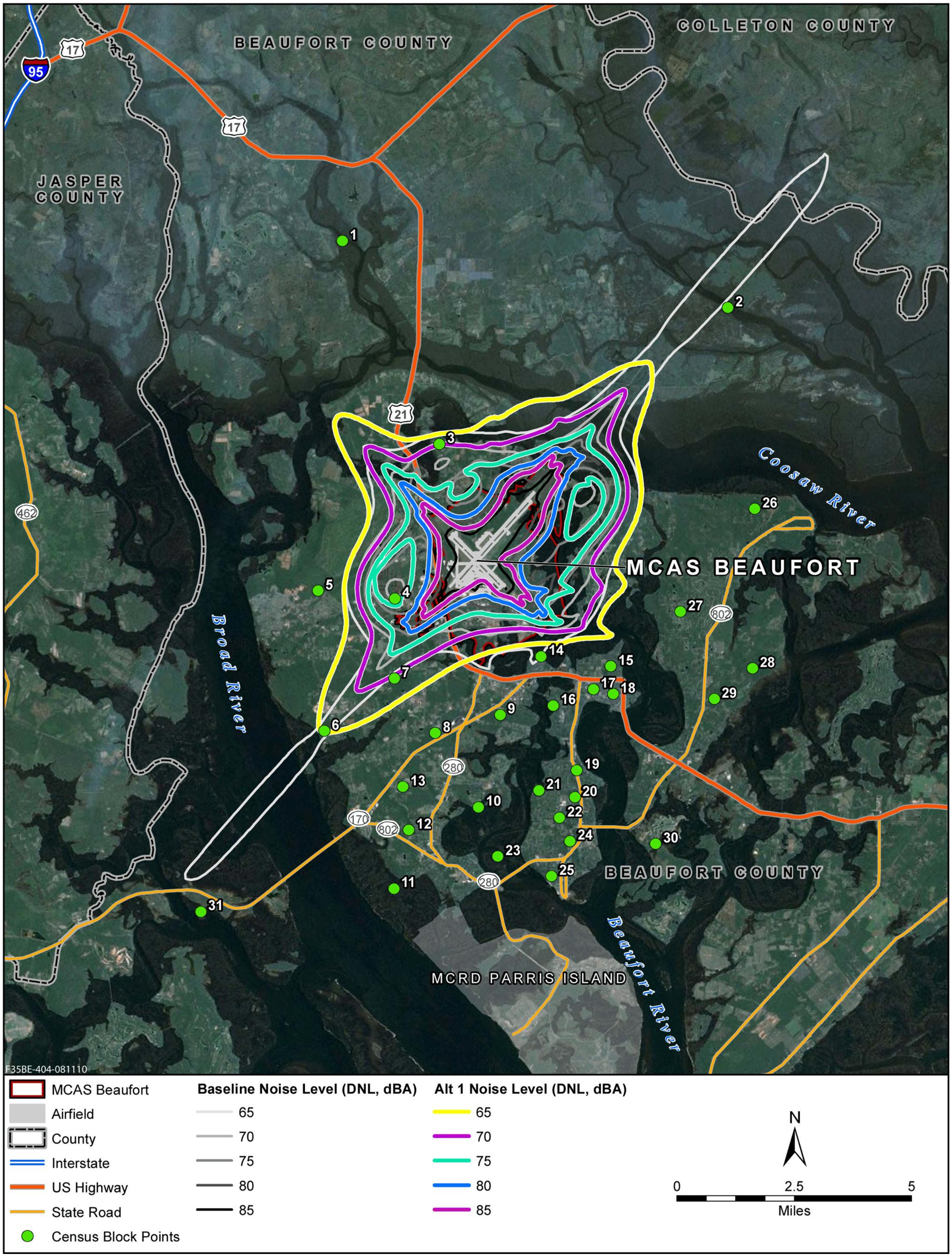


Figure 4.3-2 MCAS Beaufort Alternative 1 Projected Aircraft Noise Contours

noise contours, in 5 dB increments, from 65 to 85 dB DNL (baseline contours are included for comparison). Table 4.3-5 provides Alternative 1 noise exposure within each DNL contour band for on- and off-Station acreage (excluding bodies of water), population, and housing units. Net change from baseline conditions is also indicated for each of the three elements. Under Alternative 1, 8,860 people and 2,365 housing units within 18,219 acres of land would be exposed to noise levels greater than 65 dB DNL, of which 62 housing units are located within the 80 dB DNL and greater noise contour bands. No schools would be exposed to average noise levels of 65 dB DNL and greater.

Table 4.3-5 MCAS Beaufort Alternative 1 Projected Aircraft Noise Exposure Compared to Baseline Conditions On and Off Station

Contour Band (dB DNL)	Acres[a]				Population[b]				Housing Units[b]			
	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change
65-70	325	5,734	6,059	-1,147	543	3,235	3,778	+1,027	49	1,079	1,128	+287
70-75	406	3,443	3,849	+1,054	443	2,026	2,469	+974	39	664	703	+276
75-80	1,241	2,920	4,161	-938	631	1,256	1,887	-359	63	409	472	-38
80-85	1,064	487	1,551	+56	504	212	716	+77	0	62	62	+32
85+	2,401	198	2,599	+1,178	9	1	10	-29	0	0	0	-1
Subtotal	***5,437***	***12,782***			***2,130***	***6,730***			***151***	***2,214***		
TOTAL			**18,219**	**+203**			**8,860**	**+1,690**			**2,365**	**+498**

Notes:
[a]Exclusive of bodies of water.
[b]Estimated based on 2000 Census block data.

Table 4.3-6 lists the land uses and notes the net change for conditions, compared to the baseline, which could occur under Alternative 1. Please note that the total acres listed in Table 4.3-5 differ from those listed in Table 4.3-6 because these land use categories are not necessarily all inclusive as the acres reported above in Table 4.3-5. As the data illustrate, Noise Zone III acres would increase over low density residential, commercial, light industrial, public, and MCAS Beaufort lands. Noise Zone II acreage would decrease over all land use categories with the exception of medium density residential, urban, and public lands.

Table 4.3-6 Alternative 1 Land Uses (in acres) Occurring within Noise Zone Contour Bands at MCAS Beaufort

Land Use Category[a]	Noise Zone II (DNL)			Zone II Net Change	Noise Zone III (DNL)				Zone III Net Change
	65-70	70-75	Subtotal		75-85	80-85	>85	Subtotal	
Rural/Agricultural	616	27	643	-338	0	0	0	0	0
Low Density Residential	1,352	2,314	3,666	-180	1,640	238	88	1,966	+180
Medium Density Residential	1,611	33	1,644	+1,623	0	0	0	0	0
Urban	214	0	214	+197	0	0	0	0	0
Commercial	21	27	48	-3	45	43	11	99	+18
Light Industrial	143	117	260	-62	764	89	13	866	+104
Lands with USMC Restrictive Easements[b]	271	144	415	-121	16	0	0	16	-74
Public	13	122	135	+131	157	93	49	299	+228
MCAS Beaufort	325	406	731	-39	1,241	1,064	2,401	4,706	+14
TOTAL	**4,566**	**3,190**	***7,756***	**1,208**	**3,863**	**1,527**	**2,562**	***7,952***	**+470**

Notes:

[a]Refer to Section 3.3 for definition of land use categories.

[b]Total acreages under easement are current as of Fall 2009.

Speech interruptions are measured in the number of events above an indoor L_{max} (see Table 4.3-1); Section 3.3, Appendix C, and Appendix D.3.2 for more detail on these noise metrics and how speech interference is modeled. Figure 4.3-2 presents the location (labeled with numbers) for 31 points where speech interference events were analyzed. The points represent the geographic centers of the individual census blocks that surround MCAS Beaufort. Table 4.3-7 presents the potential for speech interruptions at these locations for all four alternatives. As presented, there would be the potential for 23 locations to experience interruptions with windows closed and 31 locations to experience interruptions with windows open.

Table 4.3-7 MCAS Beaufort Indoor Speech Interference Under all Action Alternatives[a]

Location	Windows Closed[b] Daytime Hourly[d] Events Above (L_{max} 50 dBA) Indoors By Alternative				Windows Open[c] Daytime Hourly[d] Events Above (L_{max} 50 dBA) Indoors By Alternative			
	1	2	3	4	1	2	3	4
1	<1	<1	<1	<1	1	<1	<1	1
2	3	2	2	3	3	2	2	3
3	7	5	4	6	11	8	7	9
4	10	7	6	9	11	8	7	9
5	5	4	4	5	9	6	6	8
6	5	3	3	5	7	5	5	7
7	6	4	4	5	10	8	6	9
8	3	2	2	3	8	6	5	7
9	3	2	2	3	8	6	5	7
10	0	0	0	0	3	2	2	3
11	2	2	2	2	3	2	2	3
12	2	2	2	2	3	2	2	3

Table 4.3-7 MCAS Beaufort Indoor Speech Interference Under all Action Alternatives[a]

Location	Windows Closed[b]				Windows Open[c]			
	Daytime Hourly[d] Events Above (L_{max} 50 dBA) Indoors By Alternative				Daytime Hourly[d] Events Above (L_{max} 50 dBA) Indoors By Alternative			
	1	2	3	4	1	2	3	4
13	3	2	2	3	4	3	3	4
14	6	5	4	5	12	9	7	10
15	<1	<1	<1	<1	10	8	7	9
16	<1	<1	<1	<1	8	6	5	7
17	<1	<1	<1	<1	8	6	5	7
18	<1	<1	<1	<1	6	5	4	5
19	0	0	0	0	4	3	3	4
20	0	0	0	0	<1	<1	<1	<1
21	0	0	0	0	3	2	2	3
22	0	0	0	0	<1	<1	<1	<1
23	0	0	0	0	2	2	2	3
24	0	0	0	0	<1	<1	<1	<1
25	0	0	0	0	2	2	2	2
26	1	1	1	2	3	2	2	3
27	<1	<1	<1	<1	7	5	4	6
28	<1	<1	<1	<1	2	2	2	2
29	<1	<1	<1	<1	3	2	2	2
30	<1	<1	<1	<1	<1	<1	<1	<1
31	<1	<1	<1	<1	3	2	2	3

Notes: [a]Baseline data could not be provided because this supplemental analysis was not included in the AICUZ report.
[a]Outdoor/Indoor assumes an attenuation of 25 dB.
[b]Outdoor/Indoor assumes an attenuation of 15 dB.
[c]Rounded to nearest integer.

Table 4.3-8 provides the DNL average noise level that each location would experience under the four action alternatives compared to baseline. Under Alternative 1, center points 3, 4, 6, and 7 would experience average noise levels between 65 and 74 dB DNL.

Table 4.3-8 MCAS Beaufort Census Block Center Point Noise Levels (in dB DNL) under all Action Alternatives

Location		dB DNL*			
	Baseline	Alt 1	Alt 2	Alt 3	Alt 4
1	<45	48	47	46	48
2	63	55	53	53	55
3	71	70	69	66	67
4	70	74	73	71	73
5	58	60	59	58	59
6	66	65	64	64	65

Table 4.3-8 MCAS Beaufort Census Block Center Point Noise Levels (in dB DNL) under all Action Alternatives

Location		dB DNL*			
	Baseline	Alt 1	Alt 2	Alt 3	Alt 4
7	64	69	68	68	69
8	53	58	57	57	58
9	54	56	55	54	55
10	<45	49	48	48	49
11	<45	52	51	51	52
12	<45	53	51	51	53
13	47	56	54	54	56
14	65	62	61	60	61
15	55	57	55	55	56
16	54	54	53	52	53
17	55	55	54	52	54
18	54	54	53	52	53
19	<45	47	46	45	46
20	<45	45	<45	<45	45
21	<45	47	46	46	47
22	<45	45	<45	<45	<45
23	<45	47	46	45	47
24	<45	<45	<45	<45	<45
25	<45	<45	<45	<45	<45
26	49	54	53	53	54
27	53	57	55	55	56
28	53	53	51	51	53
29	47	50	48	48	50
30	<45	<45	<45	<45	<45
31	54	49	47	47	49

Baseline DNL source: AICUZ Report for MCAS Beaufort (February 2003) CY 2007 DNL noise contours grid file.
Notes: *Rounded to nearest integer.

Table 4.3-9 provides the number of people (based proportionally on the area within each 1-dB noise contour band using Census block data) exposed to DNL at and above 80 dB, in 1 dB increments, and the associated average NIPTS and 10th percentile NIPTS. While there are no residential areas at risk for PHL on MCAS Beaufort, there would be off-Station populations exposed to 80 dB DNL and greater under this alternative. The average and 10th percentile NIPTS would be lower than what is presented in Table 4.3-9 for those persons without 40 years of daily exposure to average noise levels of 80 dB DNL and above.

Table 4.3-9 MCAS Beaufort PHL Estimates under Alternative 1

Contour Band (dB DNL)	Baseline Residential Population	Proposed Residential Population	Average NIPTS (dB)[a, b]	10th Percentile NIPTS (dB) [a, b]
80-81	25	58	3.0	7.0
81-82	21	47	3.5	8.0
82-83	17	43	4.0	9.0
83-84	12	35	4.5	10.0
84-85	5	28	5.5	11.0
85-86	0	0	6.0	12.0
86-87	0	0	7.0	13.5
87-88	0	0	7.5	15.0
88-89	0	0	8.5	16.5
89-90	0	0	9.5	18.0

Source: [a]National Academy of Sciences 1977.
Note: [b]Rounded to the nearest 0.5 dB.

Alternative 2

At MCAS Beaufort, Alternative 2 would establish two FRSs to comprise the PTC (with up to 40 F-35B aircraft). Projected F-35B flight operations would average a total of 77,538 annually (refer to Table 2-16), and when added to other based and transient aircraft (operations already conducted under baseline conditions), airfield operations would total 83,687, representing an approximate 35 percent increase from baseline conditions. Figure 4.3-3 shows the 65 to 85 dB DNL contours, in 5 dB increments, for Alternative 2 at MCAS Beaufort. The figure also includes baseline contours for comparison purposes.

Table 4.3-10 provides Alternative 2 noise exposure within each DNL contour band for on- and off-Station acreage (excluding bodies of water), population, and housing units. Net change from baseline conditions is also indicated for each of these elements. Under Alternative 2, 7,878 people and 2,047 housing units within 16,359 acres of land would be exposed to noise levels greater than 65 dB DNL. No schools would be exposed to average noise levels of 65 dB DNL and greater.

Table 4.3-10 MCAS Beaufort Alternative 2 Projected Aircraft Noise Exposure Compared to Baseline Conditions On and Off Station

Contour Band (dB DNL)	Acres[a]				Population[b]				Housing Units[b]			
	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change
65-70	355	4,828	5,183	-2,023	530	2,787	3,317	+566	47	930	977	+136
70-75	432	3,715	4,147	+1,352	438	2,107	2,545	+1,050	39	685	724	+297
75-80	1,343	1,852	3,195	-1,904	658	688	1,346	-900	69	224	293	-217
80-85	1,000	420	1,420	-75	476	184	660	+21	0	53	53	+23
85+	2,254	160	2,414	+993	9	1	10	-29	0	0	0	-1
Subtotal	***5,384***	***10,975***			***2,111***	***5,767***			***155***	***1,892***		
TOTAL			**16,359**	**-1,657**			**7,878**	**+708**			**2,047**	**+180**

Notes: [a]Exclusive of bodies of water.
[b]Estimated based on 2000 Census block data.

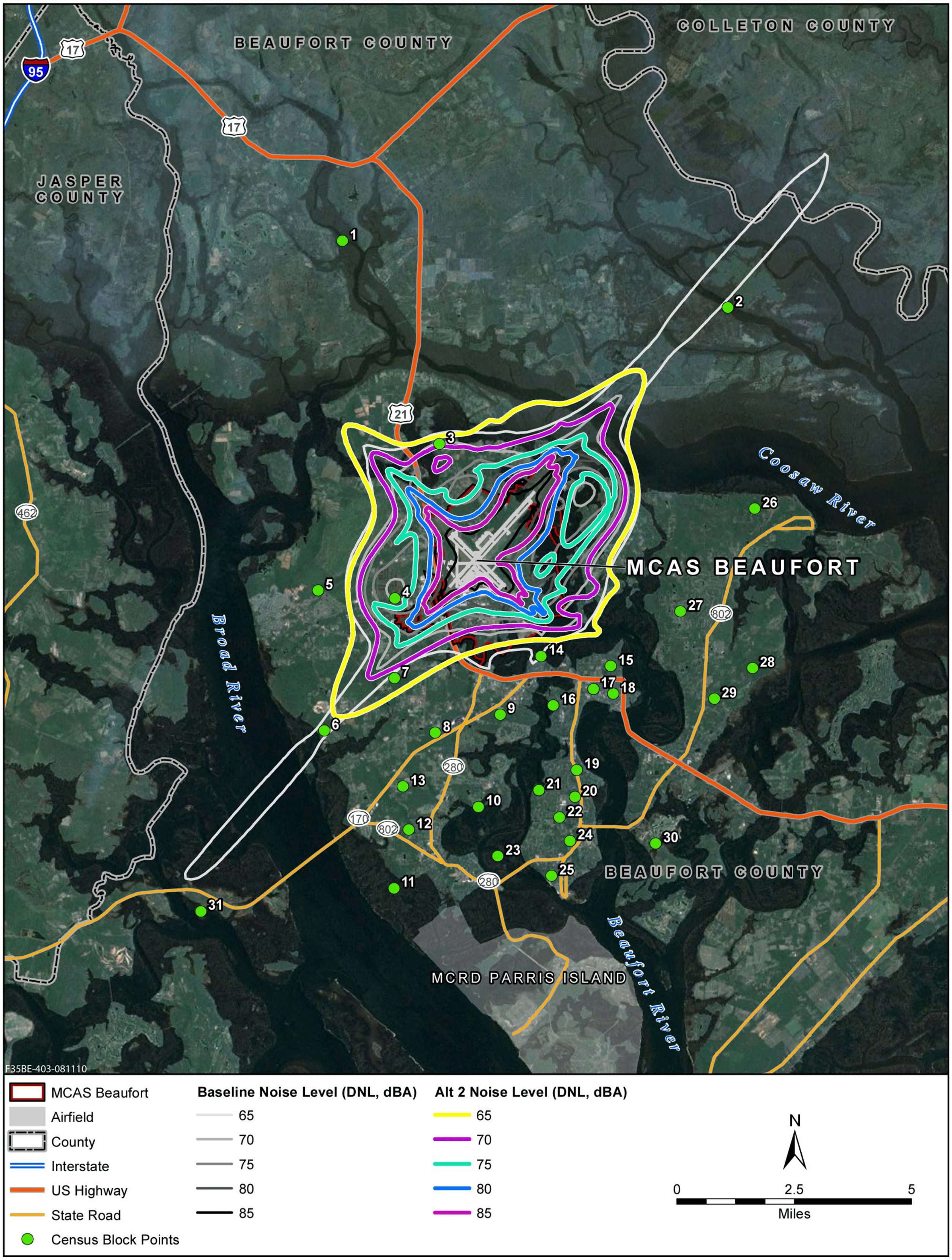


Figure 4.3-3 MCAS Beaufort Alternative 2 Projected Aircraft Noise Contours

Table 4.3-11 lists the land uses and notes the net change for conditions, compared to the baseline, which could occur under Alternative 2. Please note that the total acres listed in Table 4.3-10 differ from those listed in Table 4.3-11 because these land use categories are not necessarily all inclusive as the acres reported above in Table 4.3-10.

Table 4.3-11 Alternative 2 Land Uses (in acres) Occurring within Noise Zone Contour Bands at MCAS Beaufort

Land Use Category[a]	Noise Zone II (DNL)			Zone II Net Change	Noise Zone III (DNL)				Zone III Net Change
	65-70	70-75	Subtotal		75-85	80-85	>85	Subtotal	
Rural/Agricultural	363	0	363	-618	0	0	0	0	0
Low Density Residential	1,689	2,278	3,967	+121	1,165	190	74	1,429	-357
Medium Density Residential	1,006	0	1,006	+985	0	0	0	0	0
Urban	30	0	30	+13	0	0	0	0	0
Commercial	22	39	61	+10	0	0	0	0	+2
Light Industrial	121	615	736	+414	265	70	10	345	-417
Lands with Marine Corps Restrictive Easements[b]	273	124	397	-139	5	0	0	5	-85
Public	39	113	152	+148	163	72	46	281	+210
MCAS Beaufort	355	432	787	+17	1,343	1,000	2,254	4,597	-95
TOTAL	**3,898**	**3,601**	***7,499***	**+951**	**2,976**	**1,375**	**2,389**	***6,740***	**-742**

Notes:
[a]Refer to Section 3.3 for definition of land use categories.
[b]Total acreages under easement are current as of Fall 2009.

Acres exposed to Noise Zone III levels would decrease over low density residential, light industrial, lands with Marine Corps restricted easements, and at MCAS Beaufort. For Noise Zone II acres, noise levels would increase over all land use categories with the exception of rural land and those areas with Marine Corps restrictive easements.

As presented in Table 4.3-7 and shown in Figure 4.3-3, under Alternative 2 the potential for speech interruptions would occur for 23 locations with windows closed and 31 locations with windows open. As presented in Table 4.3-8, center points 3, 4, and 7 would experience average noise levels between 73 and 68 dB DNL under Alternative 2. Table 4.3-12 shows the estimated residential populations at risk for PHL. Under this alternative, no residential areas would be exposed to 80 dB and greater DNL contour bands on MCAS Beaufort; however, there would be off-Station areas exposed to these noise levels. The average and 10th percentile NIPTS would be lower than what is presented in Table 4.3-12 (on the following page) for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above (see Section 3.3 for PHL definition).

Alternative 3

At MCAS Beaufort, Alternative 3 involves basing eight operational squadrons with up to 128 F-35B aircraft. Projected F-35B flight operations would average a total of 59,579 annually (refer to Table 2-16), and when added to other based and transient aircraft operations under baseline conditions, there would be a total of 65,728 airfield operations. This represents an approximate 6-percent increase from baseline conditions. Figure 4.3-4 shows the 65 to 85 dB DNL contour bands, in 5 dB increments for Alternative 3 at MCAS Beaufort. The figure also includes baseline contour bands for comparison purposes.

Table 4.3-12 MCAS Beaufort PHL Estimates under Alternative 3

Contour Band (dB DNL)	Baseline Residential Population	Proposed Residential Population	Average NIPTS (dB)[a, b]	10th Percentile NIPTS (dB)[a, b]
80-81	25	49	3.0	7.0
81-82	21	43	3.5	8.0
82-83	17	37	4.0	9.0
83-84	12	29	4.5	10.0
84-85	5	26	5.5	11.0
85-86	0	0	6.0	12.0
86-87	0	0	7.0	13.5
87-88	0	0	7.5	15.0
88-89	0	0	8.5	16.5
89-90	0	0	9.5	18.0

Source: [a]National Academy of Sciences 1977.
Note: [b]Rounded to the nearest 0.5 dB.

Table 4.3-13 provides Alternative 3 noise exposure within each DNL contour band for on- and off-Station acreage (excluding bodies of water), housing units, and population. Net change from baseline conditions is also indicated. Under Alternative 3, 7,307 people and 1,876 housing units within 15,264 acres of land would be exposed to noise levels greater than 65 dB DNL. No schools would be exposed to average noise levels of 65 dB DNL and greater.

Table 4.3-13 MCAS Beaufort Alternative 3 Projected Aircraft Noise Exposure Compared to Baseline Conditions On and Off Station

Contour Band (dB DNL)	Acres[a]				Population[b]				Housing Units[b]			
	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change
65-70	397	4,865	5,262	-1,944	451	2,758	3,209	+458	39	920	959	+118
70-75	1,037	4,091	5,128	+2,333	612	2,031	2,643	+1,148	54	666	720	+293
75-80	1,158	783	1,941	-3,158	550	360	910	-1,336	62	110	172	-338
80-85	980	208	1,188	-307	448	90	538	-101	0	25	25	-5
85+	1,704	41	1,745	+324	7	0	7	-32	0	0	0	-1
Subtotal	***5,276***	***9,988***			***2,068***	***5,239***			***155***	***1,721***		
TOTAL			**15,264**	**-2,752**			**7,307**	**+137**			**1,876**	**+9**

Notes:
[a]Exclusive of bodies of water.
[b]Estimated based on 2000 Census block data.

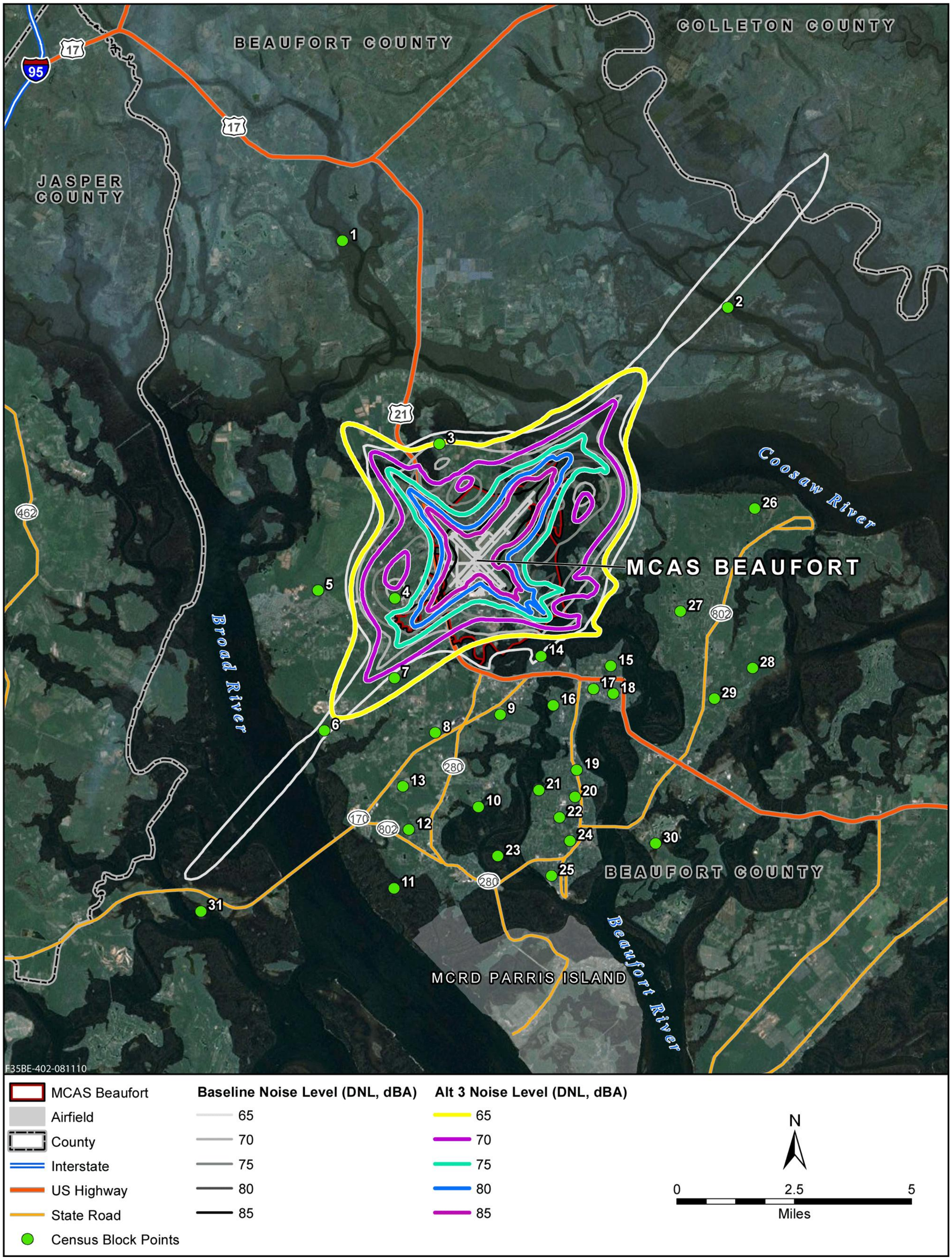


Figure 4.3-4 MCAS Beaufort Alternative 3 Projected Aircraft Noise Contours

Table 4.3-14 lists the land uses and notes the net change for conditions, compared to the baseline, which could occur under Alternative 3. Please note that the total acres listed in Table 4.3-13 differ from those listed in Table 4.3-14 because these land use categories are not necessarily all inclusive as the acres reported above in Table 4.3-13. Acres exposed to Noise Zone III levels would decrease over low density residential, commercial, light industrial, lands with Marine Corps restricted easements, and MCAS Beaufort. For Noise Zone II acreage, levels would increase over all land use categories with the exception of rural lands and those areas with Marine Corps restrictive easements.

Table 4.3-14 Alternative 3 Land Uses (in acres) Occurring within Noise Zone Contour Bands at MCAS Beaufort

Land Use Category[a]	Noise Zone II (DNL)			Zone II Net Change	Noise Zone III (DNL)				Zone III Net Change
	65-70	70-75	Subtotal		75-85	80-85	>85	Subtotal	
Rural/Agricultural	378	1	379	-602	0	0	0	0	0
Low Density Residential	2,093	2,437	4,530	+684	468	88	11	567	-1,219
Medium Density Residential	933	0	933	+912	0	0	0	0	0
Urban	35	0	35	+18	0	0	0	0	0
Commercial	22	49	71	+20	32	37	3	72	-9
Light Industrial	114	779	893	+571	141	12	2	155	-607
Lands with Marine Corps Restrictive Easements[b]	317	89	406	-130	0	0	0	0	-90
Public	65	152	217	+213	156	34	21	211	+140
MCAS Beaufort	397	1,037	1,434	+664	1,158	980	1,704	3,842	-850
TOTAL	**4,354**	**4,544**	***8,898***	**+2,350**	**1,955**	**1,151**	**1,741**	***4,847***	**-2,635**

Notes:
[a]Refer to Section 3.3 for definition of land use categories.
[b]Total acreages under easement are current as of Fall 2009.

As presented in Table 4.3-7 and shown in Figure 4.3-4, under Alternative 3, the potential for speech interruptions would occur for 23 locations with windows closed and 31 locations with windows open. As presented in Table 4.3-8, center points 3, 4, and 7 would experience average noise levels between 71 and 66 dB DNL under Alternative 3. Table 4.3-15 shows the estimated residential populations at risk for PHL. Under this alternative, no residential areas would be exposed to 80 dB and greater DNL contour bands on MCAS Beaufort; however, there would be off-Station areas exposed to these noise levels. The average and 10th percentile NIPTS would be lower than what is presented in Table 4.3-15 for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above (see Section 3.3 for PHL definition).

Table 4.3-15 MCAS Beaufort PHL Estimates under Alternative 3

Contour Band (dB DNL)	Baseline Residential Population	Proposed Residential Population	Average NIPTS (dB)[a,b]	10th Percentile NIPTS (dB)[a,b]
80-81	25	30	3.0	7.0
81-82	21	22	3.5	8.0
82-83	17	16	4.0	9.0
83-84	12	13	4.5	10.0
84-85	5	10	5.5	11.0
85-86	0	0	6.0	12.0
86-87	0	0	7.0	13.5
87-88	0	0	7.5	15.0
88-89	0	0	8.5	16.5
89-90	0	0	9.5	18.0

Source: [a]National Academy of Sciences 1977.
Notes: [b]Rounded to the nearest 0.5 dB.

Alternative 4

At MCAS Beaufort, Alternative 4 involves the basing of 11 operational squadrons with up to 176 F-35B aircraft. Projected F-35B flight operations would average 81,921 annually (refer to Table 2-16), and when added to other based and transient aircraft operations under baseline conditions, there would be a total of 88,070 airfield operations. This represents an approximate 42-percent increase from baseline conditions. Figure 4.3-5 shows the 65 to 85 dB DNL contours, in 5 dB increments, for Alternative 4 at MCAS Beaufort. The figure also includes baseline contours for comparison purposes.

Table 4.3-16 provides Alternative 4 noise exposure within each DNL contour band for on- and off Station acreage (excluding bodies of water), housing units, and population. Net change from baseline conditions is also indicated. Under Alternative 4, 8,419 people and 2,233 housing units within 17,412 acres of land would be exposed to noise levels greater than 65 dB DNL. No schools would be exposed to average noise levels of 65 dB DNL and greater.

Table 4.3-16 MCAS Beaufort Alternative 4 Projected Aircraft Noise Exposure Compared to Baseline Conditions On and Off Station

Contour Band (dB DNL)	Acres[a]				Population[b]				Housing Units[b]			
	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change
65-70	378	5,792	6,170	-1,036	486	3,198	3,684	+933	43	1,068	1,111	+270
70-75	534	4,142	4,676	+1,881	441	2,298	2,739	+1,244	39	756	795	+368
75-80	1,468	1,733	3,201	-1,898	692	686	1,378	-868	70	220	290	-220
80-85	1,039	301	1,340	-155	479	131	610	-29	0	37	37	+7
85+	1,952	73	2,025	+604	8	0	8	-31	0	0	0	-1
Subtotal	***5,371***	***12,041***			***2,106***	***6,313***			***206***	***2,081***		
TOTAL			**17,412**	**-604**			**8,419**	**+1,249**			**2,233**	**+366**

Notes:
[a]Exclusive of bodies of water.
[b]Estimated based on 2000 Census block data.

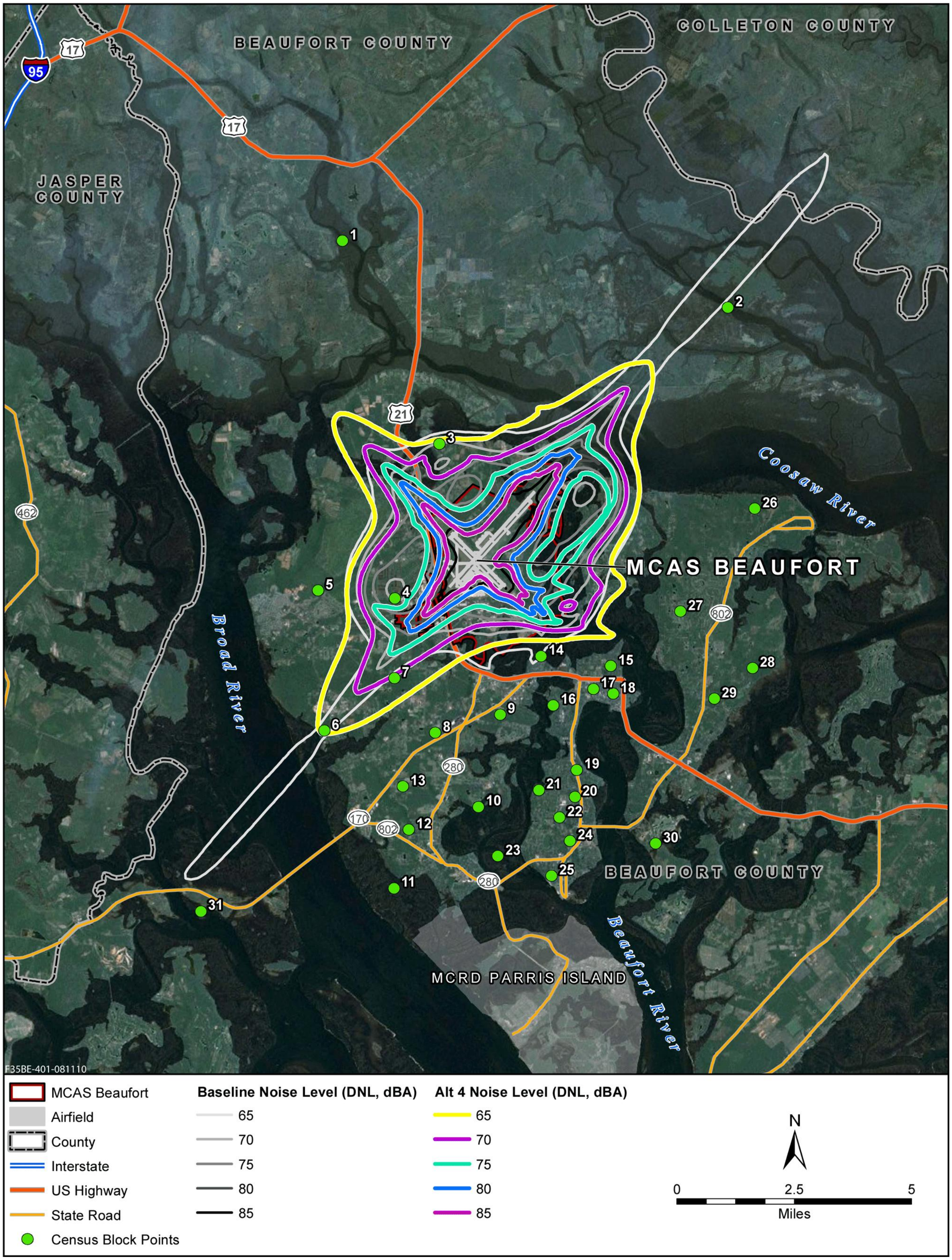


Figure 4.3-5 MCAS Beaufort Alternative 4 Projected Aircraft Noise Contours

Table 4.3-17 lists the land uses and notes the net change for conditions, compared to the baseline, which could occur under Alternative 4. Please note that the total acres listed in Table 4.3-17 differ from those listed in this table because these land use categories are not necessarily all inclusive as the acres reported above in Table 4.3-16. Acres exposed to Noise Zone III levels would decrease over all land use categories with the exception of commercial and public lands. For areas within Noise Zone II, exposed acres would increase over all land use categories with the exception of rural lands and those areas with Marine Corps restrictive easements.

Table 4.3-17 Alternative 4 Land Uses (in acres) Occurring within Noise Zone Contour Bands at MCAS Beaufort

Land Use Category[a]	Noise Zone II (DNL)			Zone II Net Change	Noise Zone III (DNL)				Zone III Net Change
	65-70	70-75	Subtotal		75-85	80-85	>85	Subtotal	
Rural/Agricultural	609	34	643	-338	0	0	0	0	0
Low Density Residential	1,755	2,511	4,266	+420	1,041	142	23	1,206	-580
Medium Density Residential	1,502	29	1,531	+1,510	0	0	0	0	0
Urban	218	0	218	+201	0	0	0	0	0
Commercial	20	35	55	+4	41	41	9	91	+10
Light Industrial	139	702	841	+519	233	26	3	262	-500
Lands with Marine Corps Restrictive Easements[b]	286	146	432	-104	0	0	0	0	-90
Public	17	130	147	+143	206	55	27	288	+217
MCAS Beaufort	378	534	912	+142	1,468	1,039	1,952	4,459	-233
TOTAL	**4,924**	**4,121**	***9,045***	**+2,497**	**2,989**	**1,303**	**2,014**	***6,306***	**-1,176**

Notes:

[a]Refer to Section 3.3 for definition of land use categories.

[b]Total acreages under easement are current as of Fall 2009.

As presented in Table 4.3-7 and shown in Figure 4.3-5, under Alternative 4 the potential for speech interruptions would occur for 23 locations with windows closed and 31 locations with windows open. As depicted in Table 4.3-8, center points 3, 4, 6, and 7 would experience average noise levels between 73 and 65 dB DNL under Alternative 4. Table 4.3-18 shows the estimated residential population at risk for PHL. Under this alternative, no residential areas would be exposed to 80 dB and greater DNL contour bands on MCAS Beaufort; however, there would be off-Station areas exposed to these noise levels. The average and 10th percentile NIPTS would be lower than what is presented in Table 4.3-18 for those without 40 years of daily exposure to average noise levels of 80dB DNL and above (see Section 3.3 for PHL definition).

Table 4.3-18 MCAS Beaufort PHL Estimates under Alternative 4

Contour Band (dB DNL)	Baseline Residential Population	Proposed Residential Population	Average NIPTS (dB)[a,b]	10th Percentile NIPTS (dB)[a,b]
80-81	25	40	3.0	7.0
81-82	21	34	3.5	8.0
82-83	17	24	4.0	9.0
83-84	12	19	4.5	10.0
84-85	5	14	5.5	11.0
85-86	0	0	6.0	12.0
86-87	0	0	7.0	13.5
87-88	0	0	7.5	15.0
88-89	0	0	8.5	16.5
89-90	0	0	9.5	18.0

Source: [a]National Academy of Sciences 1977.
Notes: [b]Rounded to the nearest 0.5 dB.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

4.3.3 Summary Comparison of Alternatives

Table 4.3-19 presents a summary of the impacts by alternative.

Table 4.3-19 Noise Impacts Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternative 1	• Net increase of 1,690 people exposed to 65 dB DNL or greater • Net increase of 498 housing units exposed to 65 dB DNL or greater • Net increase of 203 acres exposed to 65 dB DNL or greater • Net increase of 1,208 acres of land uses within the Noise Zone II over land use categories; however, no change to land uses anticipated • Net increase of 470 acres for land uses within the Noise Zone III over land use categories; however, no change to land uses anticipated • The potential for speech interferences would occur for 23 locations with windows closed and 31 locations with windows open • Average noise levels between 74 and 65 dB DNL would occur over 4 center points • No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above
Alternative 2	• Net increase of 708 people exposed to 65 dB DNL or greater • Net increase of 180 housing units exposed to 65 dB DNL or greater • Net decrease of 1,657 acres exposed to 65 dB DNL or greater • Net increase of 951 acres of land uses within the Noise Zone II over land use categories; however, no change to land uses anticipated • Net decrease of 742 acres for land uses within the Noise Zone III over land use categories; however, no change to land uses anticipated • The potential for speech interferences would occur for 23 locations with windows closed and 31 locations with windows open

Table 4.3-19 Noise Impacts Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternative 2	• Average noise levels between 73 and 65 dB DNL would occur over 3 center points • No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above
Alternative 3	• Net increase of 137 people exposed to 65 dB DNL or greater • Net increase of 9 housing units exposed to 65 dB DNL or greater • Net decrease of 2,752 acres exposed to 65 dB DNL or greater • Net increase of 2,350 acres of land uses within the Noise Zone II over land use categories; however, no change to land uses anticipated • Net decrease of 2,635 acres for land uses within the Noise Zone III over land use categories; however, no change to land uses anticipated • The potential for speech interferences would occur for 23 locations with windows closed and 31 locations with windows open • Average noise levels between 71 and 65 dB DNL would occur over 3 center points • No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above
Alternative 4	• Net increase of 1,249 people exposed to 65 dB DNL or greater • Net increase of 366 housing units exposed to 65 dB DNL or greater • Net decrease of 604 acres exposed to 65 dB DNL or greater • Net increase of 2,497 acres of land uses within the Noise Zone II over land use categories; however, no change to land uses anticipated • Net decrease of 1,176 acres for land uses within the Noise Zone III over land use categories; however, no change to land uses anticipated • Average noise levels between 73 and 65 dB DNL would occur over 4 center points • The potential for speech interferences would occur for 23 locations with windows closed and 31 locations with windows open No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above
No Action Alternative	• Baseline conditions would persist

4.4 Air Quality

4.4.1 Affected Environment (Baseline Conditions)

In regard to the National Ambient Air Quality Standards (NAAQS), the USEPA designates all areas of the U.S. in terms of having air quality better (attainment) or worse than (nonattainment) the NAAQS (refer to Section 3.4 for NAAQs standards). An area generally is in nonattainment for a pollutant if its NAAQS has been exceeded more than once per year. Former nonattainment areas that have attained the NAAQS are designated as maintenance areas. Presently, the regulatory area around MCAS Beaufort is in attainment for all NAAQS pollutants.

The Federal Clean Air Act (CAA) and its subsequent amendments establish air quality regulations and the NAAQS and delegate the enforcement of these standards to the states. In South Carolina, the South Carolina Department of Health and Environmental Control (SCDHEC) is responsible for monitoring air quality and reporting to USEPA. The CAA establishes air quality planning processes and requires areas in nonattainment of a NAAQS to develop a State Implementation Plan that details how the state will attain the standard within mandated time frames. The requirements and compliance dates for attainment are based on the severity of the nonattainment classification of the area.

The SCDHEC has similar ambient air quality standards as the NAAQS (refer to Table 3-3 in Section 3.4), except for total suspended particulates (TSP) (also referred to as Particulate Matter) and gaseous fluorides, expressed as hydrogen fluoride. The South Carolina ambient air quality standards for these two pollutants are listed in Table 4.4-1.

Table 4.4-1 South Carolina Ambient Air Quality Standards

Pollutant[a]	Averaging Time	Primary	Secondary
TSP	Annual Geometric Mean	75 micrograms per cubic meter ($\mu g/m^3$)	--
Hydrogen fluoride	12 Hours	3.7 $\mu g/m^3$	--
	24 Hours	2.9 $\mu g/m^3$	--
	1 Week	1.6 $\mu g/m^3$	--
	1 Month	0.8 $\mu g/m^3$	--

Source: SCDHEC Regulation 61-62.5 Standard No. 2 Ambient Air Quality Standards and 40 Code of Federal Regulations (CFR) Part 50.

Notes: [a]These standards must not be exceeded more than once per year.

The Air Quality Control Region (AQCR) for MCAS Beaufort is the Savannah (Georgia) – Beaufort (South Carolina [SC]) Interstate AQCR (40 CFR Part 81.113). This AQCR includes the South Carolina counties of Beaufort, Colleton, Hampton, and Jasper; and the Georgia counties of Bryan, Bulloch, Candler, Chatham, Effingham, Evans, Liberty, and Tattnall.

Emission thresholds associated with CAA conformity requirements are the primary means of assessing the air quality impacts associated with implementation of a Proposed Action. A formal conformity determination is required for Federal actions occurring in nonattainment or maintenance areas when the total direct and indirect stationary and mobile source emissions of nonattainment pollutants or their precursors exceed *de minimis* thresholds. In addition, a formal conformity determination is required for actions defined as regionally significant (i.e., if the total emissions from a Federal action exceed 10 percent of a nonattainment area's emission inventory for that pollutant). As stated, MCAS Beaufort is in attainment for all criteria pollutants, and therefore, *de minimis* does not apply. Therefore, further conformity analysis is not needed to base the F-35B at MCAS Beaufort. The following evaluates whether projected emissions represent a regional significance.

For estimating emissions, a 3,000-ft AGL ceiling was selected for a conservative estimate of the average height of a stable temperature inversion common to the coastal maritime air shed. This type of inversion can significantly inhibit, if not effectively block, vertical and widespread lateral dispersion of air pollutants. Thus, pollutants can be considered confined between the base of the inversion and the ground, or that portion of the lower atmosphere commonly termed the boundary layer. Emissions released above this mixing layer would not appreciably affect ground-level air quality and are only incorporated into the analysis for Greenhouse Gases (GHGs). For the purposes of assessing air pollutant emissions, therefore, all aircraft operations at or below 3,000 ft AGL and ground support equipment (GSE) were included to estimate criteria pollutants and GHG emissions.

The average maximum annual temperature in Beaufort, SC is 76.3 degrees Fahrenheit (°F), and the average minimum annual temperature is 56.7°F. January is the coldest month with an average maximum temperature of 60.7°F and average minimum temperature of 39.9°F. July is the warmest month with an average daily maximum temperature of 90.3°F. In July there is about a 60 percent chance of sunshine compared to a 54 to 59 percent chance of sunshine in December.

Precipitation in the state is ample, with maximum precipitation amounts occurring in March and July and minimum precipitation amounts in May and November. There is no wet or dry season, and no month averages less than 2 inches of precipitation anywhere in South Carolina. Frozen precipitation (snow and sleet) can also affect Beaufort County, and in 1989 a record of 5 inches of snow fell. Thunderstorms and tropical cyclones can bring large rainfall events. Prevailing winds tend to be either from the northeast or the southwest. Average surface wind speeds for all months range between 6 to 10 miles per hour. The Bermuda High (a pressure system that sits over the Atlantic during the summer) contributes to an average of 20 stagnation days per year in the Coastal Plain, especially during summer (SCSCO 2008).

The current attainment status designations for areas within South Carolina are summarized in 40 CFR 81.341. Beaufort County is classified as "better than national standards" for TSPs (includes particulate matter less than 10 microns [PM_{10}]) and sulfur dioxide. For carbon monoxide (CO), fine particulate matter less than 2.5 microns ($PM_{2.5}$), and ozone, the county is designated as "unclassifiable/attainment" and is designated as "cannot be classified or better than national standards" for nitrogen dioxide (NO_2).

Existing emissions of criteria pollutants exceed the 100 tons per year (TPY) threshold at the Air Station. Under CAA Title V, MCAS Beaufort is required to obtain operating permits from the SCDHEC Bureau of Air Quality for certain emission sources and their associated air pollution control equipment. Currently, MCAS Beaufort is operating under a Part 70 Air Quality Permit issued by the State of South Carolina, permit number TV-0360-0004. The permit was effective as of April 1, 2006 and will expire on March 31, 2011 (SCDHEC 2005).

Under the Proposed Action, several support facilities and hangars would be constructed. Depending on the alternative, older hangars (with stationary emission sources such as heating and hot water units) would be demolished and replaced by new state-of-the-art hangars. Replacement of these older stationary source units with new equipment (designed and operated for reduced emissions) would result in an overall reduction in emissions. Because no other new stationary sources are anticipated under any of the alternatives, emissions from these sources are not considered to be a factor in potentially degrading regional air quality. Evaluation of stationary source emissions, therefore, is not carried forward in this Environmental Impact Statement (EIS).

While stationary sources are not a major factor impacting regional air quality under the Proposed Action alternatives, mobile sources (aircraft [including engine run-ups], GSE, and personally owned vehicles [POVs]) would be the primary sources contributing to pollutant emissions. Since it was assumed that the Proposed Action would result in no increases in use of government-owned vehicles, they were excluded from the baseline. Table 4.4-2 presents the baseline mobile source emissions for these types of mobile sources at MCAS Beaufort. Included are emissions from legacy aircraft, and their associated GSE and vehicles of commuting military personnel. The specific calculations used for aircraft operations, GSE, and commuting personnel are found in Appendix E.

Table 4.4-2 MCAS Beaufort Baseline Annual Mobile Source Emissions

Emissions Source	Criteria Pollutant (tons)					
	Volatile Organic Compounds (VOCs)	CO	Nitrogen Oxides (NO_x)	Sulfur Oxides (SO_x)	PM_{10}	$PM_{2.5}$
Legacy F/A-18 Aircraft	396.78	1,029.44	176.27	8.97	160.85	<160.85
POV	4.16	55.12	3.39	0.04	0.12	<0.12
GSE	4.83	8.05	19.81	0.11	2.31	<2.31
TOTAL ANNUAL EMISSIONS	**405.77**	**1,092.61**	**199.47**	**9.12**	**163.28**	**<163.28**

4.4.2 Environmental Consequences

To determine potential impacts to regional air quality, MCAS Beaufort baseline conditions were compared to those projected for each alternative in terms of construction as well as aircraft and maintenance operations. Air quality potential impacts include: 1) increases of ambient air pollution concentrations above the NAAQS, 2) contributing to an existing violation of the NAAQS, 3) interfering with, or delaying timely attainment of the NAAQS, or 4) results in the potential for any new stationary source to be considered a major source of emissions as defined in 40 CFR Part 52.21 (total emissions of any pollutant subject to regulation under the CAA that is greater than 250 TPY for attainment areas).

For all of the four alternatives, construction would occur at MCAS Beaufort beginning in 2011 and reaching completion no later than 2023. By 2023, all of the aircraft associated with the action would be present at the Air Station, along with all personnel required to support aircraft operations. Each of the four alternatives includes variations in construction and in the number and type of squadrons to be based at MCAS Beaufort.

Demolition/Construction. Air quality impacts from proposed construction activities were estimated from: 1) combustion emissions due to the use of fossil fuel-powered equipment; 2) fugitive dust emissions (PM_{10} and $PM_{2.5}$) during demolition activities, earth-moving activities, and the operation of equipment on bare soil; and 3) VOC emissions from application of asphalt materials during paving operations.

Airfield Operations. Air quality impacts were assessed by comparing the net change in emissions associated with F-35B operations within the MCAS Beaufort region. These emissions include: 1) F-35B aircraft operations (including engine run-ups) within the airfield and surrounding airspace under 3,000 ft AGL; 2) GSE operations; and 3) POV use by commuting personnel associated with the proposed basing. It was assumed that the Proposed Action would result in no increases in use of government-owned vehicles and minimal increases in stationary sources (primarily, heat and hot water sources for Bachelor Enlisted Quarters [BEQs] under Alternatives 4).

Action Alternatives

Demolition/Construction. Tables 4.4-3 through 4.4-6 summarizes the projected annual emissions under Alternatives 1 through 4, respectively, and includes those related to both demolition and construction activities. Emissions from demolition/construction activities would not alter attainment status or represent a regional significance within the regional AQCR. Refer to Appendix E for specifics on demolition debris, construction equipment, and disturbance footprints.

Table 4.4-3 Projected Annual Construction Emissions Under Alternative 1

Year	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Construction Year (CY) 1	0.6	3.1	5.6	0.6	1.9	0.4
CY2	5.7	23.8	64.6	7.1	11.7	4.1
CY3	5.7	23.7	62.2	6.8	24.6	5.3
CY4	1.7	8.8	12.5	1.4	5.8	1.2
CY5	0.7	4.3	6.2	0.7	2.5	0.5
CY6	0.4	2.0	3.7	0.4	0.6	0.2
CY7	0.4	2.0	3.7	0.4	0.6	0.2

Table 4.4-4 Projected Annual Construction Emissions Under Alternative 2

Year	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
CY1	0.6	2.9	4.2	0.5	1.5	0.4
CY2	4.7	19.8	51.7	5.7	18.0	4.2
CY3	4.7	19.2	53.8	5.9	18.6	4.3
CY4	1.0	5.7	8.7	1.0	2.3	0.7
CY5	0.3	1.8	2.3	0.3	0.5	0.2
CY6	0.2	1.2	1.9	0.2	0.2	0.1
CY7	0.2	1.2	1.9	0.2	0.2	0.1

Table 4.4-5 Projected Annual Construction Emissions Under Alternative 3

Year	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
CY1	0.8	3.8	6.5	0.7	1.9	0.5
CY2	5.7	23.4	65.0	7.2	15.4	4.5
CY3	6.5	27.3	73.0	8.1	27.0	6.1
CY4	1.5	8.5	14.3	1.6	7.6	1.4
CY5	0.9	4.6	7.8	0.9	3.7	0.7
CY6	0.5	2.7	5.2	0.6	1.1	0.3
CY7	0.5	2.7	5.2	0.6	1.1	0.3

Table 4.4-6 Projected Annual Construction Emissions Under Alternative 4

Year	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
CY1	0.9	4.5	7.9	0.9	2.8	0.6
CY2	8.0	32.6	92.0	10.0	20.2	6.1
CY3	6.8	28.8	75.7	8.4	22.6	5.8
CY4	1.8	9.6	16.3	1.9	10.5	1.9
CY5	1.1	6.0	10.1	1.1	5.7	1.1
CY6	0.7	3.5	6.9	0.8	1.9	0.5
CY7	0.7	3.5	6.9	0.8	1.9	0.5

Non-road diesel engines can significantly contribute to PM and NO_x emissions. In recent years, the USEPA has set standards for engines used in most new construction equipment. However, because construction equipment can last 25 to 30 years, it will take many years before existing equipment is replaced with newer, cleaner equipment. Because the USEPA's May 2004 regulations only apply to newly-manufactured diesel engines, the USEPA developed the Clean Construction USA program to assist operators of heavy non-road, diesel-powered equipment (including the military) to reduce emissions from the older engines that are in operation today. Emissions education methods include:

- *Idle-reduction practices* to save money, reduce emissions, add fuel savings, extend engine life, and provide a safer and better work environment for equipment operators.
- *Switching to ultra low-sulfur diesel* fuel to reduce engine wear, deposits, and oil degradation.
- *Retrofitting equipment* to reduce emissions.
- *Installing USEPA-approved catalysts and filters* to ensure emission reductions and durability of retrofit technologies. Engine upgrade kits can also be installed during routinely scheduled engine rebuilds to reduce emissions.
- *Following the Leadership in Energy and Environmental Design (LEED) Green Building Rating System* to ensure all new construction meets LEED Silver Level certification or better.

To support emissions reduction, installations can request that the newer Tier 2 or Tier 3 engines be prioritized for use and can place that as a stipulation in construction proposals. In addition, an Erosion and Sediment Pollution Control Plan is required under the National Pollutant Discharge Elimination System for construction activities, and this plan includes requirements for dust control in disturbed areas.

Airfield Operations. Tables 4.4-7 through 4.4-10 presents a summary of projected annual operational emissions under Alternatives 1 through 4, respectively. As the results indicate (see Appendix E for specific data), VOCs, CO, and particulate matter (PM_{10} and $PM_{2.5}$) emissions would decrease when compared to those generated by legacy aircraft, and NO_x and SO_x would increase. Emissions from aircraft operations would not alter attainment status or represent a regional significance within the regional AQCR.

Table 4.4-7 Projected Annual Mobile Source Emissions Under Alternative 1

Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
F-35B Operations	2.83	118.02	496.33	40.52	6.95	<6.95
GSE	4.95	8.37	20.04	0.01	2.4	<2.4
POVs	3.38	72.23	2.56	0.14	0.11	<0.11
TOTAL ANNUAL EMISSIONS	**11.16**	**198.62**	**518.93**	**40.67**	**9.46**	**<9.46**
*Net Change from Baseline**	*-394.61*	*-893.99*	*+319.46*	*+31.55*	*-153.82*	*-153.82*

Note: *Totals may vary slightly from those in Appendix E due to rounding.

Table 4.4-8 Projected Annual Mobile Source Emissions Under Alternative 2

Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
F-35B Operations	2.10	87.43	382.55	30.87	5.16	<5.16
GSE	2.30	3.83	9.43	0.00	1.10	<1.10
POV	1.63	34.75	1.23	0.07	0.05	<0.05
TOTAL ANNUAL EMISSIONS	**6.03**	**126.01**	**393.21**	**30.94**	**6.31**	**<6.31**
*Net Change from Baseline**	*-399.74*	*-966.60*	*+193.74*	*+21.82*	*-156.97*	*-156.97*

Note: *Totals may vary slightly from those in Appendix E due to rounding.

Table 4.4-9 Projected Annual Mobile Source Emissions Under Alternative 3

Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
F-35B Operations	1.96	81.56	303.42	25.73	4.75	<4.75
GSE	7.36	12.26	30.19	0.01	3.51	<3.51
POVs	5.55	118.52	4.20	0.23	0.17	<0.17
TOTAL ANNUAL EMISSIONS	**14.87**	**212.34**	**337.81**	**25.97**	**8.43**	**<8.43**
*Net Change from Baseline**	*-390.90*	*-880.27*	*+138.34*	*+16.85*	*-154.85*	*-154.85*

Note: *Totals may vary slightly from those in Appendix E due to rounding.

Table 4.4-10 Projected Annual Mobile Source Emissions Under Alternative 4

Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
F-35B Operations	2.69	112.8	412.67	35.20	6.52	<6.52
GSE	10.13	16.86	41.51	0.01	4.83	<4.83
POVs	7.63	162.97	5.78	0.32	0.24	<0.24
TOTAL ANNUAL EMISSIONS	**20.45**	**292.63**	**459.96**	**35.53**	**11.59**	**<11.59**
*Net Change from Baseline**	*-385.32*	*-799.98*	*+260.49*	*+26.41*	*-151.69*	*-151.69*

Note: *Totals may vary slightly from those in Appendix E due to rounding.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and baseline conditions would remain unchanged.

4.4.3 Summary Comparison of Alternatives

Table 4.14-11 presents a summary comparison of the action alternatives and the No Action Alternative.

Table 4.4-11 Air Quality Summary Comparison of Alternatives

Alternative	Environmental Consequences
Action Alternatives	• Regional attainment status would not be altered, nor would emissions represent a regional significance • Construction impacts would be below regulatory thresholds for all air pollutants • Mobile source emissions would decrease except for NO_x and SO_x, which would increase • No net change to stationary source emissions
No Action Alternative	• Baseline conditions would persist

4.5 Hazardous Materials, Toxic Substances, Hazardous Waste, and Contaminated Sites

4.5.1 Affected Environment (Baseline Conditions)

Hazardous Materials. A variety of hazardous materials are used at MCAS Beaufort, including petroleum, oil, and lubricants, solvents and thinners, caustic cleaning compounds and surfactants, antifreeze, acids and corrosives, adhesives, paints (including enamels, lacquers, and polyurethane coatings), fungicides, and batteries (MCAS Beaufort 2009a). At MCAS Beaufort, hazardous materials are managed through a Joint Hazardous Material Minimization Center (JHC) operated by the Supply Department (personal communication, Dukes 2009). The JHC serves as the central stocking and issue point for all hazardous materials used by each unit at MCAS Beaufort; furthermore, the JHC is responsible for managing the acquisition, storage, and use of all hazardous materials at the Air Station (MCAS Beaufort 2007a). The system uses the Hazardous Materials Management System to track hazardous materials purchased through the system and materials issued for reuse at the JHC. Hazardous materials are purchased, stored, managed, used, and disposed of in compliance with applicable health, safety, and environmental regulations and in such a manner as to minimize the potential for spills and impacts to the land and existing facilities (MCAS Beaufort 2007a).

Toxic Substances. Regulated toxic substances typically associated with buildings and facilities include asbestos, lead-based paint (LBP), and poly-chlorinated biphenyls (PCBs). MCAS Beaufort has conducted a comprehensive asbestos baseline survey and performs re-inspections for buildings where asbestos-containing materials (ACM) have been identified. Certified contractors are used in all renovation or demolition projects; the contractors follow the Air Station's guidance for asbestos management. The Natural Resources and Environmental Affairs Office (NREAO) Asbestos Coordinator retains all records of asbestos surveys, re-inspections, and removal and disposal activities at MCAS Beaufort (MCAS Beaufort 2007b).

MCAS Beaufort has conducted the required investigations for the presence of LBP and has prepared risk assessments as appropriate. Contractors are required to follow proper procedures if LBP is encountered during repairs or renovations (MCAS Beaufort 2007a).

MCAS Beaufort has removed or replaced all known PCB-containing transformers and PCB-contaminated electrical equipment. The last PCB-containing transformers and electrical equipment at the Air Station were removed and properly disposed of in August 2002 (MCAS Beaufort 2007a).

Hazardous Waste. MCAS Beaufort is regulated as a Large Quantity Generator of hazardous waste as required under the Resource Conservation and Recovery Act (RCRA). Common hazardous waste streams generated include waste paints and thinners, spent solvents, contaminated blast media, solid materials such as rags contaminated with paints or solvents, and spill clean-up residues (MCAS Beaufort 2007a; USEPA 2009c). Multiple satellite accumulation areas for hazardous waste are located in proximity to the generators. The NREAO also maintains two less-than 90-day storage areas, which are used primarily in emergency situations. Hazardous waste from these sites is collected at a RCRA Part B permitted Treatment Storage and Disposal Facility at the Air Station and transported off-site for treatment or disposal as arranged through contracts administered by the Defense Reutilization and Marketing Office (USEPA 2009d; MCAS Beaufort 2007a). Hazardous wastes are managed and disposed of in compliance with applicable health, safety, and environmental regulations and in such a manner as to minimize the potential for spills and impacts to the land and existing facilities. Air Station procedures are detailed in the MCAS Beaufort Hazardous Waste Management Plan and Hazardous Waste Management Environmental Standard Operating Procedures (MCAS Beaufort 2008b; 2006a).

Contaminated Sites. In 1986, a RCRA Facility Assessment was conducted at MCAS Beaufort, which resulted in the identification of 75 solid waste management units (SWMUs) and 16 Areas of Concern (AOCs) (USEPA 2009c). The Air Station's RCRA permit lists three sites, SWMU 77 and Hangars 414 and 416, as being located within the affected area (SCEQC, BLWM 2004). SWMU 77, the former Acid Neutralization Pit, is located south of the runway adjacent to Building 36. This site was listed as closed in a previous report; however, the RCRA permit requires confirmatory sampling to be conducted at the pit to confirm its status (USEPA 2009c). Closure of the pit is expected to occur in 2010 (MCAS Beaufort 2009b). AOC-C, a mop-washing area, is located at the southeastern end of Hangar 416. Mops used during the washing and maintenance of aircraft and associated equipment were cleaned in this area; waste fluids potentially released at this site include paints, oils, and JP-5 jet fuel. In 1994, soil at the site was excavated during the construction of an underground oil/water separator. The excavated soil was removed, and laboratory analytical results from soil samples of the excavated material indicated no contamination. In 1997, U.S. Army Corps of Engineers (USACE) conducted groundwater investigations at AOC-C and identified the presence of benzene, cadmium, lead, chromium, and selenium at elevated levels. Further investigations identified low levels of petroleum and solvent-based VOCs in the groundwater (DoN 2003a). A Phase II RCRA Facility Investigation is being planned for AOC-C (personal communication, Ehde 2009; MCAS Beaufort 2009b).

When MCAS Beaufort was a Naval Air Station, the area around Hangar 414 was an aviation gasoline tank farm. In late 2003, utility workers broke an old terra cotta drain of unknown origin and use outside Hangar 414. A small amount of petroleum spilled out of the drain line and was immediately cleaned up at the site (MCAS Beaufort 2008b). Demolition drawings from the 1950s showed that the tanks in this area were removed from service when a jet parking area and an aircraft hangar were constructed. A series of geophysical surveys have been completed and 10 monitoring wells have been installed (MCAS Beaufort 2008b). The geophysical surveys showed that at least the base of the old concrete tanks remain in place beneath the concrete aircraft parking apron to the northwest of Hangar 414 (personal communication, Ehde 2009). In addition, both groundwater and soil contamination have been detected in the old tank farm area, consisting of aviation gasoline and its breakdown products. The groundwater plume is located beneath the parking apron. Additional assessment is planned for this site (SCDHEC 2008a). Any remediation work at the Hangar 414 aviation gasoline contaminated site is managed in conjunction with SCDHEC's Bureau of Land and Waste Management.

4.5.2 Environmental Consequences

Hazardous Materials. Under Alternatives 1 through 4, established procedures for the management of hazardous materials would be followed during the demolition of older structures and construction of new facilities. Specifically, the demolition and construction contractor(s) would be responsible for notifying MCAS Beaufort prior to bringing any hazardous materials onto the Air Station. The demolition and construction contractor(s) would also be responsible for the proper handling of any hazardous materials used on the site during these activities.

Under Alternatives 1 through 4, procedures for hazardous material management established for MCAS Beaufort would also be followed during squadron operations. With a few exceptions, it is anticipated that the quantities and types of hazardous materials needed for maintenance of the F-35B would be comparable to those currently used for maintenance of legacy aircraft (personal communication, Luker 2009). The major differences would be the use of a non-chromium containing coatings, unlike the hexavalent chromium containing materials utilized by legacy aircraft. The elimination of these substances would slightly reduce the amount of hazardous materials used, thus reducing the overall potential impacts to the environment (personal communication, Luker 2009).

Toxic Substances. Of the buildings proposed to be demolished under Alternatives 1 through 4, only Hangars 414 and 416 are known to contain ACM (EEG 2007a, 2007b). Hangar 416 would not be demolished under Alternative 2. All structures proposed for demolition would be inspected for ACM and LBP according to established MCAS Beaufort procedures, and 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 MCAS Beaufort procedures. All LBP would also be managed and disposed of in accordance with the Toxic Substances Control Act, OSHA regulations, and established MCAS Beaufort procedures.

Hazardous Waste. Under Alternatives 1 through 4, established procedures for the management of hazardous wastes would be followed during the demolition of older structures and construction of new facilities. Specifically, the demolition and construction contractor(s) would be responsible for coordinating the disposal of any hazardous wastes generated with MCAS Beaufort.

Established procedures for hazardous waste management would also be followed during squadron operations. The volumes of hazardous wastes generated in operations involving primer are expected to decrease slightly with the introduction of the F-35B, as the primer for that aircraft does not contain cadmium or chromium (personal communication, Luker 2009). MCAS Beaufort operates as a large quantity generator of hazardous waste. The exact amounts of hazardous waste generated under each alternative are unknown; however, under all alternatives MCAS Beaufort would continue to operate within its hazardous waste permit conditions.

***Contaminated Sites*.** SWMU 77 is located south of the runway adjacent to Building 36, AOC-C is located at the southeastern end of Hangar 416, and a former aviation gasoline tank farm is located in the vicinity of Hangar 414. Closure of SWMU 77 is anticipated to occur in 2010 and there is no known threat to human health (SCDHEC 2004; MCAS Beaufort 2009b). A Phase II RCRA Facility Investigation is planned at AOC-C and additional assessment is planned for the aviation gasoline tank farm near Hangar 414 (SCDHEC 2008a; personal communication, Ehde 2009; MCAS Beaufort 2009b). Construction activities are not likely to encounter contaminated groundwater, which is 6 to 10 ft below ground surface (personal communication, Ehde 2009). If contaminated groundwater is encountered during demolition or construction, Best Management Practices (BMPs) for working with contaminated groundwater would be utilized by workers at the site. Alternatives 1 through 4 would necessitate the relocation of MCAS Beaufort's RCRA-Part B permitted, hazardous waste storage facility and the installation of a fence, which is part of the security upgrade. Closure of the existing hazardous waste storage facility and construction of a new hazardous waste storage facility would be performed in accordance with requirements described in MCAS Beaufort's RCRA Part B permit and state hazardous waste regulations. In order to complete these actions, MCAS Beaufort's RCRA Part B permit would need to be modified. Depending on the location of the fence, state regulators would be notified if the fence would be installed near any known contaminated sites.

Any soils excavated in areas with potential contamination as part of the Proposed Action would be properly segregated by the construction contractor and then sampled by representatives of MCAS Beaufort. The sample results would determine whether soils can be reused on the site or require proper disposal off-site at a facility permitted to receive the soils pursuant to appropriate South Carolina regulations. Furthermore, project specific stormwater BMPs such as windbreaks and water spraying would be employed to control dust during excavation and construction activities. A notification process is required under the Air Station's RCRA Part B permit and consists of submitting a letter to SCDEHC informing them that work would be conducted at a remediation site and providing the proposed dates of the work.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented, therefore, baseline conditions would remain unchanged.

4.5.3 Summary Comparison of Alternatives

Table 4.5-1 presents a summary of the impacts by alternative.

Table 4.5-1 Hazardous Materials, Toxic Substances, and Hazardous Waste Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternatives 1, 3, and 4	• Established procedures for the management of hazardous materials and hazardous waste would be followed during the demolition of older structures and construction of new facilities • Primers containing cadmium and chromium would be discontinued • Hangars 414 and 416 contain ACM, which would be removed and properly disposed • LBP would be managed and disposed of properly • Old aviation gasoline piping is located west of Hangar 414; soils excavated would be segregated and sampled prior to disposal • The existing hazardous waste storage facility would be demolished and a new hazardous waste storage facility constructed; RCRA Part B permit would be modified as necessary
Alternative 2	• Same as Alternative 1 except only Hangar 414 would be demolished
No Action Alternative	• Baseline conditions would persist

4.6 Safety

4.6.1 Affected Environment (Baseline Conditions)

Aviation Safety. The FAA is responsible for ensuring safe and efficient use of U.S. airspace by military and civilian aircraft and for supporting national defense requirements. In order to fulfill these requirements, the FAA has established safety regulations, airspace management guidelines, a civil-military common system, and cooperative activities with DoD. The primary concern regarding 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 bird/wildlife-aircraft strikes. As discussed in Section 3.6, aircraft mishaps are classified as A, B, or C. Class A mishaps are the most severe with total property damage of $2 million or more, or a fatality and/or permanent total disability. Historic mishap data relative to flight hours flown for current F/A-18s and AV-8Bs are provided in Table 4.6-1. Mishap rates are typically calculated per 100,000 flying hours.

The Marine Corps Class A aviation mishap rate for all Marine Corps aircraft for Fiscal Year 2002 (FY02) through FY08 was 2.8 mishaps per 100,000 flight hours flown (Naval Safety Center 2009a). From 1999 to 2008, four Class A mishaps involving F/A-18s have occurred at MCAS Beaufort: one in 2000, two in 2004, and one in 2007 (Naval Safety Center 2009b).

Table 4.6-1 Historic Worldwide Class A Flight Mishaps for Relevant Navy Aircraft[a]

Year	F/A-18[b]			AV-8B		
	Class A Mishaps	Flight Hours	Mishap Rate	Class A Mishaps	Flight Hours	Mishap Rate
FY99	3	267,714	1.12	7	30,441	23.00
FY00	9	242,459	3.71	2	22,088	9.05
FY01	7	248,956	2.81	1	32,372	3.09
FY02	6	276,226	2.17	3	43,078	6.96
FY03	11	253,480	4.34	3	47,103	6.37
FY04	14	226,353	6.19	2	40,775	4.91
FY05	4	232,487	1.72	5	37,969	13.17
FY06	6	224,377	2.67	3	40,467	7.41
FY07	5	207,137	2.41	1	35,718	2.80
TOTAL	**65**	**2,179,189**	**2.98**	**27**	**330,011**	**8.18**

Sources: Naval Safety Center 2007, 2009a

Notes: [a]Historic mishap data is based on a $1 million Class A threshold, which changed to $2 million in October 2009; as such, the actual number of Class A mishaps may be less than reported.
[b]F/A-18 data reflects F/A-18A/B/C/D mishaps, not only those related to Marine Corps aircraft.

Emergency and Mishap Response at MCAS Beaufort. MCAS Beaufort maintains detailed emergency and mishap response plans to react to an aircraft accident, should one occur. These plans assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on or off Station. Response would normally occur in two phases. The initial response focuses on rescue, evacuation, fire suppression, safety, elimination of explosive devices, ensuring security of the area, and other actions immediately necessary to prevent loss of life or further property damage. The initial response element usually consists of Aircraft Rescue Fire Fighters, Emergency Medical Technicians, and Military Police. The second phase is the mishap investigation, involving an array of organizations whose participation would be governed by the circumstances associated with the mishap and actions required to be performed.

Accident Potential Zones (APZs). Clear Zones and APZs for MCAS Beaufort are depicted in Figure 4.6-1. Land use plans, programs, and controls address compatible development within the APZs. For further information, please refer to Section 4.7 (Land Use).

Bird/Wildlife Aircraft Strike Hazards (BASH). The intent of the MCAS Beaufort BASH Reduction Plan is to reduce BASH occurrences at the Air Station by creating an integrated hazard abatement program through awareness, avoidance, monitoring, and actively controlling bird and animal population movements (MCAS Beaufort 2006b). Some of the procedures outlined in the BASH Plan include monitoring the airfield for deer and for bird activity, issuing bird hazard warnings, initiating bird avoidance procedures when potentially hazardous bird activities are reported, and submitting BASH reports for all incidents. From February 2, 1999 to August 12, 2009, 50 BASH incidents have been recorded at MCAS Beaufort (Naval Safety Center 2009c). None of the incidents resulted in an aircraft mishap, and most resulted in no damage to the aircraft. Only two aircraft sustained damage greater than $10,000 (Naval Safety Center 2009c). Species identification began in 2008. Songbirds, including the Eastern meadowlark (*Sturnella magna*), Tree Swallow *(Tachycineta bicolor),* Swainson's Thrush *(Catharus ustulatus),* Common Yellowthroat *(Geothlypis trichas*), Gray Catbird (*Dumetella carolinensis*), and Chimney Swift (*Chaetura pelagic*) were the most common types of birds involved in BASH incidents. Of the species identified, most incidents occurred in October and November of 2008 and 2009 (Naval Safety Center 2010).

Explosive Safety**.** Explosive Safety Quantity Distance (ESQD) arcs define the minimum permissible distance between a potential explosion site and any inhabited building, public assembly area, and/or the installation boundary. The ESQD arc-encumbered lands at MCAS Beaufort include 805 acres in the Ordnance Area, from north of the intersection of the two runways to the northern Air Station boundary (Figure 4.6-2). The ESQD arcs encompass the Air Station's main ordnance storage facility, Combat Aircraft Loading Area, and the northwest end of the 14-32 Runway (MCAS Beaufort 2004).

Construction Safety. All construction and demolition that takes place at MCAS Beaufort is performed in accordance with applicable OSHA regulations. Specific practices and policies to protect human health and minimize safety risks are coordinated between contractors and the Safety Office prior to initiation of construction and demolition activities.

Figure 4.6-1 Baseline MCAS Beaufort Safety Zones

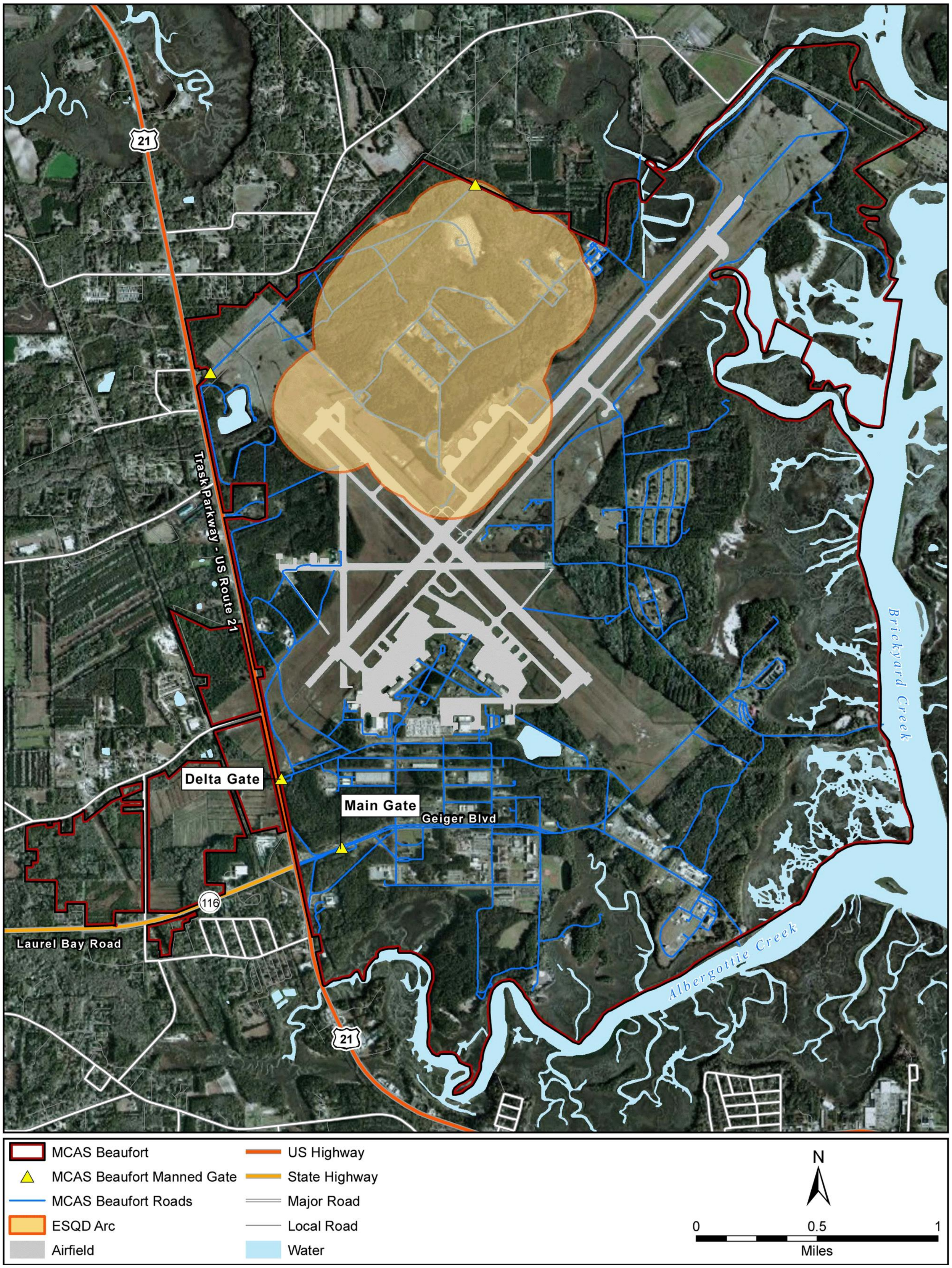


Figure 4.6-2 MCAS Beaufort ESQD Arc

4.6.2 Environmental Consequences

Aircraft Mishaps and Mishap Response.

The F-35B 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-35B becomes more operationally mature, the aircraft mishap rate is expected to become comparable with a similarly sized aircraft with a similar mission. For instance, since 1980, the average historical mishap rate for the F/A-18 and AV-8B is 4.39 mishaps per 100,000 flight hours. The Marine Corps Class A aviation mishap rate for all Marine Corps aircraft for FY02 through FY08 was 2.8 mishaps per 100,000 flight hours flown (Naval Safety Center 2009b). However, each decade since 1980 has seen a marked reduction in mishaps. Specifically, from 1980 to 1989, the average mishap rate was 5.56; from 1990 to 1999, the average mishap rate was 4.54; and from 2000 to 2007, the average mishap rate was 3.71. Specific to MCAS Beaufort, the annual average Class A mishap rate is 0.1.

Although the F-35B is a new aircraft, the single engine that powers it is a compilation 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. The propulsion system design included a dedicated system safety program with an acceptable risk level that was more stringent than legacy engines. The engine safety program focused on the major contributors of what previously caused the loss of an aircraft and provided redundancies in case of control system failures, and additionally, allowed for safe recovery of the aircraft even with system failures. Throughout the design and testing process, the safety initiatives took the previous Best Practices for single engine safety and built upon them to promote flight safety progress. Examples of design characteristics that are damage tolerant and enhance safety include a dual wall engine liner, a fan blade containment shell, and a shaft monitor for vibration, torque, and alignment.

In addition, several technologies have been developed through the years to reduce mishap rates. These technologies include advanced warnings to prevent aircraft from crashing into terrain and man-made structures due to pilot or navigational system error; data recorders that provide lessons-learned from every mishap; and backup and redundant systems that ensure the aircraft are controllable and can be landed with system failures and malfunctions. Although these advancements and upgrades apply to legacy aircraft, these technologies are being designed into all variants of the first F-35 aircraft. This would ensure the F-35B begins its operational service with no increase in safety risks as compared to operational legacy aircraft. In addition, the Autonomic Logistics Information System (ALIS) is an integral part of the F-35 system. ALIS integrates current performance, operational parameters, current configuration, scheduled upgrades and maintenance, component history, predictive diagnostics (prognostics) and health management, and service support for the F-35 (DoD 2010b). This technology provides essential and invaluable behind-the-scenes monitoring, maintenance, and prognostics to support the aircraft and ensure the aircraft's health and safety.

The F-35B would follow established local approach and departure patterns, which assist in minimizing accident risks to the community. In addition, current airspace safety procedures would continue to be implemented and additional airfield flight operations would adhere to established safety procedures. Students in the Marine Corps F-35B pilot training program would use simulators. Simulator curriculum would include basic flight operations and comprehensive emergency procedures. The use of simulators would minimize the risk associated with mishaps due to student errors. In addition, in all training phases student pilots would operate under direct supervision of highly qualified instructor pilots, further minimizing flight mishap potential.

All current training regulations and procedures would be updated as necessary to reflect F-35B specific rules, and pilots would continue to adhere to training policies. In addition, the emergency and mishap response plans would also be updated as needed.

Accident Potential Zones. Under any of the action alternatives, additional, new Clear Zones would be established for the LHD/LHA Training Facility (Figure 4.6-3). According to Office of the Chief of Naval Operations Instruction (OPNAVINST) 11010.36C and Marine Corps Order 11010.16, APZ I is required under areas where flight tracks experience 5,000 or more annual departures *or* approaches (but not both) of fixed-wing operations. APZ II is used whenever APZ I is required. Therefore, since annual LHD/LHA operations would not exceed 5,000, there would be no need for new APZs.

Bird/Wildlife Aircraft Strike Hazards. Under Alternatives 1 through 4, the F-35B would operate in the same airfield environment as the current aircraft. As such, the overall BASH potential is not anticipated to be different following the beddown of the F-35B. F-35B aircrews operating in the MCAS Beaufort airspace would be required to follow applicable procedures outlined in the MCAS Beaufort BASH Plan. MCAS Beaufort has developed aggressive procedures designed to minimize the occurrence of bird/wildlife aircraft strikes, and has documented detailed procedures to monitor and react to heightened risk of bird/wildlife aircraft strikes (MCAS Beaufort 2006b). When risk increases, limits are placed on low altitude flights and some types of training (e.g., multiple approaches, closed pattern work) in the airfield environment. Furthermore, special briefings are provided to pilots whenever the potential exists for greater bird/wildlife aircraft strikes within the airspace; F-35B pilots would also be subject to these procedures.

Explosive Safety. None of the proposed construction or demolition projects are located within the ESQD arc, and existing storage areas, ESQD arcs, explosive safety activities, and procedures would not change as a result of F-35B basing.

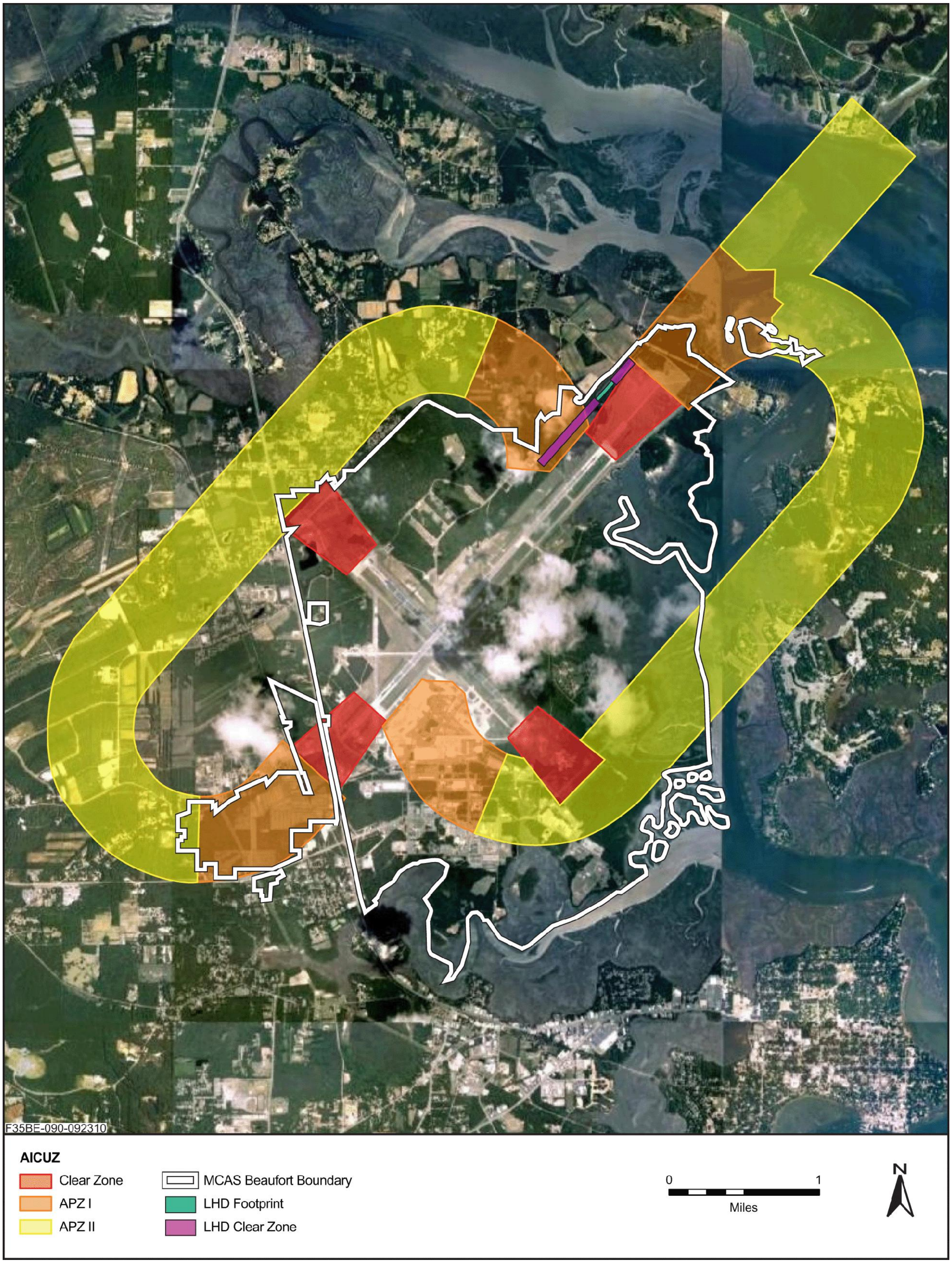


Figure 4.6-3 Proposed MCAS Beaufort Safety Zones

Construction Safety. Under Alternatives 1 through 4, construction and demolition activities would occur throughout the flightline areas at MCAS Beaufort. These activities may expose workers to construction-related risks. However, the proposed construction and demolition activities would not introduce any unique or unusual risks. Specific practices and policies to protect human health and minimize safety risks would be coordinated between the contractor and the Safety Office prior to initiation of construction and demolition activities. Furthermore, all activities would follow all applicable OSHA requirements. In addition to construction worker safety, perimeter fencing would be used to separate the base population from the construction area.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

4.6.3 Summary Comparison of Alternatives

Table 4.6-2 presents a summary of the impacts by alternative.

Table 4.6-2 Safety Summary Comparison of Alternatives

Alternative	Environmental Consequences
Action Alternatives	• Airfield operations would increase; however, it is not anticipated that the mishap rate would introduce increased safety risks • Proposed construction and demolition activities would be consistent with established APZs • Clear Zones would be established for the LHD/LHA Training Facility • None of the proposed construction or demolition projects are located within any of the ESQD arcs; no impacts are anticipated to ordnance storage areas, established safety arcs, or to explosive safety plans and procedures as a result of basing the F-35B • No unique or unusual construction risks are posed; construction workers would follow OSHA requirements
No Action Alternative	• Baseline conditions would persist

4.7 Land Use

4.7.1 Affected Environment (Baseline Conditions)

MCAS Beaufort Land Use. The Air Station is located in Beaufort County, SC, approximately 5 mi northwest of the City of Beaufort and encompasses approximately 5,869 acres of land. At MCAS Beaufort, aircraft operations constitute the largest land use activity, consisting of two cross-runways, parking aprons, taxiways, and associated Clear Zones and APZs (DoN 2003a). As depicted in Figure 4.7-1, the majority of development at the Air Station has occurred in the core area, south of the cross-runway configuration. The core area has a mixture of land uses, which include aircraft operations, training, and maintenance, or utility uses adjacent to Runways 5/32. Much of the remaining core area is occupied by medical, supply or storage, administrative, community, personnel housing, and recreational land use.

The Laurel Bay Family Housing Area is approximately 973 acres in size and is located 3 mi west of the Air Station at the end of State Route 116. This enlisted and officer family housing area is configured with single-family and duplex residential structures in the central portion of the property surrounded by recreation, open space, and community facilities. The northern section of the Laurel Bay property is currently undeveloped forested area.

Adjacent Land Uses. The majority of Beaufort County's surface area is composed of tidal wetlands and open water. Currently, about 9 percent of the county territory is developed, with another 33 percent of the total territory classified as "undeveloped." Lands immediately east and south of the Air Station consist of unimproved saltwater wetlands associated with Brickyard and Albergotti Creeks. Land uses east of Brickyard Creek are single-family residential, forested/natural, and agricultural. Land use south of Albergotti Creek, along the major transportation corridors, is primarily commercial. Off the main transportation corridors, the principal land uses are agricultural, forested/natural, and residential. The north and northeast areas of the Air Station are bordered by low-density, residential and agricultural land uses, with some commercial activities along U.S. Highway 21. The land west of MCAS Beaufort, along and west of U.S. Highway 21, is dominated by Beaufort County's principal industrial park. Other land uses west of the Air Station are primarily undeveloped forests, residential, and agricultural areas. Newer, denser residential developments have been constructed east and southeast of MCAS Beaufort on Lady's Island, as well as southwest of the Air Station along the Broad River (USMC 2004a).

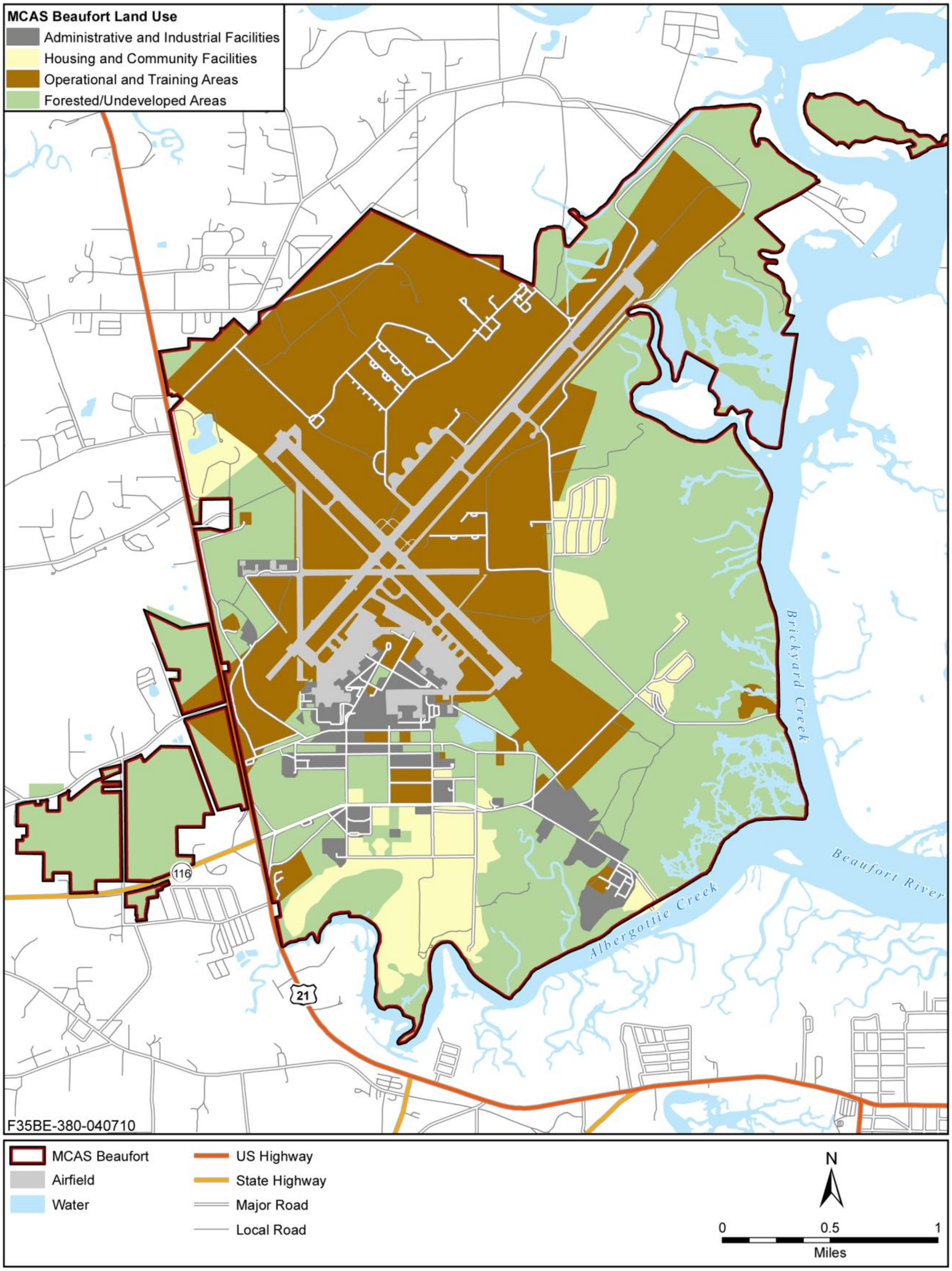


Figure 4.7-1 Baseline Land Use Conditions for MCAS Beaufort

Within the AICUZ Program (see Sections 3.6 and 3.7), Clear Zones and APZs are identified as areas with the highest potential for aircraft accidents if one were to occur. However, these zones do not reflect the probability of an accident. APZs follow departure, arrival, and pattern flight tracks and are based upon analysis of historical data. There are three safety zones:

1. Clear Zone: Extends 3,000 ft immediately beyond the runway and has the highest potential for accidents;
2. APZ I: Extends 5,000 ft beyond the Clear Zone, with a width of 3,000 ft; and
3. APZ II: Extends 7,000 ft beyond APZ I, with a width of 3,000 ft.

Aircraft operations and overflights have been a continuous aspect of the MCAS Beaufort area since 1961, and the MCAS Beaufort AICUZ safety footprint is part of the existing land use pattern in Beaufort County. As such, the Air Station broadly participates in and/or influences local zoning, planning, and conservation efforts.

To identify land use compatibility in the adjacent communities with MCAS Beaufort operations, the Air Station evaluated its safety zones (Figure 4.7-2) and compared them with current land use maps. As shown, all of the Clear Zones are contained on MCAS Beaufort property. Both APZ I and APZ II extend beyond the Air Station into adjacent communities, with APZ II extending northeast into the Coosaw River. Table 4.7-1 provides the total area by land use category within MCAS Beaufort Clear Zones, APZ I, and APZ II.

Table 4.7-1 Baseline Land Uses in MCAS Beaufort Safety Zones (in acres)

Land Use Category[a]	Clear Zone	APZ I	APZ II	Totals
Rural/Agriculture	31	1	41	73
Low-Density Residential	0	499	1,725	2,224
Medium Density Residential	0	0	0	0
Urban	0	0	0	0
Light Industrial	0	41	287	328
Commercial	0	0	63	63
Lands with Marine Corps Restrictive Easements[b]	0	0	111	111
Public/Quasi Public	0	43	9	52
MCAS Beaufort	512	781	682	1,975
Total	**543**	**1,365**	**2,918**	**4,826**

Source: Beaufort County 2008.
Notes:
[a]Refer to Section 3.3 for definition of land use categories.
[b]Total acreages under easement are current as of Fall 2009.

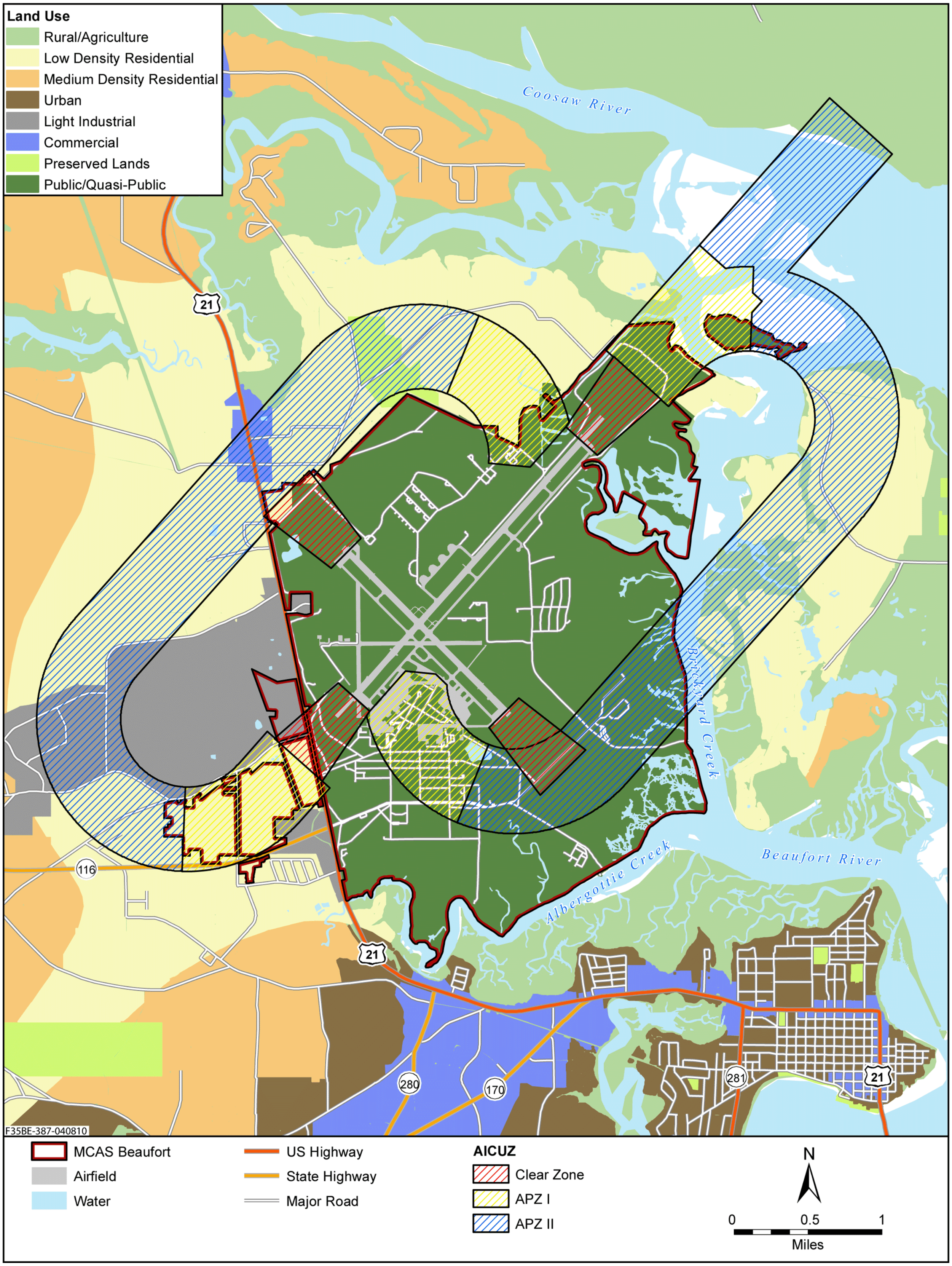


Figure 4.7-2 Baseline Land Use Conditions Affected by MCAS Beaufort Safety Zones

Along with the AICUZ Program, MCAS Beaufort is participating in several other initiatives. A 2004 Joint Land Use Study was completed for MCAS Beaufort (Lowcountry Council of Governments 2004). The ultimate goal of the study was to reduce potential land use conflicts, while accommodating necessary growth and sustaining the economic health of the area. The Low Country Council of Governments served as the study lead, and other participants included Beaufort County, the City of Beaufort, the Town of Port Royal, and MCAS Beaufort. In December 2006, Beaufort County, the Town of Port Royal, and the City of Beaufort passed coordinated AICUZ ordinances pursuant to recommendations in the Study and in accordance with Department of the Navy (DoN) guidelines. The county and localities have adopted special Airport Overlay Districts called AICUZ Districts to synchronize zoning codes with DoD compatibility guidelines in those areas impacted by military aircraft noise and APZs.

In addition to the Airport Overlay District, Beaufort County has designated a Military Planning Area on the County's future land use map coinciding with MCAS Beaufort AICUZ noise and APZ footprints. Land uses designated as most appropriate for the Military Planning Area include low-density, single-family residential; agriculture and open space; most recreational uses; industrial uses; and limited commercial uses. Another initiative, Beaufort County's Rural and Critical Lands Program provides for the purchase of high-quality lands in fee or through acquisition of development rights so that rural and critical lands may be protected and enhanced. The program has been used in partnership with the Marine Corps.

There are another three initiatives underway to address lands outside of the Air Station affected by APZs and specific noise zones: 1) the MCAS Beaufort-Beaufort County Rural and Critical Lands (BCRCL) and the Beaufort County Open Land Trust (BCOLT) partnership initiative, 2) land acquisition through the Marine Corps Military Construction (MILCON) program, and 3) the Transfer of Development Rights Program. MCAS Beaufort provides funds to BCRCL and BCOLT so that they can acquire restrictive easements on lands in which there is mutual interest. All are consistent and in support of both the AICUZ and the Joint Land Use Study initiatives, but are preemptive actions taken to ensure that the Air Station maintains mission capabilities. All initiatives provide means to guarantee that AICUZ-encumbered lands within the APZs and noise zones will not be developed in an incompatible manner.

4.7.2 Environmental Consequences

***MCAS Beaufort Land Use*.** Under Alternatives 1 through 4, all demolition and new construction would be consistent with surrounding land use and land use impacts would not occur. Under Alternative 4, an area that is currently manicured lawn would be lost to construct the BEQs. This area of new construction would also be consistent with surrounding land use and would not incur any land use impacts. Operations would not differ from existing conditions in such a manner to impact land uses.

Adjacent Land Uses. The primary issue is the potential for increased incompatibilities with on- and off-Station land uses. These incompatibilities may be associated with changes to the AICUZ safety footprint in combination with encroachment that is fueled by continued population growth outside the

Installation boundary. All project-related construction and demolition would occur within the boundaries of MCAS Beaufort and would not result in land use conflicts with off-Station land uses because no changes in how lands are used or managed would result from implementing this Proposed Action (refer to Section 4.3.2 for potential noise impacts to land use categories). In addition, the new Clear Zones associated with the proposed LHD/LHA Training Facility would not result in land use conflicts (Figure 4.7-3). According to the Office of the Chief of Naval Operations Instruction (OPNAVINST) 11010.36C and Marine Corps Order 11010.16, APZ I is provided under flight tracks that experience 5,000 or more annual fixed-wing operations (departures or approaches, but not both combined). APZ II is used whenever APZ I is required. As such, new APZs are not required at MCAS Beaufort since annual LHD/LHA operations would total less than 5,000 operations.

Changes in personnel and dependent populations would be minor in the regional context, not resulting in a change in regional or local land use plans, policies, and controls. Operations would not differ from existing conditions in such a manner to impact adjacent land uses.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

4.7.3 Summary Comparison of Alternatives

Table 4.7-2 summarizes the impacts of the alternatives considered in this analysis.

Table 4.7-2 Land Use Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternatives 1, 2, and 3	• Proposed on-Station construction and operations consistent with existing and proposed on-Station land use • Proposed LHD/LHA training facility would result in additional lands set aside for Clear Zones • Alternatives would not result in land use conflicts with off-Station land uses
Alternative 4	• Proposed on-Station construction and operations consistent with existing and proposed on-Station land use • Proposed LHD/LHA training facility would result in additional lands set aside for Clear Zones • The proposed two new BEQs would be constructed at a site that would be compatible for such development • Alternative would not result in land use conflicts with off-Station land uses
No Action Alternative	• Baseline conditions would persist

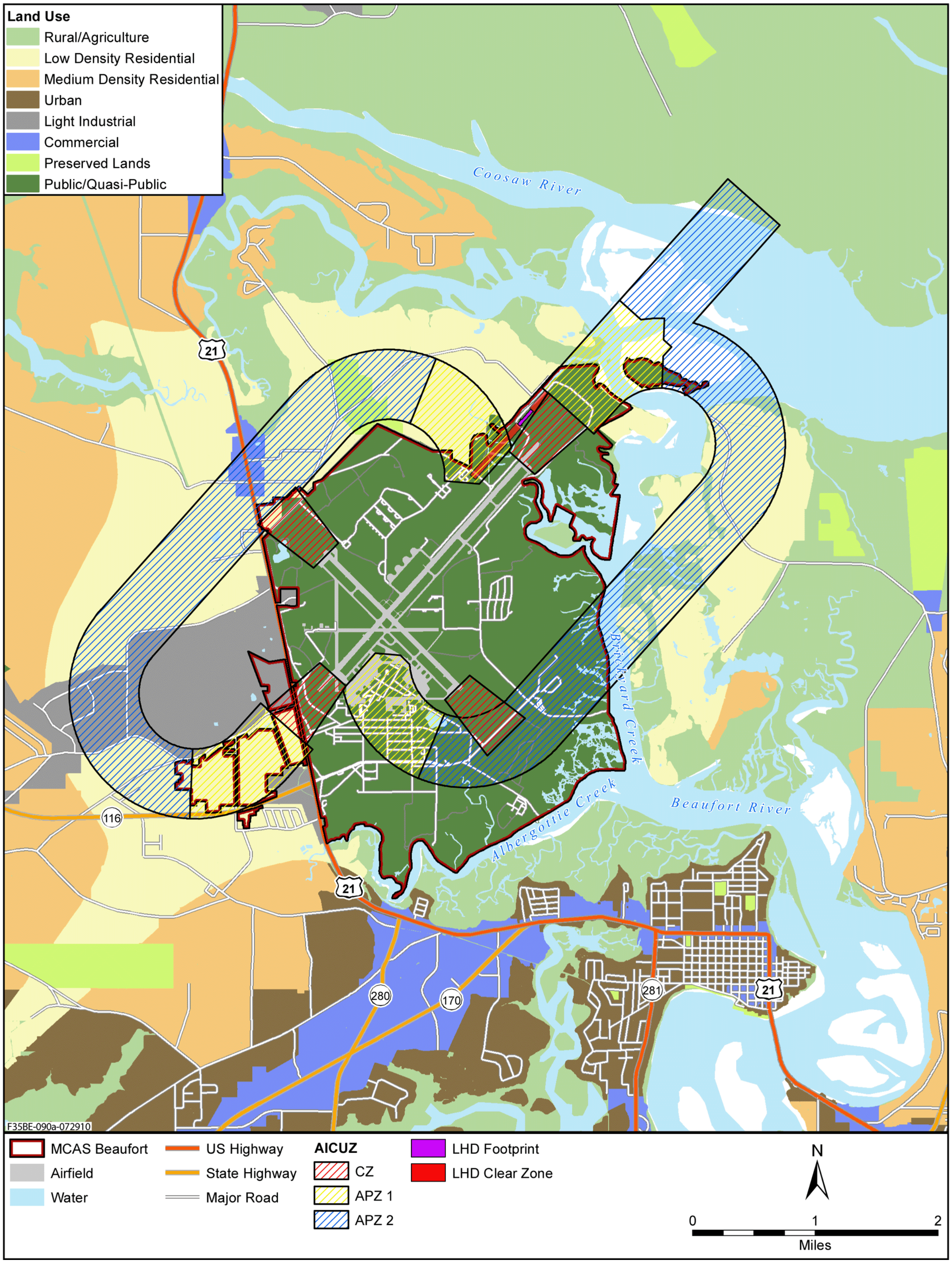


Figure 4.7-3 Projected Safety Zones under any Action Alternative

4.8 Socioeconomics

4.8.1 Affected Environment (Baseline Conditions)

Demographics. In FY08 MCAS Beaufort employed 4,190 military personnel (all services) and 583 civilian personnel (MCAS Beaufort 2008c). Total dependents associated with these personnel are estimated at 11,455 (using an average accompaniment factor of 2.4).

Between 1990 and 2000 the population for the City of Beaufort and Beaufort County significantly increased by 33.6 and 39.9 percent, respectively (Table 4.8-1). The population of the City of Beaufort decreased by 7.2 percent from 2000 to 2008. During those same years, the population of Beaufort County and the state continued to grow at 21.3 and 9.7 percent, respectively. The population of Beaufort County is expected to continue to grow through 2020; however, at a slower rate (26.2 percent) (SCORS 2009a). In comparison, the state population is only expected to increase by 13.9 percent during the same time frame. Projected population data are not available for the City of Beaufort.

Table 4.8-1 MCAS Beaufort Regional Population Trends

Geographic Area	1990[a]	2000[b]	Percent Change (1990 to 2000)	2008 Estimate	July 2010 Projected Population[e]	2020 Projected Population[f]	Projected Percent Change (2000 to 2020)
City of Beaufort	9,576	12,789	33.6	11,868[c]	--	--	--
Beaufort County	86,425	120,937	39.9	146,743[d]	156,070	185,220	26.2
South Carolina	3,486,703	4,012,012	15.1	4,403,175[d]	4,549,150	5,020,400	13.9

Sources: [a]U.S. Census Bureau 1993; [b]U.S. Census Bureau 2009a; [c]Lowcountry Council of Governments 2008a, 2007 data, [d]U.S. Census Bureau 2009b, [e]SCORS 2009b, [f]SCORS 2009a.

Economic Characteristics. MCAS Beaufort had an estimated $562 million direct economic impact to the regional area in FY08, of which $117 million represented active duty military salaries; $72 million for retired military salaries; $213 million for civilian salaries (appropriated, non-appropriated, and retired); $86 million for materials, supplies, and services; and $42.7 million for construction (MCAS Beaufort 2008c). The Installation's payroll and expenditures result in further indirect economic benefits to the region as dollars move through the economy, supporting indirect jobs and expenditures in various economic sectors.

Employment Sectors. In 2000 and 2008, the largest employment sector in Beaufort County was the educational services, health care, and social assistance sector, which (for both years) represented 17.0 percent of the civilian labor force 16 years and older. Similarly, the largest employment sector for the City of Beaufort in 2000 was the educational services, health care, and social assistance sector, which represented 25.1 percent. Employment sector data for 2008 was not available for the City of Beaufort. The largest employment sector for South Carolina in 2000 was the manufacturing sector at 19.4 percent followed closely by the educational services, health care, and social assistance sector at 18.6 percent. In contrast, the largest employment sector for the state in 2008 was the educational services, health care, and social assistance sector at 20.0 percent followed by the manufacturing sector at 14.8 percent (U.S. Census Bureau 2009b, 2009c).

From 2000 to 2008 the labor force 16 years and older in Beaufort County within the Armed Forces decreased from 9.5 percent to 6.3 percent, respectively. In 2000, the Armed Forces represented 20.1 percent of the labor force 16 years and older in the City of Beaufort. The affected environment had a higher percentage of the labor force 16 years and older in the Armed Forces than the state (1.2 percent and 1.0 percent in 2000 and 2008, respectively) (U.S. Census Bureau 2009b, 2009c). In 2008, MCAS Beaufort employed 4,190 military and 583 civilian personnel (MCAS Beaufort 2008c). This total represented approximately 7 percent of the 2008 Beaufort County labor force (U.S. Census Bureau 2009b).

Income and Unemployment. Table 4.8-2 presents median household income and unemployment rates for the City of Beaufort, Beaufort County, and South Carolina. In 2000 and 2008, Beaufort County had a greater median household income than that for the state as a whole. The median household income for the City of Beaufort was lower than the state and Beaufort County in 2000. From 2000 to 2008, both Beaufort County and the state median household income increased by 16 and 17 percent, respectively. Median household income data for 2008 was not available for the City of Beaufort.

In 2000, the City of Beaufort had a higher unemployment rate of those 16 years and older in the civilian workforce than Beaufort County and South Carolina as a whole. In 2000, Beaufort County had a lower unemployment rate at 4.3 percent than the state at 5.9 percent. The current average seasonally unadjusted unemployment rate for Beaufort County is 8.7 percent while that for the state is 11.5 percent. Reflecting the current National recession, the unemployment rates have increased dramatically.

Table 4.8-2 Income and Unemployment Rates

Geographic Area	Median Household Income		Unemployment Rates		
	2000[a]	2008[b]	2000[a]	2008[b]	2009[c]
City of Beaufort	$36,532	--	6.2	--	--
Beaufort County	$46,992	$54,356	4.3	5.3	8.7
South Carolina	$37,802	$44,326	5.9	7.3	11.5

Sources: [a]U.S. Census Bureau 2009c, [b]U.S. Census Bureau 2009b, [c]SC Employment Security Commission 2009.

Housing. Family housing at MCAS Beaufort is privatized. The Pine Grove family housing community is located on Station and contains 146 duplex units. The Laurel Bay community is located 3 mi west of MCAS Beaufort in Beaufort County and includes 1,296 housing units. The occupancy rate for family housing ranges from 80 percent to 96 percent (personal communication, Miller 2009).

All bachelor enlisted personnel of ranks E5 (Sergeants) and below are required to live on Station unless adequate space is not available, in which case Basic Allowance for Housing at the without-dependents rate has been authorized. Bachelor enlisted personnel of ranks E6 (Staff Sergeants) and above or equivalent may elect to live off Station and receive Basic Allowance for Housing rather than occupy government quarters. In general, if sufficient space is not available to house all bachelors of Ranks E1 through E5, the senior ranking Marines would be the first personnel authorized Basic Allowance for Housing at the without-dependents rate (USMC 2006). MCAS Beaufort currently has 1,014 unaccompanied personnel spaces and a current occupancy rate of approximately 87 percent (personal communication, K. Powell 2009).

As reported in the U.S. Census Bureau 2006-2008 American Community Survey, there were 80,989 housing units within Beaufort County, of which 28.1 percent were vacant (Table 4.8-3). The American Community Survey is conducted by the U.S. Census Bureau in every county and provides critical economic, social, demographic, and housing information on an annual basis. Beaufort County and South Carolina as a whole had similar percentages of owner occupied housing units (70.4 percent and 70.3 percent, respectively) and renter occupied housing units (29.6 percent and 29.7 percent, respectively). The latest year for which data are available for the City of Beaufort is 2000. In 2000, the City of Beaufort had 5,134 total housing units of which 91.2 percent were occupied (U.S. Census Bureau 2009c).

During March 2010, approximately 1,300 single family homes (including townhouses and condominiums) were listed for sale in Beaufort County. The average number of days on the market for the first quarter of 2010 was 184, and the average sale price was $221,781 over the same time period (personal communication, Lauland 2010).

Table 4.8-3 2008 Housing Units in the Affected Environment

Geographic Area	Housing Units	Percent Vacant	Occupied Housing Units		
			Total	Percent Owner	Percent Renter
City of Beaufort[a]	5,134	8.8	4,680	56.0	44.0
Beaufort County	80,989	28.1	58,192	70.4	29.6
South Carolina	2,018,762	16.5	1,686,571	70.3	29.7

Sources: U.S. Census Bureau 2009b, 2009c.
Note: [a]2000 Census data.

4.8.2 Environmental Consequences

Alternative 1 (Preferred Alternative)

Demographic Impacts. Under Alternative 1, there would be a net decrease in military personnel by 228, which would represent approximately 5 percent of the total Air Station workforce. Combined with the loss of their associated 409 dependents, the total population of the Region of Influence (ROI) would decrease by 637, or less than 1 percent.

Economic Impacts. Including their basic pay and housing and subsistence allowances, the net loss of personnel at MCAS Beaufort would result in a lost annual payroll of approximately $9.9 million under Alternative 1. This loss of regional spending would affect final demand in numerous economic sectors. Ongoing secondary impacts (direct, indirect, and induced effects) would result in an estimated 171 lost jobs and an estimated $9.6 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 64,318 people in the region's civilian labor force in 2008 (U.S. Census Bureau 2009b). The long-term loss of these 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 (Table 4.8-4). In addition, changes in civilian and contractor personnel associated with the introduction of the F-35B are anticipated under this alternative; however, the number of these non-military personnel is continually changing as the aircraft and its systems evolve.

Table 4.8-4 Alternative 1 Employment and Income Impacts[a] Associated with MILCON Projects

SECTOR	CY1	CY2	CY3	CY4	CY5
Employment Impacts[b]					
Direct	720	881	862	734	622
Indirect	126	154	151	128	109
Induced	170	208	204	173	147
TOTAL EMPLOYMENT	1,016	1,242	1,217	1,036	878
Labor Income Impacts[c]					
Direct	31.2	38.2	37.4	31.8	27.0
Indirect	6.1	7.4	7.3	6.2	5.3
Induced	6.3	7.7	7.5	6.4	5.4
TOTAL INCOME	43.6	53.3	52.2	44.4	37.6

Source: Estimated for this study with IMPLAN (Minnesota IMPLAN Group 2004).
Notes: [a]Impacts due to MILCON projects, assuming all expenditures in region. May not add due to rounding.
[b]Number of jobs.
[c]Employee compensation plus proprietors' income (in millions of 2012 dollars).

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 2004), the Federal government would lose $1.7 million annually, and South Carolina and local governments would lose $0.9 million annually. Again, 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 (Table 4.8-4). Refer to Appendix F for additional information.

Based on best available data, the combined expenditures for MILCON projects for this alternative would be $437.07 million and span five construction years (refer to Section 2.3.2.3 for more information).

As shown in Table 4.8-4, the peak year of impacts would be CY2 for projects at MCAS Beaufort under Alternative 1. Total regional employment impacts from construction spending would total an estimated 1,242 full- and part-time jobs in CY2 including 881 direct construction jobs, 154 indirect jobs to support these construction activities, and 208 induced jobs from regional purchases due to the increased earnings of affected workers. Total labor income impacts in that peak year are estimated at $53.3 million.

Overall, the peak year total represents about 2 percent of the region's civilian labor force in 2008 and the peak construction employment represents 11 percent of the 8,123 total regional construction jobs in

2008 (U.S. Census Bureau 2009b). Therefore, whereas the regional labor force would be able to absorb the indirect and induced jobs, it would be likely that some workers would move into the region in response to the direct job impacts in construction. Such impacts are short-term though, and it should be expected that any construction workers who in-migrate would most likely leave the region for other opportunities when the construction projects near completion.

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 2004), the Federal government would collect an additional $9.5 million due to CY2 construction projects alone and $41.1 million over the course of the 5-year construction period. In addition, South Carolina and local governments would collectively gain $8.6 million due to CY2 construction projects, and $37.5 million over the 5 years of construction. Refer to Appendix F for additional information.

Housing Impacts. Under Alternative 1, 228 military personnel would be reassigned from MCAS Beaufort. Using the most conservative (or worst-case) scenario, it was assumed all military personnel that would be reassigned owned homes and would place their homes for sale. As such, this analysis assumed that 228 housing units would be put up for sale at the same time. This would represent less than 1 percent of the current housing stock in Beaufort County and approximately 17 percent of the single family homes currently listed for sale. However, it is unlikely that all the military personnel would be reassigned at the same time since this alternative would be phased over five years. Further, not all the military personnel who would be reassigned own homes, and not all military personnel that own homes would sell their homes. Therefore, while there may be short-term impacts, the local housing market would be expected to recover.

Alternative 2

Demographic Impacts. Under Alternative 2, military personnel at MCAS Beaufort would decrease by 1,161, which would represent approximately 24 percent of the total Air Station workforce. Combined with the loss of their associated 2,177 dependents, the total population of the ROI would decrease by 3,338 or about 2 percent.

Economic Impacts. Including their basic pay and housing and subsistence allowances, the total loss of personnel at MCAS Beaufort would result in a lost annual payroll of approximately $54.3 million under Alternative 2. Ongoing secondary impacts (direct, indirect, and induced effects) from reduced spending in the ROI would result in an estimated 786 lost jobs and an estimated $42.7 million in reduced labor income.

These employment impacts represent about 1 percent of the 64,318 people in the region's civilian labor force in 2008 (U.S. Census Bureau 2009b). The long-term loss of these positions may result in a minor increase in the regional unemployment rate. However, these effects would be partially offset in the short-term by the gain of jobs as a result of construction expenditures (Table 4.8-5). In addition, changes in civilian and contractor personnel associated with the introduction of the F-35B are anticipated under this alternative; however, the number of these non-military personnel is continually changing as the aircraft and its systems evolve.

Table 4.8-5 Alternative 2 Employment and Income Impacts[a] Associated with MILCON Projects

SECTOR	CY1	CY2	CY3	CY4	CY5
Employment Impacts[b]					
Direct	448	608	582	455	342
Indirect	78	106	102	79	60
Induced	106	144	138	107	81
Total	632	858	822	641	483
Labor Income Impacts[c]					
Direct	19.4	26.4	25.2	19.7	14.8
Indirect	3.8	5.1	4.9	3.8	2.9
Induced	3.9	5.3	5.1	4.0	3.0
Total	27.1	36.8	35.2	27.5	20.7

Source: Estimated for this study with IMPLAN (Minnesota IMPLAN Group 2004).

Notes:

[a]Impacts due to MILCON projects, assuming all expenditures in region. May not add due to rounding.

[b]Number of jobs.

[c]Employee compensation plus proprietors' income (in millions of 2012 dollars).

Federal, state, and local government tax revenues would decline as a result of this lost economic activity. The Federal government would lose $8.0 million annually, and South Carolina and local governments would lose $4.3 million annually. Again, 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 (Table 4.8-5). Refer to Appendix F for additional information.

Based on best available data, the combined expenditures for MILCON projects for this alternative would be $278.6 million and span five construction years (refer to Section 2.3.2.3 for more information). As shown in Table 4.8-5, the peak year of impacts would be CY2, resulting in an estimated 858 full- and part-time jobs. Total labor income impacts in that peak year are estimated at $36.8 million.

Overall, the peak year total represents about 1 percent of the region's civilian labor force in 2008 and the peak construction employment represents 7 percent of the 8,123 total regional construction jobs in 2008 (U.S. Census Bureau 2009b). It would be likely that some workers would move into the region in response to the direct job impacts in construction, but these workers would most likely leave the region for other opportunities when the construction projects near completion.

Additional taxes from construction activities would result in the Federal gain of $26.3 million over the course of the 5-year construction period. In addition, South Carolina and local governments would collectively gain $23.8 million over the 5 years of construction (Minnesota IMPLAN Group 2004). Refer to Appendix F for additional information.

***Housing Impacts*.** Under Alternative 2, 1,161 military personnel would be reassigned from MCAS Beaufort. Using the worst-case scenario, it was assumed all military personnel that would be reassigned owned homes and would place their homes for sale. As such, this analysis assumed that 1,161 housing units would be put up for sale at the same time. This would represent about 1.4 percent of the current housing stock in Beaufort County and approximately 88 percent of the single family homes currently listed for sale. However, it is unlikely that all the military personnel would be reassigned at the same time since this alternative would be phased over five years. Further, not all the military personnel who would be reassigned own homes, and not all military personnel that own homes would sell their homes. Short-term impacts to the local housing market would be expected under this alternative; however, the extent of the impact would depend on local economic conditions at the time.

Alternative 3

***Demographic Impacts*.** Under Alternative 3, military personnel at MCAS Beaufort would increase by 667, which would represent approximately 14 percent of the total Air Station workforce. Combined with the gain of their associated 1,291 dependents, the total population of the ROI would increase by 1,958 or about 1 percent.

***Economic Impacts*.** Including their basic pay and housing and subsistence allowances, the total gain of personnel at MCAS Beaufort would earn an estimated total of $30.5 million in direct annual income. 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.

Ongoing secondary impacts (direct, indirect, and induced effects) would total an estimated 433 jobs and an estimated $23.4 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 64,318 people in the region's civilian labor force in 2008 (U.S. Census Bureau 2009b). With an unemployment rate of about 9 percent in Beaufort County, 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, it would not be likely that the employment impacts by themselves would trigger any in-migration to the region, beyond the military personnel and dependents.

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 2004), the Federal government would collect an additional $4.4 million annually, and

South Carolina and local governments would collectively gain $2.4 million annually. Refer to Appendix F for additional information.

Based on best available data, the combined expenditures for MILCON projects for this alternative would be $610.8 million and span five construction years (refer to Section 2.3.2.3 for more information). As shown in Table 4.8-6, the peak year of impacts would be CY3, resulting in an estimated 1,741 full- and part-time jobs. Total labor income impacts in that peak year are estimated at $74.7 million.

Overall, the peak year total represents about 2.7 percent of the region's civilian labor force in 2008 and the peak construction employment represents 15 percent of the 8,123 total regional construction jobs in 2008 (U.S. Census Bureau 2009b). It would be likely that some construction workers would move into the region in response to the direct job impacts in construction, but these workers would most likely leave the region for other opportunities when the construction projects near completion.

Additional taxes from construction activities would result in the Federal gain of $57.6 million over the course of the 5-year construction period. In addition, South Carolina and local governments would collectively gain $53.4 million over the 5 years of construction (Minnesota IMPLAN Group 2004). Refer to Appendix F for additional information.

Table 4.8-6 Alternative 3 Employment and Income Impacts[a] Associated with MILCON Projects

SECTOR	CY1	CY2	CY3	CY4	CY5
Employment Impacts[b]					
Direct	948	1,159	1,234	1,055	942
Indirect	166	203	216	184	165
Induced	224	274	291	249	223
Total	1,337	1,635	1,741	1,488	1,330
Labor Income Impacts[c]					
Direct	41.1	50.2	53.5	45.7	40.9
Indirect	8.0	9.8	10.4	8.9	8.0
Induced	8.2	10.1	10.7	9.2	8.2
Total	57.3	70.1	74.7	63.8	57.0

Source: Estimated for this study with IMPLAN (Minnesota IMPLAN Group 2004).
Notes:
[a]Impacts due to MILCON projects, assuming all expenditures in region. May not add due to rounding.
[b]Number of jobs.
[c]Employee compensation plus proprietors' income (in millions of 2012 dollars).

***Housing Impacts*.** This analysis assumes that all new military personnel would seek community housing. Under Alternative 3, 667 additional military personnel would be assigned to MCAS Beaufort; this would represent approximately 1 percent of the current housing stock in Beaufort County. However, the influx of personnel would be phased over five years.

As shown in Table 4.8-3 vacancy rates in the City of Beaufort and Beaufort County range from 9 to 28 percent. Further, there are approximately 1,300 single family homes currently listed for sale. The housing market in the MCAS Beaufort area would be expected to have the capacity to respond to actual increased market demand for housing that would occur with this alternative.

Alternative 4

***Demographic Impacts*.** Under Alternative 4, military personnel at MCAS Beaufort would increase by 1,600, which would represent approximately 34 percent of the total Air Station workforce. Combined with the gain of their associated 3,058 dependents, the total population of the ROI would increase by 4,658 or about 3 percent.

***Economic Impacts*.** Including their basic pay and housing and subsistence allowances, the total gain of personnel at MCAS Beaufort would earn an estimated total of $75.0 million in direct annual income under Alternative 4. Ongoing secondary impacts (direct, indirect, and induced effects) from increased spending would total an estimated 1,047 jobs and an estimated $56.5 million in labor income. These employment impacts represent about 1.6 percent of the 64,318 people in the region's civilian labor force in 2008 (U.S. Census Bureau 2009b). It would be expected that many of the new jobs would be filled by the current unemployed labor force, family members of the new personnel, and other workers taking second jobs. No in-migration to the region for employment is anticipated. Additional taxes would result in a Federal gain of $10.7 million annually, and South Carolina and local governments would collectively gain $5.8 million annually (Minnesota IMPLAN Group 2004).

Based on best available data, the combined expenditures for MILCON projects for this alternative would be $821.8 million and span five construction years (refer to Section 2.3.2.3 for more information). As shown in Table 4.8-7, the peak year of impacts would be CY3, resulting in an estimated 2,419 full- and part-time jobs. Total labor income impacts in that peak year are estimated at $107.1 million.

Table 4.8-7 Alternative 4 Employment and Income Impacts[a] Associated with MILCON Projects

SECTOR	CY1	CY2	CY3	CY4	CY5
Employment Impacts[b]					
Direct	1,197	1,446	1,684	1,467	1,235
Indirect	209	253	332	294	216
Induced	283	341	403	352	292
Total	1,689	2,040	2,419	2,113	1,743
Labor Income Impacts[c]					
Direct	51.9	62.7	75.1	65.7	53.5
Indirect	10.1	12.2	16.6	14.8	10.4
Induced	10.4	12.6	15.4	13.5	10.7
Total	72.4	87.5	107.1	94.0	74.7

Source: Estimated for this study with IMPLAN (Minnesota IMPLAN Group 2004).
Notes:
[a]Impacts due to MILCON projects, assuming all expenditures in region. May not add due to rounding.
[b]Number of jobs.
[c]Employee compensation plus proprietors' income (in millions of 2012 dollars).

These employment impacts would be substantial, especially to the construction industry. Overall, the peak year total represents about 4 percent of the region's civilian labor force in 2008 and the peak construction employment represents 21 percent of the 8,123 total regional construction jobs in 2008 (U.S. Census Bureau 2009b). It would be likely that some workers would move into the region in response to the direct job impacts in construction, but would most likely leave the region for other opportunities when the construction projects near completion.

Additional taxes associated with construction activities would result in a Federal gain of $76.7 million over the course of the 5-year construction period. In addition, South Carolina and local governments would collectively gain $71.0 million over the 5 years of construction (Minnesota IMPLAN Group 2004). Refer to Appendix F for additional information.

Housing Impacts**.** Alternative 4 would include construction of 2 BEQs that would house a total of 600 unaccompanied personnel. This analysis assumes that, with the exception of 600 unaccompanied enlisted personnel, all new personnel would seek community housing. The resulting demand for 1,000 community housing units would represent approximately 1.2 percent of the current housing stock in Beaufort County. Given that the vacancy rates in the City of Beaufort and Beaufort County range from approximately 9 to 28 percent, and that there are approximately 1,300 single family homes currently listed for sale in Beaufort County, the housing market in the MCAS Beaufort area would be expected to have the capacity to respond to the minor increase in market demand. In addition, the influx of personnel would be phased over five years.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

4.8.3 Summary Comparison of Alternatives

Table 4.8-8 presents a summary of the impacts by alternative.

Table 4.8-8 Socioeconomic Summary Comparison of Alternatives

Alternative	Environmental Consequences		
	Demographics	Economics	Housing
Alternative 1	• 5 percent decrease in Air Station workforce • Less than 1 percent decrease of ROI population	• Reduction in military personnel would result in long-term loss of $9.9 million in annual payroll income • Expenditure of $437.1 million over 5 years for construction projects at the Air Station • Peak year of construction (CY2) would create 1,242 jobs resulting in $53.3 million in labor income offsetting negative impacts from loss of military positions	• Increase in for-sale listings in ROI with loss of military personnel would result in short-term impact to housing market
Alternative 2	• 24 percent decrease in Air Station workforce • 2 percent decrease of ROI population	• Reduction in military personnel would result in long-term loss of $54.3 million in annual payroll income • Expenditure of $278.6 million over 5 years for construction projects at the Air Station • Peak year of construction (CY2) would create 858 jobs resulting in $36.8 million in labor income offsetting negative impacts from loss of military positions	• Increase in for-sale listings in ROI with loss of military personnel would result in short-term impact to housing market, but greater than Alternative 1
Alternative 3	• 14 percent increase in Air Station workforce • 1 percent increase of ROI population	• Increase of military personnel would result in increase of $30.5 million in annual payroll income • Expenditure of $610.8 million over five years for construction projects at the Air Station • Peak year of construction (CY3) would create 1,741 jobs resulting in $74.7 million in labor income	• Increased demand for housing in ROI but demand could be met by current stock
Alternative 4	• 34 percent increase in Air Station workforce • 3 percent increase in ROI population	• Increase of military personnel would result in increase of $75.0 million in annual payroll income • Expenditure of $821.8 million over five years for construction projects at the Air Station • Peak year of construction (CY3) would create 2,419 jobs resulting in $107.1 million in labor income	• Increased demand for housing in ROI but demand could be met by current stock
No Action Alternative	• Baseline conditions would persist	• Baseline conditions would persist	• Baseline conditions would persist

4.9 ENVIRONMENTAL JUSTICE/PROTECTION OF CHILDREN

4.9.1 Affected Environment (Baseline Conditions)

For the purposes of this analysis, South Carolina serves as the community of comparison since it is the next largest geographic area that encompasses the ROI. In South Carolina, the total minority population is 33.1 percent and the total percent of individuals living below the poverty line is 14.1 percent. Children under the age of 18 represent 25.2 percent of the South Carolina population (U.S. Census Bureau 2009c). Census data on the racial and ethnic composition of the affected area in 2000 are summarized in Table 4.9-1. Overall, the majority of the affected area is white. There is a higher percentage of African Americans within South Carolina as a whole compared to the City of Beaufort and Beaufort County. Persons of Hispanic or Latino origin make up a greater percentage of the population in the affected area than in South Carolina as a whole.

Table 4.9-1 Percent Race and Ethnicity, 2000[a]

Jurisdiction	White	Black/African American	American Indian/Alaska Native	Asian	Native Hawaiian/ Other Pacific Islander	Hispanic or Latino Origin[b]
City of Beaufort	69.4	25.1	0.3	1.1	0.1	4.4
Beaufort County	70.0	24.0	0.3	0.8	0.1	6.8
State of South Carolina	67.2	29.5	0.3	0.9	0.0	2.4

Source: U.S. Census Bureau 2009c.
Notes: [a]Data presented reflects most reported race and ethnicity categories; percentages may not add to 100 percent due to rounding.
[b]Hispanic origin may be of any race.

The percentage of low-income individuals in the City of Beaufort and Beaufort County with income below poverty level (based on family size and composition) is 13.0 and 10.7 percent, respectively. This is below the 14.1 percent level found in South Carolina (U.S. Census Bureau 2009c). Children under the age of 18 make up 21.6 percent of the City of Beaufort population and 23.3 percent of the Beaufort County population, both below the state's level of 25.2 percent.

Table 4.9-2 presents baseline total, low-income, and minority populations underlying MCAS Beaufort noise contour bands that are affected by noise levels above 65 dB DNL. The affected population under these areas was determined using 2000 Census Bureau census block data (see Section 3.3) to calculate the total affected area in each block, and then used to obtain the percentage of low-income and minority population for that area. The percentage was then used to achieve population estimates under each contour band. The 2000 Census data represent the best available data at this time that can be analyzed for potential impacts to low-income and minority populations using geographic information systems (see Section 3.3. and 3.9).

Table 4.9-2 Baseline Low-Income and Minority Populations Underlying MCAS Beaufort Aircraft Noise Contour Bands

Contour Band (DNL dB)	Total Population	Total Low-Income Population	Percent Low-Income	Total Minority Population	Percent Minority
65-70	2,751	530	19.3	1,449	52.7
70-75	1,495	214	14.3	705	47.2
75-80	2,246	266	11.8	940	41.9
80-85	639	49	7.7	213	33.3
> 85	39	2	5.1	11	28.2
TOTAL	**7,170**	**1,061**	**14.8**	**3,318**	**46.3**

Source: Data from 2000 U.S. Census.

4.9.2 Environmental Consequences

Under any of the action alternatives, all construction and demolition activities would occur within MCAS Beaufort boundaries and would not affect low-income or minority populations, disproportionately or otherwise. No additional safety or health issues would arise for children from implementing any of the alternatives; all on-Station construction would occur within developed areas and be consistent with existing land use designations (refer to Section 4.6, Safety, for additional discussion on construction safety). Airfield operations would occur within the same areas already used for these purposes. Clear zones and APZs (refer to Section 4.6, Safety) have been established to ensure on- and off-Station land use compatibility and safety. Therefore, no disproportionate safety issues should affect low-income and minority populations or children. Impacts associated with airfield noise impacts are detailed below.

Alternative 1 (Preferred Alternative)

Minority and Low-Income Populations. Table 4.9-3 presents the total number of people, including low-income and minority populations, who would be affected by noise levels greater than 65 dB DNL under Alternative 1. The proportion (14.0) of low-income populations, however, would decrease by 0.8 percent when compared to baseline conditions (14.8 percent). The proportion (45.5 percent) of minority populations affected by noise levels greater than 65 dB DNL would also decrease by 0.8 percent when compared to the 46.3 percent proportionally impacted under baseline conditions. Therefore, no disproportionate impacts to low-income or minority populations are anticipated if this alternative were selected for implementation.

Table 4.9-3 Alternative 1 Low-Income and Minority Populations Underlying MCAS Beaufort Aircraft Noise Contour Bands

	Baseline			Alternative 1		
Contour Band (dB DNL)	**Total Population**	**Total Low-Income Population**	**Total Minority Population**	**Total Population**	**Total Low-Income Population**	**Total Minority Population**
65-70	2,751	530	1,449	3,778	593	1,832
70-75	1,495	214	705	2,469	337	1,121
75-80	2,246	266	940	1,887	232	795
80-85	639	49	213	716	75	284
> 85	39	2	11	10	1	3
Subtotal Populations	***7,170***	***1,061***	***3,318***	***8,860***	***1,237***	***4,035***
Net Change from Baseline Conditions				**+1,690**	**+176**	**+717**
Percent Impacted under Alternative 1					**14.0**	**45.5**

Protection of Children. Under Alternative 1, no schools would be exposed to average noise levels of 65 dB DNL and greater; therefore, no new impacts would be anticipated when compared to baseline conditions. Refer to Section 4.3 for additional information on potential noise impacts. Refer to Appendix D, Section D.3 for a discussion on the effects of noise on hearing, health, performance, and learning.

Alternative 2

Minority and Low-Income Populations. Under Alternative 2, the total number of people, including low-income and minority populations, who would be affected by noise levels greater than 65 dB DNL would increase by 708 (Table 4.9-4). Of the total 7,878, there would be a 1.1 percent decrease in the proportion (13.7 percent) of low-income populations impacted by noise levels of 65 dB DNL and greater when compared to baseline conditions (14.8 percent). The 45.4 percent of minority populations affected by noise levels greater than 65 dB DNL would decrease by 0.9 percent when compared to the 46.3 percent proportionally impacted under baseline conditions. Therefore, no disproportionate impacts to low-income or minority populations are anticipated if this alternative were selected for implementation.

Table 4.9-4 Alternative 2 Low-Income and Minority Populations Underlying MCAS Beaufort Aircraft Noise Contour Bands

	Baseline			Alternative 2		
Contour Band (dB DNL)	**Total Population**	**Total Low-Income Population**	**Total Minority Population**	**Total Population**	**Total Low-Income Population**	**Total Minority Population**
65-70	2,751	530	1,449	3,317	498	1,570
70-75	1,495	214	705	2,545	370	1,217
75-80	2,246	266	940	1,346	149	532
80-85	639	49	213	660	66	254
> 85	39	2	11	10	1	3

Table 4.9-4 Alternative 2 Low-Income and Minority Populations Underlying MCAS Beaufort Aircraft Noise Contour Bands

	Baseline			Alternative 2		
Contour Band (dB DNL)	Total Population	Total Low-Income Population	Total Minority Population	Total Population	Total Low-Income Population	Total Minority Population
Subtotal Affected Populations	***7,170***	***1,061***	***3,318***	***7,878***	***1,083***	***3,576***
Net Change from Baseline Conditions				**+708**	**+22**	**+258**
Percent Impacted under Alternative 2					**13.7**	**45.4**

Protection of Children. Under Alternative 2, no schools would be exposed to average noise levels of 65 dB DNL and greater. No new impacts, therefore, would be anticipated when compared to baseline conditions. Refer to Section 4.3 for additional information on potential noise impacts. Refer to Appendix D, Section D.3 for a discussion on the effects of noise on hearing, health, performance, and learning.

Alternative 3

Minority and Low-Income Populations. Under Alternative 3, 7,275 people would be affected by noise levels 65 dB DNL and greater. The proportion (13.2 percent) of low-income populations, however, would decrease by 1.6 percent when compared to baseline (14.8 percent) conditions. The 44.3 percent of minority populations affected by noise levels greater than 65 dB DNL would also decrease by 2 percent when compared to the 46.3 percent proportionally impacted under baseline conditions. Therefore, no disproportionate impacts to low-income or minority populations are anticipated if this alternative were selected for implementation.

Table 4.9-5 Alternative 3 Low-Income and Minority Populations Underlying MCAS Beaufort Aircraft Noise Contour Bands

	Baseline			Alternative 3		
Contour Band (dB DNL)	Total Population	Total Low-Income Population	Total Minority Population	Total Population	Total Low-Income Population	Total Minority Population
65-70	2,751	530	1,449	3,209	482	1,523
70-75	1,495	214	705	2,643	334	1,146
75-80	2,246	266	940	910	103	376
80-85	639	49	213	538	47	192
> 85	39	2	11	7	0	2
Subtotal Populations	***7,170***	***1,061***	***3,318***	***7,307***	***966***	***3,240***
Net Change from Baseline Conditions				**+137**	**-95**	**-78**
Percent Impacted under Alternative 3					**13.2**	**44.3**

Protection of Children. Under Alternative 3, no schools would be exposed to average noise levels of 65 dB DNL and greater. Therefore, no new impacts are anticipated when compared to baseline. Refer to Section 4.3 for additional information on potential noise impacts. Refer to Appendix D, Section D.3 for a discussion on the effects of noise on hearing, health, performance, and learning.

Alternative 4

Minority and Low-Income Populations. Table 4.9-6 presents the total number of people, including low-income and minority populations, who would be affected by noise levels greater than 65 dB DNL. Of the total 8,419 people impacted under Alternative 4, there would be a 0.9 percent decrease in the proportion (13.9 percent) of low-income populations impacted by noise levels of 65 dB DNL and greater when compared to baseline conditions (14.8 percent). The 45.5 percent of minority populations affected by noise levels greater than 65 dB DNL would decrease by 0.8 percent when compared to the 46.3 percent proportionally impacted under baseline conditions. Therefore, no disproportionate impacts to low-income or minority populations are anticipated if this alternative were selected for implementation.

Table 4.9-6 Alternative 4 Low-Income and Minority Populations Underlying MCAS Beaufort Aircraft Noise Contour Bands

	Baseline			Alternative 4		
Contour Band (dB DNL)	Total Population	Total Low-Income Population	Total Minority Population	Total Population	Total Low-Income Population	Total Minority Population
65-70	2,751	530	1,449	3,684	579	1,796
70-75	1,495	214	705	2,739	387	1,278
75-80	2,246	266	940	1,378	141	527
80-85	639	49	213	610	58	227
> 85	39	2	11	8	0	2
Subtotal Populations	***7,170***	***1,061***	***3,318***	***8,419***	***1,166***	***3,831***
Net Change from Baseline Conditions				**+1,249**	**+105**	**+513**
Percent Impacted under Alternative 4					**13.9**	**45.5**

Protection of Children. Under Alternative 4 no schools would be exposed to average noise levels of 65 dB DNL and greater. As such, no new impacts would be anticipated. Refer to Section 4.3 for additional information on potential noise impacts. Refer to Appendix D, Section D.3 for a discussion on the effects of noise on hearing, health, performance, and learning.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

4.9.3 Summary Comparison of Alternatives

Table 4.9-7 summarizes the impacts of the alternatives considered in this analysis.

Table 4.9-7 Environmental Justice/Protection of Children Summary Comparison of Alternatives

Alternative	Environmental Consequences
Action Alternatives	• No disproportionate low-income or minority populations impacted by noise levels greater than 65 dB DNL • No schools would be exposed to average noise levels of 65 dB DNL and greater • No safety or health risks introduced to impact children during construction or due to aircraft operational activities
No Action Alternative	• Baseline conditions would persist

4.10 Community Services

4.10.1 Affected Environment (Baseline Conditions)

***Emergency Services and Law Enforcement*.** The MCAS Beaufort Fire Department provides emergency response to fire and accidents on Station. Last year the MCAS Beaufort Fire Department responded to 538 911-calls with an average response time of 5 minutes, 17 seconds (personal communication, Otterbine 2009). The Provost Marshal's Office (PMO), located in Building 584, is the primary police station for MCAS Beaufort's military police force. It also serves as the parent command for nearby Marine Corps Recruit Depot (MCRD) Parris Island's law enforcement unit. The PMO receives approximately 100 911-calls on an annual basis, of which between 10 and 15 occur on MCAS Beaufort and MCRD Parris Island respectively, and the majority of calls occur within the Laurel Bay Housing Community. Additionally, the PMO receives about 75 alarm activations a year that require response. The average response time to a 911 call or alarm activation by the PMO is approximately 2.5 minutes (personal communication, Strickroth 2009).

MCAS Beaufort has several emergency service agreements with regional service providers. Mutual aid agreements for firefighting services have been signed with MCRD Parris Island, the City of Beaufort, Town of Port Royal, Burton Fire District, Lady's Island/St Helena Fire District, Fripp Island Fire Department, Sheldon Fire District, Bluffton Fire District, and the Town of Hilton Head. The purpose of these agreements is for the benefits of mutual aid in the event of natural or man-made disasters involving hazardous materials response, weapons of mass destruction, confined space rescues, mass casualty incidents, and aircraft mishaps. MCAS Beaufort also has a mutual aid agreement in place for emergency medical services (EMS) with Beaufort County EMS in the event additional manpower and equipment are needed on the Air Station property, as well as an agreement with LifeStar/Medicare for emergency medical transport of patients from MCAS Beaufort (personal communication, Otterbine 2009).

MCAS Beaufort's Explosive Ordnance Division has an agreement with the four surrounding counties of Beaufort, Jasper, Hampton, and Colleton to assist local agencies with the diffusion, detonation, and disposal of suspected or live unexploded ordnance (personal communication, Otterbine 2009).

Off Station, the Beaufort County Sheriff's Office polices the county. The towns of Port Royal and Bluffton, as well as the City of Beaufort, have their own police departments (MCAS Beaufort 2004). The Beaufort County Fire District has substations strategically placed to provide rapid response to any part of the county. In addition, the Beaufort and Hilton Head Fire Departments have water rescue units, and are available 24 hours a day (MCAS Beaufort 2004).

Hospitals. The Branch Medical Clinic located on Station provides outpatient medical care to military personnel and their dependents. Naval Hospital Beaufort is located on Pinckney Boulevard in Port Royal, approximately halfway between MCAS Beaufort and MCRD Parris Island. The hospital is a complete military compound in itself, rather than a tenant of a larger command. Located within the grounds of the Naval Hospital Beaufort are 53 family housing single-story units, one BEQ, recreational facilities, and retail stores, as well as its own complete public works facility. Naval Hospital Beaufort provides general medical, surgical, and emergency services to all Active Duty Navy and Marine Corps personnel, as well as retired military personnel and all military dependents residing in the Beaufort area, a total population of approximately 35,000 beneficiaries (DoN 2009d).

Beaufort Memorial Hospital is located in Beaufort on Ribaut Road. This not-for-profit hospital has 197 beds and over 150 physicians offering a variety of medical services to the community. Associated with this facility is the Keyserling Cancer Center in Port Royal and the Bluffton Medical Services that provide a variety of primary care services to residents in the southern part of the county (Beaufort Memorial Hospital 2010).

***Schools*.** Beaufort County School District provides public education for school-age children of military families not residing on MCAS Beaufort and MCRD Parris Island (personal communication, Morgan 2009 and Green and Morgan 2010). There are also three schools that serve MCAS Beaufort (as well as MCRD Parris Island) as part of the DoD Domestic Dependent Elementary and Secondary Schools (DDESS). They are found within the Laurel Bay School District and include two elementary schools and one elementary/middle school (DoD 2009). Table 4.10-1 provides enrollment data, school capacity, and data regarding Federally-connected students living on MCAS Beaufort/MCRD Parris Island during the 2009/2010 school year.

Of those attending Beaufort County schools, 1,695 students, or 8.3 percent, were Federally connected (personal communication, Green and Morgan 2010). Federally-connected students include, but are not limited to, children of members of the uniformed services and children whose parents work on Federal Property (DOE 2010a). Note that the Federally-connected student data reflects completed Federal Impact Aid forms received by the school. As such, Federally-connected student numbers may be higher than reported. Impact Aid is a Federal program designed to assist local school districts that have lost traditional revenue sources due to the presence of tax-exempt Federal property or that have experienced increased expenditures due to the enrollment of Federally-connected children. Impact Aid provides the school district Basic Support Payments (Section 8003[b]) to assist with the basic educational needs of Federally-connected students (DOE 2010b).

Table 4.10-1 Enrollment Data for Beaufort County and DDESS Schools

<table>
<tr><th>Schools</th><th>Student Enrollment 2009/2010[a, b]</th><th>Capacity[a, c]</th><th>Percent Capacity</th></tr>
<tr><td>Beaufort Elementary School</td><td>647</td><td>505</td><td>128</td></tr>
<tr><td>Bluffton Elementary School</td><td>923</td><td>946</td><td>98</td></tr>
<tr><td>Broad River Elementary School</td><td>387</td><td>612</td><td>63</td></tr>
<tr><td>Coosa Elementary School (K-4)</td><td>535</td><td>476</td><td>112</td></tr>
<tr><td>Daufuskie Island School</td><td>14</td><td>68</td><td>21</td></tr>
<tr><td>Hilton Head International Baccalaureate Elementary School</td><td>740</td><td rowspan="3">2,355[a]</td><td rowspan="3">81</td></tr>
<tr><td>Hilton Head School for the Creative Arts</td><td>729</td></tr>
<tr><td>Hilton Head Early Childhood Center (Pre-kindergarten – Kindergarten)</td><td>428</td></tr>
<tr><td>Joseph S. Shanklin Elementary School</td><td>442</td><td>578</td><td>76</td></tr>
<tr><td>Lady’s Island Elementary School (K-4)</td><td>361</td><td>485</td><td>75</td></tr>
<tr><td>M.C. Riley Elementary School</td><td>920</td><td>929</td><td>99</td></tr>
<tr><td>Mossy Oaks Elementary School</td><td>485</td><td>493</td><td>98</td></tr>
<tr><td>Okatie Elementary School</td><td>523</td><td>672</td><td>78</td></tr>
<tr><td>Port Royal Elementary School</td><td>307</td><td>309</td><td>99</td></tr>
<tr><td>Red Cedar Elementary School</td><td>754</td><td>800</td><td>94</td></tr>
<tr><td>Riverview Charter School</td><td>249</td><td>NA</td><td>NA</td></tr>
<tr><td>Shell Point Elementary School</td><td>412</td><td>604</td><td>68</td></tr>
<tr><td>St. Helena Early Learning Center/St. Helena Elementary School</td><td>417</td><td>961</td><td>43</td></tr>
<tr><td>Whale Branch Elementary School</td><td>336</td><td>544</td><td>62</td></tr>
<tr><td>Beaufort Middle School</td><td>615</td><td>793</td><td>78</td></tr>
<tr><td>H.E. McCracken Middle School</td><td>1,217</td><td>909</td><td>134</td></tr>
<tr><td>Hilton Head Island Middle School</td><td>885</td><td>1,007</td><td>88</td></tr>
<tr><td>Lady’s Island Middle School (5-8)</td><td>750</td><td>1,088</td><td>69</td></tr>
<tr><td>Robert Smalls Middle School</td><td>545</td><td>1,087</td><td>50</td></tr>
<tr><td>Whale Branch Middle School</td><td>329</td><td>864</td><td>38</td></tr>
<tr><td>Battery Creek High School</td><td>1,217</td><td>1,505</td><td>81</td></tr>
<tr><td>Beaufort High School</td><td>1,730</td><td>1,595</td><td>109</td></tr>
<tr><td>Beaufort-Jasper Academy for Career Excellence</td><td colspan="3">Part-time students are counted with their home school.</td></tr>
<tr><td>Bluffton High School</td><td>1,528</td><td>1,434</td><td>107</td></tr>
<tr><td>Hilton Head Island High School</td><td>1,183</td><td>1,382</td><td>86</td></tr>
</table>

Table 4.10-1 Enrollment Data for Beaufort County and DDESS Schools

Schools	Student Enrollment 2009/2010[a,b]	Capacity[a, c]	Percent Capacity
DDESS (Laurel Bay) Schools			
Robert E. Galer Elementary School	250	330	76
Middleton S. Elliott Elementary School	253	447	57
Charles F. Bolden Elementary/Middle School	409	500	83
TOTAL	20,520	24,278	85

Sources: [a]Personal communication, Green and Morgan 2010.
[b]Laurel Bay Schools information from DoD 2009.
[c]Laurel Bay Schools information from DoD 2009.

Note:
Hilton Head International Baccalaureate and Hilton Head School for the Creative Arts share a campus. Hilton Head Early Child Development Center feeds into these schools. Beaufort County Schools consolidate the capacities of these three schools.

Typically, school districts are eligible if they educate at least 400 Federally-connected students or the Federally-connected students comprise at least 3 percent of the district's total average daily attendance (DOE 2010b). In addition, school districts that educate Federally-connected children who are eligible for services under the Individuals with Disabilities Act can receive Children with Disabilities Payments (Section 8003[d]) in addition to the Basic Support Payments (DOE 2010b). The Basic Support Payments can be used to fund teacher and teacher aide salaries, textbooks, computers, and after school programs; Children with Disabilities Payments must be used to fund the added cost of educating these children (DOE 2010c). A summary of Impact Aid provided to the school district in FY00 (the most recent year data was available) is provided in Table 4.10-2.

Table 4.10-2 Federal Impact Aid Payments in Fiscal Year 2000

School District	Basic Support Payments ($)		Children with Disabilities Payments ($)		Total Funds
Federally-Connected Student Category	Uniformed	Civilian	Uniformed	Civilian	
Beaufort County	130,749	5,748	34,459	0	170,956

Source: DOE 2006.

Childcare. There are three child development centers that serve MCAS Beaufort; one is located on-Station, one is located at MCRD Parris Island, and one can be found in the Laurel Bay area. All three centers offer child care for children 6 weeks to 5 years of age. The centers are open Monday through Friday, 6:00 a.m. to 6:00 p.m. (MCCS 2009). Average wait times for enrollment vary depending on the age, with an approximate 6-month wait time for infants and an approximate 1 month wait time for older children. A Family Child Care system (in-home care by other military families living on-Station, or a private home off-Station) is also available, and this service is also used by families at MCRD Parris Island. Two Youth Centers (one located at MCRD Parris Island and one located at Laurel Bay) serve children age 5 to 10 years and mainly act as before and after-school care (personal communication, E. Powell 2009).

There are 50 childcare centers within Beaufort County, 20 of which are located in the City of Beaufort, that are registered with the Department of Social Services. There are also 53 Family Child Care Centers (in-home care of no more than six children) within the county, 16 of which are located in the City of Beaufort (SC Department of Social Services 2010).

4.10.2 Environmental Consequences

Table 4.10-2 presents the overall projected net change in Marines and dependents at MCAS Beaufort. Marine Corps-wide demographic data were used to calculate an estimated number of school-age children (MCCS 2007) (Table 4.10-3).

Table 4.10-3 Projected Net Change in Military Personnel and Dependents at MCAS Beaufort

Authorized Legacy Aircraft Military Personnel and Dependents[a]		Net Change in People by Alternative			
		1	2	3	4
Total Personnel	**1,821**	-228	-1,161	+667	+1,600
Total Dependents	**3,423**	-409	-2,177	+1,291	+3,058
Total Children	**1,951**	-233	-1,241	+736	+1,743
Total Children 6-18 years old	**995**	-119	-633	+375	+889
TOTAL	**5,244**	**-637**	**-3,338**	**+1,958**	**+4,658**

Notes:

[a]Marine Corps-wide demographic data representing dependents associated with Marines by grade were used to develop multipliers and calculate an estimated number of families and school-age children associated with the personnel increase (MCCS 2007).

Emergency Services and Law Enforcement. Under Alternatives 1 and 2 there would be an overall reduction of 637 and 3,338 Marines and dependents at MCAS Beaufort, respectively. MCAS Beaufort currently provides fire/emergency services and police protection for approximately 1,276 military families and more than 700 unaccompanied enlisted permanent personnel residing on-Station (Global Security 2009). With the proposed decrease in the number of Marines, civilians, and their dependents, emergency services and law enforcement should not expect any major impacts to response times or strain on services.

Under Alternatives 3 and 4, there would be an overall increase of 1,958 and 4,658 Marines and dependents, respectively. However, the increase in population would be gradual, and it is expected that emergency services would adjust to any increase in demand as mandated by Federal regulations.

Hospitals. It is anticipated that any new personnel and their associated dependents assigned to MCAS Beaufort under the Proposed Action would utilize either the Branch Medical Clinic or Naval Hospital Beaufort for major medical services. The maximum increase of personnel (Alternative 4; 4,658 personnel and dependents) would represent a 13 percent increase in the population utilizing Naval Hospital Beaufort. Given this increase, it is possible that some military dependents may choose to utilize Beaufort Memorial Hospital or other small clinics in the community.

Schools. Under Alternatives 1 and 2 it is anticipated that 119 and 633 school-age children would leave the Air Station, respectively, and no longer attend schools within the Beaufort County and DDESS School Systems (see Table 4.10-4). A broad look at those schools indicates that, with a few exceptions, these schools are not currently over capacity (see Table 4.10-1). The proposed decrease of school-age children would not be expected to have an adverse impact on the Beaufort County and DDESS schools and could alleviate some of the capacity concerns in a few of the schools that are approaching or have exceeded full capacity. The overall reduction in Federally-connected students is expected to be spread among the 30 Beaufort County and three DDESS schools and would result in no long-term impacts.

Table 4.10-4 Federally-Connected Student Enrollment by Alternative

County School District	Available Seats	Net Change in Student Enrollment by Alternative			
		1	2	3	4
Beaufort	**3,758**	-119	-633	+375	+889
TOTAL STUDENT ENROLLMENT	**3,758**	**-119**	**-633**	**+375**	**+889**

Sources: personal communication, Green and Morgan 2010 and DoD 2009.

Under Alternatives 3 and 4 it is anticipated that an additional 375 and 889 school-age children, respectively, would attend schools within the Beaufort County and DDESS School Systems (see Table 4.10-4). A broad look at those schools indicates there are approximately 3,758 available seats (see Table 4.10-1). Also, Beaufort County expects to open three new schools with the capacity to educate an additional 2,300 students. Therefore, while the initial increase in students may have a short-term impact to the schools as they adjust to a gradual increase in student enrollment, it is expected that long-term impacts would not occur since there is adequate capacity remaining in Beaufort County schools.

Childcare. Under Alternatives 1 and 2 the three child development centers that serve MCAS Beaufort would be expected to see a minor decrease in demand. There is currently a wait list that may decrease with the subsequent alleviation in demand. Families with infants currently experience the longest wait time of up to 6 months. Military families that remain at MCAS Beaufort with infants and toddlers may have an easier time finding on-Station childcare options than previously experienced.

Under Alternatives 3 and 4, there would be an overall increase of 361 and 854 non-school age children, respectively. There is currently a wait list at the three child development centers on Station, which would likely increase with the subsequent increase in demand. Families with infants would experience the longest wait time.

Possible solutions to the on-Station child development centers, such as the Family Child Care Program and licensed childcare centers and family childcare facilities, exist. Currently, there are 103 childcare facilities available throughout Beaufort County (SC Department of Social Services 2010). While short-term impacts and inconvenience associated with finding day care would be expected, local facilities would likely respond to the increased demand for services since the military personnel increase would be gradual.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

4.10.3 Summary Comparison of Alternatives

Table 4.10-5 presents a summary of the impacts by alternative.

Table 4.10-5 Community Services Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternative 1	• Net reduction of 228 personnel and 409 dependents • Decrease in school age children by 119 • Overall decreased demand for community services
Alternative 2	• Net reduction of 1,161 personnel and 2,177 dependents • Decrease in school age children by 633 • Overall decreased demand for community services
Alternative 3	• Net gain of 667 personnel and 1,291 dependents • Increase in school age children by 375; adequate capacity exists • Overall increased demand for community services
Alternative 4	• Net gain of 1,600 personnel and 3,058 dependents • Increase in school age children by 889; adequate capacity exists • Overall increased demand for community services
No Action Alternative	• Baseline conditions would persist

4.11 Utilities and Infrastructure

4.11.1 Affected Environment (Baseline Conditions)

The baseline affected environment encompasses part of Beaufort and Jasper Counties. Table 4.11-1 shows current utility information within this environment.

Table 4.11-1 Baseline Utilities and Infrastructure Conditions within the MCAS Beaufort Affected Environment

<table>
<tr><th rowspan="2">Area</th><th colspan="3">Potable Water</th><th colspan="2">Wastewater</th><th colspan="2">Electricity</th><th colspan="2">Solid Waste</th></tr>
<tr><th>Source</th><th>Average Daily Demand (mgd)</th><th>Capacity</th><th>Average Flow Rate (mgd)</th><th>Max Capacity (mgd)[a]</th><th>Provider</th><th>Capacity Concerns</th><th>Landfill</th><th>Capacity (years)</th></tr>
<tr><td>MCAS Beaufort</td><td>BJWSA</td><td rowspan="7">21.5[a]</td><td rowspan="7">44.1 expandable to 50[a]</td><td>1.2[b]</td><td rowspan="4">7.5[c]</td><td>SCE&G</td><td>No</td><td rowspan="7">Hickory Hill Landfill, Oakwood Landfill (C&D), and Barnwell Resources Landfill (C&D)</td><td rowspan="7">16.7, 26, and 16, respectively</td></tr>
<tr><td>Beaufort County</td><td>BJWSA</td><td rowspan="3">2.5[c]</td><td>SCE&G and Palmetto Electric Cooperative</td><td>No</td></tr>
<tr><td>City of Beaufort</td><td>BJWSA</td><td>SCE&G</td><td>No</td></tr>
<tr><td>Town of Port Royal</td><td>BJWSA</td><td>SCE&G</td><td>No</td></tr>
<tr><td>Town of Bluffton</td><td>BJWSA</td><td>3.5</td><td>7.5</td><td>SCE&G and Palmetto Electric Cooperative</td><td>No</td></tr>
<tr><td>Town of Hilton Head</td><td>BJWSA and HHPSD</td><td>HHPSD</td><td>HHPSD</td><td>Palmetto Electric Cooperative</td><td>No</td></tr>
<tr><td>Jasper County</td><td>BJWSA</td><td>2.5[a]</td><td>7.5[a]</td><td>Palmetto Electric Cooperative</td><td>No</td></tr>
</table>

Key: mgd=million gallons per day, BJWSA=Beaufort-Jasper Water and Sewer Authority, C&D=construction and demolition; SCE&G=South Carolina Electric & Gas, and HHPSD=Hilton Head Public Service District

Note: [a]Maximum capacity does not necessarily equal permitted capacity.
[b]Includes MCAS Beaufort and MCRD Parris Island.
[c]Reflects services provided by BJWSA.

Potable Water. Potable water is supplied to MCAS Beaufort by the BJWSA (Table 4.11-1), with all treatment and storage occurring off Station. The main water supply is stored and gravity-fed by a BJWSA-owned elevated storage tank. Water treatment capability is available on Station; however, the treatment facilities do not operate on a regular basis.

All potable water is drawn from the Savannah River and pumped to the Chelsea Water Treatment Plant (WTP), which can produce up to 24 mgd of drinking water. BJWSA also operates a second WTP known as Purrysburg WTP. The Purrysburg WTP can provide up to 15 mgd of drinking water and currently supplies Jasper County and the southern portion of Beaufort County. The Purrysburg WTP was designed to allow expansion to treat up to 45 mgd (BJWSA 2008). BJSWA also utilizes Aquifer Storage and Recovery facilities that store groundwater in large tanks for use during peak demand periods. BJWSA currently has a total capacity to treat 44.1 mgd which can increase to 50 mgd when the Aquifer Storage and Recovery facilities are in use. Current average daily demand on BJWSA treatment facilities for potable water is 21.5 mgd (personal communication, Petry 2010).

Hilton Head Island also is currently receiving potable water from BJWSA but has constructed a reverse osmosis water treatment facility. This facility draws water from the Floridian Aquifer and blends it with water purchased from BJWSA to reduce water purchasing costs. The Hilton Head facility is operated by the HHPSD and is expandable to 6 mgd (HHPSD 2009).

Wastewater. Wastewater treatment for MCAS Beaufort, Laurel Bay Housing Area, and MCRD Parris Island was transferred to BJWSA in 2008. In addition, BJWSA provides sanitary sewer and wastewater services to Beaufort County, the City of Beaufort, Town of Port Royal Island, and the Town of Bluffton and operates 10 water reclamation facilities (WRFs) within Beaufort and Jasper Counties. Areas not serviced by the BJWSA use individual septic tank systems or other, smaller wastewater service providers. Hilton Head Island provides wastewater treatment services to its local residents through the HHPSD.

Beaufort WRF services the Town of Bluffton and has a maximum capacity of 7.5 mgd, and an average daily flow of 3.5 mgd (personal communication, Petry 2010). Beaufort WRF was master planned for a three phase expansion giving a total capacity of 18 mgd. This facility currently provides up to 950,000 gallons per day (gpd) of reclaimed water to area golf courses for irrigation. When there is little demand for this reclaimed water, up to 500,000 gpd are discharged into the Great Swamp (BJWSA 2010).

Port Royal Island WRF was completed in 2006 and currently services all of northern Beaufort County, including the City of Beaufort and the Town of Port Royal Island. This facility currently has a capacity of 7.5 mgd with an average daily flow of 2.5 mgd. In the near future, it is planned that wastewater from MCAS Beaufort and MCRD Parris Island will be consolidated and sent to the Port Royal Island WRF. After consolidation, average daily flow is estimated to be 3.7 mgd. The Port Royal Island WRF can upgrade in a single phase to a treatment capacity of 15 mgd (personal communication, Petry 2010).

The SCDHEC has established a Total Maximum Daily Load (TMDL) of 0.1 milligrams per liter for the Beaufort River, which allocated certain pollution amounts as permissible into the river (SCDHEC 2006a). The TMDL was established after the Beaufort River was listed as impaired for dissolved oxygen. Chemical Oxygen Demand and ammonia concentrations in the river are monitored for permitted discharges.

Electricity and Telecommunications**.** As indicated in Table 4.11-1, SCE&G and Palmetto Electric Cooperative provide electricity to Beaufort County. SCE&G provides electricity to MCAS Beaufort via one 115,000 volt line that is stepped down to 12,000 volts (personal communication, Temple 2010). MCAS Beaufort is responsible for distributing the electricity on Station. Neither of the two power providers has existing capacity issues. At MCAS Beaufort, CenturyLink (formerly Embarq) provides the telecommunication services, with both Hargray and CenturyLink providing services to Beaufort County.

Solid Waste. MCAS Beaufort is responsible for the collection of waste and recycling on Station. The recycling program includes pick-up for material such as scrap metal, batteries, office paper, cardboard, wooden pallets, and concrete (DoN 2003a). Solid waste generated at MCAS Beaufort, Laurel Bay Housing Area, and in the community of Beaufort is currently sent to Hickory Hill Landfill in Jasper County. In 2008 Hickory Hill Landfill disposed of 226,493 tons of waste, of which 1,621 tons of solid waste was received from MCAS Beaufort. It has an annual permitted rate of disposal of 307,000 tons (SCDHEC 2009). The landfill has an estimated facility life of 16.7 years based on current disposal rates (SCDHEC 2009). C&D debris generated from MCAS Beaufort is currently sent to Oakwood Landfill in Jasper County and Barnwell Resources Landfill on Lady's Island. In 2008 Oakwood Landfill disposed of 65,371 tons of waste, which is below its permitted annual disposal rate of 188,000 tons. Oakwood Landfill has an estimated, conservative facility life of 26 years (SCDHEC 2008b). Barnwell Resources Landfill disposed of 27,041 tons of waste in 2008; its permitted annual disposal rate is 120,000 tons. Given the current capacity at Barnwell Resources Landfill, it has a conservative, estimated facility lifespan of 16 years (SCDHEC 2009).

4.11.2 Environmental Consequences

Potable Water. Water is consumed by military personnel during operations, as well as by military personnel and their dependents at home. This analysis assumes that the average daily water consumption is the same as the wastewater flow rates. As such, this analysis assumes that each military person at the office and each residential user would consume an average of 13 and 69.3 gpd, respectively (USEPA 2002). In addition, it was assumed that the total amount of days worked in a year totaled 250 days (5-day work week with 10 Federal holidays). Refer to Table 4.11-2 for the projected net change in water consumption by military personnel for Alternatives 1 through 4. The numbers reflected in the analysis reflect military personnel only. Civilian and contract employees associated with the Proposed Action are not included in the analysis since these numbers are not known at this time. A similar approach was used to calculate the additional residential water consumption from military personnel and their dependents at home on an annual basis. Refer to Table 4.11-2 for the projected net change in water consumption by residential users for Alternatives 1 through 4.

As stated previously, BJWSA has a total capacity to treat 44.1 mgd which can be expanded to 50 mgd. Current average daily demand for potable water is 21.5 mgd. Considering the entire MCAS Beaufort consumption, under Alternatives 1 and 2 there would be an overall decrease in operational demand by less than one percent. Under Alternatives 3 and 4 there would be a less than one percent increase in operational demand. The additional demand would be accommodated by the existing system and no short- or long-term impacts are expected.

Table 4.11-2 Projected Water Consumption for MCAS Beaufort Action Alternatives

Alternative	Military Personnel (Operations)		Military Personnel and Dependents (Residential)		Average Potable Water Daily Demand (mgd)[a]	Average Wastewater Flow Rate (mgd)[a, b]
	Net Population Change	Projected Net Change in Water Consumption (gpd)	Net Population Change	Projected Net Change in Water Consumption (gpd)		
1	-228	-2,964	-637	-44,144	21.5	3.7
2	-1,161	-15,093	-3,338	-231,323	21.5	3.7
3	+667	+8,671	+1,958	+135,689	21.5	3.7
4	+1,600	+20,800	+4,658	+322,799	21.5	3.7

Notes:
[a]As indicated in Table 4-11.1, numbers provided are totals for the ROI.
[b]Reflects consolidated wastewater from MCAS Beaufort and MCRD Parris Island.

The operational-related water consumption estimates are considered conservative since they do not take into account implementation of requirements detailed in Executive Order (EO) 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*. Specifically, water management strategies, including the use of water-efficient and low-flow fixtures, must be implemented, which would minimize the amount of potable water consumed. EO 13514 also requires that all new construction comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* (Guiding Principles). This includes reducing potable water consumption by a minimum of 50 percent over water consumed by conventional means. LEED provides a process to achieve the high performance sustainable building objectives found in EO 13514. All new facilities would meet LEED standards to reduce water consumption.

Under Alternatives 1 and 2 there would be a 0.2 and 1.1 percent decrease in residential water consumption. Under Alternatives 3 and 4, there would be an additional demand of 135,689 and 322,799 gpd of water consumption, respectively. This represents a 0.6 percent and 1.5 percent increase over current average daily demand for Alternatives 3 and 4, respectively. The additional demand could be accommodated by the existing system and no short- or long-term impacts are expected.

Wastewater. Wastewater is generated through a myriad of activities such as those found at administrative, instructional, and maintenance facilities, residences, and operational areas. This analysis assumes that the average daily wastewater flow from office personnel and typical residential dwellings are equal to indoor water consumption. As such, this analysis conservatively assumed that each military person and residential users would produce wastewater flows of 13 and 69.3 gpd, respectively (USEPA 2002).

As stated previously, the wastewater from MCAS Beaufort will be consolidated and sent to the Port Royal Island WRF, which would result in an average daily flow of 3.7 mgd. The Port Royal Island WRF has a capacity of 7.5 mgd. Assuming that the average quantity of wastewater discharged is 100 percent of the volume of potable water consumed, there would be a net increase in operational-related wastewater discharge of less than one percent under Alternatives 3 and 4. Since adequate capacity exists, no short- or long- term impacts are expected. There would be a net decrease in operational-related wastewater discharge of less than one percent under Alternatives 1 and 2.

These operational-related wastewater discharge estimates are considered conservative since they do not take into account implementation of requirements detailed in EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*. As discussed previously under the potable water discussion, water management strategies, would be implemented, which would minimize the amount of potable water consumed. This in turn, would minimize the amount of wastewater discharged.

An approximate increase of 135,689 and 322,799 gpd of residential wastewater could occur from implementation of Alternatives 3 and 4. This represents a 5.8 percent and 13.7 percent increase over current wastewater discharge for Alternatives 3 and 4, respectively. Since adequate capacity exists at the Port Royal Island WRF, no short- or long- term impacts are expected.

Electricity and Telecommunications. Personnel at the Air Station would utilize the current electricity and telecommunication systems in place. There are currently no capacity issues with the services on Station. The proposed new facilities would require connections to the electricity and telecommunications lines. Specific electrical and telecommunications requirements for the proposed facilities have not been determined, but given there are currently no issues related to capacity or supply, it is expected that an increase in demand for these services would be met by existing infrastructure. If, however, additional electrical capacity is needed for on-Station needs, it would be accommodated by SCE&G (personal communication, Temple 2010). In addition, in accordance with LEED, existing facilities would be managed to reduce energy consumption, and all new facilities would meet LEED standards such as using energy-efficient products.

None of the electrical and telecommunication providers have existing capacity issues, and there are no expected impacts associated with population increases in the area. The phased-in approach to personnel increases would allow service providers sufficient time to plan and accommodate for the increased demand of service.

Solid Waste. Solid waste generated during the demolition and construction of the facilities would be disposed of at Oakwood Landfill in Jasper County and Barnwell Resources Landfill on Lady's Island. The average C&D construction debris generation rate is 4.34 pounds per square ft (lbs/ft^2) for nonresidential structures, and the average demolition debris generation rate is 158 lbs/ft^2 for nonresidential structures (USEPA 2005c). For residential structures (such as the BEQs), the construction debris generation rate is 4.51 lbs/ft^2 (USEPA 2005c). Approximately 25 to 35 percent of C&D debris is recycled (USEPA 2005c). Under this action, demolition materials would be recycled to the maximum extent practicable. Using a conservative approach, it was assumed that 25 percent of C&D debris would be recycled. Refer to Table 4.11-3 for the C&D construction and demolition debris estimates for each alternative.

Under Alternatives 1 through 4, assuming all C&D debris is disposed of at one of the C&D landfills during the same year, which is a very conservative assumption, there would be a one-time increase in tonnage disposed of by 17, 14, 24, and 27 percent, respectively, at the Oakwood Landfill. If all of the C&D debris is disposed of at the Barnwell Resources Landfill there would be a one-time increase in tonnage disposed of by 41, 34, 58, and 66 percent for Alternatives 1 through 4, respectively.

Table 4.11-3 C&D Waste Generation in Tons per Year

Alternative	Construction Debris	Demolition Debris	Total C&D Waste	Current Disposal Rate Oakwood Landfill	Percent Change over Baseline	Current Disposal Rate Barnwell Resources Landfill	Percent Change over Baseline
1	752	10,286	11,038	65,371	+17%	27,041	+41%
2	423	8,855	9,278	65,371	+14%	27,041	+34%
3	917	14,753	15,669	65,371	+24%	27,041	+58%
4	1,690	16,183	17,873	65,371	+27%	27,041	+66%

The one-time increase of disposal at either the Oakwood Landfill or the Barnwell Resources Landfill is within the permitted annual disposal rates of 188,000 tons and 120,000 tons, respectively. Under current disposal rates, Oakwood has a remaining capacity of 2.3 million cubic yards (y^3) and Barnwell's remaining capacity is approximately 1 million y^3 (personal communications, Sussman 2009 and Mason 2009). As such, the respective C&D landfills are far from full capacity. New construction would be required to meet LEED requirements. As such, recycling would occur in accordance with those requirements; for instance, during the construction phase, any materials from site-grading activities that are recyclable would be separated out of the waste stream.

Solid waste generated during operation and maintenance of the facilities and personnel is disposed at Hickory Hill Landfill. The USEPA estimates that the average person generates approximately 4.5 lbs of solid waste per day (USEPA 2008). The USEPA estimates that approximately 1.5 lbs of municipal solid waste is recycled (USEPA 2008). The analysis assumes that each military person would generate approximately 3.0 lbs per day during daily work operations. In addition, it was assumed that the total amount of days worked in a year totaled 250 days (5-day work week with 10 Federal holidays). Refer to Table 4.11-4 for the projected net change in operationally-related solid waste generated by military personnel under Alternatives 1 through 4. A similar approach was used to calculate the additional residentially-related solid waste generated from military personnel and their dependents at home on an annual basis. Refer to Table 4.11-4 for the projected net change in solid waste generated by military personnel and their dependents at home under Alternatives 1 through 4.

Table 4.11-4 Solid Waste Generation in Tons per Year

Alternative	Net Change in Operational Waste	Net Change in Residential Waste	TOTAL Net Change	Current Disposal Rate	Percent Change from Baseline
1	-86	-349	-434	226,493	-0.2%
2	-435	-1,828	-2,263	226,493	-1.0%
3	+250	+1,072	+1,322	226,493	+0.6%
4	+600	+2,550	+3,150	226,493	+1.4%

The Hickory Hill Landfill has an annual permitted rate of disposal of 307,000 tons. As stated previously, Hickory Hill disposed of 226,493 tons of waste in 2008, leaving an available maximum disposal capacity of 80,507 tons per year. Under Alternatives 1 through 4, there would be a net change in the annual tons of municipal solid waste disposed of by -0.2, -1.0, +0.6, and +1.4 percent, respectively. The projected increase in solid waste disposal for Alternatives 3 and 4 would account for approximately 2 and 4 percent, respectively, of the remaining annual capacity at the landfill. This increase would not appreciably alter the anticipated facility life of 16.7 years.

These solid waste estimates are considered conservative as the recycling rate may be greater than 1.5 lbs per person per day since several types of materials from office operations such as paper, toner cartridges, aluminum cans, glass containers, steel and bi-metal cans, and textiles would be recycled. In addition, EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* requires the diversion of at least 50 percent of non-hazardous solid waste, excluding C&D debris, by the end of FY15. In addition, the estimates provided in Table 4.11-4 include solid waste generated at the workplace and at home, which would result in an overly conservative estimate. Based on the estimated solid waste generated (Table 4.11-4) and the annual permitted disposal rate for the Hickory Hill Landfill, the landfill has adequate capacity to accommodate the additional solid waste generated under Alternatives 3 and 4.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

4.11.3 Summary Comparison of Alternatives

Table 4.11-5 provides a summary comparison of alternatives.

Table 4.11-5 Utilities and Infrastructure Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternative 1	• Decrease in operational-related water consumption and wastewater discharge by military personnel by 2,964 gpd • Decrease in residential water consumption and wastewater discharge by military personnel and dependents by 44,144 gpd • Annual decrease in solid waste by 434 tons • One time increase in C&D debris of 11,038 tons
Alternative 2	• Decrease in operational-related water consumption and wastewater discharge by military personnel by 15,093 gpd • Decrease in residential water consumption and wastewater discharge by military personnel and dependents by 231,323 gpd • Annual decrease in solid waste by 2,263 tons • One time increase in C&D debris of 9,278 tons
Alternative 3	• Increase in operational-related water consumption and wastewater discharge by military personnel by 8,671 gpd • Increase in residential water consumption and wastewater discharge by military personnel and dependents by 135,689 gpd • Annual increase in solid waste by 1,322 tons • One time increase in C&D debris of 15,669 tons
Alternative 4	• Increase in operational-related water consumption and wastewater discharge by military personnel by 20,800 gpd • Increase in residential water consumption and wastewater discharge by military personnel and dependents by 322,799 gpd • Annual increase in solid waste by 3,150 tons • One time increase in C&D debris of 17,873 tons
No Action Alternative	• Baseline conditions would persist

4.12 Transportation and Ground Traffic

4.12.1 Affected Environment (Baseline Conditions)

On-Station Roadways. MCAS Beaufort has one main gate and four alternative gates that provide access to the Air Station via off-Station roadways (Figure 4.12-1). The main entrance is located just inside MCAS Beaufort, east of the intersection of U.S. Highway 21 and State Route 116. Three of the remaining four gates are used exclusively by security personnel. The gate known as Delta Gate, located near the intersection of U.S. Highway 21 and Longstaff Avenue, is used for processing truck deliveries.

The existing transportation network on MCAS Beaufort, as depicted in Figure 4.12-1, consists of Geiger Boulevard, Moore Street, Quilaili Road, Drayton Street, and Simpson Road (USMC 2004a). Geiger Boulevard extends eastward from the main entrance; Moore Street extends from Geiger Boulevard northeast through Runway 14/32; Quilaili Road intersects Moore Street; and Drayton Street and Simpson Road provides access to air operations and support service areas (USMC 2004a).

With the exception of Geiger Boulevard, which is a four-lane highway, all other on-Station roadways are two-lane roadways. Stop signs are located at the majority of intersections and although traffic police are used during peak hours to assist with traffic control, a number of accidents have occurred at these intersections. A traffic study was conducted December 10-15, 2005 at three intersections (USMC 2004a):

- Geiger Boulevard and Gordon Street;
- Geiger Boulevard and Drayton Street; and
- Geiger Boulevard and State Route 116 and U.S. Highway 21 (Geiger Boulevard, Route 116, and U.S. Highway 21 intersect just outside the main entrance to MCAS Beaufort).

The first traffic light was installed on Station at the intersection of Geiger Boulevard and Gordon Street as a result of the traffic study (USMC 2004a). No specific traffic counts were provided for on-Station roadways.

Off-Station Roadways**.** The local and regional transportation network that provides access to MCAS Beaufort consists of several state and Federal roadways. The major thoroughfare providing access to MCAS Beaufort is U.S. Highway 21. U.S. Highway 21 is a four-lane highway that traverses from Colleton County in the north, to east of MCAS Beaufort through the City of Beaufort and south to Hunting Island. U.S. Highway 21 carries the majority of truck and tourist traffic (USMC 2004a). The South Carolina Department of Transportation data show that annual average daily traffic for the intersection of U.S. Highway 21 and State Route 116 is 28,400 vehicles (SCDOT 2008).

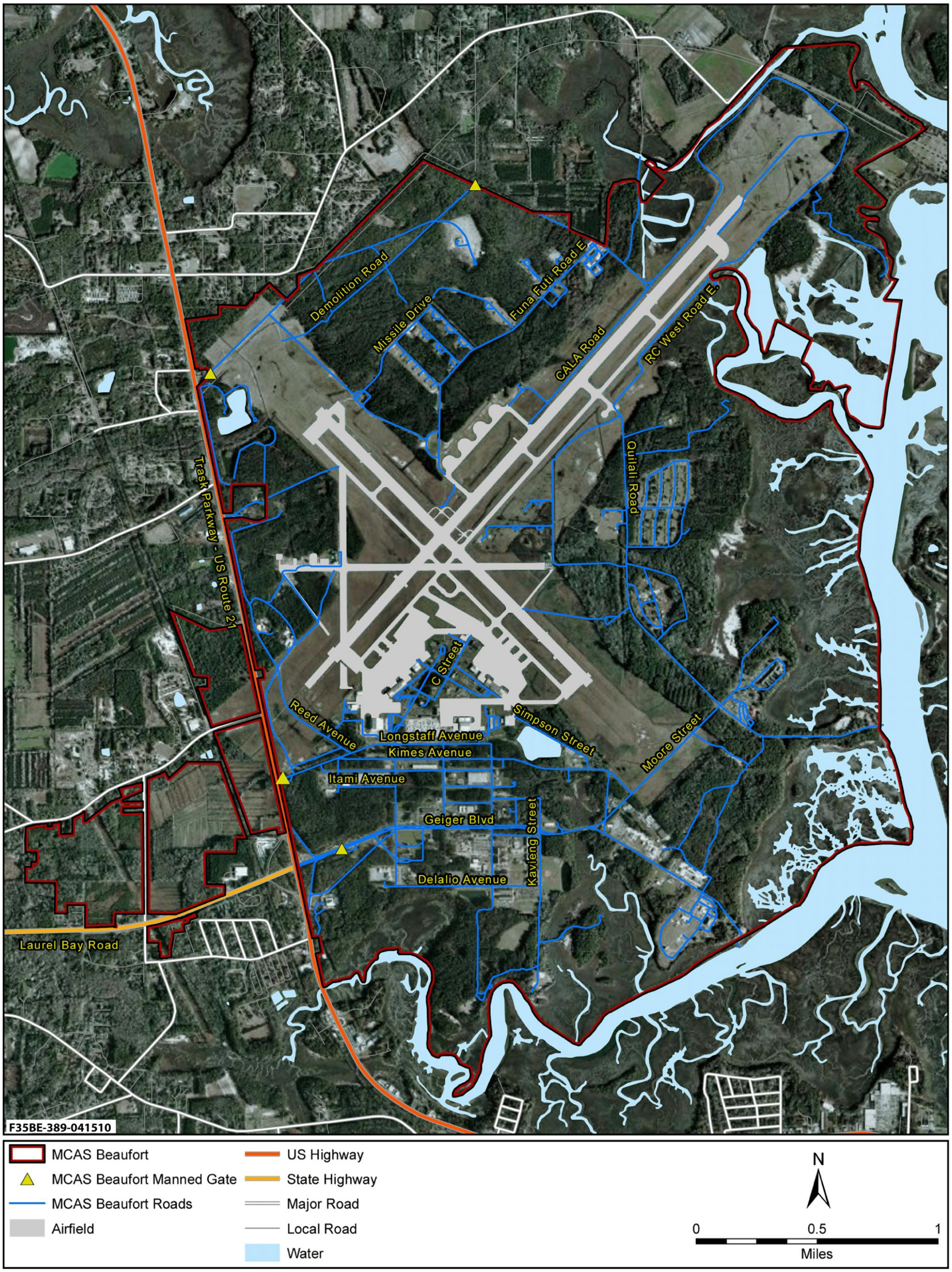


Figure 4.12-1 Existing Transportation Patterns for MCAS Beaufort

State Route 116, a two-lane highway, extends from Laurel Bay housing area east to MCAS Beaufort. State Route 116 intersects with U.S. Highway 21 just west of the main entrance to MCAS Beaufort. State Route 170 is a two-lane roadway that extends from State Route 278 southwest to U.S. Highway 21, south of MCAS Beaufort. State Route 280 is a two-lane roadway that carries traffic from the southern end of Port Royal Island to U.S. Highway 21 south of MCAS Beaufort (USMC 2004a).

4.12.2 Environmental Consequences

Implementation of Alternatives 1 and 2 would decrease personnel numbers at the Air Station, thereby decreasing the number of in-bound/out-bound vehicular trips per day. Average daily trips associated with each action alternative are shown in Table 4.12-1 for military personnel only. Civilian and contractor personnel were not included in this estimation because the numbers are uncertain at this time (refer to Chapter 2 for more information). Although temporary construction impacts would occur, no long-term impacts would occur as the number of daily trips in and out of the Air Station would decrease with the reduction in personnel. Delays from construction traffic may be encountered at the gates; however, since morning peak arrival times are typically from 6:00 a.m. to 8:00 a.m., vehicles would be staggered over this time period. Even though there are four alternate gates at MCAS Beaufort, there are no plans to alter current gate procedures; therefore traffic redirection through these alternate gates would not occur.

Implementation of Alternatives 3 and 4 would increase the number of personnel at the Air Station and subsequently the number of daily vehicular trips in-bound and out-bound. Average daily trips associated with each action alternative are shown in Table 4.12-1. Capacity could be further increased by encouraging carpooling and/or implementing tandem processing to allow additional processing capacity and/or changing in-bound vehicle processing. Traffic-related construction impacts would be similar to those described under Alternatives 1 and 2 and would be temporary in nature.

Additionally, EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* requires the advancement of regional and local integrated planning through the participation in regional transportation planning and recognizing existing community transportation infrastructure. The EO requires that the planning process for new facilities include a consideration of sites that are pedestrian friendly, near existing employment centers, and accessible to public transit.

Table 4.12-1 Estimated Number of Vehicular Trips per Day for each Alternative

Alternative	Authorized Legacy Aircraft Military Personnel (Baseline)	Net Change in Military Personnel by Alternative	Net Change in Vehicular Trips per Day Relative to Baseline
Alternative 1	1,821	-228	-456
Alternative 2	1,821	-1,161	-2,322
Alternative 3	1,821	+667	+1,334
Alternative 4	1,821	+1,600	+3,200

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented; thus, baseline conditions would remain unchanged.

4.12.3 Summary Comparison of Alternatives

Table 4.12-2 gives a summary comparison of action Alternatives 1 through 4, and the No Action alternative.

Table 4.12-2 Transportation and Ground Traffic Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternative 1	• Average Daily Trips would decrease by 456 • Construction impacts could cause gate delays, but would be temporary in nature
Alternative 2	• Average Daily Trips would decrease by 2,322 • Construction impacts could cause gate delays, but would be temporary in nature
Alternative 3	• Average Daily Trips would increase by 1,334 • Gate delays could occur during peak hours, but rerouting of traffic through the four entry gates could alleviate delays • Construction impacts could cause gate delays, but would be temporary in nature
Alternative 4	• Average Daily Trips would increase by 3,200 • Gate delays could occur during peak hours, but rerouting of traffic through the four entry gates could alleviate delays • Construction impacts could cause gate delays, but would be temporary in nature
No Action Alternative	• Baseline conditions would persist

4.13 Biological Resources

4.13.1 Affected Environment (Baseline Conditions)

Vegetation. The flight line area of MCAS Beaufort where the proposed demolition and construction would occur is primarily developed land bordered by maintained, open grasslands. Grasslands are mowed periodically to maintain the runway clear zones. Forest communities occurring in or near the construction areas are loblolly pine (*Pinus taeda*), slash pine (*Pinus elliotti*), a mixture of loblolly pine and hardwood, and a mixture of sweetgum (*Liquidambar styraciflua*) and willow oak (*Quercus phellos*). Located further away from the runway areas are communities of slash pine mixed with hardwood and freshwater wetland communities (Figure 4-13.1) (MCAS Beaufort 2006b).

Terrestrial Wildlife. The diversity of habitats found within MCAS Beaufort supports a wide variety of terrestrial wildlife. The Air Station's wildlife is typical of South Carolina's outer coastal plain. The most common species are detailed in the Integrated Natural Resources Management Plan (INRMP) for MCAS Beaufort (MCAS Beaufort 2006b). Typical urban wildlife can be found in the vicinity of the runway area where proposed demolition and construction would occur (i.e., white-tailed deer, raccoon, squirrel, opossum, etc.).

Birds. MCAS Beaufort contains habitat that supports a wide variety of migratory birds because of its coastal position along the Atlantic Flyway, a major migratory route used by birds during the spring and fall. The waters and shorelines along the estuarine marshes that border the Air Station provide excellent foraging and roosting habitats for migratory, wintering, and resident breeding marine birds, including shorebirds, waterfowl, wading and diving birds, and generalist water birds (i.e., gulls). Species occurrence varies greatly with differing habitat types.

MCAS Beaufort operates in accordance with EO 13186, *Migratory Bird Conservation.* A BASH plan is utilized by MCAS Beaufort to avoid mishaps involving aircraft and migratory birds (see Section 4.6 for more detailed BASH description).

Special Status Species. The INRMP for MCAS Beaufort lists 64 special status species that occur or could potentially occur on the Air Station or in the surrounding waters. An initial rare species study was conducted by the Air Station in 1991 and 1992, and it was subsequently updated in 1998 and 1999 (MCAS Beaufort 2006b). Table 4.13-1 provides a list of all the Federal and state listed species that could possibly occur at MCAS Beaufort, the status of the listing, a brief description of its habitat, and the potential of the species to occur within the ROI (for a definition of the ROI, see Section 3.13).

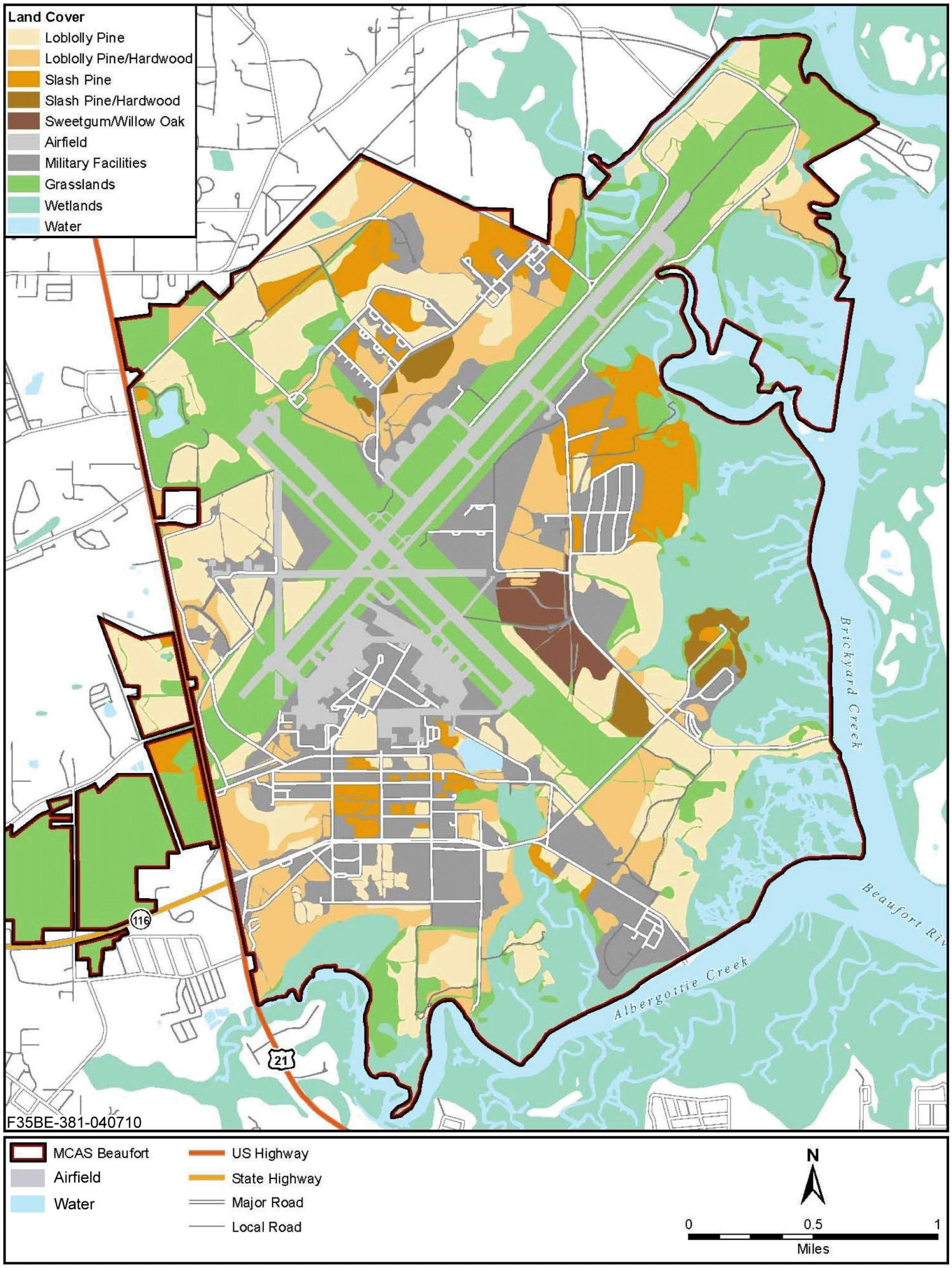


Figure 4.13-1 Classification of MCAS Beaufort Ecological Areas

***Bird/Wildlife Aircraft Strike Hazard*.** MCAS Beaufort has an active BASH program and Bird Hazard Working Group. This group is tasked with collecting, compiling and reviewing data on bird strikes, identifying and recommending actions to reduce hazards, recommending changes in operational procedures, preparing informational programs for aircrews, and serving as a point of contact for off-Station BASH The Installation uses the resources of the U.S. Department of Agriculture Animal and Plant Health Inspection Service's Wildlife Services program to help control birds and other wildlife that are potentially hazardous to aircraft (MCAS Beaufort 2006b). The Marine Corps devotes considerable attention to avoid the possibility of bird/wildlife aircraft strikes. Special purpose permits may be requested and issued that allow for the relocation or transport of migratory birds for management purposes. See Section 4.6 for additional information on BASH.

4.13.2 Environmental Consequences

Vegetation. The majority of demolition and construction activities associated with Alternatives 1, 2, and 3 would take place in the vicinity of the existing flight line. The flight line area is primarily cleared and developed land, and vegetation cover in this area is comprised of mowed grasslands, with several small stands of loblolly and slash pine. Proposed locations of the majority of the new facilities are within or very near the locations of existing facilities requiring demolition. Under Alternatives 1 through 4, 58.6, 58.6, 51.5, and 52.8 acres of forested land, respectively, would require clearing for the proposed construction (including clear zones). This land supports a mix of loblolly pine and slash pine. The forested land consists of smaller noncontiguous patches of forest that border the flightline. Removal of these forest patches would not increase forest fragmentation at the Air Station. Use of the airfield by F-35B would not affect vegetation.

Terrestrial Wildlife. Under Alternatives 1 through 4, all demolition, construction, and renovation would occur in previously developed or disturbed land. The flight line and its associated buildings are encircled by a buffer area consisting of manicured grass surrounded by sparse to dense forest lands. The grass buffer area is designed to limit the presence of wildlife near flight line operations, which reduces the BASH potential. New buildings not constructed on previously developed land would be constructed within the grass buffer area or in loblolly and slash pine stands. There would be no substantial loss or degradation of natural habitat or ecosystem functions (natural features and processes) essential to the persistence of terrestrial wildlife (see previous section on Vegetation). Resident wildlife would experience minor, short-term disturbance associated with construction noise. Given that the proposed demolition and construction activities would occur in an airfield environment, the noise associated with construction is not anticipated to have long-term impacts.

Table 4.13-1 Potential Occurrence of MCAS Beaufort Special Status Species in the ROI[a]

Type	Scientific Name	Common Name	Federal Listing[b]	State Listing[b]	Habitat Requirements	Potential Occurrence
Plants	*Lindera melissifolia*	Pondberry	E	--	Pondberry is restricted to the upper edges of intermittently wet ponds in pine woodlands. It occurs at four locations on the Station; three are within planted loblolly pine in the northeast portion of the property, and the fourth is in close proximity to the radar receiving tower.	Not likely to occur in ROI. Suitable habitat is not present.
	Oxypolis canbyi	Canby's Dropwort	E	--	Canby's dropwort inhabits a variety of coastal plain communities, including pond cypress savannahs, sloughs, and wet pine savannas in coastal South Carolina. However, Canby's dropwort has never been found during plant surveys onsite.	Not likely to occur in ROI. Suitable habitat is not present.
	Schwalbea Americana	American Chaff-seed	E	--	Chaff-seed grows in grasslands containing scattered trees and drought resistant undergrowth, or in longleaf pine woodlands. However, chaff-seed has never been found on the Station.	Not likely to occur in ROI. Suitable habitat is not present.
Amphibians	*Ambystoma cingulatum*	Flatwoods Salamander	T	E	Primarily inhabits flatwoods dominated by pine and grasses, but requires either cypress ponds, swamps, to bogs to also be present. Some suitable habitat exists on Station, but the species has never been found during amphibian surveys.	Not likely to occur in ROI. Suitable habitat is not present.
Reptiles	*Alligator mississippiensis*	American Alligator	T(S/A)[c]	T(S/A)[c]	Alligators inhabit river systems, canals, lakes, swamps, bayous, and coastal marshes, and they feed on a wide variety of prey items. Habitat is limited on Station, with alligators occasionally observed in freshwater and retention ponds.	Known to occur in ROI. Suitable habitat exists in ROI.
Birds	*Halieetus leucocephalus*	Bald Eagle	--	T	Bald eagles live near rivers, lakes, and marshes. Suitable feeding, roosting and nesting habitat occur on the Station. Two active nests appear annually; one north of Laurel Bay Housing on the Broad River, and one near the Air Station to the northeast on Brickyard Creek.	Infrequently occurs in ROI. Suitable foraging habitat in ROI.
	Mycteria americana	Wood Stork	E	E	Wood storks nest in colonies, especially in forested swamps. They feed in farm ponds, flooded pastures, tidal pools, or anywhere with shallow water where small fish may be concentrated.	Infrequently occurs in ROI. Suitable foraging habitat exists in ROI.

***Table 4.13-1 Potential Occurrence of MCAS Beaufort Special Status Species in the ROI*[a]**

Type	Scientific Name	Common Name	Federal Listing[b]	State Listing[b]	Habitat Requirements	Potential Occurrence
Mammals	*Corynorhinus rafinesquii*	Rafinesque's Big-eared Bat	--	E	Inhabits forested regions of pine flatwoods and hardwood hammocks. May roost in hollow trees, crevices behind bark, under dry leaves, in buildings and other man-made structures. Could be roosting in hardwoods onsite with large living or dead trees. However, never captured or detected in prior surveys.	May occur in ROI. Suitable habitat exists in ROI.
	Myotis austroriparius	Southeastern Myotis	--	T	The southeastern myotis roosts within caves, mines, abandoned building and large hollow trees within forested bottomlands, swamps, Carolina bays, mesic deciduous forest and mixed forests. On Station, this species may use bottomland habitats with large, hollow trees for roosting. Bat roosts have been found at the Station, but occupying species were not determined.	May occur in ROI. Suitable habitat exists in ROI.

Source: MCAS Beaufort 2006b.

Notes: [a]For the purposes of this table, the ROI is the flight line, areas of demolition and construction, and the airspace utilized for take-offs, landings, and touch-and-go operations at MCAS Beaufort (see section 3.13 for more information).

[b]E = Endangered, T = Threatened, T(S/A) = Threatened due to Similarity of Appearance, SC = Special Concern, FSC = Federal species of concern (These species are not protected under the Endangered Species Act but have declining numbers that warrant monitoring), SC = State species of concern.

[c]Although still listed as Federally threatened, the American alligator is considered recovered.

Other potential sources of impacts to wildlife would be from the associated noise resulting from touch-and-go operations, takeoffs, and landings. Noise modeling results indicate some increase in noise exposure levels at the MCAS Beaufort airfield and associated operations with the introduction of the F-35B squadrons (see Section 4.3). Subjecting wildlife to any increase in noise levels has the potential to elicit a negative response, including startle response, possible injury due to trampling or uncontrolled running or flight, increased expenditure of energy during critical periods such as breeding, temporarily masking auditory signals, and/or reducing the protection and stability of young. Because the F-35B is a new aircraft, no studies of noise effects on wildlife from this aircraft exist. The studies cited below describe the effects of aircraft noise on wildlife from other similar jet powered aircraft and the general response from wildlife would be similar for noise associated with the F-35B.

Aircraft noise is generally thought to be the most detrimental during periods of stress such as winter, gestation, and calving (Pepper *et al.* 2003, DeForge 1981). Studies on the effects of noise on wildlife have been predominantly conducted on mammals and birds. Some studies have shown that the responses to noise are transient and of short duration and suggest that the animals acclimate to the sounds (Workman *et al*. 1992; Krausman *et al*. 1993, 1998; Weisenberger *et al*. 1996). Similarly, the impacts to raptors and other birds (e.g., waterfowl, grebes) from aircraft low-level flights were found to be brief and not detrimental to reproductive success (Smith *et al*. 1988, Lamp 1989, Ellis *et al*. 1991, Grubb and Bowerman 1997). At the flightline, resident species in nearby habitats would likely have already acclimated to the noise of jet aircraft.

Birds. Activities proposed by Alternatives 1 through 4 would not alter migratory bird habitat. As with terrestrial wildlife, long-term impacts from noise on migratory birds in proximity to the flight line for construction or aircraft operation are not anticipated (see *Wildlife* discussion above for information on potential impacts to terrestrial species).

Special Status Species. There are no special status species that are likely to occur within construction areas at MCAS Beaufort for any of the action alternatives. The mowed grasslands and small loblolly and slash pine stands are not suitable to support known special status species on the Air Station. Two bald eagle nests have been identified within the ROI; however, according to existing permitting guidelines, aircraft overflights are not considered as a “take”. Therefore, no permit is required and no additional measures needed to implement any of the four action alternatives.

For those species that may be located in habitats under airspace associated with airfield operations, no impacts are likely, as this airspace is currently used by jet aircraft (see *Wildlife* discussion above for information on potential impacts to terrestrial species).

Of particular interest to various members of the public is the potential impact F-35B basing would have on the wood stork (*Mycteria americana*). The Marine Corps has determined that none of the alternatives in this EIS would impact the wood stork. There are no documented wood stork rookeries (communal nesting areas) on MCAS Beaufort and the closest rookery is located approximately 4.5 miles west of the airfield near where flight altitudes of the F-35B would be above 1,000 feet AGL. Since the rookery has continued to grow since its establishment and the distance of the rookery from the proposed activities is consistent with the Habitat Management Guidelines for the wood stork in the Southeast Region (USFWS 1990), it is unlikely that the F-35B would affect the rookery.

Foraging in the wetlands of MCAS Beaufort and transiting through the Air Station to other locations does infrequently occur. However, when observed on or near the installation, wood storks were found to be mainly foraging in the marsh and not reacting to nearby aircraft or noise generated by those aircraft, indicating that they were not affected (personal communication, Daughtery 2010). This would be anticipated to remain the same with the F-35B, especially since the SEL and L_{max} of the F/A-18 C/D and F-35B operations are nearly equal.

As for aircraft collisions with wood storks, there has never been a documented strike or near miss at MCAS Beaufort and the Navy/Marine Corps has no documented strikes attributed to wood storks form 1981 to present (personal communication, Stanley 2010). It is not anticipated this would change due to the fact that the wood stork spends most of its time on the ground feeding in the marshes and is in flight for only limited periods when transiting to and from the rookery or to other feeding sites nearby. Furthermore, MCAS Beaufort has a well established BASH program (see below and Section 4.6) and Standard Operating Procedures that are aggressively implemented to prevent BASH incidence.

***Bird/Wildlife Aircraft Strike Hazard*.** Under Alternatives 1 through 4, the F-35B would operate in the same airfield environment as the current aircraft. As such, the overall BASH potential is not anticipated to be different following the beddown of the F-35B. F-35B aircrews operating in MCAS Beaufort airspace would be required to follow the same applicable procedures outlined in the current MCAS Beaufort BASH Plan. MCAS Beaufort has developed aggressive procedures designed to minimize the occurrence of bird/wildlife aircraft strikes, and has documented detailed procedures to monitor and react to heightened risk of bird/wildlife aircraft strikes (MCAS Beaufort 2006b). When the risk increases, limits are placed on low-altitude flights and some types of training (e.g., multiple approaches, closed pattern work) in the airfield environment. Further, special briefings are provided to pilots whenever the potential exists for greater bird/wildlife aircraft strikes within the airspace; F-35B pilots would be subject to these procedures. Refer to Section 4.6 for further information on BASH.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented; thus, baseline conditions would remain unchanged.

4.13.3 Summary Comparison of Alternatives

Table 4.13-2 gives a summary comparison of each action alternative and the No Action Alternative.

Table 4.13-2 Biological Resources Summary Comparison of Action Alternatives

Alternative	Environmental Consequences
Action Alternatives	• Construction would occur along flight line predominately on previously disturbed or developed areas; permanent loss of up to 58.6 acres of noncontiguous loblolly and slash pine forest would occur under Alternatives 1 and 2, 51.5 acres under Alternative 3, and 52.8 acres under Alternative 4 • Short-term impacts from construction disturbance to terrestrial wildlife, but would not constitute a threat to any species or ecological community; no long-term impacts to wildlife due to noise • No long-term impacts to migratory birds anticipated • No impacts to special status species
No Action Alternative	• Baseline conditions would persist

4.14 Geology, Topography, and Soils

4.14.1 Affected Environment (Baseline Conditions)

***Geology*.** MCAS Beaufort is located in the Atlantic Coastal Plain portion of South Carolina. The Atlantic Coastal Plain consists of mostly marine sedimentary rocks that tilt seaward, formed from ocean sediments deposited during the Late Cretaceous Period to the present times (USGS 2009). Most of the surface and near surface sediment deposits consist of limestone, shell, sand, and clay (MCAS Beaufort 2006b). MCAS Beaufort has a slight risk of being exposed to the impacts of an earthquake because of the proximity of the Charleston Seismic Area. No major earthquakes have occurred near MCAS Beaufort to date and the Installation lies to the southwest of the earthquake source zones for the Charleston Seismic Area (USGS 2008).

***Topography*.** MCAS Beaufort lies on parts of the Talbot and Pamlico terraces which are composed of unconsolidated marine sediment deposits. The land is generally flat with broad ridges and shallow valleys. Land elevations at MCAS Beaufort range from mean sea level (msl) near the Broad and Beaufort Rivers to 37 ft msl (MCAS Beaufort 2006b).

***Soils*.** There are 22 different soils found within the boundaries of MCAS Beaufort. Figure 4.14-1 identifies the locations of all the soils present on MCAS Beaufort.

4.14.2 Environmental Consequences

The flight line area of MCAS Beaufort where the proposed demolition and construction would occur is comprised of several soil types. However, the majority of the soil in the flight line area is Udorthents, which is not natural soil. Areas of Udorthents have been cleared of the original soil and replaced with fill material. Other soils present include Seabrook, Coosaw, Williman, Wando, Seewee, Tomotley, and Ridgeland (MCAS Beaufort 2006b).

The topography of MCAS Beaufort would not be affected by any of the action alternatives because the areas of demolition and construction are already developed and flat; the amount of required grading would be minor. Depending on site specific soil and topographic conditions, additional fill material could be required. The proposed demolition and construction activities would not increase potential for exposure to unstable geologic units at MCAS Beaufort.

The soils at MCAS Beaufort in the flight line area would undergo temporary impacts during the demolition and construction phases of the action alternatives. During demolition and construction, standard erosion and sedimentation control techniques would be utilized to minimize impacts to soil as outlined in the INRMP (MCAS Beaufort 2006b). These techniques could include the revegetation of soils with native plants and the use of silt fencing and sediment traps. The vegetative erosion controls that

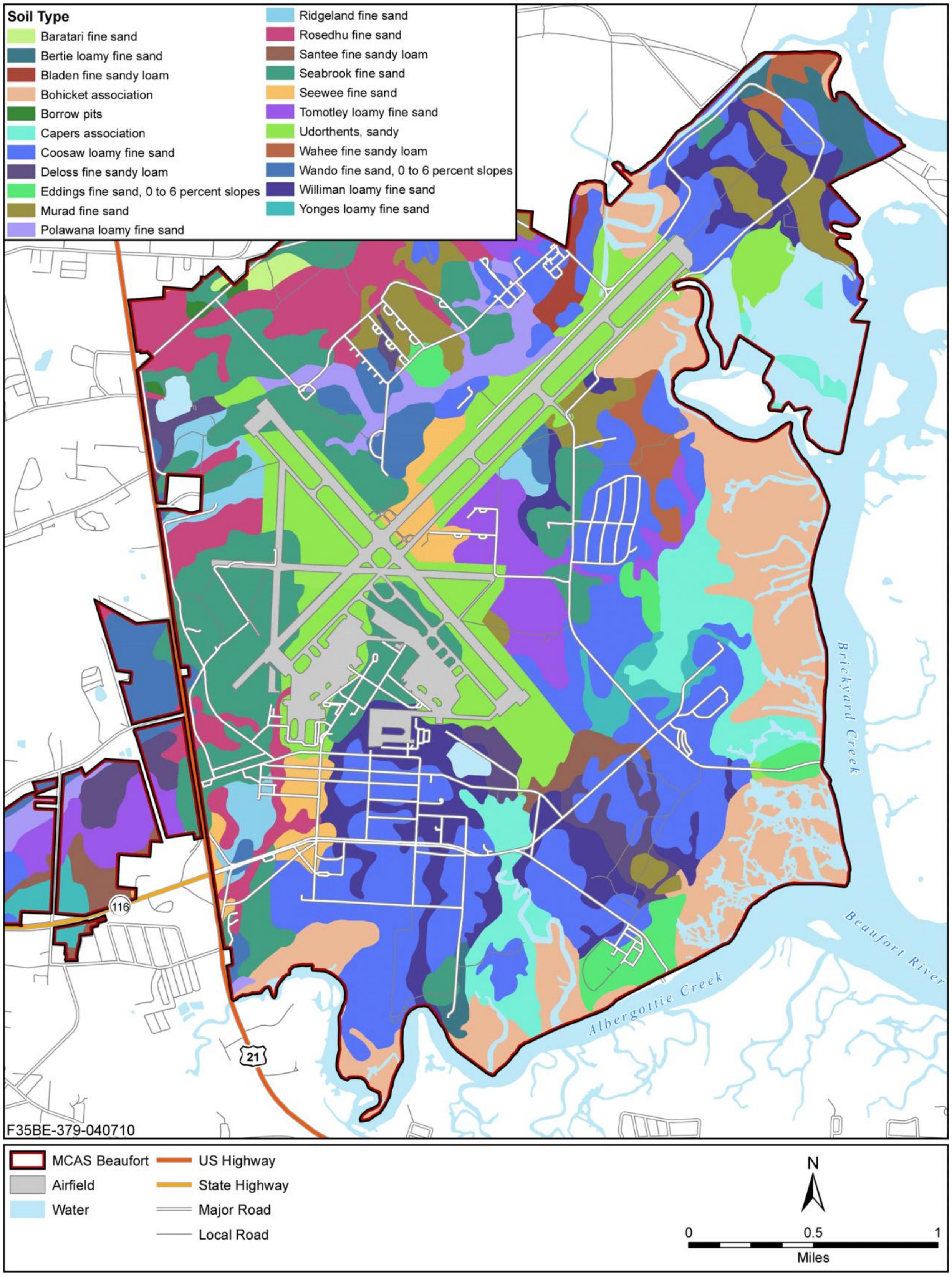


Figure 4.14-1 MCAS Beaufort Soils

could be implemented include temporary seeding, permanent seeding, sod stabilization, vegetative buffer strips, and the protection of trees. Sediment controls commonly practiced at MCAS Beaufort include: earth dikes, silt fences, straw bales, grassed drainage swales, check dams, level spreaders, subsurface drains, pipe slope drains, storm drain inlet protection, rock outlet protection, stormwater detention/retention basins, and sediment traps. The increase in impervious surfaces from construction could result in higher stormwater runoff levels, which in turn could lead to erosion in under-engineered drainages. However, use of proper stormwater management practices and BMPS as outlined in the Air Station's Stormwater Pollution Prevention Plan (SWPPP), would avoid any adverse impacts caused by increased impervious surface cover (MCAS Beaufort 2009c). Additionally, use of Low Impact Development (LID) techniques with regard to minimizing stormwater impacts would occur wherever practicable. LID techniques would strive to maintain or restore natural hydrologic functions of a site and achieve natural resource protection as well as fulfilling requirements as described by applicable Marine Corps, DoN, DoD, and EO 13514 LID policies. For further discussion of stormwater, see Section 4.15.

No-Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

4.14.3 Summary Comparison of Alternatives

Table 4.14-1 presents a summary comparison of the action alternatives and the No Action Alternative.

Table 4.14-1 Geology, Topography, and Soils Summary Comparison of Alternatives

Alternative	Environmental Consequences
Action Alternatives	• Minimal grading required due to flat topography • No impacts to geology from construction or demolition • Short-term impacts to soils from construction activities, but impacts would be minimized through standard erosion and sedimentation control procedures
No Action Alternative	• Baseline conditions would persist

4.15 Water Resources

4.15.1 Affected Environment (Baseline Conditions)

***Surface Water/Stormwater*.** MCAS Beaufort lies within the Broad-St. Helena Watershed (U.S. Geological Survey Cataloging Unit 03050208). As described in the SWPPP, a total of 49 stormwater drainage basins are located throughout MCAS Beaufort. These basins are composed of industrial as well as non-industrial (housing) areas. Waters from MCAS Beaufort drain into Brickyard and Albergottie Creeks, which drain into the Beaufort River and Port Royal Sound or (less commonly) into Whale Branch, the Coosaw River, and St. Helena Sound. Waters from Laurel Bay drain into Broad River, which subsequently drains into Port Royal Sound and Whale Branch, then into St. Helena Sound via the Coosaw River (Figure 4.15-1). The only impaired waterbody is Beaufort River's channel marker 231, which has been listed for low dissolved oxygen.

There are two manmade ponds and three major stormwater retention basins managed at MCAS Beaufort with many other smaller basins and swales throughout the Air Station. All other surface waters on the Installation are classified as intermittent in nature even though some streams and ponds only go dry during extreme drought (SCDHEC 2006b).

Groundwater. Two groundwater aquifers, a shallow unconfined aquifer and a deep confined aquifer (Floridan Aquifer), are present in the region. The shallow unconfined aquifer consists of approximately 40 to 60 ft of Pleistocene-age sands above the limestone bedrock aquifer and is generally permeable. The rate of groundwater flow in the shallow aquifer generally ranges from 0.2 to 1.2 ft per day (MCAS Beaufort 2006b). The Floridan Aquifer extends continuously from South Carolina into Florida. The area around MCAS Beaufort has been identified as a recharge zone for the Floridan Aquifer due to the intermittent occurrence of the confining layer between the surficial aquifer and the Floridan Aquifer (MCAS Beaufort 2006b).

Wetlands. Most of the large wetlands at MCAS Beaufort are estuarine and occur along Brickyard and Albergottie Creeks (Figure 4.15-1). A 2006 wetland survey using the 1989 USACE Wetlands Delineation Manual determined that the Main Installation had 187.64 acres of wetlands, with 137.65 acres being jurisdictional wetlands as defined by USACE. The remaining 49.99 acres are considered non-jurisdictional to the USACE because these wetlands are hydrologically isolated from other jurisdictional wetlands. However, these wetlands are still considered under the jurisdiction of SCDHEC and require permitting if activities will disturb or remove them. The Laurel Bay Housing Area property has large wetland areas associated with the Broad River, and 6.87 acres of jurisdictional freshwater wetlands within the boundary. Areas to the immediate southwest of the Main Installation that were previously agriculturally outleased properties were historically wetlands, but were converted to uplands many years ago through ditching and other draining techniques allowing them to be used agriculturally. These areas also

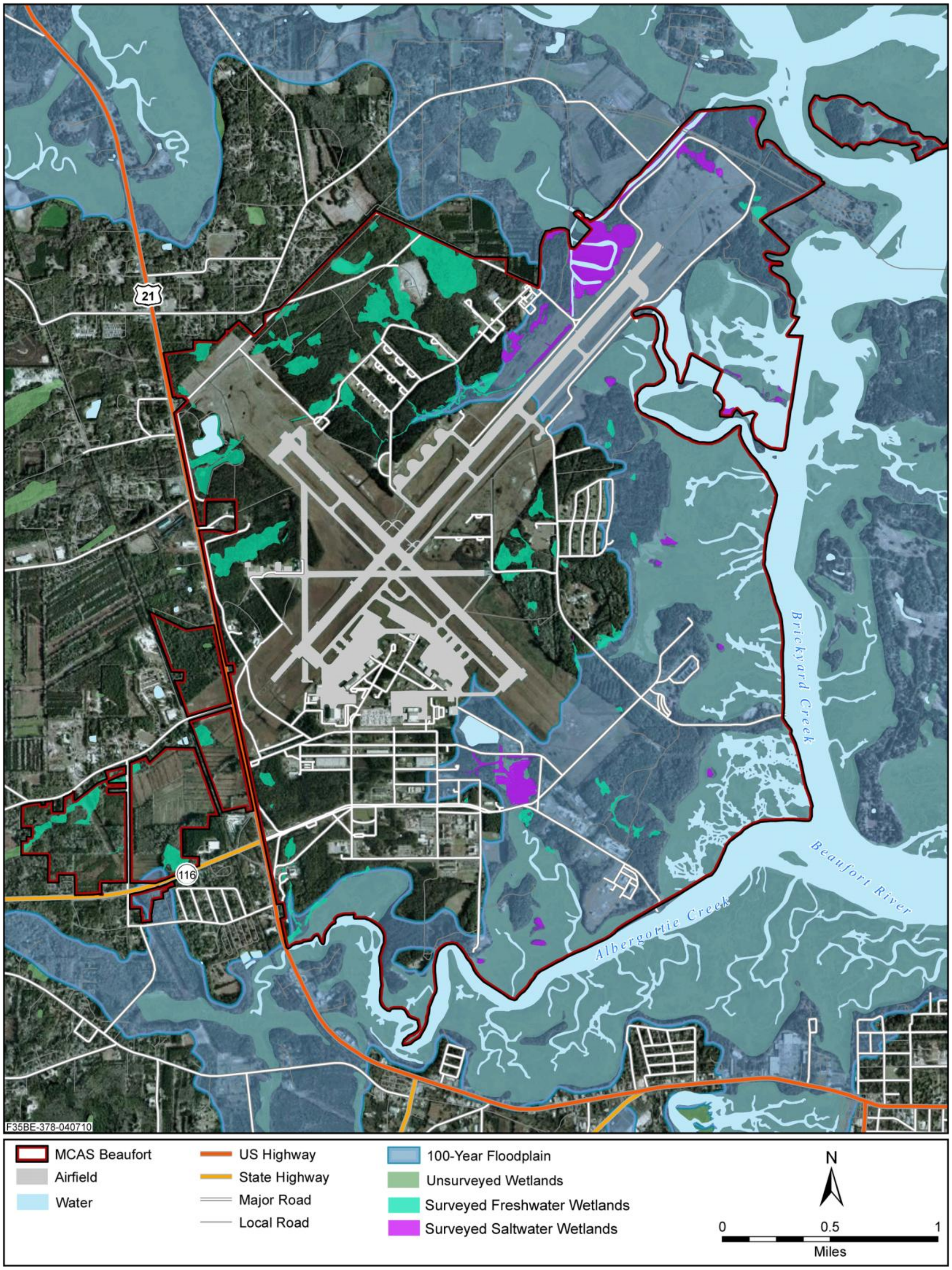


Figure 4.15-1 Water Resources at MCAS Beaufort

contain 21.07 acres of jurisdictional wetlands, 0.11 acres of jurisdictional culverts or ditches, and 4.14 acres of non-jurisdictional wetlands (MCAS Beaufort 2006c).

Floodplains*.* Extensive floodplain areas exist in the Beaufort area because of its slight elevation above msl and the relatively flat topographic relief of the land surface (Figure 4.14-1). Much of the eastern portion of MCAS Beaufort is in the 100-year floodplain.

4.15.2 Environmental Consequences

Surface Water/Stormwater*.* Under Alternatives 1 through 4, the hangar demolition projects, as well as construction of the support equipment maintenance area and flight simulator, are not anticipated to impact water resources. If required, the perimeter of each demolition project would be lined with stormwater control measures that would minimize the risk of increased sedimentation in stormwater. Furthermore, project-specific BMPs such as silt fences and drain covers would be implemented as part of the proposed construction projects to minimize impacts to water quality from the fine sand and sandy soils located in this area.

The support facilities including the aviation armament shop, ejection seat and canopy maintenance area, engine maintenance shop, and support equipment storage area would be constructed on grass-covered areas surrounding the existing wash rack. Following completion of these projects, the total amount of impervious surface at the flight line area would increase. Project-specific BMPs would be implemented as part of the proposed construction projects to minimize impacts to water quality from the fine sand and sandy soils located in this area. Implementation of traditional stormwater engineering controls (e.g., buildings with gutters, culvert/channels directing stormwater to retention basins) would decrease impacts to water quality following construction. Furthermore, spill contingency plans and SWPPP would also minimize impacts to water quality. EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* requires that all new construction comply with *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings.* This includes employing design and construction strategies that reduce stormwater runoff. Additionally, use of LID techniques with regard to minimizing stormwater impacts would occur wherever practicable. LID techniques would strive to maintain or restore natural hydrologic functions of a site and achieve natural resource protection as well as fulfilling requirements as described by applicable Marine Corps, DoN, DoD, and EO 13514 LID policies.

Groundwater**.** The Floridan Aquifer and other surficial waters would not be impacted by any of the alternatives. None of the alternatives would increase the risk of groundwater pollutants at MCAS Beaufort, and therefore, no impacts to groundwater resources are anticipated under the action alternatives.

Wetlands. There would not be any wetlands impacts from implementation of the Proposed Action. Construction and demolition projects may have the perimeter of each project lined with stormwater control measures to minimize the risk of increased sedimentation in stormwater entering adjacent wetlands. In addition, project specific BMPs would be implemented as part of the proposed construction projects to minimize impacts to water quality, and implementation of traditional stormwater engineering controls (e.g., buildings with gutters, culvert/channels directing stormwater to retention basins) would decrease future impacts to water quality following construction.

Floodplains. Under all four alternatives, the LHD/LHA Training Facility, with an approximate 33-acre footprint would be located entirely within the 100-year floodplain (only 3 acres would be developed). While this situation is not ideal, when compared to other possible sites, this location would introduce the least number of impacts to the environment and community.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented; baseline conditions would remain unchanged.

4.15.3 Summary Comparison of Alternatives

Table 4.15-1 provides a summary comparison of each action alternative and the No Action alternative.

Table 4.15-1 Water Resources Summary Comparison of Alternatives

Alternative	Environmental Consequences
Action Alternatives	• Construction and demolition activities are not anticipated to impact surface water or stormwater due to use of standard erosion and sedimentation controls • No impacts to groundwater • No impacts to wetlands • The LHD/LHA Training Facility, with an approximate 33-acre footprint, would be located entirely within the 100-year floodplain (only 3 acres would be developed)
No Action Alternative	• Baseline conditions would persist

4.16 Cultural and Traditional Resources

4.16.1 Affected Environment (Baseline Conditions)

Archaeological Resources. A total of 186 sites have been identified on MCAS Beaufort, including the Laurel Bay Housing Area (MCAS Beaufort 2007c). They include prehistoric and historic archaeological sites ranging in age from Early Archaic period (8000 BC) to early European colonization and later settlement (MCAS Beaufort 2007c). Of the 186 sites, eleven have been determined eligible for the National Register of Historic Places (NRHP) while 30 sites require additional testing to determine NRHP eligibility. Approximately 78 percent of all recorded archaeological sites (144 sites) at the Air Station have been determined ineligible (MCAS Beaufort 2007c).

Architectural Resources. A comprehensive, base-wide survey of architectural resources on MCAS Beaufort, including the Laurel Bay Housing Area, was conducted in 2001 (MCAS Beaufort 2007c). The survey documented 1,519 resources, including family housing units, hangars, administrative buildings, sewage treatment plants, and training facilities. The survey concluded that the architectural resources at MCAS Beaufort do not possess qualities of historic significance and are not eligible for listing on the NRHP (DoN 2003a). The historic district of the City of Beaufort, located outside Air Station boundaries, is within the area of potential effects for indirect impacts related to noise, visual intrusions, and vibration.

Traditional Cultural Resources and Sacred Sites. No formal surveys for traditional cultural properties or sacred sites have been conducted; however, a number of Federally-recognized tribes have historical or ancestral ties to the area that is now MCAS Beaufort. Requests for information to these tribes have not resulted in identification of such sites or administered properties within the Air Station (MCAS Beaufort 2007c).

4.16.2 Environmental Consequences

MCAS Beaufort has recently consulted with the South Carolina State Historic Preservation Office and obtained concurrence that the Cantonment area of the Air Station requires no further survey. Therefore, none of the structures designated for demolition under this Proposed Action are eligible for NRHP listing. However, if during construction any archaeological resources are discovered, work would immediately cease and the procedures for inadvertent discovery as outlined in the Air Station's Integrated Cultural Resources Management Plan (ICRMP) would be implemented.

The City of Beaufort Historic District would continue to be exposed to noise generated from MCAS Beaufort operations; however, these levels would not change to such an extent to be noteworthy. In conclusion, this Historic District would not be affected under any of the four action alternatives.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented; thus, baseline conditions would remain unchanged.

4.16.3 Summary Comparison of Alternatives

Table 4.16-1 gives a summary comparison of impacts from each of the action alternatives and the No Action alternative.

Table 4.16-1 Cultural Resources Summary Comparison of Alternatives

Alternatives	Environmental Consequences
Action Alternatives	• None of the buildings designated for demolition under the alternatives are eligible for NRHP listing • Any inadvertent discovery made during construction would follow the procedures outlined in the Air Station's ICRMP • The City of Beaufort's Historic District would not be affected
No Action Alternative	• Baseline conditions would persist

4.17 Coastal Zone Management

4.17.1 Affected Environment (Baseline Conditions)

The coastal zone program in South Carolina is managed by the SCDHEC, Office of Ocean and Coastal Resource Management (OCRM). The OCRM has direct permitting authority over the “critical areas” of the coast, defined as coastal waters, tidelands, and beach/dune systems. OCRM also has indirect management authority of coastal resources throughout the coastal zone. The coastal zone includes coastal waters and submerged lands seaward to the state’s jurisdictional limits, as well as the lands and waters of the eight South Carolina coastal counties.

MCAS Beaufort is located in Beaufort County, SC, and as such is part of the coastal zone and has to be evaluated from a coastal zone management perspective. Figure 4.17-1 shows the coastal resources in the vicinity of MCAS Beaufort. The natural and water resources of the Air Station are all regulated by OCRM. For specific information on the natural and water resources located on MCAS Beaufort refer to Sections 4.13 and 4.15, respectively.

4.17.2 Environmental Consequences

Although the various alternatives proposed would require different amounts of demolition and construction, all would have a negligible, short-term impact on coastal zone management during demolition and construction activities. Construction and demolition would occur in already disturbed areas. Specifically the following conclusions have been made from this analysis:

- Adequate measures will be implemented to eliminate contamination due to storm water run-off by the use of BMPs during all phases of construction and demolition as part of the Proposed Action.
- Wetlands will be avoided to the maximum extent practicable.
- The LHD/LHA Training Facility, with an approximate 33-acre footprint, would be located entirely within the 100-year floodplain (only 3 acres would be developed).
- Up to 58.6 acres of non-contiguous managed pine forest along the flightline may be lost due to construction and the need to establish clear zones under Alternatives 1 and 2; 51.5 acres under Alternative 3; and 52.8 acres under Alternative 4.
- There will be no impacts to wildlife resources as a result of the Proposed Action.

The action alternatives would be consistent with the enforceable policies of South Carolina’s Coastal Management Program. A Coastal Consistency Determination (Appendix G) was sent to OCRM for concurrence.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

4.17.3 Summary Comparison of Alternatives

Table 4.17-1 shows a summary comparison of the action alternatives and the No Action alternative.

Table 4.17-1 Coastal Zone Management Summary Comparison of Alternatives

Alternative	Environmental Consequences
Action Alternatives	• The LHD/LHA Training Facility, with an approximate 33-acre footprint, will be located entirely within the 100-year floodplain (only 3 acres would be developed) • Loss of up to 58.6 acres of non-contiguous pine forest along the flightline under Alternatives 1 and 2; 51.5 acres under Alternative 3; and 52.8 acres under Alternative 4 • All other actions associated with the Proposed Action would have no impacts to the management of the coastal zone
No Action Alternative	• No changes to baseline conditions would occur

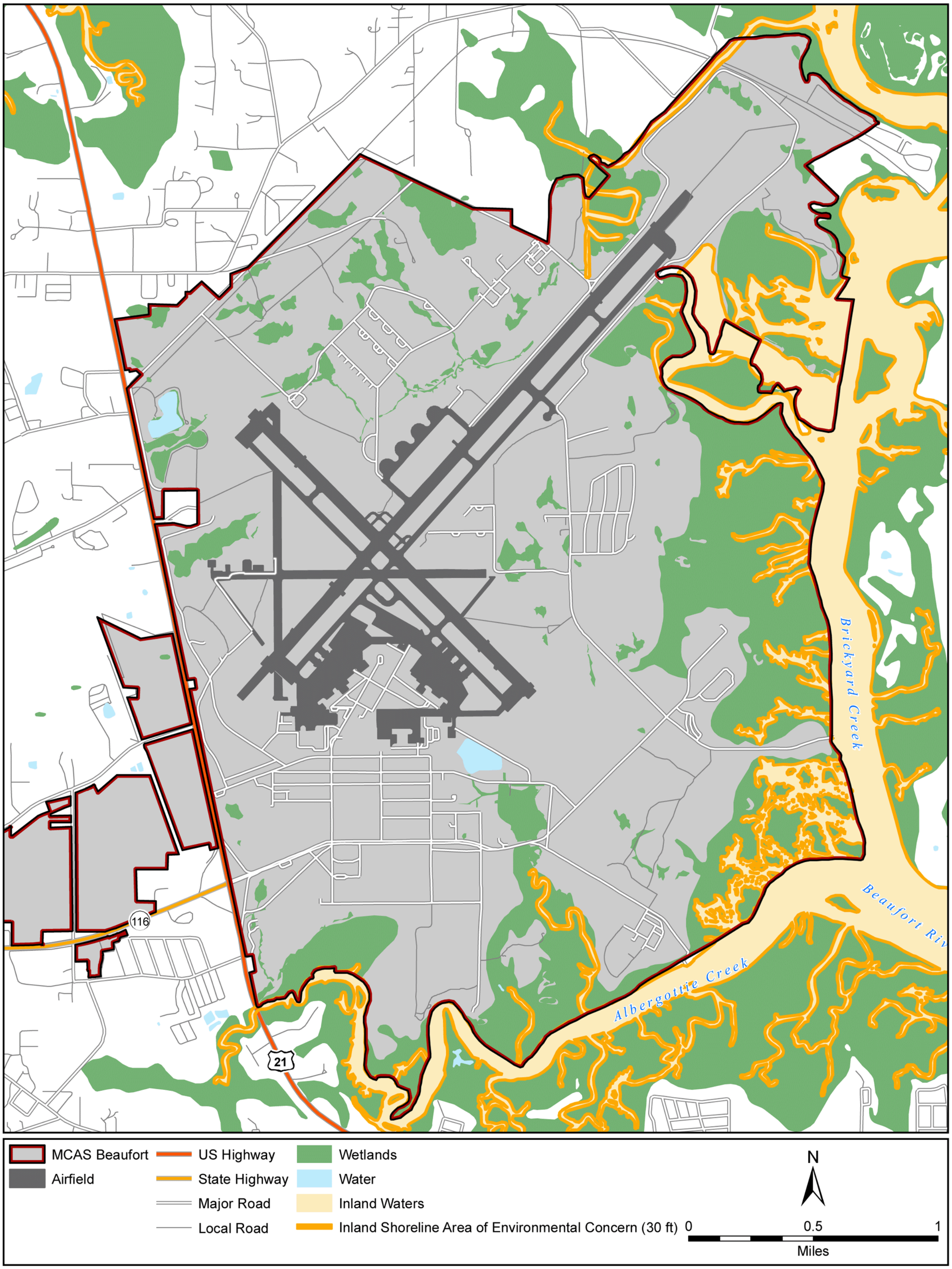


Figure 4.17-1 Coastal Resources in the Vicinity of MCAS Beaufort

5.0 MCAS CHERRY POINT AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

5.1 MCAS Cherry Point

Chapter 5 provides the baseline conditions of the affected environment (or the particular area that would be impacted by the action alternatives). Each resource is presented with a discussion of the potential impacts the four action alternatives and No Action Alternative would have if implemented at Marine Corps Air Station (MCAS) Cherry Point.

Table 5.1-1 outlines the primary elements that drive potential impacts associated with the Proposed Action. These elements include proposed F-35B aircraft numbers and projected airfield operations, construction disturbance areas, estimated construction costs, and projected number of military personnel and dependents according to alternative. The projected net change in military personnel and dependents includes 78 additional pilots associated with the Pilot Training Center (PTC). Under Alternatives 3 and 4, 66 of the 78 PTC pilots would be annually based at MCAS Cherry Point. Changes in civilian and contractor personnel associated with the introduction of the F-35B are anticipated under all alternatives; however, the number of these non-military personnel is continually changing as the aircraft and its systems evolve. As such, the Marine Corps has not included these non-military personnel changes because they cannot be predicted with any fidelity at this time. Once the data have more fidelity and it becomes evident that these numbers constitute a substantial change from existing conditions, the Marine Corps will undertake the appropriate level of environmental documentation to determine potential impacts.

Table 5.1-1 MCAS Cherry Point Proposed Action Alternative Elements

Elements	Alternative 1 (Preferred)	Alternative 2	Alternative 3	Alternative 4
F-35B Proposed Aircraft Loading	128	176	88	40
F-35B Proposed Airfield Operations	55,361	76,122	96,475	75,714
MCAS Cherry Point Total Proposed Aircraft Loading	174	222	134	86
MCAS Cherry Point Total Proposed Airfield Operations	83,380	104,141	124,494	103,733
Construction Disturbance (acres)[a, b]	112.8	206.3	107.3	96.3
Estimated Construction Costs ($ millions)	$536.3	$816.2	$391.9	$246.2
Net Change in Proposed Military Personnel	*+1,194*	*+2,127*	*+299*	*-634*
Net Change in Proposed Dependents	*+2,323*	*+4,090*	*+623*	*-1,144*

Notes: [a]The total includes areas disturbed due to clearing, grading, and construction equipment storage (i.e., laydown area); access roads and entrances; as well as associated parking areas and landscaping activities.
[b]Includes 41.3 acres of disturbance at Marine Corps Auxiliary Landing Field (MCALF) Bogue.

5.2 Airfield and Associated Airspace

5.2.1 Affected Environment (Baseline Conditions)

The affected environment includes the runways, taxiways, pads, and overlying airspace that aircraft use to takeoff, land, and conduct other types of local operations. MCAS Cherry Point's airfield is at an elevation of 29 feet (ft) above mean sea level (msl) and is configured with two pairs of offset runways (5/23 L/R and 14/32 L/R) that form a common "center-mat" area. All takeoffs originate from the center of the airfield on Runways 5L, 14R, 23L, and 32R (Departure Runways); landings are made toward the center of the airfield on Runways 5R, 14L, 23R, and 32L (Arrival Runways). Four existing pads (north, south, northeast, and southeast) support AV-8B and helicopter vertical takeoffs and landings (Figure 5.2-1). Additionally, MCAS Cherry Point is a divert field for Space Shuttle landing with a useable runway length of 17,381 ft on the northwest, southeast orientation and 15,551 ft of useable runway length on a northeast/southwest orientation (ATCFacO P3722.1N, January 2009).

MCAS Cherry Point is located within Alert Area 530, which is depicted on aeronautical charts to inform nonparticipating pilots that the area may contain a high volume of pilot training or an unusual type of aerial activity. Air traffic control services are provided within their area of responsibility from the Air Station's Radar Air Traffic Control Facility (RATCF) to multiple military, civilian airports, and outlying landing fields. In addition, RATCF and the Range Operations Center provide radar containment services for Special Use Airspace under their purview.

Runways 32 L/R and 23 L/R are the most frequently used. About 43 percent of airfield operations are assigned to Runway 32 L/R (designated as the Calm Wind runway). Thirty-three percent are assigned to Runways 23 L/R; Runways 5 L/R support 15 percent; and about 9 percent of airfield operations are assigned to Runways 14 L/R.

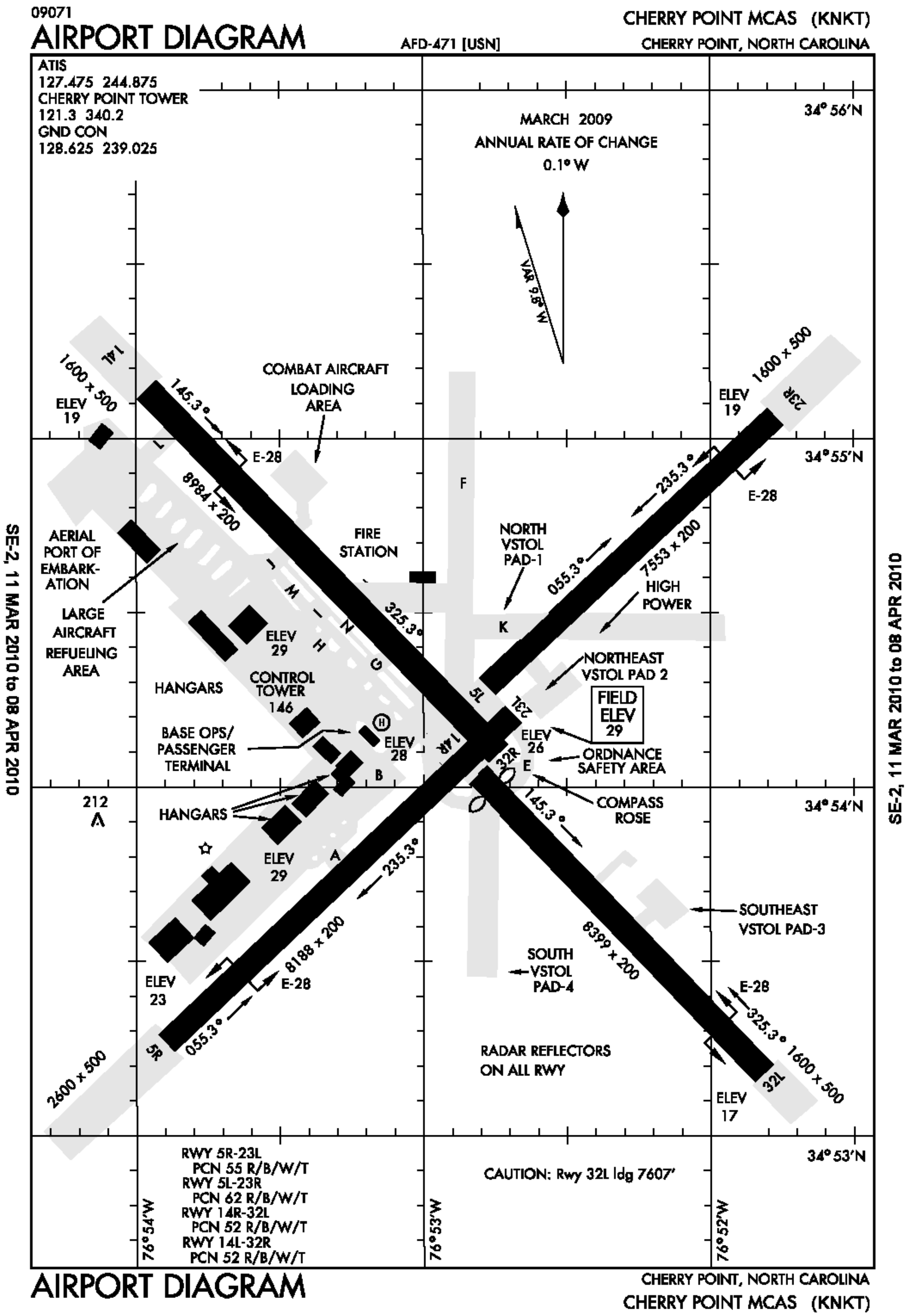


Figure 5.2-1 MCAS Cherry Point Airfield Environment

On an annual basis, pilots conduct 95,426 total aircraft operations at MCAS Cherry Point (Table 5.2-1). Baseline operations include the decision to base two Navy squadrons of F/A-18E/Fs at MCAS Cherry Point. Operations presented are based on those projected in the Environmental Impact Statement (EIS) and Record of Decision for the basing of F/A-18 E/Fs on the East Coast (DoN 2003a, 2003b). Environmental daytime operations are those that occur between 7:00 a.m. through 10:00 p.m.; those that occur between 10:00 p.m. and 7:00 a.m. are termed environmental nighttime operations. AV-8B operations dominate the airfield at approximately 59 percent of total operations.

Table 5.2-1 MCAS Cherry Point Annual Baseline Operations

Airfield Operation Type	Day	Night	Total
AV-8B			
Departures	9,581	44	9,625
Arrivals	9,319	298	9,617
Patterns	37,995	1,178	39,173
AV-8B Subtotal	*56,895*	*1,520*	*58,415*
EA-6B			
Departures	1,489	1	1,490
Arrivals	1,413	52	1,465
Patterns	5,822	215	6,037
EA-6B Subtotal	*8,724*	*268*	*8,992*
F/A-18 E/F			
Departures	1,805	222	2,027
Arrivals	1,638	361	1,999
Patterns	2,796	262	3,058
F/A-18E/F Subtotal	*6,239*	*845*	*7,084*
KC-130J			
Departures	911	6	917
Arrivals	830	96	926
Patterns	2,261	187	2,448
KC-130J Subtotal	*4,002*	*289*	*4,291*
Other Fixed Wing[a]			
Departures	3,068	305	3,373
Arrivals	3,344	29	3,373
Patterns	6,080	38	6,118
Other Fixed Wing Subtotal	*12,492*	*372*	*12,864*
Rotary Wing (Helicopter)			
Departures	1,457	433	1,890
Arrivals	1,878	12	1,890
Patterns	0	0	0
Other Helicopter Subtotal	*3,335*	*445*	*3,780*
TOTAL ANNUAL AIRFIELD OPERATIONS	**91,687**	**3,739**	**95,426**

Source: DoN 2003b.
Note: [a]Fixed-wing aircraft include minor operations from C-12s, transient use by other jets such as AV-8Bs, and transport aircraft such as C-17s.

5.2.2 Environmental Consequences

Impacts under the alternatives are:

- Alternative 1, MCAS Cherry Point total annual airfield operations would decrease from 95,426 to 83,380 total operations.
- Alternative 2, total annual airfield operations would increase from 95,426 to 104,141 total operations.
- Alternative 3, total annual airfield operations would increase from a baseline level of 95,426 to 124,494 total operations.
- Alternative 4, total annual airfield operations would increase from 95,426 to 103,733 operations.

The F-35B would operate in an airfield environment similar to the current operational environment and would follow established local approach and departure patterns at MCAS Cherry Point.

No Action Alternative

Under the No Action Alternative, baseline conditions would remain unchanged.

5.2.3 Summary Comparison of Alternatives

Table 5.2.-2 provides a summary of airfield and associated airspace impacts for MCAS Cherry Point.

Table 5.2-2 Summary Comparison of Airfield Operations by Alternative

Alternative	Environmental Consequences
Alternative 1	• Annual airfield operations would decrease by 12,046 from baseline • F-35B operations would continue to follow established local approach and departure patterns to avoid air traffic congestion
Alternative 2	• Annual airfield operations would increase by 8,715 from baseline • F-35B operations would continue to follow established local approach and departure patterns to avoid air traffic congestion
Alternative 3	• Annual airfield operations would increase by 29,068 from baseline • F-35B operations would continue to follow established local approach and departure patterns to avoid air traffic congestion
Alternative 4	• Annual airfield operations would increase by 8,307 from baseline • F-35B operations would continue to follow established local approach and departure patterns to avoid air traffic congestion
No Action Alternative	• Baseline conditions would persist

5.3 Noise

5.3.1 Affected Environment (Baseline Conditions)

Refer to Section 3.3 and Appendix D for resource and modeling definitions as well as the methodology. It is the Marine Corps policy to adhere to all Federal Aviation Administration (FAA) regulations and Office of the Chief of Naval Operations Instructions (OPNAVINST) regarding minimum safe altitudes and noise abatement. Marine Corps personnel are sensitive to the effects of noise on the Air Station and surrounding communities, and continue to take all steps necessary to reduce aircraft noise impacts on the general population.

To minimize noise exposure to off-Station receptors, MCAS Cherry Point restricts high power run-ups between 11:00 p.m. and 7:00 a.m. daily. Overhead (or break) traffic, low approaches, and touch and go landings are not authorized between 11:00 p.m. and 7:00 a.m. without prior approval from the Airfield Operations Officer. Noise sensitive areas in the vicinity of MCAS Cherry Point that are avoided include the City of Havelock and Minnesott Beach.

When there is a noise complaint, the MCAS Cherry Point Airfield Operations Duty Officer records it on a Noise Complaint Form, and forwards it to Flight Clearance for further investigation. The investigation may include any or all of the following: review of flight schedules, flight strips and radar tapes, consultation with pilots and controllers on duty. The form is then sent to the Community Plans and Liaison (CP&L) Office, with copies to the Wing Safety Officer and the Director of Operations. The nature and location of the complaint is reviewed. The CP&L Officer notifies the complainant about the investigation findings and actions taken, as appropriate. The complaint forms are maintained in the CP&L Office files for future reference. Noise complaints can arise from a variety of causes, often related to the intensity and frequency of the events as well as the individual sensitivity of the person filing the complaint. The complaints often arise outside the areas depicted by noise contours and are often due to a single event that is unusual (a loud plane flying over an area not commonly overflown). There were 20 noise complaints recorded in calendar year 2008 for MCAS Cherry Point.

The baseline noise environment used for MCAS Cherry Point modeling are those conditions recorded in the April 2003 Noise Study for the *Introduction of the F/A-18E/F to the East Coast of the United States* (U.S.) (Alternative 6B) (DoN 2003c). MCAS Cherry Point annual baseline operations total 95,426 (refer to Section 2.3.3.4). Of the total flight operations at MCAS Cherry Point, 58,415 flight operations involved AV-8B aircraft. The remaining 28,019 operations were done by other aircraft and included: Navy F/A-18E/F Superhornet, EA-6B Prowler, KC-130 Hercules, and other fixed-wing and rotary-wing aircraft. Of the modeled flights, environmental nighttime operations (i.e., those occurring between 10:00 p.m. and 7:00 a.m.) account for 3 percent of the total.

Several measures for noise levels were done for purposes of this analysis. Single noise events are designated in Maximum Sound Level (L_{max}) and Sound Exposure Level (SEL). L_{max} comprises the highest sound level measured during a single aircraft overflight. This is an instantaneous sound level, occurring for a fraction of a second. The SEL metric is a single-number representation of a noise energy dose. It takes into account the effect of both the duration and intensity of a noise event. During an aircraft flyover, it would take into account the noise levels produced during the onset and recess period of the flyover. Because an individual overflight takes seconds and L_{max} occurs instantaneously, SEL forms the best metric to compare noise levels from overflights.

Table 5.3-1 provides both the SEL and L_{max} sound levels for representative types of aircraft operating out of MCAS Beaufort and MCAS Cherry Point, the F-35B estimates are also provided to serve as a comparison.

Table 5.3-1 Representative A-Weighted Instantaneous SEL and L_{max} Levels at Various Altitudes

Operation Type	Altitude (ft AGL)	AV-8B[a]				F/A-18E/F			
		SEL (dBA)	L_{max} (dBA)	Power (%RPM)	Speed (knots)	SEL (dBA)	L_{max} (dBA)	Power (%NC)	Speed (knots)
Departure (Conventional)	2,000	104	97	113.5	300	109	103	95	300
Departure (Short Takeoff)	2,000	104	97	113.5	250	NA	NA	NA	NA
Non-Break Arrival[b] (Conventional)	1,000	102	94	85	125	114	108	85	130
Overhead Arrival (Initial Approach)	1,500	93	89	85	350	94	88	80	300
Touch and Go[b] (Downwind Leg)	1,000	103	96	90	150	113	107	84	130
FCLP[b] (Downwind Leg)	600	107	101	90	150	NA	NA	NA	NA
GCA Box (Downwind Leg)	1,600	97	91	93	250	99	91	82	250

Operation Type	Altitude (ft AGL)	F/A-18C/D				C-17			
		SEL (dBA)	L_{max} (dBA)	Power (%NC)	Speed (knots)	SEL (dBA)	L_{max} (dBA)	Power (EPR)	Speed (knots)
Departure (Conventional)	2,000	110	100	96.5	275	91	82	1.3	175
Departure (Short Takeoff)	2,000	NA	NA	NA	NA	NA	NA	NA	NA
Non-Break Arrival[b] (Conventional)	1,000	106	100	85	136	98	91	1.25	160
Overhead Arrival (Initial Approach)	1,500	98	92	88	300	NA	NA	NA	NA
Touch and Go[b] (Downwind Leg)	1,000	108	102	87	136	NA	NA	NA	NA
FCLP[b] (Downwind Leg)	600	111	107	87	136	NA	NA	NA	NA
GCA Box (Downwind Leg)	1,600	88	83	81	235	86	80	1.1	230

Table 5.3-1 Representative A-Weighted Instantaneous SEL and L_{max} Levels at Various Altitudes

Operation Type	Altitude (ft AGL)	F-35B[c]			
		SEL (dBA)	L_{max} (dBA)	Power (%ETR)	Speed (knots)
Departure (Conventional)	2,000	110	106	100	300
Departure (Short Takeoff)[d]	535[d]	125	123	100	290
Non-Break Arrival[b] (Conventional)	1,000	107	102	55	170
Overhead Arrival (Initial Approach)	1,500	89	84	35	300
Touch and Go[b] (Downwind Leg)	1,000	107	102	55	150
FCLP[b] (Downwind Leg)	600	111	107	55	150
GCA Box (Downwind Leg)	1,600	93	87	43	250

Notes: Weather: 64.2 F, 61.2% Relative Humidity (based on the average of modeled conditions for MCAS Beaufort and Cherry Point). NA=Does not apply to operation type. Engine Unit of Power: RPM—Revolutions Per Minute; NC—Engine Core RPM; EPR—Engine Pressure Ratio; and ETR—Engine Thrust Ratio; FCLP-Field Carrier Landing Practice; GCA-Ground Controlled Approach; AGL-Above Ground Level; dBA- A-weighted decibel (dB).

[a]Modeled with reference acoustics data for an AV-8B with the F402-RR-408 engine (measured at Naval Air Weapons Station China Lake, September 2006).

[b]NoiseMap Flight noise file lower limit for "Approach" power setting is 86.1%NC. Landing gear and flaps down.

[c]Modeled with acoustics data for an F-35A (measured at Edwards Air Force Base, October 2008).

[d]Altitude for F-35B short takeoff determined by using the equivalent flight path distance of a conventional departure reaching 2,000 ft AGL.

Figure 5.3-1 presents baseline noise levels within the 65 to 85 dB Day-Night Average Sound Level (DNL) contours, in 5 dB increments. Table 5.3-2 lists the noise exposure on and off Station in terms of acreage (excluding bodies of water), population, and housing units within each DNL contour band. Housing units include 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 who share living quarters (U.S. Census Bureau 2010). Please refer to Table 3-3 for SEL and L_{max} noise levels generated by legacy aircraft. These represent the A-weighted noise levels a receptor would experience during the entirety of a single overflight (SEL) and instantaneously (L_{max}).

Table 5.3-2 MCAS Cherry Point Baseline Aircraft Noise Conditions On and Off Station

Contour Band (dB DNL)[a]	Acres[b]			Population[b]			Housing Units[b]		
	On	Off	TOTAL	On	Off	TOTAL	On	Off	TOTAL
65-70	2,450	4,516	6,966	2,594	3,079	5,673	762	1,146	1,908
70-75	2,352	3,937	6,289	2,532	1,796	4,328	543	677	1,220
75-80	1,674	1,187	2,861	1,871	493	2,364	367	182	549
80-85	1,421	194	1,615	1,246	189	1,435	0	81	81
85+	1,743	3	1,746	152	0	152	0	0	29
Subtotal	***9,640***	***9,837***	***19,477***	***8,395***	***5,557***	***13,952***	***1,672***	***2,086***	***3,758***

Notes:

[a]Exclusive of upper bound for all bands.

[b]Excludes bodies of water.

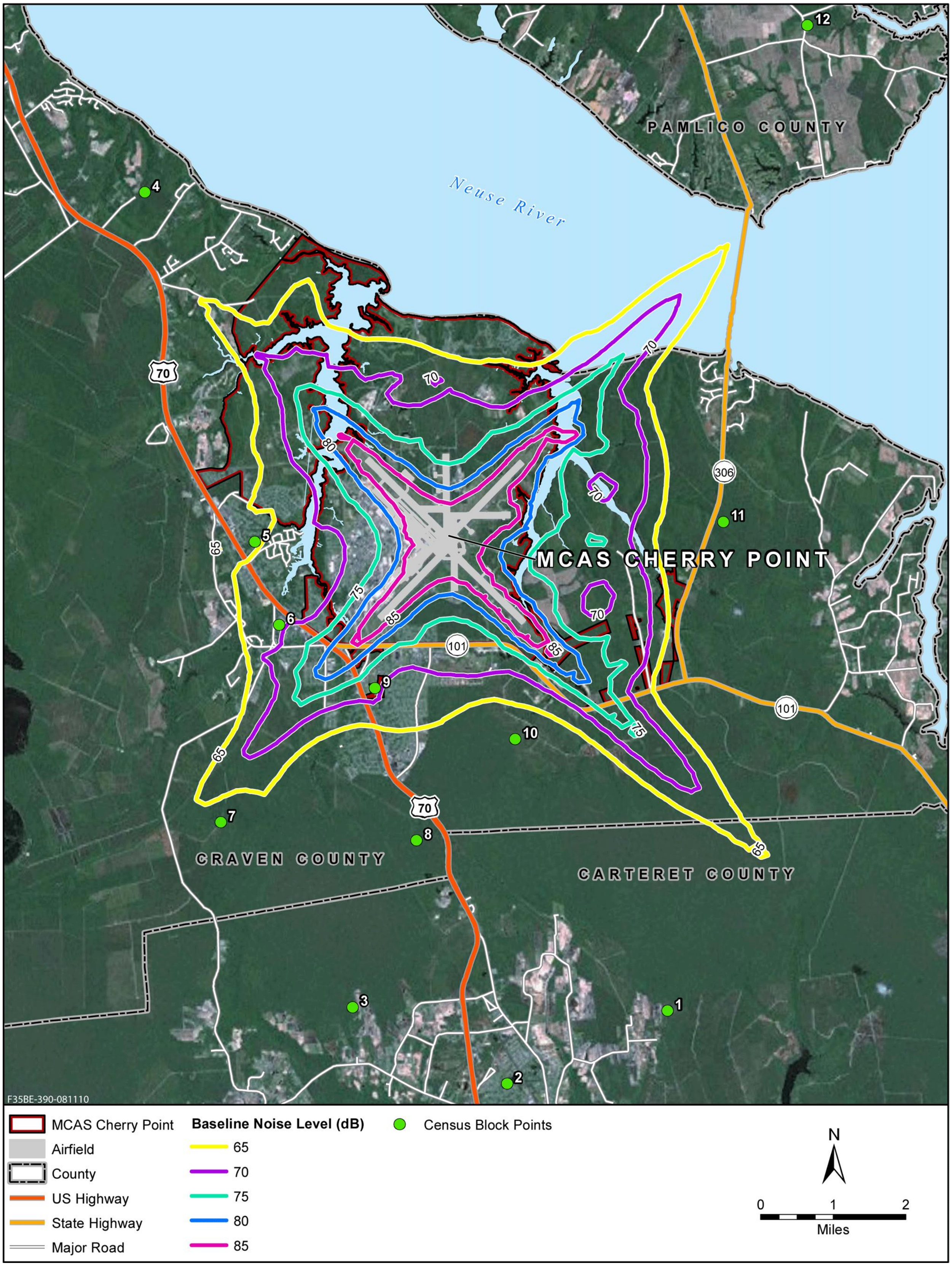


Figure 5.3-1 MCAS Cherry Point Baseline Aircraft Noise Contours

As presented in Section 3.3, population and housing units were determined by identifying the proportional area (using proportions based on census block data) of the noise contour bands and then applying these proportions to ascertain the number of people and units within each DNL contour band. Because the Census is conducted every 10 years, and the 2010 Census data are not yet available, population and housing units were estimated based on 2000 Census block data. This approach assures that the analyses are comparable across the three airfields. Census blocks are areas bounded on all sides by visible features (e.g., streets, roads, streams, and railroad tracks) and by invisible boundaries (e.g., city, town, township, and county limits, property lines, and short, imaginary extensions of streets and roads). A census block is the smallest geographic entity for which the Census Bureau collects and tabulates 100-percent decennial census data, including population and housing unit data. To further define the number of people and housing units affected by noise, the Marine Corps determined the proportion of acres found within each contour band and then applied this proportion to the census block. References to more recent Census sources may be used in this document. However, these references were used to provide definitions of terms, or for housing, employment, or population trends. Again, more recent data could not be used to calculate potential noise impacts because the analysis needed to ensure results were comparable across the entire analytical area.

Using proportions based on census block data, it was found that under baseline conditions , 19,477 total acres and 13,952 people are exposed to noise levels greater than 65 dB DNL (about 49 percent are on-Station and 51 percent are off-Station). There are 3,758 housing units exposed to noise levels greater than 65 dB DNL. This includes 1,672 units on Station and 2,086 units off Station. While there are an estimated 1,398 people exposed to noise levels greater than 80 dB DNL on Station, these population numbers are a function of the proportional calculations and are not located within residential units.

In terms of land uses, Table 5.3-3 provides specific categories within Noise Zones II and III noise levels. The total acres listed in this table differ from those listed in Table 5.3-2 because not all land use categories are reported in Table 5.3-3. Refer to Section 3.3 for definitions of land use categories listed in the table below. Under baseline, 920 acres (Table 5.3-3) supporting rural/agricultural, as well as low and medium density residential areas (i.e. sensitive land uses), are found within the Noise Zone III contour bands. Low and medium density residential land uses would be considered incompatible under the Air Installation Compatible Use Zone (AICUZ) Program guidelines. The goal of these guidelines is to minimize noise sensitive uses within moderate or high noise areas.

Table 5.3-3 Land Uses (in acres) Occurring within Baseline Noise Zone Contour Bands at MCAS Cherry Point

Land Use Category[a]	Noise Zone II (DNL)		Zone II Subtotal	Noise Zone III (DNL)			Zone III Subtotal
	65-70	70-75		75-85	80-85	>85	
Rural/Agriculture	2,786	2,874	5,660	781	54	1	836
Low Density Residential	828	174	1,002	68	16	0	84
Medium Density Residential	5	10	15	0	0	0	0
Light Industrial	43	184	227	145	40	0	185
Commercial	174	124	298	30	37	0	67
Future Development	252	210	462	56	14	0	70
Public	80	219	299	45	0	0	45
MCAS Cherry Point	2,450	2,352	4,802	1,674	1,421	1,743	4,838
TOTAL	**6,618**	**6,147**	**12,765**	**2,799**	**1,582**	**1,744**	**6,125**

Source: DoN 2003c.
Notes:
[a]Refer to Section 3.3 for definition of land use categories.

Table 5.3-4 identifies schools exposed to average noise levels of 65 dB DNL and greater. Under baseline conditions, teachers in classrooms could be interrupted or students might not be able to hear some instructions. Please refer to Appendix D, Section D.3.2 for a more detailed discussion of speech interruption and classroom studies.

Table 5.3-4 Baseline Aircraft Noise Exposure to Schools

Receptor Description	dB DNL
Havelock Elementary School	75-80
Havelock Middle School	75-80
Havelock High School	70-75
Roger Bell Elementary	70-75
G.A. Barden Elementary School	65-70

Source: DoN 2003b.

To evaluate Potential Hearing Loss (PHL) under the Proposed Action, baseline conditions were determined. Per Department of Defense (DoD) policy, analysis of PHL considers a person's long-term exposure to noise levels of 80 dB DNL or greater.

In 1972, the National Institute for Occupational Safety and Health (NIOSH) published a criteria document with a recommended exposure limit of 85 dBA 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 DNL recommended exposure limit (NIOSH 1998). Air Station workers, including aircraft maintainers along the flightline and employees within the industrialized area adjacent to the runways, are exposed to noise during the work day. Compliance with Occupational Safety and Health Administration (OSHA) regulations, DoD Instruction 6055.12, *Hearing Conservation Program*; Navy

Environmental Health Center Technical Manual [TM] 6260.51.99-2, *Navy Medical Department Hearing Conservation Program Procedures*; Chief of Naval Operations Instruction 5100.23G, *Navy Safety and Occupational Health Program Manual*; and Marine Corps Order 6260.1E, *Marine Corps Hearing Conservation Program* would minimize the potential for hearing loss. In addition, the Navy and Marine Corps Public Health Center and Air Station Safety Office monitor military and civilian personnel as part of their Hearing Conservation Program. Per TM 6260.51.99-2, the Hearing Conservation Program consists of the following five elements:

1. Noise measurement and exposure analysis to identify noise hazardous areas or sources and the personnel exposed.
2. Engineering control of noise levels to reduce the potential hazard to the maximum extent feasible.
3. Periodic hearing testing of all military and civilian personnel at risk (i.e., those routinely exposed to sound levels greater than 84 dB DNL over an 8-hour time-weighted average) will be considered at risk to monitor the effectiveness of the program, and enable timely audiologic and medical evaluation of those personnel who demonstrate significant hearing loss or threshold shift.
4. Recommendations for use of hearing protective devices as an interim measure pending effective engineering controls.
5. Education 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.

The number of off-Station people at risk for PHL is indicated in Table 5.3-5. This table reflects the estimated number of people exposed to noise at and above 80 dB DNL, in 1 dB increments, and the associated average Noise Induced Permanent Threshold Shift (NIPTS) and 10th percentile NIPTS (refer to Section 3.3 and at Appendix D.3.4 for detailed information). In the assessment of PHL, the use of DNL to characterize noise exposure provides a conservative assessment of hearing loss risk as DNL includes a 10-dB weighting factor for environmental nighttime operations between 10:00 p.m. and 7:00 a.m. (local time). The population counts by contour band were performed using Census block population and a methodology that assumes an even distribution of population within each block under the respective contour bands. This methodology provides only an estimate of the number of people who may be exposed, but was used because Census block-level data, while being the finest resolution available, are of a size comparable to that of the 1-dB contour band width and may only be partially located under any individual band. Finally, the 10th percentile NIPTS values are included to provide an assessment of PHL for the population most sensitive to noise, defined as the top 10 percent of the population. According to the U.S. Environmental Protection Agency (USEPA) Levels (USEPA 1974) and Criteria (USEPA 1973) documents, changes in hearing levels of less than 5 dB are generally not considered noticeable or significant.

Table 5.3-5 MCAS Cherry Point Baseline PHL Estimates

Contour Band (dB DNL)	Baseline Residential Population	Avg. NIPTS (dB)[a, b]	10th Percentile NIPTS (dB)[a, b]
80-81	67	3.0	7.0
81-82	49	3.5	8.0
82-83	42	4.0	9.0
83-84	25	4.5	10.0
84-85	7	5.5	11.0
85-86	0	6.0	12.0
86-87	0	7.0	13.5
87-88	0	7.5	15.0
88-89	0	8.5	16.5
89-90	0	9.5	18.0

Source: [a]National Academy of Sciences 1977.
Note: [b]Rounded to the nearest 0.5 dB.

Within MCAS Cherry Point boundaries, there are no residential areas found within the 80 dB and greater DNL noise contour bands. However, under baseline conditions there are communities off Station that are exposed to 80 dB DNL and greater noise levels. As presented in Table 5.3-5, it is estimated that there are a minimum of 67 people within the 80 to 81 dB DNL contour band affected by a 3.0 dB average NIPTS. A maximum of 7 people within the 84 to 85 dB DNL contour band are affected by a 5.5 dB average NIPTS. No other populations are found above the 85 dB DNL contour band.

Other generators of noise, such as general vehicle traffic, and other maintenance and landscaping activities, are a common ongoing occurrence at the Air Station. While these sources may contribute to the overall noise environment, they would not appreciably change under any of the action alternatives; therefore, these sources are not included in the noise analyses.

5.3.2 Environmental Consequences

The noise evaluation for all alternatives used the methodology presented in Appendix C and the modeling parameters, assumptions, and data input supplied in Appendix D.5 and D.6. Please note that under all four alternatives, 99 percent of F-35B operations would occur during environmental daytime hours (7:00 a.m. to 10:00 p.m.) and 1 percent from 10:00 p.m. to 7:00 a.m. (or environmental nighttime hours).

Alternative 1 (Preferred Alternative)

Under Alternative 1, eight operational squadrons (with up to 128 F-35B aircraft) would be based at MCAS Cherry Point. Projected annual F-35B flight operations would average 55,361; when added to other aircraft at the Air Station (i.e., Navy F/A-18s), total operations would equal 83,380. As discussed in Chapter 2 (Table 2-22), this represents an approximate 13-percent decrease in airfield operations when compared to baseline conditions.

To determine noise levels under this alternative, the data and methodology described in Appendix D were used. Figure 5.3-2 presents projected noise contours, in 5 dB increments, from 65 to 85 dB DNL dB. Baseline contours are also depicted for comparison purposes. Table 5.3-6 provides Alternative 1 noise exposure within each DNL contour band for on- and off-Station acreage (excluding bodies of water), population, and housing units. Net change from baseline conditions is also indicated for each of the three elements.

Table 5.3-6 MCAS Cherry Point Alternative 1 Projected Aircraft Noise Exposure Compared to Baseline Conditions On and Off Station

Contour Band (dB DNL)	Acres[a]				Population[b]				Housing Units[b]			
	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change
65-70	2,793	5,691	8,484	+1,518	3,294	3,524	6,818	+1,145	656	1,305	1,961	+53
70-75	2,385	4,926	7,311	+1,022	2,711	1,996	4,707	+379	550	750	1,300	+80
75-80	1,575	1,615	3,190	+329	1,657	801	2,458	+94	325	297	622	+73
80-85	1,292	436	1,728	+113	1,327	182	1,509	+74	0	66	66	-15
85+	2,508	86	2,594	+848	110	7	117	-35	0	3	3	3
Subtotal	***10,553***	***12,754***			***9,099***	***6,510***			***1,531***	***2,421***		
TOTAL			**23,307**	**+3,830**			**15,609**	**+1,657**			**3,952**	**+194**

Notes: [a]Exclusive of upper bound for all bands and bodies of water.
[b]Estimated based on 2000 Census block data.

When compared to baseline conditions, the numbers of acres exposed to noise levels greater than 65 dB DNL would increase by 3,830. The majority of this increase occurs within the 65 to 75 dB DNL noise contours. Under Alternative 1, the number of people exposed to noise levels 65 dB and greater would also grow by 1,657. Although there is a decrease in the number exposed in the 85+ dB DNL noise contour, there are increases found in the other noise level contours. Housing units exposed to 65 dB DNL and greater also grows with the exception of the 80 to 85 dB DNL; 194 more units (mostly found within the 65 to 80 dB DNL noise contours) would be exposed to noise levels not found under baseline conditions.

For schools, noise-level conditions would not change from the five already exposed under baseline conditions. Table 5.3-7 provides the projected noise levels over these receptors in comparison to baseline conditions. No other schools would be exposed to average noise levels of 65 dB DNL and greater. As was the case under baseline conditions, teachers in classrooms could be interrupted or students might not be able to hear some instructions. Please refer to Appendix D.3.2 for a more detailed discussion of speech interruption and classroom studies.

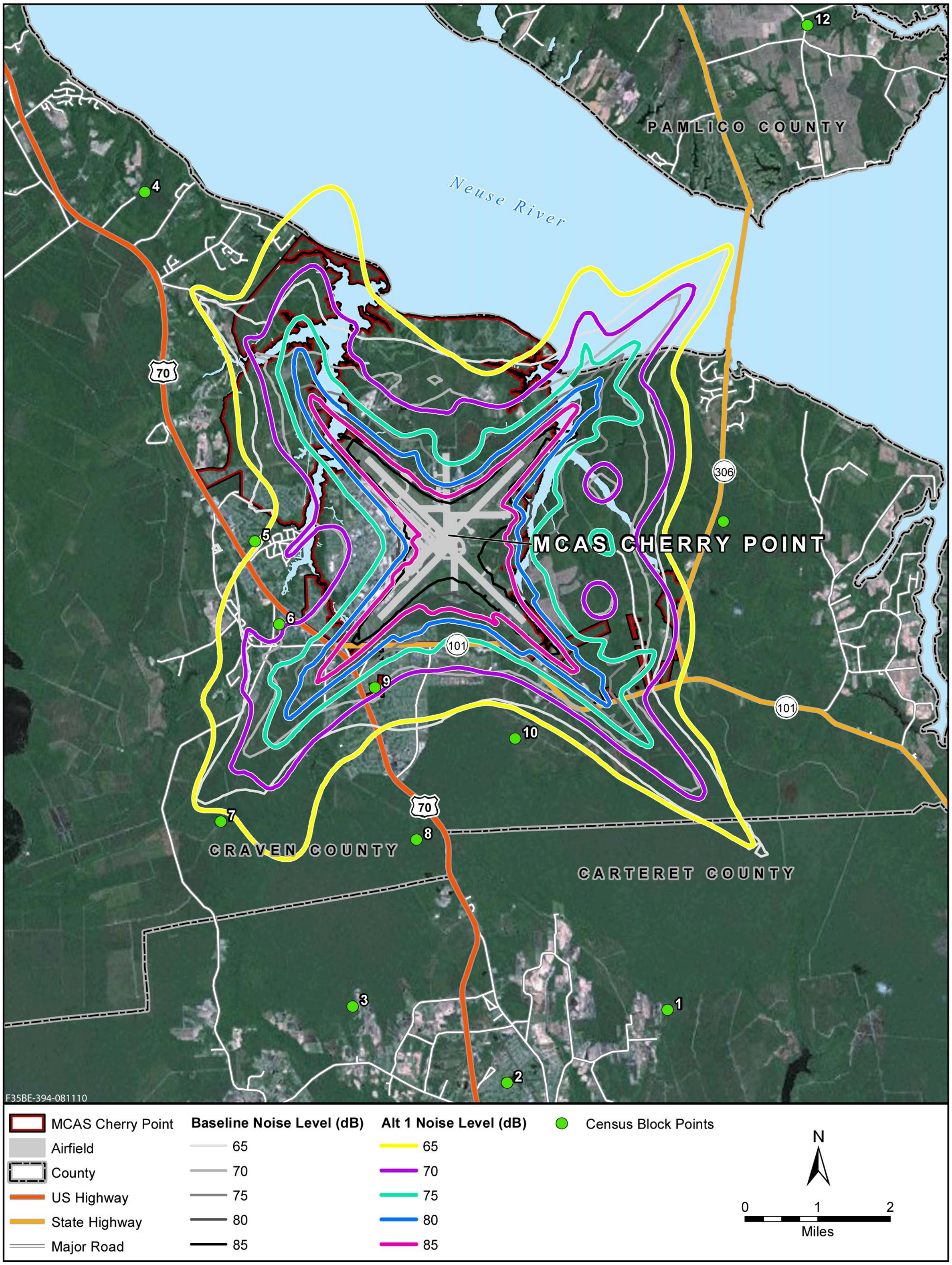


Figure 5.3-2 MCAS Cherry Point Alternative 1 Projected Aircraft Noise Contours

Table 5.3-7 Alternative 1 Aircraft Noise Exposure to Schools

Receptor Description	Baseline dB DNL	Alternative 1
Havelock Elementary School	75-80	75-80
Havelock Middle School	70-75	70-75
Havelock High School	70-75	70-75
Roger Bell Elementary	70-75	70-75
G.A. Barden Elementary School	65-70	65-70

Table 5.3-8 lists the land uses and notes the net change for conditions, compared to the baseline, which could occur under Alternative 1. Under Alternative 1, Noise Zone III acres in all land use designations would remain unchanged or increase. Although the majority of this increase occurs over MCAS Cherry Point and rural lands, low density residential, commercial, light industrial, public, and areas designated for future development would also experience this increase but to a lesser degree. Acres within Noise Zone II would generally increase over all land use areas, with the exception of light industrial.

Table 5.3-8 Alternative 1 Land Uses (in acres) Occurring within Noise Zone Contour Bands at MCAS Cherry Point

Land Use Category[a]	Noise Zone II (DNL)			Zone II Net Change	Noise Zone III (DNL)				Zone III Net Change
	65-70	70-75	Subtotal		75-85	80-85	>85	Subtotal	
Rural/Agricultural	3,744	3,769	7,513	+1,853	1,078	217	10	1,305	+469
Low Density Residential	941	291	1,232	+230	56	45	7	108	+24
Medium Density Residential	7	11	18	+3	0	0	0	0	0
Light Industrial	24	125	149	-78	166	84	13	263	+78
Commercial	211	152	363	+65	30	24	25	79	+12
Future Development	293	220	513	+51	97	26	9	132	+62
Public	125	221	346	+47	104	9	5	118	+73
MCAS Cherry Point	2,793	2,385	5,178	+376	1,575	1,292	2,508	5,375	+537
TOTAL	**8,138**	**7,174**	***15,312***	**+2,547**	**3,106**	**1,697**	**2,577**	***7,380***	**+1,255**

Notes: [a]Refer to Section 3.3 for definition of land use categories.

Speech interruptions are measured in the number of events above an indoor L_{max} (see Table 5.3-1); Section 3.3 and Appendix D.3.2 for more detail on these noise metrics and how speech interference is modeled. Figure 5.3-2 presents the location (labeled with numbers) for 12 points where speech interference events were analyzed. The points represent the geographic centers of the individual census blocks that surround MCAS Cherry Point. Table 5.3-9 presents the potential for speech interruptions at these locations for all four alternatives. As presented, there would be the potential for the 12 locations to experience interruptions with windows both closed and open.

Table 5.3-9 Indoor Speech Interference Under all Action Alternatives[a]

Location	Windows Closed[b]				Windows Open[c]			
	Daytime Hourly[d] Events Above (L_{max} 50 dBA) Indoors By Alternative (Alt)				Daytime Hourly[d] Events Above (L_{max} 50 dBA) Indoors By Alternative (Alt)			
	1	2	3	4	1	2	3	4
1	<1	<1	<1	<1	2	2	2	2
2	<1	<1	<1	<1	2	2	2	2
3	2	2	2	2	2	2	2	2
4	2	3	3	2	3	4	4	3
5	5	6	7	5	7	9	11	9
6	3	4	5	4	6	8	10	8
7	3	3	3	3	4	6	6	5
8	2	2	2	2	3	4	5	4
9	4	5	6	5	7	9	11	8
10	5	6	7	6	6	8	10	8
11	4	5	6	5	6	7	9	7
12	<1	<1	<1	<1	<1	<1	<1	<1

Notes: [a]Baseline data could not be provided because this supplemental analysis was not included in the AICUZ report.
[b]Outdoor/Indoor assumes an attenuation of 25 dB.
[c]Outdoor/Indoor assumes an attenuation of 15 dB.
[d]Rounded to nearest integer.

Table 5.3-10 provides the DNL average noise level that each center point would experience under the four action alternatives. Under Alternative 1, center points 6 and 9 would experience average noise levels between 71 and 69 dB DNL.

Table 5.3-10 MCAS Cherry Point Census Block Center Point Noise Levels (in dB DNL) under all Action Alternatives

Location		DNL (dBA)*			
	Baseline	Alt 1	Alt 2	Alt 3	Alt 4
1	<45	50	51	51	50
2	52	49	50	50	50
3	51	54	56	56	54
4	52	55	56	56	55
5	64	64	65	67	67
6	69	69	70	71	70
7	62	64	65	65	64
8	53	58	60	60	59
9	71	71	72	74	73
10	60	62	63	64	63
11	56	59	60	61	60
12	45	45	46	46	45

Baseline DNL source: FEIS for the Introduction of the F/A-18E/F Aircraft to the East Coast of the United States (July 2003) MCAS Cherry Point Alternative 6 with OLF projected DNL noise contours grid file.
Notes: *Rounded to nearest integer.

Table 5.3-11 provides the number of people (based proportionally on the area within each 1-dB noise contour band using Census block data) exposed to DNL at and above 80 dB, in 1 dB increments, and the associated average NIPTS and 10th percentile NIPTS. While there are no residential areas at risk for PHL on MCAS Cherry Point, there would be off-Station populations exposed to 80 dB DNL and greater under this alternative. The number of people exposed to 80 to 84 dB DNL would slightly decrease; however, there would be newly exposed populations to noise levels within the 85 to 90 dB DNL noise contour bands that would experience 6.0 to 9.5 dB average NIPTS. The average and 10th percentile NIPTS would be lower than what is presented in Table 5.3-11 for those without 40 years of daily exposure to average noise levels of 80dB DNL and above.

Table 5.3-11 MCAS Cherry Point PHL Estimates under Alternative 1

Contour Band (dB DNL)	Baseline Residential Population	Proposed Residential Population	Average NIPTS (dB)[a,b]	10^{th} Percentile NIPTS (dB)[a,b]
80-81	67	59	3.0	7.0
81-82	49	48	3.5	8.0
82-83	42	34	4.0	9.0
83-84	25	24	4.5	10.0
84-85	7	18	5.5	11.0
85-86	0	2	6.0	12.0
86-87	0	2	7.0	13.5
87-88	0	1	7.5	15.0
88-89	0	1	8.5	16.5
89-90	0	1	9..5	18.0

Source: [a]National Academy of Sciences 1977.
Note: [b]Rounded to the nearest 0.5 dB.

Alternative 2

At MCAS Cherry Point, Alternative 2 would establish 11 operational squadrons (with up to 176 F-35B aircraft). Projected F-35B flight operations would annually total 76,122 (refer to Table 2-22). When added to other based and transient aircraft (28,019), average annual operations would total 104,141, representing a net increase of 8,715 operations (or 9 percent) from baseline conditions. Figure 5.3-3 shows the 65 to 85 dB DNL contours, in 5 dB increments.

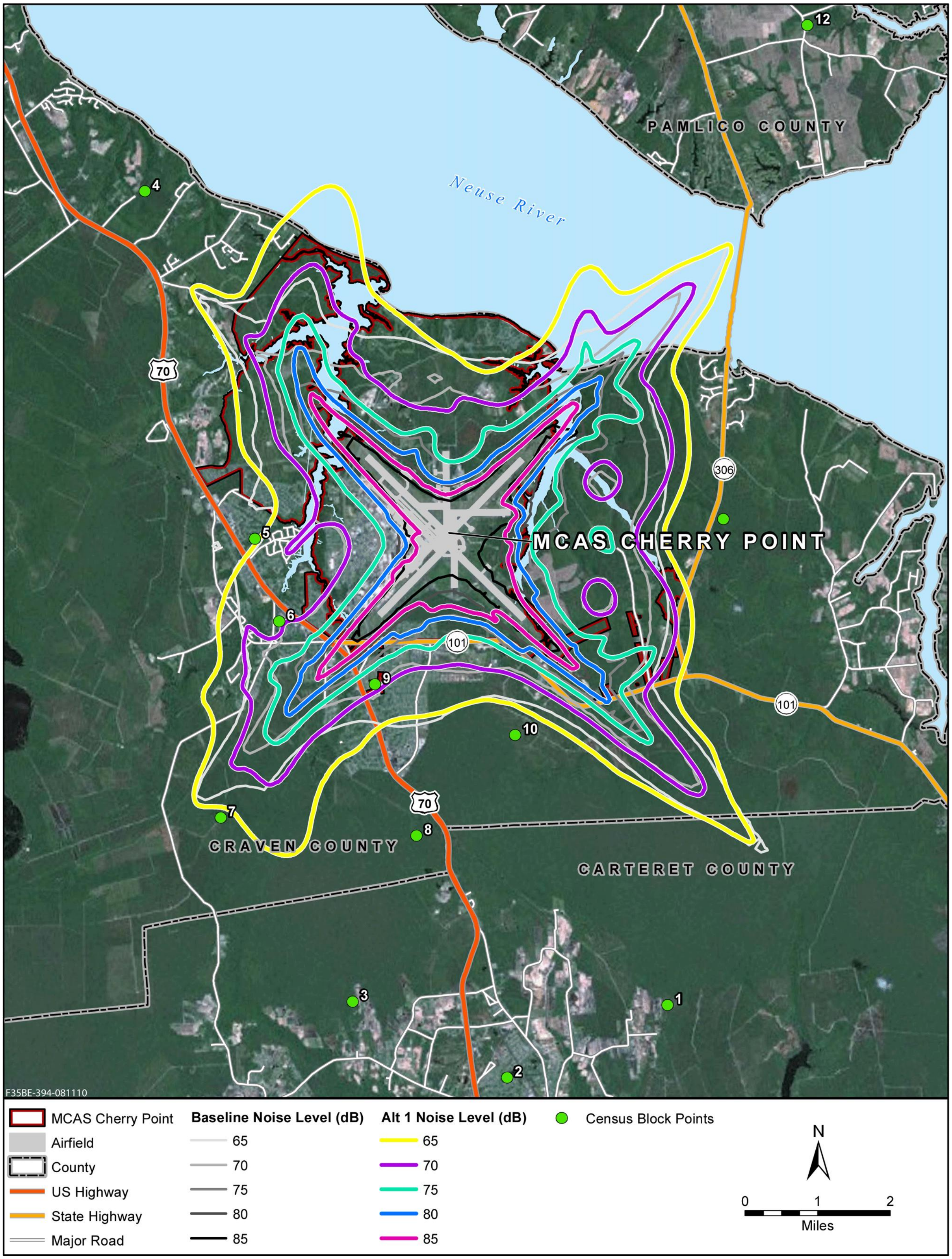


Figure 5.3-3 MCAS Cherry Point Alternative 2 Projected Aircraft Noise Contours

Table 5.3-12 provides Alternative 2 noise exposure within each DNL contour band for on- and off-Station acreage (excluding bodies of water), population, and housing units. Net change from baseline conditions is also indicated. Total acres exposed, under Alternative 2, to F-35B-generated noise levels would increase by 5,814 acres from baseline conditions. In terms of population numbers, the number of people exposed to noise levels greater than 65 dB DNL would increase by 2,637. Housing units exposed to sounds greater than 65 dB DNL increases by 476 with most of the growth taking place below the 80 dB DNL contour bands.

Table 5.3-12 MCAS Cherry Point Alternative 2 Projected Aircraft Noise Exposure Compared to Baseline Conditions On and Off Station

Contour Band (dB DNL)	Acres[a]				Population[b]				Housing Units[c]			
	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change
65-70	2,341	6,403	8,744	+1,778	2,988	3,464	6,452	+779	590	1,281	1,871	-37
70-75	2,781	5,207	7,988	+1,699	3,136	2,435	5,571	+1,243	638	911	1,549	+329
75-80	1,654	2,042	3,696	+835	1,752	999	2,751	+387	342	371	713	+164
80-85	1,373	589	1,962	+347	1,416	270	1,686	+251	0	98	98	+17
85+	2,766	135	2,901	+1,155	121	8	129	-23	0	3	3	+3
Subtotal	***10,915***	***14,376***			***9,413***	***7,176***			***1,570***	***2,664***		
TOTAL			**25,291**	**+5,814**			**16,589**	**+2,637**			**4,234**	**+476**

Notes:

[a]Exclusive of upper bound for all bands and bodies of water.

[b]Estimated based on 2000 Census block data.

For schools, noise levels would remain similar in four of the five schools exposed under baseline conditions, with noise exposure increasing at Havelock Middle School. Table 5.3-13 provides the projected noise levels over these receptors in comparison to baseline conditions. No other schools would be exposed to average noise levels of 65 dB DNL and greater. As is the case under baseline conditions, teachers in classrooms could be interrupted or students might not be able to hear some instructions. Please refer to Appendix D, Section D.3.2 for a more detailed discussion of speech interruption and classroom studies.

Table 5.3-13 Alternative 2 Aircraft Noise Exposure to Schools

Receptor Description	Baseline dB DNL	Alternative 2
Havelock Elementary School	75-80	75-80
Havelock Middle School	70-75	75-80
Havelock High School	70-75	70-75
Roger Bell Elementary	70-75	70-75
G.A. Barden Elementary School	65-70	65-70

Table 5.3-14 lists the land uses and notes the net change for conditions, compared to the baseline, which could occur under Alternative 2. Please note that the total acres listed in this table differ from those listed in Table 5.3-12 because these land use categories are not necessarily all inclusive as the

acres reported above in Table 5.3-12. Implementation of Alternative 2 would expose more acres for all land use categories in Noise Zone III levels, except medium density residential (Table 5.3-14). Most of the increase occurs over rural areas and MCAS Cherry Point. Acres within Noise Zone II would also increase for all land use categories with the exception being a 119-acre decrease to areas categorized as light industrial.

Table 5.3-14 Alternative 2 Land Uses (in acres) Occurring within Noise Zone Contour Bands at MCAS Cherry Point

Land Use Category[a]	Noise Zone II (DNL)			Zone II Net Change	Noise Zone III (DNL)				Zone III Net Change
	65-70	70-75	Subtotal		75-85	80-85	>85	Subtotal	
Rural/Agricultural	4,511	3,782	8,293	+2,633	1,422	327	17	1,766	+930
Low Density Residential	913	469	1,382	+380	78	39	21	138	+54
Medium Density Residential	5	13	18	+3	0	0	0	0	0
Light Industrial	12	96	108	-119	186	95	23	304	+119
Commercial	180	200	380	+82	41	24	31	96	+29
Future Development	279	275	554	+92	93	46	12	151	+81
Public	155	196	351	+52	130	21	6	157	+112
MCAS Cherry Point	2,341	2,781	5,122	+320	1,654	1,373	2,766	5,793	+955
TOTAL	**8,396**	**7,812**	***16,208***	**+3,443**	**3,604**	**1,925**	**2,876**	***8,405***	**+2,280**

Notes: [a]Refer to Section 3.3 for definition of land use categories.

As presented earlier in Table 5.3-9 and shown in Figure 5.3-3, under Alternative 2 the potential for speech interruptions would occur at the 12 representative locations regardless of windows being closed or opened. For Alternative 2 (as presented in Table 5.3-10), center points 5, 6, 7, and 9 would experience average noise levels between 72 and 65 dB DNL. Table 5.3-15 lists the estimated residential population that would be at risk for PHL. While there are no residential areas exposed on MCAS Cherry Point, it is anticipated that there would be off-Station populations exposed to 80 dB and greater DNL contour bands under this alternative. The average and 10th percentile NIPTS would be lower than what is presented in Table 5.3-15 for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above.

Table 5.3-15 MCAS Cherry Point PHL Estimates under Alternative 2

Contour Band (dB DNL)	Baseline Residential Population	Proposed Residential Population	Average NIPTS (dB)[a,b]	10th Percentile NIPTS (dB)[a,b]
80-81	67	87	3.0	7.0
81-82	49	66	3.5	8.0
82-83	42	52	4.0	9.0
83-84	25	39	4.5	10.0
84-85	7	27	5.5	11.0
85-86	0	3	6.0	12.0
86-87	0	2	7.0	13.5
87-88	0	1	7.5	15.0
88-89	0	1	8.5	16.5
89-90	0	1	9..5	18.0

Source: [a]National Academy of Sciences 1977.
Note: [b]Rounded to the nearest 0.5 dB.

Alternative 3

At MCAS Cherry Point, Alternative 3 involves the basing of three operational squadrons and two Fleet Replacement Squadrons (FRSs) (with up to 88 F-35B aircraft). Projected F-35B flight operations would average 96,475 on an annual basis (Table 2-22). When added to other aircraft operations, there would be a total of 124,494 within the MCAS Cherry Point airfield environment. This total represents an approximate 30-percent increase in operations from baseline conditions. Figure 5.3-4 shows the 65 to 85 dB DNL contours, in 5 dB increments for Alternative 3. The figure also includes baseline contours for comparison purposes.

Table 5.3-16 provides Alternative 3 noise exposure within each DNL contour band for on- and off-Station acreage (excluding bodies of water), population, and housing units. Total acres exposed to 65 dB DNL and greater noise levels would increase by 6,736, when compared to baseline conditions. The majority of this increase occurs in the 70 to greater than 85 dB DNL noise contours. In terms of population numbers, there would be a net change of 3,179 more people exposed to noise levels greater than 65 dB DNL; the majority of this increase occurs in the 70 to 80 dB DNL noise contours. The number of housing units exposed to 65 dB DNL and greater increases by 661. This increase is found particularly in the 70 to greater than 80 dB DNL noise contour bands.

Table 5.3-16 MCAS Cherry Point Alternative 3 Projected Aircraft Noise Exposure Compared to Baseline Conditions On and Off Station

Contour Band (dB DNL)	Acres[a]				Population[b]				Housing Units[c]			
	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change
65-70	1,808	5,986	7,794	+828	2,685	2,637	5,322	-351	522	962	1,484	-424
70-75	3,071	5,029	8,100	+1,811	3,537	3,147	6,684	+2,356	765	1,183	1,948	+728
75-80	1,629	3,070	4,699	+1,838	1,782	1,305	3,087	+723	349	487	836	+287
80-85	1,390	796	2,186	+571	1,483	404	1,887	+452	0	148	148	+67
85+	3,263	171	3,434	+1,688	142	9	151	-1	0	3	3	+3
Subtotal	***11,161***	***15,052***			***9,629***	***7,502***			***1,636***	***2,783***		
TOTAL			**26,213**	**+6,736**			**17,131**	**+3,179**			**4,419**	**+661**

Notes: [a]Exclusive of upper bound for all bands and bodies of water.
[b]Estimated based on 2000 Census block data.

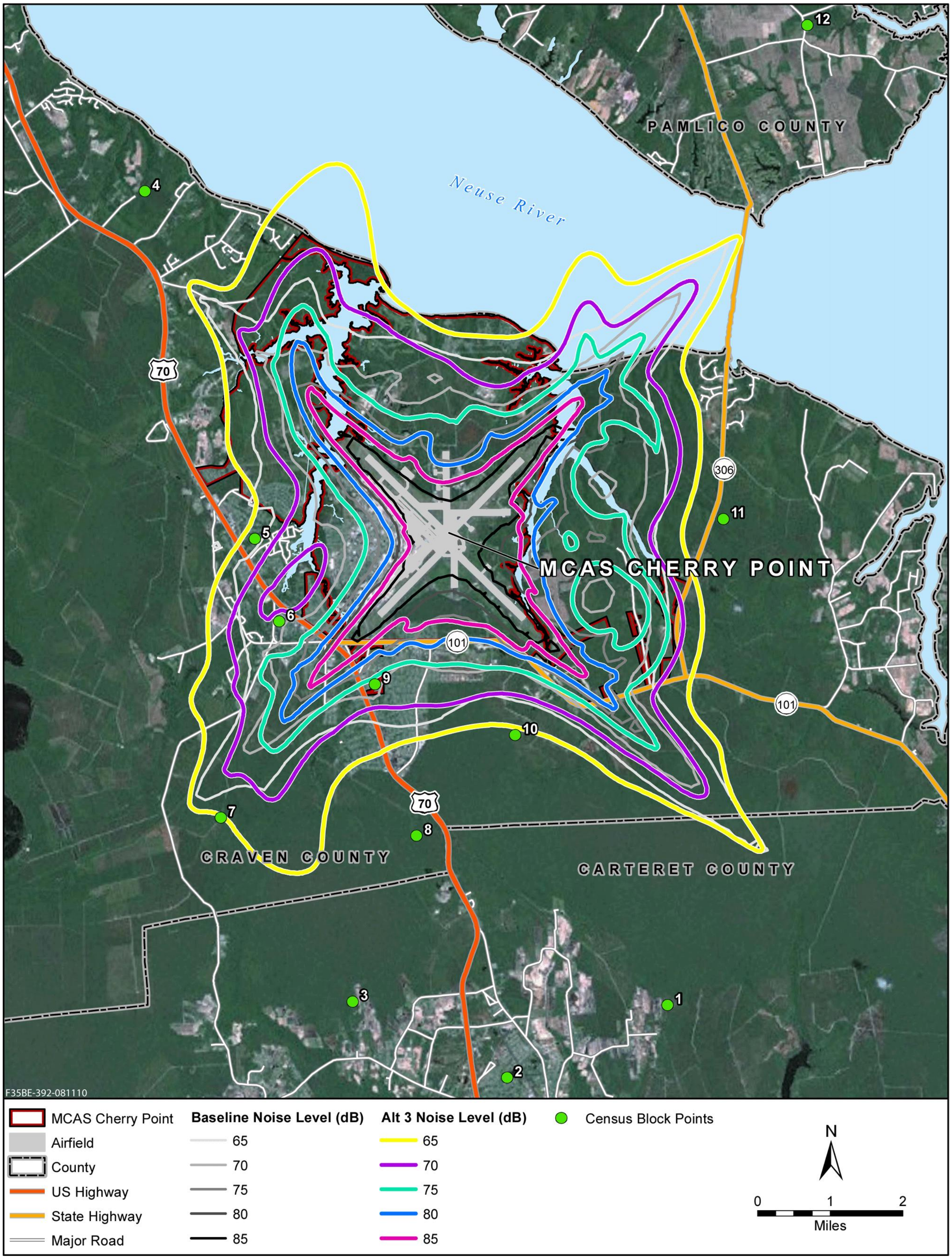


Figure 5.3-4 MCAS Cherry Point Alternative 3 Projected Aircraft Noise Contours

For schools, noise levels would remain unchanged at Havelock Elementary School from those found at baseline. However, Havelock Middle and High Schools as well as Roger Bell and G.A. Barden Elementary Schools would be exposed to increased noise levels. Table 5.3-17 provides the projected noise levels over these receptors in comparison to baseline conditions. No other schools would be exposed to average noise levels of 65 dB DNL and greater. As is the case under baseline conditions, teachers in classrooms could be interrupted or students might not be able to hear some instructions. Please refer to Appendix D, Section D.3.2 for a more detailed discussion of speech interruption and classroom studies.

Table 5.3-17 Alternative 3 Aircraft Noise Exposure to Schools

Receptor Description	Baseline dB DNL	Alternative 3
Havelock Elementary School	75-80	75-80
Havelock Middle School	70-75	75-80
Havelock High School	70-75	75-80
Roger Bell Elementary	70-75	75-80
G.A. Barden Elementary School	65-70	70-75

Under Alternative 3, exposure to increased noise levels would occur for most land use categories. Table 5.3-18 lists the land uses and notes the net change for conditions, compared to the baseline, which could occur under Alternative 3. As the results indicate, there would be net increases in acreages to all land use categories exposed to Noise Zone III levels. This would be the same case for acres within Noise Zone II; with the exception of areas designated as medium density residential, light industrial, and public lands, where acres exposed would decrease by a total of 211 acres when compared to baseline conditions.

Table 5.3-18 Alternative 3 Land Uses (in acres) Occurring within Noise Zone Contour Bands at MCAS Cherry Point

Land Use Category[a]	Noise Zone II (DNL)			Zone II Net Change	Noise Zone III (DNL)				Zone III Net Change
	65-70	70-75	Subtotal		75-85	80-85	>85	Subtotal	
Rural/Agricultural	4,558	3,266	7,824	+2,164	2,209	447	48	2,704	+1,868
Low Density Residential	679	757	1,436	+434	111	41	21	173	+89
Medium Density Residential	3	7	10	-5	9	0	0	9	+9
Light Industrial	4	70	74	-153	200	115	27	342	+157
Commercial	145	238	383	+85	60	34	31	125	+58
Future Development	225	279	504	+42	154	68	12	234	+164
Public	117	129	246	-53	229	40	8	277	+232
MCAS Cherry Point	1,808	3,071	4,879	+77	1,629	1,390	3,263	6,282	+1,444
TOTAL	**7,539**	**7,817**	***15,356***	**+2,591**	**4,601**	**2,135**	**3,410**	***10,146***	**+4,021**

Notes: [a]Refer to Section 3.3 for definition of land use categories.

As presented in Table 5.3-9 and shown in Figure 5.3-4, under Alternative 3 the potential for speech interruptions would occur at the 12 representative locations regardless of windows being closed or opened. For Alternative 3 (as presented in Table 5.3-10), center points 5, 6, 7, and 9 would experience average noise levels between 74 and 67 dB DNL. Table 5.3-19 shows the estimated residential population that would be at risk for PHL. While there are no residential areas exposed on MCAS Cherry Point, it is anticipated that there would be off-Station populations exposed to 80 dB and greater DNL contour bands. The average and 10th percentile NIPTS would be lower than what is presented in Table 5.3-19 for those without 40 years of daily exposure to average noise levels of 80dB DNL and above.

Table 5.3-19 MCAS Cherry Point PHL Estimates under Alternative 3

Contour Band (dB DNL)	Baseline Residential Population	Proposed Residential Population	Average NIPTS (dB)[a,b]	10th Percentile NIPTS (dB)[a,b]
80-81	67	136	3.0	7.0
81-82	49	98	3.5	8.0
82-83	42	73	4.0	9.0
83-84	25	55	4.5	10.0
84-85	7	41	5.5	11.0
85-86	0	3	6.0	12.0
86-87	0	2	7.0	13.5
87-88	0	1	7.5	15.0
88-89	0	1	8.5	16.5
89-90	0	1	9..5	18.0

Source: [a]National Academy of Sciences 1977.
Notes: [b]Rounded to the nearest 0.5 dB.

Alternative 4

At MCAS Cherry Point, Alternative 4 involves establishment of the PTC at MCAS Cherry Point. There would be two FRSs, with a complement of 40 F-35B aircraft. Projected F-35B flight operations would average 75,714 on an annual basis (refer to Table 2-22). These operations, plus the 28,019 generated by other and transient aircraft, would average 103,733 annually, or represent an 8-percent increase when compared to baseline conditions. Figure 5.3-5 presents the 65 to 85 dB DNL contours, in 5 dB increments and includes baseline contours for comparison.

Table 5.3-20 provides Alternative 4 noise exposure within each DNL contour band for on- and off-Station acreage (excluding bodies of water), population, and housing units. Net change from baseline conditions is also indicated. When compared to baseline, the number of acres, people, and housing units exposed to noise levels greater than 65 dB DNL would increase under Alternative 4. The acreage increases are fairly evenly distributed between all noise contour bands, with the exception of land in the 80 to 85 contour band which are markedly less than the other bands. People within noise contour bands 65 to 80 dB DNL would experience the most change from baseline conditions. Lastly, there would be 372 more houses exposed to noise levels exceeding 65 dB DNL (the majority of increases are found in the 70 to 80 contours) when compared to baseline conditions.

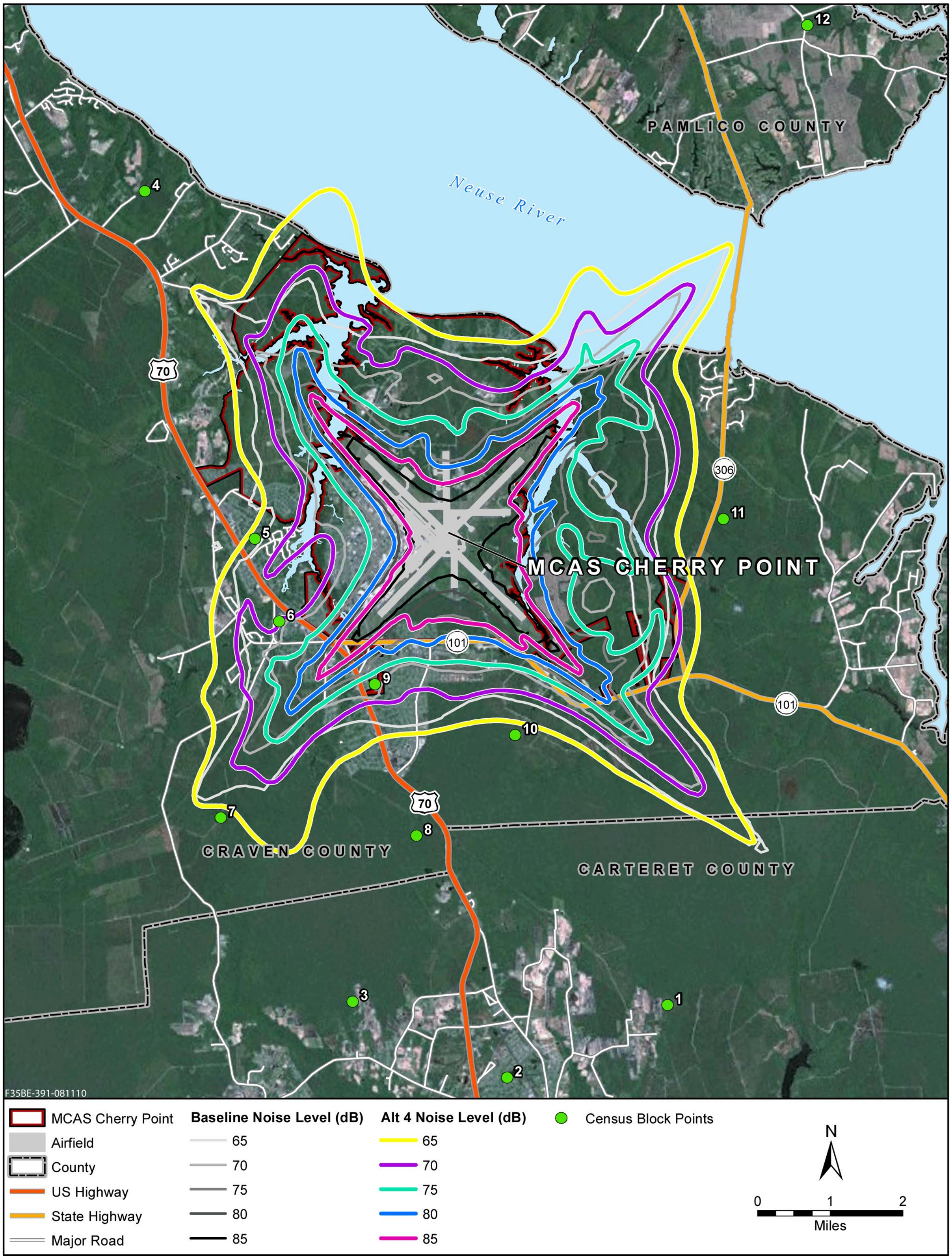


Figure 5.3-5 MCAS Cherry Point Alternative 4 Projected Aircraft Noise Contours

Table 5.3-20 MCAS Cherry Point Alternative 4 Projected Aircraft Noise Exposure Compared to Baseline Conditions On and Off Station

Contour Band (dB DNL)	Acres[a]				Population[b]				Housing Units[c]			
	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change	On	Off	Subtotal	Net Change
65-70	2,276	5,645	7,921	+955	3,042	3,177	6,219	+546	601	1,172	1,773	-135
70-75	2,697	4,602	7,299	+1,011	3,136	2,287	5,423	+1,095	638	857	1,495	+275
75-80	1,513	2,587	4,100	+1,239	1,663	1,129	2,792	+428	325	420	745	+196
80-85	1,362	622	1,984	+369	1,445	311	1,756	+321	0	114	114	+33
85+	3,076	116	3,192	+1,466	134	7	141	-11	0	3	3	+3
Subtotal	***10,924***	***13,572***			***9,420***	***6,911***			***1,564***	***2,566***		
TOTAL			**24,496**	**+5,019**			**16,331**	**+2,379**			**4,130**	**+372**

Notes: [a]Exclusive of upper bound for all bands and bodies of water.
[b]Estimated based on 2000 Census block data.

In terms of the schools, noise levels would remain similar to baseline conditions for Havelock Elementary and G.A. Barden Elementary Schools. However, Havelock Middle and High Schools, as well as the Robert Bell Elementary School would experience increased noise-level exposure. Table 5.3-21 provides the projected noise levels over these receptors in comparison to baseline conditions. No other schools would be exposed to average noise levels of 65 dB DNL and greater under Alternative 4. As is the case under baseline conditions, teachers in classrooms could be interrupted or students might not be able to hear some instructions. Please refer to Appendix D, Section D.3.2 for a more detailed discussion of speech interruption and classroom studies.

Table 5.3-21 Alternative 4 Aircraft Noise Exposure to Schools

Receptor Description	Baseline dB DNL	Alternative 4
Havelock Elementary School	75-80	75-80
Havelock Middle School	70-75	75-80
Havelock HS	70-75	75-80
Roger Bell Elementary	70-75	75-80
G.A. Barden Elementary School	65-70	65-70

For most land use categories, exposure to noise levels greater than 65 dB DNL would increase. Table 5.3-22 lists the land uses and notes the net change for conditions, compared to the baseline, which could occur under Alternative 4. As the table indicates, impacts would be very similar to those found under the other alternatives. All land use designations in Noise Zone III would experience an increase in acreage. Noise Zone II acres would increase over all land use designations with the exception of light industrial, medium-density residential, and public lands, where acres levels would decrease by 196 when compared to baseline conditions.

Table 5.3-22 Alternative 4 Land Uses (in acres) Occurring within Noise Zone Contour Bands at MCAS Cherry Point

Land Use Category[a]	Noise Zone II (DNL)			Zone II Net Change	Noise Zone III (DNL)				Zone III Net Change
	65-70	70-75	Subtotal		75-85	80-85	>85	Subtotal	
Rural/Agricultural	3,907	3,308	7,215	+1,555	1,791	336	33	2,160	+1,324
Low Density Residential	797	533	1,330	+328	87	45	9	141	+57
Medium Density Residential	4	5	9	-6	9	0	0	9	+9
Light Industrial	2	92	94	-133	202	99	16	317	+132
Commercial	205	162	367	+69	50	33	25	108	+41
Future Development	277	213	490	+28	135	41	9	185	+115
Public	131	111	242	-57	214	25	7	246	+201
MCAS Cherry Point	2,276	2,697	4,973	+171	1,513	1,362	3,076	5,951	+1,113
TOTAL	**7,599**	**7,121**	***14,720***	**+1,955**	**4,001**	**1,941**	**3,175**	***9,117***	**+2,992**

Notes:
[a]Refer to Section 3.3 for definition of land use categories.

As presented in Table 5.3-9 and shown in Figure 5.3-5, under Alternative 4 the potential for speech interruptions would occur within the 12 representative communities regardless of windows being closed or opened. For Alternative 4 (as presented in Table 5.3-10), center points 5, 6, and 9 would experience average noise levels between 73 and 67 dB DNL. Table 5.3-23 shows the estimated residential population at risk for PHL. While there are no residential areas exposed on MCAS Cherry Point, it is anticipated that there would be off-Station populations exposed to 80 dB and greater DNL contour bands under this alternative. The average and 10th percentile NIPTS would be lower than what is presented in Table 5.3-23 for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above.

Table 5.3-23 MCAS Cherry Point PHL Estimates under Alternative 4

Contour Band (dB DNL)	Baseline Residential Population	Proposed Residential Population	Average NIPTS (dB)[a,b]	10th Percentile NIPTS (dB)[a,b]
80-81	67	106	3.0	7.0
81-82	49	78	3.5	8.0
82-83	42	57	4.0	9.0
83-84	25	40	4.5	10.0
84-85	7	31	5.5	11.0
85-86	0	2	6.0	12.0
86-87	0	2	7.0	13.5
87-88	0	1	7.5	15.0
88-89	0	1	8.5	16.5
89-90	0	0	9..5	18.0

Source: [a]National Academy of Sciences 1977.
Notes: [b]Rounded to the nearest 0.5 dB.

No Action Alternative

Under the No Action Alternative, the proposed action would not be implemented and baseline conditions would remain unchanged.

5.3.3 Summary Comparison of Noise Impacts by Alternatives

Table 5.3-24 presents a summary of the impacts by alternative.

Table 5.3-24 Noise Impacts Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternative 1	• Net increase of 3,380 acres in total area exposed to 65 dB DNL and greater noise levels • Net population increase of 1,657 for those exposed to 65 dB DNL or greater noise levels • Net increase of 194 more housing units exposed to 65 dB DNL or greater noise levels • Exposure to greater than 65 dB DNL noise levels to Havelock Elementary, Middle, and High Schools; Roger Bell Elementary School; and G.A. Barden Elementary School, would remain unchanged from baseline conditions • Net increase of 2,547 acres in Noise Zone II over land use categories; however, no change to land uses anticipated • Net increase of 1,255 acres in Noise Zone III over land use categories; however, no change to land uses anticipated • The potential for speech interferences would occur in the 12 modeled locations • PHL would occur to off-Station communities within 80 and greater dB DNL noise contour bands but would be unlikely because populations would not be consistently exposed to these noise levels over 40 years • Average noise levels between 71 and 65 dB DNL would occur over 2 center points • No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above
Alternative 2	• Net increase of 5,814 acres in total area exposed to 65 dB DNL and greater noise levels • Net population increase of 2,637 for those exposed to 65 dB DNL or greater noise levels • Net increase of 476 more housing units exposed to 65 dB DNL or greater noise levels • Havelock Middle School would experience increased noise levels when compared to baseline conditions • Net increase of 3,443 acres in Noise Zone II over land use categories; however, no change to land uses anticipated • Net increase of 2,280 acres in Noise Zone III over land use categories; however, no change to land uses anticipated • The potential for speech interferences would occur in 12 modeled locations • Average noise levels between 72 and 65 dB DNL would occur over 4 center points • No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above
Alternative 3	• Net increase of 6,736 acres in total area exposed to 65 dB DNL and greater noise levels • Net population increase of 3,179 for those exposed to 65 dB DNL or greater noise levels • Net increase of 661 more housing units exposed to 65 dB DNL or greater noise levels • Havelock Middle and High Schools, as well as Roger Bell Elementary School and G.A. Barden Elementary School would experience increased noise levels when compared to baseline conditions • Net increase of 2,591 acres in Noise Zone II over land use categories; however, no change to land uses anticipated • Net increase of 4,021 acres in Noise Zone III over land use categories; however, no change to land uses anticipated • The potential for speech interferences would occur in 12 modeled locations • Average noise levels between 74 and 65 dB DNL would occur over 4 center points

Table 5.3-24 Noise Impacts Summary Comparison of Alternatives

Alternative	Environmental Consequences
	• No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above
Alternative 4	• Net increase of 5,019 acres in total area exposed to 65 dB DNL and greater noise levels • Net population increase of 2,379 for those exposed to 65 dB DNL or greater noise levels • Net increase of 372 more housing units exposed to 65 dB DNL or greater noise levels • Havelock Middle and High Schools, as well as Roger Bell Elementary School would experience increased noise levels when compared to baseline conditions • Net increase of 1,955 acres in Noise Zone II over land use categories; however, no change to land uses anticipated • Net increase of 2,992 acres in Noise Zone III over land use categories; however, no change to land uses anticipated • The potential for speech interferences would occur in 12 modeled locations • Average noise levels between 73 and 65 dB DNL would occur over 3 center points • No residential areas at risk for PHL; however, there would be off-Station populations exposed to 80 dB DNL and greater; the average and 10th percentile NIPTS would be lower for those without 40 years of daily exposure to average noise levels of 80 dB DNL and above
No Action Alternative	• Baseline conditions would persist

5.4 Air Quality

5.4.1 Affected Environment (Baseline Conditions)

In regard to the National Ambient Air Quality Standards (NAAQS), the USEPA designates all areas of the U.S. in terms of having air quality better (attainment) or worse than (nonattainment) the NAAQS (refer to Section 3.4 for NAAQS standards. An area generally is in nonattainment for a pollutant if its NAAQS has been exceeded more than once per year. Former nonattainment areas that have attained the NAAQS are designated as maintenance areas. Presently, the regulatory area around MCAS Cherry Point is in attainment for all NAAQS pollutants.

The federal Clean Air Act (CAA) and its subsequent amendments establish air quality regulations and the NAAQS and delegate the enforcement of these standards to the states. In North Carolina, the North Carolina Department of Environment and Natural Resources (NCDENR) is responsible for monitoring air quality and reporting to USEPA. The CAA establishes air quality planning processes and requires areas in nonattainment of a NAAQS to develop a State Implementation Plan that details how the state will attain the standard within mandated time frames. The requirements and compliance dates for attainment are based on the severity of the nonattainment classification of the area.

NCDENR has the similar ambient air quality standards as the NAAQS, except for an additional ambient air quality standard for total suspended particulates (TSP) (also referred to as Particulate Matter). The North Carolina ambient air quality standards for this standard are listed in Table 5-4.1).

Table 5.4-1 North Carolina Ambient Air Quality Standards

Pollutant[a]	Averaging Time	Primary	Secondary
TSP	24 hours	150 micrograms per meter^3 ($\mu g/m^3$)	--
	Annual Geometric Mean	75 $\mu g/m^3$	--

Source: North Carolina Administrative Code 54 02D.0403 (1981) and 40 Code of Federal Regulations (CFR) 50.
Notes: [a]This standard must not be exceeded more than one time per year.

The Air Quality Control Region (AQCR) for MCAS Cherry Point is the Southern Coastal Plain Intrastate AQCR (40 CFR Part 81.151). This AQCR includes the North Carolina counties of Brunswick, Carteret, Columbus, Craven, Duplin, Greene, Jones, Lenoir, New Hanover, Onslow, Pamlico, Pender, and Wayne County.

Emission thresholds associated with CAA conformity requirements are the primary means of assessing the air quality impacts associated with implementation of a Proposed Action. A formal conformity determination is required for Federal actions occurring in nonattainment or maintenance areas when the total direct and indirect stationary and mobile source emissions of nonattainment pollutants or their precursors exceed *de minimis* thresholds. In addition, a formal conformity determination is required for actions defined as regionally significant (i.e., if the total emissions from a Federal action exceed 10 percent of a nonattainment area's emission inventory for that pollutant). As stated, MCAS Cherry Point is in attainment for all criteria pollutants and, therefore, *de minimis* does not apply. Therefore, further conformity analysis is not needed to base the F-35B at MCAS Cherry Point.

For estimating emissions, a 3,000-ft AGL ceiling was selected for a conservative estimate of the average height of a stable temperature inversion common to the coastal maritime air shed. This type of inversion can significantly inhibit, if not effectively block, vertical and widespread lateral dispersion of air pollutants. Thus, pollutants can be considered confined between the base of the inversion and the ground, or that portion of the lower atmosphere commonly termed the boundary layer. Emissions released above this mixing layer generally would not appreciably affect ground-level air quality and are only incorporated into the analysis for Greenhouse Gases (GHGs). For the purposes of assessing air pollutant emissions, all aircraft operations at or below 3,000-ft AGL and ground support equipment (GSE) were included to estimate criteria pollutants and GHG emissions.

The average maximum annual temperature at MCAS Cherry Point is 88.9 degrees Fahrenheit (°F), and the average minimum annual temperature is 35.8°F. January is the coldest month and July is the warmest. Precipitation in North Carolina is ample with an annual precipitation of 57.1 inches, and there are no distinct wet or dry seasons. The average monthly rainfall is 4.33 inches with a maximum monthly rainfall of 19.91 inches and a minimum monthly rainfall of 0.23 inches. July-August-September receive the most rainfall on a daily basis according to data from 1971 to 2000. The prevailing winds blow generally from the southwest for all months except September and October when the prevailing winds blow from the northeast. Wind speeds are generally from 8 to 10 miles per hour. Summer weather is dominated by the "Bermuda High" pressure system that results in calm conditions with little to no air movement allowing for stagnation of air pollutant emissions (SCONC 2009).

The current attainment status designations for areas within North Carolina are summarized in 40 CFR 81.334. Craven County is classified as "better than national standards" for TSPs (includes particulate matter less than 10 microns [PM_{10}]) and sulfur dioxide. Craven County is designated as "unclassifiable/ attainment" for carbon monoxide (CO), fine particulate matter less than 2.5 microns ($PM_{2.5}$), and ozone. The county is also designated as "cannot be classified or better than national standards" for nitrogen dioxide (NO_2).

Existing emissions of criteria pollutants exceed the 100 tons per year (TPY) threshold at the Air Station. Under Title V of the CAA, MCAS Cherry Point is required to obtain operating permits from the NCDENR Air Quality Division for certain emission sources and their associated air pollution control equipment. Currently, MCAS Cherry Point is operating under NCDENR Division of Air Quality permit number 04069T28, effective December 3, 2007. Permitted emission sources include two coal/fuel oil-fired boilers with electrostatic precipitators for emission control devices, five fuel-oil/off-specification JP-5/used oil-fired boilers, one coal ash storage and handling process, various fuel storage tanks, three outdoor open aircraft test stations, one jet engine test cell, and various paint booths/painting operations (NCDENR 2007).

Under the Proposed Action alternatives, several support facilities and hangers would be constructed. Depending on the alternative, older hangars (with stationary emission sources such as heating and hot water units) would be demolished and replaced by new state-of-the-art hangars. Replacement of these older stationary source units with new equipment (designed and operated for reduced emissions) would result in an overall reduction in emissions. Because no other new stationary sources are anticipated under any of the Proposed Action alternatives, emissions from stationary sources are not considered to be a factor in potentially degrading regional air quality. Evaluation of stationary source emissions, therefore, is not carried forward in this EIS.

While stationary sources are not a major factor impacting regional air quality under the Proposed Action alternatives, mobile sources (aircraft [including engine run-ups], GSE, and Personally Owned Vehicles [POVs]) would be the primary sources contributing to pollutant emissions. Since it was assumed that the Proposed Action would result in no increases in use of government-owned vehicles, they were excluded from the baseline. Table 5.4-2 presents the baseline source emissions for these types of mobile sources at MCAS Cherry Point, included are emissions from legacy AV-8B aircraft, associated GSE, and vehicles of commuting military and civilian personnel. The specific calculations for aircraft operations, GSE, and commuting personnel are found in Appendix E.

Table 5-4.2 MCAS Cherry Point Baseline Annual Mobile Source Emissions

Emissions Sources	Criteria Pollutant (tons)					
	Volatile Organic Compounds (VOCs)	CO	Nitrogen Oxides (NO_x)	Sulfur Oxides (SO_x)	PM_{10}	$PM_{2.5}$
Legacy Aircraft	99.83	640.03	187.99	9.34	172.31	<172.31
POV	1.84	17.09	1.83	0.01	0.10	<0.10
GSE	2.98	4.96	12.22	0.07	1.42	<1.42
TOTAL ANNUAL EMISSIONS	**104.65**	**662.09**	**202.04**	**9.42**	**173.83**	**<173.83**

5.4.2 Environmental Consequences

To determine potential impacts to regional air quality, MCAS Cherry Point baseline conditions were compared to those projected for the alternatives in terms of construction as well as aircraft and maintenance operations. Air quality potential impacts include: 1) increases of ambient air pollution concentrations above the NAAQS, 2) contributing to an existing violation of the NAAQS, 3) interfering with, or delaying timely attainment of the NAAQS, or 4) results in the potential for any new stationary source to be considered a major source of emissions as defined in 40 CFR Part 52.21 (total emissions of any pollutant subject to regulation under the CAA that is greater than 250 TPY for attainment areas).

For all of the four alternatives, construction would occur at MCAS Cherry Point beginning in 2015 and reaching completion no later than 2023. By 2023, all of the aircraft associated with the action would be present at the Air Station, along with all personnel required to support aircraft operations. Each of the four alternatives includes variations in construction and in the number and type of squadrons to be based at MCAS Cherry Point.

Demolition/Construction. Air quality impacts from proposed construction activities were estimated from: 1) combustion emissions due to the use of fossil fuel-powered equipment; 2) fugitive dust emissions (PM_{10} and $PM_{2.5}$) during demolition activities, earth-moving activities, and the operation of equipment on bare soil; and 3) VOC emissions from application of asphalt materials during paving operations.

Airfield Operations. Air quality impacts were assessed by comparing the net increase in emissions associated with F-35B operations within the MCAS Cherry Point region. These emissions include: 1) F-35B aircraft operations (including engine run-ups) within the airfield and surrounding airspace under 3,000 ft AGL; 2) GSE operations; and 3) POV use by commuting personnel associated with the Proposed Action. It was assumed that the Proposed Action alternatives would result in no increases in the use of government-owned vehicles and minimal increases in stationary sources (primarily, heat and hot water sources for Bachelor Enlisted Quarters [BEQs] in Alternative 2).

Action Alternatives

Demolition/Construction. Tables 5.4-3 through 5.4-6 summarize the projected annual emissions under Alternatives 1 through 4, respectively, and includes those related to both demolition and construction activities. Emissions from demolition/construction activities would not alter attainment status or represent a regional significance within the regional AQCR. Refer to Appendix E for specifics on demolition debris, construction equipment, and disturbance footprints.

Table 5.4-3 Projected Annual Construction Emissions Under Alternative 1

Year	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Construction Year (CY) 1	0.8	5.4	7.4	0.8	1.1	0.1
CY2	0.1	0.8	1.1	0.1	0.1	0.1
CY3	0.3	1.4	2.6	0.3	0.6	0.2
CY4	0.2	1.0	1.9	0.2	1.2	0.2
CY5	0.3	2.1	3.2	0.4	1.3	0.3
CY6	0.6	3.2	5.8	0.7	2.7	0.6
CY7	0.4	1.3	4.3	0.4	1.4	0.3
CY8	0.2	0.7	2.7	0.2	0.4	0.1
CY9	0.1	0.5	1.8	0.2	0.2	0.1

Table 5.4-4 Projected Annual Construction Emissions Under Alternative 2

Year of Construction	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
CY1	0.9	4.5	9.2	1.0	3.6	0.8
CY2	0.3	1.4	2.0	0.2	0.1	0.1
CY3	0.4	1.9	2.9	0.3	0.8	0.2
CY4	0.7	2.7	5.8	0.7	2.7	0.6
CY5	0.4	1.8	3.4	0.4	1.2	0.3
CY6	2.0	7.5	20.3	2.3	13.8	2.3
CY7	2.0	8.4	20.8	2.3	14.2	2.4
CY8	0.5	2.0	3.2	0.4	1.5	0.3
CY9	0.4	1.9	3.9	0.4	0.3	0.2

Table 5.4-5 Projected Annual Construction Emissions Under Alternative 3

Year of Construction	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
CY 1	0.9	4.4	9.0	1.0	3.0	0.7
CY 2	0.3	1.9	1.6	0.2	0.2	0.1
CY 3	0.3	1.5	2.3	0.3	0.5	0.2
CY 4	0.2	1.0	2.2	0.3	0.4	0.2
CY 5	0.4	1.7	3.3	0.4	2.9	0.5
CY 6	0.6	3.0	5.6	0.6	3.0	0.6
CY 7	0.4	1.4	4.3	0.4	1.4	0.3
CY 8	0.2	0.7	2.4	0.2	1.3	0.2
CY 9	0.3	0.5	3.7	0.2	0.3	0.1

Table 5.4-6 Projected Annual Construction Emissions Under Alternative 4

Year of Construction	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
CY1	0.7	3.0	8.3	0.9	2.1	0.6
CY2	0.1	0.9	0.7	0.1	0.1	0.0
CY3	0.1	0.9	0.8	0.1	0.07	0.05
CY4	0.1	0.7	1.2	0.1	0.2	0.1
CY5	0.2	0.6	1.7	0.2	1.4	0.2
CY6	0.5	2.3	4.3	0.5	1.5	0.4
CY7	0.4	1.2	4.9	0.4	1.0	0.3
CY8	0.2	0.5	2.8	0.2	0.2	0.1
CY9	0.1	0.3	1.7	0.1	0.1	0.0

Non-road diesel engines can significantly contribute to PM and NO_x emissions. In recent years, the USEPA has set standards for engines used in most new construction equipment. However, because construction equipment can last 25 to 30 years, it will take many years before existing equipment is replaced with newer, cleaner equipment. Because the USEPA's May 2004 regulations only apply to newly-manufactured diesel engines, the USEPA developed the Clean Construction USA program to assist operators of heavy non-road, diesel-powered equipment (including the military) to reduce emissions from the older engines that are in operation today. Emissions education methods include:

- *Idle-reduction practices* to save money, reduce emissions, add fuel savings, extend engine life, and provide a safer and better work environment for equipment operators.
- *Switching to ultra low-sulfur diesel* fuel to reduce engine wear, deposits, and oil degradation.
- *Retrofitting equipment* to reduce emissions.
- *Installing USEPA-approved catalysts and filters* to ensure emission reductions and durability of retrofit technologies. Engine upgrade kits can also be installed during routinely scheduled engine rebuilds to reduce emissions.
- *Following the Leadership in Energy and Environmental Design (LEED) Green Building Rating System* to ensure all new construction meets LEED Silver Level certification or better.

To support emissions reduction, installations can request that the newer Tier 2 or Tier 3 engines be prioritized for use and can place that as a stipulation in construction proposals. In addition, an Erosion and Sediment Pollution Control Plan is required under the National Pollutant Discharge Elimination System (NPDES) for construction activities, and this plan includes requirements for dust control in disturbed areas.

Airfield Operations. Tables 5.4-7 through 5.4-10 present the summary of projected annual operational emissions for Alternatives 1 through 4, respectively. As the results indicate (see Appendix E for specific data) VOCs, CO, PM_{10}, and $PM_{2.5}$ emissions would decrease when compared to those generated by legacy AV-8B aircraft. However, F-35B emissions of NO_x and SO_x would increase. Emissions from aircraft operations would not alter attainment status nor represent a regional significance within the regional AQCR.

Table 5.4-7 Projected Annual Mobile Source Emissions under Alternative 1

Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
F-35B Operations	1.89	79.73	282.55	24.24	4.66	≤4.66
GSE	5.61	9.34	23.00	0.01	2.68	≤2.68
POVs	5.03	107.41	3.81	0.21	0.16	≤0.16
TOTAL ANNUAL EMISSIONS	**12.53**	**196.48**	**309.36**	**24.46**	**7.49**	**≤7.49**
*Net Change from Baseline**	*-92.12*	*-465.61*	*107.32*	*15.04*	*-166.34*	*≤-166.34*

Note: *Totals may vary due to rounding.

Table 5.4-8 Projected Annual Mobile Source Emissions Under Alternative 2

Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
F-35B Operations	2.60	109.62	388.51	33.33	6.40	≤6.40
GSE	7.72	12.85	31.63	0.01	3.68	≤3.68
POV	6.91	147.72	5.24	0.29	0.22	≤0.22
TOTAL ANNUAL EMISSIONS	***17.23***	***270.19***	***425.38***	***33.63***	***10.30***	***≤10.30***
*Net Change from Baseline**	*-87.42*	*-391.89*	*223.34*	*24.21*	*-163.53*	*≤-163.53*

Note: *Totals may vary due to rounding.

Table 5.4-9 Projected Annual Mobile Source Emissions Under Alternative 3

Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
F-35B Operations	2.79	116.67	478.86	39.33	6.87	≤6.87
GSE	3.86	6.42	15.81	0.00	1.84	≤1.84
POV	3.38	72.23	2.56	0.14	0.11	≤0.11
TOTAL ANNUAL EMISSIONS	***10.03***	***195.32***	***497.23***	***39.47***	***8.82***	***≤8.81***
*Net Change from Baseline**	*-94.62*	*-466.77*	*295.20*	*30.06*	*-165.02*	*≤-165.02*

Note: *Totals may vary due to rounding.

Table 5.4-10 Projected Annual Mobile Source Emissions Under Alternative 4

Activity	Air Pollutant Emissions (tons)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
F-35B Operations	2.08	86.79	373.26	30.26	5.12	≤5.12
GSE	1.75	2.92	7.19	0.00	0.84	≤0.84
POV	1.30	27.78	0.98	0.05	0.04	≤0.04
TOTAL ANNUAL EMISSIONS	***5.13***	***117.49***	***381.44***	***30.32***	***6.00***	***≤6.00***
*Net Change from Baseline**	*-99.52*	*-554.60*	*179.40*	*20.90*	*-167.83*	*≤-167.83*

Note: *Totals may vary due to rounding.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and baseline conditions would remain unchanged.

5.4.3 Summary Comparison of Alternatives

Table 5.4-11 presents a summary comparison of the action alternatives and the No Action Alternative.

Table 5.4-11 Air Quality Summary Comparison of Alternatives

Alternative	Environmental Consequences
Action Alternatives	• Construction impacts would be below regulatory thresholds for all air pollutants • Mobile source emissions would decrease except for NO_x and SO_x, which would increase • No net changes in stationary source emissions
No Action Alternative	• Baseline conditions would persist

5.5 Hazardous Materials, Toxic Substances, Hazardous Waste, and Contaminated Sites

5.5.1 Affected Environment (Baseline Conditions)

Hazardous Materials. A variety of hazardous materials are used at MCAS Cherry Point for aircraft, vehicle, and building maintenance as well as facilities construction (MCAS Cherry Point 2006; USEPA 2009a). Common hazardous materials include petroleum, oil, and lubricants, solvents and thinners, caustic cleaning compounds and surfactants, antifreeze, acids and corrosives, adhesives, paints (including enamels, lacquers, and polyurethane coatings), fungicides, and batteries (MCAS Cherry Point 2006; USEPA 2009b). At MCAS Cherry Point, hazardous materials are managed through the Hazardous Material Control Center using the electronic Hazardous Material Management System. Hazardous material minimization is accomplished through the return of usable materials for reissue, and the Hazardous Material Control Center also operates a hazardous material recycling center (MCAS Cherry Point 2006). Hazardous materials are purchased, stored, managed, used, and disposed in compliance with applicable health, safety, and environmental regulations and in such a manner as to minimize the potential for spills and impacts to the land and existing facilities.

Toxic Substances. Regulated toxic substances typically associated with buildings and facilities include asbestos, lead-based paint (LBP), and poly-chlorinated biphenyls (PCBs). MCAS Cherry Point maintains an Asbestos Management Plan that serves as a guide for the identification, handling, abatement, and management of asbestos-containing materials (ACM) and asbestos-related wastes. Prior to demolition, structures are inspected for ACM according to 40 CFR 61.145 and established MCAS Cherry Point procedures. Prior to or during demolition, all ACM is properly removed and disposed of in accordance with 40 CFR 61.40 through 157 and established MCAS Cherry Point procedures. The contractors responsible for the management of toxic substances during abatement, renovation, and demolition projects are required to develop and implement compliant work plans for the safe sampling, handling, removal, transportation, and disposal of toxic substances and wastes generated as a result of their work. MCAS Cherry Point takes responsibility for the wastes generated during this type of work by signing waste manifests in accordance with applicable Federal and State regulations (MCAS Cherry Point 2009a). MCAS Cherry Point also requires that a thorough asbestos inspection be conducted prior to renovation or demolition activities. This inspection must be conducted by a certified asbestos inspector (MCAS Cherry Point 2009b).

Prior to any renovation or demolition, any building suspected to contain LBP must be inspected by a certified lead inspector (MCAS Cherry Point 2009c). Should LBP be detected in a structure scheduled for demolition, it is managed and disposed of in accordance with the Toxic Substances Control Act, OSHA regulations, North Carolina LBP Hazard Management Program, and established MCAS Cherry Point procedures.

MCAS Cherry Point has developed a PCB Management Plan that documents storage and disposal procedures, spill contingency and remediation plans, and record keeping procedures for PCBs at the Air Station. According to information obtained during the 2008 Benchmark Environmental Compliance Evaluation MCAS Cherry Point has been free of PCBs since 2006 (MCAS Cherry Point 2008a).

Hazardous Waste. MCAS Cherry Point is regulated as a Large Quantity Generator of hazardous waste as defined under the Resource Conservation Recovery Act (RCRA). Common hazardous waste streams generated include waste paints and thinners, spent solvents, waste adhesives, contaminated filters and blast media, solid materials such as rags contaminated with paints or adhesives, fluorescent lamps, and lead-acid aircraft batteries (USEPA 2009e). Over 80 satellite accumulation areas and more than 30 less-than-90-day accumulation sites for hazardous waste are located in proximity to the waste generating activities (MCAS Cherry Point 2008a). Hazardous waste from these sites is collected at a RCRA Part B permitted treatment, storage, and disposal facility at the Air Station and transported off-site for treatment or disposal as arranged through contracts administered by the Defense Reutilization and Marketing Office (MCAS Cherry Point 2008a; USEPA 2009f). The Air Station maintains a Hazardous Waste Management Plan, in which standard operating procedures are outlined for the handling and disposal of hazardous waste (MCAS Cherry Point 2006, 2009a).

Contaminated Sites. On December 16, 1994, MCAS Cherry Point was scored and ranked by the USEPA for inclusion on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List. Under CERCLA, the Marine Corps acts as the lead agency, in partnership with the USEPA and NCDENR, to address environmental investigations at the facility through the Installation Restoration Program (CH2MHILL 2008). Since 1994, 15 operable units (OUs) have been identified at MCAS Cherry Point. These OUs include multiple contaminated sites and solid waste management units. Contamination from two OUs (OU1 and OU14) has been identified in the area affected by the action alternatives.

OU1 covers approximately 565 acres in the industrialized portion of the Air Station and extends into the proposed construction and demolition areas at MCAS Cherry Point (CH2MHILL 2008). Twelve contaminated sites occur within OU1, and six of these sites (Sites 42, 47, 51, 52, 92, and 98) have been identified as contributing chlorinated volatile organic compound (cVOC) contamination to the groundwater. These six sites constitute the OU1 Central Groundwater Plume. Hangars 131, 1665, 1667, and 1700 are located within the boundaries of the OU1 Central Groundwater Plume. The other six sites (Sites 14, 15, 16, 17, 18, and 83) are not source areas for the OU1 Central Groundwater Plume, but are undergoing additional investigation activities or are being evaluated for potential remedial action (CH2MHILL 2008). The proposed demolition and construction areas are not near or adjacent to these sites. The bulk of the contamination associated with the OU1 Central Groundwater Plume is located beneath Building 133; however, some portions of OU1 extend north from the main Fleet Readiness Center (FRC)-East complex. In particular, Site 47, the Industrial Area Sewer System, extends from the

FRC-East main facilities and either connects to or runs past Hangars 131, 1665, 1667, and 1700. Site 47 is a system of underground pipes and aboveground drains that transfer industrial wastewater to the industrial wastewater treatment plant (CH2MHILL 2008). Portions of this sewer system, which was originally installed in 1942, have leaked over the years. Infiltration and leakage studies have been conducted along this sewer line, and repairs to the system are ongoing. Additional treatment has been recommended for the groundwater in the entire area of the OU1 Central Groundwater Plume to include Site 47. A pump and treat system for this plume was installed in 1998; however, the system was shut down in February 2005 as it was not achieving the remedial action objectives (CH2MHILL 2008). Remedial investigations and feasibility studies continue at OU1.

Site 90 (OU14) is a plume of groundwater contamination first identified near Hangar 130. (Hangar 130 is located near Hangars 1700 and 1701, which are proposed for demolition under the Proposed Action.) The Final OU14 Remedial Investigation (RI) Report was submitted in July 2008 and includes the results of the human health and ecological risk assessment. Based on an evaluation of the data collected during all phases of the RI, including historical data, cVOC contamination is limited to the Surficial Aquifer groundwater and a small area of soil near Tank Farm A (located west of Hangar 1701). Petroleum underground storage tank-related contamination is prevalent throughout the site in soil and Surficial Aquifer groundwater (DoN 2008a). The baseline human health risk assessment concluded that there are no risks above acceptable ranges from exposure to surface water, sediment, or groundwater from the Yorktown Aquifer. Moreover, there are no risks or hazards above acceptable ranges for the construction worker, current/future industrial worker, or an adult/adolescent trespasser/visitor (DoN 2008a). An evaluation of vapor intrusion screening results in the Final OU14 RI Report indicates a potential risk to current/future industrial workers from inhalation of estimated vapor concentrations of 2, 1-dichloroethane, benzene, trichloroethene, and vinyl chloride vapors (CH2MHILL 2008). The selected remedy for the groundwater contamination at OU14 is monitored natural attenuation and land use controls (LUC) (DoN 2009e). In general, LUCs maintain groundwater and associated property-use restrictions until the contaminant concentrations in groundwater have been reduced to levels that allow for unlimited use/unrestricted exposure (DoN 2009e). The objectives of the LUCs include the following:

- Prohibit all uses of groundwater from the Surficial Aquifer within the LUC boundaries (except for monitoring and remediation purposes), including, but not limited to, human consumption, dewatering, irrigation, heating/cooling, and industrial processes, unless prior written approval is obtained from the USEPA and NCDENR;
- Prohibit unauthorized intrusive activities below the water table within the LUC boundaries, unless prior written approval is obtained from the USEPA and NCDENR;
- Evaluate the potential for vapor intrusion impacts from new building construction, major physical modifications, or changes in occupancy/usage of existing structures within the LUC boundaries; and

- Maintain the integrity of any existing or future monitoring or remediation system at the site (personal communication, Potter 2009).

In addition, MCAS Cherry Point is required to notify USEPA and NCDENR at least 60 days in advance of any proposed land use changes (e.g., excavation below the water table in contaminated areas, installation of a groundwater supply well, etc.) that are inconsistent with the LUC objectives or the selected remedy for OU14. Until concurrence is obtained from these regulatory agencies, no land use change can be implemented (personal communication, Potter 2009)

5.5.2 Environmental Consequences

Hazardous Materials. Established procedures for the management of hazardous materials would be followed during the demolition of older structures and construction of new facilities. Specifically, the demolition and construction contractor(s) would be responsible for notifying MCAS Cherry Point Environmental Affairs Department prior to bringing any hazardous materials onto the Air Station. The demolition and construction contractor(s) would also be responsible for appropriately managing and disposing of, if necessary, any hazardous materials used on the site during these activities.

Established procedures for hazardous material management established for MCAS Cherry Point would also be followed during squadron operations. It is anticipated that the quantities and types of hazardous materials needed for maintenance of the F-35B would be comparable to those currently used for maintenance of legacy aircraft. The major differences would be the use of a non-chromium containing coatings, unlike the hexavalent chromium containing materials used by legacy aircraft. The elimination of these substances would slightly reduce the amount of hazardous materials used, thus reducing the overall potential impacts to the environment (personal communication, Luker 2009).

Toxic Substances. All structures proposed for demolition would be inspected for ACM and LBP according to established MCAS Cherry Point procedures. 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 MCAS Cherry Point procedures. All LBP would also be managed and disposed of in accordance with the Toxic Substances Control Act, OSHA regulations, North Carolina requirements (regarding site work practices for buildings with LBP), and established MCAS Cherry Point procedures.

Hazardous Waste**.** Established procedures for the management of hazardous wastes would be followed during the demolition of older structures and construction of new facilities. Specifically, the demolition and construction contractor(s) would be responsible for coordinating disposal of any hazardous wastes generated with MCAS Cherry Point.

Established procedures would also be followed during squadron operations. The amounts of hazardous wastes generated in operations involving primer are expected to decrease slightly with the introduction of the F-35B, as the primer for that aircraft does not contain cadmium or chromium (personal communication, Luker 2009). MCAS Cherry Point operates as a large quantity generator of hazardous waste. The exact amounts of hazardous waste generated under each alternative are unknown; however, under all alternatives MCAS Cherry Point would continue to operate within its hazardous waste permit conditions.

***Contaminated Sites*.** As stated previously, OU1 covers approximately 565 acres in the industrialized portion of the Air Station. Hangars 131, 1665, 1667, and 1700 (hangars that may be demolished under the Proposed Action) are located within the boundaries of the OU1 Central Groundwater Plume. OU14 is a plume of groundwater contamination first identified near Hangar 130. Hangar 130 is located near Hangars 1700 and 1701, which are proposed for demolition under the Proposed Action. These have been extensively evaluated. Based on a review of the information compiled to date, the existing contamination at OU1 is not expected to impact demolition or construction phases as long they are consistent with the control objectives and selected remedy for OU1.

Existing contamination at OU14 is not expected to impact any alternative activities as long they are consistent with the control objectives and selected remedy for OU14 (refer to Section 5.5.1 for additional information). This conclusion is based on the fact that site preparation and construction activities would not encounter surficial groundwater (i.e., the upper Surficial Aquifer extends from approximately 12 ft below ground surface to a depth of 25 to 30 ft below ground surface), project specific stormwater Best Management Practices (BMPs) such as windbreaks and water spraying would be employed to control dust during construction activities, and excavated soils with potential contamination would be segregated and sampled (DoN 2009e; MCAS Cherry Point 2009d). The sampling would define the nature of the potential worker exposure, and determine whether the soils can be reused at the site or disposed of off-site at a facility permitted to receive the soils pursuant to appropriate North Carolina regulations. Furthermore, prior approval may be required from the USEPA and NCDENR before construction can begin. Although changes to the existing land use are not expected under the Proposed Action, the construction contractor(s) would need to review and adhere to the LUCs for OU14, including the evaluation of the vapor intrusion pathway (DoN 2009e; personal communication, Potter 2009).

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented; therefore, baseline conditions would remain unchanged.

5.5.3 Summary Comparison of Alternatives

Table 5.5-1 presents a summary of the impacts by alternative.

Table 5.5-1 Hazardous Materials, Toxic Substances, Hazardous Waste, and Contaminated Sites Summary Comparison of Alternatives

Alternative	Environmental Consequences
Action Alternatives	• Established procedures for the management of hazardous materials and hazardous waste would be followed during the demolition of older structures and construction of new facilities • Primers containing cadmium and chromium would be discontinued • Surveys would be conducted for presence of ACM and LBP; all ACM would be removed and properly disposed of and LBP would be managed and properly disposed • OU1 and OU14 are not expected to be impacted since the alternative activities are consistent with existing controls and selected remedies at these two sites • OU1 would have no effect on squadron operations • Construction contractor(s) would need to review and adhere to the land use controls for any new construction occurring within OU14
No Action Alternative	• Baseline conditions would persist

5.6 Safety

5.6.1 Affected Environment (Baseline Conditions)

Aviation Safety. The Federal Aviation Administration (FAA) is responsible for ensuring safe and efficient use of U.S. airspace by military and civilian aircraft and for supporting national defense requirements. In order to fulfill these requirements, the FAA has established safety regulations, airspace management guidelines, a civil-military common system, and cooperative activities with the DoD. The primary concern with regard to military training flights is the potential for aircraft mishaps.

As discussed in Section 3.6, aircraft mishaps are classified as A, B, or C. Class A mishaps are the most severe with total property damage of $2 million or more, a fatality, or permanent total disability. Historic mishap data relative to flight hours flown for current F/A-18s and AV-8Bs are provided in Table 4.6-1. Mishap rates are typically calculated per 100,000 flying hours.

The Marine Corps Class A aviation mishap rate for all Marine Corps aircraft for Fiscal Year 2002 (FY02) through FY08 was 2.8 mishaps per 100,000 flight hours flown (Naval Safety Center 2009a). Of those, eight occurred between 1999 and 2009 and two involved non-legacy aircraft (i.e., an AH-1 and a C-2).

Table 5.6-1 Historic Worldwide Class A Flight Mishaps for Legacy Marine Corps Aircraft[a]

Year	F/A-18[b]			AV-8B		
	Class A Mishaps	Flight Hours	Mishap Rate	Class A Mishaps	Flight Hours	Mishap Rate
FY99	3	267,714	1.12	7	30,441	23.00
FY00	9	242,459	3.71	2	22,088	9.05
FY01	7	248,956	2.81	1	32,372	3.09
FY02	6	276,226	2.17	3	43,078	6.96
FY03	11	253,480	4.34	3	47,103	6.37
FY04	14	226,353	6.19	2	40,775	4.91
FY05	4	232,487	1.72	5	37,969	13.17
FY06	6	224,377	2.67	3	40,467	7.41
FY07	5	207,137	2.41	1	35,718	2.80
Total	**172**	**5,194,591**	**3.31**	**96**	**904,933**	**10.6**

Sources: Naval Safety Center 2007, 2009a

Note:[a]Historic mishap data is based on a $1 million Class A threshold, which changed to $2 million in October 2009, the actual number of Class A mishaps may be less than reported

[b]F/A-18 data reflects F/A-18A/B/C/D mishaps, not only those related to Marine Corps aircraft.

Emergency and Mishap Response at MCAS Cherry Point. MCAS Cherry Point maintains detailed emergency and mishap response plans to react to an aircraft accident, should one occur. These plans assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on or off Station. Response would normally occur in two phases. The initial response focuses on rescue, evacuation, fire suppression, safety, elimination of explosive devices, ensuring security of the area, and other actions immediately necessary to prevent loss of life or further property damage. The initial response element usually consists of Aircraft Rescue Fire Fighters, Emergency Medical

Technicians, and Military Police. The second phase is the mishap investigation, which is comprised of an array of organizations whose participation would be governed by the circumstances associated with the mishap and actions required to be performed.

Accident Potential Zones (APZs). Clear Zones and APZs for MCAS Cherry Point are depicted in Figure 5.6-1. Land use plans, programs, and controls address compatible development within the APZs. For further information, please refer to Section 5.7.

Bird/Wildlife Aircraft Strike Hazards (BASH). The intent of the MCAS Cherry Point BASH Reduction Plan is to reduce BASH issues at the Air Station by creating an integrated hazard abatement program through awareness, avoidance, monitoring, and actively controlling bird and animal population movements (MCAS Cherry Point 2007). Some of the procedures outlined in the BASH Plan include monitoring the airfield for bird and wildlife activity, issuing bird hazard warnings, initiating bird avoidance procedures when potentially hazardous bird activities are reported, and submitting BASH reports for all incidents. MCAS Cherry Point Air Station Order 3000.2B requires Air Traffic Control Tower personnel to communicate the current airfield BASH condition via the Automatic Terminal Information System per FAA Order 7110.65.

Since 1999, there have been 92 BASH incidents recorded for MCAS Cherry Point with four occurring from January 2009 through August 2009 (Naval Safety Center 2009c). None of the incidents involving military aircraft resulted in an aircraft mishap. However, a September 2007 commercial DC-10 aircraft struck a great blue heron. This BASH incident destroyed one engine and caused $1.7 million in repairs to the aircraft (FAA 2010). Identification of species involved in BASH incidents began in 2008. Songbirds, including the Yellow Throated Vireo (*Vireo flavifrons*), Mourning Dove *(Zenaida macroura),* American Robin (*Turdus migratorius*), and Cliff Swallow (*Hirundo pyrrhonota*) were the most common types of birds involved in BASH incidents. Of the species identified, most incidents occurred in September and October. Other shorebirds, such as the Killdeer (*Charadrius vociferus*) and two bats were also identified in BASH incidents (Naval Safety Center 2010).

Explosive Safety. The magazine storage complex is located in the west central area of MCAS Cherry Point. It contains 40 magazines and a ready service area. The ready service area is used by tenant activities to prepare and temporarily hold training munitions for delivery to the flight line and subsequent use. Other facilities used by the ordnance division include an office building, maintenance and carpenter shop, vehicle parking shed, guard house, and quonset hut for classroom use. The Explosive Safety Quantity Distance (ESQD) arcs are shown in Figure 5.6-2. These arcs are for the maximum amount of ordnance authorized for each magazine, even though the actual amount stored may be less (MCAS Cherry Point 2008b).

Construction Safety. All construction and demolition activities that take place at MCAS Cherry Point are performed in accordance with applicable OSHA regulations. Specific practices and policies to protect human health and minimize safety risks are coordinated between the contractor and the Safety Office prior to initiation of construction and demolition activities at MCAS Cherry Point.

5.6.2 Environmental Consequences

Aircraft Mishaps and Mishap Response. The F-35B 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-35B becomes more operationally mature, the aircraft mishap rate is expected to become comparable with a similarly sized aircraft with a similar mission. For instance, since 1980, the average historical mishap rate for the F/A-18 and AV-8B is 4.39 mishaps per 100,000 flight hours. The Marine Corps Class A aviation mishap rate for all Marine Corps aircraft for FY02 through FY08 was 2.8 mishaps per 100,000 flight hours flown (Naval Safety Center 2009b). However, each decade since 1980 has seen a marked reduction in mishaps. Specifically, from 1980 to 1989, the average mishap rate was 5.56; from 1990 to 1999, the average mishap rate was 4.54; and from 2000 to 2007, the average mishap rate was 3.71. Specific to MCAS Cherry Point, the annual average Class A mishap rate is 0.1.

Although the F-35B is a new aircraft, the single engine that powers it is a compilation 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. The propulsion system design included a dedicated system safety program with an acceptable risk level that was more stringent than legacy engines. The engine safety program focused on the major contributors of what previously caused the loss of an aircraft and provided redundancies in case of control system failures, and additionally, allowed for safe recovery of the aircraft even with system failures. Throughout the design and testing process, the safety initiatives took the previous Best Practices for single engine safety and built upon them to promote flight safety progress. Examples of design characteristics that are damage tolerant and enhance safety include a dual wall engine liner, a fan blade containment shell, and a shaft monitor for vibration, torque, and alignment.

In addition, several technologies have been developed through the years to reduce mishap rates. These technologies include advanced warnings to prevent aircraft from crashing into terrain and man-made structures due to pilot or navigational system error; data recorders that provide lessons-learned from every mishap; and back-up and redundant systems that ensure the aircraft are controllable and can be landed with system failures and malfunctions. Although these advancements and upgrades apply to legacy aircraft, these technologies are being designed into all variants of the first F-35B aircraft. This would ensure the F-35B begins its operational service with no increase in safety risks as compared to operational legacy aircraft. In addition, the Autonomic Logistics Information System (ALIS) is an integral part of the F-35 system.

Figure 5.6-1 MCAS Cherry Point Safety Zones

Figure 5.6-2 MCAS Cherry Point ESQD Arcs

ALIS integrates current performance, operational parameters, current configuration, scheduled upgrades and maintenance, component history, predictive diagnostics (prognostics) and health management, and service support for the F-35B (DoD 2010a). This technology provides essential and invaluable behind-the-scenes monitoring, maintenance, and prognostics to support and ensure aircraft health and safety.

The F-35B would follow established local approach and departure patterns, which assist in minimizing accident risks to the community. In addition, current airspace safety procedures would continue to be implemented and additional airfield flight operations would adhere to established safety procedures. Students in the Marine Corps F-35B pilot training program would use simulators. Simulator curriculum would include basic flight operations and comprehensive emergency procedures. The use of simulators would minimize the risk associated with mishaps due to student errors. In addition, in all training phases student pilots would operate under direct supervision of highly qualified instructor pilots, further minimizing flight mishap potential.

All current training regulations and procedures would be updated as needed to reflect F-35B specific rules, and pilots would continue to adhere to training policies. In addition, the emergency and mishap response plans would also be updated as needed.

Accident Potential Zones. APZ configuration is dependent on runway classes established by DoD Instruction 4165.57. The runways at MCAS Cherry Point are currently designated as Class B, and the introduction of the F-35B would not alter this designation. Proposed construction and demolition projects related to Alternatives 1 through 4 would be consistent with established APZs, and no new Clear Zones would be established.

Bird/Wildlife Aircraft Strike Hazards. Under Alternatives 1 through 4, the F-35B would operate in the same airfield environment as the current aircraft. Therefore, the overall BASH potential is not anticipated to be different following the basing of the F-35B. In addition, F-35B aircrews operating in the MCAS Cherry Point airspace would be required to follow applicable procedures outlined in the MCAS Cherry Point BASH Plan. MCAS Cherry Point has developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes, and has documented detailed procedures to monitor and react to heightened risk of bird/wildlife aircraft strikes (MCAS Cherry Point 2007). When risk increases, limits are placed on low altitude flights and some types of training (e.g., multiple approaches, closed pattern work) in the airfield environment. Furthermore, special briefings are provided to pilots whenever the potential exists for greater bird/wildlife aircraft strikes within the airspace; F-35B pilots would be subject to these procedures.

Explosive Safety. None of the proposed construction or demolition projects are located within any of the ESQD arcs, and existing storage areas, ESQD arcs, explosive safety activities, and procedures would not change as a result of F-35B basing.

Construction Safety. Under Alternatives 1 through 4, construction and demolition activities would occur throughout the flightline areas at MCAS Cherry Point. These activities may expose workers to construction-related risks. However, the proposed construction and demolition activities would not introduce any unique or unusual risks. Specific practices and policies to protect human health and minimize safety risks would be coordinated between the contractor and the Safety Office prior to initiation of construction and demolition activities. Furthermore, all activities would follow all applicable OSHA requirements. In addition to construction worker safety, perimeter fencing would be used to separate the base population from the construction area.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and baseline conditions would remain unchanged.

5.6.3 Summary Comparison of Alternatives

Table 5.6-2 presents a summary of the impacts by alternative.

Table 5.6-2 Safety Summary Comparison of Alternatives

Alternative	Environmental Consequences
Action Alternatives	• Airfield operations would increase (with the exception of Alternative 1); it is not anticipated that the mishap rate would introduce increased safety risks • The proposed construction and demolition activities would be consistent with established APZs and no new Clear Zones would be established • None of the proposed construction or demolition projects is located within existing ESQD arcs; no impacts are anticipated to ordnance storage areas, established safety arcs, or to explosive safety plans and procedures as a result of F-35B basing • No unique or unusual construction risks are posed; construction workers would follow OSHA requirements
No Action Alternative	• Baseline conditions would persist

5.7 Land Use

5.7.1 Affected Environment (Baseline Conditions)

***MCAS Cherry Point Land Use*.** The main station encompasses 11,567 acres, with an additional 14,870 acres of auxiliary properties (USMC 2009e). The primary mission of MCAS Cherry Point is to provide a combat-ready aviation element that includes the training and support of aircrews, combat engineers, and aviation control group personnel.

Current and planned land use at the Air Station is influenced by airfield facilities and environmental constraints associated with creeks, wetlands, and floodplains. Aircraft operational areas include four runways, runway clear zones, and their associated APZs. Other land uses include support and training facilities, administrative, maintenance and supply, housing and community facilities, utilities, forestry, and open space/conservation (DoN 2003a). Land use planning designations for MCAS Cherry Point are defined in Table 5.7-1 and illustrated in Figure 5.7-1.

Consistent with its mission, MCAS Cherry Point uses 3,529 acres of the station (31 percent of the total acreage) for operations and training (USMC 2009e). The most developed portion of the Air Station covers approximately 1,172 acres of land between Runways 5R/32L and 14L/32R and east of Roosevelt Boulevard. Industrial uses, such as aircraft hangars, maintenance, supply, and storage, are located parallel to Runways 5R/32L and 14L/32R. The central and western sections of this core industrial area are less intensely developed, consisting mainly of land uses such as housing, community, administrative, and a few industrial facilities. The remainder of the Air Station is largely undeveloped forestland and primarily classified as undeveloped/forested.

Table 5.7-1 Land Use Planning Designations Defined by MCAS Cherry Point

Land Use	Definition
Administrative/Industrial Facilities	Military and civilian personnel offices, security operations, headquarters, and communication centers.
Operations and Training	Aviation unit operations facilities, maintenance hangars, passenger and freight terminals, and aircraft maintenance facilities. This category also includes airfield uses: runways, overruns, taxiways, aircraft parking areas, navigation aids, and airfield clear zones, as well as the Ordnance Storage Area. The training areas include classroom training, flight simulator training, combat pool training, and outdoor areas.
Housing and Community Facilities	Family housing, billeting, exchange and commissary facilities, banking facilities, library, chapel facilities, and other facilities that directly support personnel living and/or working on MCAS Cherry Point.
Undeveloped/Forested	All forested areas on the Air Station, as well as the golf course, athletic fields, and park and picnic areas. This category also includes the Ordnance Storage Area.

Source: MCAS Cherry Point 1998.

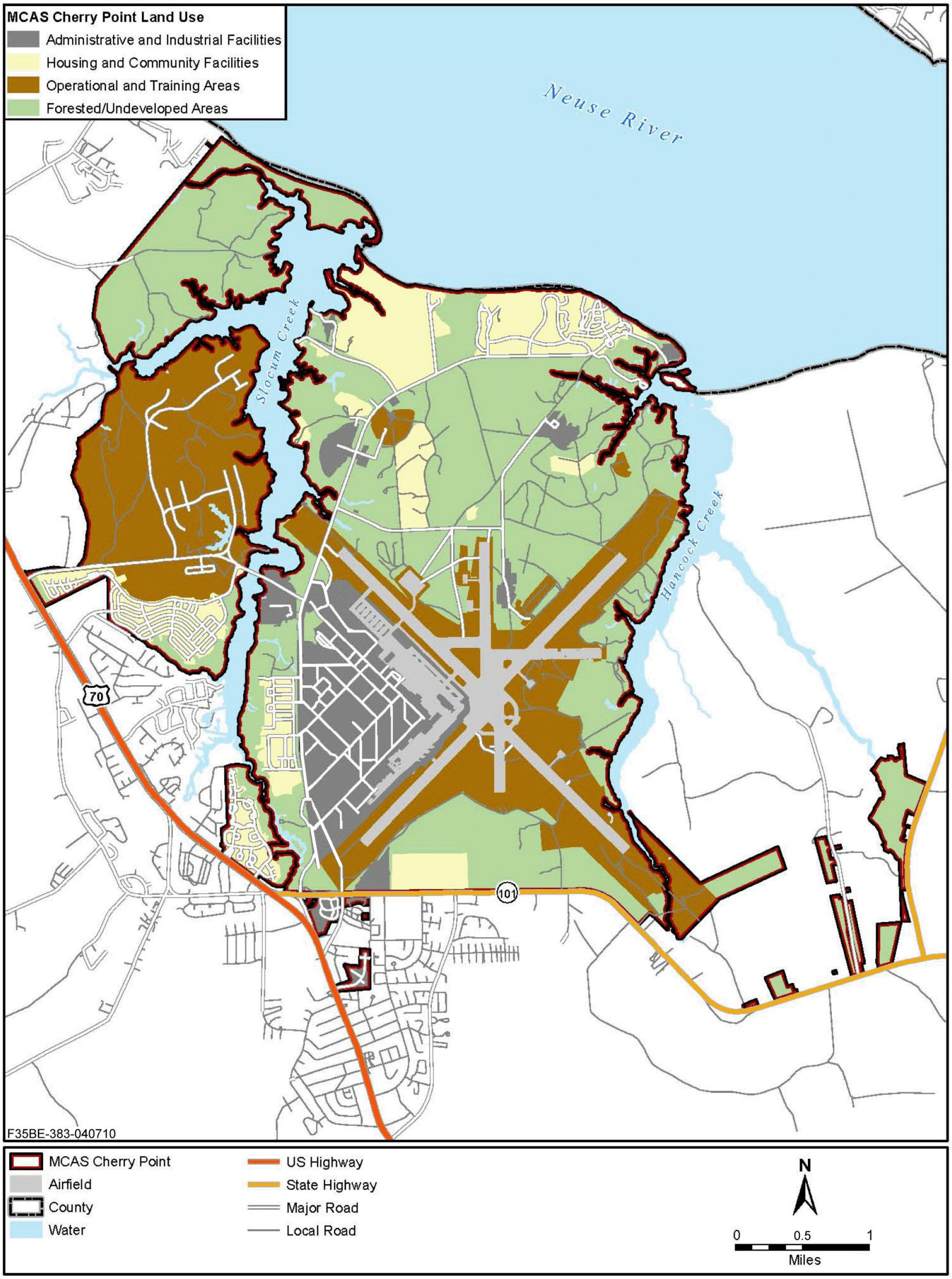


Figure 5.7-1 Baseline Land Use Conditions for MCAS Cherry Point

Much of the undeveloped tracts are used as field maneuver/training areas. Additionally, a portion of the undeveloped land encompasses the surface danger zone of the small arms range complex (USMC 2009e). Ground-based military training opportunities provided on MCAS Cherry Point lands play a vital role in meeting individual training standards of 2nd Marine Aircraft Wing units and other visiting II Marine Expeditionary Force units.

MCAS Cherry Point also manages undeveloped forested areas for ecosystem values and commodity production. Activities include timber production, management of habitats for native and migratory wildlife, threatened and endangered species management, and the application of fire to maintain ecosystem health. These areas also provide additional cover and nesting habitat for game and non-game species. Recreational uses such as hunting, camping, and bird watching are also conducted on undeveloped, forested areas.

***Adjacent Land Uses*.** MCAS Cherry Point boundaries fall within Craven County; however, 14,870 acres of other properties, including Bombing Target (BT)-11, Marine Corps Outlying Landing Field Atlantic, and MCALF Bogue, are located within Carteret County. Land use planning is conducted under the guidance of the 2005 Carteret County Land Use Plan Update (Carteret County 2005). The County is currently updating their Plan and expects completion by 2010.

Carteret County offers plentiful waterfront areas that attract tourists, vacation home owners, and retirees. It has experienced a 95 percent population growth since 1970. The County's Land Use Plan focuses on utilizing the economic opportunity of the increasing retirement and seasonal population as well as creating employment opportunities that are attractive to younger adults. MCAS Cherry Point is the County's leading employer. The Community Vision, as defined in the County's Land Use Plan, strives to balance the benefits of new development with the protection of valuable natural resources that enhance the area. It is anticipated that the western and central portions of the County will continue to grow, including the White Oak Township, which is located in the western portion of Carteret County. Growth projections in the 2005 Land Use Plan estimate that an additional 1,740 acres would be needed to accommodate increases in the permanent and seasonal population from 2005 to 2025. The proposed growth acreage was based upon a population density of 2.86 households per acre and was derived from 2000 Census data (Carteret County 2005). However, the county planning board has increased the projected acreage by 50 percent, making it 2,610 acres. This increase is to allow for unanticipated growth, to provide market flexibility, and to anticipate the acreages of lands that are undevelopable, notably wetlands or other protected lands (Carteret County 2005). The projected acreage needed for future growth would be composed of the following land uses: residential (2,401 acres), commercial (131 acres), institutional (52 acres), and industrial (26 acres).

Current land uses in Carteret County include industrial, residential, institutional, commercial, and undeveloped areas. Over half of the county is considered undeveloped land (182,510 acres or 66 percent), which includes areas that may be used for forestry or agriculture practices. The second largest area (79,964 acres or 29 percent) is classified as institutional, which includes military bases, Federal land, state-owned land, county parks, and beach access points. Residential areas occupy 12,548 acres (5 percent), and commercial and industrial areas occupy a combined 733 acres (0.4 percent) (Carteret County 2005).

Craven County encompasses MCAS Cherry Point and extends northwest around the Neuse River. Land-use planning is conducted under guidelines outlined in its 1996 Land Use Plan Update (Craven County 1996). The City of Havelock prepared a separate Land Use Plan in 1999 (City of Havelock 1999); however, both Craven County and the City of Havelock Land Use Plans are currently being updated and are expected to be completed in 2010.

Like most coastal counties, Craven has experienced population growth since 1960 (approximately 48 percent). Most of the coastal counties have lost their rural nature as they shift toward a retail- and service-based economy with the population centered on urban areas. Growth at MCAS Cherry Point has also contributed to growth within the County. In the 1990 census, over half of Craven County's population lived in New Bern, Havelock, River Bend, and Trent Woods. MCAS Cherry Point is the County's most important economic contributor, employing 19 percent of the County's workforce in 1990. Planning within the County and the City of Havelock are heavily influenced by manpower changes on MCAS Cherry Point (Craven County 1996; City of Havelock 1999).

The majority of Craven County's total area is forested (estimated at 279,000 acres or 55 percent). Farms account for 72,181 acres (14 percent) while State, Federal, and local parks account for 63,694 acres (13 percent). Urban and developed areas cover approximately 37,260 acres (7 percent). Right-of-ways cover the remaining 7,765 acres of land (2 percent). Water covers approximately 42,400 acres (8 percent) of the County (Craven County 1996). Zoning has only occurred around MCAS Cherry Point in the City of Havelock. Land use compatibility with future development is a concern in the county and the City of Havelock.

Within the AICUZ Program (see Sections 3.6 and 3.7), Clear Zones and APZs are identified as areas with the highest potential for aircraft accidents if one were to occur. However, these zones do not reflect the probability of an accident. APZs follow departure, arrival and pattern flight tracks and are based upon analysis of historical data. There are three safety zones:

1. Clear Zone: 3,000 ft immediately beyond the runway and has the highest potential for accidents;
2. APZ I: Extends 5,000 ft beyond the Clear Zone, with a width of 3,000 ft; and
3. APZ II: Extends 7,000 ft beyond APZ 1, with a width of 3,000 ft.

To identify land use compatibility in the adjacent communities with MCAS Cherry Point operations, the Air Station evaluated its safety zones (Figure 5.7-2) and compared them with current land use maps. As shown, most of the Clear Zones are contained within MCAS Cherry Point. Both APZ I and APZ II extend beyond the Air Station into adjacent communities. Table 5.7-2 provides the total area by land use category within the Clear Zones, APZ I, and APZ II for MCAS Cherry Point.

Table 5.7-2 Baseline Land Uses Around MCAS Cherry Point Safety Zones (in acres)

Land Use Category	Clear Zone	APZ I	APZ II	Totals
Rural/Agriculture[a]	1	429	1,659	2,089
Low Density Residential	0	67	34	101
Medium Density Residential	0	0	0	0
Light Industrial	0	238	35	273
Commercial	0	55	7	62
Future Development	0	68	69	137
Public/Quasi-Public[b]	5	51	36	102
MCAS Cherry Point	465	397	490	1,352
TOTAL	**471**	**1,305**	**2,330**	**4,116**

Source: Craven County 2008.
Notes: [a]The acreage from Carteret County (65dB) is included in the "Rural/Agriculture" total acreage.
[b]Public/Quasi-Public lands are owned by federal, state, or local governments.

The Marine Corps has acquired restrictive easements on 1,279 acres of land beyond the boundary of MCAS Cherry Point. These easements were purchased from landowners and allow the Marine Corps to restrict certain activities on the property that would be incompatible with airfield operations (e.g., residential developments) (DoN 2003a).

Land use on the MCAS Cherry Point Range Complex and in surrounding county and municipal jurisdictions is influenced by various factors, all of which contribute to the development of county and local land use management plans. The Marine Corps has an active encroachment control program that strives to reduce incompatible development adjacent to its boundaries or under restricted airspace. Through collaborative efforts, MCAS Cherry Point works in coordination with local municipal, county, state and other non-governmental entities to maintain that land use surrounding the military Installation is compatible with mission readiness and sustainment while allowing for compatible development through various economic growth sectors.

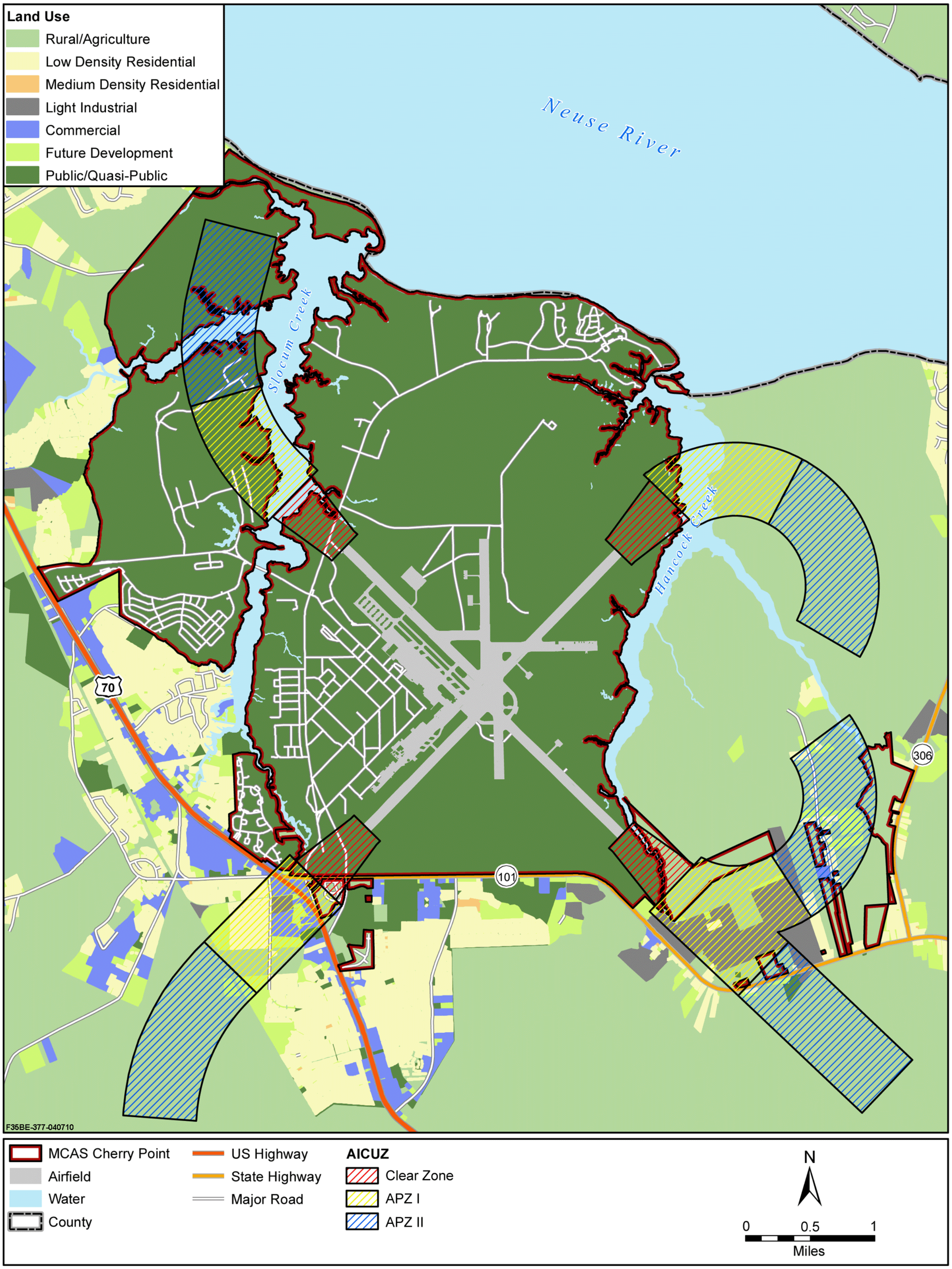


Figure 5.7-2 Baseline Land Uses within MCAS Cherry Point Safety Zones

MCAS Cherry Point executes an encroachment control strategy based upon various planning documents, such as an Encroachment Control Plan and an Encroachment Partnering Strategy. The Encroachment Control Plan has a military training and operations focus directed toward incompatible development within AICUZ zones and considers other military training requirements such as range operations and noise. The Encroachment Partnering Strategy includes a mission focus while considering specific regional natural resources conservation objectives found within multiple federal, state, and non-governmental planning documents (e.g., Onslow Bight Conservation Forum, North Carolina Coastal Habitat Protection Plan, North Carolina State Wildlife Action Plan, and Partners in Flight).

The Cherry Point Encroachment Partnering Strategy was based upon provisions of U.S. Code 264a (National Defense Authorization Act) that encouraged the DoD to partner with eligible entities toward the preservation of lands that could serve the dual purpose of conservation and prevention of incompatible adjacent development. The encroachment strategy for MCAS Cherry Point includes three separate areas of interest (AOIs) based upon conservation values of lands and compatibility with the military mission. Figure 5.7-3 reflects MCAS Cherry Point AOIs. Under this effort, a total of 3,471 acres have been conserved around BT-11 (Piney Island) and 212 acres near the main Air Station.

5.7.2 Environmental Consequences

MCAS Cherry Point. Under Alternatives 1 through 4, all demolition and new construction would occur in the existing flight line area of MCAS Cherry Point, an area that has already been highly developed. However, under Alternative 2, two BEQs would be constructed as shown in Figure 2-20. All construction and demolition activities under any alternative would be consistent with existing land uses and land classifications in the MCAS Cherry Point Master Plan. Operations would not differ from existing conditions in such a manner to impact land uses.

Adjacent Land Uses. The primary issue is the potential for increased incompatibilities with on- and off-Station land uses. These incompatibilities may be associated with changes to the AICUZ safety footprint in combination with encroachment that is fueled by continued population growth outside the Installation boundary. All project-related construction and demolition would occur within the boundaries of the Air Station and would not incur any new direct conflicts with off-Station land uses. Operations would not differ from existing conditions in such a manner to impact adjacent land uses.

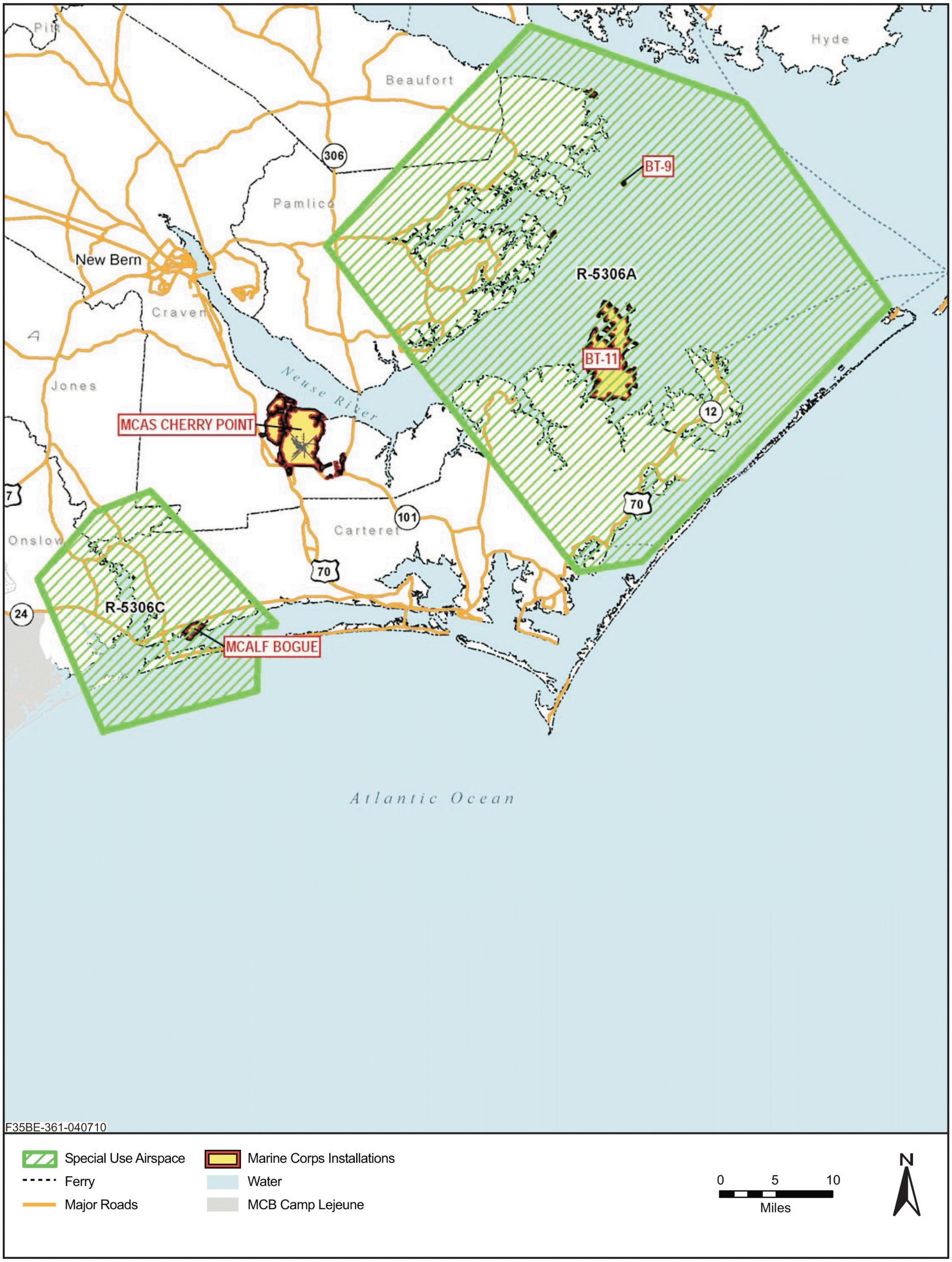


Figure 5.7-3 MCAS Cherry Point Areas of Interest (AOI)

Potential growth induced development; however, could create a need for residential and commercial development associated with projected increases in population. It is anticipated that most of the development would occur within the City of Havelock and nearby portions of Craven County. These areas already support concentrated development. The potential growth induced development within these areas is not anticipated to greatly impact existing land uses. Both the City of Havelock and Craven County have planned for economic and residential growth under their Comprehensive Land Use Plans. In accordance with the City of Havelock's zoning ordinance, new development would be approved in areas that support that zoning classification.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and baseline conditions would remain unchanged.

5.7.3 Summary Comparison of Alternatives

Table 5.7-3 presents a summary of the impacts for the action alternatives and the No Action Alternative.

Table 5.7-3 Land Use Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternatives 1, 3, and 4	• Proposed on-Station construction and operations would be consistent with existing and proposed on-Station land use • Alternatives would not result in land use conflicts with off-Station land uses
Alternative 2	• Proposed on-Station construction and operations would be consistent with existing and proposed on-Station land use • Proposed construction of new BEQs would occur at a site compatible for such development • Alternative would not result in land use conflicts with off-Station land uses
No Action Alternative	• Baseline conditions would persist

5.8 Socioeconomics

5.8.1 Affected Environment (Baseline Conditions)

Demographics. In FY08 MCAS Cherry Point and its tenant commands employed 13,984 personnel. Retired military and civilian personnel associated with the Air Station totaled 12,675 with an additional 26,232 dependents (MCAS Cherry Point 2008c).

As shown in Table 5.8-1, between 1990 and 2000, the population in the City of Havelock and Craven County increased by 12.0 percent and 12.9 percent in Carteret County. In comparison, the state of North Carolina population grew 17.7 percent. Between 2000 and 2007 (the latest year for which consistent data are available) the population for the City of Havelock remained approximately the same; whereas, the populations of Craven County and Carteret County increased by 5.4 percent and 6.4 percent, respectively, from 2000 to 2008. It is expected that the MCAS Cherry Point region will continue to grow. The population of Craven County is expected to increase by 10.4 percent between 2000 and 2020, significantly outpacing Carteret County at 3.8 percent.

Seasonal fluctuations in population are most pronounced in Carteret County. During the summer months of May through August, the population in many of the oceanfront communities increases by several times the normal year-round population. For example, peak seasonal population of Carteret County in 2000 was approximately 134,676 (not including the permanent population), more than twice the permanent year-round population of 59,383 (Carteret Economic Development Council 2009). Due to the smaller tourist industry in Craven County, seasonal fluctuations are not as pronounced.

Table 5.8-1 MCAS Cherry Point Regional Population Trends

Geographic Area	1990[a]	2000[b]	Percent Change (1990 to 2000)	2008 Estimate[c]	July 2010 Projected Population[d]	July 2020 Projected Population[e]	Projected Percent Change (2000 to 2020)
City of Havelock	20,268	22,701	12.0	22,604[f]	--	--	--
Craven County	81,613	91,436	12.0	96,434	99,211	106,394	10.4
Carteret County	52,556	59,383	12.9	63,184	64,144	65,683	3.8
North Carolina	6,628,637	8,049,313	17.7	9,036,449	9,572,644	11,272,964	24.3

Sources:[a]U.S. Census Bureau 1993; [b]U.S. Census Bureau 2009a; [c]U.S. Census Bureau 2009c, [d]NCOSBM 2009a, [e]NCOSBM 2009b, [f]NCOSBM2008 and 2007 data.

Economic Characteristics. MCAS Cherry Point estimated a $1.8 billion direct economic impact on North Carolina in FY08, of which $572 million represented salaries of active military, $132 million for retired military salaries, $564 million on civilian salaries (appropriated, non-appropriated, and retired), $381 million for procurement, and $163 million for construction, maintenance, and service contracts (MCAS Cherry Point 2008c). The installation's payroll and expenditures result in further indirect economic benefits to the region as dollars move through the economy, supporting indirect jobs and expenditures in various economic sectors.

***Employment Sectors*.** In 2000 and 2008, the largest employment sector in Carteret and Craven counties was the educational services, health care, and social assistance sector, which represents 18.0 percent and 17.9 percent for Carteret County, respectively, and 20.8 percent and 20.0 percent for Craven County, respectively, of the civilian labor force 16 years and older. Similarly, the largest employment sector for the City of Havelock in 2000 was the educational services, health care, and social assistance sector at 19.6 percent; employment sector data for 2008 were not available. In contrast, in 2000 the largest employment sector for North Carolina was the manufacturing sector (19.7 percent) closely followed by the educational services, health care, and social assistance sector (19.2 percent). In 2008, the educational services, health care, and social assistance sector (22.0 percent) was the largest employment sector within the state; the civilian labor force in the manufacturing sector decreased to 13.8 percent (U.S. Census Bureau 2009b, 2009c).

In both Carteret and Craven counties from 2000 to 2008 the arts, entertainment, recreation, accommodation, and food services sector increased; from 10.2 percent to 12.13 percent for Carteret County and from 7.5 percent to 10.4 percent for Craven County. This employment sector includes many visitor services potentially related to visitation to the oceanfront communities of Carteret County (U.S. Census Bureau 2009b, 2009c).

In 2000, in the City of Havelock, the Armed Forces consisted of 37.6 percent of the labor force 16 years and older. In Craven County those within the Armed Forces decreased slightly from 9.9 percent in 2000 to 9.4 percent in 2008. Carteret County had the smallest percentage, 1.4 percent, in 2000 and 1.9 percent in 2008. Similarly, for the State in 2000 and 2008 the labor force 16 years and older in the Armed Forces consisted of 1.4 percent and 1.2 percent, respectively (U.S. Census Bureau 2009b, 2009c). In 2008 MCAS Cherry Point employed 8,684 military and 5,300 civilian personnel (MCAS Cherry Point 2008c). This total represented approximately 18 percent of the 2008 Craven and Carteret county labor force (U.S. Census Bureau 2009c).

***Income and Unemployment*.** Table 5.8-2 presents median household income and unemployment rates. In 2000, median household income was lower than the State as a whole. In 2008 Carteret County had a median household income higher than the State. From 2000 to 2008, median household income increased with the most notable increase for the City of Havelock (approximately 37 percent). Over the same period Carteret and Craven counties experienced an increase in median household income of approximately 30 percent and 27 percent, respectively; whereas, the state only increased by approximately 18 percent.

In 2000, the City of Havelock had the highest unemployment rate of those 16 years and older in the civilian workforce within the affected environment at 5.9 percent. Carteret County had the lowest at 4.9 percent. From 2000 to 2008 the unemployment rate increased for the entire affected environment and for the state. In October 2009, the seasonally unadjusted unemployment rates for Carteret and Craven counties were 8.3 percent and 10.3 percent, respectively. The state's seasonally adjusted rate for November 2009 was 10.8 percent (NCESC 2009).

Table 5.8-2 Income and Unemployment Rates

Geographic Area	Median Household Income		Unemployment Rates (percent)		
	2000[a]	2008[b]	2000[a]	2008[b]	2009[c]
City of Havelock	$35,351	$48,290	5.9	10.4	--
Craven County	$35,966	$45,775	5.3	7.2	10.3
Carteret County	$38,344	$49,958	4.9	7.9	8.3
North Carolina	$39,184	$46,107	5.3	6.7	10.8[4]

Sources: [a]U.S. Census Bureau 2009b, [b]U.S. Census Bureau 2009c, [c]NCESCCommission 2009, [4]Seasonally adjusted.

***Housing*.** Family housing at MCAS Cherry Point is currently undergoing reconstruction and privatization. As existing housing units are either demolished and rebuilt, or renovated, the number of military personnel and families living on Station fluctuates greatly and would continue to do so for the foreseeable future. In 2008, the total number of family housing units was 1,748 of which 1,394 were occupied and 354 units were vacant (USMC 2009e).

Unaccompanied personnel housing at MCAS Cherry Point also is in a state of flux. The Marine Corps' BEQ Campaign Plan calls for the construction of additional BEQs necessary to eliminate space deficiencies, provide more space and privacy for Marines, and eliminate barracks with inadequate building condition ratings. All bachelor enlisted personnel of ranks E5 (Sergeants) and below are required to live on Station unless adequate space is not available, in which case Basic Allowance for Housing at the without-dependents rate has been authorized. E6 (Staff Sergeants) and above or equivalent may elect to live off Station and receive Basic Allowance for Housing rather than occupy government quarters. If sufficient space is not available to house all bachelors of Ranks E1 through E5, generally the senior Marines would be the first personnel authorized Basic Allowance for Housing at the without-dependents rate (USMC 2006). At MCAS Cherry Point, approximately 3,100 unaccompanied personnel were housed on Station in 2007 and 420 unaccompanied personnel found housing in the community (Robert D. Niehaus, Inc. 2007). The community housing shortfall for unaccompanied personnel was approximately 80 housing units in 2007 and projected to be 105 units in 2012 (Robert D. Niehaus, Inc. 2007). An FY09 BEQ project for MCAS Cherry Point (not a part of this EIS) would provide an additional 350 spaces (USMC 2009e).

As reported in the U.S. Census Bureau 2006-2008 American Community Survey, there were 43,952 housing units in Craven County, of which 91.3 percent were occupied (Table 5.8-3). The American Community Survey is conducted by the U.S. Census Bureau in every county and provides critical economic, social, demographic, and housing information on an annual basis. In contrast, Carteret County's occupancy rate is significantly lower at 59.1 percent for 45,594 housing units. This variance may be attributed to the number of second vacation homes and seasonal fluctuations within Carteret County due to the oceanfront tourist industry. Carteret County had the highest percentage of owner occupied housing units at 75.9 percent, whereas the City of Havelock had the least at 47.0 percent. Consequently, the City of Havelock had the highest renter occupied housing units at 53.0 percent followed by Craven County at 34.7 percent.

Table 5.8-3 Housing Units 2008

Geographic Area	Housing Units	Percent Vacant	Occupied Housing Units		
			Total	Percent Owner	Percent Renter
City of Havelock	6,360	6.8	5,926	47.0	53.0
Craven County	43,952	8.7	40,145	65.3	34.7
Carteret County	45,594	40.9	26,938	75.9	24.1
North Carolina	4,120,257	14.2	3,533,366	68.1	31.9

Source: U.S. Census Bureau 2009c.

5.8.2 Environmental Consequences

Alternative 1 (Preferred Alternative)

Demographic Impacts. Under Alternative 1, military personnel at MCAS Cherry Point would increase by 1,194 which would represent approximately 8.5 percent of the total Air Station workforce. Combined with the increase of their associated 2,323 dependents, the total population of the Region of Influence (ROI) would increase by 3,517 or about 2 percent.

***Economic Impacts*.** Including their basic pay, and housing and subsistence allowances, the total gain of personnel at MCAS Cherry Point would earn an estimated total of $57.4 million in direct annual income. 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.

Ongoing secondary impacts (direct, indirect, and induced effects) would total an estimated 568 jobs and an estimated $27.2 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 just about 1 percent of the 71,563 people in the region's civilian labor force in 2008 (U.S. Census Bureau 2009c). With unemployment rates averaging 9 percent in the region, 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, it would not be the employment impacts by themselves that would trigger any in-migration to the region, beyond the military personnel and dependents.

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 2004), the Federal government would collect an additional $4.4 million annually, and

North Carolina and local governments would collectively gain $2.9 million annually. Refer to Appendix F for additional information.

Based on best available data, the combined expenditures for military construction (MILCON) projects for this alternative would be $571.1 million and span seven construction years. The reconstruction of the tower and LHD deck project at MCALF Bogue is included in this IMPLAN analysis since it would occur in the MCAS Cherry Point economic region. As shown in Table 5.8-4, the peak year of impacts would be CY6 for projects at MCAS Cherry Point. Total regional employment impacts from construction spending would total an estimated 1,649 full- and part-time jobs in CY6, including 1,173 direct construction jobs, plus 228 indirect jobs to support these construction activities, plus 248 induced jobs from regional purchases due to the increased earnings of impacted workers. Total labor income impacts in that peak year are estimated at $58.4 million.

Table 5.8-4 Alternative 1 Employment and Income Impacts[a] Associated with MILCON Projects

SECTOR	CY1	CY2	CY3	CY4	CY5	CY6	CY7
Employment[b]							
Direct	573	593	765	1,080	922	1,173	542
Indirect	111	115	149	210	179	228	105
Induced	121	125	162	228	195	248	114
TOTAL EMPLOYMENT	806	833	1,076	1,517	1,296	1,649	761
Labor Income[c]							
Direct	20.0	20.7	26.7	37.7	32.2	41.0	18.9
Indirect	4.5	4.7	6.0	8.5	7.2	9.2	4.2
Induced	4.0	4.1	5.4	7.6	6.5	8.2	3.8
TOTAL INCOME	28.5	29.5	38.1	53.7	45.9	58.4	27.0

Source: Estimated for this study with IMPLAN (Minnesota IMPLAN Group 2004).

Notes:

[a]Impacts due to MILCON projects, assuming all expenditures in region. May not add due to rounding.

[b]Number of jobs.

[c]Employee compensation plus proprietors' income (in millions of 2012 dollars).

Overall, the peak year total represents about 2 percent of the region's civilian labor force in 2008 and the peak construction employment represents 19 percent of the 6,034 total regional construction jobs in 2008 (U.S. Census Bureau 2009c). Therefore, whereas the regional labor force should be able to absorb the indirect and induced jobs, it would be likely that some workers would move into the region in response to the direct job impacts in construction. Such impacts are short-term though, and it should be expected that any construction workers who in-migrate would leave the region for other opportunities when the construction projects near completion.

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 2004), the Federal government would collect an additional $910.0 million due to CY6 construction projects alone and $48.0 million over the course of the 7-year construction period. In addition, North Carolina and local governments would collectively gain $5.0 million due to CY6 construction projects, and $24.4 million over the 7 years of construction. Refer to Appendix F for additional information.

***Housing Impacts*.** Given the current state of change in on-Station family housing due to privatization and construction/renovation activities, and the deficit in unaccompanied personnel housing, as a worst case scenario, this EIS will assume that all new military personnel would seek community housing. Under Alternative 1, 1,194 additional military personnel would be assigned to MCAS Cherry Point over 7 years; this would represent approximately 1 percent of the current housing stock in the ROI.

The Housing Market Analysis for MCAS Cherry Point estimates that the military family and unaccompanied personnel community housing shortfall in 2012 would be 1,316 and 105 units, respectively (Robert D. Niehaus, Inc. 2007). The shortfall is, in actuality, somewhat offset by virtue of personnel occupying housing that is not considered “suitable” under Marine Corps standards and is, therefore, counted in the community housing shortfall. An estimated 31.4 percent of the rental stock in the MCAS Cherry Point area (including mobile homes) is unacceptable in quality by Marine Corps standards. This rental housing stock that is considered unsuitable includes 1,421 non-mobile home rental units and 3,952 mobile home units (Robert D. Niehaus, Inc. 2007). Because the Marine Corps has no way to prevent individuals from spending their Basic Housing Allowance on housing that does not meet Marine Corps standards, an unknown percentage of military families likely would occupy these housing units, resulting in a corresponding offset to the estimated community housing shortfall.

In addition, Atlantic Marine Corps Communities at Cherry Point, a military family housing community, is accepting military bachelors, reservists, DoD employees, and military retirees due to low occupancy rates (Atlantic Marine Corps Communities 2010). The availability of this housing would further reduce the demand placed on the community housing market.

As shown in Table 5.8-3 vacancy rates in the City of Havelock and Craven County are about 7 to 9 percent and are higher in the more tourist-oriented Carteret County. The total housing supply has increased by an average of 1,761 units (1.9 percent) annually since 2000 (Robert D. Niehaus, Inc. 2007). The phasing of the personnel influx, the availability of some military housing, plus the historic pace of residential construction in the ROI would lessen the short-term impacts to the local housing market.

Alternative 2

***Demographic Impacts*.** Under Alternative 2, military personnel at MCAS Cherry Point would increase by 2,127 which would represent approximately 15 percent of the total Air Station workforce. Combined with the increase of their associated 4,090 dependents, the total population of the ROI would increase by 6,217 or about 4 percent.

***Economic Impacts*.** Including their basic pay, and housing and subsistence allowances, the total gain of personnel at MCAS Cherry Point would earn an estimated total of $101.5 million in direct annual income under Alternative 2. Ongoing secondary impacts (direct, indirect, and induced effects) from spending associated with the new personnel would total an estimated 1,008 jobs and an estimated $48.4 million in labor income. These employment impacts represent about 1 percent of the 71,563 people in the region's civilian labor force in 2008 (U.S. Census Bureau 2009c). As presented under Alternative 1, many of the new jobs would be filled by the current unemployed labor force, family members of the new personnel, and workers taking second jobs. No in-migration to the ROI would be anticipated. Additional taxes associated with this new economic activity would result in a Federal gain of $7.8 million annually, while North Carolina and local governments would collectively gain $5.1 million annually (Minnesota IMPLAN Group 2004).

Based on best available data, the combined expenditures for MILCON projects for this alternative would be approximately $851.1 million and span eight construction years. The reconstruction of the tower and LHD deck project at MCALF Bogue is included in this IMPLAN analysis since it would occur in the MCAS Cherry Point economic region. As shown in Table 5.8-5, the peak year of impacts would be CY6, resulting in an estimated 2,804 full- and part-time jobs. Total labor income impacts in that peak year are estimated at $99.3million.

Overall, the peak year total represents about 4 percent of the region's civilian labor force in 2008 and the peak construction employment represents 33 percent of the 6,034 total regional construction jobs in 2008 (US Census Bureau 2009c). As with Alternative 1, it would be likely that some workers would move into the region in response to the direct job impacts in construction, but would leave the region when construction projects near completion. Additional taxes associated with construction activities would result in Federal gain of $70.4million over the course of the 8-year construction period. In addition, North Carolina and local governments would collectively gain $36.2 million over the 8 years of construction (Minnesota IMPLAN Group 2004). Refer to Appendix F for additional information.

Housing Impacts**.** Under Alternative 2, 2,127 additional military personnel would be assigned to MCAS Cherry Point. This alternative would also include construction of 2 BEQs that would house a total of 400 personnel. As a worst case scenario, this analysis will assume that, with the exception of 400 unaccompanied enlisted personnel that would occupy the new BEQs, all new military personnel would seek community housing. This assumption is based on the current state of change in on-Station family housing due to privatization and construction/renovation activities, and the deficit in unaccompanied personnel housing. As such, the resulting demand for 1,727 community housing units would represent approximately 2 percent of the current housing stock in the ROI. As with Alternative 1, the phasing of the personnel influx, the availability of military housing, plus the historic pace of residential construction in the ROI would lessen the short-term impacts to the local housing market.

Table 5.8-5 Alternative 2 Employment and Income Impacts[a] Associated with MILCON Projects

SECTOR	CY1	CY2	CY3	CY4	CY5	CY6	CY7	CY8
Employment[b]								
Direct	759	778	1,071	1,270	1,228	1,996	899	173
Indirect	147	151	251	247	281	388	175	34
Induced	160	164	233	268	266	421	190	36
TOTAL EMPLOYMENT	1,066	1,093	1,555	1,785	1,776	2,804	1,264	243
Labor Income[c]								
Direct	26.5	27.2	37.4	44.4	42.9	69.7	31.4	6.0
Indirect	6.0	6.1	10.0	10.0	11.2	15.7	7.1	1.4
Induced	5.3	5.4	7.7	8.9	8.8	14.0	6.3	1.2
TOTAL INCOME	37.8	38.7	55.1	63.2	62.9	99.3	44.8	8.6

Source: Estimated for this study with IMPLAN (Minnesota IMPLAN Group 2004).
Notes: [a]Impacts due to MILCON projects, assuming all expenditures in region. May not add due to rounding.
[b]Number of jobs.
[c]Employee compensation plus proprietors' income (in millions of 2012 dollars).

Alternative 3

Demographic Impacts. Under Alternative 3, military personnel at MCAS Cherry Point would increase by 299 which would represent approximately 2 percent of the total Air Station workforce. Combined with the increase of their associated 623 dependents, the total population of the ROI would increase by 922 or less than 1 percent.

***Economic Impacts*.** Including their basic pay, and housing and subsistence allowances, the total gain of personnel at MCAS Cherry Point would earn an estimated total of $17.4 million in direct annual income under Alternative 3. Ongoing secondary impacts (direct, indirect, and induced effects) from spending associated with the new personnel would total an estimated 145 jobs and an estimated $6.5 million in labor income. These employment impacts represent less than 1 percent of the 71,563 people in the region's civilian labor force in 2008 (U.S. Census Bureau 2009c). As described under Alternative 1, many of the new jobs would be filled by the current unemployed labor force, family members of the new personnel, and workers taking second jobs. No in-migration to the ROI would be anticipated. Additional taxes associated with this new economic activity would result in a Federal gain of $1.1 million annually, and North Carolina and local governments would collectively gain $0.8 million annually (Minnesota IMPLAN Group 2004). Refer to Appendix F for additional information.

Based on best available data, the combined expenditures for MILCON projects for this alternative would be approximately $374.5 million and span seven construction years. The reconstruction of the tower and LHD deck project at MCALF Bogue is included in this IMPLAN analysis since it would occur in the MCAS Cherry Point economic region. As shown in Table 5.8-6, the peak year of impacts would be CY6 for projects at MCAS Cherry Point resulting in an estimated 1,198 full- and part-time jobs. Total labor income impacts in that peak year are estimated at $42.4 million. Overall, the peak year total employment impacts represents about 2 percent of the region's civilian labor force in 2008 and the peak construction employment represents 14 percent of the 6,034 total regional construction jobs in 2008 (U.S. Census Bureau 2009c). As with Alternative 1, it would be likely that some workers would move into the region in response to the direct job impacts in construction, but would leave the region when construction projects near completion.

Additional taxes associated with construction activities would result in a Federal gain of $32.0 million over the course of the 7-year construction period. In addition, North Carolina and local governments would collectively gain $16.2 million over the 7 years of construction (Minnesota IMPLAN Group 2004). Refer to Appendix F for additional information.

Table 5.8-6 Alternative 3 Employment and Income Impacts[a] Associated with MILCON Projects

SECTOR	CY1	CY2	CY3	CY4	CY5	CY6	CY7
Employment Impacts[b]							
Direct	556	408	388	535	665	852	356
Indirect	108	79	75	104	129	166	69
Induced	117	86	82	113	140	180	75
TOTAL EMPLOYMENT	782	573	546	751	935	1,198	501
Labor Income Impacts[c]							
Direct	19.4	14.2	13.6	18.7	23.2	29.8	12.4
Indirect	4.4	3.2	3.0	4.2	5.2	6.7	2.8
Induced	3.9	2.9	2.7	3.7	4.7	6.0	2.5
TOTAL INCOME	27.7	20.3	19.3	26.6	33.1	42.4	17.7

Source: Estimated for this study with IMPLAN (Minnesota IMPLAN Group 2004).
Notes: [a] Impacts due to MILCON projects, assuming all expenditures in region. May not add due to rounding.
[b] Number of jobs.
[c] Employee compensation plus proprietors' income (in millions of 2012 dollars).

***Housing Impacts*.** Under Alternative 3, 299 additional military personnel would be assigned to MCAS Cherry Point over 7 years resulting in demand for 299 community housing units. As a worst case scenario, this analysis will assume that all new military personnel would seek community housing. This assumption is based on the current state of change in on-Station family housing due to privatization and construction/renovation activities, and the deficit in unaccompanied personnel housing. As such, this would represent less than 1 percent of the current housing stock in the ROI. As with Alternative 1, the phasing of the personnel influx, the availability of military housing, plus the historic pace of residential construction in the ROI would lessen any short-term impacts to the local housing market. The housing market in the MCAS Cherry Point area would be expected to have the capacity to respond to the minor increased market demand.

Alternative 4

***Demographic Impacts*.** Under Alternative 4, military personnel at MCAS Cherry Point would decrease by 634, which would represent approximately 5 percent of the total Air Station workforce. Combined with the loss of their associated 1,144 dependents, the total population of the ROI would decrease by about 1 percent.

***Economic Impacts*.** Including their basic pay, and housing and subsistence allowances, the total loss of personnel at MCAS Cherry Point would result in a lost annual payroll of approximately $26.7 million under Alternative 4.

Ongoing secondary impacts (direct, indirect, and induced effects) would result in an estimated 296 lost jobs and an estimated $14.7 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 71,563 people in the region's civilian labor force in 2008 (U.S. Census Bureau 2009c). The long-term loss of these positions may result in a minor increase in the regional unemployment rate as laid-off employees seek new positions. It is possible that laid-off employees may relocate from the local area. However, these effects would be partially offset in the short-term by the gain of jobs as a result of construction expenditures (Table 5.8-7). Changes in civilian and contractor personnel associated with the introduction of the F-35B are anticipated under this alternative; however, the number of these non-military personnel is continually changing as the aircraft and its systems evolve.

Table 5.8-7 Alternative 4 Employment and Income Impacts[a] Associated with MILCON Projects

SECTOR	CY1	CY2	CY3	CY4	CY5	CY6	CY7
Employment Impacts[b]							
Direct	371	223	203	350	480	564	171
Indirect	72	43	39	68	93	110	33
Induced	78	47	43	74	101	119	36
TOTAL EMPLOYMENT	522	313	286	491	675	793	241
Labor Income Impacts[c]							
Direct	13.0	7.8	7.1	12.2	16.8	19.7	6.0
Indirect	2.9	1.7	1.6	2.7	3.8	4.4	1.3
Induced	2.6	1.6	1.4	2.4	3.4	3.9	1.2
TOTAL INCOME	18.5	11.1	10.1	17.4	23.9	28.1	8.5

Source: Estimated for this study with IMPLAN (Minnesota IMPLAN Group 2004).
Notes: [a] Impacts due to MILCON projects, assuming all expenditures in region. May not add due to rounding.
[b] Number of jobs.
[c] Employee compensation plus proprietors' income (in millions of 2012 dollars).

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 2004), the Federal government would lose $2.3 million annually, and North Carolina and local governments would lose $1.4 million annually. Again, 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 (Table 5.8-7). Refer to Appendix F for additional information.

Based on best available data, the combined expenditures for MILCON projects for this alternative would be approximately $228.8 million and span seven construction years. The reconstruction of the tower and LHD deck project at MCALF Bogue is included in this IMPLAN analysis since it would occur in the MCAS Cherry Point economic region. As shown in Table 5.8-7, the peak year of impacts would be CY6 for construction projects at MCAS Cherry Point resulting in an estimated 793 full- and part-time jobs. Total labor income impacts in that peak year are estimated at $28.1 million.

Overall, the peak year total employment impacts represents about 1 percent of the region's civilian labor force in 2008 and the peak construction employment represents 9 percent of the 6,034 total regional construction jobs in 2008 (US Census Bureau 2009c). It is possible that some workers would move into the region in response to the direct job impacts in construction, but would leave the region when construction projects near completion. Additional taxes associated with construction activities would result in a Federal gain of $20.1 million over the course of the 7-year construction period. In addition, North Carolina and local governments would collectively gain $10.2 million over the 7 years of construction.

***Housing Impacts*.** Under Alternative 4, 634 military personnel would be reassigned from MCAS Cherry Point. Using the worst-case (i.e., most conservative) scenario, it was assumed all military personnel that would be reassigned owned homes and would place their homes for sale. As such, this analysis assumed that 634 housing units would be put up for sale at the same time. This would represent about 1 percent of the current housing stock in the ROI. However, it is unlikely that all the military personnel would be reassigned at the same time since this alternative would be phased over 7 years. Further, not all the military personnel who would be reassigned own homes, and not all military personnel that own homes would sell their homes. Therefore, while there may be short-term impacts, the local housing market would be expected to recover.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

5.8.3 Summary Comparison of Alternatives

Table 5.8-8 presents a summary of the impacts by alternative.

Table 5.8-8 Socioeconomic Summary Comparison of Alternatives

Alternative	Environmental Consequences		
	Demographics	Economics	Housing
Alternative 1	• 8.5 percent increase in Air Station workforce • 2 percent increase of ROI population	• Increase in military personnel would result in a long-term gain of $57.4 million in annual payroll income • Expenditure of $571.1 million over 7 years for construction projects on the Air Station • Peak year of construction (CY6) would create 1,649 jobs resulting in $58.4 million in labor income	• Increased demand for housing in ROI would result in short-term impact to housing market

Table 5.8-8 Socioeconomic Summary Comparison of Alternatives

Alternative	Environmental Consequences		
	Demographics	Economics	Housing
Alternative 2	• 15 percent increase in Air Station workforce • 4 percent increase of ROI population	• Increase in military personnel would result in long-term gain of $101.5 million in annual payroll income • Expenditure of $851.1 million over 8 years for construction projects on the Air Station • Peak year of construction (CY6) would create 2,804 jobs resulting in $99.3 million in labor income	• Increased demand for housing in ROI would result in short-term impact to housing market. Worse than Alternative 1
Alternative 3	• 2 percent increase in Air Station workforce • Less than 1 percent increase of ROI population	• Increase of military personnel would result in Increase of $17.4 million in annual payroll income • Expenditure of $374.5 million over 7 years for construction projects on the Air Station • Peak year of construction (CY6) would create 1,198 jobs resulting in $42.4 million in labor income	• Increased demand for housing in ROI • Demand could be met by current housing stock
Alternative 4	• 5 percent decrease in Air Station workforce • 1 percent decrease of ROI population	• Reduction of military personnel would result in long-term loss of $26.7 million in annual payroll income • Expenditure of $228.8 million over 7 years for construction projects on the Air Station • Peak year of construction (CY5) would create 793 jobs resulting in $28.1 million in labor income offsetting negative impacts from loss of military positions	• Increase in for-sale listings in ROI with loss of military personnel would result in short-term impact to housing market
No Action Alternative	• Baseline conditions would persist	• Baseline conditions would persist	• Baseline conditions would persist

5.9 Environmental Justice/Protection of Children

5.9.1 Affected Environment (Baseline Conditions)

In North Carolina, the total minority population is 29.0 percent (Table 5.9-1). Blacks comprise a greater percentage of the population in Craven County as compared to North Carolina as a whole. In the City of Havelock, persons of Hispanic or Latino origin are a higher percentage than found in Carteret and Craven Counties, and in North Carolina as a whole.

Table 5.9-1 Percent Race and Ethnicity, 2000[a]

Jurisdiction	White	Black/ African American	American Indian/ Alaska Native	Asian	Native Hawaiian/ Other Pacific Islander	Hispanic or Latino Origin[b]
City of Havelock	70.5	18.5	0.8	2.5	0.1	9.0
Carteret County	90.3	7.0	0.4	0.5	0.1	1.7
Craven County	69.9	25.1	0.4	1.0	0.1	4.0
North Carolina	72.1	21.6	1.2	1.4	0.0	4.7

Source: U.S. Census Bureau 2009c.

Notes: [a]Data presented reflects most reported race and ethnicity categories; percentages may not add to 100 percent due to rounding.

[b]Hispanic origin may be of any race.

Based on 2000 data, the total percent of individuals living at or below the poverty level in North Carolina was 12.3 percent (U.S. Census Bureau 2009c). In the City of Havelock, 8.6 percent of individuals live below the poverty level. For Craven County, 13.1 percent of the population lives at or below the poverty line. In Carteret County, 10.7 percent of total county population lives at or below the poverty level. Children under the age of 18 represent 24.4 percent of the North Carolina population. Both the City of Havelock and Craven County have higher percentages of children than the state, 28.2 percent and 24.6 percent, respectively. Children make up 20.7 percent of Carteret County's population (U.S. Census Bureau 2009c).

Table 5.9-2 presents baseline total, low-income, and minority populations underlying MCAS Cherry Point noise contours that are affected by noise levels above 65 dB DNL. The affected population under these areas was determined using 2000 Census Bureau census block data to calculate the total affected area in each block, and then used to obtain the percentage of low-income and minority population for that area. The percentage was then used to achieve population estimates under each contour. The 2000 Census data represent the best available data at this time that can be analyzed for potential impacts to low-income and minority populations using geographic information systems. The total population affected by noise levels above 65 dB DNL is approximately 13,952, of which approximately 4,569 and 1,355 are low-income and minority, respectively. The percentage of low-income populations currently affected by noise is 32.7 percent (compared to 14.6 percent for the state), while the percentage of minority populations affected by noise levels 65 dB DNL and above is 9.7 percent (compared to 29.7 percent for the State).

Table 5.9-2 Baseline Low-Income and Minority Populations Underlying MCAS Cherry Point Aircraft Noise Contour Bands

Contour Band (dB DNL)	Total Population	Total Low-Income Population	Percent Low-Income	Total Minority Population	Percent Minority
65-70	5,673	1,844	32.5	559	9.9
70-75	4,328	1,512	35.0	448	10.4
75-80	2,364	764	32.3	222	9.4
80-85	1,435	407	28.4	114	7.9
> 85	152	41	27.0	11	7.2
TOTAL	**13,952**	**4,569**	**32.7**	**1,355**	**9.7**

Source: U.S. Census Bureau 2009c.

5.9.2 Environmental Consequences

Under any of the action alternatives, all construction and demolition activities would occur within MCAS Cherry Point boundaries and would not affect low-income or minority populations, disproportionately or otherwise. No additional safety or health issues would arise for children from implementing any of the alternatives; all on-Station construction would occur within developed areas and be consistent with existing land use designations (refer to Section 5.6 Safety, for specifics on construction safety). Airfield operations would occur within the same areas already used for these purposes. Clear zones and APZs (see Section 5.6) have been established to ensure on- and off-Station land use compatibility and safety. Therefore, no disproportionate safety issues should affect low-income and minority populations or children. Potential Environmental Justice impacts associated with airfield noise impacts are detailed below.

Alternative 1 (Preferred Alternative)

Minority and Low-Income Populations. For Alternative 1, the total number of people, including low-income and minority populations, who would be affected by noise levels greater than 65 dB DNL is presented in Table 5.9-3. There would be 1,654 more people within these populations that could be affected by noise levels 65 dB DNL and greater when compared to baseline conditions. The increase, however, is only 0.3 percent (33.0 percent) more, proportionately, when compared to baseline at 32.7 percent. This would not represent a disproportionate impact to low-income populations. In terms of minority populations, 9.8 percent would be affected when compared to the 9.7 percent found under baseline conditions. Again, this would not represent a disproportionate impact to this population.

Protection of Children. As stated in Section 5.3.2, there are five schools exposed to average noise levels of 65 dB DNL and greater under baseline conditions. Under Alternative 1, noise-level conditions would not change from the five schools already exposed under baseline conditions. As such, no new impacts would be anticipated. Refer to Section 5.3 for additional information on potential noise impacts. Refer to Appendix D, Section D.3 for a discussion on the effects of noise on hearing, health, performance, and learning.

Table 5.9-3 Alternative 1 Low-Income and Minority Populations Underlying MCAS Cherry Point Aircraft Noise Contour Bands

Contour Band (dB DNL)	Baseline			Alternative 1		
	Total Population	Total Low-Income Population	Total Minority Population	Total Population	Total Low-Income Population	Total Minority Population
65-70	5,673	1,844	559	6,818	2,176	661
70-75	4,328	1,512	448	4,707	1,659	495
75-80	2,364	764	222	2,455	820	240
80-85	1,435	407	114	1,509	456	130
> 85	152	41	11	117	32	9
Subtotal Populations	***13,952***	***4,569***	***1,355***	***15,606***	***5,144***	***1,535***
Net Change from Baseline Conditions				**+1,654**	**+576**	**+181**
Percent Impacted under Alternative 1					**33.0**	**9.8**

Alternative 2

Minority and Low-Income Populations. Table 5.9-4 presents the total number of people, including low-income and minority populations, who would be affected by noise levels greater than 65 dB DNL under Alternative 2. In total, 16,589 people (an increase from baseline of 2,637) would be affected by these noise levels. This increase includes 33.1 percent low-income and 9.9 minority populations. For low-income populations, this represents a proportional 0.4 percent increase when compared to baseline and for minority populations there would be a proportional increase of 0.2 percent. As found with Alternative 1, these populations would not be disproportionately impacted when compared to baseline conditions.

Table 5.9-4 Alternative 2 Low-Income and Minority Populations Underlying MCAS Cherry Point Aircraft Noise Contour Bands

Contour Band (dB DNL)	Baseline			Alternative 2		
	Total Population	Total Low-Income Population	Total Minority Population	Total Population	Total Low-Income Population	Total Minority Population
65-70	5,673	1,844	559	6,452	2,073	636
70-75	4,328	1,512	448	5,571	1,920	573
75-80	2,364	764	222	2,751	935	275
80-85	1,435	407	114	1,686	521	149
> 85	152	41	11	129	35	10
Subtotal Populations	***13,952***	***4,569***	***1,355***	***16,589***	***5,483***	***1,643***
Net Change from Baseline Conditions				**+2,637**	**+915**	**+289**
Percent Impacted under Alternative 2					**33.1**	**9.9**

Protection of Children. As stated in Section 5.3.2, there are five schools exposed to average noise levels of 65 dB DNL and greater under baseline conditions. Under Alternative 2, noise levels would remain similar in four of the five schools exposed under baseline conditions, with noise exposure increasing at Havelock Middle School. This noise increase has the potential to be a noticeable, but not substantial impact to children. No other schools would be exposed to average noise levels of 65 dB DNL and greater. Refer to Section 5.3 for additional information on potential noise impacts. Refer to Appendix D, Section D.3 for a discussion on the effects of noise on hearing, health, performance, and learning.

Alternative 3

Minority and Low-Income Populations. Table 5.9-5 presents the total number of people, including low-income and minority populations, who would be affected by noise levels greater than 65 dB DNL under Alternative 3. In total, 17,131 people (an increase from baseline of 3,179) would be affected by these noise levels. This increase includes 33.2 percent low-income and 9.9 minority populations. For low-income populations, this represents a 0.5 percent proportional growth when compared to baseline, and for minority populations there would be a proportional increase of 0.2 percent. As found with Alternative 1, these populations would not be disproportionately impacted when compared to baseline conditions.

Table 5.9-5 Alternative 3 Low-Income and Minority Populations Underlying MCAS Cherry Point Aircraft Noise Contour Bands

Contour Band (dB DNL)	Baseline			Alternative 3		
	Total Population	Total Low-Income Population	Total Minority Population	Total Population	Total Low-Income Population	Total Minority Population
65-70	5,673	1,844	559	5,322	1,725	531
70-75	4,328	1,512	448	6,684	2,230	666
75-80	2,364	764	222	3,087	1,089	324
80-85	1,435	407	114	1,887	595	172
> 85	152	41	11	151	42	12
Subtotal Populations	***13,952***	***4,569***	***1,355***	***17,131***	***5,681***	***1,704***
Net Change from Baseline Conditions				**+3,179**	**+1,113**	**+350**
Percent Impacted under Alternative					**33.2**	**9.9**

Protection of Children. As stated in Section 5.3.2, there are five schools exposed to average noise levels of 65 dB DNL and greater under baseline conditions. Under Alternative 3, noise levels would remain unchanged at Havelock Elementary School from those found at baseline. However, Havelock Middle and High Schools as well as Roger Bell and G.A. Barden Elementary Schools would be exposed to increased noise levels. These noise increases have the potential to be a noticeable, but not substantial impact to children. No other schools would be exposed to average noise levels of 65 dB DNL and greater. Refer to Section 5.3 for additional information on potential noise impacts. Refer to Appendix D, Section D.3 for a discussion on the effects of noise on hearing, health, performance, and learning.

Alternative 4

Minority and Low-Income Populations. For Alternative 4, the total number of people, including low-income and minority populations, who would be affected by noise levels greater than 65 dB DNL is presented in Table 5.9-6. In total, 16,331 people (an increase from baseline of 2,379) would be affected by these noise levels. This increase includes 33.2 percent found in low-income and 9.9 within minority populations. For low-income populations, this represents a 0.5 percent proportional growth when compared to baseline, and for minority populations there would be a proportional increase of 0.2 percent. As found under the other three alternatives, these populations would not be disproportionately impacted when compared to baseline conditions.

Protection of Children. As stated in Section 5.3.2, there are five schools exposed to average noise levels of 65 dB DNL and greater under baseline conditions. Under Alternative 4, noise levels would remain similar to baseline conditions for Havelock Elementary and G.A. Barden Elementary Schools. However, Havelock Middle and High Schools, as well as the Robert Bell Elementary School would experience increased noise-level exposure. These noise increases have the potential to be a noticeable, but not substantial impact to children. No other schools would be exposed to average noise levels of 65 dB DNL and greater under Alternative 4. Refer to Section 5.3 for additional information on potential noise impacts. Refer to Appendix D, Section D.3 for a discussion on the effects of noise on hearing, health, performance, and learning.

Table 5.9-6 Alternative 4 Low-Income and Minority Populations Underlying MCAS Cherry Point Aircraft Noise Contour Bands

Contour Band (dB DNL)	Baseline			Alternative 4		
	Total Population	Total Low-Income Population	Total Minority Population	Total Population	Total Low-Income Population	Total Minority Population
65-70	5,673	1,844	559	6,219	1,999	610
70-75	4,328	1,512	448	5,423	1,857	553
75-80	2,364	764	222	2,792	976	290
80-85	1,435	407	114	1,756	543	156
> 85	152	41	11	141	39	11
Subtotal Populations	***13,952***	***4,569***	***1,355***	***16,331***	***5,415***	***1,620***
			Net Change from Baseline Conditions	**+2,379**	**+847**	**+266**
				Percent Impacted under Alternative 2	**33.2**	**9.9**

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and baseline conditions would remain unchanged.

5.9.3 Summary Comparison of Alternatives

Table 5.9-7 summarizes the impacts of the alternatives considered in this analysis.

Table 5.9-7 Environmental Justice/Protection of Children Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternative 1	• No disproportionate low-income or minority populations impacted by noise levels 65 dB DNL and greater • No disproportionate safety or health impacts would occur to minority and low-income populations due to construction or demolition activities • No safety or health risks introduced to impact children during construction or due to aircraft operational activities • Noise-level conditions would not change from the five schools already exposed under baseline conditions.
Alternative 2	• No disproportionate low-income or minority populations impacted by noise levels 65 dB DNL and greater • No disproportionate safety or health impacts would occur to minority and low-income populations due to construction or demolition activities • No safety or health risks introduced to impact children during construction or due to aircraft operational activities • Noise levels would remain similar in four of the five schools exposed under baseline conditions; noise increase at this one school has the potential to be a noticeable, but not substantial impact to children
Alternative 3	• No disproportionate low-income or minority populations impacted by noise levels 65 dB DNL and greater • No disproportionate safety or health impacts would occur to minority and low-income populations due to construction or demolition activities • No safety or health risks introduced to impact children during construction or due to aircraft operational activities • Noise levels would remain similar in one of the five schools exposed under baseline conditions; noise increase at the other four schools has the potential to be a noticeable, but not substantial impact to children
Alternative 4	• No disproportionate low-income or minority populations impacted by noise levels 65 dB DNL and greater • No disproportionate safety or health impacts would occur to minority and low-income populations due to construction or demolition activities • No safety or health risks introduced to impact children during construction or due to aircraft operational activities • Noise levels would remain similar in two of the five schools exposed under baseline conditions; noise increase at the other three schools has the potential to be a noticeable, but not substantial impact to children
No Action Alternative	• Baseline conditions would persist

5.10 Community Services

5.10.1 Affected Environment (Baseline Conditions)

***Emergency Services and Law Enforcement*.** The MCAS Cherry Point Fire Protection Division provides emergency response to fire and accidents on-Station. The Provost Marshall's Office (PMO) is the primary police station for MCAS Cherry Point's military police force. The PMO receives an average of 1,500 911-calls per year with an average response time of 1.5 minutes or less (USMC 2009e). MCAS Cherry Point has several emergency service agreements with regional service providers. Mutual aid agreements have been signed with Craven County and the City of Havelock for police, fire, and emergency medical services at the Air Station (DoN 2008b).

In Craven County, the City of Havelock's Fire Department provides fire response within the city limits and the Emergency Medical Service (EMS) response area extends out over an approximate 220-square mi area (City of Havelock 2010a). Craven County Sheriff's Department provides public safety services throughout most of the county and eight municipalities, excluding MCAS Cherry Point. The department has three divisions: administration, jail, and school resource officers (Craven County 2010).

Carteret County has 15 EMS providers and 23 fire departments (Carteret County 2010a; 2010b). Carteret County Sheriff's Department provides public safety services for the unincorporated areas of Carteret County. The Sheriff's Department also operates the E-911 communications center (Carteret County 2010c).

***Hospitals*.** Naval Health Clinic Cherry Point, located at MCAS Cherry Point, provides outpatient medical care to military personnel and their dependents. Nearby Naval Hospital Camp Lejeune provides 82-bed inpatient care and a variety of outpatient care services. Active duty military personnel stationed at MCAS Cherry Point and their dependents have access to the services offered at Naval Hospital Camp Lejeune (personal communication, Johnson 2010). Area hospitals include the Craven County Regional Medical Center, a 350-bed hospital located in New Bern; the Carteret General Hospital, a 135-bed facility located in Morehead City; and the Onslow Memorial Hospital, a 162-bed facility located in Jacksonville.

***Schools*.** Twenty four schools within the Craven County School District and 18 schools within the Carteret County School District provide public education to area school-age children. Enrollment data, school capacity, and percent capacity are provided in Tables 5.10-1 and 5.10-2 for the Craven and Carteret County schools, respectively.

Of those attending Craven County schools, 2,562 students (includes 15 pre-kindergarten students), or 18 percent, were federally connected (personal communication, Davenport 2010). Federally connected students include, but are not limited to, children of members of the uniformed services and children whose parents work on Federal Property (DOE 2010a). Within Craven County, there are four private schools for pre-kindergarten to 8th grade and four private schools for students in 9th to 12th grades (Private School Review 2010).

Of those attending Carteret County schools in calendar year 2009/2010, 539 students, or 6.5 percent, were federally-connected (personal communication, Joyner 2010). In addition, two schools located in Carteret County, Tiller Elementary School and Bridges Alternative School, are not included in Table 5.10-2. Tiller Elementary School is a free public charter school that is not considered part of the Carteret County Public School System. Bridges Alternative School is a public alternative school that serves at risk students within the Carteret County School System until they can return to the normal curriculum; it educates students from 3rd to the 9th grades.

Federally connected students include, but are not limited to, children of members of the uniformed services and children whose parents work on Federal Property (DOE 2010a). Impact aid is a Federal program designed to assist local school districts that have lost traditional revenue sources due to the presence of tax-exempt Federal property or that have experienced increased expenditures due to the enrollment of federally connected children. Impact aid provides the school district Basic Support Payments (Section 8003[b]) to assist with the basic educational needs of federally connected students (DOE 2010b). Typically, school districts are eligible if they educate at least 400 federally connected students or the Federally connected students comprise at least 3 percent of the district's total average daily attendance (DOE 2010b). In addition, school districts that educate federally connected children who are eligible for services under the Individuals with Disabilities Act can receive Children with Disabilities Payments (Section 8003[d]) in addition to the Basic Support Payments (DOE 2010b). The Basic Support Payments can be used to fund teacher and teacher aide salaries, textbooks, computers, after school programs; Children with Disabilities Payments must be used to fund the added cost of educating these children (DOE 2010c). A summary of impact aid provided to the Carteret and Craven County schools for FY06 (the most recent data available) is provided in Table 5.10-3.

Table 5.10-1 Enrollment Data for Craven County Schools

Schools	Student Enrollment 2009/2010	Capacity	Percent Capacity
Albert H. Bangert Elementary School	452	481	94
Arthur W. Edwards Elementary School[a]	529	774	68
Ben D. Quinn Elementary School	525	502	105
Bridgeton Elementary School	491	554	89
Brinson Memorial Elementary School	666	940	71
Creekside Elementary School	508	635	80
Graham A. Barden Elementary School[a]	341	390	87
Havelock Elementary School[a]	325	445	73
James W. Smith Elementary School	556	701	79
J.T. Barber Elementary School	364	516	71
Oaks Road Elementary School	429	460	93
Roger R. Bell Elementary School[a]	430	508	85
Trent Park Elementary School	344	450	76
Vanceboro-Farm Life Elementary School	620	695	89
W.J. Gurganus Elementary School[a]	508	520	98
Grover C. Fields Middle School	541	734	74
Havelock Middle School[a]	457	528	87
H.J. MacDonald Middle School	863	1,048	82
Tucker Creek Middle School[a]	563	642	88
West Craven Middle School	805	974	83
Craven Early College	184	200	92
Havelock High School[a]	1,173	1,215	97
New Bern High School	1,819	1,625	112
West Craven High School	1,127	1,055	107
TOTAL	**14,620**	**16,592**	**88**

Source*:* Personal communication, Davenport 2010.
Note: [a]Attended by school-aged students from MCAS Cherry Point.

Table 5.10-2 Enrollment Data for Carteret County Schools

Schools	Student Enrollment 2009/2010	Capacity	Percent Capacity
Atlantic Elementary School (Pre-Kindergarten to 8th grade)	128	200	64
Beaufort Elementary School	474	600	79
Harkers Island Elementary School (Kindergarten to 8th grade)	156	220	71
Newport Elementary School	785	900	87
Smyrna Elementary School (Pre-Kindergarten to 8th grade)	280	350	80
White Oak Elementary School	687	675	102
Morehead Elementary at Camp Glenn (4th and 5th grades)	322	400	81
Bogue Sound Elementary School	436	550	79
Morehead City Primary School (Pre-Kindergarten to 3rd grade)	647	700	92

Table 5.10-2 Enrollment Data for Carteret County Schools

Schools	Student Enrollment 2009/2010	Capacity	Percent Capacity
Beaufort Middle School	258	350	74
Morehead City Middle School	466	600	78
Broad Creek Middle School	589	650	91
Newport Middle School	469	600	78
East Carteret High School	569	850	67
West Carteret High School	1,204	1,400	86
Croatan High School	854	850	100
TOTAL	**8,324**	**9,895**	**84**

Source: Carteret County Public School System 2010; personal communication, Russell 2010.

Table 5.10-3 Federal Impact Aid Payments in Fiscal Year 2006

School District	Basic Support Payments ($)		Children with Disabilities Payments ($)		Total Funds
Federally Connected Student Category	Uniformed	Civilian	Uniformed	Civilian	
Craven County	2,333,670	214,986	137,971	0	2,686,627
Carteret County	24,044	2,378	0	0	26,422

Source: DOE 2009.

Childcare. There are two child development centers on MCAS Cherry Point. One offers child care for children 6 weeks of age to 12 years and the other offers child care for children 6 weeks of age to 5 years. Both centers are open Monday through Friday, 6:00 a.m. to 6:00 p.m. Average wait times for enrollment vary depending on the age, the approximate wait time for infants is 8 to 12 months, and approximately 2 to 5 months for older children. A Family Child Care Program (in-home care by other military families living on Station) is also available that offers trained, certified providers as an alternative to the child development centers (USMC 2009e). In addition to on-Station day care, there are 29 licensed childcare centers and 62 licensed family childcare facilities (in-home childcare) in Craven County and 23 licensed childcare centers and 15 licensed family childcare facilities in Carteret County (North Carolina Division of Child Development 2010).

5.10.2 Environmental Consequences

Table 5.10-4 presents the overall projected net change in Marines and dependents at MCAS Cherry Point.

Table 5.10-4 Projected Net Change in Military Personnel and Dependents at MCAS Cherry Point

Total Personnel and Dependents		Net Change in People by Alternative			
		1	2	3	4
Total Personnel	1,294	+1,194	+2,127	+299	-634
Total Dependents[a]	2,391	+2,323	+4,090	+623	-1,144
Total Children	1,363	+1,324	+2,331	+355	-652
Total Children 6-18 years old	695	+675	+1,189	+181	-333
TOTAL PERSONNEL AND DEPENDENTS	**3,685**	**+3,517**	**+6,217**	**+922**	**-1,778**

Source: MCCS 2007.
Notes:
[a]Marine Corps-wide demographic data representing dependents associated with Marines by grade were used to develop multipliers and calculate an estimated number of families and school-age children associated with the personnel increase.

***Emergency Services and Law Enforcement*.** Under Alternatives 1, 2, and 3 there would be an overall increase of 3,517; 6,217; and 922 Marines and dependents at MCAS Cherry Point, respectively. MCAS Cherry Point currently provides fire/emergency services and police protection for approximately 1,288 military families and more than 3,100 unaccompanied enlisted permanent personnel residing on Station (USMC 2009e). With the increase of Marines and their dependents, response times to emergency situations may be impacted. However, military personnel would not arrive at MCAS Cherry Point at the same time. Therefore, the MCAS Cherry Point would be able to adjust to the gradual increase in military personnel and subsequent demand for emergency services. In addition, the use of mutual aid agreements between Craven County, the City of Havelock, and the Air Station would also be able to provide supplemental service. As such, no long-term impacts to emergency services would be anticipated. Under Alternative 4, there would be an overall decrease of 1,778 Marines and dependents. With the proposed decrease in the number of Marines and their dependents, emergency services and law enforcement should not expect any adverse impacts to response times or strain on services.

In the urban areas off Station, the projected increase could increase average response times for emergency services, as well as require additional EMS squads and law enforcement personnel. Within the more rural portions of the ROI, response times are more a function of distance than the number of residents. Given that the projected increase in population would be gradual, impacts to emergency services and law enforcement are not expected. In addition, the use of mutual aid agreements would also be able to provide supplemental service.

Hospitals. As discussed previously, Naval Health Clinic Cherry Point provides daytime outpatient medical care, and Naval Hospital Camp Lejeune provides inpatient and outpatient care to active duty military personnel stationed at MCAS Cherry Point and their dependents. Additional inpatient care and emergency services are available in area hospitals including the Craven County Regional Medical Center, Carteret General Hospital, or Onslow Memorial Hospital. These facilities offer a variety of medical service and have a total of 647 beds. As such, it is anticipated that there would be no long-term impacts associated with implementation of Alternatives 1, 2, or 3. Alternative 4 would result in a decrease of personnel, which would then in turn reduce the overall demand for hospital care.

Schools. Under Alternatives 1, 2, and 3 it is anticipated that an additional 675; 1,189; and 181 federally connected school-age children would attend schools within the Craven and Carteret County school system, respectively (Table 5.10-5). Based on 2009-2010 enrollment data, Craven County schools have approximately 1,948 available seats and Carteret County schools have approximately 1,571 available seats. To determine which county school district federally connected students would likely attend under each alternative, the current distribution of these students was used. As such, it was assumed approximately 83 percent of federally connected students would attend Craven County schools and 17 percent would attend Carteret County schools. The distribution of federally connected student enrollment by alternative is presented in Table 5.10-5.

Table 5.10-5 Federally Connected Student Enrollment by Alternative

County School District	Available Seats	Net Change in Student Enrollment by Alternative[a]			
		1	2	3	4
Carteret	1,571	+115	+202	+31	-57
Craven	1,948	+560	+987	+150	-276
TOTAL STUDENT ENROLLMENT	**3,519**	**+675**	**+1,189**	**+181**	**-333**

Source: Personal communication, Davenport 2010.
Notes:
[a]Based on federally connected student enrollment data for the 2009-2010 school year, it is assumed that 83% of federally connected students would attend Craven County schools and 17% would attend Carteret County schools.

While the initial increase in students may have a short-term impact to the schools as they adjust to a gradual increase in student enrollment, it is expected that long-term impacts would not occur since there is adequate capacity remaining throughout the Craven and Carteret County school districts.

Under Alternative 4, there would be an overall reduction of 333 school age children. Assuming the reduction of students would reflect the current distribution of federally connected students, the student population in Craven and Carteret Counties would be reduced by 276 and 57, respectively. Since there are currently 24 schools within Craven County and 16 schools (not including Tiller Elementary School and Bridges Alternative School) within Carteret County, the overall reduction is expected to be spread among these 40 schools and would result in no long-term impacts.

Childcare. Under Alternatives 1, 2, and 3 there would be an overall increase of 649; 1,142; and 174 non-school age children. There is currently a wait list at the two on-Station child development centers, which would most likely increase with the subsequent increase in demand. Families with infants would experience the longest wait time. Under Alternative 4, there would be an overall reduction of 319 non-school age children. Given the overall abundance of childcare options, this reduction in non-school age children would not result in any long-term impacts.

Possible solutions to the on-Station child development centers, such as the Family Child Care Program and licensed childcare centers and family childcare facilities, exist. Currently there are 11 homes at MCAS Cherry Point that participate in the Family Child Care Program; each home is authorized to accommodate up to six children (personal communication, Dabrowski 2010). Moreover, there are 129 licensed childcare facilities available throughout Craven and Carteret Counties (North Carolina Division of Child Development 2010). While short-term impacts and inconvenience associated with finding day care would be expected, local facilities would likely respond to the increased demand for services since the military personnel increase would be gradual.

No Action Alternatives

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

5.10.3 Summary Comparison of Alternatives

Table 5.10-6 presents a summary of the impacts by alternative.

Table 5.10-6 Community Services Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternative 1	• Net gain of 1,194 personnel and 2,323 dependents • Increase in school age children by 675; adequate capacity exists • Overall increase in demand for community services
Alternative 2	• Net gain of 2,127 personnel and 4,090 dependents • Increase in school age children by 1,189; adequate capacity exists • Overall increase in demand for community services
Alternative 3	• Net gain of 299 personnel and 623 dependents • Increase in school age children by 181; adequate capacity exists • Overall increase in demand for community services
Alternative 4	• Net reduction of 634 personnel and 1,144 dependents • Decrease in school age children by 333 • Overall decrease in demand for community services
No Action Alternative	• Baseline conditions would persist

5.11 Utilities and Infrastructure

5.11.1 Affected Environment (Baseline Conditions)

Potable Water. MCAS Cherry Point obtains potable water from groundwater wells on the Air Station from the Castle Hayne Aquifer (Table 5.11-1). There are 25 separate wells at MCAS Cherry Point and one water treatment plant. The water treatment plant has a treatment capacity of 6 million gallons per day (mgd). The estimated average annual demand on the water treatment plant is 3.2 mgd (USMC 2009e).

Craven County has a county-wide system that obtains water from the Black Creek Aquifer. No water treatment plant is needed since water is treated at the wells (USMC 2009e). The City of Havelock has one water treatment plant which draws from the Castle Hayne Aquifer. New Bern draws from the Black Creek Aquifer and water is treated at the wells. River Bend draws from the Castle Hayne Aquifer. The town of Trent Woods receives potable water service from New Bern. There are no capacity issues with the potable water supply in the county or any of the selected municipalities (USMC 2009e).

Carteret County obtains its potable water supply from the Castle Hayne Aquifer. There are two county-wide water systems as well as town operated and privatized water systems. Beaufort, Atlantic Beach, and Newport each operate their own water treatment plant. Emerald Isle and Indian Head receive water service from a private entity, Bogue Banks Water Corporation. Bogue Banks Water Corporation has a water treatment plant but it is not used since the water is treated at the wells. Morehead City does not have a water treatment plant as the water is also treated at the wells. There are no potable water supply concerns within the county or any of the selected municipalities (USMC 2009e).

***Wastewater*.** Wastewater at MCAS Cherry Point is conveyed to an on-Station Wastewater Treatment Plant (WWTP) that discharges to the Neuse River. The plant's process and sludge handling systems were designed for an average daily flow of 3.5 mgd, and are currently processing approximately 2 mgd. Treated sludge (not to exceed 350 dry tons) from the plant is applied to sites along the runway clear zones at MCAS Cherry Point. Additionally, approximately 5 percent of the WWTP discharge is used to irrigate the golf course. MCAS Cherry Point upgraded the existing WWTP, which significantly reduced the levels of nitrogen discharged to the Neuse River to 18,100 pounds (lbs) per year, which is 46 percent of the permitted limit of 39,421 lbs per year (MCAS Cherry Point 2008a).

Table 5.11-1 Utilities and Infrastructure within the Affected Environment

County/City	Potable Water			Wastewater		Electricity		Solid Waste	
	Source	Average Daily Demand (mgd)	Capacity (mgd)	Average Flow Rate (mgd)	Max Capacity[a] (mgd)	Provider	Capacity Concerns	Landfill	Capacity
MCAS Cherry Point									
MCAS Cherry Point (Main Station)	Castle Hayne Aquifer	3.2	6.0	2.0	3.5	Progress Energy	None	Tuscarora Regional	50 years
Craven									
County-wide system	Black Creek Aquifer	1.9	2.6	No county-wide system		Progress Energy, Jones-Onslow EMC[b], Carteret-Craven Electric Cooperation, and Tideland EMC	None	Tuscarora Regional	50 years
City of Havelock	Castle Hayne Aquifer	1.2	2.8	1.45	2.24				
New Bern	Black Creek Aquifer	3.98	7	4.5	6.5				
River Bend	Castle Hayne Aquifer	0.285	0.4	0.185	0.31				
Trent Woods	Service from New Bern			Service from New Bern					
Carteret									
County-wide system	Castle Hayne Aquifer	0.3	0.697	No county-wide system		Progress Energy, Jones-Onslow EMC, Carteret-Craven Electric Cooperation, and Tideland EMC	None	Tuscarora Regional	50 years
Beaufort	Castle Hayne Aquifer	0.6	1.0	0.7	1.5				
Atlantic Beach	Castle Hayne Aquifer	0.474	2.5	Septic tanks					
Emerald Isle	Castle Hayne Aquifer	1.48	2.7	Septic tanks		Progress Energy, Jones-Onslow EMC, Carteret-Craven Electric Cooperation, and Tideland EMC	None	Tuscarora Regional	50 years
Morehead City	Castle Hayne Aquifer	1.4	2.5	1.3	1.7				
Newport	Castle Hayne Aquifer	0.43	0.9	0.45	0.6				

Source: USMC 2009e.
Notes: [a]Maximum capacity does not necessarily equal permitted capacity
[b]EMC=Electric Membership Corporation.

Craven County does not have a county-wide wastewater system. The county relies on individual septic systems or other municipally-operated systems for sewage disposal. The Cities of Havelock, New Bern, and River Bend each operate a municipally-owned WWTP. Trent Woods receives wastewater service from New Bern (USMC 2009e). As of August 2009, the City of Havelock had approximately 94,438 gallons per day (gpd) of their 1.9 mgd permitted sewer capacity allotment available (City of Havelock 2009a).

Carteret County does not own or operate a wastewater collection or treatment system. Wastewater disposal and treatment is provided by municipally-owned systems, public or private package treatment systems, and individual septic-tank systems. Atlantic Beach and Emerald Isle are on septic tanks or package treatment systems. Beaufort, Morehead City, and Newport each have a WWTP (USMC 2009e). There are no current capacity concerns for processing wastewater.

Electricity and Telecommunications. The Progress Energy Company provides power directly to MCAS Cherry Point through three feed lines and two delivery substations, one located at Slocum Road and Roosevelt Boulevard and the other located at NC 101. Telecommunication infrastructure on-Station is primarily owned by the Air Station. MCAS Cherry Point is currently expanding on-Station capacity for telecommunications (USMC 2009e).

Progress Energy also provides service to Craven and Carteret Counties. Progress Energy also sells power to smaller, local EMCs which then provide energy to residents and commercial businesses. There are currently no electrical capacity issues with any of the providers. Most of the providers prepare long-term and short-term plans in order to continue to provide electricity to all residents and business owners. Telecommunications service is provided by Sprint, Embarq, AT&T, Time Warner, and Charter Communications (USMC 2009e).

***Solid Waste*.** The Facilities Maintenance Department at MCAS Cherry Point is responsible for the collection of waste and recyclables from all the on-Station areas, excluding the housing areas which have been privatized. The BMAKK Corporation is responsible for maintaining a Transfer Station and transporting the waste to the Tuscarora Regional Landfill. This landfill also serves Craven and Carteret Counties.

The Tuscarora Regional Landfill is operated by the Coastal Regional Solid Waste Management Authority and has been in operation since 1993. The landfill currently occupies 100 permitted acres with an approximate 13 million cubic yard capacity. Given the current capacity and an additional 100 acres of contiguous land for future expansion, the landfill has an expected lifespan of 50 years (personal communication, Hardison 2010). In FY07-08, the landfill received approximately 217,483 tons of solid waste, of which 8,216 tons of solid waste was received from MCAS Cherry Point (USMC 2009e; NCDENR 2008). Recyclables are taken to the Regional Sorting Material Recovery Facility, operated by the East

Carolina Vocational Center. In 2007, the Air Station generated 5,554 tons of recycled materials (USMC 2009e).

5.11.2 Environmental Consequences

Potable Water. Water is consumed by military personnel during operations, as well as by military personnel and their dependents at home. This analysis assumes that the average daily water consumption is the same as the wastewater flow rates. As such, this analysis assumes that each military person at the office and residential user would consume an average of 13 and 69.3 gpd, respectively (USEPA 2002). Refer to Table 5.11-2 for the projected change in water consumption by military personnel during operations for Alternatives 1 through 4. A similar approach was used to calculate the additional residential water consumption from military personnel and their dependents at home on an annual basis.

Table 5.11-2 Projected Water Consumption MCAS Cherry Point Action Alternatives

Alternative	Military Personnel (Operations)		Military Personnel and Dependents (Residential)		Average Potable Water Daily Demand (mgd)[a]	Average Wastewater Flow Rate (mgd)[a]
	Net Population Change	Projected Net Change in Water Consumption (gpd)	Net Population Change	Projected Net Change in Water Consumption (gpd)		
1	1,194	15,522	3,517	243,728	0.285-3.98	0.185-4.5
2	2,127	27,651	6,217	430,838	0.285-3.98	0.185-4.5
3	299	3,887	922	63,895	0.285-3.98	0.185-4.5
4	-634	-8,242	-1,778	-123,215	0.285-3.98	0.185-4.5

Notes: [a]Range for ROI, as indicated in Table 5.11-1.

As stated previously, MCAS Cherry Point has an average potable water daily demand of 3.2 mgd with a total capacity of 6.0 mgd. Under Alternatives 1, 2, and 3, there would be a 0.5, 0.9, and 0.1 percent increase in operational demand. The additional demand could be accommodated by the existing system and no short- or long-term impacts are expected. Under Alternative 4, there would be a decrease in operational demand by 0.3 percent.

The operational-related water consumption estimates are considered conservative since they do not take into account implementation of requirements detailed in Executive Order (EO) 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*. Specifically, water management strategies, including the use of water-efficient and low-flow fixtures, must be implemented, which would minimize the amount of potable water consumed. EO 13514 also requires that all new construction comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* (Guiding Principles). This includes reducing potable water consumption by a minimum of 50 percent over water consumed by conventional means. LEED provides a process to achieve the high performance sustainable building objectives found in EO 13514. All new facilities would meet LEED standards to reduce water consumption.

As indicated in Table 5-11.1, the region's average potable water daily demand ranges from 0.285 to 3.98 mgd, with a total capacity of 0.4 to 7.0 mgd. Under Alternatives 1 through 3, there would be a net increase in potable water demand from residential users. Military personnel and their dependents would stagger their arrival at MCAS Cherry Point over several years, and the overall increase in demand would be spread over the ROI; therefore, no short- or long-term impacts to individual systems are expected. Residential demand would decrease for Alternative 4 by 123,215 gpd.

Wastewater. Wastewater can be generated by military personnel during operations and military personnel and their dependents at home. This analysis assumes that the average daily wastewater flow from office personnel and typical residential dwellings is equal to indoor water consumption. As such, this analysis conservatively assumed that each military person and residential users would produce wastewater flows of 13 and 69.3 gpd, respectively (USEPA 2002).

The WWTP at MCAS Cherry Point is permitted to discharge an average of 3.5 mgd to the Neuse River; however, the actual annual average daily discharge flow is approximately 2 mgd. Assuming that the average quantity of operational-related wastewater discharged is 100 percent of the volume of potable water consumed, there would be an annual increased discharge of 0.8, 1.4, and 0.2 percent under Alternatives 1, 2, and 3, respectively. There would be an annual decrease in wastewater discharge of 0.4 percent under Alternative 4. Since adequate capacity exists at the MCAS Cherry Point WWTP, no short- or long- term impacts are expected.

These operational-related wastewater discharge estimates are considered conservative since they do not take into account implementation of requirements detailed in EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*. As discussed previously under the potable water discussion, water management strategies would be implemented, which would minimize the amount of potable water consumed. This in turn, would minimize the amount of wastewater discharged.

An approximately annual increase of 243,728; 430,838; and 63,895 gpd of residential wastewater would occur from implementation of Alternatives 1, 2, and 3. As indicated in Table 5-11.1, the region's average wastewater flow rate ranges from 0.185 to 4.5 mgd, with a total capacity of 0.31 to 6.5 mgd. Military personnel and their dependents would stagger their arrival at MCAS Cherry Point over several years, and the overall increase in wastewater flow rates would be spread over the ROI; therefore, with exception of the City of Havelock, no short- or long-term impacts to individual systems are expected.

The City of Havelock has approximately 94,438 gpd of their 1.9 mgd permitted sewer capacity allotment available (City of Havelock 2009a). As such, the City of Havelock could be potentially impacted under Alternatives 1 and 2. However, as mentioned previously and discussed in Section 5.8, the phasing in of military personnel and their dependents, the availability of military housing, and the availability of community housing would provide sufficient housing, preventing the need for new construction. As such, it is unlikely the City of Havelock to exceed their wastewater treatment capacity.

Electricity and Telecommunications. The additional personnel at the Station would utilize the current electricity and telecommunication systems in place. There are currently no capacity issues with the services on-Station and no capacity issues are expected with the increase in personnel. The proposed new facilities would require connections to the electricity and telecommunications lines. Specific electrical and telecommunications requirements for the proposed facilities have not been determined, but given there are currently no issues related to capacity or supply an increase in demand for these services would be met by existing infrastructure.

Progress Energy Company is currently the main provider of electricity within the ROI. Craven and Carteret counties also has several smaller suppliers who purchase electricity from Progress Energy Company. None of the power providers have existing capacity issues and none are expected with the proposed population increases in the area. The phased in approach to personnel increases would allow power providers sufficient time to plan and accommodate for the increased demand of service, if necessary. In addition, in accordance with LEED, existing facilities would be managed to reduce energy consumption, and all new facilities would meet LEED standards such as using energy-efficient products.

Solid Waste. Solid waste generated during the demolition, construction, operation, and maintenance of the facilities would be disposed of at the Solid Waste Transfer Station before being transferred to the Tuscarora Regional Landfill or the on-Station Land Clearing and Inert Debris Landfill. The average construction and demolition (C&D) construction debris generation rate is 4.34 pound lbs per square foot (lbs/ft^2) for nonresidential structures, and the average demolition debris generation rate is 158 lbs/ft^2 for nonresidential structures. For residential structures (such as the BEQs), the construction debris generation rate is 4.51 lbs/ft^2 (USEPA 2005c). Approximately 25 to 35 percent of C&D debris is recycled (USEPA 2005c). Under this action, demolition materials would be recycled to the maximum extent practicable. Using a conservative approach, it was assumed that only 25 percent of C&D debris would be recycled. Refer to Table 5.11-3 for the C&D construction and demolition debris estimates for each Alternative.

Assuming all C&D debris is disposed of during the same year, which is a very conservative assumption since proposed construction would occur over several fiscal years, there would be a one-time increase in tonnage disposed of by 13.4, 13.8, 14.4, and 6.8 percent, respectively. Moreover, the estimate assumes only 25 percent of C&D debris would be recycled. In actuality, new construction would be required to meet LEED certification requirements. As such, recycling would occur in accordance with those requirements; for instance, during the construction phase, any materials from site-grading activities that are recyclable would be separated out of the waste stream.

Table 5.11-3 Construction and Demolition Waste Generation in Tons per Year

Alternative	Construction Debris	Demolition Debris	Total C&D Waste	Current Disposal Rate	Percent Change Over Baseline
1	944	28,302	29,246	217,483	+13.4%
2	1,696	28,302	29,998	217,483	+13.8%
3	825	28,302	29,127	217,483	+13.4%
4	516	14,238	14,754	217,483	+6.8%

The USEPA estimates that the average person generates approximately 4.5 lbs of solid waste per day (USEPA 2008). The USEPA estimates that approximately 1.5 lbs of municipal solid waste is recycled (USEPA 2008). As such, the analysis assumes that each military person would generate approximately 3.0 lbs per day during daily work operations. In addition, it was assumed that the total amount of days worked in a year totaled 250 days (5-day work week with 10 Federal holidays). A similar approach was used to calculate the additional solid waste generation from military personnel and their dependents at home on an annual basis. Refer to Table 5.11-4 for the projected change in solid waste generation by military personnel (during work) and for their dependents at home for Alternatives 1 through 4.

The Tuscarora Regional Landfill has approximately 1.2 million tons of remaining capacity under the existing permit. As stated previously, the Tuscarora Regional Landfill disposed of 217,483 tons of waste in FY07-08. As such, under Alternatives 1 through 4, there would be a net change in the total municipal solid waste (reported as tons per year) disposed of by 1.1, 1.9, 0.3 and -0.6 percent, respectively. These solid waste estimates are considered conservative as the recycling rate may be greater than 1.5 lbs per person per day since several types of materials from office operations such as paper, toner cartridges, aluminum cans, glass containers, steel and bi-metal cans, and textiles would be recycled. In addition, EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* requires the diversion of at least 50 percent of non-hazardous solid waste, excluding C&D debris, by the end of FY15. In addition, the estimates provided in Table 5.11-4 include solid waste generated at the workplace and at home, which would result in an overly conservative estimate. Based on the estimated solid waste generated (Table 5.11-4) and the annual permitted disposal rate for the Tuscarora Landfill, the landfill has adequate capacity to accommodate the additional solid waste generated under Alternatives 1, 2, 3, and 4.

Table 5.11-4 Solid Waste Generation in Tons per Year

Alternative	Net Change in Operational Waste	Net Change in Residential Waste	TOTAL Net Change	Current Disposal Rate	Percent Change Over Baseline
1	+448	+1,926	+2,373	217,483	+1.1%
2	+798	+3,404	+4,201	217,483	+1.9%
3	+112	+505	+617	217,483	+0.3
4	-238	-973	-1,211	217,483	-0.6

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

5.11.3 Summary Comparison of Alternatives

Table 5.11-5 for a summary comparison of alternatives.

Table 5.11-5 Utilities and Infrastructure Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternative 1	• Increase in operational-related water consumption and wastewater discharge by military personnel by 15,522 gpd • Increase in residential water consumption and wastewater discharge by military personnel and dependents by 243,728 gpd • Annual increase in solid waste of 2,373 tons • One time increase in C&D debris of 29,246 tons
Alternative 2	• Increase in operational-related water consumption and wastewater discharge by military personnel by 27,651 gpd • Increase in residential water consumption and wastewater discharge by military personnel and dependents by 430,838 gpd • Annual increase in solid waste of 4,201 tons • One time increase in C&D debris of 29,998 tons
Alternative 3	• Increase in operational-related water consumption and wastewater discharge by military personnel by 3,887 gpd • Increase in residential water consumption and wastewater discharge by military personnel and dependents by 63,895 gpd • Annual increase in solid waste of 617 tons • One time increase in C&D debris of 29,127 tons
Alternative 4	• Decrease in operational-related water consumption and wastewater discharge by military personnel by 8,242 gpd • Decrease in residential water consumption and wastewater discharge by military personnel and dependents by 123,215 gpd • Annual decrease in solid waste of 1,211 tons • One time increase in C&D debris of 14,754 tons
No Action Alternative	• Baseline conditions would persist

5.12 Transportation and Ground Traffic

5.12.1 Affected Environment (Baseline Conditions)

***On-Station Roadways*.** Four primary gates provide access to the Air Station; the Main Gate, Cunningham Road Gate (Gate 6), Slocum Gate, and the Back Gate (also known as Staff Capehart Gate; Figure 5.12-1). The Main Gate is off North Carolina (NC) Highway 101, which connects with U.S. Highway 70 adjacent to Havelock. The Main Gate serves morning entry traffic arriving both east and westbound on U.S. Highway 70, and eastbound on NC Highway 101. The Cunningham Road Gate is also a main entry point to the Air Station and is open on weekdays only (closed Saturday and Sunday) and serves all personnel entering or leaving the Air Station. Slocum Gate primarily serves inbound traffic traveling east on U.S. Highway 70 (MCAS Cherry Point 2008b). The Back Gate is currently closed, but can be operated in the event of an emergency. Peak entry times and volume under morning peak-time conditions are shown in Table 5.12-1.

Table 5.12-1 Peak Entry Times and Volume

Gate	Peak Time	Volume
Main Gate	06:15-07:15	1,570
Cunningham Gate	06:00-07:00	1,235
Slocum Gate	06:00-07:00	1,200

Source: MCAS Cherry Point 2008b.

The existing transportation network on MCAS Cherry Point consists of three main roadways: Slocum Road; Roosevelt Boulevard; and Cunningham Boulevard (Figure 5.12-1). Slocum Road provides access to MCAS Cherry Point from U.S. Highway 70 through the Slocum Gate, which is located approximately one-half mile east of U.S. Highway 70. The road passing through the gate is two lanes into the Air Station and one lane out of the Air Station. A 2006 traffic study recommended three inbound lanes be considered for entrance to the Slocum Gate (MCAS Cherry Point 2006). As shown in Table 5.12-1, the Slocum Gate experiences peak in-bound traffic from 6:00 a.m. to 7:00 a.m. During this time, 1,200 vehicles entered through the gate (USMC 2009e). Slocum Road has a maximum capacity restriction of 10,000 passengers per day due to explosive safety limitations from the Air Station's adjacent ammunition bunkers (USMC 2009e). Daily passenger counts currently are near the 10,000 passengers per day cap, and if these daily passenger counts exceed 10,000, three options exist; (1) traffic could be redirected through the City of Havelock to the Main Gate, (2) ordnance storage capacity be reduced, or (3) Slocum Road be relocated (MCAS Cherry Point 2006).

Figure 5.12-1 Existing Transportation Patterns for MCAS Cherry Point

Traffic congestion occurs at the intersection of Slocum Road and U.S. Highway 70 due to security screening at the Slocum Gate especially during peak morning hours (MCAS Cherry Point 2006). Even with efforts to minimize security screening times, congestion remains a problem as the roadway currently exists. Recent capacity analysis indicates that with the exception of the capacity restriction, Slocum Road could accommodate an additional 72,580 vehicles per day (USMC 2009e).

Slocum Road intersects with Roosevelt Boulevard and Alexander Road. Both intersections are signalized. Roosevelt Boulevard is a north-south road which is the main thoroughfare for the Air Station. On the Air Station, Roosevelt Boulevard is a four-lane roadway (two-lanes northbound and two-lanes southbound). Recent capacity analysis for Roosevelt Boulevard indicates it can accommodate an additional 56,571 vehicles per day (USMC 2009e).

The Cunningham Road Gate is located at Cunningham Boulevard where it meets NC Highway 101 approximately 1,600 ft east of the Main Gate at Roosevelt Boulevard (MCAS Cherry Point 2008b). Cunningham Boulevard consists of an open-section, divided four-lane roadway. The Cunningham Road Gate sits within the safety Clear Zone and it has been recommended that due to its location, the gate should be permanently closed (MCAS Cherry Point 2008b). If the Cunningham Road Gate is closed, Cunningham Boulevard would then serve as an internal roadway only, completing the perimeter road connection around the airfield. Recent capacity analysis for Cunningham Boulevard indicates it can accommodate an additional 22,310 vehicles per day (USMC 2009e).

Off-Station Roadways. The main roadway adjacent to MCAS Cherry Point is U.S. Highway 70, which runs northwest to southeast along the western edge of the Air Station. U.S. Highway 70 extends from Asheville east through Winston Salem and Greensboro to Raleigh, Goldsboro, New Bern, Havelock and on to MCAS Cherry Point terminating at Morehead City State Port along the Atlantic Ocean coast (USMC 2009e). Numerous side streets and access points intersect with U.S. Highway 70. Specifically, NC Highway 101 crosses U.S. Highway 70 and extends east and provides access to the Main Gate at Roosevelt Boulevard or Gate 6 at Cunningham Boulevard. U.S. Highway 70 divides MCAS Cherry Point's southern border and the City of Havelock. According to the North Carolina Department of Transportation (NCDOT), the 2008 annual average daily traffic (AADT) for vehicles heading toward the Main Gate via U.S. Highway 70 is 24,000 vehicles; for vehicles travelling on NC Highway 101 toward the Main Gate, the AADT is 8300 (NCDOT 2008a). Recent capacity studies indicate U.S. Highway 70 can accommodate up to an additional 49,000 vehicles per day and NC Highway 101 can accommodate up to an additional 66,600 vehicles per day (USMC 2009e).

5.12.2 Environmental Consequences

Implementation of Alternatives 1, 2, and 3 would all increase personnel numbers to varying degrees at the Air Station (as shown in Table 2-15), and therefore increase in-bound/out-bound vehicular trips per day, correspondingly. Table 5.12-2 shows a summary of vehicular trips per day from each alternative for military personnel only. Civilians and contractor personnel were not included in this estimation because the numbers of civilians and contractor personnel is uncertain at this time (refer to Chapter 2 for more information). Construction traffic would create additional, but short-term impacts to traffic. Under each of these action alternatives, the capacity cap at Slocum Road could be exceeded and could lead to traffic delays at the Air Station's gates. The capacity cap for Slocum Road would continue to be enforced until the three options previously mentioned to alleviate congestion and maximize capacity are evaluated and implemented.

Table 5.12-2 Estimated Number of Vehicular Trips per Day for each Alternative

Alternative	Authorized Legacy Aircraft Military Personnel (Baseline)	Net Change in Military Personnel by Alternative	Net Change in Vehicular Trips per Day Relative to Baseline
1	1,294	+1,194	+2,388
2	1,294	+2,127	+4,254
3	1,294	+299	+598
4	1,294	-634	-1,268

Existing roadways would accommodate the increase in additional vehicles per day that would be generated under Alternatives 1, 2, and 3. Traffic problems exist off-site on U.S. Highway 70 and increasing daily traffic counts could exacerbate congestion during peak travel times. The NCDOT has proposed a bypass for U.S. Highway 70 around Havelock but its implementation is not scheduled (MCAS Cherry Point 2006). Delays may be encountered at the gates; however, capacity could be increased by encouraging carpooling and/or implementing tandem processing to allow additional processing capacity. The increase in vehicular traffic at MCAS Cherry Point could create or worsen delays entering or exiting the Air Station. However, implementation of the alternatives creating impacts to existing levels of traffic safety or creating delays to the existing traffic system would be minimal since changes to processing in-bound vehicles at the gates could be altered to increase processing speed and capacity.

Implementation of Alternative 4 would decrease personnel by 634; thus, decreasing in-bound/out-bound traffic by approximately 1,268 trips per day. Although temporary construction traffic would occur, long-term traffic would decrease.

Additionally, EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* requires the advancement of regional and local integrated planning through the participation in regional transportation planning and recognizing existing community transportation infrastructure. The EO requires that the planning process for new facilities include a consideration of sites that are pedestrian friendly, near existing employment centers, and accessible to public transit.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and baseline conditions would remain unchanged.

5.12.3 Summary Comparison of Alternatives

Table 5.12-3 gives a summary comparison of action Alternatives 1 through 4, and the No Action Alternative.

Table 5.12-3 Transportation and Ground Traffic Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternative 1	• Average Daily Trips would increase by approximately 2,388 • Roadway capacity is sufficient to accommodate additional trips • Slocum Road maximum capacity restriction of 10,000 passengers per day due to explosive safety limitations could be exceeded
Alternative 2	• Average Daily Trips would increase by 4,254 • Roadway capacity is sufficient to accommodate additional trips • Slocum Road maximum capacity restriction of 10,000 passengers per day due to explosive safety limitations could be exceeded
Alternative 3	• Average Daily Trips would increase by 598 • Roadway capacity is sufficient to accommodate additional trips • Slocum Road maximum capacity restriction of 10,000 passengers per day due to explosive safety limitations could be exceeded
Alternative 4	• Average Daily Trips would decrease by approximately 1,268
No Action Alternative	• Baseline conditions would persist

5.13 Biological Resources

5.13.1 Affected Environment (Baseline Conditions)

Vegetation. The flight line area of MCAS Cherry Point where the proposed demolition and construction would occur is primarily developed land bordered by and interspersed with regularly maintained, open grasslands. The nearest forest communities to the proposed construction areas are pine forest and hardwood. The plant communities present at MCAS Cherry Point are mostly maintained grasslands with some areas of pine forest, lower slope mixed hardwoods, inland floodplain swamp forests, freshwater marshes, and coastal fringe forests (MCAS Cherry Point 2009e). Figure 5.13-1 illustrates the broad vegetation types present at MCAS Cherry Point.

Terrestrial Wildlife. Terrestrial wildlife inhabiting the flight line area of MCAS Cherry Point is sparse and includes common urban species such as white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), and many species of songbirds. In addition, the land beneath the airspace associated with the flight line is inhabited by wildlife species common to eastern forests and marshlands such as beaver *(Castor canadensis)*, muskrat (*Ondatra zibethicus*), bobwhite quail (*Colinus virginianus*), black bear (*Ursus americanus*), and Florida cottontail (*Sylvanagus floridanus*) to name a few. Gum swamp wetlands, scattered over the Air Station, provide important habitat for wintering waterfowl, reptiles, and amphibians.

Birds. MCAS Cherry Point sees a wide array of migratory birds because of its central/coastal position in the Atlantic Flyway. The Atlantic Flyway is heavily utilized by migratory birds and waterfowl during spring and fall. The nearshore habitats at MCAS Cherry Point support numerous bird species. The waters and shorelines of the sounds, rivers, and ocean beneath the airspace utilized for airfield operations at the Air Station provide important foraging and roosting habitats for migratory, wintering, and resident-breeding marine birds, including shorebirds, waterfowl, wading and diving birds, and generalist waterbirds (e.g., gulls). The nearshore habitats also serve as a migratory corridor for various marine birds (e.g. terns). The shallow water estuarine habitat is heavily used by waterbirds for foraging and on-water resting habitat (MCAS Cherry Point 2009e). Black ducks (*Anas rubripes*), wood ducks (*Aix sponsa)*, Canada geese (*Branta canadensis*), and mallards (*Anas platyrhynchos*) nest at MCAS Cherry Point. Large numbers of diving ducks, such as ruddy ducks (*Oxyura jamaicensus*), scaup (*Aythya* spp.), canvasback (*Aythya valisineria*), and ringneck ducks (*Aythya collaris*) use the open waters of Slocum and Hancock creeks and the Neuse River during the winter months. A full description of all wildlife and their associated habitats at MCAS Cherry Point is found within the Integrated Natural Resources Management Plan (INRMP). Species occurrences throughout the area vary greatly spatially due to strong association with the substrate type present (MCAS Cherry Point 2009e).

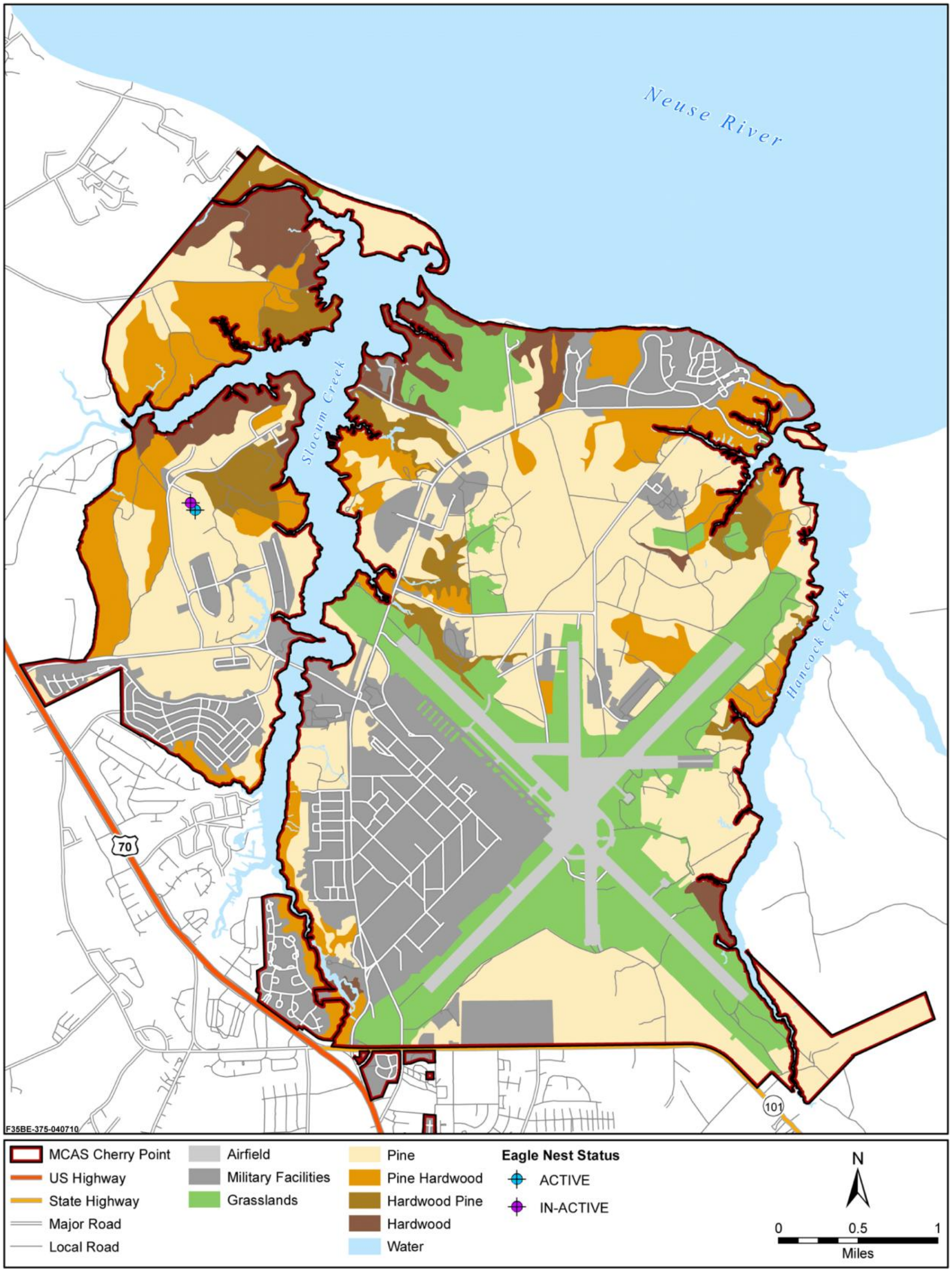


Figure 5.13-1 Classification of MCAS Cherry Point Ecological Areas

MCAS Cherry Point operates in accordance with EO 13186, *Migratory Bird Conservation*. A BASH Plan is utilized at the Air Station to prohibit mishaps involving aircraft and migratory birds (see Section 5.6 for a full description of the BASH Plan).

Special Status Species. The INRMP for MCAS Cherry Point lists 14 special status species that occur or could potentially occur on the Air Station or in the surrounding waters (MCAS Cherry Point 2009e). Table 5.13-1 includes a list of all the Federally and State listed species that could potentially be found at MCAS Cherry Point, the status of its listing, a brief description of its habitat, and the potential of the species to occur within the ROI (for definition of ROI see Section 3.13).

The bald eagle (*Haliaeetus leucocephalus*) was formerly listed as threatened but is now recovered and delisted, although it remains protected from incidental take under the Federal Bald and Golden Eagle Protection Act. Bald eagles are primarily associated with open water areas fringed with riparian habitat and are typically found along the coasts, rivers, and lakes where nesting occurs in tall, living trees. One active bald eagle nest currently is known at MCAS Cherry Point and are shown in Figure 5.13-1. The primary threats to this species are human activities that can cause them to abandon their nest, not properly incubate eggs, or not care for young.

Bird/Wildlife Aircraft Strike Hazard**.** MCAS Cherry Point Air Station Order 3000.2B established the Bird Hazard Working Group. This group is tasked with collecting, compiling and reviewing data on bird strikes, identifying and recommending actions to reduce hazards, recommending changes in operational procedures, preparing informational programs for aircrews, and serving as a point of contact for off-Station BASH (MCAS Cherry Point 2009e). The Marine Corps devotes considerable attention to avoid the possibility of bird/wildlife aircraft strikes. Special purpose permits may be requested and issued that allow for the relocation or transport of migratory birds for management purposes. See Section 5.6 for additional information on BASH.

Table 5.13-1 Potential Occurrence of MCAS Cherry Point Special Status Species in the ROI[a]

Type	Scientific Name	Common Name	Federal Listing	State Listing	Habitat Requirements	Potential Occurrence
Plants	*Solidago verna*	Spring-flowering Goldenrod	FSC[b]	T[b]	Spring-flowering goldenrod habitats include pine savannas, pocosins, and pine barrens.	Not likely to occur in ROI. Suitable habitat is not present.
	Lysimachia asperulifolia	Rough-leaved Loosestrife	E[b]	E	Rough-leaved loosestrife generally occurs in the ecotones between longleaf pine uplands and pond pine pocosins on moist to seasonally saturated sands and on shallow organic soils overlaying sand. It has not yet been documented as occurring at MCAS Cherry Point.	Not likely to occur in ROI. Suitable habitat is not present.
	Aeschynomenic virginica	Sensitive Jointvetch	T	E	Sensitive joint-vetch grows in the intertidal zone where plants are flooded twice daily. Not yet documented at MCAS Cherry Point.	Not likely to occur in ROI. Suitable habitat is not present.
	Carex chapmanii	Chapman's Sedge	NA[b]	W1[b]	Chapman's sedge inhabits wet, sandy, acidic soils, sometimes over limestone, under deciduous or mixed deciduous-evergreen forests.	Not likely to occur in ROI. Suitable habitat is not present.
Birds	*Halieetus leucocephalus*	Bald Eagle	NA[b]	T	Bald eagles live near rivers, lakes, and marshes.	Known occurrence in ROI. Active nest (RN14) located on Cherry Point.
	Picoides borealis	Red-cockaded Woodpecker	E	E	Red-cockaded woodpecker habitat is composed of open pine stands with trees that are approximately 60 years old.	Not likely to occur in ROI. Suitable habitat exists in ROI.
Reptiles	*Malaclemys terrapin centrata*	Carolina Diamondback Terrapin	FSC[b]	SC	The Carolina diamondback Terrapin is found in tidal channels of sounds and estuaries that are bordered primarily by *Spartina* spp.	May occur in ROI. Suitable habitat exists in ROI.
	Alligator mississippiensis	American Alligator	T(S/A)[c]		American alligators live in wetland areas.	Known to occur in ROI. Suitable habitat exists in ROI.
	Sistrurus milarius	Carolina Pygmy Rattlesnake	NA	SC	Pygmy rattlesnake habitat is composed of pine flatwoods and sandy, open woodlands with pines, wiregrass, and scrub oaks, and is frequently near cypress ponds and other bodies of water.	May occur in ROI. Suitable habitat exists in ROI.

Notes: [a]For the purposes of this table, the ROI is the flight line, areas of demolition and construction, and the airspace utilized for take-offs, landings, and touch-and-go operations at MCAS Cherry Point.

[b]E = Endangered, T = Threatened, T(S/A) = Threatened due to Similarity of Appearance, SC = Special Concern, FSC = Federal Species of Concern (These species are not protected under the ESA but have declining numbers that warrant monitoring), SC = State Species of Concern, SR = State Rare, W1 = North Carolina Watch List; rare, but relatively secure, NA = Not Applicable, Y = Yes, N = No.

[c]Although still listed as Federally threatened, the American alligator is considered recovered.

Source: MCAS Cherry Point 2009e

5.13.2 Environmental Consequences

Vegetation. For Alternatives 1 through 4, demolition and construction activities would take place along the flight line or in developed areas of the Air Station. The flightline area is primarily cleared and developed, and vegetation cover in this area is comprised of non-native annual grassland. Proposed locations of new facilities are within or very near the locations of existing facilities requiring demolition. There would be no impacts to native vegetation or important wildlife habitats (including wetland habitats) from demolition or construction activities associated with Alternatives 1, 3, and 4.

In addition, under Alternative 2, construction of community support facilities (i.e., Marine Corps Community Services (MCCS) 7-Day Store, Fitness Center, Chow Hall, and Access/Duffy Road improvements) north of the flight line would require the loss of up to 26.8 acres of vegetation. There would be no impacts to important wildlife habitats (including wetland habitats) from these construction activities.

Use of the airfield at MCAS Cherry Point under all four action alternatives would not impact vegetation.

Terrestrial Wildlife. Under Alternatives 1 through 4, demolition, and construction would occur along the flight line, in already disturbed or developed land, or within the grass buffer. The grass buffer is designed and managed to limit the presence of wildlife in proximity to flight line operations. Because of this, there would not be a substantial loss or degradation of habitat or ecosystem functions (natural features and processes) essential to the persistence of native plant and animal populations. Resident wildlife would experience minor, short-term disturbance associated with construction noise. Given that the proposed demolition and construction activities would occur in an airfield environment, the noise associated with construction is not anticipated to have long-term or detrimental impacts to terrestrial wildlife.

In addition, under Alternative 2, construction of community support facilities (i.e., MCCS 7-Day Store, Fitness Center, Chow Hall, and Access/Duffy Road improvements) would occur north of the flight line. Since the proposed construction location is located close to the flight line, there would not be a substantial loss or degradation of habitat or ecosystem functions essential to the persistence of native plant and animal populations. Further, residential wildlife would experience minor, short-term disturbance associated with construction noise; however, since the proposed construction location is located near the airfield environment, the noise associated with construction is not anticipated to have long-term or detrimental impacts to terrestrial wildlife.

Other potential sources of impacts to wildlife would be from the associated noise resulting from touch-and-go operations, takeoffs, and landings. Noise modeling results indicate some increase in noise exposure levels at the MCAS Cherry Point airfield with the introduction of the F-35B squadrons (see Section 5.2). Subjecting wildlife to any increase in noise levels has the potential to elicit a negative response, including startle response, possible injury due to trampling or uncontrolled running or flight, increased expenditure of energy during critical periods such as breeding, temporarily masking auditory signals, and/or reducing the protection and stability of young. Because the F-35B is a new aircraft, no studies of noise effects on wildlife exist from this aircraft. The studies cited below describe the effects of aircraft noise on wildlife from other similar aircraft and the general response from wildlife would be similar for noise associated with the F-35B.

Generally, aircraft noise is thought to be the most detrimental during periods of stress such as winter, gestation, and calving (Pepper *et al.* 2003, DeForge 1981). Studies on the effects of noise on wildlife have been predominantly conducted on mammals and birds. Some studies have shown that the responses to noise are transient and of short duration and suggest that the animals habituate to the sounds (Workman *et al*. 1992; Krausman *et al*. 1993, 1998; Weisenberger *et al*. 1996). Similarly, the impacts to raptors and other birds (e.g., waterfowl, grebes) from low-flying aircraft were found to be brief and not detrimental to reproductive success (Smith *et al*. 1988, Lamp 1989, Ellis *et al*. 1991, Grubb and Bowerman 1997).

At the flight line, species inhabiting nearby habitats would likely have acclimated to the noise and visual presence of jet aircraft.

Birds. Alternatives 1 through 4 would not alter habitat for migratory birds. As with terrestrial wildlife, long-term noise impacts to migratory birds in proximity to the flight line from construction or aircraft operation are not anticipated (see *Wildlife* discussion above for information on potential impacts to terrestrial species).

***Special Status Species*.** No special status species are known to occur or potentially occur in the proposed demolition and construction areas under Alternatives 1 through 4. However, two bald eagle nests occur within proximity to flight tracks; only one nest is currently active. The bald eagles nesting there would be acclimated to the noise impacts associated with aircraft activity. Current Federal regulations would not consider any activities from the overflights associated with the action alternatives as a “take.” No additional measures are required for protection of this species, other than what is currently laid out the MCAS Cherry Point INRMP. Likewise, the existing American alligators and Carolina diamondback terrapin inhabiting MCAS Cherry Point would be habituated to aircraft activity and would not be impacted by changes under the action alternatives (see *Wildlife* discussion above for information on potential impacts to terrestrial species).

Bird/Wildlife Aircraft Strike Hazard. Under Alternatives 1 through 4, the F-35B would operate in the same airfield environment as the current aircraft. Therefore, the overall BASH potential is not anticipated to be different following the basing of the F-35B. In addition, F-35B aircrews operating in the MCAS Cherry Point airspace would be required to follow the same applicable procedures outlined in the current MCAS Cherry Point BASH Plan. MCAS Cherry Point has developed aggressive procedures designed to minimize the occurrence of bird/wildlife-aircraft strikes, and has documented detailed procedures to monitor and react to heightened risk of bird/wildlife aircraft strikes (MCAS Cherry Point 2007). When risk increases, limits are placed on low-altitude flights and some types of training (e.g., multiple approaches, closed pattern work) in the airfield environment. Furthermore, special briefings are provided to pilots whenever the potential exists for greater bird/wildlife aircraft strikes within the airspace; F-35B pilots would be subject to these procedures. Refer to Section 5.6 for further information on BASH.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

5.13.3 Summary Comparison of Alternatives

Table 5.13-2 gives a comparison of each action alternative and the No Action Alternative.

Table 5.13-2 Biological Resources Summary Comparison of Alternatives

Alternative	Environmental Consequences
Alternatives 1, 3, and 4	• Construction and demolition would take place within the grassy airfield environment or in areas previously disturbed • Short-term impacts from construction disturbance to terrestrial wildlife, but would not constitute a threat to any species or ecological community; no long-term impacts to wildlife due to noise • No long term impacts to migratory birds • No impacts to special status species
Alternative 2	• Loss of 26.8 acres of vegetation from construction of community support facilities • Short-term impacts from construction disturbance to terrestrial wildlife, but would not constitute a threat to any species or ecological community; no long-term impacts to wildlife due to noise • No long-term impacts to migratory birds • No impacts to special status species
No Action Alternative	• Baseline conditions would persist

5.14 Geology, Topography, and Soils

5.14.1 Affected Environment (Baseline Conditions)

Geology. MCAS Cherry Point is located in the Atlantic Coastal Plain portion of North Carolina. The Atlantic Coastal Plain consists of mostly marine sedimentary rocks that tilt seaward, formed from ocean sediments deposited during the Late Cretaceous Period to the present times (USGS 2009). MCAS Cherry Point does not lie within any known geological hazard areas.

Topography. MCAS Cherry Point is part of the Talbot Terrace Plain, which is composed of unconsolidated marine sediment deposits. The land surface is characterized by broad, flat terraces between major stream valleys. Land elevations range from approximately msl near the Neuse River, Slocum Creek, and Hancock Creek to 25 to 33 ft above msl on the terraces (MCAS Cherry Point 2009e).

Soils. There are 27 different soils found within the boundaries of MCAS Cherry Point. Figure 5.14-1 identifies the locations of all the soils present on MCAS Cherry Point.

5.14.2 Environmental Consequences

Under Alternatives 1 through 4, all demolition and new construction would occur in the existing flight line area of MCAS Cherry Point. The flight line area of MCAS Cherry Point where the proposed demolition and construction would occur contains five soil types. The majority of the soil on the flight line is Bragg. Areas of Bragg soil have been cut, filled, or graded. The second most common soil on the flight line is Urban land, followed by Lynchburg-Urban land complex, Goldsboro-Urban land complex, and Goldsboro loamy fine sand. Urban land pertains to areas that are covered by at least 75 percent asphalt or buildings. The Urban land complexes are units covered with less than 75 percent asphalt or buildings, but maintain many similar characteristics of urban land.

The topography of MCAS Cherry Point would not be affected by the action alternatives because the area of demolition and construction is already developed and flat, so the amount of required grading would be minor. The proposed demolition and construction activities would not increase potential for exposure to geologic hazards at MCAS Cherry Point because no unstable geologic units exist in the area.

The soils at MCAS Cherry Point in the flight line area would undergo temporary impacts during the demolition and construction phases of Alternatives 1 through 4. During demolition and construction, standard erosion and sedimentation control techniques would be utilized to minimize impacts to soil. MCAS Cherry Point's Stormwater Pollution Prevention Plan (SWPPP) outlines the necessary erosion and sediment controls.

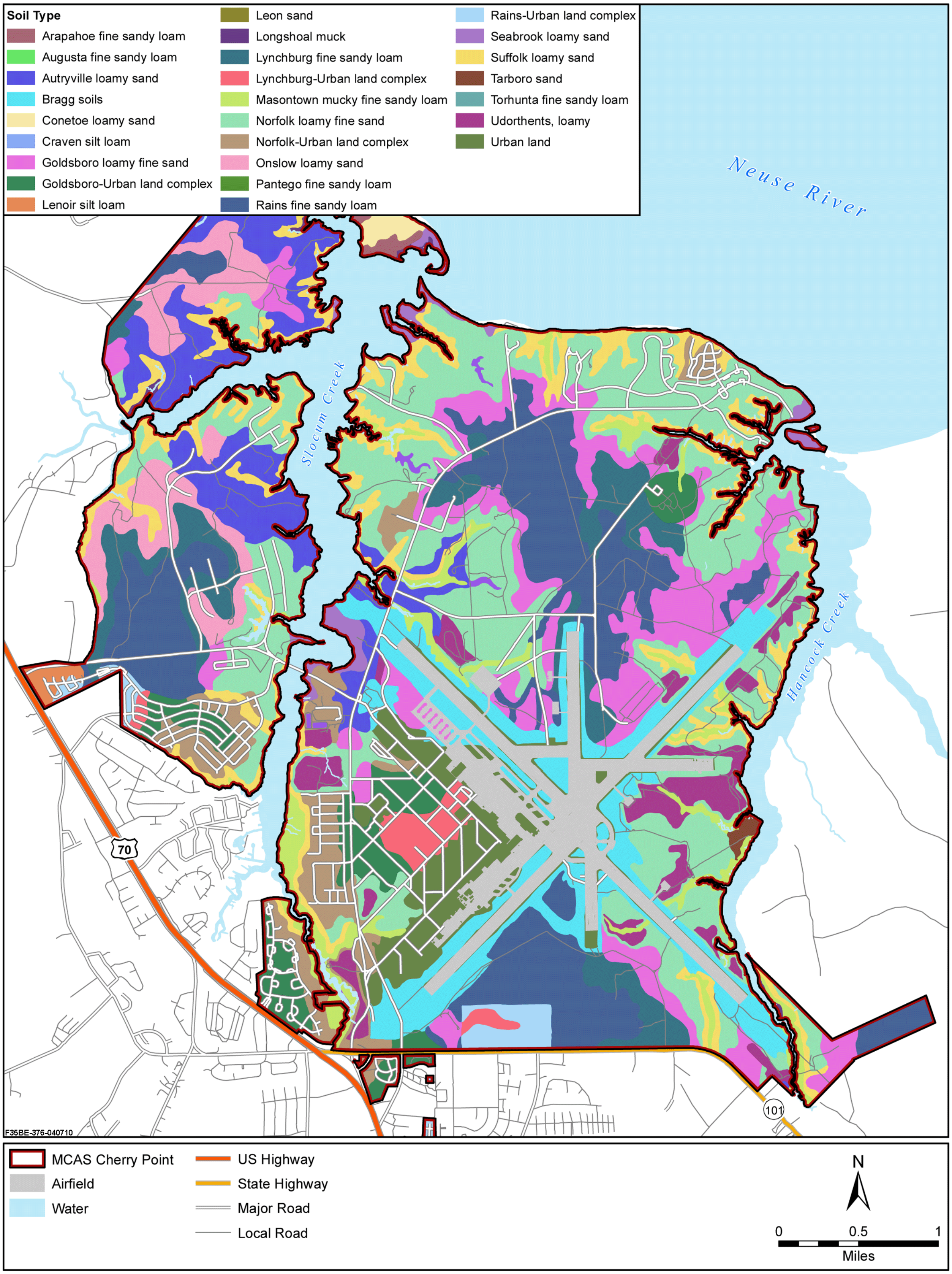


Figure 5.14-1 MCAS Cherry Point Soils

The vegetative erosion controls that could be implemented include temporary seeding, permanent seeding, sod stabilization, vegetative buffer strips, and the protection of trees. Sediment controls commonly practiced at MCAS Cherry Point include: earth dikes, silt fences, straw bales, grassed drainage swales, check dams, level spreaders, subsurface drains, pipe slope drains, storm drain inlet protection, rock outlet protection, stormwater detention/retention basins, and sediment traps. The increase in impervious surfaces from construction could result in higher stormwater runoff levels, which in turn could lead to erosion in under-engineered drainages. However, use of proper stormwater management practices and BMPS as outlined in the Air Station's SWPPP, would avoid any adverse impacts caused by increased impervious surface cover (MCAS Cherry Point 2003). Additionally, use of Low Impact Development (LID) techniques with regard to minimizing stormwater impacts would occur wherever practicable. LID techniques would strive to maintain or restore natural hydrologic functions of a site and achieve natural resource protection as well as fulfilling requirements as described by applicable Marine Corps, Department of the Navy (DoN), DoD, and EO 13514 LID policies. For further discussion of stormwater, see Section 5.15.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

5.14.3 Summary Comparison of Alternatives

Table 5.14-1 presents a summary comparison of the action alternatives and the No Action Alternative.

Table 5.14-1 Geology, Topography, and Soils Summary Comparison of Alternatives

Alternative	Environmental Consequences
Action Alternatives	• Minimal grading required due to flat topography • No impacts to geology from construction or demolition • Short-term impacts to soils from construction activities, but impacts would be minimized through standard erosion and sedimentation control procedures
No Action Alternative	• Baseline conditions would persist

5.15 Water Resources

5.15.1 Affected Environment (Baseline Conditions)

***Surface Water/Stormwater*.** MCAS Cherry Point is located within the Neuse River Basin (Figure 5.15-1). The Neuse River is 275 miles (mi) long, originating northeast of Durham, NC by the junction of Flat, Eno, and Little Rivers. It flows generally southeast through Falls Lake reservoir and passes to the east of Raleigh, flows past Smithfield, Goldsboro, Kinston, and New Bern where it widens into an estuary 5 mi wide that extends 40 mi east to Pamlico Sound. The Neuse River flows from the North Carolina Piedmont to the coastal plain physiographic province. All waters of the Neuse River Basin have been classified as nutrient sensitive waters; a State-wide nutrient management strategy has been implemented to address excess nutrients in the river (DoN 2008b). The portion of the Neuse River adjacent to MCAS Cherry Point is classified by North Carolina as 'SB' or a surface water used for primary recreation, as well as 'SC' or life propagation/protection and secondary recreation.

Slocum Creek is located along the western perimeter of MCAS Cherry Point. Slocum Creek is classified as nutrient sensitive water, due to its potential to support large, rapid algal blooms. Slocum Creek is classified as 'SC', tidal salt waters protected for secondary recreation such as fishing, boating, and other activities involving minimal skin contact; aquatic life propagation and survival; and wildlife. Also, Slocum Creek is listed as an impaired water body due to elevated pH (pH is the measurement of acidity) (NCDWQ 2008).

Hancock Creek is located along the eastern perimeter of MCAS Cherry Point. Hancock Creek is classified as 'SC', tidal salt waters protected for secondary recreation such as fishing, boating, and other activities involving minimal skin contact; aquatic life propagation and survival; and wildlife. The creek is considered a nutrient sensitive water due to its potential to support large, rapid algal blooms (NCDWQ 2008).

The southern portion of Jacks Branch is located along the northeastern edge of the flightline. This tributary is classified as 'SC' and is a nutrient sensitive water, again due to the potential to support large, rapid algal blooms (NCDWQ 2008).

Several drainage ditches and unnamed tributaries are present on the Air Station. The drainage ditches do not have any special classification assigned to them. The unnamed tributaries also do not have any special classification.

Figure 5.15-1 Water Resources at MCAS Cherry Point

The stormwater infrastructure at MCAS Cherry Point includes vegetated drainage swales and stormwater retention and detention ponds. The Air Station is operating under a NPDES Phase I Stormwater permit which expired on 30 September 2006. An application for a stormwater permit under NPDES Phase II has been submitted. Direction from the North Carolina Division of Water Quality is for MCAS Cherry Point to continue operating under the terms and conditions of the expired permit until a new permit is issued (DoN 2008b).

As part of the permit program, MCAS Cherry Point operates under an approved SWPPP to control stormwater discharges from the Air Station that may adversely impact the water quality in the Neuse River Basin. The plan identifies potential sources of water contamination and presents BMPs that are used to prevent or minimize pollutant exposure to stormwater (DoN 2008b). Examples of these BMPs are:

- Vegetative erosion controls: temporary seeding, permanent seeding, sod stabilization, vegetative buffer strips, and the protection of trees.
- Sediment controls: earth dikes, silt fences, straw bales, grassed drainage swales, check dams, level spreaders, subsurface drains, pipe slope drains, storm drain inlet protection, rock outlet protection, stormwater detention/retention basins, and sediment traps.

As discussed in the SWPPP, there are five outfalls that require monitoring as a condition of the permit at MCAS Cherry Point. MCAS Cherry Point uses multi-sensor water quality equipment manufactured by Yellow Springs Instruments Incorporated, or YSI, to monitor water quality parameters at the outfalls. Parameters monitored include turbidity, pH, dissolved oxygen, specific conductivity, temperature, and water depth. The data is collected on a monthly basis.

Groundwater. MCAS Cherry Point falls within the Castle Hayne Aquifer. This aquifer is surficial or unconfined, as it overlies deeper aquifers confined by clay sediments. The Castle Hayne aquifer ranges from 5 to 954 ft in thickness, with an average depth of 175 ft. Composed of limestone, sandy limestone, and sand, it is the most productive aquifer in North Carolina, with wells typically producing 200 to 500 gallons per minute (DoN 2008b).

Wetlands. There are approximately 1,600 acres of wetlands on MCAS Cherry Point. In these areas, groundwater is near or at the surface and the soils are poorly drained due to the low relief and the water retention capacity of loam.

Floodplains. Extensive floodplain areas exist in and around MCAS Cherry Point because of its slight elevation above msl and the relatively flat topographic relief of the land surface (Figure 5.14-1). Areas along Slocum and Hancock Creeks are within the 100-year floodplain.

5.15.2 Environmental Consequences

Surface Water/Stormwater. Under Alternatives 1 through 4, the demolition projects are not anticipated to impact water resources. The perimeter of each demolition project would be lined with stormwater control measures that would minimize the risk of increased sedimentation in stormwater. Furthermore, project specific BMPs such as silt fences and drain covers would be implemented as part of the proposed construction projects to minimize impacts to water quality.

New construction would occur on previously developed or managed areas. Project specific BMPs would be implemented as part of the proposed construction projects to minimize impacts to water quality, and implementation of stormwater engineering controls (e.g., buildings with gutters, culvert/channels directing stormwater to retention basins) would decrease future impacts to water quality following construction. Furthermore, spill contingency plans and SWPPPs would also minimize impacts to water quality. EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* requires that all new construction comply with *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings.* This includes employing design and construction strategies that reduce stormwater runoff. Additionally, use of LID techniques with regard to minimizing stormwater impacts would occur wherever practicable. LID techniques would strive to maintain or restore natural hydrologic functions of a site and achieve natural resource protection, as well as fulfilling requirements as described by applicable Marine Corps, DoN, DoD, and EO 13514 LID policies.

Groundwater**.** The action alternatives will not affect the Castle Hayne Aquifer. None of the action alternatives would increase the risk of pollutants at MCAS Cherry Point and, therefore, there will be no impacts to groundwater resources under any of the alternatives.

Wetlands**.** There are no wetlands located within the proposed project boundaries under any of the alternatives. As such, there is no effect to wetlands under any of the alternatives.

Floodplains. None of the proposed site locations under any alternative is located within the 100-year floodplain. As such, there is no effect to floodplains under any of the alternatives.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and baseline conditions would remain unchanged.

5.15.3 Summary Comparison of Alternatives

Table 5.15-1 provides a summary comparison of the action alternatives and the No Action Alternative.

Table 5.15-1 Water Resources Summary Comparison of Alternatives

Alternative	Environmental Consequences
Action Alternatives	• Construction and demolition activities are not anticipated to impact surface water or stormwater due to use of standard erosion and sedimentation controls • No impacts to groundwater • No impacts wetlands or floodplains
No Action Alternative	• Baseline conditions will persist

5.16 Cultural and Traditional Resources

5.16.1 Affected Environment (Baseline Conditions)

Archaeological Resources. A total of 94 archaeological sites have been identified at MCAS Cherry Point, including the Air Station's outlying landing fields (USMC 2008d). They include prehistoric and historic archaeological sites ranging in age from the Middle Archaic period (6000 BC) to early European colonization and later settlement (USMC 2008d). Of these sites, 5 have been determined eligible for listing on the National Register of Historic Places (NRHP) while 17 require further evaluation to determine NRHP eligibility. Approximately 77 percent of all recorded archaeological sites (72 sites) at the Air Station have been determined ineligible (USMC 2008d).

Architectural Resources. The Officer's Housing Historic District is the only NRHP-eligible architectural resource located at MCAS Cherry Point (USMC 2008d). It is a 200-acre residential subdivision located in the northeast portion of the Air Station, between Roosevelt Boulevard and the Neuse River. The residences were built between 1942 and 1944 as accommodations for officers. The District is associated with the development of MCAS Cherry Point during World War (WW) II.

Traditional Cultural Resources and Sacred Sites**.** There is one Federally-recognized Native American Tribe in North Carolina, the Eastern Band of Cherokee Indians of North Carolina. This Tribe, however, has no land area claims in the counties where MCAS Cherry Point is located. Similarly, none of the non-resident federally recognized tribes have land claims to this portion of North Carolina.

5.16.2 Environmental Consequences

Under Alternatives 1 through 4, impacts to archaeological or architectural resources are not anticipated. There are no NRHP-eligible archaeological sites or sites requiring further evaluation for NRHP status identified within the proposed construction areas. In addition, the proposed construction areas are not located in high probability archaeological sensitive soils and unlikely to yield archaeological resources. However, if during construction any archaeological resources are discovered, work would immediately cease and the procedures for inadvertent discovery as outlined in the Air Station's Integrated Cultural Resources Management Plan would be implemented.

No NRHP-listed or NRHP-eligible architectural resources have been identified within the proposed construction areas. Therefore, there would be no impacts to architectural resources and no consultation with the State Historic Preservation Officer (SHPO) would be required. Additionally, notification of the availability of the Draft EIS was sent to the North Carolina State Environmental Review Clearinghouse and the SHPO responded that they concurred with the Marine Corps finding of no impacts. None of the structures that would be demolished under the Proposed Action are associated with WWII, the Korean War, the Vietnam War, or any other significant historical time.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

5.16.3 Summary Comparison of Alternatives

Table 5.16-1 gives a summary comparison of each of the action alternatives and the No Action Alternative.

Table 5.16-1 Cultural and Traditional Resources Summary Comparison of Alternatives

Alternative	Environmental Consequences
Action Alternatives	• No impacts from construction or demolition to archaeological or architectural resources • No consultation with SHPO required as no structures that would be demolished are associated with a significant historical property
No Action Alternative	• Baseline conditions would persist

5.17 Coastal Zone Management

5.17.1 Affected Environment (Baseline Conditions)

MCAS Cherry Point is located in Craven County. Craven County is one of the 20 coastal counties in North Carolina. As such, federal activities within Craven County must be consistent to the maximum extent practicable with the enforceable policies of North Carolina's Coastal Zone Management Program as well as the requirements of the North Carolina Coastal Area Management Act of 1974. Figure 5.17-1 shows the proposed demolition/construction areas with respect to coastal resources within MCAS Cherry Point.

5.17.2 Environmental Consequences

Although the various alternatives proposed would require different amounts of demolition and construction, all of the action alternatives would occur within the Air Station boundaries within previously disturbed areas. These sites do not provide unique or important habitat for the coastal zone. There would not be any direct or indirect impacts to the coastal zone or any coastal resources. A Coastal Consistency Determination is not required. A Negative Determination (Appendix G) was sent to the North Carolina Division of Coastal Management.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Thus, baseline conditions would remain unchanged.

5.17.3 Summary Comparison of Alternatives

Table 5.17-1 summarizes the impacts of the action and No Action Alternatives considered in this analysis.

Table 5.17-1 Coastal Zone Management Summary Comparison of Alternatives

Alternative	Environmental Consequences
Action Alternatives	• No impacts to coastal zone or coastal resources
No Action Alternative	• Baseline conditions would persist

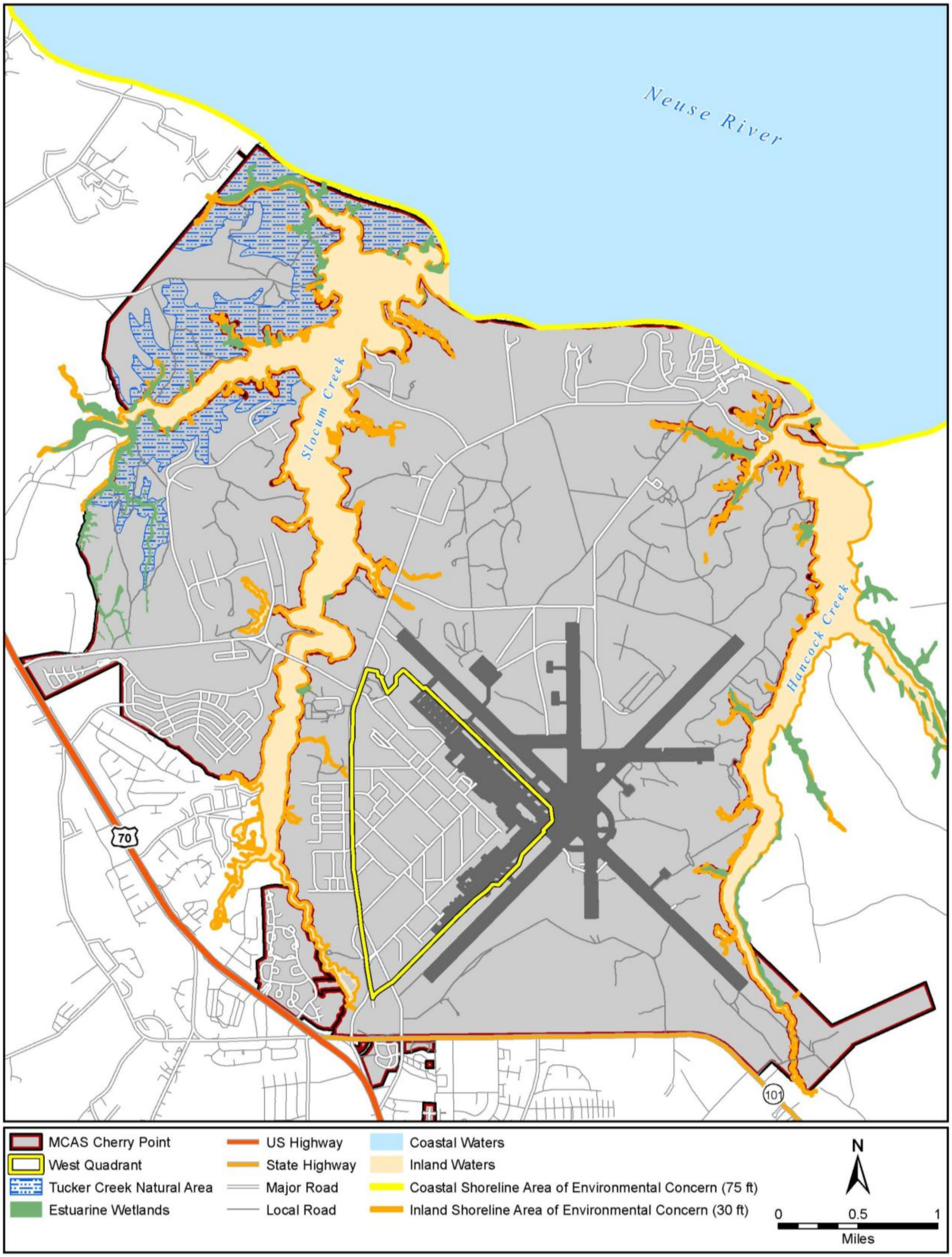


Figure 5.17-1 Coastal Resources in the Vicinity of MCAS Cherry Point

6.0 AIRSPACE, RANGES, AND AUXILIARY LANDING FIELD

6.0 Airspace, Ranges, and Auxiliary Landing Field

Chapter 6 discusses airspace and ranges (outside of the Air Station boundaries) proposed for use by East Coast F-35B aircraft. This evaluation also includes Marine Corps Auxiliary Landing Field (MCALF) Bogue due to its location about 25 miles (mi) south/southwest of Marine Corps Air Station (MCAS) Cherry Point.

Under all Proposed Action alternatives, East Coast F-35B aircraft would operate in the same southeast regional military special use airspace (SUA) and ranges as legacy aircraft from MCAS Beaufort and MCAS Cherry Point use currently. In addition, the F-35B would use the same SUA and ranges, regardless of the alternative; therefore, the analysis in this section employs maximum operational use within these SUA and ranges to obtain a conservative estimate of impacts. Refer to Sections 4.2 (MCAS Beaufort) and 5.2 (MCAS Cherry Point) for airfield and overlying airspace operations impacts.

The first step in the analysis was to identify those resource categories that could be affected by operations within the core use airspace and ranges and/or MCALF Bogue (from this point forward these operations will be referred to as the Proposed Action). This identification process demonstrated which resources would not be impacted by the Proposed Action and are therefore excluded from in-depth analysis in this chapter. Justification for this exclusion is provided below and is in accordance with 40 Code of Federal Regulations (CFR) 1502.16 (Environmental Consequences).

- **Hazardous Materials, Toxic Substances, Hazardous Waste, and Contaminated Sites.** F-35B operations would occur within existing SUA, MCALF Bogue airfield, and ranges. No new airspace or auxiliary landing fields are required to successfully complete the proposed F-35B operations. In addition, while the number of aircraft increase, the types or numbers of ordnance deployed at existing ranges (i.e., Townsend Bombing Range [TBR], Bombing Target 9 [BT-9], and BT-11) would not differ from those already analyzed and presented in earlier Marine Corps, Navy, and Air Force environmental documentation. Therefore, no changes from existing conditions are anticipated and this resource is not carried forward for further analysis.
- **Land Use.** The type of F-35B operations and training activities would not change land uses from those that are found under baseline conditions. Noise impacts to land uses, however, are examined and presented later in this chapter. The F-35B would conduct airfield operations at MCALF Bogue (i.e., arrivals, departures, and pattern work), and under the Proposed Action, reconstruction of the tower and LHD/LHA deck would occur, along with installing an apron addition and airfield overlay at MCALF Bogue. As such, potential impacts to land use due to these construction projects is included in analysis. SUA air-to-air operations would be similar, but at higher altitudes, to those undertaken by current legacy aircraft. It is not anticipated there would be any changes in existing land uses than those found under baseline conditions; therefore, SUA land use was not carried forward for further analysis.

- **Socioeconomics.** Because no construction/demolition and/or personnel increases/decreases would occur associated with SUA, ranges, and at MCALF Bogue, socioeconomic characteristics would not be impacted. Therefore, this resource is not carried forward for further analysis.
- **Environmental Justice.** While the type of proposed F-35B operations and training activities would remain consistent with baseline conditions and would not disproportionately impact low-income or minority populations; noise impacts to these populations are evaluated.
- **Community Services.** No changes to community services would be needed to operate the F-35B at MCALF Bogue, train in SUA, or conduct operations at the ranges. Therefore, community services are not carried forward for more in-depth analysis.
- **Utilities and Infrastructure.** In order to train at MCALF Bogue, fly within SUA, or conduct training at the ranges, no utilities or infrastructure would be needed. Therefore, these resources are not analyzed further in this document.
- **Transportation and Ground Traffic.** Under the Proposed Action alternatives, no construction/demolition, personnel increases/decreases, and/or new types of operations would occur within SUA, at the ranges, or on MCALF Bogue. Therefore, no effects to ground transportation or traffic are anticipated and these resources are not carried forward for further analysis.
- **Biological Resources.** Potential impacts to wildlife from noise associated from aircraft overflights have been analyzed in previous range complex National Environmental Policy Act (NEPA) documents (DoN 2009a, 2009b, 2009c). Any potential response experienced by a wildlife species to an aircraft overflight would be limited to short-term behavioral or physiological reactions. In addition, the F-35B would use the same types and numbers of ordnance analyzed in previous NEPA documents (listed in Section 1.3.4 and included by reference), and therefore, biological resources are not analyzed further in this chapter.
- **Geology, Topography, and Soils.** Because no construction/demolition activities are proposed at MCALF Bogue or the ranges (none would certainly occur to land underlying the SUA), there would be no impacts to the geology, topography, or soils. Therefore, this resource category is not further analyzed.
- **Water Resources**. The Proposed Action alternatives would not affect the quality or availability of water resources. There would be no construction or demolition activities, personnel increases or decreases, nor would any new types of operations be introduced within SUA, at the ranges, or on MCALF Bogue to affect water quality or availability. Therefore, no changes to existing water resources are anticipated and this resource is not carried forward for further analysis.
- **Cultural Resources.** The Proposed Action alternatives would not affect cultural resources**.** In terms of operations, at MCALF Bogue and the ranges no new construction would occur and existing range targets and associated weapons safety footprints would be used. Further, no new

areas would be exposed to ground disturbance that have not been previously disturbed; therefore, no further analysis is presented.

- **Coastal Zone Management.** The type of proposed F-35B operations and training activities in associated ranges and airspace would remain unchanged; therefore, no impacts to the coastal zone or coastal resources are anticipated. Coastal zone management is not carried forward for more in-depth analysis.

The resources that would be affected directly by F-35B operations and training at MCALF Bogue, SUA, and ranges, and identified for further analysis in this Chapter include airspace use and management, noise, air quality, safety, and land use (MCALF Bogue only).

6.1 Airspace Use and Management

As was presented in Section 3.2, airspace management is defined as the direction, control, and handling of flight operations in the "navigable airspace" that overlies the geopolitical borders of the United States (U.S.) and its territories. The Federal Aviation Administration (FAA) is responsible for developing plans and policy for the use of the navigable airspace and for assigning the use of the airspace necessary to ensure the safety of aircraft and its efficient use through regulations or 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.

6.1.1 Affected Environment

SUA directly associated with the Proposed Action includes existing restricted airspace (R-) over the ranges, over-land Military Operating Areas (MOAs), and over-water Warning Areas (W-) (refer to Section 2.3.5). The volume of airspace encompassed by the combination of airspace elements constitutes the affected environment for airspace use and management. As noted in Section 2.3.5, the F-35B would operate in existing core and occasional use airspace (refer to Section 2.3.5.2, Core and Occasional Use Ranges and Airspace), with the core airspace being used on a daily basis. These core airspace units include: R-3007 (inclusive of sections A, B, C, and D referred to as R-3007) which overlies TBR; R-5306A (overlying BT-9 and BT-11); R-5306 (section C and D); MCALF Bogue; the Coastal MOAs—1 East and West, 2, 4, and 5; Core MOA; and W-72, -122, -134, -157, -158, -159, -161, and -177 (Figure 6-1). Table 6-1 presents the airspace configuration—the floor and ceilings of the particular airspace unit and operating hours. Under the Proposed Action alternatives, none of these core airspace units would need reconfiguration nor would the hours of operation change; therefore, in accordance with 40 CFR 1502.15 (Affected Environment) these units are not addressed further in any detail.

Table 6-1 Core Use Airfield, Airspace, and Ranges

Unit	Designation	Floor (feet [ft])	Ceiling (ft)	Operating Hours
R-5306 (associated with BT-9 and BT-11)	R-5306A	Surface	17,999 mean sea level (msl)	Continuous
Coastal MOAs	Coastal 1 East	300 Above Ground Level (AGL)	17,999 msl	7:00 a.m. – 10:00 p.m., Monday-Friday[a]
	Coastal 1 West	300 AGL	17,999 msl	
	Coastal 2	300 AGL	17,999 msl	
	Coastal 4	14,000 msl	17,999 msl	
	Coastal 5	300 AGL	17,999 msl	
Core MOA	Core MOA	3,000 msl	17,999 msl	7:00 a.m. – 11:00 p.m., Monday-Friday[b]
R-5306	R-5306C	1,200 msl	17,999 msl	Continuous
	R-5306D	Surface	17,999 msl	
R-3007 (associated with TBR)	R-3007A	Surface	12,999 msl	7:00 a.m. – 10:00 p.m., Monday-Friday[c]
	R-3007B	1,200 AGL	12,999 msl	
	R-3007C	100 AGL	12,999 msl	
	R-3007D	13,000 msl	25,000 msl	
Warning Areas	W-72A	Surface	1,999 msl	Intermittent by Notice to Airmen (NOTAM)
	W-72A	Above 60,000 msl	Unlimited	
	W-72B	Surface	Unlimited	Intermittent by NOTAM
	W-122	Surface	Unlimited[d]	Intermittent by NOTAM
	W-134	4,500 msl	Unlimited	Intermittent by NOTAM
	W-157A	Surface	43,000 msl	Continuous
	W-157B	Surface	24,000 msl	Continuous
	W-157C	Surface	5,000 msl	Continuous
	W-158A	Surface	43,000 msl[d]	Continuous
	W-158B	Surface	24,000 msl[d]	Continuous
	W-158C	43,000 msl	Unlimited	Intermittent by NOTAM
	W-158E	Surface	1,200 msl	Intermittent by NOTAM
	W-158F	1,200 msl	1,700 msl	Intermittent by NOTAM
	W-159A	Surface	43,000 msl	Continuous
	W-159B	Surface	24,000 msl	Continuous
	W-161A	Surface	62,000 msl	Sunrise – 1:00 a.m., daily
	W-161B	Surface	30,000 msl	Sunrise – 1:00 a.m., daily
	W-177A	Surface	50,000 msl	Sunrise – 1:00 a.m., daily
	W-177B	Surface	30,000 msl	Sunrise – 1:00 a.m., daily

Notes: [a]Intermittent use by NOTAM on Saturday and Sunday from 7:00 a.m. to 10:00 p.m.
[b]Other times by NOTAM.
[c]Other times by NOTAM at least 24 hours in advance.
[d]Certain exclusions apply; for details refer to FAA Order JO 7400.8S, *Special Use Airspace*.

R-3007, Coastal MOAs, and TBR. Airspace associated with TBR is collectively referred to as the Coastal Airspace Complex and is composed of R-3007 and the Coastal MOAs. R-3007 airspace overlies and provides maneuvering airspace and multiple attack headings for aircraft conducting weapons delivery training. R-3007 includes sections A, B, C, and D, or referred to as R-3007A/B/C/D from this point forward. Operations within R-3007 and the Coastal MOAs are scheduled and managed together. R-3007 is managed and scheduled by the Georgia Air National Guard (ANG); refer to Table 6-1 for altitude configurations and operating hours (USMC 2008e).

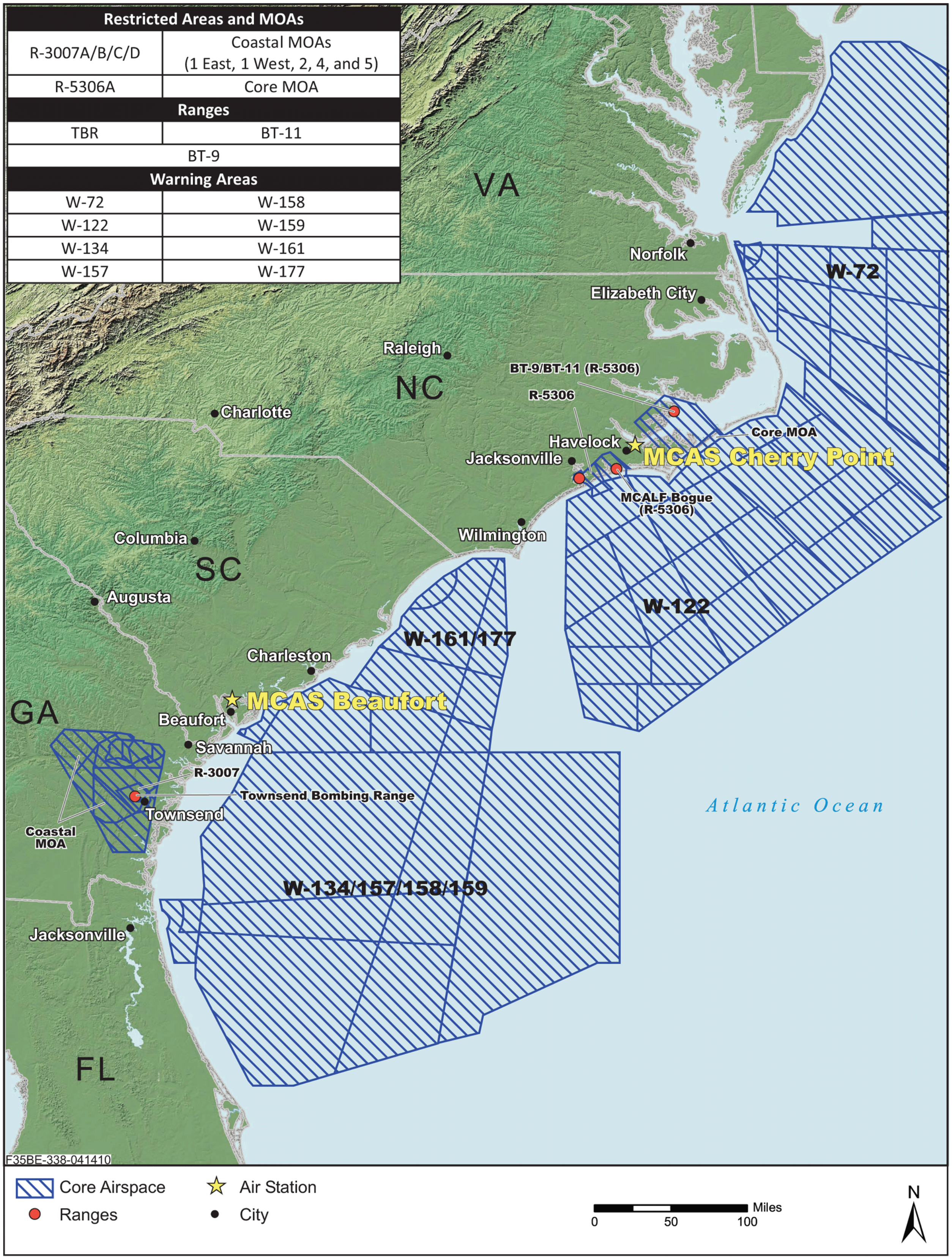


Figure 6-1 East Coast Core Airspace and Ranges

Baseline operations within R-3007A/B/C/D are presented in Table 6-2. A sortie-operation constitutes one aircraft that operates within a unit of airspace.

Table 6-2 R-3007A/B/C/D Annual Baseline Operations[a]

Aircraft Type	Baseline
AV-8[b]	*20*
F/A-18[b,c]	*1,998*
A-10	280
B-1	40
C-130	40
C-17	40
EA-6B	40
F-15	120
F-15E	120
F-16	920
F/A-18E/F	222
R-3007A/B/C/D TOTAL	**3,840**

Source: Historic operational use data validated by Georgia ANG in 2010.
Note: [a]Operations are used to define the number of aircraft operations within a specific airspace unit.
[b]Legacy aircraft replaced by F-35B, total annual operations are 2,018.
[c]Includes Navy F/A-18 A/C/D aircraft.

Coastal 1 East and West, Coastal 2, Coastal 4, and Coastal 5 MOAs are located over southern coastal Georgia, from just north of the Georgia-Florida border to Fort Stewart, and also overlies TBR and associated restricted airspace (see Figure 6-1). Coastal MOA 1 East and West were designed to minimize military operations impacts upon commercial airway routes. Baseline operations, which are all subsonic, are presented in Table 6-3.

Table 6-3 Annual Baseline Operations in Coastal MOAs[a]

Aircraft Type	Operations by MOA Section				
	Coastal 1 East	Coastal 1 West	Coastal 2	Coastal 4	Coastal 5
AV-8	*3*	*15*	*15*	*9*	*0*
F/A-18[b]	*1,461*	*1,475*	*1,494*	*1,067*	*369*
Legacy Aircraft Subtotal	***1,464***	***1,490***	***1,509***	***1,076***	***369***
A-10	209	209	209	0	46
EA-6B	30	30	31	0	0
B-1	0	22	31	19	0
C-130	30	30	31	0	0
C-17	30	30	31	0	0
F-15	66	90	91	57	1
F-15E	90	90	91	57	17
F-16	230	120	688	533	67
F/A-18E/F	160	162	166	119	44
Coastal MOAs TOTAL	**2,309**	**2,273**	**2,878**	**1,861**	**544**

Source: Historic operational use data validated by HQMC in 2010.
Note: [a]Numbers have been updated from the Draft Environmental Impact Statement (EIS) to correct typographical errors; however, the acoustical analysis presented in the Draft EIS reflects the correct number of airfield operations.
[b]Includes Navy F/A-18 A/C/D.

Coastal 1 East and West and Coastal 2 MOAs are activated with R-3007 (i.e., flight restrictions in the MOAs are initiated to minimize conflicts between military and non-participating civilian/commercial aircraft). When R-3007 is not activated, it is scheduled and operated as part of Coastal 1 East MOA. Coastal 4 MOA is high altitude airspace (14,000 msl and higher). When activated, Coastal 4 is scheduled with all or a combination of Coastal 1 East and West, Coastal 2, and R-3007. Coastal 5 MOA, when activated, is scheduled with Coastal 1 East and West. While F/A-18 aircraft out of MCAS Beaufort provide the majority of operations within these SUA, all of the Coastal MOAs are managed and scheduled by Georgia ANG through the Savannah Combat Readiness Training Center. Refer to Table 6-1 for restricted airspace altitude and operating hours.

TBR is an air-to-ground inert ordnance training facility used by all Department of Defense (DoD) services for aircrew bombing, gunnery, electronic warfare, and air combat skills. TBR is a 5,183-acre facility located in McIntosh County, Georgia (GA). TBR is located approximately 60 mi south-southwest of Savannah, GA, 20 mi inland from the Atlantic Ocean, and 2 mi west of Townsend. The range (including the lands and infrastructure comprising the TBR) is owned by MCAS Beaufort but operated by the Georgia ANG. Marine Corps and Navy F/A-18 squadrons based at MCAS Beaufort are the primary users of TBR. Other regular users include fixed-wing and rotary-wing aircrews from more than 15 Army, Air Force, Department of the Navy, Marine Corps, and ANG installations in the southeast, as well as carrier and amphibious groups at sea off the U.S. East Coast. Additionally, Army and Marine Corps ground forces use TBR for limited training events. Test operations are occasionally conducted at TBR, such as operational testing of the Joint Surveillance Target Attack Radar System upgrades (USMC 2008e). Operations at the range are primarily devoted to fixed-wing air-to-ground inert ordnance practice on ten numbered air-to-ground targets, an Urban Target Array, strafe pit, and an infrared target.

R-5306A, BT-9, and BT-11. Air-to-ground operations for BT-9 and BT-11 occur in R-5306A. This airspace is used for pilot training in air-to-ground weapons delivery, air-to-air tactics, tactical and electronic warfare exercises, and unmanned aerial system flights (DoN 2009b). Table 6-4 presents the baseline sortie operations for that portion of R-5306A that is used in conjunction with BT-9 and BT-11.

BT-9 (Brant Island Shoal) is an unmanned/scored target consisting of ship hulls grounded on Brant Island Shoal in Pamlico Sound, Pamlico County, North Carolina (NC). The marine environment within a 3-mile radius of the target is designated a Danger Zone (33 CFR 334.420[a], Pamlico Sound and adjacent waters; North Carolina danger zones for Marine Corps operations) and is closed to water navigation at all times. BT-11 (Piney Island) is a 12,500-acre manned multi-purpose target complex encompassing all of Piney Island, which is located in Pamlico Sound, Carteret County, NC. This complex contains both land- and water-based targets and has designated Danger Zones and restricted areas (33 CFR 334.420[b]). Targets at BT-9 and BT-11 are authorized for conventional weapons delivery; operations are scheduled by MCAS Cherry Point. Explosive ordnance used at BT-9 is limited to 100 pounds (lbs), and non-explosive ordnance is limited to 2,000 lbs. Further detail on specific physical attributes, range operations, and ordnance characteristics for BT-9 and BT-11 are discussed in the Environmental Assessment for MCAS Cherry Point Range Operations, which is incorporated by reference (DoN 2009b).

Table 6-4 Annual Baseline Operations in R-5306A (BT-9 and BT-11)

Airspace Designation	Aircraft Type	Operations
R-5306A (BT-9)	*F/A-18 C/D (Marine Corps)*	*216*
R-5306A (BT-9)	*AV-8B (Operational)*	*182*
R-5306A (BT-9)	*AV-8B (Fleet Replacement Squadron [FRS])*	*430*
	Legacy Aircraft Subtotal	***828***
R-5306A (BT-9)	F/A-18 C/D (Navy)	210
R-5306A (BT-9)	F-15E and F-16 (Air Force)	500
R-5306A (BT-9)	CH-46, CH-53, AH-1, UH-1 (Marine Corps)	196
R-5306A (BT-9)	Other Rotary	76
R-5306A (BT-9)	Other Jets and Propeller	43
	R-5306A (BT-9) TOTAL	**1,853**
R-5306A (BT-11)	*F/A-18 C/D (Marine Corps)*	*392*
R-5306A (BT-11)	*AV-8B (Operational)*	*1,182*
R-5306A (BT-11)	*AV-8B (FRS)*	*413*
	Legacy Aircraft Subtotal	***1,987***
R-5306A (BT-11)	F/A-18 C/D (Navy)	674
R-5306A (BT-11)	KC-130 (Marine Corps)	4
R-5306A (BT-11)	F-15E and F-16C (Air Force) and F-16C (Air Guard)	945
R-5306A (BT-11)	CH-46, CH-53, AH-1, UH-1 (Marine Corps)	287
R-5306A (BT-11)	Other Jets and Propellers	60
R-5306A (BT-11)	Other Rotary	92
	R-5306A (BT-11) TOTAL	**4,049**

Source: Historic operational use data validated by HQMC in 2010.

R-5306A (not including BT-9 and BT-11), Core MOA, R-5306C, and R-5306D. R-5306A overlies Pamlico Sound and the mouths of the Neuse and Pamlico Rivers. The towns of Hobucken, Lowland, Merritt, Pamlico, Bayboro, Oriental, Sealevel, Stacy, and Davis also underlie this restricted airspace. The Core MOA provides operational and transit airspace for aircraft between W-122 and R-5306A. The Core MOA (refer to Figure 6-1) overlies a portion of North Carolina's Core Banks (Carteret County, NC), extending about 40 mi along the Core Banks from about 8 mi northeast of the Cape Lookout lighthouse to about 1.25 mi from the eastern end of Portsmouth Island, which is also in Carteret County, NC. The MOA also extends about 3.5 mi to the southeast over the Atlantic Ocean. The primary aircraft training activities associated with the Core MOA are subsonic ingress (sea-to-land) and egress (land-to sea) missions intercepting existing targets at R-5306A (DoN 2003d). Both R-5306A and the Core MOA are managed and scheduled by MCAS Cherry Point.

Table 6-5 Annual Baseline Operations in R-5306A, Core MOA, R-5306C/D[a]

Airspace Designation	Aircraft Type	Annual Operations
R-5306A	*F/A-18 C/D (Marine Corps)*	*100*
R-5306A	*AV-8B (Operational)*	*2,689*
R-5306A	*AV-8B (FRS)*	*2,341*
	Legacy Aircraft Subtotal	***5,130***
R-5306A	Air Force F-15E, F-16C, A-10A and Air Guard F-16	315
R-5306A	AH-1 (Marine Corps)	134
R-5306A	Other Jet and Propeller	126
	R-5306A TOTAL	**5,705[b]**
Core MOA	*AV-8B (FRS)*	*25*
Core MOA	*AV-8B (Operational)*	*974*
Core MOA	*F/A-18C/D (Marine Corps)*	*150*
	Legacy Aircraft Subtotal	***1,149***
Core MOA	F/A-18C/D (Navy)	67
Core MOA	F-15E and F-16C (Air Force)	212
Core MOA	Other Jets	6
	Core MOA TOTAL	**1,434**
R-5306C	*F/A-18A/C/D*	*597*
R-5306C	*AV-8B*	*216*
	Legacy Aircraft Subtotal	***813***
R-5306C	C-130 and C-17	3
R-5306C	Other Fixed Wing	13
R-5306C	A-10A, F-15E, F-16C, and F/A-22A (Air Force)	375
R-5306C	Other Rotary (MV-22 and UH-60)	11
	R-5306C TOTAL	**1,215[a]**
R-5306D	*AV-8B*	*215*
R-5306D	*F/A-18A/C/D*	*544*
	Legacy Aircraft Subtotal	***759***
R-5306D	AH-1, UH-1, and UH-60	1,158
R-5306D	CH-46, CH-47, and CH-53	3,289
R-5306D	F-15E, F-16C, F/A-22A and A-10A (Air Force)	73
R-5306D	Other Fixed Wing	24
R-5306D	MV-22	1,670
	R-5306D TOTAL	**6,973[a]**

Source: Historic operational use data validated by HQMC in 2010.

Note: [a]Numbers have been updated from the Draft EIS to correct typographical errors; however, the acoustical analysis presented in the Draft EIS reflects the correct number of airfield operations.

[b]Operations are not additive. An aircraft can and do operate in several SUA units during a single mission but may not go into all adjacent units during that particular mission.

R-5306C lies over several small towns, including Swansboro, Cape Carteret, Emerald Isle, Kuhns, Bogue, and Ocean, and a portion of Onslow Bay (see Figure 6-1). R-5306D is located adjacent to R-5306C (to the southwest) with a portion overlying Marine Corps Base (MCB) Camp Lejeune training areas. Fixed-wing operations in R-5306C (managed and scheduled by MCAS Cherry Point) are routinely scheduled in conjunction with fixed-wing operations occurring in R-5306D (managed and scheduled by MCB Camp Lejeune) (DoN 2009b). Table 6-5 presents baseline operations for R-5306A, Core MOA, R-5306C, and R-5306D.

MCALF Bogue. MCALF Bogue is a controlled, lighted, expeditionary landing field located in southeastern Carteret County, NC. MCALF Bogue comprises approximately 837 acres and supports Field Carrier Landing practices, expeditionary airfield (EAF) operations, unmanned aerial systems, and limited ground and rotary-wing operations. MCALF Bogue is the primary practice location for AV-8B vertical short take-offs and landings, and is used by other aircraft (DoN 2009b). MCALF Bogue has one runway that is 4,010-ft long by 96-ft wide, with a 4,000 ft by 150 ft aluminum matting laid over an asphalt strip to simulate on-board ship and carrier training field. Table 6-6 presents annual baseline operations for MCALF Bogue. Refer to Table 6-1 for altitude and operating hours. The 2d Marine Aircraft Wing (MAW) at MCAS Cherry Point is the scheduling authority for MCALF Bogue.

Table 6-6 MCALF Bogue Annual Baseline Airfield Flight Operations[a]

Operation Type	Number
AV-8B Departures	664
AV-8B Arrivals	664
AV-8B Pattern Work	13,888
Subtotal AV-8B	***15,216***
Other Transient Aircraft	1,179
BASELINE TOTAL	**16,395**

Source: USMC 2009d.
Note: [a]Numbers have been updated from the Draft EIS to correct typographical errors; however, the acoustical analysis presented in the Draft EIS reflects the correct number of airfield operations.

6.1.2 Environmental Consequences

Under any of the action alternatives, the F-35B would expend the same types and numbers of ordnance at BT-9, BT-11, and TBR, as have been analyzed and presented in Marine Corps, Navy, Air Force, and ANG environmental documentation and are incorporated by reference. No new types of weapons or levels of ordnance delivery would be required in order to successfully establish the F-35B to either Air Station (DoN 2009b, 2009c; USMC 2008e; Air Force 2006b; Georgia ANG 2006). Therefore these analyses focused only on changes in airspace use that would result from the projected annual operations.

Training needs associated with increased numbers of F-35B aircraft would not require changes to the management or structure of the affected SUA. F-35Bs would conduct operations in a fashion similar to the current Marine Corps aircraft missions assigned to MCAS Beaufort and MCAS Cherry Point. Although a similar training regime would be used, the F-35B would operate at higher altitudes than legacy AV-8B and F/A-18 aircraft. As shown in Table 6-7, operations would increase in all SUA units with the exception of R-5306A where operations would decrease; operations would remain unchanged in the Core and Coastal 4 MOAs, R-5306A (BT-9), and R-5306C/D. These operational numbers best reflect the requirements identified thus far to successfully meet the F-35B Pilot Training Center and operational missions. Existing airspace units have the capability to meet these training needs without requiring any structural changes to the airspace.

Table 6-7 Comparison of Annual Baseline and Proposed Airspace Operations[a]

Airspace/Range	Total Baseline Legacy Aircraft Operations[b]	Total Proposed F-35B	Net Change from Baseline
Core MOA	1,149	1,149	0
R-5306A	5,130	4,461	-669
R-5306A (BT-9)	828	828	0
R-5306A (BT-11)	1,987	4,461	+2,474
R-5306C	813	813	0
R-5306D	759	759	0
R-3007A/B/C/D	2,018	5,320	+3,302
Coastal 1 East MOA	1,464	5,320	+3,856
Coastal 1 West MOA	1,490	5,320	+3,830
Coastal 2 MOA	1,509	5,320	+3,811
Coastal 4 MOA	1,076	1,076	0
Coastal 5 MOA	369	5,320	+4,951

Source: HQMC data validated in 2010.
Note: [a]Numbers have been updated from the Draft EIS to correct typographical errors; however, the acoustical analysis presented in the Draft EIS reflects the correct number of airfield operations.
[b]Baseline operations reported include only those undertaken by legacy aircraft operating in the SUA, authorized and analyzed in previous NEPA documentation. These documents are included by reference and are as follows: Air Force 2006b; USMC 2009b; MCAS Beaufort 2008a, and DoN 2003a.

While operations increase in almost all of the SUA units, it is anticipated that impacts to civil and commercial air traffic would be minimal. This conclusion is justified because operations within this Complex would still be managed and scheduled by the Georgia ANG, aircraft would still operate according to established FAA procedures, no new airspace configurations would be needed, and no new flight restrictions would be required. The SUA would continue to be managed and scheduled as they are currently and these units are of such a size that they can accommodate F-35B operations increases. The FAA would be able to continue to support civil and commercial aircraft operations within this area and flights to and from public and private use airports would not be interrupted. In summary, operations within the Coastal Airspace Complex would not affect air operations within this region.

Unlike the SUA and ranges, at MCALF Bogue, operations would differ between the alternatives because airfield operations are driven by the number of aircraft being established at MCAS Cherry Point.

Table 6-8 presents these operations by alternative. Under all action alternatives overall F-35B operations would decrease when compared to legacy AV-8B aircraft.

Table 6-8 Proposed F-35B MCALF Bogue Airfield Flight Operations by Alternative

Operation Type	Baseline	Alternative 1 (Preferred)	Alternative 2	Alternative 3	Alternative 4
Departures	664	583	802	675	456
Arrivals	664	583	802	675	456
EAF and Pattern Work	13,888	4,218	5,800	3,406	1,824
TOTAL	***15,216***	***5,385***	***7,404***	***4,755***	***2,736***
Change from Baseline	*N/A*	*-9,831*	*-7,812*	*-10,461*	*-12,480*

Source: HQMC 2010.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and baseline conditions would remain unchanged.

6.2 Noise

The noise evaluation for all alternatives used the methodology presented in Section 3.3 and the data input supplied in Appendix D. Please note that under all four alternatives, 99 percent of F-35B operations would occur during environmental daytime hours (7:00 a.m. to 10:00 p.m.) and 1 percent from 10:00 p.m. to 7:00 a.m (or environmental nighttime hours). In addition, noise sensitive areas that are avoided in and around Restricted Area 5306A include the towns of: Hobucken (by 2 nautical mi [nm] and 3,000 ft AGL); Lowlands (by 2 nm and 3,000 ft AGL); Cedar Island (by 1 nm and 1,500 ft AGL); Oriental (by 1 nm and 1,500 ft AGL); Bayboro (by 1 nm and 1,000 ft AGL); and Ward Creek (by 2 nm and 750 ft AGL). Marine Corps Outlying Landing Field Atlantic also has an associated avoidance area of 1,500 ft AGL.

6.2.1 Affected Environment (Baseline Conditions)

Coastal MOAs and R-3007 A/B/C/D. For purposes of this evaluation, the noise affected environment includes Coastal 1 East and West, 2, 4, 5 MOAs and TBR lands underlying restricted airspace R-3007. Baseline noise levels are shown in Table 6-9.

R-5306A/C/D and Core MOA. Noise conditions around BT-9 and BT-11 in R-5306A are dominated both by impulsive noise (generated by small arms firing, large caliber weapon firing, and the detonation of explosives) and by intermittent noise (generated by the operation of civilian and military aircraft, and civilian traffic and military tactical vehicles). Baseline noise conditions (refer to Table 6-9) are those recorded in the April 2003 noise study (DoN 2003b). As stated previously, the primary aircraft training activities associated with the Core MOA are subsonic ingress (sea-to-land) and egress (land-to sea) missions intercepting existing targets at R-5306A (DoN 2003d). Baseline noise levels in this MOA are presented in Table 6-9.

Table 6-9 Core Airspace Baseline Aircraft Noise Levels (L_{dnmr})

Airspace Unit		Baseline
Coastal MOA	1 East	52
	1 West	54
	2	55
	4	<45
	5	47
Core MOA	N/A	<45
R-3007	A	62
	B	55
	C	61
	D	<45
R-5306	A	58
	C	<45
	D	57

Notes: L_{dnmr}-Onset-rate Adjusted Day-Night Average Sound Level

MCALF Bogue. In Figure 6-2, MCALF Bogue baseline Day-Night Average Sound Level (DNL) contours are presented in 5 decibel (dB) increments, from 65 to 85 dB DNL. Table 6-10 presents baseline noise exposure within each DNL contour band for on- and off-Station acreage (excluding bodies of water), housing units (excluding MCALF Bogue because no homes are located therein), and population (excluding MCALF Bogue because no person is stationed permanently at the MCALF). Housing units include 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 who share living quarters (U.S. Census Bureau 2010).

Table 6-10 MCALF Bogue Baseline Aircraft Noise Exposure On and Off Station

Contour Band (dB DNL)	Acres[b]		Population[c]	Housing Units[c]
	On	Off	Off	Off
65-70	21	806	428	192
70-75	149	818	740	338
75-80	226	234	247	108
80-85	193	82	134	56
85+	252	0	31	0
Subtotal	***841***	***1,940***	**--**	**--**
TOTAL	**2,781**		**1,580**	**694**

Notes: [a]Exclusive of upper bound for all bands.
[b]Excludes bodies of water .
[c]Estimated based on 2000 Census block and county parcel data (Carteret County 2010d).

As presented in Section 3.3, population and housing units were determined by identifying the proportional area (using proportions based on census block data) of the noise contour bands and then applying these proportions to ascertain the number of people and units within each DNL contour band. Because the Census is conducted every 10 years, and the 2010 Census data are not yet available, population and housing units were estimated based on 2000 Census block data. This approach assures that the analyses are comparable across the three alternative locations. References to more recent Census sources may be used in this document. However, these references were used for defining terms, or for housing, employment, or population trends. Again, more recent data were not used as they would not be comparable across the three distinct geographic alternative locations.

For purposes of this analysis, census blocks were used; these are areas bounded on all sides by visible features (e.g., streets, roads, streams, and railroad tracks) and by invisible boundaries (e.g., city, town, township, and county limits, property lines, and short, imaginary extensions of streets and roads). A census block is the smallest geographic entity for which the Census Bureau collects and tabulates 100-percent decennial census data, including population and housing unit data. To further define the number of people and housing units affected by noise, the Marine Corps determined the proportion of acres found within each contour band and then applied this proportion to the census block. Using this proportional approach, it was found that under baseline conditions 1,580 people and 694 housing units (within 2,781 acres of lands) are exposed (on average) to noise levels greater than 65 dB DNL. No schools are exposed to average noise levels of 65 dB DNL and greater under baseline conditions.

To evaluate Potential Hearing Loss (PHL) under the Proposed Action, baseline conditions were determined. Per DoD policy, analysis of PHL considers a person's long-term exposure to noise levels of 80 dB DNL or greater.

In 1972, the National Institute for Occupational Safety and Health (NIOSH) published a criteria document with a recommended exposure limit of 85 A-weighted dB (dBA) 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 DNL recommended exposure limit (NIOSH 1998). Air Station workers, including aircraft maintainers along the flightline and employees within the industrialized area adjacent to the runways, are exposed to noise during the work day. Compliance with Occupational Safety and Health Administration regulations, DoD Instruction 6055.12, *Hearing Conservation Program*; Navy Environmental Health Center Technical Manual [TM] 6260.51.99-2, *Navy Medical Department Hearing Conservation Program Procedures*; Chief of Naval Operations Instruction 5100.23G, *Navy Safety and Occupational Health Program Manual*; and Marine Corps Order 6260.1E, *Marine Corps Hearing Conservation Program* would minimize the potential for hearing loss. In addition, the Navy and Marine Corps Public Health Center and Air Station Safety Office monitor military and civilian personnel as part of their Hearing Conservation Program. Per TM 6260.51.99-2, the Hearing Conservation Program consists of the following five elements:

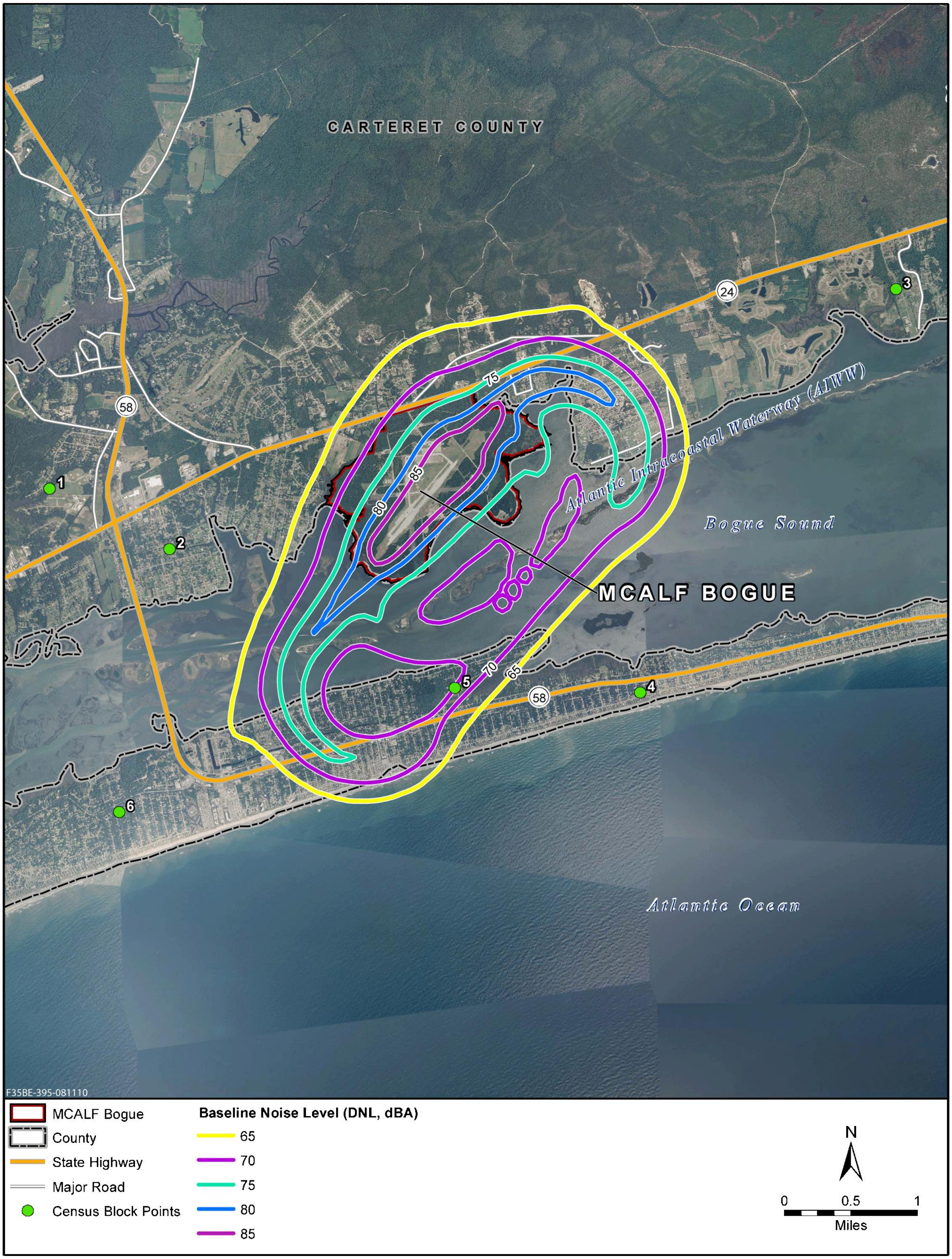


Figure 6-2 MCALF Bogue Baseline Aircraft Noise Contours

1. Noise measurement and exposure analysis to identify noise hazardous areas or sources and the personnel exposed.
2. Engineering control of noise levels to reduce the potential hazard to the maximum extent feasible.
3. Periodic hearing testing of all military and civilian personnel at risk (i.e., those routinely exposed to sound levels greater than 84 dB DNL over an 8-hour time-weighted average) will be considered at risk to monitor the effectiveness of the program, and enable timely audiologic and medical evaluation of those personnel who demonstrate significant hearing loss or threshold shift.
4. Recommendations for use of hearing protective devices as an interim measure pending effective engineering controls.
5. Education 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.

The number of off-Station people at risk for PHL is indicated in Table 6-11. This table reflects the estimated number of people exposed to noise at and above 80 dB DNL, in 1 dB increments, and the associated average Noise-Induced Permanent Threshold Shift (NIPTS) and 10th percentile NIPTS. In the assessment of PHL, the use of DNL to characterize noise exposure provides a conservative assessment of hearing loss risk as DNL includes a 10-dB weighting factor for environmental nighttime operations between 10:00 p.m. and 7:00 a.m. (local time). The population counts by contour band were performed using U.S. Census block population and a methodology that assumes an even distribution of population within each block under the respective contour bands. This methodology provides only an estimate of the number of people who may be exposed, but was needed because the U.S. Census block-level data, while being the finest resolution available, are of a size comparable to that of the 1-dB contour band width and may only be partially located under any individual band. Finally, the 10th percentile NIPTS values are included to provide an assessment of PHL for the population most sensitive to noise, defined as the top 10 percent of the population. According to the U.S. Environmental Protection Agency (USEPA) Levels (USEPA 1974) and Criteria (USEPA 1973) documents, changes in hearing levels of less than 5 dB are generally not considered noticeable or significant.

Table 6-11 MCALF Bogue Baseline PHL Estimates

Contour Band (dB DNL)	Baseline Residential Population	Avg. NIPTS (dB)[a, b]	10th Percentile NIPTS (dB)[a, b]
80-81	12	3.0	7.0
81-82	8	3.5	8.0
82-83	6	4.0	9.0
83-84	5	4.5	10.0
84-85	1	5.5	11.0
85-86	0	6.0	12.0
86-87	0	7.0	13.5
87-88	0	7.5	15.0
88-89	0	8.5	16.5
89-90	0	9.5	18.0

Source: [a]National Academy of Sciences 1977.
Note: [b]Rounded to the nearest 0.5 dB.

Within MCALF Bogue boundaries, there are no residential areas found within the 80 dB and greater DNL noise contour bands. However, under baseline conditions there are communities outside the airfield that are exposed to 80 dB DNL and greater noise levels. As presented in Table 6-11, it is estimated that there are a minimum of 12 people within the 80 to 81 dB DNL contour band affected by a 3.0 dB average NIPTS. A maximum of 1 person is found within the 84 to 85 dB DNL contour band being affected by a 5.5 dB average NIPTS. No other populations are found above the 85 dB DNL contour band.

Other generators of noise, such as general vehicle traffic, and other maintenance and landscaping activities, are a common ongoing occurrence at MCALF Bogue. While these sources may contribute to the overall noise environment, they would not change under any of the action alternatives; therefore, these sources are not included in the noise analyses.

6.2.2 Environmental Consequences

Table 6-12 provides the results of the noise evaluation for Coastal MOA, R-3007, Core MOA, and R-5306 under each of the action alternatives. Given the complexity of noise impacts associated with MCALF Bogue, impacts are discussed separately below.

Table 6-12 Core Airspace Projected Aircraft Noise Levels (L_{dnmr})

Airspace		Baseline	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Coastal MOAs	1 East	52	53	52	53	54
	1 West	54	55	54	55	56
	2	55	56	55	55	56
	4	<45	<45	<45	<45	<45
	5	47	62	60	61	62

Table 6-12 Core Airspace Projected Aircraft Noise Levels (L_{dnmr})

Airspace		Baseline	Alternative 1	Alternative 2	Alternative 3	Alternative 4
R-3007	A	62	63	62	62	63
	B	55	59	58	59	60
	C	61	62	60	61	62
	D	<45	46	<45	45	47
Core MOA	N/A	<45	<45	<45	<45	<45
R-5306	A	58	60	61	60	60
	C	<45	<45	<45	<45	<45
	D	57	58	58	58	58

Coastal MOAs. Noise levels in Coastal 1 East and West would increase no more than 2 dB (under Alternative 4) when compared to baseline conditions. Under Alternatives 1 and 4, Coastal 2 MOA would experience a 1-dB increase and Coastal 4 MOA noise levels would remain similar to baseline conditions, at less than 45 dB under any of the action alternatives. Coastal 5 MOA would experience the greatest degree of change in noise levels; from a baseline of 47 dB to 62 dB (a 15-dB increase) under Alternatives 1 and 4. The use and resultant noise level of Coastal 5 would increase because of the additional airspace required to conduct the standoff tactics utilized by the F-35B.

R-3007A/B/C/D. Under baseline conditions, noise levels are at their lowest in R-3007D and their highest in R-3007A. These conditions would remain similar under the action alternatives; however, in R-3007D, noise levels increase by 2 dB under Alternative 4 and 1 dB under Alternative 1. Within R-3007A, noise levels increase by no more than 1 dB under any of the four action alternatives. The greatest change in noise levels would be found in R-3007B where Alternatives 1 and 3 would introduce a 4-dB change in noise levels, Alternative 2 increases levels by 3 dB, and Alternative 4 by 5 dB.

Core MOA. Under all alternatives, noise levels would be similar to baseline conditions and remain below 45 dB DNL.

R-5306A/C/D. In R-5306A noise levels would increase by 2 dB under Alternatives 1, 3, and 4; there would be a 1-dB increase under Alternative 2. In R-5306C, noise levels would remain consistent with baseline conditions (i.e., less than 45 dB) under all four action alternatives. For R-5306D, there would be a 1-dB increase under all four alternatives when compared to baseline conditions.

MCALF Bogue

Alternative 1

Figure 6-3 presents projected noise contours in 5 dB increments, from 65 to 85 dB DNL noise levels for Alternative 1. Baseline contours are also depicted for comparison purposes, along with changes from the baseline.

Figure 6-3 MCALF Bogue Alternative 1 Aircraft Noise Contours

Table 6-13 provides Alternative 1 noise exposure within each DNL contour band for on- and off-Airfield acreage (excluding bodies of water). Population and housing units potentially impacted are also evaluated for people and homes outside MCALF boundaries (MCALF Bogue was excluded because no people or homes are permanently located within the airfield boundaries). The same is true for all action alternatives.

Table 6-13 MCALF Bogue Alternative 1 Projected Aircraft Noise Contour Bands On and Off Station

Contour Band (dB DNL)	Acres[a]			Population[a,b]			Housing Units[a,b]		
	On/Off Baseline	On/Off	Net Change	Off Baseline	Off	Net Change	Off Baseline	Off	Net Change
65-70	827	1,537	710	428	1,088	+660	192	478	+286
70-75	967	557	-410	740	206	-534	338	86	-252
75-80	460	295	-165	247	135	-112	108	58	-50
80-85	275	215	-60	134	109	-25	56	26	-30
85+	252	328	+76	31	42	+11	0	29	+29
Total	***2,781***	***2,932***	***+151***	***1,580***	***1,580***	***0***	***694***	***677***	***-17***

Notes: [a]Exclusive of upper bound for all bands; excludes bodies of water and MCALF Bogue.
[b]Population and housing units estimated based on 2000 Census block data, county parcel data (Carteret County 2010d, and verification by MCAS Cherry Point Environmental Affairs Department).

Total acres exposed to F-35B generated noise levels would increase from 2,781 baseline conditions to 2,932 acres. In terms of population numbers, the number exposed to noise levels greater than 65 dB DNL would remain unchanged from the 1,580 baseline population. Though, eleven more people would be exposed to 85 dB DNL or greater. Housing units exposed to 65 dB DNL and greater would decrease by 17 units. While there is a decrease of 30 units exposed to 80 to 85 dB DNL, there would be an increase of 29 units exposed to 85 dB DNL or greater noise levels.

Under Alternative 1, no schools would be exposed to average noise levels of 65 dB DNL and greater. However, there is the potential for speech interference for communities (Table 6-14) if this alternative were implemented. Speech interruptions are measured in the number of events above an indoor Maximum Sound Level (L_{max}); Section 3.3 (methodology) and Appendix D (noise background) for more detail on these noise metrics and how speech interference is modeled. Figure 6-3 presents the location (labeled with numbers) for the geographic centers of the six Census blocks surrounding MCALF Bogue. For Alternative 1, there would be the potential for five areas to experience interruptions with windows closed while all six sites would experience interruptions with windows open.

Table 6-14 MCALF Bogue Indoor Speech Interference Under all Action Alternatives[a]

Location	Windows Closed[b] Daytime Hourly[d] Events (L_{max} 50 dBA) By Alternative (Alt)				Windows Open[c] Daytime Hourly[d] Events (L_{max} 50 dBA) By Alternative (Alt)			
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
1	0	0	0	0	<1	<1	0	<1
2	<1	<1	<1	<1	<1	<1	<1	<1
3	<1	<1	<1	<1	<1	<1	<1	<1
4	<1	<1	<1	<1	<1	<1	<1	<1
5	<1	<1	<1	<1	<1	<1	<1	<1
6	<1	<1	<1	<1	<1	<1	<1	<1

Notes: [a]Baseline data could not be provided because this supplemental analysis was not included in the AICUZ report.
[b]Outdoor/Indoor assumes an attenuation of 25 dB.
[c]Outdoor/Indoor assumes an attenuation of 15 dB.
[d]Rounded to nearest integer.

Table 6-15 provides the DNL for each center point under the four action alternatives. Under Alternative 1, only center point 5 would be exposed to noise levels greater than 65 dB DNL.

Table 6-15 MCALF Bogue Census Block Center Point DNL for All Proposed Alternatives

Location		DNL (dBA)*			
	Baseline	Alt 1	Alt 2	Alt 3	Alt 4
1	<45	45	46	45	<45
2	54	55	56	56	54
3	<45	48	49	48	46
4	52	54	55	54	52
5	70	68	69	68	66
6	56	49	51	49	47

Baseline DNL source: FEIS for the Introduction of the F/A-18E/F Aircraft to the East Coast of the United States (July 2003) MCAS Cherry Point Alternative 6 with OLF projected DNL noise contours grid file.
Notes: *Rounded to nearest integer.

Table 6-16 provides the number of people (based proportionally on the area within each 1-dB noise contour band using U.S. Census block data) exposed to DNL at and above 80 dB, in 1 dB increments, and the associated average NIPTS and 10th percentile NIPTS. While there are no residential areas at risk for PHL on MCALF Bogue (i.e., there are no permanent populations residing within the airfield boundaries), there would be off-Station populations exposed to 80 dB DNL and greater under this alternative. The average and 10th percentile NIPTS would be lower than what's presented in Table 6-16 for those without 40 years of daily exposure to average noise levels of 80dB DNL and above (see Section 3.3 for PHL definition).

Table 6-16 MCALF Bogue PHL Estimates under Alternative 1

Contour Band (dB DNL)	Baseline Residential Population	Proposed Residential Population	Avg. NIPTS (dB)[a, b]	10th Percentile NIPTS (dB)[a, b]
80-81	12	3	3.0	7.0
81-82	8	3	3.5	8.0
82-83	6	3	4.0	9.0
83-84	5	3	4.5	10.0
84-85	1	2	5.5	11.0
85-86	0	3	6.0	12.0
86-87	0	3	7.0	13.5
87-88	0	3	7.5	15.0
88-89	0	3	8.5	16.5
89-90	0	1	9.5	18.0

Source: [a]National Academy of Sciences 1977.
Note: [b]Rounded to the nearest 0.5 dB.

Alternative 2

Figure 6-4 presents projected noise contours, in 5 dB increments, from 65 to 85 dB DNL for Alternative 2. Baseline noise levels are also depicted for comparison purposes, along with net change from baseline. Table 6-17 provides Alternative 2 noise exposure within each DNL contour band for acreage (excluding bodies of water), as well as the population and housing units outside MCALF Bogue boundaries.

Table 6-17 Alternative 2 Projected Aircraft Noise Exposure Compared to Baseline at MCALF Bogue

Contour Band (dB DNL)	Acres[a]			Population[b]			Housing Units[b]		
	On/Off Baseline	On/Off	Net Change	Off Baseline	Off	Net Change	Off Baseline	Off	Net Change
65-70	827	1,694	+867	428	1,233	+805	192	546	+354
70-75	967	675	-292	740	256	-484	338	135	-203
75-80	460	323	-137	247	145	-102	108	113	+5
80-85	275	230	-45	134	120	-14	56	26	-30
85+	252	378	+126	31	56	+25	0	29	+29
TOTAL	***2,781***	***3,300***	***+519***	***1,580***	***1,810***	***+230***	***694***	***894***	***+155***

Notes :[a]Exclusive of upper bound for all bands; excludes bodies of water.
[b]Estimated based on 2000 Census block data, county parcel data (Carteret County 2010d, and verification by MCAS Cherry Point Environmental Affairs Department).

Total acres exposed to F-35B-generated noise levels would increase by 519 to 3,300 acres. While there is an overall increase in acres, those exposed to 70 to 85 dB DNL would decrease. Acres found within the 85 dB DNL and greater contour would grow by 126 acres. In terms of population numbers, there would be a net increase of 230 people exposed to noise levels 65 dB DNL and greater. While there is a decrease in the number of people exposed to noise levels between 70 and 85 dB DNL, there would be increases in the 65 to 70 and greater than 85 dB DNL contour bands. Housing units exposed to 65 dB DNL and greater would increase by 155 units. While there is a net increase, there would be a 30-unit decrease in the 80 to 85 dB DNL contour band with a 29-unit increase within the 85 dB DNL or greater contour band. No schools would be exposed to average noise levels of 65 dB DNL and greater. For Alternative 2, there would be the potential for five locations to experience interruptions with windows closed while all six locations to experience interruptions with windows open (see Table 6-14 for estimated number of speech interruptions and Figure 6-4 for the locations where interruptions were estimated). Under Alternative 2, only center point 5 would be exposed to noise levels greater than 65 dB DNL (refer to Table 6-15).

Table 6-18 provides the number of people (based proportionally on the area within each 1-dB noise contour band using U.S. Census block data) exposed to DNL at and above 80 dB, in 1 dB increments, and the associated average NIPTS and 10th percentile NIPTS. While there are no residential areas at risk for PHL on MCALF Bogue (i.e., there are no permanent populations residing within the airfield boundaries), there would be off-Station populations exposed to 80 dB DNL and greater under this alternative. The average and 10th percentile NIPTS would be lower than what's presented in Table 6-18 for those without 40 years of daily exposure to average noise levels of 80dB DNL and above (see Section 3.3 for PHL definition).

Table 6-18 MCALF Bogue PHL Estimates under Alternative 2

Contour Band (dB DNL)	Baseline Residential Population	Proposed Residential Population	Avg. NIPTS (dB)[a, b]	10th Percentile NIPTS (dB)[a, b]
80-81	12	4	3.0	7.0
81-82	8	3	3.5	8.0
82-83	6	3	4.0	9.0
83-84	5	3	4.5	10.0
84-85	1	2	5.5	11.0
85-86	0	2	6.0	12.0
86-87	0	2	7.0	13.5
87-88	0	2	7.5	15.0
88-89	0	3	8.5	16.5
89-90	0	5	9.5	18.0

Source: [a]National Academy of Sciences 1977.
Note: [b]Rounded to the nearest 0.5 dB.

Figure 6-4 MCALF Bogue Alternative 2 Aircraft Noise Contours

Alternative 3

Figure 6-5 presents projected noise contours, in 5 dB increments, from 65 to 85 dB DNL for Alternative 3. Baseline noise levels are also depicted for comparison purposes, along with net change from baseline. Table 6-19 provides Alternative 3 noise exposure within each DNL contour band for acreage (excluding bodies of water), as well as the population and housing units outside MCALF Bogue boundaries.

Table 6-19 Alternative 3 Projected Aircraft Noise Exposure Compared to Baseline at MCALF Bogue

Contour Band (dB DNL)	Acres[a]			Population[b]			Housing Units[b]		
	On/Off Baseline	On/Off	Net Change	Off Baseline	Off	Net Change	Off Baseline	Off	Net Change
65-70	827	1,651	+824	428	1,127	+699	192	503	+311
70-75	967	638	-329	740	238	-502	338	101	-237
75-80	460	332	-128	247	157	-90	108	67	-41
80-85	275	244	-31	134	136	+2	56	26	-30
85+	252	424	+172	31	76	+45	0	29	+29
TOTAL	***2,781***	***3,289***	***+508***	***1,580***	***1,734***	***+154***	***694***	***726***	***+32***

Notes:

[a]Exclusive of upper bound for all bands; excludes bodies of water.

[b]Estimated based on 2000 Census block data, county parcel data (Carteret County 2010d, and verification by MCAS Cherry Point Environmental Affairs Department).

Under Alternative 3, total acres exposed to proposed F-35B generated noise would increase from baseline conditions by 508 acres to 3,289. As with the other two alternatives, increases would occur within the lower (65 to 70 dB DNL) and higher (85 dB DNL and greater) noise contour bands. In terms of population numbers, there would be a net increase of 154 people exposed to noise levels 65 dB DNL and greater. Housing units exposed to 65 dB DNL and greater would increase by 32 units. There would be a be a 30-unit decrease in the 80 to 85 dB DNL contour band; however, there would be a 29-unit increase within the 85 dB DNL or greater contour band. No schools would be exposed to average noise levels of 65 dB DNL and greater; however, all but one of the six representative communities could experience potential interruptions with windows closed or open (see Table 6-14 for estimated number of speech interruptions and Figure 6-5 for the locations where interruptions were estimated). Under Alternative 3, only center point 5 would be exposed to noise levels greater than 65 dB DNL (refer to Table 6-15).

Figure 6-5 MCALF Bogue Alternative 3 Aircraft Noise Contours

Table 6-20 provides the number of people (based proportionally on the area within each 1-dB noise contour band using U.S. Census block data) exposed to DNL at and above 80 dB, in 1 dB increments, and the associated average NIPTS and 10th percentile NIPTS. While there are no residential areas at risk for PHL on MCALF Bogue (i.e., there are no permanent populations residing within the airfield boundaries), there would be off-Station populations exposed to 80 dB DNL and greater under this alternative. The average and 10th percentile NIPTS would be lower than what's presented in Table 6-20 for those without 40 years of daily exposure to average noise levels of 80dB DNL and above (see Section 3.3 for PHL definition).

Table 6-20 MCALF Bogue PHL Estimates under Alternative 3

Contour Band (dB DNL)	Baseline Residential Population	Proposed Residential Population	Avg. NIPTS (dB)[a, b]	10th Percentile NIPTS (dB)[a, b]
80-81	12	3	3.0	7.0
81-82	8	3	3.5	8.0
82-83	6	3	4.0	9.0
83-84	5	3	4.5	10.0
84-85	1	3	5.5	11.0
85-86	0	5	6.0	12.0
86-87	0	5	7.0	13.5
87-88	0	3	7.5	15.0
88-89	0	2	8.5	16.5
89-90	0	1	9.5	18.0

Source: [a]National Academy of Sciences 1977.
Note: [b]Rounded to the nearest 0.5 dB.

Alternative 4

Figure 6-6 presents projected noise contours, in 5 dB Increments, from 65 to 85 dB DNL for Alternative 4. Baseline contours are also depicted for comparison purposes, along with net change. Table 6-21 provides Alternative 4 noise exposure within each DNL contour band for acreage (excluding bodies of water), as well as the population and housing units outside MCALF Bogue boundaries. Net total acres under Alternative 4 would decrease by 245. For population and housing unit numbers exposed, there would be a net decrease of 488 people and 251 fewer housing units exposed to sound levels greater than 65 dB DNL. While population numbers and housing units experience a net decrease, there still would be people and housing units exposed to 80 dB DNL and greater noise levels, there would still be the potential for hearing loss.

Figure 6-6 MCALF Bogue Alternative 4 Noise Contours

Table 6-21 Alternative 4 Projected Aircraft Noise Exposure Compared to Baseline at MCALF Bogue (dB DNL)

Contour Band	Acres[a]			Population[b]			Housing Units[b]		
	On/Off Baseline	On/Off	Net Change	Off Baseline	Off	Net Change	Off Baseline	Off	Net Change
65-70	827	1,165	+338	428	583	+155	192	252	+60
70-75	967	456	-511	740	161	-579	338	68	-270
75-80	460	309	-151	247	158	-89	108	68	-40
80-85	275	236	-39	134	129	-5	56	26	-30
85+	252	370	+118	31	61	+30	0	29	+29
TOTAL	***2,781***	***2,536***	***-245***	***1,580***	***1,092***	***-488***	***694***	***468***	***-251***

Notes:
[a]Exclusive of upper bound for all bands; excludes bodies of water.
[b]Estimated based on 2000 Census block data, county parcel data (Carteret County 2010d, and verification by MCAS Cherry Point Environmental Affairs Department).

No schools would be exposed to average noise levels of 65 dB DNL and greater. For Alternative 4, there would be the potential for five locations to experience interruptions with windows closed while all six locations to experience interruptions with windows open (see Table 6-14 for estimated number of speech interruptions and Figure 6-6 for the locations where interruptions were estimated). As found under the other three alternatives, only one center point, number 5, would be exposed to noise levels greater than 65 dB DNL (refer to Table 6-15).

Table 6-22 provides the number of people (based proportionally on the area within each 1-dB noise contour band using U.S. Census block data) exposed to DNL at and above 80 dB, in 1 dB increments, and the associated average NIPTS and 10th percentile NIPTS. While there are no residential areas at risk for PHL on MCALF Bogue (i.e., there are no permanent populations residing within the airfield boundaries), there would be off-Station populations exposed to 80 dB DNL and greater under this alternative. The average and 10th percentile NIPTS would be lower than what's presented in Table 6-20 for those without 40 years of daily exposure to average noise levels of 80dB DNL and above (see Section 3.3 for PHL definition).

Table 6-22 MCALF Bogue PHL Estimates under Alternative 4

Contour Band (dB DNL)	Baseline Residential Population	Proposed Residential Population	Avg. NIPTS (dB)[a, b]	10th Percentile NIPTS (dB) [a, b]
80-81	12	3	3.0	7.0
81-82	8	3	3.5	8.0
82-83	6	3	4.0	9.0
83-84	5	2	4.5	10.0
84-85	1	2	5.5	11.0
85-86	0	8	6.0	12.0
86-87	0	5	7.0	13.5
87-88	0	0	7.5	15.0

Table 6-22 MCALF Bogue PHL Estimates under Alternative 4

Contour Band (dB DNL)	Baseline Residential Population	Proposed Residential Population	Avg. NIPTS (dB)[a, b]	10th Percentile NIPTS (dB)[a, b]
88-89	0	0	8.5	16.5
89-90	0	0	9.5	18.0

Source: [a]National Academy of Sciences 1977.
Note: [b]Rounded to the nearest 0.5 dB.

No Action Alternative

Under the No Action Alternative, the Proposed Action alternatives would not be implemented. Thus, baseline conditions would remain unchanged from those presented in Section 6.2.1.

6.3 Air Quality

6.3.1 Affected Environment (Baseline Conditions)

The affected area for air quality includes F-35B flight operations at MCALF Bogue. Airfield operations are the major source of emissions when considering the airspace units. Emissions generated as a function of airspace operations would be minimal since on 1 percent of total operations within these SUA would occur below 5,000 ft AGL. Of that 1 percent, the time spent by aircraft below 3,000 ft AGL would be negligible and thus not contribute greatly to regional air quality emissions. For instance, in the Coastal MOA 1 East, there would be a total of 5,321 F-35B operations under Alternative 1. It is estimated that these operations would occur 6.4 minutes below 5,000 ft AGL (see Appendix D, aircraft operations data); translating into 567 hours (or 23 days) total that these aircraft could generate emissions on an annual basis. These emissions would occur in areas already in attainment and not impact the status of that region nor represent a major regional contributor. Therefore, airspace operational emissions were not analyzed further in this section.

6.3.2 Environmental Consequences

In order to properly analyze this resource, knowledge of the pollutant types, source emission rates, the proximity of proposed emission sources to other pollutant sources, and local and regional meteorology were used. Potential air quality impacts associated with the Proposed Action alternatives were determined by comparing the net change in emissions between current operations and proposed operations associated with F-35B aircraft operations and training activities. For purposes of this analysis, only aircraft operations occurring below 3,000 ft AGL were analyzed. This ceiling was selected as a conservative estimate of the average height of a stable temperature inversion common to the coastal maritime airshed. This type of inversion can inhibit, if not effectively block, vertical and widespread horizontal dispersion of air pollutants. Thus, pollutants can be considered confined between the ground and the base of the inversion (i.e., 3,000 ft AGL). Please refer to Section 3.4 and Appendix E for further detail on the resource definition and methodology.

Table 6-23 presents a summary of MCALF Bogue annual aircraft emissions under all action alternatives. Because there would be no construction, and there are no ground support equipment or additional trips by government or personally owned vehicles anticipated under any of the alternatives, these emissions were not included in the evaluation. Alternative 2 represents the potential to generate the highest level of pollutants when compared to Alternatives 1, 3, and 4. Refer to Appendix E for emission source data and calculations used to estimate operational emissions.

Table 6-23 MCALF Bogue Proposed Action Emissions

Pollutant	Total Annual Air Pollutant Emissions (tons/year)				
	Baseline	Action Alternatives			
		1	2	3	4
VOC	7.5	0.1	0.1	0.1	0.1
CO	70.0	2.7	3.7	2.4	1.4
NO_x	53.2	27.2	37.4	24.8	14.6
SO_x	2.3	2.0	2.8	1.8	1.1
PM_{10}	42.2	0.1	0.2	0.1	0.1
$PM_{2.5}$	<42.2	<0.1	<0.2	<0.1	<0.1

Notes: VOC-Volatile Organic Compound; CO-Carbon Monoxide; NO_x-Nitrous Oxides; SO_x-Sulfur Oxides; PM-Particulate Matter

The data presented in Table 6-23 illustrate that replacement of legacy aircraft with the F-35B would reduce emissions for six out of the five criteria pollutants (CO, NO_x, VOCs, and PM) and increase minimally at 0.5 tons for SO_x. As was mentioned above, all criteria pollutants are in attainment and emissions would decrease if any of the action alternatives were selected. Therefore, regional air quality would not be negatively affected by mobile source emissions generated by F-35B aircraft operating at MCALF Bogue.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and baseline conditions would remain unchanged.

6.4 Safety

6.4.1 Affected Environment (Baseline Conditions)

General Aviation Safety. The primary concern with regard to flight safety is the potential for aircraft accidents. Flight risks apply to all aircraft; they are not limited to the military.

The ultimate responsibility for management and control of all U.S. airspace and air traffic belongs to the FAA to ensure efficiency of use and maximum safety for all airspace users. However, actual day-to-day cognizance over airspace use has been delegated to various entities. Specifically, the Coastal MOAs and TBR are managed and scheduled by the Georgia ANG. BT-9, B-11, R-5306A/C, Core MOA, and MCALF Bogue are managed and scheduled by MCAS Cherry Point or 2d MAW. This centralized management and scheduling ensures de-confliction of military and non-military traffic.

MCAS Beaufort aircrews using range and airspace units must also follow flight instructions found in MCAS Beaufort Station Order 3710.6 (series) and Station Order P3710.4L. Similarly, MCAS Cherry Point aircrews flying within airspace units follow flight instructions found in MCAS Cherry Point Order 3710.6 (series), Air Station Order 3570.2S, and Air Station Order P3710.4L. The MCALF Bogue Air Operations Manual provides procedures for flight operations at this airfield. Specific operating procedures for each respective range and/or airspace unit are detailed below.

- ***R-3007 A/B/C/D and TBR***. The use of TBR is tightly controlled through well-established and strictly adhered to safety protocols and procedures by all who work, train, or visit TBR. TBR is authorized for delivery of inert training munitions only. All TBR regulations, safety precautions, and operating procedures are contained in Georgia ANG Combat Readiness Training Center Instruction (CRTCI) 13-212V1, Air Bases Order 3572.1 Part I, *Townsend Weapons Range* (Georgia ANG 2006). This manual establishes procedures for elements such as the safe use of weapons, range entry and exit procedures, emergency procedures, and Close Air Support procedures. The manual also sets restrictions on the use of various types of ordnance and certain types of operations.
- ***MOAs***. FAA rules, airspace management, and established procedures provide for safe operations within the Coastal 1 East and West MOAs, Coastal 2/4/5 MOAs, and Core MOA airspace units. MOAs comprise SUA designated by the FAA to identify those areas where nonhazardous military operations are being conducted and to separate certain military flight activities from nonparticipating aircraft. When a MOA is active, the FAA generally routes other air traffic around it. However, nonparticipating military and civil aircraft flying Visual Flight Rules (VFR) may transit an active MOA by employing see-and-avoid procedures. When flying Instrument Flight Rules (IFR), nonparticipating aircraft must obtain air traffic control clearance to enter a MOA.

  VFR and IFR apply to this type of airspace, providing a general means of managing its use. Both military and civil aviation abide by these rules to ensure safe operations. VFR pilots fly using visual cues along the desired route of flight, as long as appropriate visibility conditions exist, day or night. IFR requires more training and pilots operate under greater restrictions, but they may fly during periods of reduced visibility. FAA rules and regulations serve to separate VFR and IFR flights from each other and from other aircraft using the same rules.

- ***R-5306A/C/D, BT-9, and BT-11.*** MCAS Cherry Point's Air Station Order P3570.2R, *Target Facilities and Operation Areas*, provides specific operating procedures for the air-to-ground, air-to-air, surface-to-air, and air combat maneuvering ranges within R-5306A and R-5306C. The primary purpose of the document is to provide the regulations and procedures for safe and orderly conduct of flight operations when using the ranges by aircrews. Nothing contained in the regulations permits live fire that endangers lives or property and equipment. MCAS Cherry Point's Air Station Order 5370.2R is also applicable to firing munitions and using lasers for training and target practice at BT-9 and BT-11 (Air Station Order P3570.2R).

Bird/Wildlife Aircraft Strike Hazards (BASH). BASH and the hazards it presents form another safety concern for aircraft operations. The BASH programs employed at each airfield are applicable to pilots in all associated training airspace units. Additionally, CRTCI 13-212V1 outlines avoidance areas for TBR, including the Wassau National Wildlife Refuge (NWR), Harris Neck NWR, and the Blackbeard NWR during June through September to reduce the potential for BASH incidents.

6.4.2 Environmental Consequences

General Aviation Safety. The overall type of training occurring in airspace under the Proposed Action would not change from that which currently occurs. The continued strict control of restricted areas, restricted access to range areas, and use of established safety procedures would ensure the separation of range operations from non-participants, thus minimizing the potential for safety risks. Moreover, civilian and commercial air traffic would continue to be restricted from the airspace over ranges when they are being used for military activities.

Bird/Wildlife Aircraft Strike Hazards. The F-35B would operate in the same airspace environment as the current legacy aircraft and the overall BASH potential is not anticipated to be different following the basing of the F-35B. It is anticipated that BASH potential would be somewhat lessened due to the fact the F-35B would spend less time at lower altitudes where species fly than legacy aircraft. In addition, adherence to existing BASH programs would continue to minimize bird/wildlife aircraft strikes.

No Action Alternative

Under the No Action Alternative, none of the Proposed Action alternatives would be implemented; baseline conditions would remain unchanged

6.5 Land Use

As stated previously, under the Proposed Action, reconstruction of the tower and LHD/LHA deck would occur, in addition to installing an apron addition and airfield overlay at MCALF Bogue. As such, potential impacts to land use due to these construction projects is included in analysis.

6.5.1 Affected Environment (Baseline Conditions)

MCALF Bogue is located in southwestern Carteret County and comprises 875 acres. Directly adjacent to the runways and associated airfield facilities are surrounded by undeveloped land. Land use at MCALF Bogue is for military operations and training, primarily in support of AV-8 fixed-wing aircraft based at MCAS Cherry Point.

6.5.2 Environmental Consequences

MCALF Bogue Land Use. Under Alternatives 1 through 4, all demolition and new construction would occur in the existing flight line area of MCALF Bogue, an area that has already been developed. All construction and demolition activities under any alternative would be consistent with existing land uses. Operations would not differ from existing conditions in such a manner to impact land uses.

Adjacent Land Uses. The primary issue is the potential for increased incompatibilities with on- and off-Station land uses. These incompatibilities may be associated with changes to the Air Installations Compatible Use Zones safety footprint in combination with encroachment that is fueled by continued population growth outside the Installation boundary. All project-related construction and demolition would occur within the boundaries of MCALF Bogue and would not incur any new direct conflicts with off-range land uses. Operations would not differ from existing conditions in such a manner to impact adjacent land uses. As such, implementation of Alternatives 1 through 4 would not result in land use conflicts with off-Station land uses.

7.0 CUMULATIVE IMPACTS

7.0 CUMULATIVE IMPACTS

7.1 Introduction

The approach taken in the analysis of cumulative impacts follows the objectives of the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality (CEQ) regulations, and CEQ guidance. Cumulative impacts are defined in 40 Code of Federal Regulations (CFR) 1508.7 and 1508.25, respectively, as:

> The impact on the environment that results from the incremental impact of the action when added to the 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.
>
> To determine the scope of environmental impact statements, agencies shall consider ….[c]umulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement.

In addition, CEQ and the United States Environmental Protection Agency (USEPA) have published guidance addressing implementation of cumulative impact analyses—*Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (CEQ 2005) and *Consideration of Cumulative Impacts in EPA Review of NEPA Documents* (USEPA 1999). CEQ guidance entitled *Considering Cumulative Impacts Under NEPA* (1997) states that cumulative impact analyses should:

> "…determine the magnitude and significance of the environmental consequences of the proposed action in the context of the cumulative impacts of other past, present, and future actions...identify significant cumulative impacts…[and]…focus on truly meaningful impacts."

Additional guidance is provided in the Marine Corps NEPA Manual, Section 4.1 (Cumulative Effects). Based on the guidance, the Marine Corps has determined the following types of cumulative impacts need to be examined with respect to the Proposed Action:

- *Additive* effects, where individual effects from multiple actions additively affect the same environmental resources (e.g., 1+1=2);
- *Countervailing* effects, where the total cumulative effect is less than the sum of individual effects (e.g., 1+1=1); or
- *Synergistic*, where the total cumulative effect is greater than the sum of the individual effects (e.g., 1+1=3).

The geographic and time scale of the cumulative effects analysis reflects the characteristics of each resource being evaluated. For the purposes of determining cumulative effects, the Marine Corps reviewed environmental documentation regarding known past, current, and reasonably foreseeable Federal and non-Federal actions occurring at and near Marine Corps Air Station (MCAS) Beaufort and MCAS Cherry Point.

7.2 Past, Present, and Reasonably Foreseeable Future Projects

To ensure an assessment of potential cumulative impacts, this analysis sought information on Federal and non-Federal actions. Those included in this section warranted initial consideration due to their geographic or temporal overlap. If it was determined that potential interaction with the resources analyzed in this Environmental Impact Statement (EIS) were possible, the action was carried forward into the cumulative impacts analysis.

Public documents prepared by Federal, state, and local governments formed the primary source for defining actions. Documents used to define these other actions included EISs, Environmental Assessments (EAs), management and land use plans, other NEPA studies, economic and demographic projections, and newspapers. For MCAS Beaufort and MCAS Cherry Point, information on past, present and future actions was gathered from base planners, environmental managers, and operations staff. Community Plans and Liaison offices sought and provided information on actions outside the bases in the surrounding areas.

7.2.1 MCAS Beaufort and Associated Ranges and Airspace

This section focuses on past, present, and reasonably foreseeable future projects at and near MCAS Beaufort. MCAS Beaufort is within the city limits of the City of Beaufort, South Carolina (SC). The Air Station's Laurel Bay Housing area has not been incorporated into the City of Beaufort and is located in Beaufort County. Other communities in the area include the Town of Port Royal, located south of MCAS Beaufort; the Town of Bluffton, located southwest of MCAS Beaufort; and Hilton Head, a resort community located south of Port Royal Sound. Other military installations in the area include the United States (U.S.) Naval Hospital Beaufort and Marine Corps Recruit Depot Parris Island; both facilities are located south of the Air Station.

7.2.1.1 Federal Actions

Numerous projects related to improving on-Station services and general mission readiness capabilities have been or would be completed at MCAS Beaufort. Table 7-1 summarizes actions evaluated for inclusion in the potential cumulative impacts analysis and, if applicable, the level and status of NEPA documentation associated with each action, and the decision document. A brief description of each action follows the table. In general, justification for including these actions centers on the overall potential for cumulative impacts when considered incrementally with the Proposed Action. Projects located near MCAS Beaufort that do not have the potential to produce cumulative effects are not included.

Table 7-1 MCAS Beaufort Cumulative Action Evaluation – Federal Actions

Action	Level of NEPA Analysis Completed
Recent Past Actions	
Marine Corps and Navy Townsend Bombing Range (TBR) Operations	EA completed
Barrington Tract at Townsend Wildlife Management Area Easements	CATEX
Present and Reasonably Foreseeable Future Actions	
Widebody Aircraft Fuel Lane	CATEX
Enlisted Dining Facility	CATEX
Ground Support Equipment Shop	CATEX
Indoor Fitness Facility	CATEX
Relocation of Strike-Fighter Squadron Eighty-Six (VFA-86) to NAS Lemoore, California	CATEX
Laurel Bay Fire Station	CATEX
Marine and Family Readiness Center	CATEX
Naval Hospital	EA in progress
Air Embarkation Facility	CATEX
TBR Modernization	EIS in progress
Various Energy Conservation Measures, Phase II	Unknown[a]

Sources: USMC 2004b, 2008e, 2008f, 2009c.
Notes: FONSI = Finding of No Significant Impact, CATEX = Categorical Exclusion
[a]The referenced project is still in development and has not advanced to the point at which the appropriate level of NEPA review has been selected.

PAST ACTIONS

Marine Corps and Navy Townsend Bombing Range Operations. The 5,183-acre TBR is an important air-to-ground inert ordnance training facility used to fine-tune aircrew bombing, gunnery, Electronic Warfare, and air combat skills. The range is used on a regular basis by fixed- and rotary-wing aircrews from 15 separate Army, Air Force, Navy, Marine Corps, and National Guard installations in the southeast, as well as carrier and amphibious groups at sea off the East Coast of the U.S. In addition, Army and Marine Corps ground forces also use the TBR for select training events (USMC 2008e).

The Marine Corps prepared an EA analyzing the potential environmental effects associated with current, emerging, and future training operations needed to achieve and maintain readiness. The EA also analyzed the upgrade/modernization of existing range capabilities to enhance and sustain Marine Corps and naval testing and training at the TBR. Under the selected alternative, the following activities were proposed:

- Approximately 4,700 annual aircraft operations;
- Add a remotely operated moving vehicle target for 20 millimeters (mm) and 30 mm strafe;

- Expand existing strafe pit to allow for segregation of 20 mm and 30 mm ammunition, as well as provide expanded opportunities for high- and low-angle strafe training;
- Upgrade and improve target infrastructure within the current target footprint;
- Increase Ground Forward Air Controller training to include the use of ancillary existing dirt roads, establishing a land navigation course, and establishing multiple Close Air Support Observation Positions;
- Potentially modify weapons safety footprints to authorize delivery of additional ordnance types; and
- Increase Unmanned Aerial Vehicle operations training with up to 150 operations per year.

The EA presented potential impacts to soil resources, water resources, air quality, land use, coastal zone resources, noise, biological resources, outdoor recreation, hazardous materials and waste, cultural resources, socioeconomics, and safety. Based on the EA analyses, it was determined that the Proposed Action would not have a significant impact on these resources and a FONSI was signed on October 3, 2008 (USMC 2008e).

Barrington Tract at Townsend Wildlife Management Area Easement. In December 2007, the Governor of Georgia announced that 4,162 acres of land in McIntosh County near the Altamaha River and TBR would be purchased by the State of Georgia and preserved (State of Georgia 2007). This acquisition was funded through a partnership consisting of the U.S. Fish and Wildlife Service (USFWS), National Oceanographic and Atmospheric Administration, The Nature Conservancy, private landowner(s), and the Department of Defense (DoD) (State of Georgia 2009). The Marine Corps obtained an easement for this parcel.

This tract would add to a corridor of conservation lands along the Altamaha River that connect the Townsend Wildlife Management Area and the Altamaha Wildlife Management Area. The entire corridor would consist of more than 46,000 adjoining acres (State of Georgia 2007). While no analyses were prepared, it was assumed that potential beneficial impacts to safety, as well as biological and socioeconomic resources, resulted.

PRESENT AND REASONABLY FORESEEABLE FUTURE ACTIONS

Widebody Aircraft Fuel Lane. This project was awarded in January 2010 and should be completed by January 2011. As part of this project 14,531 square feet (ft^2) of pavement would be demolished and 52,797 ft^2 of Portland Cement Concrete would be used to construct a wide body taxi lane at the west fuel pits. Paint stripping, an extension of the taxi edge lighting and modifications to the storm water system would also completed.

Enlisted Dining Facility. A new 36,866 ft^2 enlisted dining facility was constructed in 2009 on the old Air Station exchange site to support resident bachelor enlisted Marines and Sailors stationed at MCAS Beaufort. As part of this project, the former dining facility (Building 442) would be demolished in 2010 (USMC 2004a).

Ground Support Equipment Shop. This project should be awarded in Fiscal Year 2013 (FY13) and completed in March 2013. As part of this project, a new 11,862 ft^2 ground support equipment shop and 18,858 ft^2 holding shed would be constructed. As part of this project, Buildings 858 and 1040 (totaling 19,806 ft^2) would be demolished and 1,701 ft^2 of Hangar 594 renovated into a maintenance hangar.

Indoor Fitness Facility. This project is expected to be awarded the 1st quarter of FY11. Under this Proposed Action, the existing 33,056-ft^2 fitness center (Building 408) located on Gordon Street, just north of Delalio Avenue, would be demolished. A new 47,867 ft^2 multipurpose fitness center would be constructed east of Kaving Street. Once completed, the new multipurpose fitness center would accommodate over 4,200 active duty military personnel, 1,100 civilian employees, 5,300 military family members, and 5,500 retirees (USMC 2008f).

Relocation of VFA-86 to NAS Lemoore, California. The project would relocate VFA-86 from MCAS Beaufort to NAS Lemoore in 2011. The relocation of VFA-86 would provide one 10-plane VFA squadron for the sixth west coast carrier air wing and relocate 22 officers and 196 enlisted personnel assigned to VFA-86 and their dependents to NAS Lemoore. Once relocated, the squadron would transition from a 10-plane F/A-18C Hornet squadron to a 10-plane F/A-18E Super Hornet squadron while conducting the same mission and same training as other VFA squadrons homebased at NAS Lemoore (NAS Lemoore 2010).

Laurel Bay Fire Station. This project is slated for award in FY14 or later. Under this Proposed Action, a single story 10,624 ft^2 satellite fire station would be built at Laurel Bay Housing Complex near the entrance gate on Laurel Bay Road near Laurel Bay Boulevard. This new building would replace the existing, soon to be demolished, fire station, currently located in Building 1513 (2,294 ft^2) off of Barracuda Drive. Once finished, the satellite fire station would provide services to 1,282 housing units; three schools; three family community centers; child development center; youth center; gas station; and several administrative, maintenance and support facilities (USMC 2008f).

Marine and Family Readiness Center. Under this Proposed Action, a new single story 13,950 ft^2 Marine and Family Readiness Center would be constructed on West Street just south of Geiger Boulevard to support expanding programs for Marine and family readiness. The building would include administrative areas, counselor offices, staff areas, classrooms, waiting rooms, storage areas, and a baby/toddler play area. As part of this project, the 980 ft^2 existing Navy and Marine Corps Relief Facility, currently located in Building 719, would be demolished (USMC 2008f).

Construction of a New Naval Hospital. The Navy plans to construct a new hospital at MCAS Beaufort, Laurel Bay, or at the existing location in Port Royal (Island Packet 2009). An EA is currently being prepared and is anticipated to be finalized in FY10.

Air Embarkation Facility. This project is slated for award in FY16. Under this Proposed Action, a new 10,320 ft^2 warehouse, 16,200 ft^2 of open covered area, and 2,000 ft^2 of administrative space would be constructed. The project also includes paving and site improvements, such as privately owned vehicle and truck parking, taxiway, landscaping, and fill/borrow. In addition, Building 860 (2,497 ft^2) would be demolished

TBR Modernization. This action would provide for the modernization and expansion of TBR in McIntosh County, Georgia (GA). Specifically, if this action were implemented TBR would be able to support employment of inert (with spotting charges) Precision Guided Munitions (PGM) and its associated impact and target areas.

The proposed action would allow the Marine Corps to more efficiently meet current training requirements by significantly increasing the air-to-ground training capabilities. Presently, squadrons from MCAS Beaufort must use West Coast training ranges to satisfy PGM training requirements. Having a range available for this training would result in greater training efficiency. The EIS is considering several land acquisition scenarios and range configuration alternatives (USMC 2010b).

Various Energy Conservation Measures, Phase II. This multi-task project will provide energy efficient upgrades identified in the FY09 energy audit. The project includes: replacing hydronic heat with radiant heat in hangars, installing ground-coupled heat pumps at the Officer's Club, performing lighting upgrades in the library, installing occupancy controls in Buildings 932 and 1242, installing de-superheaters and solar hot water at the Child Development Center, upgrading lighting at Warehouse 1171, upgrading lighting at the fire station, installing solar hot water at the Laurel Bay pool, upgrading lighting at the Exchange, and installing solar hot water the Laurel Bay Child Development Center. This comprehensive project would reduce energy usage at MCAS Beaufort by 2.5 percent. These projects would be implemented FY10 through FY14. These projects are still in development and have not advanced to the point at which the appropriate level of NEPA review has been selected.

7.2.1.2 Non-Federal Actions

Community redevelopment and expansion projects have been or would be completed in municipalities located near MCAS Beaufort. Table 7-2 summarizes actions evaluated for inclusion in the potential cumulative impacts analysis and, if applicable, the level of NEPA documentation associated with each action, and the status of the decision document. A brief description of each action follows the table. In general, justification for including these actions centers on the overall potential for cumulative impacts when considered incrementally with the Proposed Action.

Table 7-2 MCAS Beaufort Cumulative Action Evaluation – Non-Federal Actions

Action	Level of NEPA Analysis[a]
Recent Past Actions	
Municipal Complex Construction	Not Applicable
Present and Reasonably Foreseeable Future Actions	
Beaufort County Rural and Critical Land Preservation Program	Not Applicable
Beaufort County Open Land Trust Preservation Program	Not Applicable
Northern Beaufort County Regional Plan Transfer of Development Rights Program	Not Applicable
Beaufort County Transportation Improvements	Not Applicable
Boundary Street Redevelopment	Not Applicable
Ridgeland and Jasper County Airport Expansion	Unknown[b]
Hilton Head Island Airport Master Plan	Not Applicable

Sources: City of Beaufort 2006, 2009a, 2009b, 2009c, 2009d; Jasper County Council 2009a, 2009b; State of Georgia 2007, 2009.
Notes: [a]Because these are not federal actions, NEPA documentation may not be required.
[b]The referenced project is still in development and has not advanced to the point at which the appropriate level of NEPA review has been selected.

PAST ACTIONS

Municipal Complex Construction. Beginning in 2007, the City of Beaufort constructed a $14.1 million dollar municipal complex at the intersection of Boundary Street and Ribaut Road. The purpose of the municipal complex was to centralize the administrative function, police department, and municipal court operations. In addition, as part of the project, expansion of the Ribaut Road fire station would occur (City of Beaufort 2009b). On August 3, 2007, the City issued a Limited Notice to Proceed to a construction firm to complete initial planning tasks (City of Beaufort 2009c). A referendum was approved by voters on October 23, 2007 and construction began on a 35,000 ft^2 police department and municipal court building, and a 28,000 ft^2 administrative building (Island Packet 2007; Leopardo Construction 2008; City of Beaufort 2009d). While no analyses were prepared, the construction site is located in a highly developed area and it is assumed that minor, short-term impacts to multiple environmental resources resulted.

PRESENT AND REASONABLY FORESEEABLE FUTURE ACTIONS

Beaufort County Rural and Critical Land Preservation Program. The purpose of the Beaufort County Rural and Critical Land Preservation Program is to acquire land for conservation, parks, buffers, scenic vistas and for preservation of valuable economic and natural resources (Beaufort County 2009a). From 1998 through 2007, the Beaufort County Rural and Critical Land Preservation Program have acquired 10,646.7 acres (Beaufort County 2009b). A portion of this is in partnership with MCAS Beaufort.

Beaufort County Open Land Trust Preservation Program. MCAS Beaufort partners with the Beaufort County Open Land Trust. The Trust's mission is to protect land permanently by working with private citizens and communities. The Trust accepts donations of properties and assists landowners establish legal restrictions that limit harmful use and development.

Northern Beaufort County Regional Plan Transfer of Development Rights Program. In 2007, Beaufort County and the municipalities of the City of Beaufort, the Town of Port Royal and the Town of Yemassee reached an agreement on how the northern half of Beaufort County (that falling generally north of the Broad River) would grow and develop. That agreement, described in the Northern Beaufort County Regional Plan, establishes a series of common goals in guiding regional growth in the coming years. The plan includes a future land use component, a regional transportation planning strategy, a basic planning cost analysis, general environmental guidelines for planning actions, and suggestions for intergovernmental efforts in overseeing the plan's implementation (Beaufort County 2007). One yet untapped potential encroachment control tool partially laid out in the Northern Beaufort County Regional Plan is the creation of a program for transfer of development rights for Beaufort County municipalities. Such a program would allow landowners in areas of designated low-density to recoup the property value losses incurred from down-zoning by selling development rights to buyers who wish to increase development in areas of higher density zoning. Property owners within the MCAS Beaufort Air Installations Compatible Use Zones (AICUZ) could become a "sending area" and sell their development rights for transfer to pre-approved "receiving areas" deemed capable of accommodating higher density development. The program is still in its developmental stages. Implementation would require the adoption by the county and local municipalities of an overlay and a floating district (Lowcountry Council of City Governments 2008b).

Beaufort County Transportation Improvements. To improve transportation efficiency throughout Beaufort County, numerous projects are in progress. Projects near MCAS Beaufort are listed in Table 7-3.

Table 7-3 Beaufort County Transportation Projects

Project	Description
U.S. Highway 17 Widening	Widen U.S. Highway 17 from Gardens Corner to the Combahee River. Construction addresses safety concerns and includes separated multi-use pathways for bicyclists and pedestrians.
U.S. Highway 21 Bypass	Complete a corridor study to identify potential alignments for a future road to connect U.S. Highway 21 in the Grays Hill area with northern Lady's Island, which would allow motorists to bypass the City of Beaufort.
Bluffton Parkway Phase 5A and 5B	Bluffton Parkway would become a continuous roadway from U.S. Highway 278 near the Hilton Head Island bridges to SC 170; completion of this project is expected to reduce traffic on U.S. Highway 278 in the greater Bluffton area by as much as 30 percent.
Boundary Street Improvements	Increase road capacity, improve intersection design, and other related improvements to the Boundary Street corridor from SC 170 to the Boundary Street/Ribaut Road intersection. Construction would include separated multi-use pathways for bicyclists and pedestrians. In addition, project involves construction of a new roadway parallel to Boundary Street on its north side between SC 170 (Robert Smalls Parkway) and Palmetto Street.

Table 7-3 Beaufort County Transportation Projects

Project	Description
SC 802 (Ribaut Road) Intersection Improvements	Increase capacity and accomplish three intersection improvements from U.S. Highway 21 (Lady's Island Drive) and the Russell Bell Bridge in Port Royal. The project includes resurfacing, improvements to the existing sidewalks, and related enhancements.
U.S. Highway 21/SC 802 Widening	Widen SC 802 (Lady's Island Drive) from U.S. Highway 21 to Ribaut Road. Project also involves the design of a new Beaufort River bridge, which would be constructed near the existing McTeer Bridge.
SC 170 Widening	Widen SC 170 for approximately 5.9 miles (mi) from the roundabout at SC 46 to the existing traffic signal at Riverbend (Tide Watch Drive), about 1 mi north of US 278. The divided highway addresses current safety concerns, reduces the need to remove grand oak trees, and includes separated multi-use pathways for cyclists and pedestrians.

Sources: Beaufort County 2007, 2009c.

In addition to the projects listed above, projects have been identified to address projected calendar year 2025 transportation conditions and to assist in the improvement of Beaufort County road conditions. These projects include road improvements, construction of new roads, construction of bike and pedestrian connections, creation of park and ride lots, and creation of public transit services. One proposed project would create a multi-use Port-Royal-Yemassee Rail Trail (Beaufort County 2007).

Boundary Street Redevelopment. MCAS Beaufort is located along U.S. Highway 21 (Boundary Street), approximately 5 mi northwest of the Beaufort city center. Boundary Street is the main arterial roadway leading from downtown Beaufort to MCAS Beaufort. In 2006, the City of Beaufort completed a master plan to document the redevelopment of Boundary Street in order to improve safety and operational efficiency of vehicular, bicycle, and pedestrian traffic while also providing opportunities for economic growth (City of Beaufort 2006). In November 2006, the Beaufort County Council approved a 1-cent sales tax to fund the Boundary Street redevelopment project and other transportation projects in Beaufort County. The six key capital improvements, listed in order of priority, include the following:

1. Create an east to west frontage road north of Boundary Street.
2. Construct a raised landscaped median on Boundary Street.
3. Construct sidewalks and install pedestrian lighting, trees, and furnishings on both sides of Boundary Street from Ribaut Road to Neil Road.
4. Improve the Boundary Street and Robert Smalls Parkway intersection, as well as the Boundary Street and Ribaut Road intersection.
5. Construct a trail parallel to the south side of Boundary Street.
6. Construct a 4-acre central park (City of Beaufort, 2006).

Construction is anticipated to begin in 2011 (City of Beaufort 2009a). While no analyses have been prepared, it is anticipated that impacts to multiple physical and anthropogenic resources would result.

Ridgeland and Jasper County Airport Expansion. In July 2008, the South Carolina State Ports Authority and the Georgia Ports Authority jointly purchased 1,518 acres of land from the Georgia Department of Transportation for the development of the Jasper Ocean Terminal on the Savannah River in Jasper County (GPA 2009; SCSPA 2009). According to the South Carolina Department of Commerce Division of Aeronautics, an expansion or relocation of the Ridgeland Airport in Jasper County would be needed if the proposed bi-state port facility is constructed in order to accommodate the increase in commerce and business travel (SCDCDA 2008). Furthermore, the forecasted 100 percent growth increase at Ridgeland Airport over the next 20 years, the potential increase in commercial service to the region, and a transition to regional jets justify the need for either an airport expansion or new airport (SCDCDA 2008). This project is still in development and has not advanced to the point at which the appropriate level of NEPA review has been selected; as such, no analyses have been prepared to date.

Hilton Head Island Airport Improvements. An update to the 2001 Airport Master Plan is currently underway. According to the December 2008 Scope of Work, the master plan would present both short- and long-term plans for the airport's development (Talbert & Bright 2008). The Master Plan is expected to be released in 2010.

7.2.2 MCAS Cherry Point and Associated Ranges and Airspace

This section focuses on past, present, and reasonably future projects at and near MCAS Cherry Point. MCAS Cherry Point is in Craven County, North Carolina (NC) midway between New Bern and Morehead City. The main gate is located off NC Highway 101 (NC 101), which connects with U.S. Highway 70 near the City of Havelock. MCAS Cherry Point is about 90 mi west-southwest of Cape Hatteras on the Neuse River in Craven County.

7.2.2.1 Federal Actions

Numerous projects related to improving on-Station services and general mission readiness capabilities have been or would be completed at MCAS Cherry Point. Table 7-4 summarizes actions evaluated for inclusion in the potential cumulative impacts analysis and, if applicable, the level of NEPA documentation associated with each action, and the status of the decision document. A brief description of each action follows the table. In general, justification for including these actions centers on the overall potential for cumulative impacts when considered incrementally with the Proposed Action. Projects near MCAS Cherry Point that do not have the potential for cumulative effects were not included.

Table 7-4 MCAS Cherry Point Cumulative Action Evaluation – Federal Actions

Action	Level of NEPA Analysis Completed
Recent Past Actions	
Introduction of the F/A-18E/F Super Hornet	Final EIS, August 2003
Phase I Privatization of Military Family Housing	EA Completed
Phase II Privatization of Family Housing (Actions took place in FY06 and beyond)	EA Completed
Combat Vehicle Operators Training Course	EA Completed
Proposed Military Operations Areas in Eastern North Carolina	EA Completed
Construction and Operation of Digital Airport Surveillance Radar in Eastern North Carolina	EA Completed
Temporary Beddown of Proposed Increase in End Strength	EA Completed
MCAS Cherry Point Range Operations	EA Completed
Marine Corps Grow the Force in North Carolina	Final EIS, December 2009
EA-6B Basing	CATEX
Present and Reasonably Foreseeable Future Actions	
Slocum Road/U.S. Highway 70 Intersection	Unknown[a]
Ordnance Magazines	EA Completed
Two Fire Stations	Main fire station CATEX; satellite fire station EA
Jet Engine Test Cell	CATEX
Facilities Maintenance Shops	CATEX
Relocate Main Access Control Point	CATEX
Electronics Van Pad	CATEX
Guided Missiles Integration Facility	Addendum to Ordnance Magazines EA
Mariner's Bay Land Acquisition	EA in progress
Energy-related projects	Unknown[a]
EA-6B Drawdown	Unknown[a]

Source: DoN 2003a, 2003b, 2003d, 2005, 2006, 2008b; USMC 2007b, 2009e; Havelock News 2009a, 2009b; Butterfield 2009.

Notes: [a]The referenced project is still in development and has not advanced to the point at which the appropriate level of NEPA review has been selected.

PAST ACTIONS

Introduction of the F/A-18E/F Super Hornet. An EIS was prepared to evaluate the basing and operation of 10 Super Hornet fleet squadrons (120 aircraft) and one Fleet Replacement Squadron (FRS) (24 aircraft) on the East Coast to replace the F-14 and earlier model F/A-18 C/D aircraft. From eight alternatives, the Navy selected Alternative 6 as the preferred alternative in the Record of Decision (ROD) (DoN 2003b). Under Alternative 6, eight Super Hornet fleet squadrons and the one FRS would be based at Naval Air Station (NAS) Oceana, and two fleet squadrons would be based at MCAS Cherry Point beginning in FY11. As part of the alternative, a new outlying landing field (OLF) would be established between these two installations in Washington County, NC. The OLF portion of the 2003 ROD was challenged in court and a Supplemental EIS was prepared and later terminated; the homebasing decision was not challenged. The Navy is currently preparing separate NEPA documentation for new OLF sites in northeastern North Carolina and Virginia to support NAS Oceana.

The direct impacts associated with the Proposed Action would be increases in off-Station noise and air emissions. Increased off-Station noise levels within the 65-Day-Night Average Sound Level exposure area would impact about 230 more people when compared to baseline conditions. In addition, an increase in emissions for all criteria air pollutants was predicted, but levels would be below the threshold considered potentially significant (DoN 2003a). The influx of personnel associated with this action was estimated at 674 active duty personnel, and 124 civilian and contractor personnel by FY11 (DoN 2003a).

Phase I Privatization of Family Housing at Marine Corps Base (MCB) Camp Lejeune, MCAS New River, and MCAS Cherry Point. This EA evaluated the potential of the Marine Corps Public Private Venture (PPV) to provide much needed new military family housing at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point. The PPV offsets costs associated with operating and maintaining existing and future military housing units to include development, construction, demolition, renovation, replacement, maintenance, and day to day management of the housing units. The privatization process took place over three phases and includes demolition of 2,936 housing units, renovation of 2,171 housing units, and construction of 2,656 new housing units at MCAS Cherry Point. The resulting analyses supported a FONSI determination (DoN 2005).

Phase II Privatization of Family Housing at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point. A supplemental EA evaluated the potential impacts associated with changes to Phase II of the PPV initiative at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point. Phase II changes included additional demolition, construction, and renovation activities. The Supplemental EA resulted in a FONSI determination (DoN 2006).

Combat Vehicle Operators Training Course. The EA evaluated the potential impacts of constructing and operating a Combat Vehicle Operators Training course on a 20-acre portion of Training Area 5. The course consists of a network of built up roads, berms, simulated ditch and canal crossings, and other obstacles to provide a tactical training environment for driving and maneuvering armored vehicles. Analyses in the EA resulted in a FONSI determination (USMC 2007c).

Proposed Military Operations Area in Eastern North Carolina (Core Military Operating Area). The EA evaluated the creation of a functionally independent Special Use Airspace that would enhance existing and future training opportunities for the 2nd Marine Aircraft Wing and other aircraft operating out of MCAS Cherry Point. The Marine Corps completed the EA and signed a FONSI in 2003 (DoN 2003d). The Federal Aviation Administration adopted the 2003 EA and signed their FONSI on January 29, 2008.

Construction and Operation of Digital Airport Surveillance Radar in Eastern North Carolina. The objective of the radar is improved airspace management, air traffic control services, and safety in eastern North Carolina. The Digital Airport Surveillance Radar system would provide continuous and complete radar surveillance coverage in eastern North Carolina for air traffic control services. The February 2007 EA analyzed the impacts of constructing this facility; the Kilkenny Fire Tower was selected as the preferred alternative site. The FONSI was jointly signed April 25, 2007 and May 3, 2007.

Temporary Beddown of Proposed Increase in End Strength. This EA was prepared for the proposed accommodation of immediate Grow the Force increases in Marines at MCAS Cherry Point. These Marines would be accommodated in a combination of existing facilities and newly erected, movable facilities until the decision on the status of the Marines is made in association with the Grow the Force Initiative EIS. Use of existing and temporary facilities would expedite the placement and accommodation of incoming new Marines in response to the 2007 Presidential mandate (as stated in the January 2007 State of the Union address). The EA evaluated projects that would disturb approximately 14 acres. Analyses in the EA resulted in a FONSI determination (DoN 2008b).

MCAS Cherry Point Range Operations. This EA was prepared to assess the potential environmental consequences from current and projected future training operations conducted at the MCAS Cherry Point Range Complex within areas controlled by and managed under Marine Corps range standard operating procedures. The EA also addressed increases in training operations commensurate with potential increases in Marines associated with the Grow the Force Initiative (USMC 2009c). It was determined that no significant impacts would result from implementation of the Proposed Action. The EA resulted in a FONSI determination in February 2009.

Marine Corps Grow the Force in North Carolina. The Marine Corps proposed permanent accommodation of 9,901 Marine Corps personnel (active duty, civilian, and student populations) across three North Carolina installations: MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point. The Marine Corps analyzed three action alternatives (Alternatives 2 through 4) and compared potential impacts to the No Action Alternative (Alternative 1). Alternative 2, the preferred alternative, includes multi-year infrastructure and facility development with construction footprints totaling approximately 1,717 acres at MCB Camp Lejeune, 160 acres at MCAS New River, and 117 acres at MCAS Cherry Point.

Demolition under the preferred alternative would affect approximately 83,601 ft^2. New construction would total approximately 463,360 ft^2 and include headquarters, administrative, and educational facilities; operations and maintenance buildings; housing; and community services facilities. Upgrades to existing buildings, communication, power, and road networks would also occur.

The EIS analyzed potential impacts to various resources and it was determined there would be no or minor impacts to land use and coastal zone management; recreation and visual resources; hazardous materials, toxic substances and hazardous waste; noise; earth resources; cultural resources and air quality. There would be notable impacts to socioeconomics, community services and facilities, transportation and traffic, utilities and infrastructure, natural resources, and water resources. Furthermore, no significant cumulative impacts to resources at MCAS Cherry Point would result from implementation of the preferred alternative (USMC 2009e). A ROD was signed on January 22, 2010 (DoN 2010).

EA-6B Beddown at MCAS Cherry Point. EA-6B Prowlers conduct airborne electronic attacks and are flown in conjunction with F/A-18s. The Navy is currently in the process of transitioning some of its EA-6B Prowlers to the Marine Corps. By 2013, MCAS Cherry Point would add seven of these electronic warfare aircraft to the existing EA-6B Prowlers, as well as 150 personnel. This addition of personnel would be temporary as the Marine Corps plans (AvPlan 2010) for the complete drawdown of EA-6Bs (refer to discussion below for additional information on the EA-6B drawdown). To accommodate this transition, one of MCAS Cherry Point's four existing Marine Tactical Electronic Warfare squadrons would be converted to a training squadron by 2010 (MCAS Cherry Point 2009f). A NEPA evaluation was completed by MCAS Cherry Point Environmental Affairs Department and the action qualified for a CATEX under exclusion number 11, which addresses routine movement of mobile assets where no new support facilities are required (MCAS Cherry Point 2009f). Furthermore, noise levels would not increase in any perceptible manner, as this action is consistent with the 2002 AICUZ.

PRESENT AND REASONABLY FORESEEABLE ACTIONS

Slocum Road/U.S. Highway 70 Intersection. A total of 15 representatives from the City of Havelock, North Carolina Department of Transportation (NCDOT), and Naval Facilities Engineering Command met in August 2009 to reach consensus on a design for the Slocum Road and U.S. Highway 70 intersection. After reviewing four alternatives, the group decided on a design that would create two elevated overpasses. One overpass would carry eastbound traffic from U.S. Highway 70 over the westbound lanes and onto MCAS Cherry Point. The second overpass would carry traffic leaving MCAS Cherry Point over westbound traffic onto U.S. Highway 70 eastbound traffic lanes. In addition, a new lane for through traffic on U.S. Highway 70, an arcing exit leading from the Air Station to westbound U.S. Highway 70, and an arcing entry way leading from westbound U.S. Highway 70 onto the Air Station via Slocum Road would be added. Under this proposed plan, Slocum Road would shift slightly to the west (Havelock News 2009a). According to Havelock News (2009a), this design would eliminate traffic backups and reduce the number of crashes at the intersection—during the last 10 years there have been approximately 350 collisions at this intersection. This project is still in development and has not advanced to the point at which the appropriate level of NEPA review has been selected.

Ordnance Magazines. This project is slated to begin in FY10 and involves the construction of nine high explosive magazines for munitions storage and demolition of two existing magazines. New magazines would be established within the existing ordnance area just north of Slocum Road, near Orange Road. Each magazine would be covered with earth and of a single-story, concrete box type measuring 5,820 ft^2 and have a cleared and graded area extending 50 feet (ft) from two sides and the back, as well as a 60 ft by 80 ft parking apron on the front side. A new road would connect the current loading dock and the magazines. The new road (including the road and shoulders) would measure 35-ft wide.

Analyses in the EA determined the Proposed Action would have no impacts to air quality, traffic, noise, coastal zones, or cultural resources. In addition, there would be no significant effects to soils, surface and ground water, vegetation, or special status species; however, 0.39 acres of wetlands would be impacted. Pending approval from the U.S. Army Corps of Engineers, MCAS Cherry Point would mitigate wetland impacts associated with the Proposed Action through payment into the North Carolina Ecosystem Enhancement Program (USMC 2004b). Approval of this mitigation measure would result in a FONSI.

Fire Stations. The main and satellite development projects are slated to begin in FY13 and involve the construction of a single story 29,784 ft^2 main fire station, as well as a single story 8,892 ft^2 satellite fire station. As part of this proposal, four buildings (192, 193, 2000, and 4203) totaling 19,590 ft^2 would be demolished. Following evaluation of this proposal, it was determined that construction of the main fire station would have no significant effect on the environment or result in a significant change from existing conditions at the site. This main fire station construction, therefore, qualified for a CATEX. While no analyses have been prepared to date for the satellite fire station, the appropriate level of environmental analyses and associated decision document would be completed prior to any ground clearing or construction activities.

Jet Engine Test Cell. Construction of this 7,161-ft^2 facility would begin in FY13. MCAS Cherry Point Environmental Affairs Department determined that the Proposed Action would have no significant effect on the environment or result in a significant change from existing conditions at the site. As such, the action qualified for a CATEX.

Facilities Maintenance Shops. This project is slated to begin in FY13 and involves the construction of 67,188 ft^2 of facilities maintenance shops to include a public works shop (28,300 ft^2), public works maintenance storage (20,800 ft^2), hazardous/flammable storage (4,069 ft^2), and administrative offices (14,019 ft^2). In addition, a total of 74,423 ft^2 would be removed with the demolition of four buildings: 82, 85, 87, and 93. It was determined that the Proposed Action would have no significant effect on the environment or result in a significant change from existing conditions and qualified for a CATEX.

Relocate Main Access Control Point. This project is slated to begin in FY14 and involves the construction of 8,697 ft^2 Main Gate Access Control Point. As part of this project, the existing Main Gate Access Control Point would be demolished. It was determined that the Proposed Action would have no significant effect on the environment or result in a significant change from existing conditions and qualified for a CATEX.

Electronics Van Pad. Commencing in FY15, this project involves construction of a 303,004 ft^2 electronics van pad, a 614 ft^2 utility building, and a 603 ft^2 field service restroom to total 304,221 ft^2. To accommodate this new construction, a total of 20,129 ft^2 would be demolished by removal of Buildings 121 and 1012. Since there would be no significant effects or changes in conditions at the existing location, the action qualified for a CATEX.

Guided Missiles Integration Facility. This project is slated to begin in FY15 and involves the construction of a 17,288 ft^2 Guided Missiles Integration Facility. The EA would be an addendum to the Ordnance Magazines EA due to its vicinity to the area analyzed under that EA. While no additional wetlands would be affected, an addendum was determined to be needed before proceeding with this proposal.

Mariner's Bay Land Acquisition. In furtherance of encroachment control planning for MCAS Cherry Point properties, the Air Station has proposed the purchase of a 12.5-acre parcel of land which lies under Accident Potential Zone I (APZ-I) and Noise Zone 3 (highest) near Marine Corps Auxiliary Landing Field (MCALF) Bogue in Carteret County, NC. The property is currently zoned commercial and residential, and a private company had plans to develop this parcel. The Proposed Action would include a fee simple purchase of the parcel with subsequent ownership and management by the Marine Corps. Following the purchase, the area would be added to the real property index for MCAS Cherry Point and be maintained as part of routine land management actions for MCALF Bogue. While no military training activities are currently proposed for the parcel, the location of this parcel relative to MCALF Bogue may lend itself to light tactical use and communications exercises. The EA for this Federal action is currently ongoing.

Energy-related Projects. Various energy efficiency improvements are planned or in progress at MCAS Cherry Point. These projects include installing advanced metering at facilities, installing energy-efficient lighting, improvements to water distribution systems, installing solar roofs, installing solar water heating units in barracks and dining hall, and installing wind turbines. These projects would occur from FY10 through FY14. These projects are still in development and have not advanced to the point at which the appropriate level of NEPA review has been selected.

EA-6B Drawdown. The Marine Corps plans for the complete drawdown of EA-6Bs by 2020 (AvPlan 2010). For purposes of this EIS, the end state of 2023 was assumed because the EA-6Bs and AV-8Bs will have transitioned out of the Marine Corps inventory at MCAS Cherry Point. Details of the drawdown, including personnel changes, are unknown at this time and could not be included in the cumulative impacts analysis.

7.2.2.2 NON-FEDERAL ACTIONS

Community redevelopment and expansion projects have been or would be completed in municipalities located near MCAS Cherry Point. The following subsections summarize actions evaluated for potential inclusion in the cumulative impacts analysis, the level of NEPA documentation associated with each action (if applicable), and the rationale for including the action in the cumulative impacts analysis. The justification for inclusion of most of these actions centers on the overall potential for cumulative impacts when considered incrementally with the Proposed Action. Projects near MCAS Cherry Point that do not have the potential for cumulative effects are not included.

PRESENT AND REASONABLY FORESEEABLE ACTIONS

North Carolina State Transportation Improvement Program. The purpose of the State Transportation Improvement Program (STIP) is to provide the funding and timeframe for the new construction and continued maintenance of North Carolina's highways, public transportation, aviation, and Governor's Highway Safety programs. The 2009-2015 STIP funds 2,437 transportation projects totaling $13 billion (NCDOT 2008b). Select projects planned for the MCAS Cherry Point area are included in Table 7-5.

Table 7-5 North Carolina DOT Transportation Projects Near MCAS Cherry Point

Project ID	Project Description
EE-4902	Complete Ecosystem Enhancement Program for mitigation purposes
R-1015	Construct a 9-mi four-lane divided Havelock Bypass, from north of Pine Grove to north of the Carteret County line
R-2301A	Construct a 5.9-mi four-lane divided freeway - New Bern Bypass from U.S. Highway 17 south of New Bern to U.S. Highway 70
R-2301B	Construct a 9.9-mi four-lane divided freeway - New Bern Bypass from U.S. Highway 70 to U.S. Highway 17
R-2513	Widen 13.3 mi of State Route (SR) 1438 (Spruill Town Road) to south of SR 1127 (Possum Track Road)
R-2513A	Widen 1.9 mi of NC 43 to SR 1438 (Spruill Town Road)
R-2539	Widen 15.5 mi of U.S. Highway 17 at Bridgeton to NC 304 in Bayboro
R-3307	Construct a four-lane road at Radio Island to U.S. Highway 70 north of Beaufort near SR 1429 (Olga Road)
R-3403	Widen 9.8 mi of Mills Street to NC 43
R-3437	Construct a new two-lane U.S. Highway 70 to NC 101 connector in Newport
R-3624	Relocate 2.2 mi of NC 101 to accommodate runway extension at the Beaufort-Morehead City Airport
R-3821	Construct a 15-mi, two-lane bypass from New Bern to U.S. Highway 70 near Riverdale
R-4431	Construct a 33.1-mi, multi-lane Havelock Bypass to Beaufort
R-4463	Construct a connector from NC 43 to U.S. Highway 17
R-4721	Grade NC 24 at NC 58 intersection to interchange
R-4746	Upgrade NC 101 in Beaufort to Cedar Island
U-3431	Widen SR 1763 (Miller Boulevard) and SR 1763 (Lake Road) to Outer Banks Drive
U-3448	Widen SR 1278 (Trent Road) and U.S. Highway 17 (Martin Luther King Jr. Boulevard) to SR 1215 (Simmons Street)
W-4700	Widen SR 1140 to 24 ft, west of U.S. Highway 70

Sources: NCDOT 2008b, 2009a, 2009b.

Of particular note are the Super 70 Corridor projects which would expand U.S. Highway 70 to make it a major freeway from Interstate 95 to the North Carolina coast. These include the Havelock Bypass

(Project Identification (ID) R-1015), North Carteret Bypass (Project ID R-4431), and Beaufort Bypass (Project ID R-3307) (NCDOT 2008b, 2009a). The expected overall goals from U.S. Highway 70 expansion include improving safety, reducing travel time, and attracting and retaining commercial activity along the corridor, which is expected to lead to increased employment opportunities in the area. Local governments are actively involved in the planning process to ensure compatibility with established communities and local development plans.

The Havelock Bypass (Project ID R-1015) involves the construction of a 9-mi, four-lane divided Havelock Bypass, from north of Pine Grove to north of the Carteret County line. Project planning is in progress, the right of way acquisition is slated for 2010, and construction is anticipated to begin in 2015 (NCDOT 2009c).

The Northern Carteret Bypass (Project ID R-4431) involves the construction of a 33.1-mi, multi-lane Havelock Bypass to Beaufort. The right of way acquisition and constructions costs remain unfunded (NCDOT 2009c). However, a feasibility study was prepared in July 2009 by the NCDOT to describe the proposed North Carteret Bypass. The purpose of this U.S. Highway 70 alternative would be to improve traffic safety, operations, and access from the east end of the proposed Havelock Bypass to the east end of the proposed Beaufort Bypass/Gallants Channel Bridge (NCDOT 2009c). The current recommendation was divided into the following seven sections in order to evaluate projected costs and identify potential issues:

- Section 1-This section comprises 7.1 mi from U.S. Highway 70 to approximately 0.6 mi west of NC 101. The Proposed Action includes new bridges over a Croatan National Forest roadway and Hancock Creek and a diamond interchange at the U.S. Highway 70 and proposed Havelock Bypass junction. In addition, a portion of existing NC 101 would be used as a service road.
- Section 2-This section comprises 6.7 mi from U.S. Highway 70 to approximately 0.6 mi west of NC 101. The Proposed Action includes new bridges over three Croatan National Forest roadways and Hancock Creek and a diamond interchange at the U.S. Highway 70 and proposed Havelock Bypass junction.
- Section 3-This section comprises 8.1 mi from the terminus of Sections 1 and 2 to approximately 0.2 mi north of SR 1163 (Laurel Road). The Proposed Action includes new bridges over a Croatan National Forest roadway, the Harlowe Canal, SR 1700 (Adams Creek Road), two Weyerhaeuser Company roadways, and the Intracoastal Waterway, as well as a diamond interchange with NC 101 at the Harlowe and SR 1163 (Laurel Road) junctions.
- Section 4-This section comprises 3.3 mi, from the terminus of Sections 3 and 7 to approximately 0.1 mi south of U.S. Highway 70. The Proposed Action includes new bridges over SR 1163 (Laurel Road) and a diamond interchange at the proposed realigned U.S. Highway 70 and SR 1300 (Merrimon Road) junction.

- Section 5-Option A includes a four-lane, divided freeway from the terminus of Section 4 to approximately 0.2 mi south of SR 1429 (Olga Road).
- Section 5-Option B includes a four-lane, divided expressway from the terminus of Section 4 to approximately 0.2 mi south of SR 1429 (Olga Road).
- Section 6-This section comprises approximately 2.1 mi from the terminus of Section 5 to approximately 0.5 mi south of NC 101. The Proposed Action includes a diamond interchange at the junction with the proposed realigned U.S. Highway 70 and a partial cloverleaf interchange at the junction with the proposed realigned NC 101.
- Section 7-This section comprises approximately 13.5 mi, from U.S. Highway 70 to about 0.2 mi north of SR 1163 (Laurel Road). The Proposed Action includes new bridges over SR 1134 (Danny Garner Road), Deep Creek, Ghouls Fork, Main Prong, a Croatan National Forest roadway, the Harlowe Canal, SR 1160 (Hardesty Loop Road), and the Intracoastal Waterway. In addition, a trumpet interchange at the junction with U.S. Highway 70, a diamond interchange at the junction with SR 1155 (Old Wineberry Road), and a diamond interchange at the junction with NC 101 are proposed (NCDOT 2009c).

Currently, three alternatives are being considered. Alternative 1 includes Sections 1, 3, 4, and 5 at a cost of $390.1 million. Under this alternative, 160 residences and 17 businesses would be relocated. Alternative 2 includes Sections 2, 3, 4, and 5 at a cost of $383.3 million. Under this alternative, 141 residences and 13 businesses would be relocated. Alternative 3 includes Sections 3, 4, 5, and 7 at a cost of $372.4 million. Under this alternative 139 residences and 11 businesses would be relocated (NCDOT 2009b). Under all three alternatives, if the Merrimon Expressway option is exercised (i.e., Section 5, Option B), costs would be reduced by $100.1 million and 88 residences and 4 businesses would not have to relocate. The following two additional sections are also being considered:

- Section 8 -This section comprises approximately 3.9 mi, from the end of Sections 3 and 7 to approximately 0.3 mi north of SR 1466 (Harbor Drive).
- Section 9-Option A includes a four-lane, divided freeway from the terminus of Section 8 to approximately 0.2 mi south of SR 1429 (Olga Road).
- Section 9-Option B includes a four-lane, divided expressway from the terminus of Section 8 to approximately 0.2 mi south of SR 1429 (Olga Road) (NCDOT 2009c).

Although an impact analysis has not yet been conducted, the July 2009 feasibility study identified eight properties listed on the National Register of Historic Places (NRHP) or state study list; four Natural Communities (High Pocosin, Low Pocosin, Mesic Pine Flatwoods, and Pond Pine Woodland) and six Natural Heritage Areas (Billfinger Road Flatwoods, Union Point Pocosin, North River Bracking Marsh, Walkers Millpond [also a dedicated nature preserve]); and the Croatan National Forest that may all be affected by the alternatives. In addition, shellfish strata, an anadromous fish spawn area, the Marsh Bird

Nesting Area special habitat, and several threatened and endangered species (Table 7-6) are located within the project area.

Table 7-6 Threatened and Endangered Species within the Northern Carteret Bypass Project Area

Common Name	Scientific Name	Federal Status	State Status
Bog Bluestem	*Andropogon nohrii*	None	SR-P
Dismal Swamp Green Stink Bug	*Chlorochroa dimalia*	None	SR
Black-throated Green Warbler	*Dendroica virens waynei*	FSC	SR
A Noctuid Moth	*Franclemontia interroganis*	None	SR
A Liverwort	*Frullania donnellii*	None	SR-T
Venus Flytrap Cutworm Moth	*Hemipachnobia subpophyrea*	FSC	SR
Black-necked Stilt	*Himantopus mexicanus*	None	SR
A Liverwort	*Lejeunea bermudiana*	None	SR-P
Lemmer-foots Pinion	*Lithophane lemmeri*	None	SR
Carolina Water Snake	*Nerodia sipedon williamengelsi*	None	SC
Owlet Moth	*Meropleon cinnamicolor*	None	SR
American Pondweed	*Potamogeton nodosus*	None	SR-D
Croatan Cray Fish	*Procambarus plumumanus*	None	SR
Annointed Sallow Moth	*Pyreferra ceromatica*	FSC	SR
Short-bristled Beaksedge	*Rhynchospora breviseta*	None	SR-P
Carter-foots Noctuid Moth	*Spartiniphaga carterae*	FSC	SR
West Indian Manatee	*Trichechus manatus*	E	E

Source: NCDOT 2009c.

Key: D-Disjunct; E-Endangered; FSC-Federal Species of Concern; L-Limited; P-Peripheral; SC-State Species of Concern; SR-Significantly Rare; T-Throughout

The Beaufort Bypass (Project ID R-3307) involves the construction of four lanes at Radio Island to U.S. Highway 70 north of Beaufort near SR 1429 (Olga Road). The right of way acquisition is underway and construction is anticipated to begin in 2015 (NCDOT 2009b).

Onslow Bight Conservation Forum (Encroachment Partnering Program). In 2002, the Marine Corps and The Nature Conservancy jointly established the Onslow Bight Conservation Forum to address encroachment issues and protect the natural heritage of coastal North Carolina. Subsequently, many other partners joined the multi-party, multi-county (nine coastal North Carolina counties) forum, representing land managers and conservation advocates who are working to increase land protection, promote appropriate land management, create habitat corridors and reach out to local communities to encourage their involvement. This forum includes MCAS Cherry Point, MCB Camp Lejeune, The Nature Conservancy, the North Carolina Coastal Land Trust, North Carolina Coastal Federation, North Carolina Wildlife Resources Commission, North Carolina Department of Environment and Natural Resources, the USFWS, Natural Resources Conservation Service, the U.S. Forest Service, and other non-governmental organizations. Projects sponsored by the Onslow Bight Conservation Forum have protected over 40,000 acres of diverse, ecologically important habitat while preserving the military mission.

New Bern/Havelock Inter-Local Sewer Agreement. The City of Havelock's permit allows a maximum average flow of 1.9 million gallons per day (mgd) and is prohibited from exceeding 90 percent of the permitted amount, or 1.71 mgd average annual flow (City of Havelock 2010b). At the end of March 2010, the City of Havelock had approximately 0.111 mgd of their 1.71 mgd sewer capacity allotment available (City of Havelock 2009a).

The City of Havelock is considering three projects that would allow them to increase their sewer capacity. One project would expand their sewer capacity an additional 284,000 gallons per day (gpd) by connecting to the City of New Bern's sewer system through a new 10-inch pipe across from a new development called Stately Pines (Havelock News 2008, 2009c; City of Havelock 2009b). Both cities are presently conducting an economic analysis (City of Havelock 2009a). The second project would expand the City of Havelock's sewer capacity an additional 350,000 gpd by relocating the city's discharge pipe from Slocum Creek to Neuse River; to save costs, the pipe would run through part of MCAS Cherry Point (Havelock News 2009c). The City has hired an engineering firm to prepare an EA and conduct surveys. The third project would increase the City of Havelock's sewer capacity 1.25 mgd by expanding the existing wastewater treatment plant (Havelock News 2009c).

7.3 Cumulative Impacts Analysis

Where feasible, the cumulative impacts were assessed using quantifiable data; however, for many of the projects, these data are not available and a qualitative analysis was undertaken. In addition, since an analysis of potential environmental effects for future actions has not been completed, assumptions were made regarding cumulative impacts related to this EIS. The analytical methodology presented in Appendix C, which was used to determine potential impacts to the various resources analyzed in this EIS, was also used to determine cumulative impacts. The four action alternatives addressed in this EIS include changes in personnel, aircraft loading, and infrastructure (Table 7-7). The potential for cumulative effects in the Region of Influence (ROI) is analyzed below as a range, determined the maximum and minimum effects expected from the four action alternatives associated with the Proposed Action. All other projects in the ROI are quantified and added separately to these maximum and minimum figures to arrive at potential cumulative effects.

Table 7-7 Summary of Element Impacts by Alternative

Elements Causing Potential Impacts	No Action	Alternative 1 (Preferred)	Alternative 2	Alternative 3	Alternative 4
MCAS Beaufort					
Total Aircraft Loading	109	89	41	129	177
Net Change in Military Personnel	NA	-228	-1,161	+667	+1,600
Net Change in Dependents	NA	-409	-2,177	+1,291	+3,058
Construction Disturbance (acres)[a]	0.0	100.9	80.1	109.8	138.4
Vegetation Loss (acres)[b]	0.0	58.6	58.6	51.5	52.8

Table 7-7 Summary of Element Impacts by Alternative

Elements Causing Potential Impacts	No Action	Alternative 1 (Preferred)	Alternative 2	Alternative 3	Alternative 4
MCAS Cherry Point					
Total Aircraft Loading	140	174	222	134	86
Net Change in Military Personnel	NA	+1,194	+2,127	+299	-634
Net Change in Dependents	NA	+2,323	+4,090	+623	-1,144
Construction Disturbance (acres)[a, c]	0.0	112.8	206.3	107.3	96.3
Vegetation Loss (acres)[b]	0.0	0.0	26.8	0.0	0.0

Notes:

[a]Includes cleared and graded areas, areas set aside for equipment storage, access roads, facility entrances, parking lots, and landscaping.

[b]Vegetation loss refers to forested undeveloped land only; other types of vegetation, such as grasslands, are excluded from the estimates shown.

[c]Includes 41.3 acres of construction disturbance at MCALF Bogue.

7.3.1 MCAS Beaufort

7.3.1.1 Airfield and Associated Airspace

The geographic scope of this cumulative analysis includes airfields and associated airspace at MCAS Beaufort. Projects within this region could impact the airfield and overlying airspace if they result in an adverse change in the operational environment, such as an increase in aircraft operations.

Alternative 1 would produce a 71 percent increase in airfield operations (USMC 2003) for the Air Station by 2023. Alternative 3 would increase airfield operations by 6 percent. No other actions, either in the past, present, or reasonably foreseeable future would incrementally result in any impacts to the management or operation of the airfield. The increase in air traffic would be managed in accordance with existing procedures and follow established local approach and departure patterns to avoid conflicts and minimize safety risks.

7.3.1.2 Noise

All alternatives associated with the Proposed Action would bring changes to the current noise contour footprint in the Beaufort area, with the majority of Zone II noise increases to be borne by medium-density residential areas. Alternatives 2 through 4 are expected to decrease the number of total acres in Noise Zones II and III affected by the Proposed Action. Alternative 1 would increase land under Noise Zones II and III by 1,678 acres, impact an additional 1,690 people, and affect an additional 498 housing units when compared to baseline conditions. As a minimum benchmark to gage potential noise impacts, although Alternative 3 would decrease the total land affected by 2,752 acres, it is expected to affect 137 additional people and 9 additional housing units.

Several other projects discussed in Sections 7.2.1.1 and 7.2.1.2 could contribute cumulatively to the potential impacts associated with the Proposed Action. Actions that could cumulatively impact noise include future TBR operations, military construction projects, local highway expansion projects, and the

Ridgeland and Jasper County airport expansion. As discussed previously, the TBR modernization project would provide for enhanced PGM training capabilities on the East Coast. However, only initial exploratory planning has been accomplished, and not enough information regarding the proposed action is known to determine what, if any, cumulative impacts would occur. It is assumed that any noise generated from military construction, highway expansion projects, or the airport expansion project would be short in duration. In addition, any noise generated from these projects would be dominated by the noise generated from the F-35B, which was previously discussed in Section 4.3. As such, no cumulative impacts to noise are expected from this or other projects in the area.

7.3.1.3 AIR QUALITY

The affected environment considered in this air quality cumulative analysis includes areas in and near the Air Station. In terms of aircraft operations, no past, present, or reasonably foreseeable future actions identified in Section 7.2.1 would incrementally contribute to project cumulative air quality impacts (please refer to Section 4.4 for discussion of these impacts). Construction projects, however, could produce an additive amount of emissions from concurrent construction activities (e.g., clearing, grading, facility construction, and paving). Section 4.4 (Tables 4.4-7 to 4.4-10) includes a complete discussion of emissions due to operations (including engine run ups), ground support equipment, and privately-owned vehicles associated with the Proposed Action. No other emissions (for example, stationary sources, government-owned vehicles, and other based aircraft) would change from baseline conditions (see Table 4.4-2) and thus would not induce cumulative impacts when considered incrementally with future projects.

Cumulative impacts, however, resulting from Alternative 1 and other construction activities at MCAS Beaufort would produce emissions but would remain below potential air quality impacts significance thresholds (refer to Section 4.4.2). Any concurrent and future emissions-generating projects that occur in the vicinity of MCAS Beaufort would have the potential to contribute additional emissions. However, because proposed construction would produce only a nominal amount of emissions (when compared to regional levels), it is not anticipated that current and projected air emissions (when other projects are considered incrementally with Alternative 1) would create an exceedance. This is especially true in and near the Air Station, a region already in attainment for all criteria pollutants.

Greenhouse Gases

The potential effects of proposed Green House Gas (GHG) emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, an appreciable impact on global climate change would only occur when proposed GHG emissions combine with GHG emissions from other man-made activities on a global scale.

Currently, there are no formally adopted or published NEPA thresholds of significance for GHG emissions stemming from proposed actions. Formulating such thresholds is problematic, as it is difficult to determine what level of proposed emissions would substantially contribute to global climate change. Therefore, in the absence of an adopted or science-based NEPA significance threshold for GHGs, this EIS compares GHG emissions that would occur from Alternative 1 to the U.S. GHG baseline inventory of 2006 to determine the relative increase in proposed GHG emissions.

Table 7-8 summarizes the annual GHG emissions associated with the proposed action operations from implementation of Alternative 1, which would result in the largest volume of GHG emissions (this directly translates to the largest number of annual flight operations). In each case, only carbon dioxide (CO_2) emissions were calculated because of the negligible quantity of methane (CH_4) and nitrous oxide (N_2O) emitted by aircraft, which are the primary source of GHG emissions under the Proposed Action.

Table 7-8 Comparison of Baseline and Alternative 1 GHG Emissions at MCAS Beaufort

Scenario/Activity	Metric Tons per Year[a]			
	CO_2	CH_4	N_2O	CO_2e
MCAS Beaufort Baseline F/A-18 Operations	66,379	-	-	66,379
F-35B Proposed Operations	119,072	-	-	119,072
Net Change	***+52,693***	**-**	**-**	***+52,693***
U.S. 2006 Baseline Emissions (10^6 metric tons)	-	-	-	7,054.2
Proposed Emissions as a % of U.S. Emissions	**-**	**-**	**-**	***0.0007%***

Notes:
CO_2e=CO_s equivalent
[a]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 296)$

CO_2 emissions from aircraft operations are increasing with the replacement of F/A-18 legacy aircraft, with a net annual increase of 52,693 metric tons of CO_2 per year. The projected annual CO_2 emissions from F-35 B operations would amount to 0.0007 percent of the total CO_2e emissions generated by the U.S. Therefore, cumulative emissions to global climate change would be negligible.

Executive Order (EO) 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* recommends that projects be evaluated on a lifecycle basis, taking into account the anticipated lifetime of a given project. It is anticipated that the F-35B aircraft will be operational for 28 years. Lifecycle emissions would increase, therefore, from those presented in Tables 4.4-7 to 4.4-10, over existing GHG emissions, multiplied by a lifetime of 28 years.

Although Alternative 1 would cause only negligible cumulative emissions, this important topic warrants discussion of Marine Corps and the Department of the Navy (DoN) leadership in broad-based programs to reduce energy consumption and shift to renewable and alternative fuels, thereby reducing emissions of carbon dioxide and other GHGs.

EO 13514 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 EO 13514, Federal agencies will be required to develop a 2008 baseline for scope 1 and 2 GHG emissions, and to develop a percentage reduction target for agency-wide reductions of scope 1 and 2 GHG emissions by FY20. As part of this effort, Federal agencies will evaluate sources of GHG emissions, and develop, implement, and annually update an integrated Strategic Sustainability Performance Plan that will prioritize 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. The DoD is currently developing its Strategic Sustainability Performance Plan that will guide Marine Corps initiatives to reduce GHG emissions.

The Commandant of the Marine Corps' *Facilities Energy and Water Management Program Campaign Plan* (2009) declares the intent to implement measures to conserve energy and to reduce GHG emissions and dependence on foreign oil. The campaign plan identifies long-term goals to reduce energy intensity and increase the percentage of renewable electrical energy consumed. This plan requires base commanders to "evaluate the effectiveness of incorporating emerging technologies" including integrated photovoltaics, cool roofs, daylighting, ground source heat pumps, heat recovery ventilation, high efficiency chillers, occupancy sensors, premium efficiency motors, radiant heating, solar water heating, and variable air volume systems.

As part of its programs to meet the Federal sustainability goals, the DoN and the Marine Corps, are developing and implementing energy conservation programs, as well as participating in the development of renewable energy projects designed to reduce dependence on fossil fuels. Table 7-9 provides a summary of the energy conservation projects that have been implemented, are in the process of being implemented, or are planned for future implementation at MCAS Beaufort. Each of the initiatives identified in Table 7-9 are anticipated to reduce emissions of greenhouse gases. The energy initiatives are not proposed to compensate for "ton for ton" emissions reductions to directly compensate for GHG emissions produced by the Proposed Action, but do provide an early response to EO 13514 to factor greenhouse gas management into DoN proposals and impact analyses. These initiatives, and other GHG reductions programs, will provide concurrent reductions in emissions that will occur at the same time as the Proposed Action.

Table 7-9 Energy Conservation Projects at MCAS Beaufort

Location	Project
Hangar 414	Replace hydronic heaters with radiant heaters
	Replace lighting
Hangar 416	Replace hydronic heaters with radiant heaters
	Replace lighting
Hangar 418	Replace hydronic heaters with radiant heaters
	Replace lighting
Building 554, Officer's Club	Replace lighting
	Exhaust hood timers
	Ground coupled heat pumps
	Solar hot water
Building 596, Training Building Library	Lighting replacement
Building 952, Naval Air Warfare Center	Occupancy sensor for HVAC

Table 7-9 Energy Conservation Projects at MCAS Beaufort

Location	Project
Building 1142, Child Development Center (CDC)	Install de-superheaters on kitchen refrigeration units
	Install solar domestic hot water on south facing roof
Building 1242, Marine Corps Community Services Log Cabin	Occupancy sensor for HVAC
Building 1513, Fire Station	Lighting replacement
Building 1539, LB Pool	Solar hot water
Building 1617, Morale, Welfare, and Recreation 7-Day Store	Lighting replacement
Building 1618, Fuel Dispensing Shelter	Lighting replacement
Building 1632, CDC	Solar hot water
Building 1171, Warehouse	Lighting replacement

Climate Change Adaptation

In addition to assessing the GHG emissions that will come from the Proposed Action and the potential impact on climate change, we must also assess how climate change will impact the Proposed Action and what adaptation strategies will be developed in response. This is a global issue for the DoD. As is clearly outlined in the Quadrennial Defense Review Report of February 2010, the DoD will need to adjust to the impacts of climate change on our facilities and military capabilities. The Department already provides environmental stewardship at hundreds of DoD 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 climate change, it will 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 were already facing elevated levels of risk from rising sea levels. DoD's operational readiness hinges on continued access to land, air, and sea training and test space. Consequently, the Department must complete a comprehensive assessment of all installations to assess the potential impacts of climate change on its missions and adapt as required.

The Quadrennial Defense Review Report goes on to illustrate that DoD will work to foster efforts to assess, adapt to, and mitigate the impacts of climate change. Domestically, the Department will 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. Abroad, the Department will increase its investment in the Defense Environmental International Cooperation Program not only to promote cooperation on environmental security issues, but also to augment international adaptation efforts.

The U.S. Global Climate Research Program report, "Global Climate Change Impacts in the U.S." reviewed the unique impacts of climate change on the U.S. (Karl et al., 2009). According to the report, climate in the Southeast is characterized as warm and wet with mild winters and high humidity. Climate models predict that by 2080, average temperatures may increase approximately 4.5 to 10 degrees Fahrenheit (Karl *et al*., 2009).

The report goes on to illustrate that the Southeast communities, infrastructure, and ecosystems are vulnerable to coastal inundation due to sea-level rise and hurricanes. The report indicates the Atlantic coastline could possibly experience an increase in the intensity of hurricanes, which could likely increase inland and coastal flooding, coastal erosion rates, wind damage to coastal forest, and wetland loss (Karl *et al*., 2009).

The availability of freshwater is likely to be reduced as a result of increased temperatures, societal demands, and time between rain events, which would impact the Southeast's economy (Karl *et al*., 2009). Sea-level rise also affects island water supplies by causing salt water to contaminate the freshwater lens and by causing an increased frequency of flooding due to storm high tides. Water pollution (such as from agriculture or sewage), exacerbated by storms and floods, can contaminate freshwater supplies, affecting public health.

As climate science advances, the DoN will regularly reevaluate climate change risks and opportunities in order to develop policies and plans to manage its effects on the DoN's operating environment, missions, and facilities.

7.3.1.4 Hazardous Materials, Toxic Substances, Hazardous Waste, and Contaminated Sites

Impacts for this resource were evaluated in terms of the Air Station's ability to manage hazardous materials and toxic substances, and hazardous waste that would be generated in combination with all the other present and future projects. Implementation of any of the action alternatives at MCAS Beaufort would require construction and demolition. Other actions at MCAS Beaufort include numerous military construction projects. When considered incrementally, past, present, and reasonably foreseeable construction and demolition activities could cause short-term increases in the volume of hazardous waste generated. However, any hazardous materials that are generated at the Air Station would be managed in accordance with local Marine Corps Orders, Air Station Orders, as well as Federal and State standard operating procedures and regulatory requirements. Any negative impacts would be minimized so that there would be no cumulative impacts when considering past, present, or reasonably foreseeable actions.

7.3.1.5 Safety

Alternatives 1 through 4 would all have a similar impact on safety at MCAS Beaufort, so when considered along with past, present, and reasonably foreseeable future actions, no alternative would result in noticeable cumulative impacts to the safety of public or military personnel. Flight operations involving the operational F-35B aircraft would follow the same procedures as those involving other aircraft currently utilizing the airfield. Alternatives 1 through 4 at MCAS Beaufort, in conjunction with other projects on and in the vicinity of the Air Station, would not result in cumulative environmental health and safety impacts.

7.3.1.6 Land Use

The proposed demolition and construction activities associated with all action alternatives would not adversely impact regional land use. Since the project-related construction and demolition would occur within the boundaries of MCAS Beaufort, no conflicts with off-Station land uses are anticipated. Furthermore, implementation of Alternative 2 would result in a net decrease in personnel and dependents of 3,338, while implementation of Alternative 4 would result in a net increase in personnel and dependents of 4,658. It is not expected that these population changes in regional context would result in short- or long-term changes to regional or local land use plans, policies, or controls. Review of relevant past, present, and reasonably foreseeable future actions indicate that positive impacts could be anticipated based on the prevention of incompatible land use development and preservation of open spaces and encroachment buffer zones. By applying the MCAS Beaufort Master Plan within Air Station boundaries, following Comprehensive Plans for development outside the military reservations, and continued participation in conservation programs, it is anticipated that there would be no cumulative impacts to land use. Noise impacts to sensitive receptors are discussed in Sections 4.3 and 7.2.1.2.

7.3.1.7 Socioeconomics

The past, present, and reasonably foreseeable future actions identified in the MCAS Beaufort vicinity were reviewed for their demographic, economic, and housing impacts. Of all the past, present, and reasonably foreseeable projects evaluated, only the proposed construction of a new naval hospital, which would replace the existing hospital in Port Royal, SC, has the potential to increase the number of personnel and visitors on Station. The EA is in the process of being prepared and not enough project information is known to adequately determine whether additional personnel or housing would be needed. In addition, the relocation of VFA-86 from MCAS Beaufort to NAS Lemoore in 2011 would decrease the number of people at MCAS Beaufort by 218 military personnel and 410 dependents, which include 119 school-aged children (calculated based on projected average dependents using MCCS 2007).

Other past, present, and reasonably foreseeable construction and land preservation projects identified in Tables 7-1 and 7-2 may also affect local socioeconomic characteristics. All these projects have the potential to result in employment impacts, income and tax revenue impacts, and housing market impacts. However, some impacts would be positive to the local economic region and some would be negative.

Implementation of Alternative 2 would result in a decrease of approximately 2 percent of the ROI population, a decrease of less than 1 percent of the region’s civilian employment due to secondary impacts associated with military payrolls and construction spending, a decrease in Federal, state, and local tax revenues, and an increase of less than 1.4 percent of the existing available housing stock.

Alternative 4 would result in an increase of approximately 3 percent of the ROI population, an increase of 1 percent of the region's civilian employment due to secondary impacts, an increase in Federal, state, and local tax revenues, and a decrease of approximately 1.2 percent of available housing stock.

The loss of personnel and dependents associated with the relocation of VFA-86 to NAS Lemoore would result in a decrease in on-Station population of 1.6 percent. However, as discussed in Section 4.8 and shown in Table 4.8-1, the project July 2010 ROI population for Beaufort County is 156,070. The reasonable foreseeable, total potential change in the ROI population from the relocation of VFA-86 and implementation of Alternative 2 or 4 would be -2.5 to 2.6 percent, respectively. Overall, the past, present, and reasonably foreseeable projects in conjunction with Alternative 2 or Alternative 4 would not be expected to result in adverse cumulative impacts to the ROI.

7.3.1.8 Environmental Justice/Protection of Children

No other projects discussed in Sections 7.2.1.1 or 7.2.1.2 would contribute cumulatively to the potential impacts associated with the Proposed Action. Therefore, no cumulative consequences are expected to have disproportionate impacts to minority or low-income populations in the vicinity of MCAS Beaufort. In addition, no cumulative health or safety risks to children are expected. Noise impacts are covered in Sections 4.3 and 4.9.

7.3.1.9 Community Services

Of all the past, present, and reasonably foreseeable projects evaluated, only the proposed construction of a new naval hospital, which would replace the existing hospital in Port Royal, has the potential to increase the number of personnel on Station. The EA is in the process of being prepared and not enough project information is known to adequately determine whether additional personnel would be needed, which would result in an increase in dependents. In addition, the relocation of VFA-86 from MCAS Beaufort to NAS Lemoore in 2011 would decrease the number of people at MCAS Beaufort by 218 military personnel and 410 dependents, which include 119 school-aged children (calculated based on projected average dependents using MCCS 2007).

Implementation of Alternative 2 at MCAS Beaufort would result in a net decrease of military personnel and their dependents by 3,338 people, of which 633 are expected to be school-aged. Alternative 4, on the other hand, would result in a net increase of military personnel and their dependents by 4,658, of which 889 are expected to be school-aged. A new 36,866 ft^2 enlisted dining facility was constructed in 2009, and there are plans to construct a new 47,867 ft^2 fitness center (FY11) and a new satellite fire station at the Laurel Bay Housing Complex in FY13. In addition, a new 13,950 ft^2 Marine and Family Readiness Center is planned for MCAS Beaufort. The addition of these facilities at MCAS Beaufort would ensure the continued ability for MCAS Beaufort to provide services to its military personnel and their dependents. Moreover, based on current enrollment data, there are approximately 3,758 available seats within the Beaufort County school systems (see Table 4.10-1). Also, Beaufort County expects to open three new schools with the capacity to educate a total of 2,300 students. When this Proposed Action is considered along with past, present, and reasonably foreseeable projects, there would be a no cumulative impacts to community facilities and services.

7.3.1.10 UTILITIES AND INFRASTRUCTURE

Of all the past, present, and reasonably foreseeable projects evaluated, only the proposed construction of a new naval hospital, which would replace the existing hospital in Port Royal, has the potential to increase the number of personnel on Station. The EA is in the process of being prepared and not enough project information is known to adequately determine whether additional personnel would be needed, which would result in an increase in dependents. In addition, the relocation of VFA-86 from MCAS Beaufort to NAS Lemoore in 2011 would decrease the number of people at MCAS Beaufort by 218 military personnel and 410 dependents (calculated based on projected average dependents using MCCS 2007).

As discussed in Section 4.11, implementation of Alternative 2 would result in a net decrease in the operational-related and residential water consumption and wastewater generation by 15,093 gpd and 231,323 gpd, respectively. Alternative 4 would result in a net increase in the operational-related and residential water consumption and wastewater generation by 20,800 gpd and 322,799 gpd, respectively. However, the current average daily demand for potable water is 21.5 mgd and the Beaufort-Jasper Water and Sewer Authority has a total capacity to treat 44.1 mgd, which can be expanded to 50 mgd. The wastewater from MCAS Beaufort would be consolidated and sent to the Port Royal Island water reclamation facility (WRF), which would result in an average daily flow of 3.7 mgd. The Port Royal Island WRF has a capacity of 7.5 mgd. Since adequate capacity exists, no adverse cumulative impacts are expected.

According to the USEPA, the average demolition debris generation rate for nonresidential structures is 158 pounds (lbs) of debris per ft^2 (lbs/ft^2), the renovation debris generation rate for nonresidential structures is 11.79 lbs/ft^2, and the construction debris generation rate for nonresidential structures is 4.34 lbs/ft^2 (USEPA 2005c). Using this USEPA debris estimate, proposed demolition and new construction at MCAS Beaufort would yield approximately 7,853 tons of construction and demolition (C&D) debris (Table 7-10). Taking into account a conservative estimate that approximately 25 percent of C&D debris would be recycled, the C&D debris estimate was reduced to 5,890 tons. As discussed in Section 4.11, an estimated 9,278 to 17,873 tons of C&D debris would be generated from implementation of Alternatives 2 or 4, respectively. As such, a total of approximately 15,168 to 23, 763 tons of C&D debris could be cumulatively generated at MCAS Beaufort. C&D debris generated from MCAS Beaufort is currently sent to the Oakwood Landfill in Jasper County, SC, or the Barnwell Resources Landfill on Lady’s Island, SC. As discussed in Section 4.11, the existing landfills have adequate capacity and it is expected that there would be no adverse cumulative impacts to solid waste from implementation of the Proposed Action at MCAS Beaufort.

Table 7-10 Construction and Demolition Debris Generation for Cumulative Actions

Action	Estimated Size (ft^2)	Debris Estimate (lbs/ft^2)
Renovation		
Hangar 594	1,701	20,055
TOTAL	1,701	20,055
TOTAL (tons)		10
Total with Estimated 25% Recycling Rate		7.5
Demolition		
Building 442, Enlisted Dining Facility	36,866	5,824,828
Buildings 858 and 1040	19,806	3,129,348
Building 408, Fitness Center	33,056	5,222,848
Building 1513, Laurel Bay Fire Station	2,294	362,452
Building 719 (Navy and Marine Corps relief facility)	980	154,840
Building 860	2,497	394,526
TOTAL	**95,449**	**15,088,842**
TOTAL (tons)		**7,544**
Total with Estimated 25% Recycling Rate (tons)		**5,658**
Construction		
Enlisted Dining Facility	36,866	159,998
Fitness Center	47,867	207,743
Laurel Bay Fire Station	10,624	46,108
Marine and Family Readiness Center	13,950	60,543
Air Embarkation Facility	28,520	123,777
TOTAL	**137,827**	**598,169**
TOTAL (tons)		**299**
Total with Estimated 25% Recycling Rate (tons)		**224**

As discussed in Section 4.11, implementation of the Proposed Action could reduce the amount of operational-related and residential solid waste generated by 2,263 tons per year (Alternative 2), but could also increase it to approximately 3,150 tons per year (Alternative 4). Solid waste generated at MCAS Beaufort is sent to Hickory Hill Landfill in Jasper County. Hickory Hill Landfill has an annual permitted rate of disposal of 307,000 tons and disposed of 226,493 tons of waste in 2008. The landfill has an estimated facility life of 16.7 years based on current disposal rates (SCDHEC 2009). As such, it is anticipated that the existing landfill has adequate capacity and that there would be no adverse cumulative impacts to solid waste from implementation of the Proposed Action at MCAS Beaufort.

Of all the past, present, and reasonably foreseeable projects evaluated for inclusion into the cumulative impacts analysis, only the proposed construction of a new hospital would have the potential to increase the number of personnel and visitors on-Station. Preparation of the new hospital EA is underway; however, not enough project information is known to adequately calculate water consumption, wastewater generation, or electrical and telecommunication requirements, therefore it cannot be evaluated cumulatively for its impacts.

7.3.1.11 Transportation and Ground Traffic

The affected areas considered in this analysis include roadway systems on or within the vicinity of MCAS Beaufort. Actions that increase total traffic volumes on existing roadways could result in cumulative impacts to ground traffic and transportation. Of all the past, present, and reasonably foreseeable projects evaluated, only the proposed construction of a new naval hospital, which would replace the existing hospital in Port Royal, has the potential to increase the number of personnel on-Station. The hospital EA is in the process of being prepared and not enough project information is known to adequately determine the impacts, if any, to transportation and ground traffic at MCAS Beaufort. Other reasonably foreseeable Military Construction projects would result in short-term increase in traffic by construction workers. Beaufort County transportation projects as well as the Boundary Street redevelopment are future projects that, when completed, would assist in improving local road conditions and reducing travel times.

Implementation of Alternative 2 at MCAS Beaufort would decrease personnel on Station by 1,161. Assuming two-trips (coming and going) per day per person are currently made, Alternative 2 would decrease the number of trips per day by 2,322. This decrease in personnel, coupled with the potential reduction in travel times associated with local road improvements, would result in a reduction of gate congestion and greater vehicular operation efficiency on local roadways.

Alternative 4 would increase personnel on-Station by 1,600, which would equate to an increase of 3,200 trips per day. Although improvements of local road conditions may reduce travel times, implementation of Alternative 4, as well as reasonably foreseeable construction projects, could result in localized impacts at the Main Gate especially during the morning commute. However, since morning peak arrival times are typically from 6:00 a.m. to 8:00 a.m., vehicles would be staggered over this time period. Congestion during peak hours could also be minimized by encouraging carpooling, implementing tandem processing to allow additional processing capacity, and considering redirecting in-bound traffic through either out-bound lanes or through other alternative gates. Therefore, the likelihood of the increase in vehicular traffic at MCAS Beaufort creating long-term cumulative impacts to existing levels of traffic safety or creating delays to the existing traffic system is minimal since changes could be made to increase processing times thus moving vehicular traffic from off-Station roadways onto the Air Station.

7.3.1.12 Biological Resources

Implementation of the Proposed Action at MCAS Beaufort would require construction and demolition. Other actions at MCAS Beaufort include numerous military construction projects. These projects locations generally occur within urban areas of the Station, with most of the new construction occurring within the original footprints of the buildings that are being demolished. Any impacts to vegetation, wildlife, or special status species at MCAS Beaufort, therefore, would be minor. Table 7-11 provides a list of past and present projects and the estimated vegetation clearance that would occur with the construction. As shown, these projects in conjunction with the F-35B Basing action would total approximately 51.5 to 58.6 acres of lost vegetation.

Table 7-11 Past/Present Actions at MCAS Beaufort – Natural Resources Impacts

Action	Vegetation Clearance
East Coast F-35B Basing	51.5 to 58.6 acres[a]
Widebody Aircraft Fuel Lane	0 acres
Enlisted Dining Facility	0 acres
Ground Support Equipment Shop	0 acres
Indoor Fitness Facility	0 acres
Marine and Family Readiness Center	0.64 acres [b]
Air Embarkation Facility	1.11 acres
Laurel Bay Fire Station (Laurel Bay Housing Complex)	0 acres
TOTAL	**53.25 to 60.35**

Notes:

[a]Represents minimum and maximum range based on implementing Alternatives 3 and 1 or 2, respectively (refer to Table 2-15).

[b]The total amount of vegetation to be cleared was estimated by calculating twice the building footprint.

As discussed in Section 7.2.1, several projects, including road widening and construction of new roads, are proposed near MCAS Beaufort. These projects have the potential to result in the loss of vegetation and potential habitat for wildlife and special status species. Road widening projects generally only remove a small strip of vegetation near the current roadway. Therefore, the longer the section of road, the greater the overall impact to vegetation, wildlife, and potential special status species. In contrast, new road construction removes a corridor of habitat and creates an obstacle for wildlife to freely move from one side of the road to the other. Fragmentation of habitat would disrupt wildlife movements and migration and divide existing wildlife populations (Jackson 2000). In addition to mortality, elevated noise from highways has been shown to have adverse impacts on call effectiveness on breeding song birds and certain species of amphibians (Bee and Swanson 2007; Dooling and Popper 2007). In the long-term, transportation projects would create new mortality danger areas for those animals needing to cross the road to access other habitat areas or water (Boarman and Sazaki 2006; Erritzoe *et al*. 2003; Saunders *et al*. 2002).

Efforts by groups such as the MCAS Beaufort-Beaufort County Land Partnership and the Beaufort County Rural and Critical Land Preservation Program have preserved open spaces and controlled growth in the area. Specifically, the MCAS Beaufort-Beaufort County Land Partnership retains easements for over

1,200 acres. The Beaufort County Rural and Critical Land Preservation Program have preserved over 10,646.7 acres of land in Beaufort County.

The Proposed Action, in combination with other past, present and reasonably foreseeable future projects would cumulatively impact natural resources. Efforts by groups such as the MCAS Beaufort-Beaufort County land partnership and the Beaufort County Rural and Critical Land Preservation Program, as well as proper land use planning would ensure the continued preservation of open land and control area growth and development. Therefore, there would be no adverse cumulative impacts to biological resources from implementation of Alternative 1 at MCAS Beaufort.

7.3.1.13 Geology, Topography, and Soils

Impacts to geology, topography, and soils are site-specific and are not affected by development in the region. Cumulative impacts to the geology or topography within or immediately near the ROI are expected to be minor. The cumulative impacts to soils would be additive to those of the Proposed Action and would include soil compaction, and disturbed and modified soil layers.

All action alternatives would require construction and demolition. Other actions at MCAS Beaufort include numerous military construction projects. These project locations generally occur within urban areas of the Station, with most of the new construction occurring within the original footprints of the buildings that are being demolished. Exposed soils are more susceptible to erosion, and soil productivity, (i.e., the capacity of the soil to produce vegetative biomass) would also decline in disturbed areas, and be completely eliminated for those areas within the footprint of paved or other hardened areas and new structures. Impacts to soils from construction and/or demolition activities occurring in areas that are currently or previously developed would be minimal, given the fact that these soils have been previously disturbed or modified, and in some areas are already covered by structures, concrete, or other appropriate surfaces. Structural and non-structural Best Management Practices (BMPs) would be implemented in accordance with State-approved erosion and sedimentation control plans to reduce erosion. Therefore, these actions would have only short-term, minor impacts on soils with the use of proper erosion, sedimentation, and stormwater management techniques. In addition, there would be negligible impacts on topography and geology of MCAS Beaufort. Therefore, The Proposed Action would not have adverse cumulative impacts on the geology, topography, and soils of MCAS Beaufort (see Section 4.14, Geology, Topography, and Soils).

7.3.1.14 Water Resources

Implementation of any of the action alternatives would have no effect to groundwater or floodplains and therefore, there would be no potential for cumulative impacts. These resource categories are not discussed further.

Implementation of all action alternatives at MCAS Beaufort would require construction and demolition with potential cumulative effects on surface water and stormwater management. Other actions at MCAS Beaufort include numerous military construction projects. These project locations generally occur within urban areas of the Station, with most of the new construction occurring within the original footprints of the buildings that are being demolished. Although there is a potential for short-term impacts to surface waters and stormwater from proposed construction and demolition activities, these impacts would not be considered adverse since implementation of proper erosion, sedimentation, and stormwater management techniques would be incorporated into the project. Following construction, implementation of low impact development (LID) stormwater management techniques, as well as traditional stormwater engineering controls (e.g., buildings with gutters, culvert/channels directing stormwater to retention basins) would decrease future impacts to water quality. As such, only minor cumulative impacts to surface waters or stormwater would occur from implementation of the Proposed Action at MCAS Beaufort.

7.3.1.15 Cultural and Traditional Resources

No NRHP listed or NRHP-eligible architectural resources have been identified within the proposed construction areas. MCAS Beaufort has received concurrence from South Carolina State Historic Preservation Officer (SHPO) that the Cantonment area where construction and demolition would occur requires no further survey. The Proposed Action would only impact cultural resources if an inadvertent discovery were made during construction or demolition activities. Requests for information regarding the Proposed Action from Federally recognized Tribes with ties to the area have not resulted in the identification of any culturally significant sites.

Past, present, and reasonably foreseeable projects implemented within the ROI could potentially affect cultural resources where ground disturbance exposes any undocumented/unknown cultural resources or where visual elements may be introduced that are out of character with a historic property within the viewshed. If during construction and site grading, any sensitive resources are discovered, work would immediately cease and the procedures for inadvertent discovery as outlined in the Air Station's Integrated Cultural Resources Management Plan would be implemented. MCAS Beaufort would consult with the SHPO and coordinate with Federally-recognized American Indian Tribes with ancestral ties to the area. This would be done in accordance with 36 CFR 800 to avoid, minimize, or mitigate any adverse effects to historic properties. However, these impacts could have a collective and cumulative effect in reducing the overall number of historic properties in the ROI.

7.3.1.16 Coastal Zone Management

In terms of development, none of the action alternatives would result in negative impacts to the coastal zone. All permit requirements and mitigation measures (as needed) for past, present, and reasonably foreseeable actions are and would be consistent with the enforceable policies of the South Carolina Coastal Zone Management Plan to minimize adverse cumulative impacts to the coastal zone.

7.3.2 MCAS Cherry Point

7.3.2.1 Airfield and Associated Airspace

The geographic scope of this cumulative analysis includes airfields and associated airspace at MCAS Cherry Point. Projects within this region could impact the airfield and overlying airspace if they result in adverse changes in the operational environment, such as an increase in aircraft operations.

Alternative 1 would produce a 14 percent decrease in airfield operations for the Air Station by 2023. Alternative 3 would produce a 33 percent increase in airfield operations. No other actions, either in the past, present, or reasonably foreseeable future would incrementally result in any impacts to the management or operation of the airfield. The increase in air traffic would be managed in accordance with existing procedures and follow established local approach and departure patterns to avoid conflicts and minimize safety risks.

7.3.2.2 Noise

All alternatives associated with the Proposed Action would bring changes to the current noise contour footprint in the MCAS Cherry Point area. Alternatives 1 through 4 are expected to increase the number of total acres in Noise Zones II and III affected by the Proposed Action. Alternative 1, which would have the minimum impacts, would increase land under Noise Zones II and III by 3,802 acres, impact an additional 1,657 people, and affect an additional 194 housing units when compared to baseline conditions. As a maximum benchmark to gage potential noise impacts, Alternative 3 is expected to affect 3,179 additional people and 661 additional housing units in Zone II and III, and increase the land under these zones by 6,612 acres.

Military construction projects and local road construction projects discussed in Sections 7.2.2.1 or 7.2.2.2 could contribute cumulatively to the potential impacts associated with the Proposed Action. However, it is assumed that any noise generated from these projects would be short in duration. It is assumed any noise generated from these projects would be short in duration and dominated by the noise generated from the F-35B, which was previously discussed in Section 5.3. As such, no cumulative impacts to noise are expected from this or other projects in the area.

7.3.2.3 Air Quality

The affected environment considered in this air quality cumulative analysis includes areas in and near the Air Station. In terms of aircraft operations, no past, present, or reasonably foreseeable future actions identified in Section 7.2.2 would incrementally contribute to project cumulative air quality impacts (please refer to Section 5.4 for discussion of these impacts). Construction projects, however, could produce an additive amount of emissions from concurrent construction activities (e.g., clearing, grading, facility construction, and paving). Section 5.4 (Tables 5.4-7 to 5.4-10) includes a complete discussion of emissions due to operations (including engine run ups), ground support equipment, and privately-owned vehicles associated with the Proposed Action. No other emissions (for example, stationary sources, government-owned vehicles, and other based aircraft) would change from baseline conditions (see Table 5.4-2) and thus would not induce cumulative impacts when considered incrementally with future projects.

Cumulative impacts, however, resulting from Alternative 1 and other construction activities at MCAS Cherry Point would produce emissions but would remain below potential air quality significance thresholds. Any concurrent and future emissions-generating projects that occur in the vicinity of MCAS Cherry Point would have the potential to contribute additional emissions. However, because proposed construction would produce only a nominal amount of emissions (when compared to regional levels), it is not anticipated that current and project air emissions (when other projects are considered incrementally with Alternative 1) would create an exceedance. This is especially true in a region already in attainment for all criteria pollutants.

Greenhouse Gases

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

Currently, there are no formally adopted or published NEPA thresholds of significance for GHG emissions stemming from proposed actions. Formulating such thresholds is problematic, as it is difficult to determine what level of proposed emissions would substantially contribute to global climate change. Therefore, in the absence of an adopted or science-based NEPA significance threshold for GHGs, this EIS compares GHG emissions that would occur from Alternative 3 to the U.S. GHG baseline inventory of 2006 to determine the relative increase in proposed GHG emissions.

Table 7-12 summarizes the annual GHG emissions associated with the proposed action operations from implementation of Alternative 3, which would result in the largest volume of GHG emissions (this directly translates to the largest number of annual flight operations) of all the Alternatives. In each case, only CO_2 emissions were calculated because of the negligible quantity of methane and nitrous oxide emitted by aircraft, which are the primary source of GHG emissions under the proposed action.

Table 7-12 Comparison of Baseline and Alternative 3 GHG Emissions for MCAS Cherry Point

Scenario/Activity	Metric Tons per Year[a]			
	CO_2	CH_4	N_2O	CO_2e
MCAS Cherry Point Baseline AV-8B Operations	65,920	-	-	65,920
F-35B Proposed Operations	72,633	-	-	72,633
Net Change	***+6,713***	-	-	***+6,713***
U.S. 2006 Baseline Emissions (10^6 metric tons)	-	-	-	7,054.2
Proposed Emissions as a Percent of U.S. Emissions	-	-	-	***0.0001***

Notes:
[a] $CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 296)$

CO_2 emissions from aircraft operations are slightly increasing with the replacement of AV-8B legacy aircraft, a net annual increase of 6,713 metric tons per year will be realized. The projected annual CO_2 emissions from F-35 B operations would amount to 0.0001 percent of the total CO_2 emissions generated by the U.S. Therefore, cumulative emissions to global climate change would be negligible.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* recommends that projects be evaluated on a lifecycle basis, taking into account the anticipated lifetime of a given project. It is anticipated that the F-35B aircraft will be operational for 28 years. Lifecycle emissions would increase, therefore, from those presented in Tables 5.4-7 to 5.4-10, over existing GHG emissions, multiplied by a lifetime of 28 years.

Although Alternative 3 would cause only negligible cumulative emissions, this important topic warrants discussion of Marine Corps and the DoN leadership in broad-based programs to reduce energy consumption and shift to renewable and alternative fuels, thereby reducing emissions of CO_2 and other GHGs.

EO 13514 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 greenhouse gas emission reductions. According to provisions in EO 13514, Federal agencies will be required to develop a 2008 baseline for scope 1 and 2 GHG emissions, and to develop a percentage reduction target for agency-wide reductions of scope 1 and 2 GHG emissions by FY20. As part of this effort, Federal agencies will evaluate sources of greenhouse gas emissions, and develop, implement, and annually update an integrated Strategic Sustainability Performance Plan that will prioritize 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. The DoD is currently developing its Strategic Sustainability Performance Plan that will guide Marine Corps initiatives to reduce GHG emissions.

The Commandant of the Marine Corps' *Facilities Energy and Water Management Program Campaign Plan* (2009) declares the intent to implement measures to conserve energy and to reduce GHG emissions and dependence on foreign oil. The campaign plan identifies long-term goals to reduce energy intensity and increase the percentage of renewable electrical energy consumed. This plan requires base commanders to "evaluate the effectiveness of incorporating emerging technologies" including integrated photovoltaics, cool roofs, daylighting, ground source heat pumps, heat recovery ventilation, high efficiency chillers, occupancy sensors, premium efficiency motors, radiant heating, solar water heating, and variable air volume systems.

As part of its programs to meet the Federal sustainability goals, the DoN and Marine Corps, are developing and implementing energy conservation programs, as well as participating in the development of renewable energy projects designed to reduce dependence on fossil fuels. Table 7-13 provides a summary of the energy conservation projects that have been implemented, are in the process of being implemented, or are planned for future implementation at MCAS Cherry Point. Each of the initiatives identified in Table 7-13 are anticipated to reduce emissions of GHG. The energy initiatives are not proposed to compensate for "ton for ton" emissions reductions to directly compensate for GHG emissions produced by the Proposed Action, but do provide an early response to EO 13514 to factor GHG management into DoN proposals and impact analyses. These initiatives, and other GHG reductions programs, will provide concurrent reductions in emissions that will occur at the same time as the Proposed Action.

Table 7-13 Energy Conservation Projects at MCAS Cherry Point

Location	Project
Station Wide	Install advanced metering and management software
Building 1016	Install photovoltaic system
Building 289	Solar training pool
Athletic Field	Reclaimed water for athletic field irrigation
Airfield	Install LED for airfield lighting
Building 152	Install reverse osmosis filtration system
Building 159	Install solar roof
Building 194	Install solar roof
Miscellaneous Buildings	Install voltage regulation equipment in misc buildings
Barracks	Install EnergyStar washers in barracks
Water Distribution	Water distribution system improvements
N/A	Wireless communications system for load shedding
Building 250	Replace lighting
Miscellaneous Buildings	Install advanced energy and water meters in misc buildings
Station Wide	Install energy efficient lighting
Station Wide	Conduct energy audits
Dining Hall	Install solar thermal water heating
Barracks	Install solar thermal water heating
Station Wide	Install pole-mounted wind turbines
Building 1016	Install solar photovoltaic system
Station Wide	Install electronic marquee message signs
Central Heating Plant	Reclaimed water
Housing Area	Install energy efficient street lighting
Central Core Area	Install energy efficient street lighting

Table 7-13 Energy Conservation Projects at MCAS Cherry Point

Location	Project
Station Wide	Water distribution system mixers, elevated storage tanks
Miscellaneous Hangars	Replace lighting

Climate Change Adaptation

In addition to assessing the GHG emissions that will come from the Proposed Action and the potential impact on climate change, we must also assess how climate change will impact the Proposed Action and what adaptation strategies will be developed in response. This is a global issue for the DoD. As is clearly outlined in the Quadrennial Defense Review Report of February 2010, the DoD will need to adjust to the impacts of climate change on our facilities and military capabilities. The Department already provides environmental stewardship at hundreds of DoD 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 climate change, it will 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 were already facing elevated levels of risk from rising sea levels. DoD's operational readiness hinges on continued access to land, air, and sea training and test space. Consequently, the Department must complete a comprehensive assessment of all installations to assess the potential impacts of climate change on its missions and adapt as required.

The Quadrennial Defense Review Report goes on to illustrate that DoD will work to foster efforts to assess, adapt to, and mitigate the impacts of climate change. Domestically, the Department will 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. Abroad, the Department will increase its investment in the Defense Environmental International Cooperation Program not only to promote cooperation on environmental security issues, but also to augment international adaptation efforts.

The U.S. Global Climate Research Program report, "Global Climate Change Impacts in the U.S." reviewed the unique impacts of climate change on the U.S. (Karl et al., 2009). According to the report, climate in the Southeast is characterized as warm and wet with mild winters and high humidity. Climate models predict that by 2080, average temperatures may increase approximately 4.5°F to 10°F (Karl et al., 2009).

The report goes on to illustrate that the Southeast communities, infrastructure, and ecosystems are vulnerable to coastal inundation due to sea-level rise and hurricanes. The report indicates the Atlantic coastline could possibly experience an increase in the intensity of hurricanes, which could likely increase inland and coastal flooding, coastal erosion rates, wind damage to coastal forest, and wetland loss (Karl et al., 2009).

The availability of freshwater is likely to be reduced as a result of increased temperatures, societal demands, and time between rain events, which would impact the Southeast's economy (Karl et al., 2009). Sea-level rise also affects island water supplies by causing salt water to contaminate the freshwater lens and by causing an increased frequency of flooding due to storm high tides. Water pollution (such as from agriculture or sewage), exacerbated by storms and floods, can contaminate freshwater supplies, affecting public health.

As climate science advances, the DoN will regularly reevaluate climate change risks and opportunities in order to develop policies and plans to manage its effects on the DoN's operating environment, missions, and facilities.

7.3.2.4 Hazardous Materials, Toxic Substances, Hazardous Waste, and Contaminated Sites

Impacts for this resource were evaluated in terms of the Air Station's ability to manage hazardous materials and toxic substances, and hazardous waste that would be generated in combination with all the other present and future projects. Implementation of all alternatives at MCAS Cherry Point would require construction and demolition. Other actions at MCAS Cherry Point include numerous military construction projects. When considered incrementally, past, present, and reasonably foreseeable construction and demolition activities could cause short-term increases in the volume of hazardous waste generated. However, any hazardous materials that are generated at the Air Station would be managed in accordance with local Marine Corps Orders, Air Station Orders, as well as Federal and State standard operating procedures and regulatory requirements. Therefore, any negative impacts would be minimized and no cumulative impacts are anticipated when considering those related to Proposed Action and other actions past, present, or reasonably foreseeable.

7.3.2.5 Safety

None of the action alternatives, when considered along with past, present, and reasonably foreseeable future actions would result in noticeable cumulative impacts to the safety of public or military personnel. As discussed in section 7.3.2.1 airspace, although the number of flight operations could be altered from -13 to +30 percent, in any scenario flight operations are not expected to overcrowd the airspace in a way that would increase risk for incident. Flight operations involving the operational F-35B aircraft would follow the same procedures as those involving other aircraft currently utilizing the airfield. The Proposed Action at MCAS Cherry Point, in conjunction with other projects on and in the vicinity of the Air Station, would not result in cumulative environmental health and safety impacts.

7.3.2.6 Land Use

For the ROI, the trend of increasing urbanization over the past 10 years has resulted in development pressures in a largely rural and agricultural area. In response, counties have instituted comprehensive development plans to help guide this growth. Long-standing relationships between the communities and the Marines and civilian personnel who are stationed or work at the Air Station remain strong because many Marines and civilians live off the Air Station with their dependents. Family members attend the local schools; depend on local emergency and protection services; and use local roads, power, communication, and water systems. Cumulative impacts are assessed in terms of the compatibility of the cumulative actions with existing land uses. Projects within this region that are not compatible with existing Air Station plans or other planning documents would impact land use.

The proposed C&D activities associated with the Proposed Action would not change nor impact regional land uses. All project-related construction would occur within the industrial portion of MCAS Cherry Point, an area that is already highly developed. Since the project-related activities would occur within the boundaries of MCAS Cherry Point, no conflicts with off-Station land uses are anticipated from C&D.

Implementation of Alternative 4 would result in a net decrease of personnel and dependents by 1,778; implementation of Alternative 2 would result in a net increase of personnel and dependents by 6,217. The potential change in regional population could result in indirect growth-induced development beyond the Air Station. When considered incrementally, cumulative impacts from the Proposed Action, Marine Corps Grow the Force Initiative, the introduction of the F/A-18E/F Super Hornet, EA-6B beddown at MCAS Cherry Point, along with future plans described under the North Carolina STIP, could result in changes to regional land use. By applying the MCAS Cherry Point Master Plan within Air Station boundaries, following Comprehensive Plans for development outside the military reservations, and continued participation in conservation programs, it is anticipated that there would be minor cumulative impacts to land use.

7.3.2.7 Socioeconomics

Implementation of Alternative 4 would result in a long-term decrease of less than 1 percent of the ROI population, a decrease of less than 1 percent of the region's civilian employment due to secondary impacts associated with military payrolls and construction spending, slight decreases in Federal, State, and local tax revenues, and minor to no effects to the local housing market as less than 1 percent of the housing stock may be effected over a 7-year period. Conversely, Alternative 2 would result in an increase of approximately 4 percent of the ROI population, an approximate 1 percent increase of the region's civilian employment opportunities due to secondary impacts, increases in Federal, State and local tax revenues, and an increase in demand for housing representing about 2 percent of the housing stock, (Section 5.8.2 assumes a worst-case scenario in which all new personnel would seek off-post housing.)

The additive gains from Marine Corps personnel growth anticipated under the Grow the Force Initiative, Temporary Beddown of Proposed Increase in End Strength (personnel associated with this action were included in the Grow the Force Initiative), basing two F/A-18 E/F fleet squadrons at MCAS Cherry Point, and EA-6B beddown would result in a cumulative increase in on-Station population of 18.8 percent

(Table 7-14). However, as discussed in Section 5.8 and shown in Table 5.8-1, the projected July 2010 ROI population for Craven and Carteret Counties is 99,211 and 64,144 people, respectively, for a total of 163,355 people. The reasonably foreseeable, total potential increase of 2,390 to 10,667 additional military personnel and their dependents would result in a cumulative increase in the ROI population of 1.5 to 6.7 percent.

Table 7-14 Projected Net Change in Population

Project	Installation Personnel	Dependents[a]	School-Age Children
Basing of Two F/A-18 E/F Fleet Squadrons	+798	+1,544	+338
Grow the Force Initiative	+784	+892	+346
EA-6B Beddown[b,c]	+150	+282	+82
Basing of the F-35, Minimum (Alternative 4)	-634	-1,144	-333
Basing of the F-35, Maximum (Alternative 2)	+2,127	+4,090	+1,189
TOTAL (minimum)	**+1,098**	**+1,292**	**+351**
TOTAL (maximum)	**+3,859**	**+6,808**	**+1,955**
FY09 Baseline Population[b,d]	**+14,625**	**+27,492**	**+7,992**

Sources: DoN 2003a; MCAS Cherry Point 2009f; USMC 2009e.
Notes:
[a]Inclusive of school-age children.
[b]Calculated based on projected average dependents using MCCS 2007.
[c]This would be a temporary increase as the Marine Corps plans (AvPlan 2010) for the complete drawdown of EA-6Bs. .
[d]Includes military, civilian, and non-appropriated funded personnel.

The population growth would equate to additive economic gains for direct, indirect, and induced employment and income. Additional taxes would accrue to the Federal, state, and local governments as a result of this cumulative economic activity. These gains would be additive and interactive with other economic activities in the ROI and represent a positive gain for the economy. Moreover, all the proposed construction projects have the potential to result in the creation of new jobs that would bring short-term economic growth to the region, as well as additional tax revenues for the Federal, State, and local governments.

Residential land use development is regulated by local land use plans, policies, and controls which address items such as zoning for single- and multi-family residences, housing density, and provision of affordable housing. With adherence to such controls and involvement by the Eastern North Carolina Military Growth Task Force, there would not be adverse cumulative impacts to housing. Actions taken by the North Carolina Housing Coalition would be countervailing factors helping to offset negative affordable housing impacts within the ROI.

In 2008, the total number of on-Station family housing units was 1,748, of which 1,394 were occupied and 354 units were vacant (USMC 2009e). In addition, approximately 3,100 unaccompanied personnel were housed on-Station in 2007 and 420 unaccompanied personnel found housing in the community

(Robert D. Niehaus, Inc. 2007). A bachelor enlisted quarters (BEQ) project for MCAS Cherry Point would provide housing for up to 350 personnel (USMC 2009e). As reported in the U.S. Census Bureau 2006-2008 American Community Survey, there were 3,824 vacant housing units in Craven County, NC, and 18,648 vacant housing units in Carteret County, NC (U.S. Census Bureau 2009c). It is expected that the phasing of the personnel changes, the fact that military housing is available, and the historic pace of residential construction in the ROI would lessen the short- and long-term impacts to the local housing market.

Overall, the past, present, and reasonably foreseeable projects in conjunction with the MCAS Cherry Point preferred alternative would introduce positive incremental cumulative impacts to ROI population numbers, employment levels, income and tax revenues, and the housing market.

7.3.2.8 Environmental Justice/Protection of Children

No other projects discussed in Sections 7.2.2.1 or 7.2.2.2 would contribute cumulatively to the potential impacts associated with the Proposed Action. Therefore no cumulative consequences are expected to have disproportionate impacts to minority or low-income populations in the vicinity of MCAS Cherry Point. In addition, no cumulative health or safety risks to children are expected. Noise impacts to these populations are covered in Sections 5.9.

7.3.2.9 Community Services

Implementation of Alternative 2 at MCAS Cherry Point would increase military personnel by 2,127 and dependents by 4,090 (Table 7-14). Implementation of Alternative 4 would reduce military personnel by 634 and decrease the dependent population by 1,144. Alternative 2 would result in an increased demand on community services and facilities, particularly schools. In addition, present or reasonably foreseeable actions, including the Grow the Force Initiative, introduction of the F/A-18E/F Super Hornet, and EA-6B beddown would further increase demand on community services and facilities (Table 7-14). Despite the fact that the selection of Alternative 4 would represent a decrease in military personnel for the proposed action, the overall future demand for community services in the ROI will still increase due to the other re-stationing actions occurring in the ROI.

Future construction projects at MCAS Cherry Point involve the construction of a 29,784 ft^2 main fire station, 8,892 ft^2 satellite fire station, 30,649 ft^2 Family Service Center, and 25,424 ft^2 child development center. The Eastern North Carolina Military Growth Task Force has received funding from the Office of Economic Adjustment to evaluate how schools and public services can absorb incoming Marines, their families, and support staff. Completion of a comprehensive regional growth impact study that addresses impacts of growth is anticipated in 2010. Local school districts are also planning and programming for new or expanded facilities and taking actions such as redistricting, in preparation for additional school-age children.

An increase in population may result in an increase in emergency response times both on and off Station. On Station, it is anticipated that the proposed construction of a new main fire station and satellite fire station would provide additional services to military personnel and their dependents. No cumulative impacts are anticipated to constrain emergency services on-Station at MCAS Cherry Point when considering other past, present, or reasonably foreseeable actions.

Off Station, emergency service response times are more a function of distance than population within the more rural portions of the ROI, hence cumulative impacts to rural areas of the ROI are not expected. In the urban areas, increased staffing may be necessary, but the requirement would be based on the actual response time experienced. Therefore, short-term cumulative impacts may occur to emergency services, but long-term impacts are not expected since staffing additions would reduce response times.

During the 2009 school year, Craven County schools were at 88-percent capacity and Carteret County schools were at 84-percent capacity. Based on current enrollment data, it is anticipated that 83 percent of all Federally-connected school-age children would attend Craven County schools and the remaining 17 percent would attend Carteret County schools. Based on the data contained in Table 7-14 and considering the maximum population increase as projected for Alternative 2 or minimum increases expected from other military population changes in the ROI associated with Alternative 4, it is expected that an additional 359 to 1,623 students would attend Craven County schools and 74 to 332 additional students would attend Carteret County schools. The range of alternatives associated with this proposed action and added to other projects in the ROI would reduce the number of available seats at Craven County schools from 325 to 1,616 and Carteret Counties schools 1,212 to 1,497 leaving a total range of 3,113 to 1,537 available seats in the area. The overall increase in students at Craven and Carteret Counties schools is anticipated to be gradual. Therefore, it is likely that short-term cumulative impacts would occur as the various schools adjust to additional student enrollment; however, long-term cumulative impacts are not expected since there is adequate capacity remaining in Craven and Carteret Counties schools.

There is currently a wait list at the two on-Station child development centers, which would most likely increase with an increase in population. Families with infants would experience the longest wait time. It is anticipated that the proposed construction of a child development center under the Grow the Force Initiative would accommodate an additional 268 children ages 6 weeks to 6 years old. In addition, alternative solutions to the on-Station child development centers, such as the Family Child Care Program on-Station, and licensed childcare centers and family childcare facilities off-Station, exist. There are currently 129 licensed childcare facilities available throughout Craven and Carteret Counties (North Carolina Division of Child Development 2010). While short-term cumulative impacts associated with finding day care are expected, local facilities would likely respond to the increased demand for services; no long-term cumulative impacts are expected.

7.3.2.10 Utilities and Infrastructure

Water is consumed by military personnel during operations and military personnel and their dependents at home. This cumulative impacts analysis assumes that the average daily water consumption is the same as the wastewater flow rates, and that each military person at work and each residential user would consume an average of 13 and 69.3 gpd, respectively (USEPA 2002). Table 7-15 provides the projected change in water consumption expected by office personnel and residents for all reasonably foreseeable actions, including the minimum and maximum range of impacts associated with the proposed action and represented by Alternatives 4 and 2, respectively.

Table 7-15 Projected Water Consumption

Action	Military Personnel (Operations)		Military Personnel and Dependents (Residential)	
	Net Population Change	Net Change in Projected Water Consumption (gpd)	Net Population Change	Net Change in Projected Water Consumption (gpd)
Basing of Two F/A-18E/F Fleet Squadrons	+798	+10,374	+2,342	+162,301
Grow the Force Initiative	+784	+10,192	+1,676	+116,147
EA-6B Beddown[a,b]	+150	+1,950	+432	+29,938
Basing of the F-35, Minimum (Alternative 4)	-634	-8,242	-1,778	-123,215
Basing of the F-35, Maximum (Alternative 2)	+2,127	+27,651	+6,217	+430,838
TOTAL (minimum)	**+1,098**	**+14,274**	**+2,240**	**+185,171**
TOTAL (maximum)	**+3,859**	**+50,167**	**+10,667**	**+739,224**

Sources: DoN 2003a; MCAS Cherry Point 2009f; USMC 2009e.
Notes: [a]Calculated based on projected average dependents using MCCS 2007.
[b]This would be a temporary increase as the Marine Corps plans (AvPlan 2010) for the complete drawdown of EA-6Bs.

MCAS Cherry Point has one water treatment plant with a capacity of 6 mgd. The average demand for the water treatment plant is approximately 3.2 mgd. The additional demand could be accommodated by the existing system and no short- or long-term cumulative impacts are expected. An additional residential water consumption demand would be spread over the entire ROI and cumulative impacts to individual systems are not expected as adequate capacity exists (see Table 5.11-1 for capacity data on ROI systems).

Similar to potable water consumption, there is adequate capacity to accommodate increased wastewater discharge; therefore, no cumulative impacts to individual wastewater treatment systems are expected. Of particular note, the City of Havelock has approximately 94,438 gpd of their 1.9 mgd permitted sewer capacity allotment available (City of Havelock 2009a). As discussed in Sections 5.8 and 5.11, the phasing of the increase in military personnel and their dependents, the availability of some military housing, and the availability of community housing would provide sufficient housing. As such, it is unlikely that new residential construction would be required, which would lead the City of Havelock to exceed their wastewater treatment capacity.

According to the USEPA, the average C&D demolition debris generation rate for nonresidential structures is 158 lbs/ft^2, the C&D construction debris generation rate for nonresidential structures is 4.34 lbs/ft^2, the C&D construction debris generation rate for residential structures (i.e., proposed BEQ) is 4.51 lbs/ft^2 (USEPA 2005c). Using this USEPA debris estimate, proposed demolition and new construction at MCAS Cherry Point would yield approximately 20,339 tons of C&D debris (Table 7-16). Taking into account a conservative estimate that approximately 25 percent of C&D debris would be recycled, the C&D debris estimate was reduced to 15,254 tons. When the total estimated C&D debris generated from past, present, and reasonably foreseeable future actions at MCAS Cherry Point are added to the estimated 29,998 and 14,754 tons of C&D debris that would be generated as part of Alternatives 2 and 4, respectively, a total of approximately 30,008 to 45,252 tons of C&D debris would be cumulatively generated at MCAS Cherry Point. C&D debris generated from MCAS Cherry Point is currently sent to the Tuscarora Regional Landfill or the on-Station Land Clearing and Inert Debris Landfill. The existing landfills have adequate capacity and it is expected that there would be no adverse cumulative impacts to solid waste from implementation of Alternative 1 at MCAS Cherry Point.

Table 7-16 C&D Debris Generation for Cumulative Actions

Action[a]	**Estimated Size (ft^2)**	**Debris Estimate (lbs/ft^2)**
Demolition		
Marine Air Support Squadron-1 Compound	52,590	8,309,267
Marine Aviation Transition Strategy/Fleet Replacement Enlisted Skills Training Maintenance Hangar Type I	5,705	901,390
Marine Air Control Squadron-2, Operations and Maintenance	8,295	1,310,610
Motor Transportation/Communication Shop	21,689	3,426,862
Fire Station	19,590	3,095,220
Facilities Maintenance Shops	74,423	11,758,834
Family Service Center-Building 232	25,306	3,998,348
Electronics Van Pad-Buildings 121 and 1012	20,129	3,180,382
Security Office-Building 294	10,925	1,726,150
TOTAL	**238,652**	**37,707,063**
TOTAL (tons)		**18,854**
Total with Estimated 25% Recycling Rate (tons)		**14,140**
Construction		
Two Missile and High Explosives Magazines	11,647	50,548
Marine Air Support Squadron-1 Compound	77,334	335,630
Bachelor Enlisted Quarters	106,563	480,599

Table 7-16 C&D Debris Generation for Cumulative Actions

Action[a]	Estimated Size (ft^2)	Debris Estimate (lbs/ft^2)
Ordnance Magazine	12,300	53,382
Marine Aviation Transition Strategy/Fleet Replacement Enlisted Skills Training Maintenance Hangar Type I	77,931	338,221
Armory	30,085	130,569
Marine Air Control Squadron-2, Operations and Maintenance	26,036	112,996
Motor Transportation/Communication Shop	25,435	110,388
Fire Station	29,784	129,263
Satellite Fire Station	8,892	38,591
Jet Engine Test Cell	7,161	31,079
Expand Marine Air Control Group/Marine Tactical Air Control Squadron Facilities	26,555	115,249
Marine Wing Control Squadron Detachment Facilities	30,337	131,663
Water Treatment Facility Upgrade	12,002	52,089
Facilities Maintenance Shops	67,188	291,596
Relocate Main Access Control Point	8,697	37,745
Aviation Training System Training Complex	8,665	37,606
Child Development Center	25,424	110,340
Family Service Center	30,649	133,017
Electronics Van Pad-Utility Building and Restrooms	1,217	5,282
Guided Missiles Integration Facility	17,288	75,030
Marine Aircraft Group Administration Buildings	19,536	84,786
Armory Addition	7,290	31,639
Slocum Road Realignment	80	349
Security Office	12,120	52,601
TOTAL	**680,216**	**2,970,258**
	TOTAL (tons)	**1,485**
	Total with Estimated 25% Recycling Rate (tons)	**1,114**

The USEPA estimates that the average person generates approximately 4.5 lbs of solid waste per day (USEPA 2008). The USEPA estimates that approximately 1.5 lbs of municipal solid waste is recycled (USEPA 2008); therefore, the cumulative effects analysis assumes that each military person would generate approximately 3.0 lbs per day during daily work operations. In addition, it was assumed that the total amount of days worked in a year totaled 250 days (5-day work week with 10 Federal holidays). A similar approach was used to calculate the additional solid waste generation from military personnel and their dependents at home on an annual basis. Refer to Table 7-17 for the results of the analysis.

Municipal solid waste is currently sent to the Tuscarora Regional Landfill. The existing landfill has adequate capacity and it is expected that there would be no adverse cumulative impacts to solid waste from implementation of the Proposed Action at MCAS Cherry Point.

Table 7-17 Solid Waste Generation for Cumulative Actions

Action	Net Change in Operations Solid Waste (tons)	Net Change in Residential Solid Waste (tons)	Total Solid Waste Estimate
Basing of Two F/A-18E/F Fleet Squadrons	+299	+1,282	+1,581
Grow the Force Initiative	+294	+1,347	+1,641
EA-6B Beddown[a]	+56	+319	+375
Basing of the F-35, Minimum (Alternative 4)	-238	-973	-1,211
Basing of the F-35, Maximum (Alternative 2)	+798	+3,404	+4,202
TOTAL (minimum)	+386	+1,975	+2,386
TOTAL (maximum)	**+1,447**	**+6,352**	**+7,799**

Note: [a]This would be a temporary increase as the Marine Corps plans (AvPlan 2010) for the complete drawdown of EA-6Bs.

7.3.2.11 Transportation and Ground Traffic

Implementation of Alternative 4 at MCAS Cherry Point would decrease personnel on Station by 634. Assuming two-trips (coming and going) per day per person are currently made, Alternative 4 would decrease the number of trips per day by 1,268. This decrease in personnel, coupled with the potential reduction in travel times associated with proposed local road improvements, would result in a reduction of gate congestion and greater vehicular operation efficiency on local roadways.

Alternative 2 would increase personnel on-Station by 2,127, which would equate to an increase of 4,254 trips per day. Although improvements of local road conditions may reduce travel times, implementation of Alternative 2, as well as a variety of reasonably foreseeable construction projects, would result in increased trips onto the Air Station from construction workers. This would result in long-term impacts from the increase in personnel and dependents, as well as short-term impacts from on-Station construction. Using the peak entry times and volumes in Table 5.12-1 as a basis of determining the fraction of vehicles entering the Air Station using the respective gate under Alternative 2, it was determined an additional 1,659 vehicles would enter/exit through the Main Gate, 1,319 vehicles would enter/exit through the Cunningham Gate, and 1,276 vehicles would enter/exit through the Slocum Gate. (Section 5.8.2 assumes a worst-case scenario in which all new personnel would seek off-post housing, thereby affecting entry gates at a 1:1 ratio.)

As discussed in Section 5.12, existing roadways would accommodate these potential increases in vehicular traffic; however, traffic congestion would occur near the gates due to security screening. These localized impacts would be experienced the most during the morning commute. However, since morning peak arrival times are typically from 6:00 a.m. to 8:00 a.m., vehicles would be staggered over this time period. Capacity could be furthered increased by encouraging carpooling, implementing tandem processing to allow additional processing capacity, and considering the opening of the Catawba Gate in Nugent Cove. Moreover, completion of proposed transportation projects in the immediate area would further improve vehicular safety and operational efficiency. For instance, if the proposed Slocum Road and U.S. Highway 70 intersection project is completed, traffic efficiency and safety would be greatly improved. Future planned activities have the potential to result in short-term, negative cumulative impacts to transportation and ground traffic; however, there would be long-term, positive impacts from the completion of proposed transportation improvement projects. Therefore, the likelihood of the increase in vehicular traffic at MCAS Cherry Point creating long-term cumulative impacts to existing levels of traffic safety or creating delays to the existing traffic system is minimal since changes could be made to increase processing times thus moving vehicular traffic from off-Station roadways onto the Air Station.

7.3.2.12 Biological Resources

Implementation of the Proposed Action at MCAS Cherry Point would require construction and demolition in the existing flight line area of MCAS Cherry Point. Table 7-18 lists the past, present, and reasonably foreseeable actions at MCAS Cherry Point and the resulting loss of vegetation from implementation of these actions. An estimated 113.4 to 140.2 acres would be cleared under these actions. Removing natural vegetation on the Air Station would have corresponding impacts to resident wildlife. Developing open land permanently removes habitat and displaces resident wildlife. The construction of Ordnance Magazines may require USFWS consultation for disturbance to a bald eagle nest. While none of the action alternatives would result in any direct impacts to biological resources on-Station, indirect impacts from development within the community associated with growth at the Air Station could occur. This growth in conjunction with other growth and community improvements associated with past, present, and reasonably foreseeable future projects could result in increased development pressure affecting wildlife habitats. The primary impact would be from transportation projects and increased housing and/or commercial development.

As discussed in Section 7.2.2.2, several transportation projects, including road widening and construction of new roads, are proposed near the vicinity of MCAS Cherry Point. Road widening projects generally only remove a small strip of vegetation near the current roadway. Thus, the resulting impact is directly dependent on the length of road to be widened; the longer the section of road to be widened, the greater the overall impact to vegetation, wildlife, and potential special status species. In contrast, new road construction removes a corridor of habitat and creates an obstacle for wildlife to freely move from one side of the road to the other. It is anticipated that the construction of U.S. Highway 70 would result in some habitat fragmentation. Fragmentation of habitat would disrupt wildlife movements and migration and divide existing wildlife populations (Jackson 2000). In addition to mortality, elevated noise from highways has been shown to have adverse impacts on call effectiveness with breeding song birds and certain species of amphibians (Bee and Swanson 2007; Dooling and Popper 2007). In the long-term, the new road would create a new mortality danger area for those animals needing to cross the road to access other habitat areas or water (Boarman and Sazaki 2006; Erritzoe *et al*. 2003; Saunders *et al*.

2002). However, efforts such as the Onslow Bight Conservation Forum, as well as proper land use planning within the surrounding ROI would introduce countervailing factors to offset some of these losses over the long term through preservation of land and growth management.

Table 7-18 Past, Present, and Reasonable Future Actions at MCAS Cherry Point Natural Resources Impacts

Action	Vegetation Clearance
East Coast F-35B Basing	0 to 26.8 acres
Introduction of the F/A-18E/F Super Hornet	3 acres
Phase I Privatization of Military Family Housing	0 acres
Phase II Privatization of Family Housing	0 acres
Combat Vehicle Operators Training Course	20 acres
Proposed Military Operations Areas in Eastern North Carolina	0 acres
Construction and Operation of Digital Airport Surveillance Radar in Eastern North Carolina	0.92 acres
Temporary Beddown of Proposed Increase in End Strength	14 acres
MCAS Cherry Point Range Operations	0 acres
Marine Corps Grow the Force in North Carolina	69 acres
EA-6B Basing	0 acres
Ordnance Magazines	3 acres
Two Fire Stations	0 acres
Jet Engine Test Cell	0 acres
Facilities Maintenance Shops	3.1 acres[a]
Relocate Main Access Control Point	0 acres
Electronic Van Pad	0 acres
Guided Missiles Integration Facility	0.40 acre
TOTAL	**113.4 to 140.2**

Note: [a]The total amount of vegetation to be cleared was estimated by calculating twice the building footprint.

Regional changes in natural vegetation and wildlife habitat have occurred and studies have shown that there has been a regional trend in North Carolina towards higher habitat fragmentation. Between 1992 and 1997, North Carolina ranked sixth in the contiguous U.S. for conversion of non-Federally owned “undeveloped” lands to “developed” lands. Along with an increasing development of rural lands, there is a trend toward smaller and smaller tracts of private land ownership, especially as lands are located nearer to urban areas. Smaller (less than 50 acres), less contiguous tracts of land can cause different environmental pressures, such as fragmentation, as individual pieces of land are developed.

Also, smaller tracts are not well suited for current forest management strategies. This situation can lead to further fragmentation, and mismanagement of small forest tracts making them of poor quality for harvesting forest products, wildlife, or recreational pursuits. One other issue affecting forests surrounding more developed and urbanized areas is that these forests shift in value from that of being able to produce forestry products through harvest and replanting, to having more value for aesthetic and recreational reasons. Recreational forest use introduces completely different pressures to the forest ecosystem, and can range from hunting, wildlife observation, camping, and all of the possible human influenced interactions that can result. Southeastern North Carolina is a projected “hot spot” for development and urbanization, and all of these possible stresses to the forest should be taken into account for long term sustainment (USDA 2002).

The U.S. Department of Agriculture, Forest Service, has conducted studies across the U.S. to assess the effects of increased housing development on private forests. In the “Forest Edge Project,” an interdisciplinary team of specialists used Geographic Information System techniques to identify watersheds across the U.S. containing private forests that are projected to experience increased housing density by 2030 (USDA 2005). The area surrounding the Air Station is identified as a “medium change” area (housing density increases projected to occur on private forests across 5 to 20 percent of a watershed) (USDA 2005).

The Proposed Action, in combination with other past, present and reasonably foreseeable future projects would cumulatively impact natural resources. These impacts are not expected to be adverse since consultation with USFWS and/or National Marine Fisheries Service has and would ensure the continued existence of special status species, efforts by groups such as the Onslow Bight Conservation Forum, and proper land use planning would ensure the preservation of natural land and control growth.

7.3.2.13 Geology, Topography, and Soils

Impacts to geology, topography, and soils are site-specific and are not affected by development in the region. Cumulative impacts to the geology or topography within or immediately near the ROI are expected to be minor. The cumulative impacts to soils would include soil compaction and disturbed and modified soil layers.

The soil disturbance anticipated with all action alternatives, when incrementally considering impacts of past, present, and future actions, could result in cumulative adverse impacts to soils if projects do not employ adequate mitigation measures to minimize adverse impacts to soil resources. This is due to the fact that exposed soils are more susceptible to erosion, and soil productivity (i.e., the capacity of the soil to produce vegetative biomass) would decline in disturbed areas, and be completely eliminated for those areas within the footprint of paved or other hardened areas and new structures. Impacts to soils from construction and/or demolition activities occurring in areas that are currently or previously developed would be minimal, given the fact that these soils have been previously disturbed or modified, and in some areas are already covered by structures, concrete, or other appropriate surfaces. Structural and non-structural BMPs would be implemented in accordance with State approved erosion and sedimentation control plans to reduce erosion. Therefore, these actions would have only short-term, minor impacts on soils with the use of proper erosion, sedimentation, and stormwater management techniques. In addition, there would be negligible impacts on topography and geology of MCAS Cherry Point. The cumulative impact to the geology, topography, and soils of MCAS Cherry Point would be minor.

7.3.2.14 Water Resources

Implementation of any of the action alternatives would have no effect on groundwater, floodplains, or wetlands and therefore, have no potential for cumulative impacts. These resource categories are not discussed further. All proposed construction and demolition under the action alternatives would occur in the existing flight line area of MCAS Cherry Point. Although there is a potential for short-term cumulative impacts to surface waters and stormwater from the action alternatives when considered with past, present, and reasonably foreseeable construction and demolition activities, these impacts would not be considered adverse since implementation of proper erosion, sedimentation, and stormwater management techniques would be incorporated into the project. Following construction, implementation of LID stormwater management techniques, as well as traditional engineering controls (e.g., buildings with gutters, culvert/channels directing stormwater to retention basins) would decrease future impacts to water quality. There would be no cumulative impacts to surface waters or stormwater from implementing Proposed Action at MCAS Cherry Point.

7.3.2.15 Cultural and Traditional Resources

Under any of the action alternatives, there would be no impacts to architectural resources. No NRHP-listed or NRHP-eligible architectural resources have been identified within the proposed construction areas. Past, present, and reasonably foreseeable projects implemented within the ROI could potentially affect cultural resources where ground disturbance exposes any undocumented/unknown cultural resources or where visual elements may be introduced that are out of character with a historic property within the viewshed. These impacts can be avoided, minimized, or mitigated, but could have a collective and cumulative effect in reducing the overall number of historic properties in the ROI.

7.3.2.16 Coastal Zone Management

Whether associated with the direct impacts of construction on-Station or the indirect impacts of growing population in the surrounding off-Station areas, no action alternatives in conjunction with other past, present, and reasonably foreseeable projects would result in cumulative impacts to the coastal zone. Actions in the coastal zone have to be consistent with the enforceable polices of the North Carolina Coastal Area Management Act and adhere to permit requirements and any prescribed mitigation measures. These protective measures minimize the potential for cumulative impacts to the coastal zone.

8.0 OTHER NEPA CONSIDERATIONS

8.0 OTHER NEPA CONSIDERATIONS

8.1 CONSISTENCY AND COMPLIANCE WITH OTHER FEDERAL, STATE, AND LOCAL PLANS, POLICIES, AND REGULATIONS

The Proposed Action has been assessed to determine its consistency and compliance with applicable environmental regulations and other plans, policies, and controls. This analysis indicates that the Proposed Action would not conflict with the objectives of applicable plans, policies, and regulations. A summary of the compliance status for these items is provided in Table 8-1.

Table 8-1 Summary of Applicable Environmental Regulations and Regulatory Compliance

Plans, Policies, and Controls	Regulatory Agency Authority	Status of Compliance	Section of EIS
The National Environmental Policy Act (NEPA) (Public Law 91-190, 42 United States Code (USC) 4341 *et seq*. as amended) 1969, Marine Corps Environmental Compliance and Protection Manual (Marine Corps Order P5090.2A, Change 2), Department of Navy (DoN) Procedures for Implementing NEPA (Office of the Chief of Naval Operations Instruction 5090.1C, October 2007)	Marine Corps	This Environmental Impact Statement (EIS) has been prepared in accordance with the Council on Environmental Quality regulations implementing NEPA and DoN/Marine Corps NEPA procedures. Public participation and review are being conducted in compliance with NEPA.	All of document
Clean Air Act (CAA), 42 USC *et al.*	United States Environmental Protection Agency (USEPA) North Carolina Department of Environment and Natural Resources (NCDENR)-Division of Air Quality South Carolina Department of Health and Environmental Control (SCDHEC)–Bureau of Air Quality	The air quality analysis in the EIS concludes that proposed emissions under any of the alternatives: 1) would not create a major regional source of air pollutants or affect the current attainment status at either Air Station and 2) would comply with all applicable state and regional air agency rules and regulations. Title V permits would be updated to include applicable new stationary source emissions.	Sections 4.4 and 5.4

Table 8-1 Summary of Applicable Environmental Regulations and Regulatory Compliance

Plans, Policies, and Controls	Regulatory Agency Authority	Status of Compliance	Section of EIS
Clean Water Act (CWA), 33 USC Sections 1251 to 1387 (1986 & Supplement 1997) Safe Drinking Water Act of 1974, 42 USC Sections 300f to 300j-26 (1991 & Supplement 1997)	USEPA/United States Army Corps of Engineers (USACE) NCDENR–Division of Water Quality SCDHEC–Office of Ocean and Coastal Resource Management (OCRM)	Permits under CWA Sections 401 and 404 are required. Stormwater runoff during construction and operational phases of the project will be regulated (prior to off-Station discharge) under a National Pollutant Discharge Elimination System Permit and associated Stormwater Pollution Prevention Plan (SWPPP). Following construction completion, adherence to applicable Federal and state stormwater and erosion Best Management Practices would be applied to new operational activities.	Sections 4.15 and 5.15
Coastal Zone Management Act of 1972 (16 USC 1451)	NCDENR–Division of Coastal Management SCDHEC–OCRM	The Marine Corps has determined the Proposed Action alternatives are consistent, to the maximum extent practicable, and has prepared a Coastal Consistency Determination for Marine Corps Air Station (MCAS) Beaufort. For MCAS Cherry Point, no sensitive coastal resources are affected and a Negative Determination has been prepared.	Sections 4.17 and 5.17, and Appendix G
Endangered Species Act of 1973, 16 USC *et al.*	U.S. Fish and Wildlife Service (USFWS)	The Proposed Action alternatives would not affect Federally-listed species at either of the two Air Stations. No impacts would occur to listed species under the airspace or at the ranges.	Sections 4.13 and 5.13
Protection of Wetlands, Executive Order (EO) 11990 (1977), 42 FR 26961	USACE	The Proposed Action alternatives at MCAS Beaufort could impact up to 2 acres of non-jurisdictional wetlands; no direct impacts are anticipated at MCAS Cherry Point. Coordination with SCDHEC OCRM would be conducted via a Coastal Consistency Determination.	Sections 4.15 and 5.15
Construction or Alteration (of Navigable Airspace) Requiring Notice, 14 Code of Federal Regulations (CFR) 77.13(1)(5)(iii)	Federal Aviation Administration (FAA)	Designers will consult the Unified Facilities Criteria manual during the design process to avoid obstructions to airspace and airport construction (including cranes used in construction) and file the appropriate FAA Form 7460-1 for each project.	Chapter 6
National Historic Preservation Act of 1966, as amended in 1980, 16 USC 470 *et al.*	North and South Carolina State Historic Preservation Offices (SHPOs)	No SHPO consultation would be required. MCAS Beaufort is coordinating with Federally-recognized Native American Tribes; there are no such recognized tribes associated with MCAS Cherry Point.	Sections 4.16 and 5.16

Table 8-1 Summary of Applicable Environmental Regulations and Regulatory Compliance

Plans, Policies, and Controls	Regulatory Agency Authority	Status of Compliance	Section of EIS
Archaeological Resources Protection Act (ARPA) of 1979, 16 USC 470 *et al.;* ARPA) of 1979, Final Uniform Regulations, 32 CFR Part 229 (1997).	North and South Carolina SHPOs	The Proposed Action would not affect archeological resources.	Sections 4.16 and 5.16
Environmental Justice, EO 12898 59 FR 7629 (1994)	Marine Corps	The Proposed Action alternatives would not result in disproportionately high and adverse human health or environmental effects on minority or low income populations.	Sections 4.9 and 5.9
Protection of Children from Environmental Health Risks and Safety Risks, EO 13045 62 FR 19883 (1997)	Marine Corps	The Proposed Action alternatives would not result in disproportionate risks to children from environmental health risks or safety risks.	Sections 4.9 and 5.9
Noise Control Act of 1972 and Quiet Communities Act of 1978	Marine Corps	Due consideration to noise impacts consistent with these Acts was undertaken.	Sections 4.3 and 5.3
Migratory Bird Treaty Act of 1918, 16 USC 703 *et al.*	USFWS	The Proposed Action alternatives would not affect migratory birds.	Sections 4.13 and 5.13

8.2 Unavoidable Adverse Environmental Effects

Avoidance, minimization, or mitigation of adverse effects to natural, cultural, and other environmental resources were integrated into the Proposed Action (and consequently into the four action alternatives) to the greatest extent possible and practicable; however, all impacts may not be completely avoided and/or mitigated. Specifically, implementation of Alternatives 1, 2, 3, and 4 at MCAS Beaufort would result in the loss of approximately 58.6, 58.6, 51.5, and 52.8 acres of forested undeveloped land, respectively. In addition, Alternative 2 at MCAS Cherry Point would result in the loss of approximately 26.8 acres of forested undeveloped land. Additionally, the number of people exposed to noise levels 65 decibel day-night average sound level (dB DNL) and greater would increase under all four alternatives.

8.3 Relationship between Short-Term Use of the Human Environment and Maintenance and Enhancement of Long-Term Productivity

NEPA requires analysis of the relationship between a project's short-term impacts on the environment and the effects those impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This means that choosing one option may reduce future flexibility in pursuing other options, or that committing a resource to a certain use may eliminate the possibility for other uses of that resource.

The Proposed Action alternatives would result in both short- and long-term environmental effects. However, the alternatives are not expected to result in impacts that would reduce environmental productivity, permanently narrow the range of beneficial uses of the environment, or pose long-term risks to health, safety, or the general welfare of the public.

8.4 Irreversible and Irretrievable Commitments 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. Nonrenewable resources are those resources that cannot be replenished by natural means, including oil, natural gas, and iron ore. Renewable natural resources are those resources that can be replenished by natural means, including water, lumber, and soil.

The action alternatives would involve irretrievable commitments of non-renewable and renewable resources, the magnitude of which depends on the alternative selected, and could involve: 1) general industrial resources such as capital, labor, fuels, and construction materials and 2) project-specific resources such as forests and other land uses within the project construction footprint(s).

Under all alternatives at both MCAS Beaufort and MCAS Cherry Point, ground disturbance may potentially affect unknown cultural resources. These impacts can be avoided, minimized, or mitigated, but could have a collective effect in reducing the overall number of historic properties in the area. If, however, previously unknown cultural resources are discovered during construction or site grading activities, work would be stopped immediately and procedures for inadvertent discovery implemented. This would minimize any irreversible or irretrievable effects to cultural resources.

The resources necessary to implement improvements to existing military lands would not be retrievable if any of the Proposed Action alternatives were implemented. However, the total amount of construction materials (e.g., concrete, insulation, wiring, etc.) required for this action is relatively small when compared to the resources available in the region. All new construction, moreover, would comply with EO 13423, *Strengthening Federal Environmental, Energy, and Transportation* Management, and EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*. EO 13423 set goals for Federal agencies in areas such as energy efficiency, renewable energy, toxic chemical reduction, recycling, sustainable buildings, electronics stewardship, and water conservation. EO 13514 expands on the requirements set forth in EO 13423 and mandates that Federal agencies meet numerical and non-numerical targets. For example, EO 13514 requires that 95 percent of all new contracts require the use of water-efficient fixtures, low-flow fixtures, non toxic or less toxic products, and energy-efficient products. EO 13514 also 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 increase energy efficiency, eliminate solid waste, and reduce stormwater runoff. One strategy for reducing stormwater runoff is the implementation of low impact development (LID) technologies. The goal of LID technologies is to maintain or restore the natural hydrologic functions of a site and reduce the run-off rate, filter out pollutants, and facilitate the infiltration of water into the ground. Following construction, military training and office operations would consume nonrenewable resources such as jet fuel and various office supplies. Several types of materials such as paper, toner cartridges, aluminum cans, glass containers, steel and bi-metal cans, and textiles would be recycled from office operations and would not become solid waste. The construction materials and energy required for construction and operations are not in short supply; their use would not have an adverse impact on the continued availability of these resources, and the energy resource commitment is not anticipated to be excessive in terms of region-wide usage. Furthermore, compliance with the requirements set forth in EOs 13423 and 13514 would further minimize any irreversible or irretrievable effects to multiple non-renewable and renewable resources.

9.0 LIST OF PREPARERS AND CONTRIBUTORS

9.0 LIST OF PREPARERS AND CONTRIBUTORS

Preparers

TEC Inc.			
Name	**Responsibility**	**Education**	**Years Experience**
Albee, Lewis "Bud"	Marine Corps and Navy F-35 Program Manager	B.A., Biology M.S., Limnology	19
Anderson, Stephen	Soils, Geology, and Topography; Threatened and Endangered Species	B.A., Environmental Science	2
Antolik, Frances	Production	B.S. and M.A., Psychology	3
Banwart, Dana	Quality Assurance and Control	B.S. Biology	10
Brown, Dan	Airspace and Ranges	Military Airspace Manager	35
Campe, Jim	Safety and Environmental Health	B.S., Naval Architecture and Offshore Engineering	20
Costanzo, Michael	Economics Modeling	B.A., M.A., and Ph.D., Geography	28
Doan, Cathy	Safety and Environmental Health	Retired Air Force Lt. Col. B.S., English M.A., Human Resources Development	13
Everson, Chrystal	Deputy Project Manager and Human Resources Lead	B.S. and M.S., Environmental and Occupational Health	9
Ferguson, Emily	Community Services, Utilities and Infrastructure	B.A., Public and Urban Affairs	3
Graap-Loth, Ellen, CHMM,	Hazardous Materials, Toxic Substances, and Hazardous Waste Lead	B.S., Natural Resources	19
Hamiton, Lesley	Air Quality Lead	B.A., Chemistry	18
Harrison, Michael	Technical Analyst	B.S., Biology M.S., Environmental Science	5
Healey, Rachel	Socioeconomics, Utilities and Infrastructure	B.A. Biology MBA	7
Henson, Deborah	Traffic and Ground Transportation Lead	B.S., General Science M.S., Geo-Environmental Studies	12
Hoffman, Brian	Biology Resources Lead	B.S., Biology M.S., Wildlife Ecology	28
Johnson, Jacklyn	Land Use, Recreation, and Coast Zone Management	B.S., Ecology	9
Lortie, Joanne, AICP	Socioeconomics Lead	B.A. and M.A., Economics	20

TEC Inc.			
Name	**Responsibility**	**Education**	**Years Experience**
McNichols, Patrick	Wildlife	B.S., Biology M.S., Environmental Management	9
Meier, Deanna	Vegetation and Wetlands	B.S., Aquatic Biology M.S., Marine Biology	10
Mertz, Edie	Graphics	A.A. General Education	19
Myers, Lesley, C.P.E.A	Hazardous Materials, Toxic Substances, and Hazardous Waste	B.S. and M.S, Geology	29
Paulson, Amy	Quality Assurance and Control	B.S., Ecology M.S., Conservation Ecology and Sustainable Development	8
Pingree, Ryan	Water Resources	M.S., Environmental Science and Management B.S., Physical Geography	12
Rittenhouse, Paul	GIS Specialist	B.A., Biology and Psychology M.T., Science Education	7
Rose, Kathy	F-35B East Coast EIS Project Manager	B.A. Political Science M.A., International Relations M.S., Natural Resources	23
Rudolph, Teresa	Cultural and Traditional Resources	B.A. and M.A., Anthropology	31
Santos, Erin	Cultural and Traditional Resources	B.A., Anthropology	5
Savard, Shawna	Graphics	B.A., Graphic Design	5
Sherrill, Meredith	GIS Specialist	B.A., Environmental Science	2
Werner, Julie	Air Quality	B.S., Civil Engineering, LEED Accredited Professional	3
Williams, Asher	Water Resources	B.S., Environmental Science	2
Wirth, Carol	Land Use Lead	B.S., Ecology and Evolutionary Biology	15
Wyle Labs Inc.			
Name	**Responsibility**	**Education**	**Years Experience**
Grandi, Fabio	Noise Modeling Engineer	B.S., Audio Technology	14
Long, Geral	F-35B East Coast Noise Project Manager	B.S., Biology M.S., Ecology	24
Robinette, Brandon	Noise Modeling	B.A., Acoustics	4

Contributors

U.S. Marine Corps

Name	Affiliation
Marine Corps Air Station Beaufort	
Drawdy, Billy	Natural Resources and Environmental Affairs
Dukes, Gary	Natural Resources and Environmental Affairs
Ehde, Craig	Hydrogeologist, Natural Resources and Environmental Affairs
Howard, Alice	Community Planning & Liaison Office
Luce, John	Natural Resources and Environmental Affairs
Roberts, Jim	Public Works and Engineering
Rogers, Debra	Natural Resources and Environmental Affairs
Smith, Steve	Deputy Public Works Officer
Strickroth, Capt. Kevin	Provost Marshall’s Office
Thacker, Rand	Geographic Information Systems
Ward, Troy	F-35B Site Activation Task Force Program Manager
Webb, Owen	Public Works and Engineering
Wilson, David	S-4, Logistics
Marine Corps Air Station Cherry Point	
Barton, Mike	Public Affairs
Elliott, Don	Facilities
Gainey, Will	Facilities
Guilianelli, Jessica	Environmental Affairs
Harris, Tyler	Community Planning & Liaison Office
Lombardo, Carmen	Environmental Affairs
Riemer, James	Airspace and Operations Manager
Weaver, Richard	Environmental Affairs
Marine Corps Installations East	
Brandenburg, Carter	Aviation Plans and Policy
Brown, Pam	Community Planning & Liaison Officer
Fleming, Kim	Regional Environmental Coordination
Plummer, Dave	Regional Airspace Coordinator
Turner, Dave	Aviation Plans and Policy
Sholar, Tony	Facilities
Wunder, Dave	Eastern Area Counsel's Office
United States Marine Corps	
Baumert, Col. Jeffrey	4th MAW
Bordelon, Matt	Headquarters Counsel, Land Use and Environment
Caras, Mike	Marine Corps Training and Education Command
Chittenden, Brad	Headquarters F-35 Facilities Coordinator
Coerr, Lt. Col. Stanton	Headquarters Congressional Liaison Officer
Dent, Maj. Eric	Headquarters Public Affairs Officer
Goodfellow, Susan, Dr.	Headquarters Conservation Section Lead
Johnson, Veronda	Headquarters Conservation Section
Olander, Lt. Col. Geoffrey	F-35B Operations Lead, Marine Corps Air Station Yuma

U.S. Marine Corps

Name	Affiliation
Schoeman, Maj. Scott D.	Headquarters, APP-43, JSF Transition Task Force
Siders, Randy	Headquarters F-35B Program Manager
Viverette, Lee	Marine Corps Training and Education Command
Wenderoth, Steven	Headquarters Counsel, Land Use and Environment
Wiegel, Maj. Wade E	Headquarters, APP-43, JSF Transition Task Force
Workman, Lt. Col. Mark	F-35B Operations

United States Navy

Name	Affiliation
Bennett, Tom	Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic, East Coast Siting Study Project Manager
Blount, Linda	NAVFAC Mid-Atlantic, East Coast F-35B Environmental Impact Statement (EIS) Project Manager
Cochran, Mark	ATAC Corporation, Naval Aviation Simulation Model Project Manager
Jones, Michael	NAVFAC Mid-Atlantic, East Coast F-35B EIS Deputy Project Manager
Keys, Richard	United States Fleet Forces Command
Padgett, Lisa	F-35C Program Manager, U.S. Fleet Forces Command
Pierson, Fred	NAVFAC Atlantic, East Coast F-35B Noise Study Project Manager
Saboya, Adrianne	NAVFAC Southwest, West Coast F-35B EIS Project Manager
Scott, Cory	NAVFAC Southwest, West Coast F-35B EIS Project Manager Assistant
Stanley, Lt. Reynaldo	Naval Aviation Facilities, Branch Chief
Zahm, Cory	NAVFAC Atlantic F-35 NEPA Program Oversight
Zusman, Alan	NAVFAC Air Installation Compatible Use Zone and Noise Program Manager

Other Agency, Programs, and Offices

Name	Affiliation
Bush, Jack	Headquarters Air Force Liaison (HQ USAF/A7C)
Butwin, Matthew	F-35B Draft Description of Proposed Action and Alternatives, Noise Study, and Siting Study Project Manager, Ecology and Environment, Inc. (E&E)
Byers, Art	Airspace Manager, Shaw Air Force Base
Cornelius, Chris	F-35 Joint Program Office, Autonomic Logistics Propulsion Lead
Hawkins, Jean	F-35 Joint Program Office, F-35 NEPA Lead
Luker, Stacey	F-35 Joint Program Office, F-35B East Coast Liaison
Martin, David	Air Education and Training Command F-35A NEPA Project Manager (HQ AETC/A7PS)
Nelson, Lt. Col. Chad	F-35 Site Activation Task Force, Eglin AFB
Parker, Sheryl	F-35A Operational Beddown EIS Project Manager (HQ ACC/A7PS)
Zahn, Otto	F-35 Joint Program Office, F-35B West Coast Liaison

10.0 REFERENCES CITED

10.0 REFERENCES CITED

Air Force. 2010. Communication verifying Air Force and Air National Guard candidate base information. May.

_____. 2009a. Base mission and general information. Generated from the website at http://www.langley.af.mil/library/factsheets/index.asp on 15 October.

_____. 2009b. Record of Decision for the Final Environmental Impact Statement for Implementation of Base Realignment and Closure 2005. Decisions for the Joint Strike Fighter (JSF) Initial Joint Training Site at Eglin Air Force Base. February.

_____. 2006a. Langley Integrated Total Force Beddown and Logistics Support Center Final Environmental Assessment and Finding of No Significant Impact/Finding of No Practicable Alternative. Air Combat Command, Langley Air Force Base (AFB), Virginia. May.

_____. 2006b. Environmental Assessment for Base Closure and Realignment A/OA-10 Beddown at Moody AFB, Georgia. Air Combat Command, Langley AFB, Virginia. Finding of No Significant Impact (FONSI) signed 12 September.

Atlantic Marine Corps Communities. 2010. Atlantic Articles Issue 1 Volume 6. January 2010.

Beaufort County. 2009a. Beaufort County Rural and Critical Land Preservation Program. Retrieved from http://www.bcgov.net/Public_Info_Officer/Rural_Critical_Lands/R&CL_main.php on 25 September 25.

_____. 2009b. Beaufort County Rural and Critical Land Preservation Program-Project Descriptions. Retrieved from http://www.bcgov.net/Public_Info_Officer/Rural_Critical_Lands/Project_List_RCLP_Oct%20_2007.html on 25 September.

_____. 2009c. September 2009 Beaufort County 1% Sales Tax Road Improvement Projects Monthly Progress Report. Retrieved from http://www.bcgov.net/council/councilcentral/Reports.Studies/Roads/One%20Percent%20Sales%20Tax%20Reports/M092809.pdf on 25 September.

_____. 2008. Geographic Information Systems (GIS) shapefile data. Beaufort County Government, South Carolina.

_____. 2007. Comprehensive Plan, Chapter 8-Transportation Element. Retrieved from http://www.bcgov.net/Council/CompPlan2007/Chapter8.TransportationElement.pdf on 25 September.

Beaufort Jasper Water & Sewer Authority (BJWSA). 2010. Information gathered from website at http://www.bjwsa.org/options.html?action=2 on 18 January.

_____. 2008. Water Quality Report 2008. Generated from the website at http://www.bjwsa.org/pdf_files/2008waterreport.pdf on 18 January.

Beaufort Memorial Hospital. 2010. About Us. Website accessed at: http://www.bmhsc.org/aboutus_overview.htm. January.

Bee, M.A. and E.M. Swanson. 2007. Auditory Masking of Anuran Advertisement Calls by Road Traffic Noise. Animal Behavior. Vol. 74. No. 6. 1765-1776.

Berglund, B., and T. Lindvall, eds. 1995. Community Noise. Institute of Environmental Medicine.

Boarman, W.I., and M. Sazaki. 2006. A Highway's Road-Effect Zone for Desert Tortoises (*Gopherus agassizii*). Journal of Arid Environments. Vol. 65. 94-101.

Butterfield, G. K. 2009. FY2010 Appropriations Requests. Retrieved from http://butterfield.house.gov/fy2010approps.asp on October 5, 2009.

California Air Resources Board (CARB). 2005. Comparison of Asphalt Paving Emissions Factors.

Carteret County. 2010a. Emergency Services Department. Retrieved from http://www.carteretcountygov.org/departments/emergency.asp on 12 January.

_____. 2010b. Fire Marshal. Retrieved from http://www.carteretcountygov.org/departments/fire_marshal.asp on 12 January.

_____. 2010c. Sheriff's Department. Retrieved from http://www.carteretcountygov.org/departments/sheriff.asp on 10 March.

_____. 2010d. County parcel data generated from website http://carteret.connectgis.com/Default/Default.aspx.

_____. 2005. Land Use Plan Update. Carteret County, North Carolina. June.

Carteret County Public School System. 2010. Student Enrollment Numbers. Retrieved from http://www.carteretcountyschools.org/directories/schools_directory.htm on 6 January.

Carteret Economic Development Council. 2009. Carteret County Population by Year. Generated from the website at http://www.carteretedc.com/demographics/population.php#year on 24 August.

Charleston AFB. 2009. Base and mission information generated from the website http://www.charleston.af.mil/ on 15 October.

CH2MHILL. 2008. Final Site Management Plan, Fiscal Year 2009, MCAS Cherry Point. Developed for Department of the Navy – Atlantic Division Naval Facilities Engineering Command.

City of Beaufort. 2009a. Boundary Street Project Website. Retrieved from http://www.kimley-horn.com/projects/boundary/home.htm on 3 September.

_____. 2009b. Municipal Complex Development Fact Sheet. Retrieved from http://apps.cityofbeaufort.org/municipal_complex/index.htm on 3 September.

_____. 2009c. Municipal Complex Development Frequently Asked Questions. Retrieved from http://apps.cityofbeaufort.org/municipal_complex/index.htm on 3 September.

_____. 2009d. Comprehensive Plan-Draft for Public Review. September.

_____. 2006. Boundary Street Master Plan. June.

City of Havelock. 2010a. Havelock Fire and Rescue Department. Retrieved from http://www.cityofhavelock.com/Departments/Fire%20Rescue/FireRescueMain.aspx on 12 January.

_____. 2010b. Minutes of the May 24, 2010 Board of Commissioners. Retrieved from http://www.havelocknc.us/WebDocuments/Minutes/Board%20of%20Commissioners/1000524%20Minutes.pdf on 21 July.

_____. 2009a. Minutes of the July 13, 2009 Board of Commissioners. Retrieved from http://www.cityofhavelock.com/WebDocuments/Minutes/Board%20of%20Commissioners/090713%20Minutes.pdf on 8 October.

_____. 2009b. Minutes of the August 24, 2009 Board of Commissioners. Retrieved from http://www.cityofhavelock.com/WebDocuments/Minutes/Board%20of%20Commissioners/090824%20Minutes.pdf on 8 October.

_____. 1999. The City of Havelock North Carolina 1996 Land Use Plan Addendum. March.

Council on Environmental Quality (CEQ). 2005. Guidance of the Consideration of Past Actions in Cumulative Effects Analysis. June 24.

Craven County. 2010. Craven County Sheriff Divisions. Retrieved from http://www.cravencounty.com/sheriff/divisions.cfm on 10 March.

_____. 2008. Craven County GIS. Generated from the website at http://gismaps.cravencounty.com/maps/downloads-zip-files.htm

_____. 1996. Land Use Plan Update.

Dabrowski, S. 2010. Family Child Care Director, MCAS Cherry Point. Personal communication regarding Family Child Care Program on 12 January.

Daughtery, T. 2010. Wildlife Biologist, United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Service, MCAS Beaufort. Personal communication regarding presence of wood storks at MCAS Beaufort. 5 August 2010.

Davenport, A. 2010. Public Relations Director, Craven County Public Schools. North Carolina. 5 October.

DeForge, J.R. 1981. Stress: Changing Environments and the Effects on Desert Bighorn Sheep. Desert Bighorn Council 1981 Transactions.

Dooling, R.J. and A.N. Popper. 2007. The Effects of Highway Noise on Birds. Prepared for the California Department of Transportation. September.

Dukes, G. 2009. Natural Resources and Environmental Affairs Office (NREAO), MCAS Beaufort. South Carolina. Personal Communication on 29 September.

EEG Inc. 2007a. Building 414 (Maintenance Hangar) Asbestos Re-Inspection Report. Developed for MCAS Beaufort NREAO.

_____. 2007b. Building 416 (Maintenance Hangar) Asbestos Re-Inspection Report. Developed for MCAS Beaufort NREAO.

Ehde, C. 2009. Hydrogeologist, Natural Resources and Environmental Affairs Office (NREAO), MCAS Beaufort. South Carolina. Personal Communication on 29 September.

Ellis, D.H., C.H. Ellis, and D.P. Mindell. 1991. Raptor Responses to Low-Level Jet Aircraft and Sonic Booms. *Environmental Pollution Vol.*

Erritzoe, J., T.D. Mazgajski, and L. Rejt. 2003. Bird Casualties on European Roads – A Review. *Acta Ornithologica*. Vol. 38. No. 2.

Federal Aviation Administration (FAA). 2010. Some Significant Wildlife Strikes to Civil Aircraft in the United States, January 1990-November 2009. 12 January.

_____. 2009. Federal Aviation Administration National Wildlife Strike Database, Serial Report Number 15, Report of the Associate Administrator of Airports, Office of Airport Safety and Standards Airport Safety and Certification, Washington, D.C. September.

_____. 2004. Pilot/Controller Glossary. Addendum to Aeronautical Information Manual. FAA Order 7110.10, Flight Services, and FAA Order 7110.65, Air Traffic Control. Generated from the website at http://www.faa.gov/air_traffic/publications/ on 10 September.

Federal Interagency Committee on Noise (FICON). 1992. Federal Agency Review of Selected Airport Noise Analysis Issues. August.

Federal Register. 2009. Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance. Pp 52117-52127.

General Accounting Office. 1998. Military Aircraft Safety. March.

Georgia Air National Guard (Georgia ANG). 2006. Georgia Air National Guard CRTC Instruction 13-212V1, Air Bases Order 3572.1 Part I, Townsend Weapons Range. May.

Georgia Ports Authority (GPA). 2009. South Carolina’s Bethea to Lead Jasper Port Board. 6 February.

Global Security. 2009. Beaufort Marine Corps Air Station Facilities Information. Generated from the website at http://www.globalsecurity.org/military/facility/beaufort.htm on 8 October.

Green, L and Morgan, E. 2010. Beaufort County Schools Director of Data Services. Personal communication with Dana Banwart. January 2010.

Grubb, T.G., and W.W. Bowerman. 1997. Variations in Breeding Bald Eagle Responses to Jets, Light Planes, and Helicopters. *Journal of Raptor Research*, Volume 31:213-222.

Hardison, A. 2010. Executive Director, Coastal Regional Solid Waste Management Authority. Personal communication regarding Tuscarora Regional Landfill.

Harris, C.M. 1979. *Handbook of Noise Control.* McGraw-Hill Book Company.

Havelock News. 2009a. “Officials agree on changes to intersection.” Posted on August 12, 2009. Retrieved from http://www.havenews.com/news/intersection-5961-officials-point.html on 5 October.

_____. 2009b. “Cherry Point growing again.” Posted on June 1, 2009. Retrieved from http://www.havenews.com/news/cherry-5687-point-marine.html on 5 October.

_____. 2009c. “Growing Problem: Solutions to sewer capacity issues at least two years away.” Posted on September 2, 2009. Retrieved from http://www.havenews.com/articles/city-6047-sewer-havelock.html on 26 October.

_____. 2008. “Havelock board ready to back sewer agreement with New Bern.” Posted on December 19, 2008. Retrieved from http://www.havenews.com/news/havelock-4936-bern-new.html on 8 October.

Headquarters U.S. Marine Corps (HQMC). 2010. Personal communication, data verification, and operational validation at the Headquarters level with several members of the JSF Transition Task Force, 2009 through 2010.

Hilton Head Island Public Service District (HHPSD). 2009. New Water Plant on Tap. Generated from the website at http://www.hhpsd.com/PDF%20Files/Articles/RO_Plant_.pdf on 18 January.

International Civil Aviation Organization (ICAO). 2001. Seminar on Bird Hazards, Environmental Protection and Land Use at Airports for the NAM/CAR/SAM Regions. April 24-27, 2001. Insiders’ Guide. 2008. North Carolina’s Central Coast and New Bern: On the Water. Generated from the website at http://www.insiders.com/crystalcoast/main-newbern-water.htm#Heading2 on 28 March.

_____. 1999. IBIS - Bird Strikes in CAR and SAM Regions 1994 to 1999. Retrieved from http://www.icao.int/icao/en/ro/nacc/acilac/02_pinos_icao_carsam1.pdf on December 31, 2009.

Island Packet. 2009. “Funding for new Naval hospital drops off the priority list.” Posted April 16, 2009. Retrieved from http://www.islandpacket.com/1482/story/816524.html on 10 September.

_____. 2007. “Beaufort voters pass bond referendum.” Posted October 24, 2007. Retrieved from http://www.islandpacket.com/news/local/story/61453.html on 8 September.

Jasper County Council. 2009a. Minutes from Council Meeting held on July 20, 2009. Retrieved from http://www.jaspercountysc.org/_fileUploads/Actions/7-20-2009_COUNCILMEETING.pdf on 8 September.

_____. 2009b. Meeting Agenda for Council Meeting to be held on August 17, 2009. Retrieved from http://www.jaspercountysc.org/_fileUploads/Agendas/08-17-2009_COUNCILMEETING.pdf on 8 September.

Jackson, S.D. 2000. Overview of Transportation Impacts on Wildlife Movement and Populations. Pp. 7-20 In Messmer, T.A. and B. West, (eds) Wildlife and Highways: Seeking Solutions to an Ecological and Socio-economic Dilemma. The Wildlife Society.

Jacksonville International Airport. 2002. Airport Master Plan Update. Available at http://www.jaa.aero/pdf/JIA-Exec%20Summary.pdf. April.

Johnson, M. 2010. Customer Service Representative, Health Net/TRICARE Services. Personal communication regarding access to Naval Hospital Camp Lejeune by active duty military personnel stationed at MCAS Cherry Point and their dependents on 13 January.

Joint Strike Fighter (JSF) Program Office & Lockheed Martin. 2009. Joint Communications Release, Subject: F-35 Acoustics Based on Edwards AFB Acoustics Test. April.

Joyner, A. 2010. Assistant Finance Officer, Carteret County Public Schools. Personal communication regarding federally connected students on 12 January.

Karl, Thomas R., J.M. Melillo, and T.C. Peterson, eds. 2009. Global Climate Change Impacts in the United States. Cambridge University Press.

Keys, R. 2010a. U.S. Fleet Forces Command. Personal communication verifying NAS Oceana candidate base information on 25 August.

Keys, R. 2010b. U.S. Fleet Forces Command. Personal communication verifying NS Norfolk candidate base information.

Keys, R. 2010c. U.S. Fleet Forces Command. Personal communication verifying NAS Jacksonville candidate base information on 25 August.

Krausman, P.R., M.C. Wallace, D.W. DeYoung, M.E. Weisenberger, and C.L. Hayes. 1998. Effects of Jet Aircraft on Mountain Sheep. *The Journal of Wildlife Management*, Vol. 62, No. 4. October.

_____. 1993. The Effects of Low-Altitude Jet Aircraft on Desert Ungulates. International Congress: *Noise as a Public Health Problem*, Volume 6(3):471-478.

Lamp, R. E. 1989. Monitoring the effects of military air operations at Naval Air Station Fallon on the Biota of Nevada. Nevada Department of Wildlife.

Lauland, S. 2010. Membership Director, Beaufort County Association of Realtors. Personal communication regarding housing in Beaufort County on 10 March.

Leopardo Construction. 2008. Leopardo Awarded Contracts to Build $14 Million Police Station and City Hall in Beaufort, SC. Press release published April 2, 2008. Retrieved from http://www.leopardo.com/news/2008/04/02/leopardo-awarded-contracts-to-build-14-million-police-station-and-city-hall-in-beaufort-sc/ on 8 September.

Lockheed Martin Aeronautics Company (Lockheed). 2009. ALIS: Maintaining & Sustaining Critical F-35 Lightning II Systems. November.

Lowcountry Council of Governments. 2008a. The People and the Economy of the Lowcountry: A Demographic Overview. 8 October.

_____. 2008b. Proposed MCAS Beaufort AICUZ Transfer of Development Rights (TDR) Program. Presentation to Beaufort County Council. 17 November.

_____. 2004. Low Country Joint Land Use Study (JLUS) Plan. September.

Luker, S. 2009. Joint Program Office, JSF Environmental Support, Wyle Labs. Personal communication 2009 through 2010.

Mack, D. 2010. MCAS Beaufort. Personal communication between Ms. Mack and C. Everson, TEC Inc., regarding noise complaints received at MCAS Beaufort for 2007 and 2008 on 5 January.

MCAS Beaufort. 2009a. Joint Hazardous Minimization Center (JHC). Hazardous Material Data Usage for 2009.

_____. 2009b. MCAS Beaufort Exit Strategies. Retrieved from http://www.sctier2team.com/home-2/exit-strategies on December 29, 2009.

_____. 2009c. Stormwater Pollution Prevention Plan.

_____. 2008a. Environmental Assessment for U.S. Marine Corps and U.S. Navy Operations at Townsend Bombing Range, Georgia. October.

_____. 2008b. Natural Resources and Environmental Affairs Office. Hazardous Waste Management Environmental Standard Operating Procedure.

_____. 2008c. FY08 Economic Impact. Brochure Prepared by Commanding Officer, Business Performance Office. January.

_____. 2007a. NREAO. Air Station Order P5090.4, MCAS Beaufort Joint Hazardous Material Minimization Center (JHC) Program Standard Operating Procedure.

_____. 2007b. Draft Benchmark Environmental Compliance Evaluation Report. Developed for Headquarters Marine Corps.

_____. 2007c. Final Draft Integrated Cultural Resources Management Plan ,Marine Corps Air Station Beaufort, Beaufort, South Carolina. March.

_____. 2006a. Air Station Order 4570.3A, Chapter 1, Hazardous Waste Management Plan. Generated from the website at https://secnavportal.donhq.navy.mil/portal on 25 September.

_____. 2006b. Integrated Natural Resources Management Plan for the Marine Corps Air Station, Beaufort, South Carolina. July.

_____. 2006c. Wetland Services at the Main Installation, Agricultural Out-lease, and Laurel Bay Housing Area. Marine Corps Air Station Beaufort, Beaufort, South Carolina.

_____. 2004. MCAS Beaufort. Final Comprehensive Installation Plan Update. December.

MCAS Cherry Point. 2009a. Environmental Standard Operating Procedure for Hazardous Waste Management. Environmental Affairs Department, MCAS Cherry Point.

_____. 2009b. Environmental Standard Operating Procedure for Asbestos Removal Operations. Environmental Affairs Department, MCAS Cherry Point.

_____. 2009c. Environmental Standard Operating Procedure for Lead-Base Paint Abatement Operations. Environmental Affairs Department, MCAS Cherry Point.

_____. 2009d. Environmental Standard Operating Procedure for Soil Excavation and Grading. Environmental Affairs Department, MCAS Cherry Point.

_____. 2009e. Final Integrated Natural Resource Management Plan. MCAS Cherry Point, North Carolina. March.

_____. 2009f. Decision Memorandum for the Transition of EA-6B from NAS Whidbey Island, WA to MCAS Cherry Point. June 26, 2009.

_____. 2008a. MCAS Cherry Point Draft Benchmark Environmental Compliance Evaluation Report. Developed for Headquarters Marine Corps.

_____. 2008b. Master Plan MCAS Cherry Point. Naval Facilities Engineering Command Atlantic, Norfolk, Virginia.

_____. 2008c. MCAS Cherry Point FY08 Economic Impact. Brochure Prepared by Commanding Officer, Business Performance Office. January.

_____. 2007. Bird/Wildlife Aircraft Strike Hazard (BASH) and Procedures. Air Station Order 3000.2B. MCAS Cherry Point, North Carolina. August.

_____. 2006. Final Integrated Contingency Plan. Volume 1. Prepared by Baker Environmental. July.

_____. 2003. Annual Update of the Stormwater Pollution Prevention Plan.

_____. 1998. Master Plan for MCAS Cherry Point. MCAS Cherry Point, North Carolina.

Marine Corps Community Services (MCCS). 2009. Child Development Centers Information. Generated from the website at http://www.mccssc.com/community/community.asp#CHILD on 5 October.

_____. 2007. The Marine Corps "A Young and Vigorous Force-Demographics Update". Headquarters, United States Marine Corps (HQ USMC), Personnel and Family Readiness Division (MR).

Mason, K. 2009. Business Manager, Barnwell Resources Landfill. South Carolina. 8 October.

McEntire Joint National Guard Base (JNGB). 2009. Mission and general information generated from the website at http://www.169fw.ang.af.mil/ on 15 October.

Midwest Research Institute (MRI). 2005. Analysis of the Fine Fraction of Particulate Matter in Fugitive Dust, conducted for the Western Governors Association Western Regional Air Partnership (WRAP).

Miller, K. 2009. Marketing Manager, Tri-Command Communities. Personal Communication on 13 October.

Minnesota IMPLAN Group. 2004. IMPLAN Professional, Version 2.0: User's Guide, Analysis Guide, Data Guide. Minnesota IMPLAN Group, Inc.

Morgan, E. 2009. Director of Data Services, Beaufort County Schools. South Carolina. 12 October.

Naval Air Station (NAS) Lemoore. 2010. Record of Nay Categorical Exclusion for the Relocation of Strike-Fighter Squadron Eighty-Sixth (VFA-86) at MCAS Beaufort, South Carolina to NAS Lemoore, California. August.

National Academy of Sciences. 1977. Guidelines for Preparing Environmental Impact Statements on Noise. Committee on Hearing, Bioacoustics and Biomechanics, National Research Council. Washington, DC.

National Institute for Occupational Safety and Health (NIOSH). 1998. Criteria for a Recommended Standard: Occupational Noise Exposure. Generated from the website at http://www.cdc.gov/niosh/docs/98-126/chap1.html.

Naval Safety Center. 2010. Smithsonian Identification Spreadsheet for MCAS Beaufort and MCAS Cherry Point. Naval Safety Center, Norfolk Naval Base, VA. 12 March.

_____. 2009a. Aviation Data Division, Aviation Hazard Data Base. Naval Station Norfolk, VA. 1999-2009.

_____. 2009b. Aviation Data Division, Aviation Hazard Data Base. Mishap Data, MCAS Cherry Point and MCAS Beaufort. Naval Safety Center, Norfolk Naval Base, VA. 16 October.

_____. 2009c. Aviation Data Division, Aviation Hazard Data Base. BASH Data, MCAS Cherry Point and MCAS Beaufort. Naval Safety Center, Norfolk Naval Base, VA. 8 October.

_____. 2007. Aviation Data Division, 1975-1999 Aviation Hazard Data Base. Aircraft Mishap Data. Naval Safety Center, Norfolk Naval Base, VA. 8 October.

North Carolina Department of Environment and Natural Resources (NCDENR). 2008. North Carolina Solid Waste Management Annual Report-July 1, 2007 to June 30, 2008. Retrieved from http://www.wastenotnc.org/swhome/AR07_08/AR07_08.pdf on 28 September.

_____. 2007. Air Quality Permit Number 04069T28.

North Carolina Department of Transportation (NCDOT). 2009a. What is Super 70? Retrieved from http://www.super70corridor.com/ on 7 October.

_____. 2009b. Super 70 Corridor Projects. Retrieved from http://www.super70corridor.com/ on 2 October.

_____. 2009c. Feasibility Study for the New Route (Northern Carteret Bypass) from the Havelock Bypass (TIP# R-1015) to Beaufort. 22 July.

_____. 2008a. Annual Average Daily Traffic for Craven County. Generated from the website at http://www.ncdot.org/it/img/DataDistribution/TrafficSurveyMaps/2007.html on 29 October.

_____. 2008b. State Transportation Improvement Program, 2009-2015. June 2008.

North Carolina Division of Child Development. 2010. Search for a Child Care Facility. Accessed at http://ncchildcaresearch.dhhs.state.nc.us/search.asp on 12 January.

North Carolina Division of Water Quality (NCDWQ). 2008. Coastal Stormwater Rule Pamphlet. Generated from the website at http://h2o.enr.state.nc.us/su/coastal.htm.

North Carolina Employment Security Commission (NCESC). 2009. October Unemployment Rates Increase in 74 of North Carolina's 100 Counties. December 1. Generated from the website at http://www.ncesc1.com/pmi/rates/PressReleases/County/NR_October09_CountyRates.pdf on 23 December.

North Carolina Office of State Budget and Management (NCOSBM). 2009a. Projected Annual County Population Totals, 2010-2019. Generated from the website at http://www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic_data/population_estimates/demog/countytotals_2010_2019.html on 28 August.

_____. 2009b. Projected Annual County Population Totals, 2020-2029. Generated from the website at http://www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic_data/population_estimates/demog/countytotals_2020_2029.html on 13 August.

_____. 2008. Certified Municipal Estimates July 1, 2007 Population in July 1, 2008 Boundaries. Generated from the website at http://www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic_data/population_estimates/demog/cert07.htm on 13 August.

Otterbine, J. 2009. Lead Fire Inspector, MCAS Beaufort Structural Fire-Rescue Division-Fire Prevention Branch. South Carolina. 13 Personal Communication on October.

Pepper, C.B., M.A. Nascarella, and R.J. Kendall. 2003. A Review of the Effects of Aircraft Noise on Wildlife and Humans, Current Control Mechanisms, and the Need for Further Study. *Environmental Management*, Vol. 32, No. 4.

Petry, Chris. 2010. Director of Treatment for Beaufort-Jasper Water and Sewer Authority. Beaufort, South Carolina. Personal Communication on 20 January.

Potter, W. 2009. MCAS Cherry Point Environmental Affairs Department, Installation Restoration Program. Personal communication regarding OU14 Land Use Controls on 22 December.

Powell, E. 2009. Educational Technician, Child Development Centers-MCAS Beaufort. South Carolina. Personal Communication on 7 October.

Powell, K. 2009. Bachelor Housing Director. MCAS Beaufort Housing Office. Personal Communication on 13 October.

Private School Review. 2010. North Carolina Private Schools by County. Retrieved from http://www.privateschoolreview.com/state_private_schools/stateid/NC on 12 January.

Richmond International Airport. 2009. Master Plan Update. Available at http://www.flyrichmond.com/Load.php?Content=Master_Plan. August.

Robert D. Niehaus, Inc. 2007. 2007 Marine Corps Air Station Cherry Point, North Carolina Housing Market Analysis Update. 29 November.

Russell, B. 2010. Executive Assistant to the Superintendent, Carteret County Public Schools. Personal communication regarding school capacity on 6 January.

Saunders, S.C., M.R. Mislivets, J.Chen, and D.T. Cleland. 2002. Effects of Roads on Landscape Structure within Nested Ecological Units of the Northern Great Lakes Region, USA. Biological Conservation. Vol. 103, pages 209-225.

Savannah/Hilton Head International Airport (Savannah IAP). 2009. Airport information. Generated from the website at http://savannahairport.com on 15 October.

Smith, D.G., D.H. Ellis, and T.H. Johnson. 1988. Raptors and Aircraft. Southwest Raptor Management Symposium and Workshop.

South Carolina Department of Commerce Division of Aeronautics (SCDCDA). 2008. South Carolina Airports System Plan.

South Carolina Department of Health and Environmental Control (SCDHEC). 2009. South Carolina Solid Waste Management Annual Report for Fiscal Year 2008. Retrieved from http://www.scdhec.gov/environment/lwm/recycle/pubs/swm_report08.pdf on 28 September.

_____. 2008a. South Carolina Groundwater Contamination Inventory. Technical Report #002-08. October.

_____. 2008b. South Carolina Solid Waste Management Annual Report, Fiscal Year 2008.

_____. 2006a. Total Maximum Daily Loads for Dissolved Oxygen on the Beaufort River. April.

_____. 2006b. South Carolina Integrated Report 2006 Part I: Listing of Impaired Waters. October.

_____. 2005. Part 70 Air Quality Permit Number TV-0360-004.

_____. 2004. Evaluation of U.S. Marine Corps Air Station Status under the RCRA Info Corrective Action Environmental Indicator Event Codes (CA725 and CA750), EPA ID No. SCI 750 216 169. January 20, 2004.

South Carolina Department of Social Services. 2010. Childcare Search for Beaufort County. Website accessed at: http://childcare.sc.gov/main/general/facilities/search/index.aspx. January.

South Carolina Department of Transportation (SCDOT). 2008. Annual Average Daily Traffic for Beaufort County. Generated from the website at http://www.dot.state.sc.us/getting/pdfs/Traffic_Count_Files/BEAUFORT.pdf on 29 October.

South Carolina Employment Security Commission. 2009. Labor Force and Employment. Generated from the website at http://sces.org/lmi/data/labor-force/lf.asp on 15 December.

South Carolina Office of Environmental Quality Control, Bureau of Land and Waste Management (SCEQC BLWM). 2004. Hazardous Waste Permit SC 1750216169 for MCAS Beaufort, effective until 30 October 2014.

South Carolina Office of Research & Statistics (SCORS). 2009a. South Carolina State and County Population Projections 2015-2020. Generated from the website at http://www.sccommunityprofiles.org/census/proj2020.php on 18 August.

_____. 2009b. South Carolina State and County Population Projections 2006-2010. Generated from the website at http://www.sccommunityprofiles.org/census/proj2010.php on 28 August.

South Carolina State Climatology Office (SCSCO). 2008. South Carolina Climate data accessed at http://www.dnr.sc.gov/climate/sco/ClimateData/cli_sc_climate.php on October 8, 2009.

South Carolina State Ports Authority (SCSPA). 2009. Future Port Development. Retrieved from http://www.scspa.com/spa/news_statistics/news/futureportdevelopment.asp on 4 September.

Stanley. 2010. Naval Safety Center. Personal communication regarding incidence of bird strikes involving wood storks at MCAS Beaufort. August 2010.

State Climate Office of North Carolina (SCONC). 2009. Overview accessed at http://www.nc-climate.ncsu.edu/climate/ncclimate.html on October 8, 2009.

State of Georgia. 2009. Georgia Land Conservation Program. Retrieved from http://glcp.georgia.gov/00/channel_title/0,2094,82613131_82971431,00.html on 10 September.

_____. 2007. 20,000 Acres of Forest Land Permanently Protected through Georgia Land Conservation Program-State Invests $35 Million to Protect Property in Paulding, Decatur and McIntosh Counties. December 5, 2007. Retrieved from http://gov.georgia.gov/00/press_print/0,2669,78006749_99391168_99568140,00.html on 10 September.

Strickroth, K. 2009. Captain, Provost Marshall's Office-MCAS Beaufort. South Carolina. Personal Communication on 15 October.

Sussman, K. 2009. District Manager, Oakwood Landfill. South Carolina. Personal Communication on 28 September.

Talbert & Bright. 2008. Attachment A, Scope of Work for the Hilton Head Island Airport, Hilton Head Island, South Carolina, Airport Master Plan Update. 29 December.

Temple, D. 2010. South Carolina Electric and Gas. Personal communication between Mr. Temple and C. Everson, TEC Inc., regarding Beaufort County and MCAS Beaufort electrical capacity on 19 January.

U.S. Army Corps of Engineers (USACE). 1987. Wetland Delineation Manual. Technical Report Y-87-1.

U.S. Census Bureau. 2010. Terms & Definitions for Housing Unit Estimates. Retrieved from http://www.census.gov/popest/topics/terms/housing_unit.html in January.

_____. 2009a. 2000. Census, Summary File 3, Table P1, Total Population.

_____. 2009b. 2006-2008 American Community Survey.

_____. 2009c. American Fact Finder Sheet, Fact Sheet, 2000 Census.

_____. 1993. Census of Population and Housing Unit Counts for the United States, 1990.

U.S. Department of Agriculture (USDA). 2005. Forests on the Edge. Housing Development on America's Private Forests. U.S. Department of Agriculture, Pacific Northwest Research Station. General Technical Report PNW-GTR-636. May.

_____. 2002. Human Influences on the Forest – The Southern Wildland-Urban Interface Assessment. Southern Research Station General Technical Report SRS-55. Edited by Edward A. Macie and L. Annie Hermansen.

U.S. Department of Defense (DoD). 2010a. Department of Defense Noise Program Guidance referring to technical guidance provided in: Aviation Noise Planning, Analysis and Public Communication with Supplemental Noise Metrics: Guide to Using Supplemental Metrics, December 2009. Technical Bulletin: Community Annoyance Caused By Noise From Military Aircraft Operations, December 2009. Technical Bulletin: Sleep Disturbance From Aviation Noise, December 2009. Technical Bulletin: Using Supplemental Noise Metrics and Analysis Tools, December 2009. April 27.

_____. 2010b. Department of Defense. Joint Strike Fighter Technology. Retrieved from http://www.jsf.mil/program/prog_org_autolog.htm on 14 April.

_____. 2009. Domestic Dependent Elementary and Secondary Schools (DDESS) Laurel Bay Listing. Generated from the website at http://www.am.dodea.edu/scstewartcuba/Laurel%20Bay%20Schools.htm on 5 October.

_____. 2007. Defense Installations Strategic Plan. Office of the Under Secretary of Defense for Acquisition, Technology and Logistics. Generated from the website at http://www.acq.osd.mil on 8 July.

U.S. Department of Education (DOE). 2010a. Impact Aid Section 8003, Payments for Federally Connected Children-Eligibility. Retrieved from http://www.ed.gov/programs/8003/eligibility.html on 14 January.

_____. 2010b. About Impact Aid-Impact Aid Programs. Retrieved from http://www.ed.gov/about/offices/list/oese/impactaid/whatisia.html on 14 January.

_____. 2010c. Impact Aid Section 8003, Payments for Federally Connected Children-Frequently Asked Questions. Retrieved from http://www.ed.gov/programs/8003/faq.html#8003 on 14 January.

_____. 2009. Fiscal Year 2006 U.S. Department of Education Impact Aid Program-8003 Categorical Details. 5 August.

_____. 2006. Fiscal Year 2000 U.S. Department of Education Impact Aid Program-8003 Categorical Details. 7 December.

U.S. Department of the Navy (DoN). 2010. Notice of the Record of Decision for the United States Marine Corps Grow the Force at Marine Corps Base Camp Lejeune, Marine Corps Air Station New River, and Marine Corps Air Station Cherry Point, North Carolina. 22 January.

_____. 2009a. Record of Decision for the Introduction of the P-8A Multi Mission Maritime Aircraft into the U.S. Navy Fleet. Naval Facilities Engineering Command Atlantic. Norfolk, Virginia. January.

_____. 2009b. Environmental Impact Statement/Overseas Environmental Impact Statement, Navy Cherry Point Range Complex. United States Fleet Forces, Norfolk, VA. ROD signed 8 June.

_____. 2009c. Environmental Impact Statement/Overseas Environmental Impact Statement Jacksonville Range Complex. United States Fleet Forces, Norfolk, VA. ROD signed 8 June.

_____. 2009d. About Naval Hospital Beaufort. Generated from the website at http://www.med.navy.mil/sites/nhbeaufort/CommandInfo/Pages/AboutUs.aspx on 2 October.

_____. 2009e. Final Record of Decision for Operable Unit 14, Site 90 at Marine Corps Air Station Cherry Point, North Carolina. August.

_____. 2008a. Final Site Management Plan, Fiscal Year 2009, Marine Corps Air Station Cherry Point, North Carolina. November.

_____. 2008b. Final Environmental Assessment for the Temporary Beddown of Proposed Increase in End Strength at MCAS Cherry Point Naval Facilities Engineering Command, Mid-Atlantic. Norfolk, VA. June.

_____. 2006. Supplemental Environmental Assessment for Phase II Privatization of Family Housing at MCB Camp Lejeune, MCAS New River and MCAS Cherry Point, North Carolina. August.

_____. 2005. Environmental Assessment for Privatization of Military Family Housing for MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point.

_____. 2003a. Final Environmental Impact Statement for the Introduction of F/A-18 E/F (Super Hornet) Aircraft to the East Coast of the United States. July.

_____. 2003b. Record of Decision for the Introduction of F/A-18 E/F (Super Hornet) Aircraft to the East Coast of the United States. September.

_____. 2003c. Noise Study for the Introduction of F/A-18E/F to the East Coast. Prepared by Wyle Acoustics Group, Wyle Laboratories. Contract No. N62477-00-D-0056. April.

_____. 2003d. Environmental Assessment for Proposed Military Operations Areas in Eastern North Carolina. June.

_____. 2001. Air Installation Compatible Use Zone Requirements Update for Marine Corps Air Station Cherry Point, North Carolina. 18 December.

U.S. Environmental Protection Agency (USEPA). 2009a. Information obtained from the AirData website. Accessed criteria pollutant attainment status and PSD Class I locations for Georgia, North Carolina, and South Carolina. Generated from the website at http://epa.gov/oar/data/geosel.html on 20 October.

_____. 2009b. Mandatory Reporting of Greenhouse Gases Rule accessed at http://www.epa.gov/climatechange/emissions/downloads/FinalMandatoryGHGReportingRule.pdf on 12 October 12.

_____. 2009c. Biennial Reporting information for USMC Air Station Beaufort, Envirofacts Warehouse. Generated from the website at http://oaspub.epa.gov/enviro/brs_report on 21 September.

_____. 2009d. Detailed facility information for US Marine Corps MCAS Beaufort, Enforcement and Compliance History Online (ECHO). Generated from the website at http://www.epa-echo.gov/cgi-bin/get1cReport.cgi?tool=echo&IDNumber=110000607503 on 21 September.

_____. 2009e. Biennial Reporting information for MCAS Cherry Point, Envirofacts Warehouse, from the website at http://oaspub.epa.gov/enviro/brs_report on September 21.

_____. 2009f. Detailed facility information for MCAS Cherry Point, Enforcement and Compliance History Online (ECHO), from the website at http://www.epa-echo.gov/cgi-gin/ on September 21.

_____. 2008. Municipal Solid Waste in the United States: 2007 Facts and Figures. Office of Solid Waste, Washington, D.C.

______. 2005a. EPA Report No. NR-010e, Exhaust Emission Factors for Nonroad Engine Modeling—Spark-Ignition.

______. 2005b. EPA 420-R-05-015, NR-002c, Conversion Factors for Hydrocarbon Emission Components.

_____. 2005c. Characterization of Building-Related Construction and Demolition Debris in the United States. December.

_____. 2004a. EPA Report No. NR-005c, Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling.

_____. 2004b. EPA Report No. NR-009c, Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling—Compression-Ignition.

_____. 2003. Mobile 6.2.03, Mobile Source Emission Factor Model.

_____. 2002. Onsite Wastewater Treatment Systems Manual, EPA/625/R-00/008. Office of Water. February.

_____. 1999. Consideration of Cumulative Impacts in USEPA Review of NEPA Documents. May.

_____. 1991. USEPA 460/3-91-02, Nonroad Engine and Vehicle Emission Study—Report.

_____. 1982. USEPA Guidelines for Noise Impact Analysis. USEPA Report No. 550/9-82-105.

_____. 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, 550/9-74-004. March.

_____. 1973. Public Health and Welfare Criteria for Noise, 550/9-73-002. July.

_____. Undated. Wetland Regulatory Authority-Regulatory Requirements. Retrieved from http://www.epa.gov/owow/wetlands/pdf/reg_authority_pr.pdf on March 26, 2010.

U.S. Fish and Wildlife Service (USFWS). 1990. Habitat Management Guidelines for the Wood Stork in the Southeast Region. January.

U.S. Geological Survey (USGS) 2009. Generated from the website at http://tapestry.usgs.gov/features/13coastalplain.html in September.

_____. 2008. Documentation for the 2008 Update of the United States National Seismic Hazard Maps: US Geological Survey Open-File Report 2008-1128.

U.S. Marine Corps (USMC). 2010a. Draft Environmental Impact Statement for the U.S. Marine Corps F-35B West Coast Basing. Naval Engineering Facilities Southwest. San Diego, CA. May.

_____. 2010b. Townsend Bombing Range Environmental Impact Statement. Retrieved from http://www.townsendbombingrangeeis.com on September 13, 2010.

______. 2009a. Notice of Intent. Published in the Federal Register January 15. Volume 74, Number 10, page 2514.

______. 2009b. Marine Aviation Plan Fiscal Year 2010 – Supporting Our Most Lethal Asset. 1 October.

______. 2009c. Final Environmental Assessment, MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, North Carolina. January 2009. FONSI signed 11 February.

______. 2009d. Concept Development Plan for the East Coast Introduction of the JSF, F-35B. NAVFAC Atlantic, Norfolk, Virginia. August.

______. 2009e. Final Environmental Impact Statement for the U.S. Marine Corps Grow the Force in North Carolina. December.

______. 2008a. 2d MAW Homepage. Generated from the website at http://www.2maw.usmc.mil.

______. 2008b. F-35B USMC East Coast Training Range to Home Base Radius Study. September.

______. 2008c. FY09 Marine Aviation Plan – Supporting Our Most Lethal Asset. October.

______. 2008d. Final Integrated Cultural Resources Management Plan – Archeology for MCAS Cherry Point. Prepared by Naval Facilities Engineering Command.

______. 2008e. Final Environmental Assessment for U.S. Marine Corps and Navy Operations at Townsend Bombing Range, Georgia. October.

______. 2008f. MCAS Beaufort's FY11/12/13 MILCON Program. November.

______. 2007a. USMC Demographics. 10 August.

______. 2007b. Environmental Assessment, Construction and Operation of Digital Airport Surveillance Radar in Eastern North Carolina. February.

______. 2007c. Combat Vehicle Operators Training Course. MCAS Cherry Point. June.

______. 2006. Bachelor Enlisted Quarters (BEQ) Campaign Plan. 9 November.

______. 2004a. MCAS Beaufort, South Carolina, Final Comprehensive Installation Plan Update. December

______. 2004b. Final Environmental Assessment for Ordnance Magazines. August.

______. 2003. Final Air Installation Compatible Use Zone Report for Marine Corps Air Station Beaufort, Beaufort, South Carolina. February.

______. 2001. Installations 2020. April 28, 2001. Generated from the website at http://www.marines.mil on 8 July.

Weisenberger, M.E., P.R. Krausman, M.C. Wallace, D.W. DeYoung, and O.E. Maughan. 1996. Effects of Simulated Jet Aircraft Noise on Heart Rate and Behavior of Desert Ungulates. Journal of Wildlife Management, Vol. 60.

Western Regional Air Partnership (WRAP). 2006. WRAP Fugitive Dust Handbook. September.

Wirth, C.C. 2008. E-mail communication between Major Craig Wirth of HQMC Aviation and Randy Siders of HQ USMC Aviation regarding personnel numbers for the F-35B squadrons. 4 August.

Workman, G.W., T.D. Bunch, J.W. Call, R.C. Evans, L.S. Neilson, and E.M. Rawlings. 1992. Sonic Boom/Animal Disturbance Studies on Pronghorn Antelope, Rocky Mountain Elk, and Bighorn Sheep. Utah State University Foundation: Logan. Prepared for U.S. Air Force, Hill AFB, Utah.

Wyle. 2009. Detailed Description of F-35A/B/C Flight Profiles; U.S. Air Force, U.S. Navy, and U.S. Marine Corps Airfield Noise Studies, Version: Karnes 2. Wyle Laboratory, Inc. Arlington, VA. 15 July.