FINAL ENVIRONMENTAL ASSESSMENT/ OVERSEAS ENVIRONMENTAL ASSESSMENT

JOINT STRIKE FIGHTER

SYSTEM DEVELOPMENT AND DEMONSTRATION DEVELOPMENTAL TEST PROGRAM

JANUARY 2007

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE **JAN 2007**	2. REPORT TYPE	3. DATES COVERED **00-00-2007 to 00-00-2007**

4. TITLE AND SUBTITLE **Final Environmental Assessment/Overseas Environmental Assessment Joint Strile Fighter System Development and Demonstration Developmental Test Program**	5a. CONTRACT NUMBER 5b. GRANT NUMBER 5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER 5e. TASK NUMBER 5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Joint Strike Fighter Program Office,200 12th Street South, Suite 600,Arlington,VA,22202-4304**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S) 11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

This Environmental Assessment (EA)/Overseas EA (OEA) identifies and evaluates the potential effects from conducting the Joint Strike Fighter (JSF) Development Test (DT) Program, the Proposed Action. Proposed DT activities of the three F-35 aircraft variants will be conducted over a six to seven year period at Department of Defense facilities and ranges uniquely equipped with assets and experienced expertise to support tests and evaluations of military strike aircraft weapon systems. The EA/OEA evaluates two alternatives in addition to the No Action Alternative: Alternative One- Conducting the full spectrum of the JSF DT Program at an East Coast Primary Test Location [Naval Air Station (NAS) Patuxent River and Virginia Capes Operating Area of the Atlantic Warning Area], a West Coast Primary Test Location [Edwards Air Force Base (AFB), to include using the airspace and ranges of Naval Air Weapons Center, Weapons Division China Lake; Naval Air Weapons Center, Weapons Point Mugu; White Sands Missile Range; and Nevada Test and Training Range, Nellis AFB] and Other Ancillary Test Locations [Eglin AFB Air Armament Center; Naval Air Engineering Station Lakehurst and Lockheed Martin Aeronautics (LM Aero)]; and Alternative Two- Conducting the full spectrum of the JSF DT Program at the proposed test locations reflected in Alternative One, but splitting proposed hover tests of the Short Takeoff Vertical Landing variant of the F-35 between NAS Patuxent River and LM Aero. No significant impacts or harm to the environmental resources analyzed in detail (air quality, noise, biologicaVnatural resources socioeconomics, and coastal zone resources) in this EA/OEA are expected from implementing the Proposed Action under either alternative.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**549**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

DEPARTMENT OF DEFENSE

FINDING OF NO SIGNIFICANT IMPACT AND NO SIGNIFICANT HARM TO THE ENVIRONMENT STATEMENT FOR THE JOINT STRIKE FIGHTER SYSTEM DEVELOPMENT AND DEMONSTRATION, DEVELOPMENTAL TEST PROGRAM

Pursuant to the Council on Environmental Quality regulations (40 Code of Federal Regulations § 1500–1508) implementing procedural provisions of the National Environmental Policy Act (NEPA) and Executive Order (EO) 12114, *Environmental Effects Abroad of Major Federal Actions*, the Program Executive Officer (PEO) for the Joint Strike Fighter (JSF) Program Office (JPO) gives notice that an Environmental Assessment/Overseas Environmental Assessment (EA/OEA), and a Finding of No Significant Impact (FONSI) and a No Significant Harm to the Environment Statement have been prepared for the JSF Developmental Test (DT) Program.

Introduction: The JPO proposes to conduct DT of the JSF (or F-35) at Department of Defense (DoD) facilities and ranges uniquely equipped with the personnel and assets needed to support various DT activities. The F-35 is being designed as the next-generation, strike aircraft weapon system to fulfill the multi-service, multi-role requirements of the United States (U.S.) Air Force (USAF), U.S. Navy (USN), U.S. Marine Corps, and it allies, e.g., the United Kingdom Royal Navy and Royal Air Force. The proposed JSF DT Program is needed to verify the performance and effectiveness of the F-35 for its intended missions.

Proposed Action: The proposed JSF DT Program will span six to seven years (approximately 2007 through 2013). Fifteen instrumented F-35 test aircraft and various support aircraft are proposed to generate approximately 16,500 flights within 33,000 flight hours to certify three F-35 variants. Flight tests would be conducted five days per week with most of the flights occurring during the day. Later in the test program, less than 1% of the total proposed flights would occur at night. Support aircraft would serve in various capacities—such as photography, in-flight inspection, targets, and/or in-flight refueling support. Stores (e.g., missile, bomb, flare, and gun systems), drones, and other test assets, including the use of various ground support equipment, would be used as part of proposed JSF DT activities.

Alternatives Considered: Based on screening criteria, the following USN, USAF, U.S. Army, contractor locations, and associated airspaces have been identified for the two alternatives analyzed in the EA/OEA:

- **East Coast Primary Test Locations:** Naval Air Station (NAS) Patuxent River, Maryland/Virginia Capes (VACAPES OPAREA) of the Atlantic Warning Area (AWA).
- **West Coast Primary Test Locations:** Edwards Air Force Base (AFB), California, using the airspace and ranges of Naval Air Warfare Center Weapons Division (NAWCWD) China Lake, and Naval Air Warfare Center Weapons (NAWCWPNS) Point Mugu, California; White Sands Missile Range (WSMR), New Mexico; and Nevada Test and Training Range (NTTR), Nellis AFB, Nevada.
- **Other Ancillary Test Locations:** Naval Air Engineering Station (NAES) Lakehurst, New Jersey; Eglin AFB, Florida; and Lockheed Martin Aeronautics (LM Aero), Ft. Worth, Texas.

These proposed test locations satisfy the technical specifications, climate and land-based features, operating criteria, and unique Service mission requirements to meet the purpose and need of the Proposed Action.

Alternative One. Among the proposed East Coast, West Coast, and Other Ancillary Test Locations, approximately 47% of the proposed JSF DT Program would be conducted at the East Coast Primary Test Locations (approximately 35% of the DT activities would occur at NAS Patuxent River and 12% within the VACAPES OPAREA) while approximately 51% of the proposed JSF DT would occur at the West Coast Primary Test Locations; 38% of the DT activities occurring at Edwards AFB and the remaining 13% at the other West Coast locations. The remaining 2% of the entire proposed JSF DT Program would occur at the Other Ancillary Test Locations.

Alternative Two. This would be comprised of Alternative One, but would split proposed Short Takeoff Vertical Landing (STOVL) tests between NAS Patuxent River and LM Aero. Approximately 90% of planned STOVL tests would occur at NAS Patuxent River and approximately 10% at LM Aero.

Summary of Environmental Consequences: The EA/OEA focused on resources potentially affected by the Proposed Action: air quality, noise, biological/natural, socioeconomics, and coastal zone management. Alternatives One and Two are not expected to significantly affect or harm the natural or human environment at any of the proposed JSF DT locations, as summarized below. No loss or change of land use will occur, nor will significant degradation occur to air quality, the noise environment, biological/coastal zone resources, or quality of life for the surrounding communities at these proposed test locations. No significant direct, indirect, or harmful cumulative impacts are expected from the Proposed Action.

Air Quality

A formal Conformity Determination for either Proposed Action alternative is not required, as project-related emission levels are below the applicable *de minimis* thresholds, and the annual project-related emissions do not make up 10% or more of the nonattainment area's total emissions budget.

Noise

All proposed F-35 flight operations will be conducted in accordance with existing procedures approved within Air Installation Compatible Use Zone programs. Minimal to negligible impacts from noise are expected at Eglin AFB, NAWCWD China Lake, NAWCWPNS Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA. Specific noise analysis findings for Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero are as follows:

- Edwards AFB: On-base areas potentially impacted by the 65 decibel (dB) and greater Community Noise Equivalent Level (CNEL) noise contour (applicable to the State of California) increase by approximately 1,405 acres (approximately 12.2%), from approximately 11,472 to 12,877 acres. There are no off-base areas impacted by the 65 dB and greater CNEL noise contour.
- NAS Patuxent River: On-installation areas potentially impacted by the 65 dB and greater DNL noise contour increase by about 36 acres, from approximately 5,442 to 5,478 acres (less than 1%). Off-installation areas potentially impacted by the 65 dB and greater Day-Night Average Sound Level (DNL) noise contour decrease by approximately 34 acres (approximately 4%), from 808 to 774 acres, of land outside of NAS Patuxent River's installation boundary.
- NAES Lakehurst: On-installation areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 889 acres (approximately 106%), from 835 to 1,724 acres. Off-installation areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 150 acres (approximately 197%), from 76 to 226 acres.
- LM Aero: On-base areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 5 acres, from 1,566 to 1,571 acres (less than 1%). Off-base areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 54 acres (less than 1%), from 9,649 to 9,703 acres.

None of the non-residential noise sensitive receptors identified will experience a 1.5 dB or 3.0 dB increase in noise as a result of the Proposed Action alternatives. There are no discernable residential or incompatible land uses located within the 65 db or greater CNEL and DNL noise contours.

Biological/Natural Resources

Potential impacts to biological/natural resources include noise-induced effects from aircraft overflights, ground-based testing at NAES Lakehurst, and weapons separation tests. Existing biological species are expected to be acclimated to the noise generated from aircraft activities. While some proposed JSF DT flights will occur below 3,000 feet, most of those flights are of short duration, and above the 550-foot zone that has been shown to account for most wildlife reaction. Minimal to negligible impacts to biological/ natural resources are expected at Eglin AFB, NAWCWD China Lake, NAWCWPNS Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA. Specific findings for Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero are as follows:

- Edwards AFB: The proposed JSF DT activities may change the existing noise impact areas slightly, but the species present in the newly-affected area are believed to be transient in nature and accustomed to the regularly occurring flight noise associated with on-going actions at Edwards AFB. Potential impacts to biological resources, while possible, are not expected since all weapon releases will be conducted in established ranges/impact areas, which in many instances lack available suitable habitat.

Biological/Natural Resources (Continued)
• NAS Patuxent River: The potential impacts to sensitive biological resource areas from noise are minimal to negligible. The proposed weapons separation & integration tests in the Chesapeake Test Range (CTR) are not likely impact the marine environment, including marine mammals and sea turtles. Similarly, no changes to water quality or other resources needed to support fish habitats are expected. • NAES Lakehurst: The change in vacant land area will increase with the proposed JSF DT (from 307 acres to 1,073 acres; and introduce noise to the southwest of the runway, where it does not exist currently). The area potentially impacted provides important habitat for threatened and endangered grassland bird species. These species, as well as other biological resources, may already be accustomed to aircraft noise, and these species would be expected to be minimally impacted with no permanent behavioral or physiological changes. Only about 1% of the total acres in the Manchester Fish and Wildlife Management Area would fall within the projected noise contours, and there would be no changes to its use. Therefore, no significant impacts are expected to the environment. • LM Aero: No impacts to biological/natural resources are anticipated as no sensitive receptors would be present within the proposed JSF DT noise impact area. The proposed JSF DT activities will not produce any significant impacts to biological/natural resources, including Federally- and state-listed endangered or threatened species or essential fish habitat. No consultation is required since affects to protected species are not anticipated.
Socioeconomics/Environmental Justice
The addition of personnel to support the proposed JSF DT Program at Edwards AFB and NAS Patuxent River, and the temporary relocation of personnel to NAES Lakehurst, have the potential to impact the immediate, surrounding areas. No new personnel are required to support the Proposed Action at other proposed test locations. The gradual influx of personnel will result in small positive benefits to the economic region. Considering there are no discernable noise impacts to sensitive receptors or populations, no disproportionately high or adverse human health and environmental effects are expected to environmental justice populations or children.
Coastal Zones Resources
No impacts to the coastal zone resources of California, Maryland, Virginia, and Delaware are expected from implementing the Proposed Action alternatives at NAWCWPNS Point Mugu, NAS Patuxent River, and the VACAPES OPAREA, based on the results of the air quality and noise analyses. Similarly, minimal impacts are expected to biological/natural resources, including marine species. The JPO PEO has determined the Proposed Action would be consistent to the maximum extent practicable with the enforceable policies and objectives of the California, Maryland, Virginia, and Delaware Coastal Zone Management Programs. A Negative Coastal Consistency Determination has been completed by the JPO.

Conclusion: The Proposed Action is not anticipated to result in significant impacts or harm to environmental resources of the U.S. and within the global commons, based on the EA/OEA findings. As a result, an Environmental Impact Statement/Overseas Environmental Impact Statement was not prepared. Close coordination by the JPO with appropriate representatives at all of the proposed test locations further assures protection of environmental resources throughout the proposed JSF DT. Therefore, pursuant to NEPA and EO 12114 respectively, the JPO PEO concludes with a FONSI and a No Significant Harm to the Environment Statement for the Proposed Action. This Statement and the EA/OEA may be obtained from the JPO, 200 12th Street South, Suite 600, Arlington, VA 22202-4304.

3 1 JAN 07

Charles R. Davis, Brig Gen, USAF
Program Executive Officer
Joint Strike Fighter Program Office

Date

FINAL ENVIRONMENTAL ASSESSMENT/ OVERSEAS ENVIRONMENTAL ASSESSMENT

JOINT STRIKE FIGHTER SYSTEM DEVELOPMENT AND DEMONSTRATION DEVELOPMENTAL TEST PROGRAM

JANUARY 2007

RESPONSIBLE OFFICIAL:

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ABSTRACT

This Environmental Assessment (EA)/Overseas EA (OEA) identifies and evaluates the potential effects from conducting the Joint Strike Fighter (JSF) Development Test (DT) Program, the Proposed Action. Proposed DT activities of the three F-35 aircraft variants will be conducted over a six to seven year period at Department of Defense facilities and ranges uniquely equipped with assets and experienced expertise to support tests and evaluations of military strike aircraft weapon systems. The EA/OEA evaluates two alternatives in addition to the No Action Alternative: Alternative One - Conducting the full spectrum of the JSF DT Program at an East Coast Primary Test Location [Naval Air Station (NAS) Patuxent River and Virginia Capes Operating Area of the Atlantic Warning Area], a West Coast Primary Test Location [Edwards Air Force Base (AFB), to include using the airspace and ranges of Naval Air Weapons Center, Weapons Division China Lake; Naval Air Weapons Center, Weapons Point Mugu; White Sands Missile Range; and Nevada Test and Training Range, Nellis AFB] and Other Ancillary Test Locations [Eglin AFB Air Armament Center; Naval Air Engineering Station Lakehurst, and Lockheed Martin Aeronautics (LM Aero)]; and Alternative Two - Conducting the full spectrum of the JSF DT Program at the proposed test locations reflected in Alternative One, but splitting proposed hover tests of the Short Takeoff Vertical Landing variant of the F-35 between NAS Patuxent River and LM Aero. No significant impacts or harm to the environmental resources analyzed in detail (air quality, noise, biological/natural resources, socioeconomics, and coastal zone resources) in this EA/OEA are expected from implementing the Proposed Action under either alternative.

Executive Summary

Introduction

The United States (U.S.) must preserve a core force structure that is organized, equipped, trained, and supported to meet an extensive range of military operational requirements. The Joint Strike Fighter (JSF) (hereafter referred to as F-35 Air System or F-35) has been identified as the potential aircraft for preserving the core force structure while meeting each military service's unique operating requirements and mission concepts. The JSF Program is a joint Department of Defense (DoD) Major Defense Acquisition Program led by the U.S. Air Force (USAF), U.S. Navy (USN), and U.S. Marine Corps (USMC), responsible for developing an affordable, next generation, strike aircraft weapon system capable of meeting an advanced threat while improving lethality, survivability, and supportability. The proposed F-35 Air System is being designed to fulfill the multi-service, multi-role requirements of the USAF, USN, and the USMC, as well as the United Kingdom (UK) Royal Navy (RN) and Royal Air Force (RAF). Additional international partners include Australia, Canada, Denmark, Italy, the Netherlands, Norway, and Turkey.

The JSF Program Office (JPO) has prepared an Environmental Assessment (EA)/Overseas EA (OEA) to analyze potential environmental effects of the JSF Developmental Test (DT) during System Development and Demonstration (SDD), the Proposed Action. The decision to be made under this EA/OEA is where and how to conduct the Proposed Action. The JPO Program Executive Officer (PEO) is the final decision authority for the Proposed Action.

Timeframe

The entire JSF SDD Test Program will be conducted over a six to seven year period, both within and outside U.S. territory.

Purpose and Need

The purpose and need of the proposed JSF DT is twofold: (1) to satisfy the DoD's system acquisition development requirements pursuant to DoD Directive 5000.1 and DoD Instruction 5000.2 policies, and (2) to evaluate the effectiveness, compatibility, and performance of the three F-35 variants under a wide spectrum of environmental conditions, ensuring the aircraft would be properly equipped for, and capable of, combat missions. The proposed JSF DT is needed for final air system effectiveness verification and to support the decision of whether or not to proceed with JSF Operational Test and Low Rate Initial Production.

Proposed Action

The JPO has established the JSF Verification and Test (V&T) Team for the planning and execution of the proposed JSF DT. Fifteen instrumented F-35 test aircraft and various support aircraft are proposed to generate approximately 16,500 flights in 33,000 flight hours to certify the three variants. Flight tests would be conducted five days per week with most of the flights occurring during the day in compliance with airspace operating procedures. Later in the test program schedule (i.e., Test Years 3 through 6), less than 1% of the total proposed flights would occur at night. Support aircraft would be required to serve in various capacities, such as chase aircraft (photography and in-flight inspection), targets, and/or in-flight refueling support. Stores [such as missiles, bombs, fuel tanks, refueling or electronic countermeasure pods, countermeasures (flares), guns, etc.], tankers, drones, and other test and evaluation (T&E) assets would be used as part of proposed JSF DT activities. Stores will be internally or externally mounted on the F-35 or support aircraft suspension and release equipment, and may or may not be released (or separated from the aircraft) during various proposed JSF DT activities. In addition to stores, the proposed JSF DT will require the use of various ground support equipment, including, but not limited to, aircraft tow tractors, auxiliary power units, air conditioner/chilling carts, engine wash carts, compressors, generators, etc.

Test Site Selection

The JPO and JSF V&T Team recommend the following proposed USN, USAF, and US Army locations to meet the requirements of the Proposed Action, as well as the purpose and need, based on technical capability, affordability (cost to afford the best-value test program), schedule capability, and flexibility.

East Coast Primary Test Location

- Naval Air Station (NAS) Patuxent River, Maryland/Virginia Capes Operating Area(VACAPES OPAREA) of the Atlantic Warning Area (AWA)

West Coast Primary Test Location

- Edwards Air Force Base (AFB), Air Force Flight Test Center (AFFTC), California to include using the airspace and ranges of:
    - Naval Air Warfare Center, Weapons Division (NAWCWD) China Lake, California
    - Naval Air Warfare Center, Weapons (NAWCWPNS) Point Mugu, California
    - White Sands Missile Range (WSMR), New Mexico
    - Nevada Test and Training Range (NTTR), Nellis AFB, Nevada

Other Ancillary Test Locations

- Naval Air Engineering Station (NAES) Lakehurst, New Jersey
- Eglin AFB, Air Armament Center (AAC), Florida
- Lockheed Martin Aeronautics (LM Aero), Ft. Worth, Texas

Though the proposed West Coast Primary Test Location actually consists of five military facilities/ranges, Edwards AFB, AFFTC, would be the only proposed location where the F-35 would be based and all flights to the other proposed test locations would originate and return to Edwards AFB. Other proposed West Coast Primary Test Locations would be used for their airspace and the technical attributes of their ranges. Conducting the proposed JSF DT at multiple locations is needed to successfully accomplish the scope of the proposed JSF DT activities and to evaluate and validate the F-35 in its full expected combat environment (based on technical specifications, climate and land-based features, operating criteria, and unique Service mission requirements).

Summary of Alternatives

The alternatives described below are reasonable and viable, meaning that, if chosen by the JSF PEO, they could be implemented as described.

Alternative One

The proposed JSF DT would be conducted at the East and West Coast Primary Test Locations and Other Ancillary Test Locations. Detachments (DETs) would originate from NAS Patuxent River to NAES Lakehurst and Eglin AFB, AAC, and return to NAS Patuxent River. In addition, VACAPES OPAREA flights would originate from and return to NAS Patuxent River. This alternative would allow the JPO and JSF V&T Team to capitalize on professional capabilities, technical expertise, and specialized test assets while accommodating the proposed number of F-35 aircraft. DETs may include aircraft, personnel, and/or equipment to support the proposed testing at each proposed location and would be temporary in nature. No DETs of personnel and/or equipment would be expected at this time from Edwards AFB, but the ranges associated with NAWCWD China Lake, WSMR, NTTR, and NAWCWPNS Point Mugu would be used to complement proposed JSF DT activities. The use of the East and West Coast Primary Test Locations and the other Ancillary Test Locations takes advantage of unique facility or range assets, maximizes test efficiencies, reduces logistics and program costs, and supports the full spectrum of the proposed JSF DT.

Approximately 47% of the proposed JSF DT Program would be conducted at the East Coast Primary Test Location with approximately 35% of the events occurring at NAS Patuxent River, and 12% within the VACAPES OPAREA. For the West Coast Primary Test Locations, approximately 51% of the entire proposed JSF DT would occur in this geographic region with approximately 38% of the events occurring at Edwards AFB. The remaining 2% of events for the entire proposed JSF DT Program would occur at the Other Ancillary Test Locations. The proposed JSF DT Program would be a combination of ground- and flight-based activities. Other than the takeoff and landing of the F-35, the proposed JSF DT at Eglin AFB would be ground-based, indoors at the McKinley Climatic Laboratory.

Alternative Two

This would be comprised of Alternative One and the expansion of proposed JSF DT testing at LM Aero. The difference between Alternatives One and Two is proposed Short Takeoff Vertical Landing (STOVL) hover operations would be performed at both NAS Patuxent River and LM Aero locations instead of at NAS Patuxent River. Under this proposed scenario, approximately 90% of airborne STOVL hover operations would occur at NAS Patuxent River and approximately 10% at LM Aero. For ground-based operations, 64% would be conducted at NAS Patuxent River and 37% at LM Aero. Proposed ground-based tests at LM Aero would be propulsion and performance related STOVL test activities.

Other Alternatives. The JPO and JSF V&T Team have also considered computer modeling and simulation and conducting the proposed JSF DT at one principal test location. However, these alternatives were deemed insufficient for meeting the stated purpose and need for the Proposed Action. These alternatives are not considered reasonable or viable alternatives to the Proposed Action, and are therefore not analyzed in this EA/OEA.

No Action Alternative. Under the No Action Alternative, no new activities associated with the proposed JSF DT would occur at any location. This alternative would avoid all impacts associated with the Proposed Action. However, the No Action Alternative would not support the stated need to test and verify the ability to safely fly the F-35 and meet the performance requirements. Though the No Action Alternative does not satisfy the purpose and need for the Proposed Action, the No Action Alternative in this EA/OEA provides the environmental baseline data (the “as is” condition) for existing manmade and natural environmental parameters from which to assess the potential impacts of Alternatives One and Two at the proposed test locations.

Methodology

Potential environmental impacts from implementing the proposed JSF DT are analyzed in detail for those resources that could significantly be affected at each proposed test location: air quality, noise, biological/natural, socioeconomic, and coastal zone management. The potential for impacts to all other resource areas (e.g., water quality, cultural resources, geology and soils, vegetation, personnel safety and occupational health, utilities, land use, airfield operations, flight safety, farmlands, and parks/forests) is expected to be minimal to negligible, and therefore are not analyzed in greater detail in this EA/OEA. The environmental analysis focuses predominantly on the potential effects at the proposed test locations of Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero due to the complexity or extent of proposed test activities at these locations; the potential for effects at the other proposed test locations are expected to be minimal to negligible.

Environmental Consequences

Alternatives One and Two of the proposed JSF DT are not expected to significantly affect the natural or human environment at any of the proposed test locations. No significant direct, indirect, or harmful cumulative impacts to air quality, noise, biological/natural, socioeconomic, or coastal zone resources is anticipated under either Proposed Action alternative. Implementation of environmental measures as required by each test location, in addition to the JPO's and JSF V&T Team's close coordination with proposed test location Air Operations, Range Sustainability, Environmental, and Public Affairs offices, further assures continued minimal impact from the proposed JSF DT. Table ES 1-1 summarizes the potential impacts of Alternatives One and Two for the Proposed Action. No specific mitigation measures are required for the proposed JSF DT based on the analysis findings presented in this EA/OEA.

Table ES-1: Summary of Environmental Impacts from Alternatives One and Two for the Proposed Action

Air Quality
Minimal to negligible impacts to air quality are expected from implementing either Proposed Action alternative at Eglin AFB, NAWCWD China Lake, NAWCWPNS Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA. A formal Conformity Determination is not required for either Proposed Action alternative at Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero. Project related emission levels will be below the applicable *de minimis* thresholds, and the annual project-related emissions do not make up 10% or more of the nonattainment area's total emissions budget. For NAES Lakehurst, the annual project-induced emissions do not make up 10% or more of the region's projected emissions of Ozone precursors, as specified in the State Implementation Plan budget. Therefore, the Proposed Action is not likely to result in significant air quality impacts to Edwards AFB, NAS Patuxent River, NAES Lakehurst, LM Aero, or the surrounding areas.
Noise
All proposed F-35 flight operations will be conducted in accordance with existing procedures approved within Air Installation Compatible Use Zone programs. Minimal to negligible impacts from noise is expected for implementing either Proposed Action alternative at Eglin AFB, NAWCWD China Lake, NAWCWPNS Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA. Proposed JSF DT activities at these locations represent approximately 1% or less of the overall tempo of operations conducted normally or for similar RDT&E programs. Specific noise analysis findings for Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero are as follows: • Edwards AFB: On-base areas potentially impacted by the 65 decibel (dB) and greater Community Noise Equivalent Level (CNEL) noise contour (applicable to the State of California) increase by approximately 1,405 acres (approximately 12.2%), from approximately 11,472 to 12,877 acres. There are no off-base areas impacted by the 65 dB and greater CNEL noise contour. • NAS Patuxent River: On-installation areas potentially impacted by the 65 dB and greater Day-Night Average Sound Level (DNL) noise contour increase by about 36 acres, from approximately 5,442 to 5,478 acres (less than 1%). Off-installation areas potentially impacted by the 65 dB and greater DNL noise contour decrease by approximately 34 acres (approximately 4%) from 808 to 774 acres of land outside of NAS Patuxent River's installation boundary. • NAES Lakehurst: On-installation areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 889 acres (approximately 106%), from 835 to 1,724 acres. As a result of the Proposed Action, off-installation areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 150 acres (approximately 197%) from 76 to 226 acres. • LM Aero: On-base areas potentially impacted by the 65 dB and greater DNL noise contour would increase by approximately 5 acres, from 1,566 to 1,571 acres (less than 1%). Off-base areas potentially impacted by the 65 dB and greater DNL noise contour would increase by approximately 54 acres (less than 1%), from 9,649 to 9,703 acres. None of the non-residential noise sensitive receptors identified will experience a 1.5 dB or 3.0 dB increase in noise as a result of the Proposed Action alternatives. There are no discernable residential or incompatible land uses located within the 65 db or greater CNEL and DNL noise contours for the Proposed Action alternatives. Therefore, no significant impacts from noise are expected at the proposed test locations.

Table ES-1: Summary of Environmental Impacts from Alternatives One and Two for the Proposed Action (Continued)

Biological/Natural Resources
Potential environmental impacts to biological/natural resources include noise-induced effects from aircraft overflights, ground-based testing at NAES Lakehurst, and weapons separation tests. Biological species are expected to be acclimated to the noise generated from T&E activities conducted at the proposed test locations. While some proposed flights will occur below 3,000 feet above ground level (AGL), most of those flights will be of short duration and above the 550-foot AGL zone that has been shown to account for most wildlife reaction. Minimal to negligible impacts to biological/natural resources are expected for implementing either Proposed Action alternative at Eglin AFB, NAWCWD China Lake, NAWCWPNS Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA. Specific findings for Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero are as follows: • Edwards AFB: The proposed JSF DT activity may change the existing noise impact areas slightly, but the species present in the newly-affected area are believed to be transient in nature and accustomed to the regularly occurring flight noise associated with on-going actions at Edwards AFB. Potential impacts to biological resources, while possible, are not be expected since all weapon releases will be conducted in established ranges/impact areas, which in many instances lack available suitable habitat. • NAS Patuxent River: The potential impacts to sensitive biological resource areas from noise are minimal to negligible. The proposed weapons separation & integration tests in the Chesapeake Test Range (CTR) will not likely impact the marine environment, including marine mammals and sea turtles. Similarly, no changes to water quality or other resources needed to support fish habitats are expected. • NAES Lakehurst: The change in land area will increase with the proposed JSF DT (from 307 acres to 1,073 acres; and introduce noise to the southwest of the runway, where it does not exist currently). The area potentially impacted provides important habitat for threatened and endangered grassland bird species. These species, as well as other biological resources, may already be accustomed to aircraft noise, and species are expected to be minimally impacted with no permanent behavioral or physiological changes. In addition, only about 1% of the total acres in the Manchester Fish and Wildlife Management Area would fall within the projected noise contours; and there would be no change to its use. Therefore, no significant impacts are expected to the environment. • LM Aero: No impacts to biological/natural resources are anticipated as no sensitive receptors would be present within the proposed JSF DT noise impact area. The proposed JSF DT will not produce any significant impacts to biological/natural resources, including Federally- and state-listed endangered or threatened species or essential fish habitat. No consultation is required since affects to protected species are not anticipated.
Socioeconomics/Environmental Justice
The addition of personnel to support the proposed JSF DT Program at Edwards AFB and NAS Patuxent River, and the temporary relocation of personnel to NAES Lakehurst, have the potential to impact the immediate, surrounding areas. No additional, new personnel are required to support the Proposed Action at other proposed test locations. The gradual influx of personnel will result in small positive benefits to the economic region. Considering there are no discernable noise impacts to sensitive receptors or populations, no disproportionately high or adverse human health and environmental effects are expected to environmental justice populations or children.
Coastal Zones Resources
No impacts to the coastal zone resources of California, Maryland, Virginia, and Delaware are expected from implementing the Proposed Action at NAWCWPNS Point Mugu, NAS Patuxent River, and the VACAPES OPAREA based on the results of the air quality and noise analyses. Similarly, minimal impacts are expected to biological/natural resources, including marine species. The JPO PEO has determined the proposed JSF DT will be consistent to the maximum extent practicable with the enforceable policies and objectives of the California, Maryland, Virginia, and Delaware Coastal Zone Management Programs. A Negative Coastal Consistency Determination has been completed by the JPO.

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ACRONYMS AND ABBREVIATIONS

$\mu g/m^3$	Micrograms per cubic meter
AAC	Air Armament Center
AAQS	Ambient Air Quality Standards
AASF	Army Aviation Support Facility
AAVI	AMRAAM Air Vehicle Instrumented
AB	After-Burner
ABW	Air Base Wing
ACEC	Area of Critical Environmental Concern
ACLS	Automatic Carrier Landing System
AESO	Aircraft Environment Support Office
AF	Air Force
AFB	Air Force Base
AFFTC	Air Force Flight Test Center
AFI	Air Force Instruction
AFIERA	Air Force Institute for Environmental, Safety, and Occupational Health Risk Analysis
AFOSH	Air Force Occupational Safety and Health Standard
AFP	Air Force Plant
AFR	Air Force Range
AFRL	Air Force Research Lab
AGL	Above Ground Level
AICUZ	Air Installation Compatible Use Zone
AIM	Air Intercept Missile
AoA	Angle-of-Attack
AMRAAM	Advanced Medium Range Air-to-Air Missile
APCD	Air Pollution Control District
APU	Auxiliary Power Unit
AQCR	Air Quality Control Region
AR	Administrative Record
AFRL	Air Force Research Laboratory
ASRAAM	Advanced Short-Range Air-to-Air Missile
ATCAA	Air Traffic Control Assigned Airspace
ATR	Atlantic Test Range
AutoLog	Autonomic Logistics
AVAPCD	Antelope Valley Air Pollution Control District
AVAQMD	Antelope Valley Air Quality Management District
AWA	Atlantic Warning Area
AZ	Arizona
BAE	BAE Systems
BASH	Bird/Aircraft Strike Hazards
BEA	Bureau of Economic Analysis
BDU	Bomb Dummy Unit
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics

ACRONYMS AND ABBREVIATIONS (CONTINUED)

BLU	Bomb Live Unit
BO	Biological Opinion
BRAC	Base Realignment and Closure
C2	Command and Control
C^4I	Command, Control, Communications, Computers, and Intelligence
CA	California
CAA	Clean Air Act
CAAA-90	Clean Air Act Amendments of 1990
CARB	California Air Resources Board
CATB	Cooperative Avionics Test Bed
CATEX	Categorical Exclusion
CATM	Captive Air Training Missile
CBP	County Business Pattern
CCD	Coastal Consistency Determination
CCF	Central Coordinating Facility
CEQ	Council on Environmental Quality
CFA	Controlled Firing Area
CFR	Code of Federal Regulation
CLTF	Consolidated Logistics and Training Facility
CMP	Coastal Management Program
CNDDB	California Natural Diversity Data Base
CNEL	Community Noise Equivalent Level
CO	Commanding Officer
CO	Carbon Monoxide
COTF	Commander Operational Test and Evaluation Force
CPD	Coastal Program Division
CTOL	Conventional Takeoff and Landing
CTR	Chesapeake Test Range
CV	Carrier Variant
CY	Calendar Year
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DAS	Distributed Aperture System
DASH	Deer/Aircraft Strike Hazards
dB	Decibel
dBA	A-Weighted Decibel
DET	Detachment
DNL	Day-Night Average Sound Level
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DoN	Department of the Navy
DT	Developmental Test

ACRONYMS AND ABBREVIATIONS (CONTINUED)

E3	Electromagnetic Environmental Effects
EA	Environmental Assessment
EC	Electronic Combat
ECR	Electronic Combat Range
ECS	Environmental Control System
EDMS	Emissions and Dispersion Modeling System
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EI	Emissions Index
EIAP	Environmental Impact Analysis Process
EIFS	Economic Impact Forecast System
EIS	Environmental Impact Statement
EMALS	Electromagnetic Aircraft Launching System
EMD	Engineering and Manufacturing Development
EMDS	Emission and Dispersion Modeling System
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESOH	Environmental, Safety, and Occupational Health
EW	Electronic Warfare
FAA	Federal Aviation Administration
FACSFAC	Fleet Area Control and Surveillance Facility
FEIS	Final Environmental Impact Statement
FICON	Federal Interagency Committee on Noise
FL	Florida
FLIR	Forward Looking Infrared
FONSI	Finding of No Significant Impact
FQ	Flying Qualities
FRC	Fleet Readiness Center
FSI	Forecast Significance of Impact
FT	Flight Testing
FTP	Flight Test Program
FY	Fiscal Year
GEAE	General Electric Aircraft Engines
GBU	Guided Bomb Unit
GOCO	Government Owned, Contractor Operated
GPB	General Purpose Bomb
GSE	Ground Support Equipment
GTV	Guided Test Vehicle
HAP	Hazardous Air Pollutant
HAZMAT	Hazardous Materials
HAZWASTE	Hazardous Waste

ACRONYMS AND ABBREVIATIONS (CONTINUED)

HC	Hydrocarbons
Hz	Hertz
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
in	inches
INRMP	Integrated Natural Resources Management Plan
IOT&E	Initial Operational Test and Evaluation
ITF	Integrated Test Force
JBD	Jet Blast Deflector
JDAM	Joint Direct Attack Munition
JPO	Joint Strike Fighter Program Office
JRB	Joint Reserve Base
JSF	Joint Strike Fighter
JSOW	Joint Stand-Off Weapon
KCAPCD	Kern County Air Pollution Control District
KCAS	Knots Calibrated Airspeed
km	kilometers
KPP	Key Performance Parameter
kts	knots
Lbs	pounds
LC_{dn}	C-Weighted Average Day-Night Sound Level
LDGP	Low Drag General Purpose
Leq	Equivalent Noise Level
LGTR	Laser Guided Training Round
LM Aero	Lockheed Martin Aeronautics
Lmax	Maximum Noise Level
LO	Low Observable
LRIP	Low Rate Initial Production
LZ	Landing Zone
m	meters
M&S	Modeling and Simulation
MACA	Mid-Air Collision Avoidance
MAX	Maximum
MBTA	Migratory Bird Treaty Act of 1918
MCALF	Marine Corps Auxiliary Landing Field
MCAS	Marine Corps Air Station
MCO	Marine Corps Order
MD	Maryland
MDAQMD	Mojave Desert Air Quality Management District
MDE	Maryland Department of the Environment

ACRONYMS AND ABBREVIATIONS (CONTINUED)

MIL	Military
MILCON	Military Construction
MIL-STD	Military Standard
MK	Mark
MMPA	Marine Mammal Protection Act
MOA	Military Operations Area
Mod	Modification
mph	Miles per Hour
MRTFB	Major Range and Test Facility Base
MSA	Metropolitan Statistical Area
MSFCMA	Magnuson Stevens Fishery Conservation and Management Act
MSL	Mean Sea Level
MT	Metric Ton (a Megagram)
MWAQC	Metropolitan Washington Air Quality Committee
MWNAA	Metropolitan Washington Nonattainment Area
N	No
N/A	Not Applicable
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NAES	Naval Air Engineering Station
NAFR	Nellis Air Force Range
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
NASPAXRIVINST	Naval Air Station Patuxent River Instruction
NATOPS	Naval Air Training and Operating Procedure Standardization
NAVAIR	Naval Air Systems Command
NAWCAD	Naval Air Warfare Center, Aircraft Division
NAWCWD	Naval Air Warfare Center, Weapons Division
NAWCWPNS	Naval Air Warfare Center, Weapons
NAWS	Naval Air Weapons Station
NC	North Carolina
NEPA	National Environmental Policy Act
NJ	New Jersey
NJARNG	New Jersey Army National Guard
NLR	Noise Level Reduction
NM	Nautical Miles
NM	New Mexico
NMDGF	New Mexico Department of Game and Fish
NMFRCD	New Mexico Forestry Resource Conservation Division
NMFS	National Marine Fisheries Service
NMNHD	New Mexico National Heritage Program Division
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NO_X	Nitrogen Oxides
NOTMAR	Notice to Marines

ACRONYMS AND ABBREVIATIONS (CONTINUED)

NRC	Nellis Range Complex
NSR	New Source Review
NTC	National Training Center
NTTR	Nevada Test and Training Range
NV	Nevada
NWR	National Wildlife Refuge
O&M	Operations and Management
O_3	Ozone
OEA	Overseas Environmental Assessment
OEIS	Overseas Environmental Impact Statement
OLF	Outlying Landing Field
OPAREA	Operating Area
OPNAVINST	Office of the Chief of Naval Operations Instruction
Ops	Operations
ORD	Operational Requirements Document
OSD	Office of the Secretary of Defense
OSHA	Occupational Safety and Health Administration
OT	Operational Test
P	Partially
P.L.	Public Law
P&R	Personnel and Readiness
P&W	Pratt & Whitney
PAO	Poly Alpha Olefin
Pb	Lead
PEO	Program Executive Officer
PGK	Projectile Guidance Kit
PHM	Prognostics and Health Management
PM	Particulate Matter
PM_{10}	Particulate Matter of 10 microns or less in diameter
$PM_{2.5}$	Particulate Matter of 2.5 microns or less in diameter
ppm	Parts per Million
PRC	Patuxent River Complex
PSD	Prevention of Significant Deterioration
RAF	Royal Air Force
RDT&E	Research, Development, Test, and Evaluation
RF	Radio Frequency
RN	Royal Navy
ROI	Region of Influence
RONA	Record of Non-Applicability
RTV	Rational Threshold Level
SAIA	Sikes Act
SAV	Submerged Aquatic Vegetation

ACRONYMS AND ABBREVIATIONS (CONTINUED)

SBCAPCD	Santa Barbara County Air Pollution Control District
SCB	Southern California Bight
SCIF	Special Compartmental Information Facilities
SDD	System Development and Demonstration
SE	Support Equipment
SECNAVINST	Secretary of the Navy Instruction
SEL	Sound Exposure Level
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SOP	Standard Operating Procedure
SPL	Sound Pressure Level
STOVL	Short Takeoff Vertical Landing
STV	Separation Test Vehicles
SUA	Special Use Airspace
T&E	Test and Evaluation
TAC	Technical Advisory Committee
TDY	Temporary Duty
TECOM	Test and Evaluation Command
TEMP	Test and Evaluation Master Plan
tpd	tons per day
TPECR	Tolicha Peak Electronic Combat Range
tpy	tons per year
TS/SAR	Top Secret/Special Access Requirement
TSP	Total Suspended Particulate
TSPI	Time Space Positioning Instrumentation
TTR	Tonopah Test Range
TX	Texas
U.S.	United States
UK	United Kingdom
UNESCOM	United Nations Special Commission
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USMC	United States Marine Corps
USN	United States Navy
V&T	Verification and Test
VACAPES	Virginia Capes
VCAPCD	Ventura County Air Pollution Control District
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VOC	Volatile Organic Compound

ACRONYMS AND ABBREVIATIONS (CONTINUED)

VTOL	Vertical Takeoff and Landing
WCMD	Wind Corrected Munition Dispenser
WSMR	White Sands Missile Range
WSTF	White Sands Test Facility
X	Experimental
x	Extension
Y	Yes
YPG	Yuma Proving Ground

1.0 INTRODUCTION

This Environmental Assessment (EA)/Overseas EA (OEA) has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as implemented by Council on Environmental Quality (CEQ) regulations, and Presidential Executive Order (EO) 12114. In addition, relevant Department of Defense (DoD) instructions that implement those laws and regulations direct environmental consequences be considered prior to authorizing or implementing a major Federal action. The provisions of NEPA apply to major Federal actions and their associated impacts that occur in the United States (U.S.) and within 12 nautical miles (NM) of its shores. The provisions of EO 12114 apply to major Federal actions and their associated impacts that occur outside 12 NM from U.S. shores.

The Joint Strike Fighter (JSF) Program Office (JPO) has prepared this EA/OEA to analyze the potential environmental effects of performing the JSF Developmental Test (DT) Program during System Development and Demonstration (SDD), the Proposed Action. The proposed JSF DT would be conducted both within and outside the U.S. territory. To comply with CEQ directives, and to reduce paperwork and delay, this EA/OEA tiers from relevant existing NEPA/EO 12114 documents by incorporating and/or referencing, where appropriate, information and analysis from these documents.

The organization for this EA/OEA begins with a basic description of the JSF Program and Purpose and Need for the Proposed Action within Section 1. A detailed description of the Proposed Action and the site selection process used for identifying the potential test locations is discussed in Section 2. Also included in this section are the alternatives considered by the JPO for the Proposed Action. Section 3 discusses the environmental resources that are analyzed in detail vice those determined by the JPO as not to be potentially impacted by the Proposed Action. Sections 4 through 8 present the results of the analysis of the potential effects to environmental resources at proposed test locations. Overall conclusions of the analysis are presented in Section 9, while Section 10 is a list of references used in support of this EA/OEA. Section 11 is a list of the preparers and contributors as well as the agencies and public organizations offered the opportunity to review this EA/OEA. Appendices A through G provide supporting details to further the information presented in the main body of this EA/OEA.

1.1 JSF PROGRAM DESCRIPTION

The U.S. must preserve a core force structure that is organized, equipped, trained, and supported to meet an extensive range of military operational requirements. These requirements include deterring, fighting, and winning major theater wars and regional conflicts, supporting the overseas presence of American forces, and conducting rapid power projection, crisis response, and other operations in support of national interests. The JSF (hereafter referred to as the F-35 Air System or F-35) has been identified as the potential aircraft for preserving the core force structure. The proposed F-35 Air System is being designed to fulfill the multi-service, multi-role (air-to-air/air-to-ground) requirements of the U.S. Air Force (USAF), U.S. Navy (USN), and U.S. Marine Corps (USMC), as well as the United Kingdom (UK) Royal Navy (RN) and Royal Air Force (RAF). Additional international partners include Australia, Canada, Denmark, Italy, the Netherlands, Norway, and Turkey. The proposed F-35 Air System would fulfill stated Service needs as follows:

- USAF–Multi-role (primary air-to-ground) fighter to replace the F-16 and A-10, and to complement the F-22.
- USN–Multi-role strike fighter to complement the F/A-18E/F.
- USMC–Multi-role, short takeoff vertical landing (STOVL) strike fighter to replace the AV-8B and the F/A-18C/D.

- UK–Future Joint Combat Aircraft that would be a stealthy, multi-role replacement for the Sea Harrier FA2 and the Harrier GR7/9.

The proposed F-35 is a single-seat, single-engine aircraft capable of performing and surviving lethal strike warfare missions. There are three variants for the F-35: F-35A conventional takeoff and landing (CTOL), F-35B STOVL, and F-35C carrier variant (CV) (See Figures 1.1-1 thru 1.1-3). The F-35 Air System includes the Air Vehicle (aircraft and associated systems) and Autonomic Logistics (AutoLog) System. AutoLog is an integrated, knowledge-based system encompassing numerous functions associated with operating and maintaining the F-35, such as maintenance planning, supply support, pilot and maintenance training to include an interface that facilitates coordinating with mission planning, engineering, safety, and command and control functions.

Source: Image Gallery, LM Aero Website.

Figure 1.1-1: F-35A CTOL Variant

Source: Image Gallery, LM Aero Website.

Figure 1.1-2: F-35B STOVL Variant

Source: Image Gallery, LM Aero Website.

Figure 1.1-3: F-35C CV Variant

The SDD contractor for the F-35 Air System is Lockheed Martin Aeronautics (LM Aero). Primary team members are Northrop Grumman Corporation and BAE Systems. The propulsion system being designed for the F-35 Air System is the F135, a derivative of the F119-Pratt & Whitney (P&W)-100 engine that powers the F-22 Raptor; and the F136, the competing, alternative engine by General Electric Aircraft Engines (GEAE).

DoD Directive (DoDD) 5000.1 and DoD Instruction (DoDI) 5000.2 establish the framework of the acquisition process. The JSF Program is a Major Defense Acquisition Program led by the USAF, USN, and USMC. Every DoD system is developed from an Operational Requirements Document (ORD), which describes the desirable objectives the Service(s) would like the system to meet and the Key Performance Parameters (KPPs). The technical and operational thresholds that must be met to accept a system into the Service's inventory are also defined in the ORD. SDD is the acquisition phase where the ORD and KPPs are evaluated for the system. The primary objective of SDD is to develop a system; reduce risks in manufacturing/producing the system; ensure the ability to acquire a cost-affordable system; ensure operational supportability and survivability; and demonstrate system integration, interoperability, safety, and utility.

SDD includes the use of computer imagery, modeling and simulation (M&S), and formal test and evaluation (T&E) of the system. T&E programs are usually comprised of DT and Operational Testing (OT) phases. The Test and Evaluation Master Plan (TEMP) is the overarching document describing the planned T&E. DT assesses technical capabilities of the system and/or limitations, and the safety of the system (to protect people testing and using the system). DT provides the data and analytical results needed to support the decision on whether or not to proceed with OT. OT is an independent assessment to determine the effectiveness of the system under realistic operational conditions including combat; determine if the thresholds and criteria of the KPPs in the ORD have been met; and assess the ability to operate and maintain the system under conditions simulating combat stress and peacetime conditions.

The JPO has established an integrated Verification and Test (V&T) Team to define and execute the proposed JSF SDD DT, which would simultaneously certify the three F-35 variants. The JPO's objective is to execute a streamlined JSF SDD T&E Program with fewer dedicated test periods and required flights than with past aircraft test programs.

The proposed JSF DT portion of the overall SDD T&E Program would be conducted for six to seven years [approximately calendar year (CY) 2007 through 2013]. The results of the proposed JSF DT would be used to verify the effectiveness of the final air system. The proposed OT is designed to determine the overall effectiveness and suitability of the F-35 under realistic field conditions and provide independent checks of real-world use. The proposed OT Program would be conducted in approximately CY 2011–2013.

At this time, the scope of the proposed JSF OT is not sufficiently defined to support a realistic environmental analysis. The extent and type of OT events required are highly dependent upon the results of the early DT events; therefore, only the DT portion is examined hereafter in this EA/OEA. As the scope of the proposed JSF OT develops, NEPA/EO 12114 analyses and documentation (tiering as appropriate from this EA/OEA) would be conducted by the Commander Operational Test and Evaluation Force (COTF), who is the responsible action proponent for DoD OT requirements. The JPO would assist COTF, as needed, in executing NEPA/EO 12114 requirements for OT. Furthermore, no OT or live-fire, survivability testing would occur as part of the proposed JSF DT activities addressed in this EA/OEA.

1.2 PURPOSE AND NEED

The purpose and need of the Proposed Action, JSF SDD DT (hereafter referred to as JSF DT), is twofold: (1) to satisfy DoD's system acquisition development requirements pursuant to DoDD 5000.1 and DoDI

5000.2 policies, and (2) to evaluate the effectiveness, compatibility, and performance of the three F-35 variants under a wide spectrum of conditions, ensuring the aircraft would be properly equipped for, and capable of, combat missions.

The JSF V&T Team uses, to the maximum extent possible, M&S integral with T&E requirements. Computer M&S alone, however, is not sufficient to ensure the successful performance and safety of the F-35 variants. The proposed JSF DT is also needed to validate the accuracy of the M&S efforts, as well as the Service's ability to design, develop, and produce an aircraft meeting the operational and mission capabilities for each of the F-35 variants (as defined in the JSF's ORD and TEMP). The proposed JSF DT is needed to validate the KPPs and operational criteria for the F-35 variants. Critical technologies, processes, and system/component characteristics of the F-35 variants (airworthiness, avionics, human factors and safety, instrumentation, communications, weapons, propulsion systems, and ship interfaces) must be demonstrated during the proposed JSF DT. Data collected during the proposed JSF DT are needed to support the next major DoD acquisition decision of whether or not the program should proceed to OT and Low Rate Initial Production (LRIP).

The purpose of a formal SDD T&E Program is to demonstrate and evaluate the capabilities of the F-35 primarily by using established DoD Major Range and Test Facility Bases (MRTFBs) and other existing DoD facilities/ranges, and by capitalizing on their professional capabilities and technical expertise. MRTFBs are a set of test facilities and ranges regarded as national assets, which are sized, operated, and maintained primarily for DoD T&E missions.[1] DoD established the MRTFB management concept to provide coordination among major facilities, promote multi-Service use, reduce unnecessary duplication of assets, and establish budgetary priorities at the department level. This fosters joint use by all services, and eliminates unwarranted duplication.[2] The design of the proposed JSF DT is in keeping with the intent of DoD's T&E mission where all Service's facilities are managed for joint use and efficiency. Achieving these efficiencies includes such things as minimizing transit distances and time between facilities/ranges; maximizing the use of existing technical expertise, equipment, test assets, and facilities; and minimizing T&E costs. Conducting the proposed JSF DT at dedicated, primary East Coast and West Coast Test Locations is highly preferred by the JPO to maximize joint use of DoD assets with less costs incurred to execute proposed DT activities. The selection and use of MRTFBs and other existing DoD assets supports the JPO's and JSF V&T Team's purpose of assessing the operation of the F-35 in a variety of realistic combat conditions based on technical specifications, operating criteria, and unique Service (USN, USAF, USMC, and UK RN/RAF) mission requirements.

1.3 DECISION TO BE MADE

The JPO is the action proponent for this EA/OEA and for implementation of the proposed JSF DT. The decision to be made is where and how to conduct the Proposed Action. The JPO Program Executive Officer (PEO) is the final decision authority for the Proposed Action.

[1] *JIST3 2005*

[2] *JIST3 2005*

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2.0 PROPOSED ACTION AND ALTERNATIVES

Section 2.1 describes the Proposed Action. The DT requirements and screening process used by the JPO and JSF V&T Team to determine the potential alternative test locations for conducting the Proposed Action is discussed in Sections 2.2 and 2.3. Also presented are the alternatives considered and those identified as viable alternatives for implementing the Proposed Action at the proposed test locations and meeting the purpose and need (Sections 2.4–2.7). A general description of proposed tests, aircraft terms, and other DT Program-related information is also included in Appendix A.

2.1 PROPOSED ACTION

The proposed JSF DT is designed to evaluate the F-35's systems and components, ensuring technical specifications and operating criteria have been successfully designed and built into the F-35. The JSF V&T Team has structured the proposed JSF DT to use joint DoD assets and to maximize resources (e.g., people, buildings, equipment). Approximately 1,342 government and contractor personnel (approximately 1,219 civilian and 123 military) are planned to support the proposed JSF DT at its peak. These personnel would consist of engineering, logistics, maintenance, quality assurance, administrative, safety, and JPO personnel.

Fifteen instrumented F-35 test aircraft and various support aircraft would be used to conduct the proposed JSF DT activities. The proposed JSF DT would consist of a combination of ground-based and flight test activities spanning approximately six to seven years. In some instances, ground-based tests would include static operation of the aircraft engine either on the airfield, on a test stand, or in an enclosed building. Proposed flight tests would be conducted five days per week with most of the flights occurring during the day. Less than 1% of the total proposed flights would occur at night, later in the test program schedule (i.e., Test Years 4 through 7). A typical 90 minute test flight would include at least one takeoff and landing and would include multiple test activities to collect a variety of data with the F-35 variant performing various maneuvers.

Table 2.1-1 provides a descriptive overview on some of the more predominant proposed JSF DT activities. Overall, approximately 16,500 flights in 33,000 flight hours would be conducted to certify the three F-35 variants with flight altitudes ranging from 500 to 45,000 feet. Most of the proposed JSF DT activities would be conducted at altitudes above 10,000 feet after the initial landings and takeoffs. The JSF DT would be conducted on or in established airfields, T&E ranges (over land and water), airspace, test stands (on or adjacent to the airfield), and supersonic corridors. All proposed tests activities would be conducted in compliance with standard operating procedures (SOPs) used to manage DoD airspace and ranges.

It is common for test parameters to change as the F-35 variants proceed through the various proposed JSF DT activities and time periods. Therefore, the flight hours and number of flights evaluated in this EA/OEA represent planned, realistic approximations. These approximations may increase or decrease, as needed, during the actual proposed JSF DT to demonstrate F-35 capabilities and mission performances. Substantial changes to the proposed JSF DT would be examined by the JPO and JSF V&T Team, and coordinated with appropriate environmental planning and operational offices at the proposed test locations. If substantial changes to the Proposed Action, or significant new circumstances or information bearing on the Proposal Action arise that are relevant to environmental concerns and conclusions reflected in this EA/OEA, the JPO will evaluate and prepare a supplement to this EA/OEA as needed.

Support aircraft would serve in various capacities such as chase aircraft (photography and in-flight inspection), targets, and/or in-flight refueling support. Stores [such as missiles, bombs, fuel tanks, refueling or electronic countermeasure pods, countermeasures (flares), guns, etc.], tankers, drones, and other T&E assets would be used as part of proposed JSF DT. Stores would be internally or externally mounted on the F-35 or aircraft support suspension and release equipment, and may or may not be released (or separated from the aircraft) during various proposed JSF DT activities. Most of the weapon related stores (bombs and missiles) would be inert, with most missiles fired having a live solid rocket motor, but an inert warhead. The release of stores would occur in established target areas within a particular T&E range and would be accomplished in compliance with all established SOPs. A new Forward Looking Infrared (FLIR) system would be use for laser designation and targeting requirements during various proposed JSF DT activities. This FLIR system is similar to current FLIR systems used by the DoD (such as identical wavelength as current tactical lasers, but possibly a higher power output). In addition to stores, the proposed JSF DT would require the use of various ground support equipment (GSE) including, but not limited to, aircraft tow tractors, auxiliary power units (APUs), air conditioner/chilling carts, engine wash carts, compressors, generators, etc.

Table 2.1-1: Description of Proposed JSF DT Activities

Proposed Test Activity	Description
STOVL & CTOL Flying Qualities (FQ), Performance, and Propulsion	The F-35, its engine, and the associated flight control systems would be quantitatively and qualitatively evaluated through a series of tests conducted on the ground and during flights to determine if the aircraft meets safety, performance, and mission technical requirements. Aircraft flight performance characteristics would be assessed at various altitudes, power settings, climb rates, etc. As part of the overall proposed FQ and performance test activities, the engine (propulsion system) would also be evaluated both on the ground and during flights. Proposed engine ground related activities would be conducted typically within a building (commonly referred to as an engine test cell or Hush House) and/or on the airfield by running the engine at various power settings (such as idle) and lengths of time to evaluate the interface between the airframe and the propulsion system. Only after these tests are satisfactorily completed would the engine performance then be evaluated in-flight at the military and after-burner (AB) power settings. Aerial refueling would occur during the various FQ, performance, and propulsion tests. In addition, the proposed tests would involve either the carriage and/or release of the weapons proposed for the F-35, to include gun firings. Flight altitudes for these proposed tests would range from 2,500 to 47,500 feet with the majority of the tests occurring at altitudes above 5,000 feet and typically at altitudes of 10,000 to 30,000 feet. Proposed FQ tests would typically evaluate aircraft handling qualities, assess aircraft stability and control, and gather data during various flight maneuvers (rolls, banks, turns, climbs, etc.) and landings (wave-offs, touch and go, simulated flame out approaches, etc.). The capability of the F-35 autopilot and tracking systems would also be assessed. Both low and high angle tracking tests proposed would equate to approximately 1-2% of the total planned single test activity/runs (not flights/flight hours). Low angle tracking tests would involve the F-35 pilot flying from an established altitude, going into a 15 degree dive, and tracking a target. The target track would be maintained for a couple of seconds, a new target tracked, etc. until reaching the designated airspeed condition or 2,000 feet above ground level (AGL) (but no lower than 1,000 feet AGL), at which point the pilot would pull out of the dive and climb to altitudes above 5,000 feet and higher. Proposed high angle tracking tests would be similar to low angle tests, but the dive pull out altitude would be 5,000 feet AGL (but no lower than 3,000 feet AGL). FQ tests coincide with performance, propulsion, loads, and flutter test activities. Proposed performance tests would coincide with FQ, flutter, high Angle-of-Attack (AoA), and propulsion tests. The F-35 would be evaluated in general aircraft flight profile areas, such as takeoff, cruise, acceleration, deceleration, turns, landing, climbs, descents, flameouts, drag, etc. Typically, weapons would only be carried on the aircraft and not released for these tests. Supersonic flights would also be conducted in support of performance tests. Specifics systems and sub-systems of the F-35 would be evaluated as part of overall performance tests, as well as FQ and propulsion tests. System and sub-system related tests would include evaluating the electrical power system, power and thermal management system, landing gear and braking, hydraulic system, fuel system, and the air data system. In addition, specific tests would assess pilot exposure to noise, air vehicle temperatures and pressures, and aircraft vibrations and noise. Some of the single tests activities planned (such as air data system tests) would involve very short duration, low level flights (referred to as fly-bys) where the aircraft is at an altitude range of 150 to 250 feet AGL at speeds of 150 to 600 knots calibrated airspeed (KCAS). Of the total proposed single test activities/runs (not flights/flight hours), approximately 5% are at 150 to 2,500 feet AGL with fly-bys equating to about 3% of that total single test activities occurring at and below 2,500 feet AGL.

Table 2.1-1: Description of Proposed JSF DT Activities (Continued)

Proposed Test Activity	Description
STOVL & CTOL Flying Qualities (FQ), Performance, and Propulsion (continued)	Proposed propulsion tests would be closely integrated with the FQ, flutter, and high AoA tests and would generally proceed in concert with these tests. Propulsion tests would include propulsion system integration and compatibility with the aircraft system, installed engine operability, engine stability, and engine-inlet compatibility. Key objectives of the tests would be to evaluate installed engine acceleration/deceleration characteristics during various throttle settings from idle through maximum power; measure, validate, and verify main inlet airflow and flight conditions; evaluate various pressures; assess engine starting capability, bay ventilation (air cooling flow rates), engine control characteristics, smoke/plume/vapor trails generated from the engine; and evaluate propulsion system thrust response during aircraft formation flying and aerial refueling. A combination of ground and flight tests would be conducted under various climates and wind speeds using a variety of airspeed, throttle settings, etc. as needed to accomplish test objectives. Of the total proposed single test activities/runs (not flights/flight hours), approximately 2–3% are at ground level to 2,500 feet AGL.
Loads	Proposed loads tests would involve assessing the ability of the F-35 to carry stores and perform its missions based on not only the weight of the aircraft, its systems, and the stores proposed for this aircraft, but also the amount of stress aircraft systems can handle (such as the landing gear) from internal/external weights (fuel, external tanks, weapons, etc.) and aerodynamic forces during taxi, braking, takeoff, landing, and flight maneuvers. Basically, the structural strength capability of the aircraft and the store suspension equipment would be evaluated through maneuvers and landings at various aircraft weights and speeds. Proposed loads tests would typically coincide with flutter and standard FQ test activities. Proposed loads tests would involve various maneuvers, such as dives, rolls (such as a 360 degree roll and 45 degree bank roll), pull-ups, etc. Supersonic flights above and/or below 30,000 feet would also be conducted in compliance with air operation manuals and specific F-35 test plans. For proposed loads tests, the F-35 would be flown at various speeds and altitudes (ranging from 5,000 to 40,000 feet) in designated airspace over the airfield and/or ranges at the proposed test locations. The majority of the proposed flight tests would be conducted between 10,000 and 40,000 feet. Weapon releases may occur for some of the proposed test activities.
Flutter	Proposed flutter tests would evaluate the stability of F-35 at its designed air speed (750 to 700 KCAS / 1.6 Mach) from various forces (such as vibration, air turbulence, and carrying of stores) exerted against the aircraft during flight. Flutter tests would typically coincide with loads and standard FQ test activities. Initial tests would be conducted on the ground prior to flight. Once ground tests confirm the functional check-out of the F-35, then proposed flutter flight tests would be conducted to evaluate the basic airframe structural response (wings, tails, flaps, rudder, etc.), critical flutter mode frequency, and damping with the weapon bays doors closed and open. This would include assessing the clearance needed for carrying and releasing external stores. The F-35's stability would be assessed through various maneuvers, such as wide turns, banks, pitches, dives, pull-ups, and rolls. For proposed flutter tests, the F-35 would be flown at various speeds and altitudes (ranging from 2,500 to 40,000 feet) in designated airspace over the airfield and/or ranges at the proposed test locations. Most of the proposed flutter tests would be conducted above 10,000 feet with less than 10% of the proposed flights occurring at 2,500 feet. Supersonic flights may be conducted as part of these proposed tests. Stores would be predominantly carried on the aircraft and usually not released; however, there may be a few releases as needed based on test results.

Table 2.1-1: Description of Proposed JSF DT Activities (Continued)

Proposed Test Activity	Description
Land-Based Ship Suitability	Proposed tests would be conducted to determine aircraft compatibility with ship-based takeoff, approach, and recovery equipment under various environmental conditions. The performance characteristics of the aircraft would be assessed during taxi, takeoff, approach, and landing. Aircraft carrier launch catapult and recovery systems at proposed tests ranges are built into some runways to simulate shipboard conditions. This equipment would be used to determine the handling performance characteristics of a F-35 during taxi, takeoff, approach, and landing. Only after careful evaluation of data collected at these uniquely configured land-based facilities would the F-35 be cleared for further testing aboard a ship. F-35 aircraft would quickly climb to altitudes above 3,000 feet from the catapult launch takeoffs.
Weapons Separation & Integration	Proposed weapons (stores) separation & integration tests would be performed to determine the safe and satisfactory carrying and releasing of stores. The effects of firings/releases would also be assessed during these tests. These proposed tests would range from single stores separation to a combinations of stores. Proposed weapon separation & integration tests would determine the physical ability of a store to separate reliably and safely from an airframe. Dynamic stores release would determine the effects on the aircraft's structure, specifically its wing and fuselage. The flight path of the released store would also be evaluated as part of these proposed tests. Effects from opening and closing the weapons bay doors with regard to the aircraft's flight performance would be assessed as well during these proposed tests. Simulated weapons delivery would be performed for data collection and aircraft performance purposes. Simulations may include weapons delivery runs, target acquisition, weapons bay operation, and release of stores. Data collected by the aircraft's computers and video recorded by the aircraft or a chase plane would be analyzed for the purposes of determining aircraft, targeting, and pilot performance. Most of the proposed weapon releases (live and inert) would be conducted at the proposed West Coast Primary Test Locations. Aircraft altitudes during these proposed tests would typically range from 10,000 to 40,000 feet; however, gun strafing runs may comprise short duration flights at altitudes at or below 3,000 feet.
Mission Systems	Aircraft mission systems are those systems, subsystems, or components that enable the aircraft to perform its mission. Examples of mission systems include navigation, search sensors, communications, tactical control, and displays. Proposed tests would be conducted to verify proper operation of the mission systems as well as their interfacing with other aircraft systems. Proposed testing of the mission planning systems would also focus on the generation of navigation waypoints, communication plans, and displays. Proposed testing would include an evaluation on the ability to store and transfer data. The carrying and release of weapons, as well as using drones for targets, would be included for various proposed mission system test activities. Flight altitudes would typically be around 25,000 feet in designated warning and restricted areas.
Cooperative Avionics Test Bed (CATB)	Mission system software, avionics, and internal sensors would be extensively tested in an airborne environment on the CATB (a modified commercial 737 aircraft), before flight test on the F-35. Most of the proposed test activities would be conducted at altitudes above 10,000 feet, with less than 1- 2% of the total flights/flights hours occurring below 3,000 feet.
F-16 EO/Distributed Aperture System (DAS) Program	EO/DAS tests on the F-16 and/or F-15 would be conducted prior to conducting similar tests with the F-35. Data would be collected during ground and flight tests to develop algorithms for the subsystem software, refine the design of subsystem hardware components, develop inputs to digital simulations, update modeling predicted subsystem performances, and calibrate/update infrared system models and simulations. Most of the proposed tests would be conducted at altitudes above 10,000 feet.
F-16 Proficiency Flights	These are basic training flights conducted to maintain the pilot's skills. Most flights would be conducted at altitudes above 10,000 feet and would involve takeoffs, landings, general aircraft maneuvers, etc.

Table 2.1-1: Description of Proposed JSF DT Activities (Continued)

Proposed Test Activity	Description
High Angle-of-Attack (AoA)	Proposed high AoA tests focus predominantly on the propulsion system and F-35 to understand the flight conditions where engine stability is reduced, verify engine/inlet compatibility, and to develop flight manual procedures. High AoA would be considered a flight at higher than 20 degree angles. Proposed tests support overall FQ test activities. While stores may be carried on the F-35, no releases would occur. Supersonic flights would be flown for some of this proposed test activity. Proposed High AoA tests would be conducted at a variety of speeds, throttle settings, altitudes, and maneuvers (such as pitch, banks, rolls, stalls, climbs, descents, etc.). Flight altitudes would typically range from 10,000 to 30,000 feet.
KC-135 and/or KC-10 Flights	KC-135 and KC-10 aircraft would support refueling requirements during the various proposed JSF DT activities. These aircraft would also support specific aerial refueling tests conducted to validate the capability of the F-35A to refuel while in the air. The proposed validation focuses on the trail/pre-contact/contact/disconnect handling qualities with the boom or drogue and the evaluation of the tanker-receiver interfaces. The visibility of the refueling receptacle would also be assessed in daylight, degraded, and full dark light conditions. Flight altitudes would range from 10,000 to 30,000 feet for these types of tests and for basic refueling needs.
Catapults Capability/Steam Ingestion	Catapults emit launch steam above the deck during launching operations. This can result in steam being ingested into the engine, causing it to run at an off-design condition. This gives way to the possibility of a blowout, compressor stall, and/or engine flameout. Thus, the effect of steam ingestion must be determined on land before shipboard operation. The proposed tests would mimic a representative realistic degraded catapult environment to yield some of the worst possible steam conditions that could be encountered. The aircraft would be launched under these conditions to ensure that no flameouts or compressor stalls occur and no more than 25 percent of the launches result in AB blowout. Landings and takeoffs for the F-35 would be below 3,000 feet and of short duration (approximately 13 flights) over the test stands on the airfield. Proposed Jet Blast Deflector (JBD) compatibility testing would be conducted to ensure the thermal and velocity stresses exerted by the engine exhaust gas do not cause the JBD harm, and to ensure that any hot gases that flow forward and get re-ingested into the aircraft engine would not cause any engine surges or stalls. An additional test would be made with the test aircraft behind the JBD to evaluate the effects of jet blast from another aircraft flowing over the JBD and impinging on the F-35 test aircraft. For testing in front of the JBD, the F-35 would be secured in place and the engine cycled between idle, military, and maximum power settings for runs of up to ten minutes at a time. Aircraft engine parameters and JBD water and surface temperatures would be monitored for adverse trends. These ten-minute tests would be repeated between six and ten times for several different distances in front of the JBD, as well as some off-center alignments. For testing with the F-35 behind the JBD, another aircraft would be hooked up in front of the JBD and run up to both military and maximum power settings while the F-35 aircraft engine and flight control surfaces are monitored. Additionally, both near- and far-field acoustic data would typically be taken during these tests.
E28 Arresting Gear Roll-Ins/Mark (MK) 7 Roll-Ins	Proposed roll-in arrestments would be conducted to establish the limited engaging speed for the F-35 aircraft with the arresting gear. The F-35 would begin the test at a designated gross weight at a specified distance in front of the arresting gear. Military power settings would be used with the aircraft accelerating until the F-35's arresting hook catches the arresting gear. The distance the F-35 begins in front of the arresting gear would be increased until the maximum engagement speed for either the F-35 or the arresting gear is reached. Proposed roll-ins would be conducted both against the MK 7 arresting gear (shipboard-compatible arresting gear) and the E28 arresting gear (shore-based emergency arresting gear). Landings and takeoffs for the F-35 would be below 3,000 feet and of short duration (approximately 18 flights) over the tests stands on the airfield.

Table 2.1-1: Description of Proposed JSF DT Activities (Continued)

Proposed Test Activity	Description
Barricade	Proposed test operations would be performed by propelling a non-flyable test article into a nylon barricade. Proposed tests would begin at slower engage speeds and the speed increased until the barricade engagement limit speed is reached. The F-35 used for this particular test activity would have no engine installed and the landing gear would be modified to keep the F-35 on a stable directional course after release from the jet car.

2.2 PROPOSED JSF DT REQUIREMENTS

Selection of reasonable and viable test location(s) for the Proposed Action is based on a combination of specific military aircraft test facility and ranges having the capabilities needed to support proposed DT requirements. The range and facility combinations selected for the Proposed Action must support normal aircraft flight-test requirements (e.g., flying performance and handling qualities) and must be specially equipped to support specific ORD and TEMP criteria. Viable test facilities and ranges must exist within the continental U.S. and meet the requirements listed in Table 2.3-1. Other general requirements include weather monitoring and forecasting capabilities before flight-tests; normal utility services (e.g., phone service, potable water, electrical, sewer); procurement, shipping, receiving, and stock control services; ground handling equipment; jet fuel, ground refueling, and hot refueling capabilities; and various climate and landscape features (such as a combination of mountains and open terrain) and large expanses of open ocean and/or land affording realistic, combat environments.

Facilities and ranges under consideration for the proposed JSF DT are those that maximize testing capability and minimize cost. Highest consideration is given to facilities and ranges that possess the capabilities of MRTFBs; support the full spectrum of routine aircraft flight-testing; can accommodate fifteen test aircraft; and meet the testing requirements unique to DoD aviation while maximizing test control, data collection, and the ability to test the F-35 in a variety of combat conditions.

Selection of test locations is also based on JPO funding constraints and the need to reduce overall program costs. Costs for test resources and movement of support personnel and essential equipment to a particular test facility or range, as well as the transit distance (such as from a land facility to test range areas over the open ocean) and proximity to other test resources are considered in selecting proposed JSF DT locations. Each candidate location must have existing or approved military construction (MILCON) assets to support the proposed JSF DT. Neither the JPO nor the Joint Service Test Community can afford to incur the high costs and schedule delays associated with expanded infrastructure to make one particular test location capable of supporting the full spectrum of the proposed JSF DT.

Lastly, proposed test locations are preferred if concentrated potential environmental impacts are minimized and current NEPA/EO 12114 documentation at the proposed test location is applicable to the proposed JSF DT. The Department of the Navy (DoN) Environmental Policy Memorandum 99-01, *Requirements for Environmental Considerations in Test Site Selectio*n, is part of the test location selection process. This policy applies to the acquisition of new weapon systems, and states "any testing program may rely upon NEPA/EO 12114 documentation prepared for operation of an established range or other test site which includes consideration of the effect of the kind of test activity proposed." Consistent with this memorandum, the selection of a proposed test location and its ranges/operating area is given priority provided the location/range can support tests without improvements to facilities and the JPO is satisfied that the current site NEPA/EO 12114 documentation applies to the proposed JSF DT. Facilities having sufficient and current NEPA/EO 12114 documentation covering the scope of the Proposed Action are preferable to those lacking appropriate documentation.

2.3 PROPOSED JSF DT TEST LOCATION SCREENING

Based on the purpose and need and the facility/range capabilities, the JPO and the JSF V&T Team screened the following eleven USN, USAF, USMC, and US Army locations, as reflected in Table 2.3-1:

- Naval Air Station (NAS) Patuxent River, Maryland (MD)/Virginia Capes (VACAPES) Operating Area (OPAREA) of the Atlantic Warning Area (AWA)
- Edwards Air Force Base (AFB), Air Force Flight Test Center (AFFTC), California (CA)
- Eglin AFB, Air Armament Center (AAC), Florida, (FL)

- Naval Air Weapons Center, Weapons Division (NAWCWD) China Lake, CA
- Naval Air Weapons Center, Weapons (NAWCWPNS) Point Mugu, CA
- Naval Air Engineering Station (NAES) Lakehurst, New Jersey (NJ)
- White Sands Missile Range (WSMR), New Mexico (NM)
- Marine Corps Air Station (MCAS) Yuma/Yuma Proving Ground (YPG), Arizona (AZ)
- Marine Corps Auxiliary Landing Field (MCALF) Bogue, North Carolina (NC)
- Nevada Test and Training Range (NTTR) Nellis AFB, Nevada (NV)
- LM Aero, Texas (TX)

Other MRTFBs (Aberdeen Test Center, Dugway Proving Ground, Kwajalen Missile Range, Pacific Missile Range Facility, 30th Space Wing at Vandenberg AFB, 45th Space Wing at Patrick AFB, Arnold Engineering Development Center, Utah Test and Training Range, Atlantic Undersea Test and Evaluation Center, etc.) were initially considered by the JPO and the JSF V&T Team. However, these locations were not pursued further in the detailed site screening process for the proposed JSF DT because (1) these locations either were not affordable considerations due to transit distances or lack of personnel/test assets, (2) these locations do not conduct similar related missions and/or aircraft flight tests and operations; and/or (3) additional MILCON would be required to provide the resources needed for the proposed JSF DT.

Three designations were used in the site screening process: (1) Yes (Y), if the proposed test site location has the required capabilities; (2) No (N), if the proposed test location does not have the required capabilities; and (3) Partially (P), if the proposed test location has some of the capabilities. Weight was applied to each of the designations as follows: Y given a value of two; P given a value of one; and N given a value of zero. The number of Ys and Ps were then added to quantitatively compare and rank the proposed test locations. These proposed locations were analyzed further with the following additional criteria: (1) minimal transit distance between facilities and ranges, (2) no additional MILCON required to support the proposed JSF DT, (3) gained test resource efficiencies, and (4) the presence of a unique testing facility or capability.

Table 2.3-1: Site Selection Matrix

Minimum Range and Facility Requirements	NAS Patuxent River, MD/ VACAPES OPAREA	Edwards AFB, AFFTC, CA	Eglin AFB, AAC, FL	NAWCWD China Lake, CA	NAWCWPNS Point Mugu, CA	NAES Lakehurst, NJ	WSMR, NM	MCAS Yuma/ YPG, AZ	MCALF Bogue, NC	NTTR Nellis AFB, NV	LM Aero, TX
RANGE-RELATED REQUIREMENTS											
Y = Capability Present N = Capability Not Present P = Capability Partially Present											
Sea-level Flight Space Capabilities and Support to include Takeoff and Landing (and maximum engine thrust performance in STOVL operations)	Y	P	Y	N	Y	N	N	P	N	N	N
Simulated Carrier Flight Deck Operating Environment (e.g., accurate carrier deck configurations for deck landings, takeoffs, and approaches; representative GSE; and qualified personnel)	Y	P	N	Y	N	P	N	P	Y	N	N
Hover and Vertical Takeoff and Landing (VTOL) Monitoring Capabilities (e.g., temperatures, pressures, velocities, and acoustics)	Y	P	N	Y	N	N	N	P	Y	N	Y

Table 2.3-1: Site Selection Matrix (Continued)

Minimum Range and Facility Requirements	NAS Patuxent River, MD/ VACAPES OPAREA	Edwards AFB, AFFTC, CA	Eglin AFB, AAC, FL	NAWCWD China Lake, CA	NAWCWPNS Point Mugu, CA	NAES Lakehurst, NJ	WSMR, NM	MCAS Yuma / YPG, AZ	MCALF Bogue, NC	NTTR Nellis AFB, NV	LM Aero, TX
RANGE-RELATED REQUIREMENTS (CONTINUED)											
Y = Capability Present N = Capability Not Present P = Capability Partially Present											
Out-of-Ground Effect Testing Capability (STOVL)	Y	Y	N	Y	N	N	N	P	Y	N	Y
Range Capabilities for Low Observable Signature Ground Measurements	Y	Y	N	P	Y	N	Y	N	N	N	N
Time Space Positioning Instrumentation (TSPI) and Impact Scoring Data Capabilities, including Radar and Laser, on Aircraft and Weapons	Y	Y	Y	Y	Y	N	Y	N	N	Y	N
Land-Based Barricade Arrestment Capability	N	N	N	N	N	Y	N	N	N	N	N
Off-Hours Capabilities for High-Power Operations (assets in remote location or hush house)	Y	Y	Y	Y	N	Y	N	N	N	N	P

Table 2.3-1: Site Selection Matrix (Continued)

Minimum Range and Facility Requirements	NAS Patuxent River, MD/ VACAPES OPAREA	Edwards AFB, AFFTC, CA	Eglin AFB, AAC, FL	NAWCWD China Lake, CA	NAWCWPNS Point Mugu, CA	NAES Lakehurst, NJ	WSMR, NM	MCAS Yuma / YPG, AZ	MCALF Bogue, NC	NTTR Nellis AFB, NV	LM Aero, TX
RANGE-RELATED REQUIREMENTS (CONTINUED)											
Y = Capability Present N = Capability Not Present P = Capability Partially Present											
Capabilities to Conduct Most Flight Tests Day/Night Visual Meteorological Conditions (VMC) and Instrument Meteorological Conditions (IMC)	Y	Y	Y	Y	Y	N	Y	N	N	N	Y
Test Range Space and Facilities to support In-Shore and Off-Shore Weapon Testing (inert and live firings, precision-guided and ballistic weapons, guns, missiles, bomb, etc.) within Proximity for Telemetry of Aircraft and with TSPI and Impact Scoring Capabilities	Y	Y	Y	Y	Y	N	P	N	N	N	N
JSF Specific (cockpits, displays, etc) to Support F-35 Piloted Simulation	Y	Y	N	N	N	N	N	N	N	N	Y

Table 2.3-1: Site Selection Matrix (Continued)

Minimum Range and Facility Requirements	NAS Patuxent River, MD/ VACAPES OPAREA	Edwards AFB, AFFTC, CA	Eglin AFB, AAC, FL	NAWCWD China Lake, CA	NAWCWPNS Point Mugu, CA	NAES Lakehurst, NJ	WSMR, NM	MCAS Yuma / YPG, AZ	MCALF Bogue, NC	NTTR Nellis AFB, NV	LM Aero, TX
RANGE-RELATED REQUIREMENTS (CONTINUED)											
Y = Capability Present N = Capability Not Present P = Capability Partially Present											
Airborne Range Capabilities to Support Safe Dispensing of Countermeasure Devices (such as flares)	Y	Y	Y	Y	Y	N	Y	P	Y	Y	N
Open-Air Range Capabilities and Equipment for Laser Radiation (eye-safe and non-eye-safe wavelengths) Transmissions (ground and air based) at Stationary and Moving Ground Targets	Y	Y	Y	Y	Y	N	Y	N	N	P	N
Emergency Landing Capability for Engine-Out Testing	N	Y	N	N	N	N	N	N	N	N	N
Airspace Capabilities or Close Proximity to support Supersonic Tests and Low Altitude Tests [< 1,000 feet Mean Sea Level (MSL)]	Y	Y	Y	Y	Y	N	N	N	N	Y	N

Table 2.3-1: Site Selection Matrix (Continued)

Minimum Range and Facility Requirements	NAS Patuxent River, MD/ VACAPES OPAREA	Edwards AFB, AFFTC, CA	Eglin AFB, AAC, FL	NAWCWD China Lake, CA	NAWCWPNS Point Mugu, CA	NAES Lakehurst, NJ	WSMR, NM	MCAS Yuma / YPG, AZ	MCALF Bogue, NC	NTTR Nellis AFB, NV	LM Aero, TX
RANGE-RELATED REQUIREMENTS (CONTINUED)											
Y = Capability Present N = Capability Not Present P = Capability Partially Present											
Close Proximity to Flight Test Instrumentation Laboratories for Equipment Calibration	Y	Y	Y	Y	N	N	N	N	N	N	N
Facility Capabilities for Receiving, Processing, and Analyzing Telemetry Data from Test and Support Aircraft	Y	Y	P	P	P	N	N	N	N	P	N
Facilities to support Aircraft Test Detachments (DETs)	Y	Y	P	Y	Y	N	P	P	N	P	N
Office Space Facilities to Accommodate Engineering Test Team (approximately 800 People)	Y	Y	N	P	P	N	P	N	N	N	N
Hangar Space to Accommodate 9 to 11 Aircraft and Equipment	Y	Y	N	P	P	N	P	N	N	N	N
Hangar for Top Secret (TS)/Special Access Requirement (SAR) Classified Operations/Storage	Y	Y	N	N	N	N	N	N	N	Y	N

Table 2.3-1: Site Selection Matrix (Continued)

Minimum Range and Facility Requirements	NAS Patuxent River, MD/ VACAPES OPAREA	Edwards AFB, AFFTC, CA	Eglin AFB, AAC, FL	NAWCWD China Lake, CA	NAWCWPNS Point Mugu, CA	NAES Lakehurst, NJ	WSMR, NM	MCAS Yuma / YPG, AZ	MCALF Bogue, NC	NTTR Nellis AFB, NV	LM Aero, TX
RANGE-RELATED REQUIREMENTS (CONTINUED)											
Y = Capability Present N = Capability Not Present P = Capability Partially Present											
Approximately 25,000 square feet TS/SAR Classified Vaults and Data Laboratory	Y	Y	N	N	N	N	N	N	N	N	N
Warehousing to Support Expected Number of Test Airplanes, to Include Classified Storage and Classified Networking Capabilities	Y	Y	N	N	N	N	N	N	N	N	N
Adequate Ground and Maintenance Support Facilities and Technical Expertise	Y	Y	N	P	P	N	P	N	N	P	P
Capability to Provide Chilled Fuel for Aircraft Operations	Y	Y	N	N	N	N	N	N	N	N	N
Adequate Facility Space and Capabilities for Storing, Transferring, and Disposing of Fuel, Oil, and Hazardous Materials (HAZMAT)	Y	Y	Y	P	P	N	P	P	N	P	Y

Table 2.3-1: Site Selection Matrix (Continued)

Minimum Range and Facility Requirements	NAS Patuxent River, MD/ VACAPES OPAREA	Edwards AFB, AFFTC, CA	Eglin AFB, AAC, FL	NAWCWD China Lake, CA	NAWCWPNS Point Mugu, CA	NAES Lakehurst, NJ	WSMR, NM	MCAS Yuma / YPG, AZ	MCALF Bogue, NC	NTTR Nellis AFB, NV	LM Aero, TX
RANGE-RELATED REQUIREMENTS (CONTINUED)											
Y = Capability Present N = Capability Not Present P = Capability Partially Present											
Special Compartmental Information Facilities (SCIF) Supporting Highly Classified Data and Research; and Proximity to Where Executing Test Events and Test Location	Y	Y	N	N	N	N	N	N	N	N	Y
Encrypted Secure Communication Capabilities and Equipment for High Rate, Secure Data Transfers	Y	Y	Y	Y	Y	N	Y	N	N	N	P
Stable of Suitable Chase, Target, and Photo Chase Aircraft and Sufficient Quantity to support Engineering Development Tests	Y	Y	P	P	P	N	N	N	N	N	N

Table 2.3-1: Site Selection Matrix (Continued)

Minimum Range and Facility Requirements	NAS Patuxent River, MD/ VACAPES OPAREA	Edwards AFB, AFFTC, CA	Eglin AFB, AAC, FL	NAWCWD China Lake, CA	NAWCWPNS Point Mugu, CA	NAES Lakehurst, NJ	WSMR, NM	MCAS Yuma / YPG, AZ	MCALF Bogue, NC	NTTR Nellis AFB, NV	LM Aero, TX
RANGE-RELATED REQUIREMENTS (CONTINUED)											
Y = Capability Present N = Capability Not Present P = Capability Partially Present											
Ground-Based Photo Field High-Power Cameras and Equipment to Track Aircraft, Weapon Releases, High Angle-of-Attack Tests, and STOVL Tests	Y	Y	Y	P	P	N	P	N	N	N	N
Suitable Ground, Air, and Water Mission System Test Targets	Y	Y	Y	P	Y	N	P	P	N	P	N
Long-Wide Runway(s) (approximately 200 feet wide by 11,000 feet long) for Takeoff and Landing Tests at Maximum Gross Weight	Y	Y	Y	Y	Y	N	P	N	N	P	P
Suitable Cleared Parking/Pad Areas to support Test Aircraft, Radar, and Radio Frequency (RF) Spectrum Emitters including Exercise of Radar and RF Spectrum Emitters	Y	Y	Y	Y	Y	N	Y	N	N	N	N

Table 2.3-1: Site Selection Matrix (Continued)

Minimum Range and Facility Requirements	NAS Patuxent River, MD/ VACAPES OPAREA	Edwards AFB, AFFTC, CA	Eglin AFB, AAC, FL	NAWCWD China Lake, CA	NAWCWPNS Point Mugu, CA	NAES Lakehurst, NJ	WSMR, NM	MCAS Yuma / YPG, AZ	MCALF Bogue, NC	NTTR Nellis AFB, NV	LM Aero, TX
RANGE-RELATED REQUIREMENTS (CONTINUED)											
Y = Capability Present N = Capability Not Present P = Capability Partially Present											
High-Power Engine Run Facility to Support Uninstalled and Installed Engine Tests	Y	Y	Y	N	N	Y	N	N	N	N	P
Ground-Based Installed Thrust Measurement Facilities	Y	Y	N	N	N	Y	N	N	N	N	N
Ski Jump Capabilities and Facilities including Expeditionary-Sized Runway	Y	P	N	N	N	N	N	N	N	N	N
Lightning Test Facilities and Operators	Y	N	N	N	N	N	N	N	N	N	N
Land-Based Catapult and Arresting Gear Capabilities, Equipment, and Operators	Y	N	N	N	N	Y	N	N	N	N	N
Land-Based Instrumented JBD Facility, Equipment, and Operators	N	N	N	N	N	Y	N	N	N	N	N
Shipboard Representative JBD Capabilities	N	N	N	N	N	Y	N	N	N	N	N

Table 2.3-1: Site Selection Matrix (Continued)

Minimum Range and Facility Requirements	NAS Patuxent River, MD/ VACAPES OPAREA	Edwards AFB, AFFTC, CA	Eglin AFB, AAC, FL	NAWCWD China Lake, CA	NAWCWPNS Point Mugu, CA	NAES Lakehurst, NJ	WSMR, NM	MCAS Yuma / YPG, AZ	MCALF Bogue, NC	NTTR Nellis AFB, NV	LM Aero, TX
RANGE-RELATED REQUIREMENTS (CONTINUED)											
Y = Capability Present N = Capability Not Present P = Capability Partially Present											
Hot Refueling Pit Capabilities, Equipment, and Operators	Y	Y	Y	P	P	Y	P	P	P	P	P
Hover Pit	Y	P	N	N	N	N	N	N	N	N	Y
Field Arrestment Capabilities and Site (Long and Short Field) for Emergencies	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Aircraft Crash, Fire, and Rescue Support Capabilities (including rescue helicopter and crash boat emergency support) and Stable of Sufficient, Suitable Equipment	Y	Y	Y	Y	Y	P	P	P	P	Y	Y
Photogrametric Marking Technical Facilities and Personnel to Support Weapon Releases	Y	Y	Y	Y	N	N	Y	N	N	N	N
Accurate Weight and Balance Mass Property Determination of Stores Capabilities and Personnel	Y	Y	Y	Y	N	Y	N	N	N	N	Y
Climatic Testing Facilities and Equipment	P	N	Y	N	Y	N	N	N	N	N	N

Table 2.3-1: Site Selection Matrix (Continued)

Minimum Range and Facility Requirements	NAS Patuxent River, MD/ VACAPES OPAREA	Edwards AFB, AFFTC, CA	Eglin AFB, AAC, FL	NAWCWD China Lake, CA	NAWCWPNS Point Mugu, CA	NAES Lakehurst, NJ	WSMR, NM	MCAS Yuma / YPG, AZ	MCALF Bogue, NC	NTTR Nellis AFB, NV	LM Aero, TX
RANGE-RELATED REQUIREMENTS (CONTINUED)											
Y = Capability Present N = Capability Not Present P = Capability Partially Present											
Shore-to-Air Communications Capabilities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Large Technical Workforce for Evaluation and Integration at an Air System Level	Y	Y	N	N	N	N	N	N	N	N	N
Relevant NEPA/EO 12114 Documents	Y	Y	Y	Y	Y	Y	Y	Y	P	Y	P
MRTFB	Y	Y	Y	Y	Y	N	Y	N	N	Y	N
Total Score (Y + P)	***47***	***45***	***28***	***32***	***27***	***14***	***23***	***12***	***9***	***17***	***17***
Total Weighted Score	***93***	***85***	***53***	***54***	***46***	***26***	***35***	***16***	***15***	***26***	***29***

Based on the site screening results, the JPO and JSF V&T Team recommends the following USN, USAF, and US Army locations for implementing the Proposed Action based on technical capability, affordability, schedule capability and flexibility, and cost to afford the best-value test program:

East Coast Primary Test Location

- NAS Patuxent River, Maryland/VACAPES OPAREA of the AWA

West Coast Primary Test Location

- Edwards AFB, AFFTC (hereafter referred to as Edwards AFB) to include the airspace and ranges of:
  - NAWCWD China Lake
  - NAWCWPNS Point Mugu
  - WSMR
  - NTTR Nellis AFB

Other Ancillary Test Locations

- NAES Lakehurst
- Eglin AFB, AAC (hereafter referred to as Eglin AFB)
- LM Aero

Though the West Coast Primary Test Location consists of five military bases and installations, Edwards AFB would be the only location where the F-35 would be based and maintained for the proposed JSF DT. Edwards AFB would serve as the main, proposed test location with the F-35 taking off to use the near-by airspace and ranges of the other proposed West Coast Primary Test Locations and then returning to (landing at) Edwards AFB at the completion of the proposed JSF DT activities. Use of the multiple locations shown in Figure 2.3-1 would enable the JPO and JSF V&T Team to meet the purpose and need for the proposed JSF DT, as well as to successfully evaluate and validate the F-35 in its full expected combat environment (based on technical specifications, climate and land-based features, operating criteria, and unique service mission requirements). Additional supporting information on the selected, proposed test locations is provided in Appendix B.

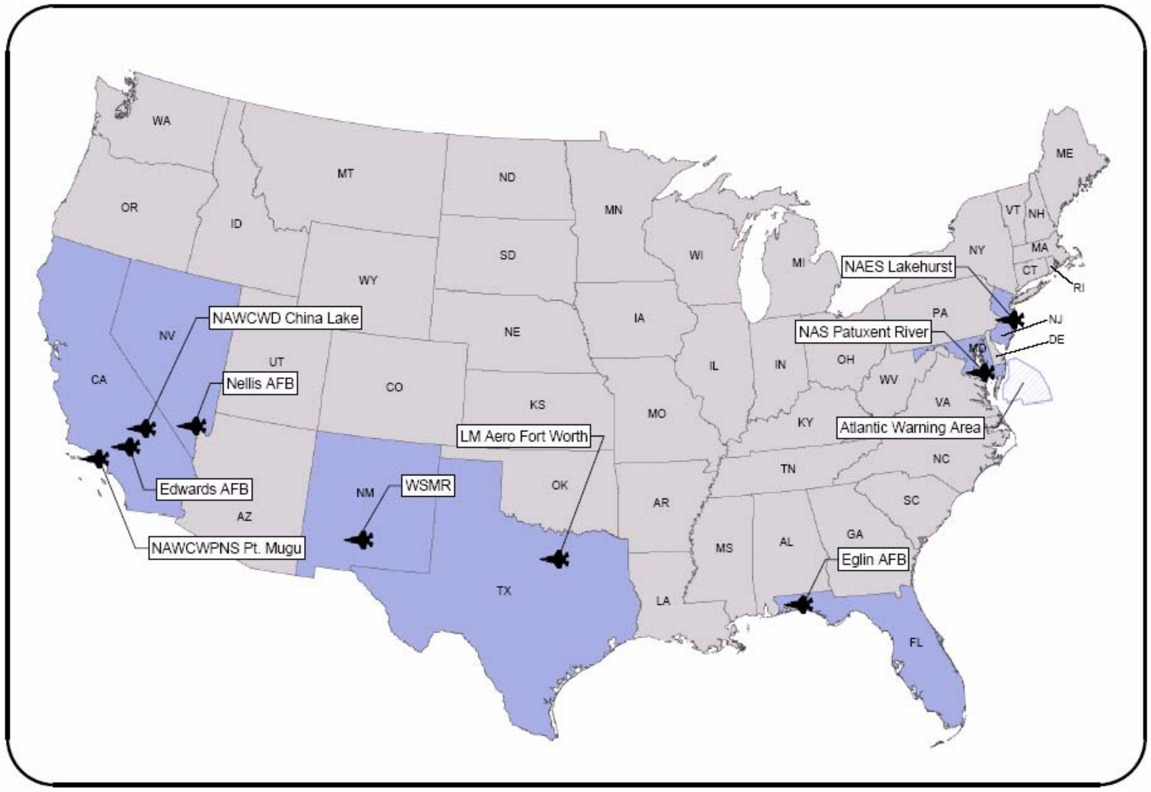

Figure 2.3-1: Proposed JSF DT Test Locations

While NAS Patuxent River and Edwards AFB could accommodate most of the proposed JSF DT requirements, additional unique capabilities (such as environmentally-controlled laboratories, shipboard-related test stands, hover pits, etc.) not present are necessary to accomplish the full purpose and need for the proposed JSF DT. The additional proposed test locations not only meet the purpose and need of the Proposed Action, but are also the premier USN, USAF, or US Army testing facilities/ranges for the types of tests proposed to occur at each proposed location. In addition, testing the F-35 in a limited combat environment (not representing the range of potential combat and natural environments) would meet neither the purpose and need, nor the ORD requirements needed to support the next major DoD acquisition decision of whether or not the JSF SDD Program should proceed to OT and LRIP. Most of the proposed test locations are MRTFBs (except for the AWA, NAES Lakehurst, and LM Aero), which furthers the purpose of using established DoD facilities/ranges and reducing unnecessary cost or schedule burdens.[3]

Structuring the proposed JSF DT with a consolidated East and West Coast Primary Test Locations allows for the F-35 to takeoff and land from the principal test locations of NAS Patuxent River and Edwards AFB to other adjacent DoD ranges and facilities with limited need for transporting personnel or equipment in support of the proposed DT activities. This further serves the JPO's objective for a streamlined test program and the requirements for the Proposed Action, as well as the purpose and need. The East and West Coast Primary Test Locations, as well as the Other Ancillary Test Locations, have the ranges and laboratory capabilities for total aircraft research, development, test, and evaluation (RDT&E); more importantly, they have the ready workforce of experienced testers and engineering and laboratory

[3] *http://www.globalsecurity.org/military/facility/mrtfb.htm*

personnel to support testing of the F-35. This expertise includes structural loads, flutter, dynamics, FQs, and performance for airframe development. For mission systems development, expertise includes radar; sensor systems; weapons integration and test; displays; threat warning; command, control, communications, computers, and intelligence (C^4I); and sensor fusion. At the air system support level, expertise includes reliability and maintainability, autolog, support equipment (SE), and training systems.

Furthermore, most of the locations selected have approved NEPA/EO 12114 documents [such as EAs or Environmental Impact Statements (EISs)] in place for tests and operations (See Table 2.3-2). These environmental analyses concluded tests and activities that are similar to those of the Proposed Action can be accomplished without significantly affecting the quality of the environment. The selection of these proposed test locations is also worthy from an environmental viewpoint, especially with regard to minimizing the potential for concentrated environmental impacts. The provisions of NEPA apply to all proposed test locations, while EO 12114 provisions are applicable to the VACAPES OPAREA within the AWA off the coasts of Delaware, Maryland, and Virginia; and the Sea Range operated by and off the coast of NAWCWPNS Point Mugu.

Table 2.3-2: Relevant NEPA/EO 12114 Documents for Proposed Test Locations

Proposed Test Location	Relevant NEPA/EO 12114 Documents
NAS Patuxent River/VACAPES OPAREA	▪ Final EIS, Increased Flights and Related Operations in the Patuxent River Complex ▪ EA JSF Concept Demonstration Phase Flight Test Program ▪ EA for the F/A-18E/F Stores Separation Testing at NAS Patuxent River ▪ EA for the Developmental Testing and Operational Testing for the CH-60S ▪ EA/OEA of the SH-60R/Airborne Low Frequency Sonar (ALFS) Test Program ▪ EA/OEA for Testing the Hellfire Missile with the H-60 Helicopter
Edwards AFB	▪ Programmatic EA for Routine Flight Line Activities ▪ EA for the Concept Demonstration Phase of JSF at Edwards AFB ▪ Final EA for the Renovation and Construction of a Modern Flight Test Complex Edwards AFB ▪ Final EA for the Continued Use of Restricted Area R-2515 ▪ EA for Low-Level Flight Testing, Evaluation, and Training at Edwards AFB
NAWCWD China Lake	▪ Final EIS for Proposed Military Operational Increases and Implementation of Associated Comprehensive Land Use and Integrated Natural Resources Management Plans
NAWCWPNS Point Mugu	▪ Final EIS/Overseas EIS Point Mugu Sea Range ▪ EA for F-22 Low-Level Supersonic Over-Water Testing

Table 2.3-2: Relevant NEPA/EO 12114 Documents for Proposed Test Locations (Continued)

Proposed Test Location	Relevant NEPA/EO 12114 Documents
WSMR	▪ EA for Flight Testing of the Advanced Medium Range Air-to-Air Missile, White Sands Missile Range ▪ Final WSMR Range-Wide EIS
NTTR Nellis AFB	▪ Legislative EIS for Renewal of the Nellis Air Force Range Land Withdrawal ▪ Final EIS, F-22 Aircraft Force Development Evaluation and Weapons School Beddown, Nellis AFB
NAES Lakehurst	▪ Draft EA for the East Coast Basing of the C-17 Aircraft ▪ EA for Relocation and Consolidation of the New Jersey National Guard Army Aviation Support Facility ▪ EA for the Electromagnetic Aircraft Launching System, SDD Phase at NAES Lakehurst
Eglin AFB	▪ Categorical Exclusion (CATEX) as documented in AF 813, for the F-22 Program in the McKinley Climatic Laboratory
LM Aero	▪ EA for the JSF SDD Facilities Expansion Project, Air Force Plant #4, LM Aero

For the Proposed Action, there are two alternatives considered reasonable and viable for executing the JSF DT at the proposed East and West Coast Primary Test Locations and the Other Ancillary Test Locations. The Proposed Action could be implemented as described if either alternative is selected by the JPO PEO. Alternatives One and Two would be to conduct the proposed tests at all of the proposed locations, however the type and tempo of proposed STOVL activities (FQ, performance, propulsion, and environment tests) conducted would differ between NAS Patuxent River and LM Aero. No construction related activities would be required for conducting the proposed JSF DT.

2.4 ALTERNATIVE ONE

Alternative One would be to conduct the proposed JSF DT at the East and West Coast Primary Test Locations and LM Aero with DETs from NAS Patuxent River to NAES Lakehurst and Eglin AFB. In addition, flights to the VACAPES OPAREA of the AWA would launch from and return to NAS Patuxent River. Alternative One would allow the JPO and JSF V&T Team to capitalize on professional capabilities, technical expertise, and specialized test assets while accommodating the proposed number of F-35 aircraft (15). DETs would include aircraft, and possibly personnel and/or equipment, to support the proposed testing at NAES Lakehurst and Eglin AFB and would be temporary in nature. No DETs (other than the F-35 aircraft) would be required from Edwards AFB, but the ranges associated with NAWCWD China Lake, WSMR, NTTR Nellis AFB, and NAWCWPNS Point Mugu would complement proposed JSF DT activities (especially with regard to mission systems and weapons separation & integration tests). The use of the East and West Coast Test Primary Locations and Other Ancillary Test Locations would take advantage of unique facility or range assets, maximize test efficiencies, reduce logistics and program costs, and support the full spectrum of the proposed JSF DT.

Table 2.4-1 provides a summary of the proposed tests, total flights, and flight hours for Alternative One at each proposed test location. Additional details on the proposed test activities at each proposed test location are provided in subsequent sections of this EA/OEA (Sections 4 through 8). Approximately 47% of the proposed JSF DT would be conducted at the East Coast Primary Test Location with approximately 35% of the activities occurring at NAS Patuxent River and 12% in the VACAPES OPAREA. Approximately 51% of the entire proposed JSF DT would occur in the West Coast Primary Test Locations geographic region with approximately 38% of the events occurring at Edwards AFB and the remaining 13% occurring at the other West Coast locations. The remaining 2% of events for the entire proposed JSF DT would occur at the Other Ancillary Test Locations. The proposed JSF DT would be a combination of ground- and flight-based activities using support aircraft as necessary to serve as chase aircraft for photography and to gather visual data. In many cases, support aircraft would be existing aircraft already in place and used in a variety of capacities for missions conducted at the proposed test locations. Some proposed tests would include weapons separation activities to measure weapons integration with the F-35, and whether weapons can be safely separated from the F-35. Specific ranges and air space [e.g. restricted, warning, Military Operating Areas (MOAs)] used for the proposed JSF DT activities would vary and would be determined by the operational scheduling authority during specific test planning. Use of a particular range or airspace depends on the type of test activity proposed, required test attributes, and availability based on other actions occurring at the same time. Some of the proposed tests also involve supersonic flights, which would be conducted in established corridors and designated flight altitudes, as well in compliance with all air operation procedures established for supersonic events. Before these flights, the appropriate modeling and analysis for predicting potential sonic booms would be performed as required at each proposed test location. In addition to the support aircraft and weapon stores (ordnance), other SE and expendables may be used and include carts [hydraulic, environmental control system (ECS), cooling, etc.], tow tractors, trucks, generators, weapon loaders, flares, drones, etc. A definition of the type of test activities, stores, expendables, and equipment associated with the proposed JSF DT is provided in Appendix A.

Table 2.4-1: Alternative One - Proposed JSF DT Profile by Test Location

Test Activity/Description	# F-35 Flights	# Support Aircraft Flights	Total Flights	F-35 Flight Hours	Support Aircraft Flight Hours	Total Flight Hours
East Coast Primary Test Location						
NAS Patuxent River						
STOVL and CTOL FQ, Performance, and Propulsion; Loads; Flutter; Land-Based Ship Suitability; Weapons Separation & Integration; STOVL Environment; Mission Systems; and CATB	2,715	3,058	*5,773*	4,633	6,116	*10,749*
VACAPES OPAREA						
CTOL FQ, Performance, and Propulsion; Loads; Flutter; Weapons Separation & Integration; and Mission Systems	649	1,333	*1,982*	1,298	2,666	*3,964*
West Coast Primary Test Locations						
Edwards AFB						
F-16 EO/DAS Program; F-16 Proficiency Flights; F-16 Support Flights; CTOL FQ, Performance, and Propulsion; STOVL Propulsion; Loads; Flutter; Weapons Separation & Integration; Mission Systems; High AoA; KC-135 Flights; F-15 Flights; and CATB	2,074	4,143	*6,217*	3,941	8,610	*12,551*

Table 2.4-1: Alternative One - Proposed JSF DT Profile by Test Location (Continued)

Test Activity/Description	# F-35 Flights	# Support Aircraft Flights	Total Flights	F-35 Flight Hours	Support Aircraft Flight Hours	Total Flight Hours
West Coast Primary Test Locations (Continued)						
NAWCWD China Lake						
CTOL FQ; Weapons Separation & Integration; Mission Systems; KC-135 Flights; F-16 Support Flights; and CATB	124	266	*390*	247	651	*898*
NAWCWPNS Point Mugu						
CTOL FQ, Performance, and Propulsion; Loads; Flutter; Weapons Separation & Integration; Mission Systems; KC-135 Flights; and F-16 Support Flights	153	203	*356*	304	501	*805*
WSMR						
Weapons Separation & Integration; Mission Systems; KC-135 Flights; and F-16 Support Flights	41	44	*85*	82	111	*193*
NTTR Nellis AFB						
Mission Systems	677	712	*1,389*	1,354	1,424	*2,778*
Other Ancillary Test Locations						
NAES Lakehurst						
JBD	30 ground-based test events with the aircraft engine running on deck for 120 hours total (no aircraft flights)					
MK7 Roll-Ins; Catapults Capability/Steam Ingestion; E28 Arresting Gear Roll-Ins; and F136 Steam Ingestion	40	0	*40*	40	0	*40*
Eglin AFB						
McKinley Climatic Laboratory Environment Condition Testing	60 to 80 hours of engine ground tests within the confines of the laboratory chambers in the building. Proposed F-35 flights (approximately two to three) are only for arrival and departure of the F-35 to Eglin AFB					
LM Aero						
CATB	0	242	*242*	0	721	*721*

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).
Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT; however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Tables 2.4-2 and 2.4-3 provide an overall listing on the types of stores/expendables and SE planned for the Proposed Action at each proposed test location. This listing is applicable to both Alternatives One and Two, explained in Section 2.5 of this EA/OEA. An additional break-out of these proposed stores/expendables is also presented in specific descriptions of the Proposed Action at each proposed test location as presented in Sections 4 through 8 of this document. Targets used in support of the proposed JSF DT would be used as needed and the type of target used would be determined based on specific test and data collection requirements.

Table 2.4-2: Proposed JSF DT Stores and Expendables by Proposed Test Location

Stores/Expendables	
Type	**Quantity***
East Coast Primary Test Location	
NAS Patuxent River	
Mark (MK) 83 Joint Direct Attack Munition (JDAM) MK 84 JDAM	36
Air Intercept Missile (AIM)-120 and/or Advanced Medium Range Air-to-Air Missile (AMRAAM)	12
Guided Bomb Unit (GBU)-12 Bomb Live Unit (BLU)-109 JDAM Joint Stand-Off Weapon (JSOW) Wind Corrected Munition Dispenser (WCMD)	90
MK 82 Fuel Tank	42
AIM-120 and/or AMRAAM AIM-9 Laser Guided Training Round (LGTR)	56
GBU-12 MK 84 JDAM AIM-132	35
VACAPES OPAREA	
MK 83 JDAM MK 84 JDAM	36
AIM-120 AMRAAM	12
GBU-12 BLU-109 JDAM JSOW WCMD	90
MK 82 Fuel Tank	42
AIM-120 and/or AMRAAM AIM-9 LGTR	56
West Coast Primary Test Locations	
Edwards AFB	
JDAM 84-STV JDAM 83-STV	12
AIM-9L/Ms AIM-120A/Bs Stingers MK 82/84 Inert Munitions Bomb Dummy Units (BDUs) Flares JDAM WCMD Advanced Short Range Air-to-Air Missile (ASRAAM)	75

Table 2.4-2: Proposed JSF DT Stores and Expendables by Proposed Test Location (Continued)

Stores/Expendables		
Type		**Quantity***
AIM-9L/Ms AIM-120A/Bs Stingers MK 82/84 Inert Munitions BDUs Flares JDAM WCMD	ASRAAM JDAM 84-STV JDAM 83-STV GBU-12 Inert WCMD-D4 JDAM 109 MK82 Low Drag General Purpose (LDGP) Tanks	470
AIM-9L/Ms AIM-120A/Bs Stingers MK 82/84 Inert Munitions BDUs Flares JDAM	WCMD ASRAAM JDAM 84 GBU-12 Inert Small Diameter Bomb JDAM 109-Projectile Guidance Kit (PGK) JDAM 82-PGK	248
AIM-9L/Ms AIM-120A/Bs Stingers MK 82/84 Inert Munitions BDUs	Flares JDAM WCMD ASRAAM	298
NAWCWD China Lake		
AIM-120-Captive Air Training Missile (CATM) AIM-120-AMRAAM Air Vehicle Instrumented (AAVI)		4
JDAM 84-Guided Test Vehicle (GTV) JDAM 83-GTV		15
JSOW JSOW-GTV GBU12-GTV WCMD-D4 JDAM 109-GTV MK 82 LDGP-inert		85
AIM-120C-AAVI JSOW-GTV AIM-120B-AAVI AIM-9X-AAVI JDAM 109 PGK-GTV JDAM 82 PGK-GTV		30
NAWCWPNS Point Mugu		
AIM-120C-AAVI AIM-120-CATM		8
AIM-120C-AAVI		4
AIM-120C-CATM JSOW JDAM 109-STV AIM-120C-AAVI		11

Table 2.4-2: Proposed JSF DT Stores and Expendables by Proposed Test Location (Continued)

Stores/Expendables	
Type	**Quantity***
AIM-120-CATM AIM-120-AAVI JSOW-GTV AIM-9X-AAVI JDAM 109-PGK-STV	24
WSMR	
AIM-120C AAVI	4
AIM-120C AAVI	4
AIM-120C AAVI AIM-9X AAVI AIM-132 AGM-154A/C GTV	13
NTTR Nellis AFB	
No stores/expendables are planned at this time	Not Applicable (N/A)
Other Ancillary Test Locations	
NAES Lakehurst	
No stores/expendables are planned at this time	N/A
Eglin AFB	
No stores/expendables are planned at this time	N/A
LM Aero	
No stores/expendables are planned at this time	N/A

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005).
Note: Proposed stores/expendables reflect approximations for the proposed JSF DT.
Total for all types

Table 2.4-3: Proposed JSF DT Support Equipment by Proposed Test Location

Support Equipment	
Type	**Quantity***
East Coast Primary Test Location	
NAS Patuxent River	
Hydraulics Cart ECS Cooling Cart Tow Tractor Aircraft Power Generator Weapons Loaders Support Trucks Light Cart Fuel Chiller Ground Support Generator	37–41
VACAPES OPAREA	
N/A	N/A
West Coast Primary Test Locations	
Edwards AFB	
Hydraulics Cart ECS Cooling Cart Poly Alpha Olefin (PAO) Light Cart Tow Tractor Ground and Aircraft Generators MJ2A Jammers Flight line trucks Fuel Trucks Chillers DASH-60 Oil Cart Air Cart TM Carts	176–1,338
NAWCWD China Lake	
N/A	N/A
NAWCWPNS Point Mugu	
N/A	N/A
WSMR	
N/A	N/A
NTTR Nellis AFB	
N/A	N/A

Table 2.4-3: Proposed JSF DT Support Equipment by Proposed Test Location (Continued)

Support Equipment	
Type	**Quantity***
Other Ancillary Test Locations	
NAES Lakehurst	
Hydraulics Cart ECS Cooling Cart Tow Tractor Aircraft Power Generator Jet Car Weapons Loaders Support Trucks	1–4
Eglin AFB	
N/A	N/A
LM Aero	
PAO Cart Maintenance Lift Ground Power Unit Ground Air Conditioner Flight Line Transport Vehicle	1–5

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005).
Note: Proposed stores/expendables reflect approximations for the proposed JSF DT.
Total for all units

2.5 ALTERNATIVE TWO - MODIFIED STOVL TESTING

Alternative Two comprises Alternative One and the expansion of testing at LM Aero. The difference between Alternatives One and Two is that proposed STOVL hover operations (related to FQ, performance, propulsion, and environment tests) would be performed at both NAS Patuxent River and LM Aero locations instead of only at NAS Patuxent River. Under this alternative, approximately 90% of airborne STOVL hover operations would occur at NAS Patuxent River and approximately 10% at LM Aero. For STOVL ground-based operations, approximately 64% would be conducted at NAS Patuxent River and 33% at LM Aero. Proposed ground-based tests at LM Aero would be propulsion and performance-related STOVL test activities.

Table 2.5-1 provides a summary of the proposed tests, total flights, and flight hours between NAS Patuxent River and LM Aero under Alternative Two. The proposed DT profiles at the other proposed test locations, as annotated in Table 2.4-1 above, remain the same under this alternative. Conducting the proposed STOVL tests at LM Aero, under this alternative, is part of the JPO's and JSF V&T Team's approach to minimizing program risks, such as test schedule delays. Based on history with other aircraft programs, the JPO and JSF V&T Team are taking prudent measures to verify that the F-35 STOVL variant is operationally capable before sending the aircraft to NAS Patuxent River. These proposed JSF DT activities at LM Aero (such as engaging the lift fan of the F-35) would confirm there are no performance, mechanical, or technical problems with the aircraft. Proposed tests would verify the F-35 STOVL variant is ready to conduct the extensive tests planned upon arrival at NAS Patuxent River. Implementing this proposed alternative would help ensure there would be no down time at NAS Patuxent River, thereby, reducing overall JSF Program risks (from both a schedule and cost perspective).

Table 2.5-1: Alternative Two - Modified STOVL Testing

Test Activity/Description	# F-35 Flights	# Support Aircraft Flights	Total Flights	F-35 Flight Hours	Support Aircraft Flight Hours	Total Flight Hours
NAS Patuxent River						
STOVL and CTOL FQ, Performance, and Propulsion; Loads; Flutter; Land-Based Ship Suitability; Weapons Separation & Integration; STOVL Environment; Mission Systems; and CATB	2,674	3,058	5,732	4,562	6,116	10,678
LM Aero						
STOVL FQ, Performance, Propulsion, Environment; and CATB	41	242	283	71	721	792

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).

Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT; however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT events and time periods.

2.6 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORTH FOR FURTHER ANALYSIS

This section describes alternatives considered, but deemed inadequate to fulfill the purpose and need for the Proposed Action. Therefore, these alternatives are not analyzed further in this EA/OEA.

2.6.1 Computer Modeling and Simulation (M&S) Alternative

Computer Modeling and Simulation (M&S) technologies can be used to infer aerodynamic and system performance. LM Aero and the JPO are using, to the maximum extent possible, computer imagery, simulation, and modeling as part of the F-35's design process and for DT/OT requirements. However, computer M&S is not sufficient to ensure the successful performance and safety of the F-35 variants, and it limits the Service's ability to meet testing and mission requirements as defined in the JSF's ORD. The Proposed Action is also needed to validate the computer M&S results obtained from the F-35 design process.

2.6.2 One Principal Test Location

Consideration was given to conducting the proposed JSF DT at a single, principal location. However, it became apparent during the site selection process that this is not a viable alternative. A significant build-up of personnel, facility, and range assets would be necessary to meet the requirements of the Proposed Action. The availability of engineering expertise is key to the safe conduct of the proposed JSF DT activities. One principal test location could not readily provide the necessary military, civilian, and contractor expertise to support the entire proposed JSF DT. Neither NAS Patuxent River nor Edwards AFB by themselves has the capacity in facilities or workforce personnel to conduct the entire proposed JSF DT. While it may be feasible to consider relocation of military pilots, the consolidation of necessary civilian and contractor expertise at one location constrains DT affordability and flexibility, and also minimizes access to seasoned expertise from across the Services' test community.

In addition, testing at a single location would (1) burden the existing infrastructure, (2) concentrate potential environmental impacts to a degree that might exceed significance threshold criteria (especially with regard to air quality and noise), (3) not support conducting tests in varied climates and terrains (e.g. dry, humid, hot, cold, rugged terrain, cross-winds, sea-level), and (4) require a substantial MILCON to develop facilities needed to support the fifteen test aircraft and approximate 1,342 test personnel required for the proposed JSF DT. This significant MILCON would expand fiscal requirements beyond what has already been projected for the JSF SDD T&E Program. To accommodate the MILCON schedule, the Proposed Action would be potentially delayed for three to five years at costs of $25 million or more. The JSF SDD Program would not meet the T&E milestone that must be met before LRIP, production, and deployment of a weapon system.

Furthermore, selection of one principal test location is not in keeping with DoD acquisition guidance, which specifies that the designated acquisition agent should optimize the use of acquisition organizations, test organizations, and other facilities of military departments. The DoD acquisition process emphasizes efficient use of DoD resources to effectively support a program and ultimately the operational forces. Neither the JPO nor the Joint Service Test Community can afford to incur the high costs and schedule delays associated with expanding infrastructure to make one particular test location able to support the full spectrum of the proposed JSF DT. As such, conducting the proposed JSF DT at one primary test location would jeopardize the entire JSF SDD Program and the stated purpose and need for the Proposed Action.

2.7 NO ACTION ALTERNATIVE

Though the No Action Alternative would not satisfy the purpose and need for the Proposed Action, the No Action Alternative is analyzed in this EA/OEA. It provides the environmental baseline data (the as is condition) for existing manmade and natural environmental parameters from which to assess the potential impacts of Alternatives One and Two at the proposed test locations. The Existing Environment of each proposed test location in this EA/OEA (Sections 4 through 8) represents baseline conditions, including the anticipated impacts of the No Action Alternative. If the No Action Alternative is selected by the JPO PEO, no additional impacts would be anticipated from this baseline. Thus, the No Action Alternative is not examined in further detail for the environmental consequences sections of this EA/OEA.

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3.0 ENVIRONMENTAL RESOURCES ANALYZED

Based on the review of relevant NEPA/EO 12114 documents and analysis of other relevant environmental and technical information, the JPO PEO reasonably concludes the Proposed Action is not expected to result in any identifiable direct, indirect, or cumulative significant impacts to the resources reflected in Table 3-1. A brief explanation of the reasons supporting this conclusion is provided in Appendix C.

Table 3-1: Environmental Resources Not Analyzed In Detail

Geology and Soils	Land Use
Water Resources	Cultural Resources
Vegetation	Airfield Operations and Flight Safety
Hazardous Materials (HAZMAT)/Hazardous Waste (HAZWASTE)	Prime and Unique Farmlands
Safety and Occupational Health	Parks and Forests, Including National Parks
Utilities	

Only air quality, noise, biological/natural resources, socioeconomics, and coastal zone management are analyzed in greater detail in this EA/OEA. This section provides a general description of the environmental resource analyzed and the basis for determining potential impacts, especially those of significance. Minimal to negligible impacts would be expected to these resources for the proposed test locations discussed in Section 4 of this EA/OEA. A more detailed analysis of potential impacts to these environmental resources is provided in this document for implementing the proposed JSF DT at Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero (see Sections 5 through 8) due to the complexity or extent of proposed test activities.

3.1 AIR QUALITY

Air quality for any particular region is defined by the amount of pollutants in the air compared to Federal or state standards. Ambient air quality is affected by a variety of human activities as well as by naturally occurring sources (such as windblown dust, plants, and volcanic activity). Primary sources of air pollution from human activity include stationary sources (e.g., boilers, emergency generators, paint spray booths) and mobile sources (e.g., cars, trucks, buses, and airplanes). The Environmental Protection Agency (EPA) has identified a group of common criteria pollutants found all over the U.S. that affect ambient air quality and can injure human health, harm the environment, and cause property damage.[4] These criteria pollutants include carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM) less than or equal to 10 microns in aerodynamic diameter (PM_{10}), PM with an aerodynamic diameter of less than or equal to 2.5 microns ($PM_{2.5}$), and sulfur dioxide (SO_2). These pollutants are monitored by the EPA, and by local and other national organizations.

The Clean Air Act (CAA) provides the principal framework for national, state, and local efforts to protect and enhance air quality. Under the Clean Air Act Amendments of 1990 (CAAA-90), EPA established National Ambient Air Quality Standards (NAAQS) for the criteria pollutants.[5] States monitor ambient air quality by installing and maintaining instruments to measure the level of pollution in the ambient environment in areas that are expected to exceed the standard. Many of the monitoring instruments measure the level of pollutant continually and the measured concentrations are averaged over the appropriate timeframe to verify compliance with the NAAQS.

[4] *EPA 2005*

[5] *42 USC 7501 et. seq. EPA*

3.1.1 National Ambient Air Quality Standards (NAAQS)

The CAAA-90 established both primary and secondary limits for the goal of increasing ambient air quality. These limits are considered the maximum pollutant concentrations for criteria pollutants that could be found in a region without jeopardizing human health or the environment.[6] The primary standard has been established to protect public health and the secondary standard is intended to prevent environmental and property damage.[7] The primary NAAQS established under the CAAA-90 are listed in Table 3.1.1-1.

Table 3.1.1-1: NAAQS[8]

Criteria Pollutant	Averaging Time	Federal Primary Standard [a] $\mu g/m^3$ (ppm)
Carbon Monoxide (CO)	1 hour [b] 8 hours [b]	40,000 (35) [c] 10,000 (9) [c]
Lead (Pb)	Quarterly	1.5 [e]
Nitrogen Dioxide (NO_2)	Annual [f, g]	100 (0.053) [e]
Ozone (O_3)	8 hours [i]	157 (0.08) [e]
Particulate Matter (PM_{10})	Annual [f, g] 24 hours	50 [e] 150 [e]
Particulate Matter ($PM_{2.5}$)	Annual [h] 24 hours [i]	15 [e] 65 [e]
Sulfur Dioxide (SO_2)	Annual [d] 24 hours [b] 3 hours [b]	80 (0.030) [c] 365 (0.14) [c] No Primary Standard [j]

$\mu g/m^3$ = micrograms per cubic meter
ppm = parts per million

Notes: a. Federal primary standards are levels of air quality necessary, with an adequate margin of safety, to protect the public health.
b. Not to be exceeded more than once per year, averaged over three years.
c. No Federal secondary standard.
d. Arithmetic mean.
e. Federal secondary standard, which is intended to prevent environmental and property damage, are the same as the Federal primary standard.
f. Calculated as annual arithmetic mean, averaged over three consecutive years.
g. Cannot be exceeded.
h. Daily maximum one-hour concentration not to be exceeded an average of more than once per year averaged over three consecutive years.
i. Not to exceed the three-year average of the fourth highest daily maximum.
j. The Federal secondary standard to protect the public welfare is 1,300 $\mu g/m^3$.

A geographic area where the air quality meets the NAAQS for any criteria pollutant is said to be in attainment for that pollutant. If the area's air quality has not yet met the standard for a particular criteria pollutant, it is said to be in nonattainment for that pollutant. Areas previously in nonattainment for any criteria pollutant that have attained the standard for that pollutant are considered to be a maintenance area. Nonattainment Areas (NAAs) are further classified depending on the concentration of the particular pollutant in the air. For instance, O_3 nonattainment areas under the eight-hour O_3 standard are classified

[6] *40 CFR Part 50.4 et. Seq.*
[7] *40 CFR Part 50.*
[8] *Ibid.*

into seven levels: marginal, moderate, serious, severe, extreme, unclassified or Subpart 1[9] nonattainment. It is possible for an area to be an attainment area for some of the ambient air quality standards and in nonattainment of others at the same time.[10]

3.1.2 State Ambient Air Quality Standards

While the EPA sets national standards for air quality in the form of NAAQS, states have the authority to establish state-specific standards. The CAAA-90 recognizes states should take the lead on protecting air quality at the local level because pollution control problems typically require knowledge of local conditions, industry, and geography. The state-specific standards are more stringent than EPA standards and are enforceable under Federal law once approved by EPA.

When an area is designated as nonattainment, EPA requires local air quality managers to determine the maximum emissions the air basin can accept in order to attain the NAAQS or state-specific standards. These emissions are included in an emissions budget and used to determine what controls must be imposed on sources within the region. The emissions budget and the state's plan for achieving and maintaining attainment with the air quality standards is documented in a State Implementation Plan (SIP). These plans are reviewed and must be approved by EPA.

Section 176 (c) of the CAAA-90 contains legislations for the general conformity rule and prohibits Federal agencies from conducting, supporting, or approving actions that do not conform to an approved SIP. Federal agencies are required to conduct a conformity review to demonstrate their actions conform with the approved SIP for the nonattainment or maintenance area prior to initiating the action. Under Title I of the CAAA-90, Congress established two types of conformity: transportation conformity and general conformity. Transportation conformity pertains to Federal transportation projects and requires these projects conform with transportation aspects of an approved SIP.[11] General conformity covers all other Federal actions not addressed by transportation conformity.[12] The two conformity provisions *only affect Federal actions occurring in nonattainment areas and maintenance areas;* for those Federal projects located in an attainment area, conformity is not a concern and will not apply. The Proposed Action does not involve a Federal transportation project, therefore, the air quality analysis for this EA/OEA focuses only on general conformity.

3.1.3 General Conformity Applicability Analysis and Determination

The DoD, like all Federal agencies, must determine whether a Proposed Action conforms to the SIP in each state where activities would occur. The general conformity rule establishes an elaborate process for analyzing and determining conformity and is outlined in the following steps:[13]

1. **Determine whether a Proposed Action is specifically exempted**. The rule exempts certain types of actions that clearly would result in little or no emissions or where emissions are already considered by other regulations such as New Source Review (NSR). Aircraft testing does not qualify for either of these exemptions.

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[9] *The "Subpart 1" nonattainment designation means that the area is considered nonattainment but is not classified in Subpart 2 (CAA, 42 USC 7502)*

[10] *EPA 2005*

[11] *40 CFR 51, Subpart T*

[12] *40 CFR 51, Subpart W and 40 CFR 93, Subpart B*

[13] *40 CFR Parts 51.853 et. seq.*

2. **Determine whether all or part of the Proposed Action is presumed to conform**. The rule allows the Federal agency to establish special categories of actions, based on past experience, that presumptively do not result in nonconforming pollutant emissions or emissions exceeding certain threshold *de minimis* amounts.[14] These exclusions must be proposed by the agency and eventually published in the Federal Register. There has been no presumptive conformity established that is applicable to aircraft testing.

3. **Determine whether the Proposed Action can be excluded as a *de minimis* project and is not regionally significant**. If the action does not qualify for an exemption or presumption, then the agency must determine if the action can be excluded as a *de minimis* project. The agency must also determine if the action is not regionally significant; both conditions must be met, otherwise a full general conformity analysis is required. To make these determinations, the agency must calculate the total actual annual direct and indirect emissions for each nonattainment pollutant resulting from project activities. If the total actual emissions increase in tons per year (tpy) are below the *de minimis* thresholds listed in Table 3.1.3-1, the action is exempted from further analysis, unless it is considered regionally significant. Emissions from a Proposed Action are considered not regionally significant if the projected actual emissions for the action will be less than 10% of the total nonattainment pollutant emissions published in the SIP for the area where the action will occur. If the emissions from the action are considered *de minimis* and not regionally significant, no further analysis is required.

4. **Conduct a full-scale general conformity analysis.** If the project has not satisfied any of the aforementioned exemptions or presumptions, the agency must conduct a full-scale general conformity analysis culminating in a conformity determination. The following methods can be used to satisfy conformity: (1) emissions from the Proposed Action are accounted for in the SIP's attainment/maintenance demonstration; (2) dispersion modeling shows total emissions would not cause or contribute to any new violation or increase the severity of an existing violation of the CO or PM_{10} NAAQS; (3) emissions are fully offset through reductions elsewhere in the nonattainment/maintenance area; and (4) emissions from the Proposed Action and all other emissions in the nonattainment/maintenance area do not exceed the emissions budget outline in the SIP. At the time the general conformity regulation was promulgated, the $PM_{2.5}$ NAAQS did not exist. It is expected that the PM_{10} thresholds will apply to the new $PM_{2.5}$ NAAQS.

[14] *De minimis is defined as so small as to be negligible or insignificant. If an action has de minimum emissions, then a conformity determination pursuant to the Clean Air Act (CAA) of 1990 is not required.*

Table 3.1.3-1: Conformity *De Minimis* Thresholds[15]

Nonattainment Area (NAA) Designation	*De minimis* Threshold (tons/year)
Ozone (O_3) [Volatile Organic Compounds (VOCs) or Nitrogen Oxides (NO_x)]	
Extreme NAAs	10
Severe NAAs	25
Serious NAAs	50
Other O_3 NAAs Outside Ozone Transport Region	100
Marginal and Moderate NAAs Inside an Ozone Transport Region	
VOCs	50
NO_x	100
Nitrogen Dioxide (NO_2) All NAAs	100
Carbon Monoxide (CO) All NAAs	100
Sulfur Dioxide (SO_2) All NAAs	100
Particulate Matter (PM_{10}) NAAs[1]	
Serious NAAs	70
Moderate NAAs	100
Particular Matter ($PM_{2.5}$) All NAAS	100
Lead (Pb) All NAAs	25
Maintenance Areas	
Ozone Maintenance Areas (VOCs):	
Inside an ozone transport region	50
Outside an ozone transport region	100
Ozone Maintenance Areas (NO_x)	100
Lead (Pb) Maintenance Areas	25
Other Maintenance Areas (CO, SO_2, NO_2, PM_{10})	100

Source: Title 40 CFR Part 93.153(b)(1); $PM_{2.5}$ de minimis threshold from Federal Register Vol. 71, No. 136, Monday, July 17, 2006.

Note: The de minimis emission level for $PM_{2.5}$ is for direct $PM_{2.5}$ emissions and precursors as defined in revised section 40 CFR Part 91.152. The precursors listed in Part 91.152 are: VOCs and ammonia emissions in nonattainment areas unless the state or EPA has made a finding that those emissions do not contribute to the $PM_{2.5}$ problem in a given area or to other downwind air quality concerns; NO_x emissions unless the state and EPA make a finding that NO_x emissions do not significantly contribute to the $PM_{2.5}$ problem in a given area or to other downwind air quality concerns; and SO_x emissions.

3.1.4 Other Regulatory Considerations

Aircraft engine emissions (excluding those generated from static engine testing) are not considered in the Federal, state, or local programs that regulate stationary sources such as NSR, Prevention of Significant Deterioration (PSD), facility, or Title V Permit programs. These programs are not directly applicable to this analysis, however, local air quality planners do take into consideration the facility cap in their planning.

[15] *40 CFR 51.853*

3.1.5 Aircraft Emissions from the Proposed Action

The Proposed Action discussed in this analysis could potentially impact air quality because aircraft operations involve the use and burning of Hydrocarbon (HC) fuel. Pollutants generated from aircraft operations that could affect air quality include: CO, unburned HC which are reactive VOCs, NO_x, NO_2, SO_2, and $PM_{2.5}$. Since Pb is not normally found in refined aircraft fuels, it has been assumed that no Pb emissions are generated from the operation of the aircraft engines included as part of this Proposed Action. Aircraft engines emit Hazardous Air Pollutants (HAPs), however, these HAP emissions have also been excluded from the air analysis in this EA/OEA. Limited research has been performed on HAP emissions from the specific aircraft engines to be used in this action and no reliable emission factors exist.

Only actual emissions generated from stationary and mobile sources on the surface, and aircraft operations on the surface up to the inversion layer are considered in this analysis. The inversion layer is a function of the local meteorology and changes from day to day, but is assumed to be 3,000 feet AGL. The inversion layer marks the top of the ground level mixing layer. Any emissions above this layer do not affect the local ground level environment and are therefore not considered in the air analysis for this EA/OEA.[16]

For purposes of analyzing the potential environmental consequences to the affected environment at each proposed test location, F-35 emissions have been calculated using EPA's Emissions and Dispersion Modeling System (EDMS) and other EPA-approved methodologies. The EDMS was modified to consider the more complex flight profiles of military aircraft as outlined in the Air Force's "Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations."[17] The methodology for determining emissions from all direct and indirect sources is discussed further in Sections 5 through 8 for each proposed test location that is analyzed in greater detail in this EA/OEA and Appendix E.

3.2 NOISE

Noise is defined as unwanted sound that interferes with normal human activities or otherwise diminishes the quality of the environment. Noise is usually the largest and most pervasive environmental problem associated with aircraft operations. Although many other sources of noise are present in the affected communities, aircraft noise is readily identifiable. Measurements and descriptions of noise (i.e., sounds) are usually based on various combinations of the following factors:

- The vibration frequency characteristics of the sound, measured as sound wave cycles per second [Hertz (Hz)]; determines the pitch of the sound.
- The total sound energy being radiated by a source, usually reported as a sound power level.
- The actual air pressure changes experienced at a particular location, usually measured as a sound pressure level (SPL) (the frequency characteristics and SPL combine to determine the loudness of a sound at a particular location).
- The duration of a sound.
- The changes in frequency characteristics or pressure levels through time.

Aircraft noise sources vary in sound level and duration due to aircraft type, power level, atmospheric conditions, flight direction, horizontal distance, and altitude relative to the receptor. Noise from individual events, as well as cumulative sound levels, can be important in determining the effects of

16 *O'Brien 2002*
17 *O'Brien 2002*

aircraft noise. Aircraft noise is analyzed by calculating noise exposure contours for airfield operations and/or military airspace. From these data, a set of contours is produced indicating the noise zones around an airfield. The results are expressed in Day-Night Average Sound Level (DNL) using a decibel (dB) A-weighted (dBA) scale; these noise metrics are defined and discussed below. Noise results are then presented in contours of five-dBA increments from 65 DNL to greater than 80 DNL. In the State of California, noise results are expressed as Community Noise Equivalent Level (CNEL).

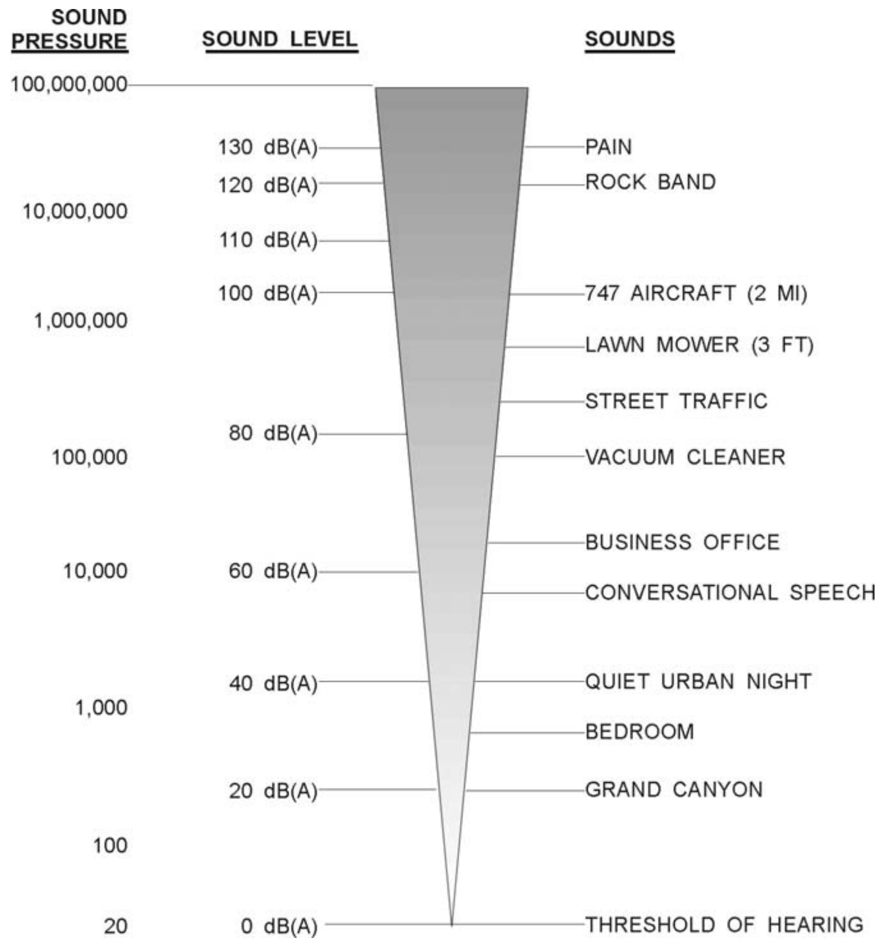
3.2.1 Noise Metrics

Noise impacts associated with military aircraft are analyzed from both physiological and behavioral perspectives. The analysis includes annoyance, speech interference, sleep disturbance, and effects on domestic animals and wildlife. Aircraft noise, including sonic booms, are considered potential impacts due to subsonic and supersonic flight testing operations that would be performed as part of the Proposed Action. In addition, the analysis to assess the potential environmental consequences from the proposed JSF DT considers potential noise impacts from a near-field noise and far-field noise exposure perspective. Discussion of noise in this section pertains to human perception and use as an indicator of human presence, while noise effects on animals and wildlife are discussed in Section 3.3.

Near-field noise levels are important for assessing the potential impact to personnel working on and near the aircraft when the engine is operating. Both the USN and USAF have established hearing protection programs for protecting personnel from overexposure to noise in accordance with DoDI 6055.12, *DoD Hearing Conservation Program*. Hazardous noise exposure occurs when workers are present in areas where noise levels exceed 85 dB. The USN addresses hearing protection in the *Navy Occupational Safety and Health Program Manual* [Office of the Chief of Naval Operations Instruction (OPNAVINST) 5100.23F]. The goal of the USN's hearing conservation program is to prevent occupational hearing loss and ensure auditory fitness for duty in the military and civilian workforce. The program includes noise measurement and analysis, engineering controls, hearing protection devices, audiometry, and education. To prevent potentially harmful effects to USAF and civilian personnel from exposure to hazardous noise, the USAF established a hazardous noise program under USAF Occupational Safety and Health Standard 48-19 (AFOSH), *Hazardous Noise Program*. Under this Program, Bioenvironmental Engineering is responsible for accomplishing hazardous noise surveillance to determine if military or DoD civilian personnel working in areas where hazardous noise exposure may require engineering controls, administrative controls or personal protection, or signage for potential hazardous noise areas. Non-DoD civilian personnel working on USAF bases are exempt from AFOSH Standard 48-19, but must comply with applicable Federal and state regulations.

Far-field noise levels are used to evaluate community noise effects from the aircraft, using a DNL/CNEL. Community annoyance to noise is reliably represented by DNL/CNEL. Adverse effects resulting from aircraft operations may include annoyance and interference with sleep and conversation.

The measurement and human perception of sound involves two physical characteristics—intensity and frequency. Intensity is a measure of the strength or magnitude of the sound vibrations and is expressed in terms of pressure—the higher the sound pressure, the more intense the perception of that sound. The frequency of the sound is the number of times per second the sound oscillates. Low-frequency sounds are characterized as a rumble or roar, while sirens or screeches typify high-frequency sounds. The range of sound intensity that can be detected comfortably by the human ear is extremely wide and covers a scale from one to 100,000,000 SPL. Representation of sound intensity using a linear index becomes difficult due to this wide range. As a result, dBA is normally used, especially since humans do not hear very low or very high frequencies as well as they hear middle frequencies. Using A-weighting corrects these relative inefficiencies of the human ear at lower or higher frequencies. To include the wide range of sounds heard everyday, a logarithmic measure is applied. For this EA/OEA, all noise levels are expressed using the A-weighted scale. Sound intensity is measured in terms of sound levels ranging from zero dB, which is approximately the threshold of hearing, to 130 dB, which is the threshold of pain for humans. Figure 3.2.1-1 presents the sound levels of typical events. For example, conversational speech is measured at about 55 dB, whereas a rock band may be as high as 120 dB.



Sources: Seminar on Noise Control Plan Development, Presented for the Department of Transportation (DOT) by Bolt, Beranek and Newman, Inc., 1979 (rev. 1983); Bruel & Kjaer, Sound Pressure vs. Sound Pressure Levels, 1988. Prepared by: Booz Allen Hamilton, 2005.

Figure 3.2.1-1: Intensity of Typical Sounds

Because of the logarithmic unit of measurement, sound levels cannot be added or subtracted linearly. However, several simple rules of thumb are useful in calculating sound levels. First, if two sounds of the same level are added, the sound level increases by approximately three dB. For example:

60 dB + 60 dB = 63 dB

Secondly, the sum of two sounds of a different level is slightly higher than the louder level. For example:

60 dB + 70 dB = 70.4 dB

Also, the minimum change in sound level that the human ear can detect is about three dB. A ten dB change in sound level is usually perceived by the average person as a doubling or halving of the sound's loudness. DNL and CNEL take into account both the noise levels of all individual events that occur during a 24-hour period and the number of times those events occur. The logarithmic nature of the dB unit causes the noise levels of the loudest events to control the 24-hour average. As a simple example of this characteristic, consider a case in which only one aircraft overflight occurs during the daytime over a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes, and 30 seconds of the day, the ambient sound level is 50 dB. The DNL for this 24-hour period is 65.9 dB. Assume, as a second example, that ten such 30-second overflights occur during daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.5 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of those events.

As used in environmental noise analyses, a metric refers to the unit or quantity that quantitatively measures the effect of noise on the environment. To quantify these effects, the DoD and the Federal Aviation Administration (FAA) use three noise-measuring techniques, or metrics: first, a measure of the highest sound level occurring during an individual aircraft overflight (single event); second, a combination of the maximum level of that single event with its duration; and third, a description of the noise environment based on the cumulative flight and engine maintenance activity. Single noise events can be described with Sound Exposure Level (SEL) or Maximum Sound Level. Another measure of instantaneous level is the Peak Sound Pressure Level. The cumulative energy noise metric used is DNL. Metrics related to DNL include the Onset-Rate Adjusted DNL, and the Equivalent Sound Level. In the State of California, it is mandated that average noise be described in terms of CNEL. CNEL represents the Day/Evening/Night average noise exposure, calculated over a 24-hour period.

DNL and CNEL are composite metrics that account for SEL of all noise events in a 24-hour period. In order to account for increased human sensitivity to noise at night, a ten dB penalty is applied to night time events (10:00 p.m. to 7:00 a.m. time period). The CNEL level includes a five dB penalty on noise during the 7:00 p.m. to 10:00 p.m. time period, and a ten dB penalty on noise during the 10:00 p.m. to 7:00 a.m. time period.

The metrics described above are average quantities, mathematically representing the continuous A-weighted or C-weighted sound level that would be present if all of the variations in sound level that occur over a 24-hour period were smoothed out so as to contain the same total sound energy. These composite metrics account for the maximum noise levels, the duration of the events (sorties or operations), and the number of events that occur over a 24-hour period. Like SEL, neither DNL nor CNEL represent the sound level heard at any particular time, but quantifies the total sound energy received. While it is normalized as an average, it represents all of the sound energy, and is therefore a cumulative measure of sound. The penalties added to both the DNL and CNEL metrics account for the added intrusiveness of sounds that occur during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient sound levels during nighttime are typically about ten dB lower than during daytime hours.

The inclusion of daytime and night time periods in the computation of the DNL and CNEL reflects their basic 24-hour definition. It can, however, be applied over periods of multiple days. For application to civil airports, where operations are consistent from day to day, DNL and CNEL are usually applied as an annual average. For some military airfields, where operations are not necessarily consistent from day to day, a common practice is to compute a 24-hour DNL or CNEL based on an average busy day, so that the calculated noise is not diluted by periods of low activity. Although DNL and CNEL provide a single measure of overall noise impact, they do not provide specific information on the number of noise events or the individual sound levels that occur during the 24-hour day. For example, a daily average sound level of 65 dB could result from a very few noisy events or a large number of quieter events.

Daily average sound levels are typically used for the evaluation of community noise effects (i.e., long-term annoyance), and particularly aircraft noise effects. In general, scientific studies and social surveys have found a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL.[18]

In accordance with the 1992 Federal Interagency Committee on Noise (FICON) recommendations, examination of noise levels between 60 dB and 65 dB DNL should be performed if determined to be appropriate after application of the FICON screening procedure.[19] If screening shows that noise-sensitive areas at or above 65 dB DNL would have an increase of DNL 1.5 dB or more, then further analysis should be conducted to identify noise-sensitive areas with 60 to 65 dB DNL and an increase of 3.0 dB DNL or more due to the Proposed Action. Potential mitigation of noise in those areas should be considered, including the same range of mitigation options available at or above 65 dB DNL and eligible for Federal funding. The FICON screening components are as follows:

1) Noise exposure contours at the 75 dB, 70 dB, and 65 dB DNLs. Additional contours are optional and considered on a case-by-case basis.

2) Analysis within the proposed alternative 65 dB DNL contour to identify noise-sensitive areas where noise would increase by 1.5 dB DNL. Increases of 1.5 dB that introduce new noise-sensitive areas to exposure levels of 65 dB or more are included in this analysis.

3) Analysis within the 60 to 65 dB DNL contours to identify noise sensitive areas where noise would increase by DNL 3.0 dB, only when 1.5 dB DNL increases are documented within the 65 dB DNL contour.

3.2.2 Noise and Compatible Land Use

Table 3.2.2-1 reflects recommended guidelines for a maximum amount of noise exposure (in terms of the cumulative noise metric DNL) that might be considered acceptable or compatible to people in living and working areas. These noise levels are derived from case histories involving aircraft noise problems at civilian airports and military airfields and the resultant community response. Residential land use is deemed acceptable for noise exposures up to 65 dB DNL. Recreational areas are also considered acceptable for noise levels above 65 dB DNL (with certain exceptions for outdoor amphitheaters).

In some instances, a supplemental noise analysis is performed to determine noise impacts at specific noise sensitive receptors (e.g., residences, schools, hospitals). This analysis identifies locations where a significant increase (1.5 dB or greater increases within the 65 dB DNL or CNEL noise contour or a 3.0 dB increase within the 60 dB DNL or CNEL contour) in aircraft noise exposure would occur when comparing the Proposed Action to the baseline existing environment.

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[18] *U.S. EPA 1978*

[19] *FICON 1992 page 3-5*

Table 3.2.2-1: Land Use Compatibility with Yearly Day-Night Average Sound Levels

Land Use	Yearly Day-Night Average Sound Level (DNL) In Decibels					
	< 65	65–70	70–75	75–80	80–85	> 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N (1)	N (1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N (1)	N (1)	N (1)	N	N
Public Use						
Schools	Y	N (1)	N (1)	N	N	N
Hospitals, nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Y (2)	Y (3)	Y (4)	Y (4)
Parking	Y	Y	Y (2)	Y (3)	Y (4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail- building materials, hardware and farm equipment	Y	Y	Y (2)	Y (3)	Y (4)	N
Retail trade-general	Y	Y	25	30	N	N
Utilities	Y	Y	Y (2)	Y (3)	Y (4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y (2)	Y (3)	Y (4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y (6)	Y (7)	Y (8)	Y (8)	Y (8)
Livestock farming and breeding	Y	Y (6)	Y (7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y (5)	Y (5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Key to Table 3.2.2-1

Y (YES)	Land use and related structures compatible without restrictions.
N (NO)	Land use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (NLR) (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35	Land use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 dB must be incorporated into design and construction of structure.

The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FICON determinations are not intended to substitute Federally-determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Notes: (1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

Table 3.2.2-1: Land Use Compatibility with Yearly Day-Night Average Sound Levels (Continued)

(2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(5) Land use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

3.2.3 Noise Modeling Approach

The Proposed Action discussed in this EA/OEA could potentially impact the noise environment at proposed test locations because of modifications and/or additions to the existing Fleet, Fleet mix of aircraft, and proposed DT activities. Fleet refers to all the varying types of aircraft (F-16s, F-18s, F-15s, UH-60s, C-12s, etc.) operating at a facility, whether they are stationed at the facility or transient. Fleet mix is an identical term to Fleet except Fleet mix is generally used when discussing noise modeling inputs, outputs, or components.

For purposes of validating the affected noise environment and analyzing the potential environmental consequences to the affected noise environment at Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero, noise impacts from the proposed JSF DT activities have been calculated using the USAF approved noise modeling programs: NOISEMAP Version 8, and BaseOps Version 7.294. Both programs are a suite of computer software used to model the potential noise exposure produced by aircraft operations (e.g., departures, arrivals, closed patterns, and maintenance) in and around military airfields. Outputs from the model are used to develop noise contours to help assess the potential impacts to communities and biological resources in the immediate, surrounding areas of the facility.

The methodology used to determine inputs from noise generating sources for the proposed JSF DT is discussed further in Sections 5 through 8 for each proposed, aforementioned test location analyzed in greater detail in this EA/OEA, and in Appendix F. Potential noise impacts at Eglin AFB, NAWCWD China Lake, NAWCWPNS Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA of the AWA are expected to be minimal to negligible (as discussed further in Section 4). No landings or takeoffs with the F-35 would occur at these locations, and most of the proposed flights would be at 3,000 feet and above within range space/MOA/warning/restricted areas. Therefore, no detailed noise modeling was considered necessary for these propsed test locations.

3.3 BIOLOGICAL/NATURAL RESOURCES[20]

Biological and natural resources are plants, animals, and their habitats. A species' habitat consists of the physical (e.g., soil, water, and air) and biological (e.g., plants and animals) components and interrelationships of the environment that supports its populations. Species that are native to an area, especially including threatened or endangered species, are of particular importance. Each proposed test location has its unique array of biological/natural resources. Among the proposed test locations, habitat types vary from marine to fresh water aquatic habitats and from desert, grassland, deciduous, and coniferous forest terrestrial habitats in locations that range from coastal to mountainous.

[20] *Manci et. al. 1988; Schmidt-Bremer, Martin Jr. and Timothy LeDoux 2004*

A considerable body of Federal environmental legislation, regulation, and guidance pertaining to the management and protection of biological/natural resources applies to the Proposed Action and its alternatives. This includes various military regulations that provide guidance for military facilities/ranges and their natural resource programs to ensure that the military continues to be good stewards of the land. Applicable laws and military regulations include those listed below:

- The Endangered Species Act (ESA) [16 United States Code (USC) 1531–1544)]
- The Migratory Bird Treaty Act (MBTA) (16 USC 703–712)
- Bald Eagle Protection Act (16 USC 668-668d, 54 Stat. 250) as amended—Approved June 8, 1940, and amended by Public Law (P.L.) 86-70 (73 Stat. 143) June 25, 1959; P.L. 87-884 (76 Stat. 1346) October 24, 1962; P.L. 92-535 (86 Stat. 1064) October 23, 1972; and P.L. 95-616 (92 Stat. 3114) November 8, 1978
- The Sikes Act (SAIA) as amended (16 USC 670a–670o)
- The Marine Mammal Protection Act (MMPA) (1972 16 USC §§ 1361–1421h, as amended 1973, 1976–1978, 1980–1982, 1984, 1986, 1988, 1990, 1992–1994 and 1996)
- Magnuson Stevens Fishery Conservation and Management Act (MSFCMA) as amended (P.L.94-265)
- EO 13089, Coral Reef Protection
- DoDD 4700.4, Natural Resource Management Program
- OPNAVINST 5090. B, Chapter 22, *Natural Resources Management*
- Marine Corps Order (MCO) 5090.2, Chapter 11, *Environmental Compliance and Protection Manual*
- Air Force Instruction (AFI) 32-7064, Integrated Natural Resources Management

There are also state laws, regulations, and guidance that pertain to biological/natural resources. While the DoD is not legally mandated to adhere to the policies surrounding state-listed threatened and endangered species, it is the DoD's policy to abide, to the maximum extent practicable, with state legislative policies pertaining to the protection of animal and plant species.

Potential impacts on biological/natural resources include direct mortality, loss of habitat, displacement, and interruption of behavioral cycles such as breeding. Direct mortality could occur when aircraft are taking off or landing (e.g., bird/aircraft strike hazard [BASH] or deer/aircraft strike hazard [DASH] incidents, or collisions with other species on the runway), when they are in flight (e.g., BASH), or when munitions or other objects are dropped toward targets on land or in the water. Management of habitat adjacent to runways minimizes the likelihood of direct mortality on runways during takeoff/landing. BASH incidents while aircraft are airborne are most likely near the ground, and become increasingly less likely as altitude is gained. BASH warning programs that track seasonal migration patterns and local occurrence of flocks of birds minimize the likelihood of direct mortality caused by airborne aircraft. Direct mortality from objects dropped onto land targets is minimized by surveillance of these targets just before release of the object from the aircraft. Direct mortality from objects dropped onto water targets is minimized by monitoring the seasonal migrations of large mammals. Although mortality of individual animals could occur, it is made unlikely by the dispersion of animals within the vast expanse of the ocean (except when life cycle events or life stages require concentration in shallow water or use of the shoreline).

Loss of habitat is the other potential direct impact from implementation of the Proposed Action alternatives. Loss of habitat includes direct mortality of plant and animal species that support other species of interest, or the alteration of the environment which renders an area uninhabitable by a given species. Because the Proposed Action would use existing facilities and most of the proposed flights would be conducted in the air at altitudes above 3,000 feet, loss of habitat from implementation of the Proposed Action alternatives would be unlikely.

Displacement and interruption of behavioral cycles primarily result from visual or noise disturbances. Visual disturbances that impact animals are those that cause them to deviate from their normal behaviors (e.g., obtaining food, breeding, sleeping, or grooming) so frequently that the health of individual organisms and ultimately populations is affected. Sudden, unanticipated large objects, especially those that hover overhead or otherwise trigger innate responses to predators may cause deviations from normal behavior. However, many individual animals habituate over time when such visual disturbances occur repeatedly; such animals continue their normal behaviors, despite the visual disturbance.

Noise disturbances from the Proposed Action may be the most likely cause for the displacement of animals or interruption of their normal behavioral cycles. Therefore, assessment of potential impacts from the Proposed Action emphasizes the potential impacts of noise created by the proposed JSF DT activities to animals. As reported in the Manci (1988) literature study, noise affects wildlife and other animals, including humans, in many ways that can be categorized as having primary, secondary, or tertiary effects. Primary effects are direct physical auditory changes, such as eardrum rupture, ossicle shattering, temporary and permanent hearing threshold shifts, and the masking of auditory signals. Masking is the inability of an animal to hear important environmental signals. These signals include noises made by breeding competitors, potential mates, predators, or prey. Aircraft noise could conceivably cause masking of the signals in some species and populations of wildlife. Secondary effects of aircraft noise on wildlife include such non-auditory effects such as stress, behavioral changes, interference with mating, and detrimental changes in the ability to obtain sufficient food, water, and cover. Tertiary effects are the direct result of both primary and secondary effects, and include population declines, destruction of important habitat and, in extreme cases, potential species extinction.[21] As discussed below, the effects of noise on animal behavior are relatively well described, but other secondary effects and tertiary effects are not well documented. Tertiary effects, in particular, are subject to other influences that confound individual causes.

Wild animals, in general, do respond to overflight noise caused by aircraft, although there appears to be considerable variation among species in their response to aircraft of varying types, altitudes, and activities. Each animal's response may also differ with its own activity and situation. Thus, animal responses to aircraft are difficult to generalize and can range from mild annoyance (demonstrated by a slight change in body position) to more severe reactions (such as panic and escape behavior).[22] Their response is typically minimal to generalized noise that increases gradually as an aircraft approaches and decreases gradually as the aircraft departs, but they respond markedly to particularly loud or abrupt noises. The most readily observed reaction to sonic booms and subsonic low-altitude flight noise is a startle reaction. However, specific reactions differ according to the species involved, whether the animal is alone or part of a group, the behavior in which the animal is engaged, and whether the individual animal has been previously exposed to such noise. Some animals appear to adapt to the disturbances quickly, their response is temporary in duration, and eventually they may even cease to respond.[23] However, if loud or abrupt noises occur frequently, they can totally disrupt behavioral sequences necessary for successful breeding, or disturb an animal's energy balance. Other factors that influence an animal's response to noise include noise frequency and the season in which the noise occurs. For example, if the noise occurs in spring and early summer when birds are incubating eggs or brooding small

[21] *Manci 1988*
[22] *NPS 1994; AFFTC 2005*
[23] *AFFTC 2005*

young, the startle effect may cause an adult to jump suddenly from the nest and inadvertently knock eggs or young out of the nest. Startle or panic reactions can also be especially detrimental in late winter if weakened animals use already depleted energy reserves to flee from the noise.

Other studies of animal responses to aircraft noise have concluded that domestic animals occasionally react to noise with reduced milk production and rate of release, changes in blood chemistry and heart rate, and reduced thyroid activity, but such studies have not been readily replicated, and most studies indicate rapid habituation to aircraft noise. Wildlife, appear more likely to react negatively to aircraft noise than domestic animals, especially where there is little cover. Terrestrial wildlife, especially grizzly bears and wild ungulates, react strongly to flights at varying altitudes below 2,000 feet AGL. The stress (as indicated by increased heart rate) and increased energy consumption (from running and avoidance behaviors) resulting from aircraft overflights are most likely to cause tertiary impacts during late winter or during the breeding season, as mentioned above. Aquatic mammals tend to continue to inhabit parts of the ocean that are overflown frequently by aircraft, a fact that has been used to infer that they are not impacted by the noise from these overflights. However, startle reactions tended to increase when noise levels were greater than 80 dB, when the overflights were of helicopters rather than fixed-wing aircraft, and when the aircraft cast shadows in the vicinity of the animals. Additionally, a particular noise level is diminished when it enters the water where it also travels more slowly. Studies of raptors, migratory waterfowl, and wading/shorebirds indicate that they too may react more strongly to aircraft overflight at varying altitudes below 1,000 feet, with species that nest in dense colonies (e.g., sooty terns) and waterfowl being most likely to flush in panic, particularly in response to sonic booms. Helicopters are more likely to elicit a startle response than jet aircraft or propeller aircraft. However, nesting birds, especially when they are incubating eggs or brooding small young, are less likely overall to flush in response to overflights than non-nesting individuals. In addition, birds have been documented to habituate to aircraft noise when overflights are relatively frequent. Overall, most studies indicate that birds acclimate, adapt, or habituate to aircraft noise after repeated exposure, and may even take opportunistic advantage of prey startled by such noise. However, the degree to which noise together with other stressors impact avian populations is still unclear. Less information is available on the response of fish, amphibians, and reptiles to noise, but some studies have documented startle reactions, reaction to particularly low frequencies and ground vibration, and hearing threshold shifts or hearing loss, as well as habituation to noise, depending on the species and the noise intensity.

It is readily apparent that groups of animals differ in their hearing sensitivity. Birds have a level of hearing sensitivity similar to that of the more sensitive mammals between 1 to 5 kHz, but at lower and higher frequencies tend to be less sensitive than mammals; reptile hearing is less sensitive that that of either birds or mammals. Songbirds have been documented to respond to the onset of a sonic boom before it was detected by adjacent people and osprey have been observed to stare in the direction of a flight before it was audible to adjacent observers. Thus, noise data provided in dB that are weighted and averaged to reflect human perceptions and responses to noise must be interpreted with care when evaluating the impacts of noise on other animals. Other animals have different hearing ranges, structural modifications that may amplify sound, and react differently to noise events.[24] Noise effects from the Proposed Action would be considered significant if populations of common species were to incur tertiary affects from noise or individual members of species of special concern were to incur permanent primary or secondary affects from noise.

24 *Schmidt-Bremer, Jr. and LeDoux. 2004. Aircraft Noise Study for Naval Air Station Joint Reserve Base, Fort Worth, Fort Worth Texas. Wylie Laboratories, Inc., Report WR 04-18*

3.4 SOCIOECONOMICS

Socioeconomics comprise the basic attributes and resources associated with the human environment, including demographic, economic, and social assets of a community. Demographics focus on population trends and age. Economic characteristics provide information on employment trends and industries. Housing, infrastructure, and services are also influenced by socioeconomic factors. Infrastructure refers to the utilities and transportation systems that are used to deliver goods and services to the population. Public services refer to the schools, police, and fire protection provided to the community.

Environmental justice is another aspect in the composition of the community. Environmental justice considers minority or low-income populations in the community to determine whether any of the Proposed Action alternatives may have a disproportionately high adverse human health or environmental effect on those populations. Environmental justice analysis is conducted in compliance with EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. Based on CEQ guidance, minority populations should be identified where either: (a) the minority population of the area exceeds 50%, or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.[25] Low-income populations are defined as those below the Federal poverty thresholds, and are identified using statistical poverty thresholds from the Bureau of Census of $17,463 for a family of four.[26] The EPA identifies a low-income community as an area with a significantly greater population of low-income families than a statistical reference area.[27] For the purposes of the socioeconomics analysis reflected in this EA/OEA, low-income populations would be defined as an area where the low-income population exceeds 25% poverty or if isolated pockets of large low-income populations are present. Poverty rates reflected in this EA/OEA were obtained from the U.S. Census 2000.

Protection of children from environmental health and safety risks is considered as part of the potential socioeconomic impacts analysis. EO 13045, *Protection of Children From Environmental Health Risks and Safety Risks*, suggests that children may suffer disproportionately from environmental health and safety risks due to their neurological, immunological, digestive, and other bodily systems immature development. In addition, it is suggested that children eat, drink and breathe more in proportion to their body weight than adults, and display behavior patterns that make them more susceptible to accidents, thus making them more susceptible to environmental health and safety risks than adults. EO 13045 requires that each Federal agency:

> "(a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks."

The affected environment for socioeconomics focuses on those aspects that may be influenced by the Proposed Action alternatives, which includes the commercial shipping and fishing industries and the local economies of the proposed test locations. The alternatives for the Proposed Action do not change the mission of the facilities/ranges, but rather potentially increase activities (such as an increase in personnel). Only four of the proposed test locations are anticipated to require an increase in personnel that could impact socioeconomics: Edwards AFB, NAS Patuxent River, NAES Lakehurst, and Eglin AFB. Information from the U.S. Census 2000, Bureau of Economic Analysis (BEA), Bureau of Labor Statistics

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[25] *CEQ 1997*
[26] *Census Bureau 2000*
[27] *EPA 1998*

(BLS), and previous NEPA documents are used for the socioeconomic analyses. The Economic Impact Forecast System (EIFS) is also used to support the socioeconomic analyses.

EIFS is a web-based modeling and information system that provides regional economic analyses to planners and analysts. EIFS was originally developed to efficiently identify and address the regional economic effects of proposed military actions. Over the years, further development of EIFS was conducted in cooperation with the USAF and the U.S. Army Corps of Engineers (USACE). EIFS provides a standardized system to quantify the impact of military actions, and to compare various options or alternatives. EIFS has been used to analyze the effects of missile deployments, Base Realignment and Closure (BRAC), and numerous day-to-day analyses.[28]

EIFS draws information from a tailored socioeconomic database for any county (or multi-county area) in the U.S., estimating the changes associated with any project proposal and assessing significance. The database items are extracted from: Economic Censuses (wholesale, retail, services, and manufactures), Census of Agriculture, BEA employment and income time series, the BEA Labor force time series, and the County Business Patterns (CBP). The local multi-county region of influence (ROI) is defined and EIFS predicts the resultant changes in total personal income, total employment, and total sales by local businesses and total population. Once these aggregate changes are predicted, EIFS then provides an analysis of historical trends in the defined ROI, and uses the Rational Threshold Level (RTV) and Forecast Significance of Impacts (FSI) profiles to develop significance criteria. Comparisons of projected change are then compared to the significance thresholds to produce conclusions.[29]

3.5 COASTAL ZONE MANAGEMENT

The National Coastal Management Program is a Federal-state partnership dedicated to comprehensive management of the nation’s coastal resources, ensuring their protection for future generations while balancing competing national economic, cultural, and environmental interests. The Coastal Zone Management Program (CZMP) is authorized by the Coastal Zone Management Act (CZMA) of 1972 and administered by the Coastal Programs Division (CPD) within the National Oceanic and Atmospheric Administration's (NOAA) Office of Ocean and Coastal Resource Management. The CPD is responsible for advancing national coastal management objectives and maintaining and strengthening state and territorial coastal management capabilities. The CZMA of 1972, 16 USC section 1451 et seq., authorizes the NOAA to make grants to states to develop coastal zone management programs in order “to preserve, protect, develop and where possible, to restore or enhance the resources of the nation’s coastal zone.”[30]

The CZMP leaves day-to-day management decisions at the state level in the 34 states and territories with Federally approved coastal management programs. Currently, 95,376 national shoreline miles (99.9%) are managed by the Program.[31] The state management plans provide for the protection of natural resources and the husbandry of coastal development. The CZMA provides a procedure for the states to review Federal actions for consistency with their own approved coastal management program. Furthermore, Section 307 (c)(1) of the Federal CZMA Reauthorization Amendments of 1979 states that each Federal agency conducting or supporting activities affecting any land, water use, or natural resource of the coastal zone must do so in a manner to the maximum extent practicable, consistent with the enforceable policies

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[28] *EIFS 2001*

[29] *EIFS 2001*

[30] *http://www.ocrm.nos.noaa.gov/czm/*

[31] *http://www.ocrm.nos.noaa.gov/czm/*

of each state's Coastal Zone Management (CZM) program and policies.[32] Federal agencies are required to certify through a Coastal Consistency Determination (CCD) that a Proposed Action in a coastal zone complies with the state's approved program, and to obtain the state's concurrence with the CCD. CZM is applicable for purposes of this EA/OEA to the following states that have Federally-approved CZM Programs: California, Maryland, Virginia, and Delaware.

California's CZM Overview[33]

California resource management and conservation means minimizing the impact of port and residential development, oil transportation, and runoff pollution for the state's extensive coast. California's CZM program oversees almost all activities on the coast to manage coastal problems. Their program involves some of the state's major coastal industries: tourism, ports, fishing, and agriculture.

Maryland's CZM Overview[34]

Major industries depending on Maryland's coast include seafood, shipping, agriculture, tourism, and recreation. Maryland's coastal program encourages sensible economic development and minimizes the impact on vital coastal resources, such as fisheries, from people.

Virginia's CZM Overview[35]

Virginia's coastal zone encompasses the eastern third of the state including the Chesapeake Bay and its tributary rivers, part of the Albemarle-Pamlico watershed, and the Atlantic coast with its vast barrier island lagoon system. Virginia's coastal resource program addresses its coastal residents and industries (such as shipping, tourism, and commercial and recreational fishing), as well as the plants and animals that rely on coastal habitats. Particular focus includes polluted runoff, habitat protection, riparian buffers, wetlands, fisheries, sustainable development, waterfront redevelopment, septic systems, and erosion and sediment control.

Delaware's CZM Overview[36]

The Delaware coastal program monitors activities in the coastal zone to keep the coast healthy and productive. Major challenges include runoff pollution and cumulative/secondary impacts of population growth and urban development. Important industries for vitality of the state's coast and economy are tourism, agriculture, marine commerce, and chemical manufacturing.

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32 *DoN 1998*

33 *http://www.ocrm.nos.noaa.gov/czm/czmcalifornia.html*

34 *http://www.ocrm.nos.noaa.gov/czm/czmmaryland.html*

35 *http://www.ocrm.nos.noaa.gov/czm/czmvirginia.html*

36 *http://www.ocrm.nos.noaa.gov/czm/czmdelaware.html*

4.0 ASSOCIATED TEST LOCATIONS

The JPO reasonably concludes the proposed JSF DT Program at Eglin AFB, NAWCWD China Lake, NAWCWPNS Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA of the AWA would not pose any foreseeable degradable direct, indirect, or cumulative significant impact or harm to the environment. As such, these proposed test locations are grouped together into one section to facilitate cohesive analysis. Most of the proposed JSF DT at these locations would not involve the landing or takeoff of the F-35 (except at Eglin AFB). The laboratory assets, airspace, and ranges of these associated locations would be used in support of the Proposed Action.

4.1 EGLIN AFB

4.1.1 Eglin AFB General Information

The McKinley Climatic Laboratory is located at Eglin AFB in northwest Florida, as depicted in Figure 4.1.1-1. The purpose of the laboratory is to provide facilities for all-weather testing of weapons and ancillary equipment to ensure functionality regardless of climatic conditions. The laboratory can recreate nearly every weather condition that exists on earth with temperatures ranging from minus 70 to plus 180 degrees Fahrenheit. Ten chambers, built in addition to the main hangar, include a temperature and humidity room, salt-test room, and rooms for wind, rain, dust, desert, tropic, and jungle climates. Every aircraft in the DoD inventory has undergone testing at the laboratory. The laboratory generally operates 24 hours a day, approximately 200 to 250 days per year.

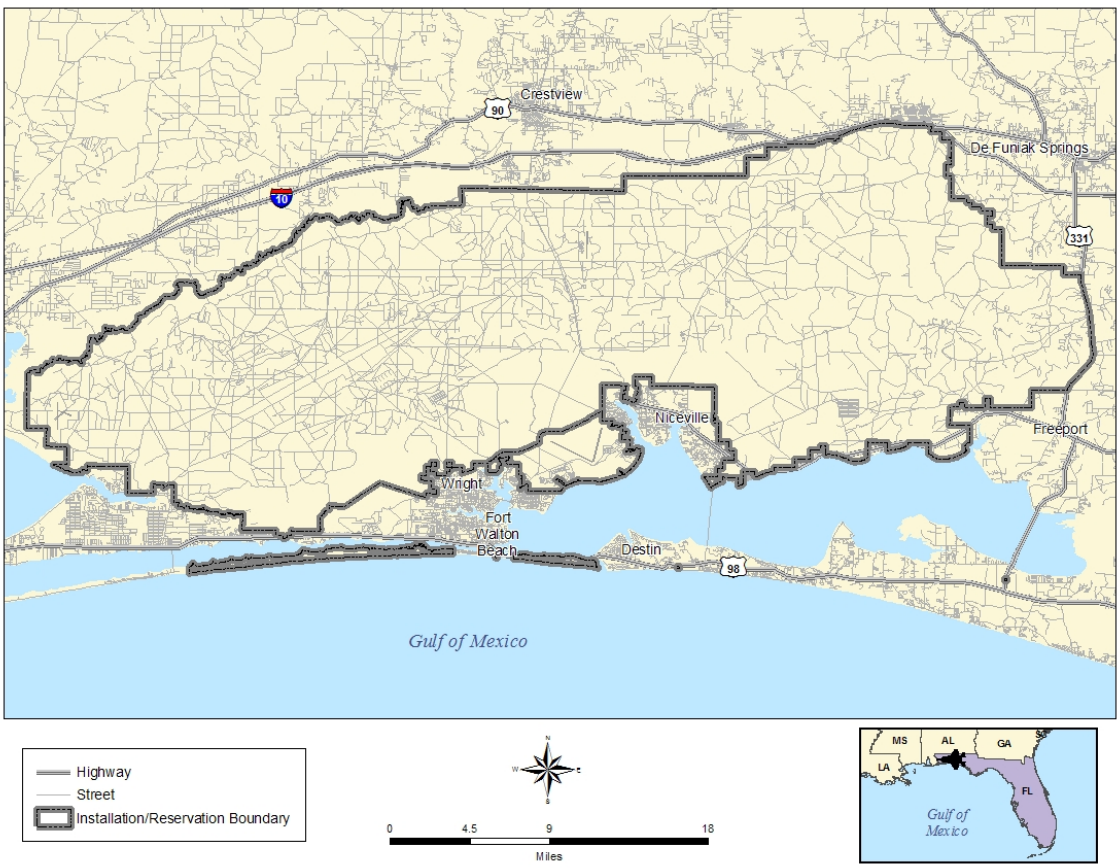

Figure 4.1.1-1: General Map of Eglin AFB

4.1.2 Proposed JSF DT at Eglin AFB

The purpose of the proposed JSF DT at McKinley Climatic Laboratory, Eglin AFB, would be to collect sufficient data to evaluate operational capabilities of the F-35 when exposed to extreme climatic environments. A temporary DET of 50 people to Eglin AFB from NAS Patuxent River would provide technical engineering and maintenance support during the F-35 climatic tests. The proposed JSF DT at McKinley Climatic Laboratory would consist of approximately 60 to 80 hours of engine ground tests within the confines of the laboratory chambers within the facility, and two to three transit flight hours of the F-35 to and from Eglin AFB. The proposed JSF DT would be approximately four months during Test Years 3 and 4. The engines would typically run at idle or moderate power modes during the proposed tests, with at least one hour in the AB power setting during some of the proposed test activities. It is common during T&E for test parameters to change as aircraft variants proceed through the various proposed JSF DT activities and time periods. Proposed tests are planned approximations and could increase or decrease during the actual proposed JSF DT as necessary to demonstrate F-35 capabilities and mission performances. The JPO and JSF V&T Team would coordinate any test activity increases with the local Eglin AFB Environmental Office to ensure proposed changes do not alter the conclusion of this EA/OEA regarding potential environmental impacts.

The proposed JSF DT is considered consistent with the on-going routine operations at Eglin AFB and the McKinley Climatic Laboratory. Furthermore, the Proposed Action is similar in scope to other aircraft test programs conducted within the laboratory. These other tests were determined to have no significant impacts to the environment and they were, therefore, categorically excluded from further NEPA analysis.[37]

The McKinley Climatic Laboratory is operated in accordance with all applicable environmental and safety laws, as well as permits, to ensure no significant impacts occur to the environment or personnel health and safety. All personnel participating in the ground/laboratory tests are briefed on proper safety and health procedures prior to beginning any test activity. The use of appropriate hearing protection is a mandatory procedure at the laboratory. All SOPs would be adhered to during proposed JSF DT activities.

4.1.3 Air Quality at Eglin AFB

4.1.3.1 Affected Environment

Eglin AFB is located in a humid, subtropical climate characterized by an abundance of sunshine and rainfall, warm and humid summers, and mild winters. Annual rainfall averages approximately 60 inches, primarily in the summer and late winter or early spring. Prevailing winds are usually from the north in winter and from the south in summer.[38]

Florida has adopted the NAAQS except for SO_2, for which the state has adopted a more stringent annual and 24-hours standard. Eglin AFB is located in three counties: Santa Rosa, Okaloosa, and Walton. The main airfield at Eglin AFB is located in Okaloosa County. All three counties are classified as attainment areas for criteria pollutants under the Federal NAAQS, as well as the state standard for SO_2.

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[37] *McKinley Climatic Lab 2002*

[38] *Eglin AFB 2000*

4.1.3.2 Environmental Consequences

Air quality impacts would be minimal to negligible. Other than the transit flights for F-35 landings and takeoffs at Eglin AFB, the Proposed Action would be conducted within the confines of the McKinley Climatic Laboratory and its various environmental chambers. The facility is equipped with appropriate air control technologies to minimize emissions into the surrounding environment and the laboratory has the appropriate permits in place for the tests conducted in this facility. The proposed JSF DT within the laboratory would not be expected to generate emissions that would result in a change to the established operating permits for the McKinley Climatic Laboratory. In addition, the proposed action would not require a conformity determination since Okaloosa County is designated as an attainment area.

4.1.4 Noise at Eglin AFB

4.1.4.1 Affected Environment

Aircraft operations are conducted within the airspace above and surrounding Eglin AFB, including restricted and warning areas in addition to military operating areas. The missions supported by Eglin AFB include aircraft (such as the F-15, F-16, UH-1, and MC-130 aircraft). Land use at Eglin AFB (main base) is predominantly airfield operations, industrial, and administrative (landscaped/urban). Some open space is associated with the airfield. Concentrated population areas in the vicinity of Eglin AFB are primarily north/northeast of the Base property (and main airfield): Valparaiso and Niceville, Florida.

Baseline noise levels have been established for Eglin AFB, expressed in DNL contours. Most of the areas (land acreage) currently affected by noise are predominantly on Eglin AFB. However, some residential land use (including two churches) in the Valparaiso areas lies within the current 65 and 75 dB DNL contours for Eglin AFB.[39]

4.1.4.2 Environmental Consequences

Noise associated with the arrivals and departures of F-35 at Eglin AFB would be transient and of short duration. All landings and takeoffs would be in compliance with Eglin AFB flight rules and patterns established for the safety of the surrounding environment. Negligible effects to baseline noise levels would be expected in the vicinity of the airfield. When compared to the approximate 39,000 sorties occurring annually at Eglin AFB, the two to three F-35 transit hours would not likely change existing noise levels.[40] In addition, potential noise impacts from the anticipated 60–80 hours of engine ground tests is not expected since proposed tests would be conducted within the confines of (inside) the laboratory chambers. The laboratory is constructed and operated to minimize the amount of noise that might escape outside of the facility during environmental tests, especially when operating aircraft engines. SOPs and hearing protection help minimize test personnel exposure to noise.

4.1.5 Biological/Natural Resources at Eglin AFB

4.1.5.1 Affected Environment

Additional information on biological/natural resources, including threatened and endangered species, at Eglin AFB is available in the *Integrated Natural Resources Management Plan (2002)*. This plan helps Eglin AFB to protect and maintain populations of native threatened and endangered plant and animal species.

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[39] *U.S. Air Force 2006*

[40] *Eglin Gulf Test and Training Range Final Programmatic Environmental Assessment, 2002, Page 1-1*

Habitats supporting the varied plant and animal species at Eglin AFB include wooded, open grassland/shrubland, barrier island, wetland, and landscaped/urban areas. Sensitive habitats include areas such as significant botanical sites, outstanding natural areas, and aquatic preserves. Federal- and state-listed species, as well as rare species, are located in Eglin AFB's diverse habitats. There are eleven Federally-listed threatened or endangered species, such as the red-cockaded woodpecker (*Picoides borealis*), piping plover (*Charadrius melodus*), flatwoods salamander (*Ambystoma cingulatum*), eastern indigo snake (*Drymarchon corais couperi*), etc. There are 64 state-listed species of which most are plants and approximately 93 rare or listed terrestrial and fresh water species.

The McKinley Climatic Laboratory is located on the main portion of Eglin AFB in an area designated as an administrative land use (landscaped/urban). The laboratory is located in an office and industrial type setting comprised of landscaped areas, with no large tracts of supporting habitat for plants and animals. Similarly, the land use around the airfield is considered active and intrusive, and is designated as landscaped/urban areas, which are not considered as good wildlife habitats.

4.1.5.2 Environmental Consequences

No impacts to these resources would be anticipated from conducting the proposed JSF DT inside the McKinley Climatic Laboratory. Any potential for impacts would be associated with the short duration landings and takeoffs of the F-35 when it arrives and leaves Eglin AFB. It is expected that species around the runways are acclimated to the noise generated during landings and takeoffs. The initial temporary response to overflight noise from the transient arrivals and departures of the F-35 would not likely have a negative impact on biological/natural resource species populations at Eglin AFB.

4.1.6 Socioeconomics at Eglin AFB

4.1.6.1 Affected Environment

The socioeconomic study area for Eglin AFB area is Okaloosa County, since the main airfield and McKinley Climatic Laboratory is located within this county. U.S. Census, BEA, and BLS sources have been used to support the baseline information regarding environmental justice considerations, the predominant socioeconomic resource area potentially affected by the proposed JSF DT. All other socioeconomic resource areas (such as economics) are not addressed in greater detail, since there would not be any permanent increase or relocation of personnel to Eglin AFB in support of the proposed JSF DT.

Okaloosa County has a poverty rate of 8.8%, which is well below the Florida rate of 12.5% and below the set CEQ threshold of 25% for low-income populations. Okaloosa County is predominantly white (81.0%) and the remaining race distribution is Black or African American (8.9%), Hispanic or Latino (4.3%), two or more races (2.5%), Asian (2.4%), Native Indian or Native Alaskan (0.5%), some other race (0.2%), and Native Hawaiian or Pacific Islander (0.1%).[41] Figure 4.1.6.1-1 summarizes the population ethnicity for Okaloosa County. Okaloosa County's minority population is at 19.0%; well below the CEQ threshold of 50%, and much lower than the state-wide average of 34.6%.[42]

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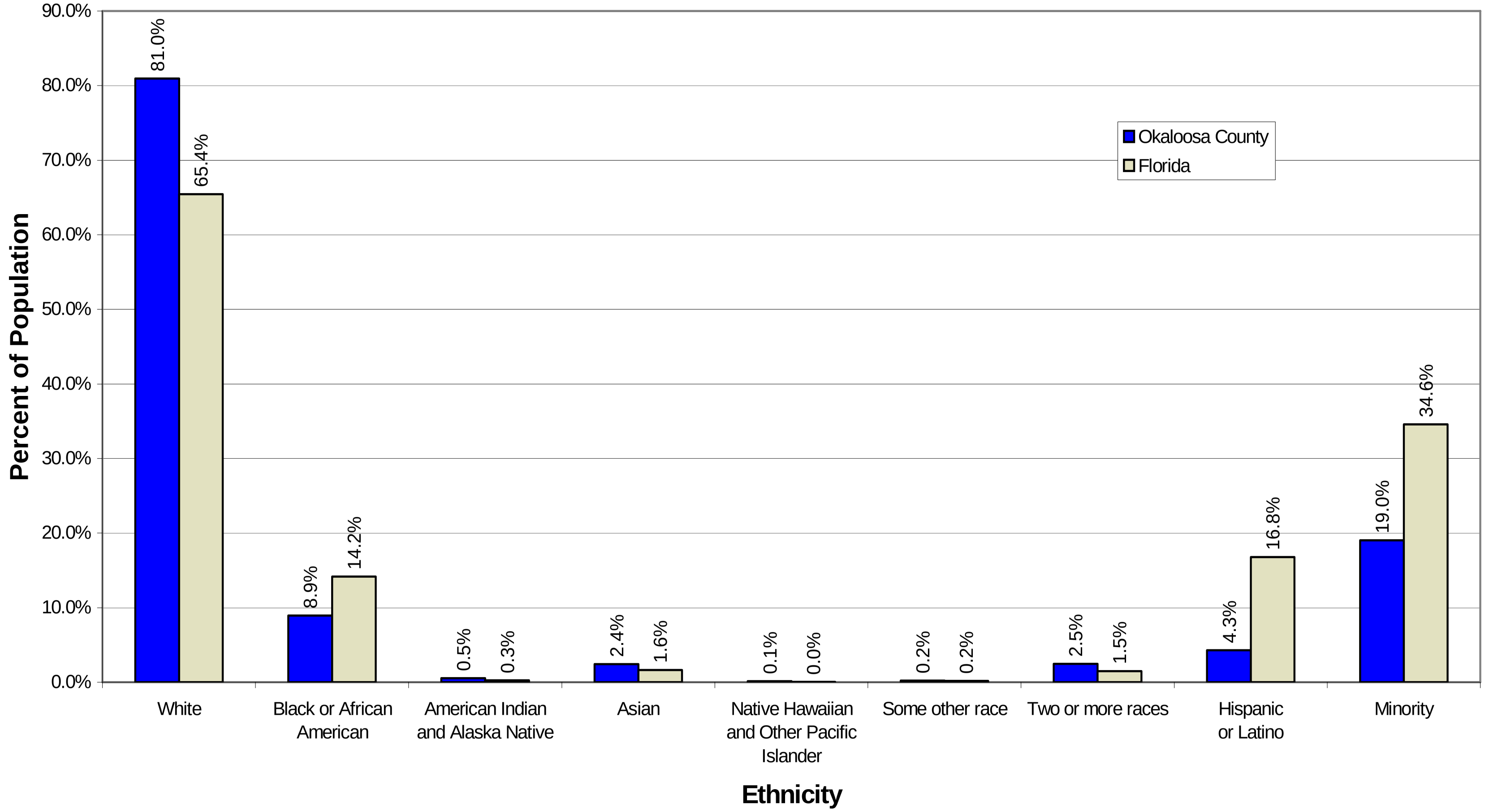
[41] *Census Bureau 2000*

[42] *Census Bureau 2000*



Source: U.S. Census Bureau, 2000.

Note: The percent of the population by ethnicity for the study area will not equal the average of the counties' percent of the population by ethnicity because denominators (county populations) are not common to all.

Figure 4.1.6.1-1: Ethnicity of Eglin AFB, Socioeconomic Study Area

4.1.6.2 Environmental Consequences

Some JSF DT personnel may temporarily detach from NAS Patuxent River, to participate in the proposed JSF DT at the McKinley Climatic Laboratory. These transfers would be of short duration, and personnel would stay in temporary housing (such as hotels or on-base housing) during the proposed tests. Based on the threshold criteria, it does not appear any environmental justice populations would be affected from the proposed JSF DT. Overall, socioeconomic impacts (both positive and negative) would be minor to negligible, from the limited arrivals and departures of the F-35 at Eglin AFB and considering the proposed JSF DT is conducted inside the McKinley Climatic laboratory chambers.

4.2 NAWCWD CHINA LAKE

4.2.1 China Lake General Information

Naval Air Weapons Station (NAWS), host to NAWCWD China Lake, is located in southern California's Western Mojave Desert, approximately 150 miles northeast of Los Angeles (depicted in Figure 4.2.1-1). The Station, composed of the North and South Ranges, encompasses over 1.1 million acres of which 17,000 square miles are restricted airspace and 1,700 square miles are dedicated land space. NAWS/NAWCWD China Lake occupies parts of Kern, Inyo, and San Bernadino Counties. NAWCWD China Lake serves as the Navy's RDT&E center of excellence for weapon systems associated with air warfare, aircraft weapons integration, missiles and their subsystems, and airborne electronic warfare systems. Expertise includes ordnance environmental and safety testing, ordnance warhead testing, radar cross-section measurement, high-speed track testing, parachute and ejection seat testing, and electronic warfare testing. NAWCWD China Lake's mission is to provide the warfighter with absolute combat power through technologies that deliver dominant combat effects and matchless capabilities by: (1) performing RDT&E, logistics, and in-service support for guided missiles, free fall weapons, targets, SE, crew systems, and electronic warfare; (2) integrating weapons and avionics on tactical aircraft; (3) operating the Navy's western land and sea range test and evaluation complex; and (4) developing and applying new technology to ensure battle space dominance.

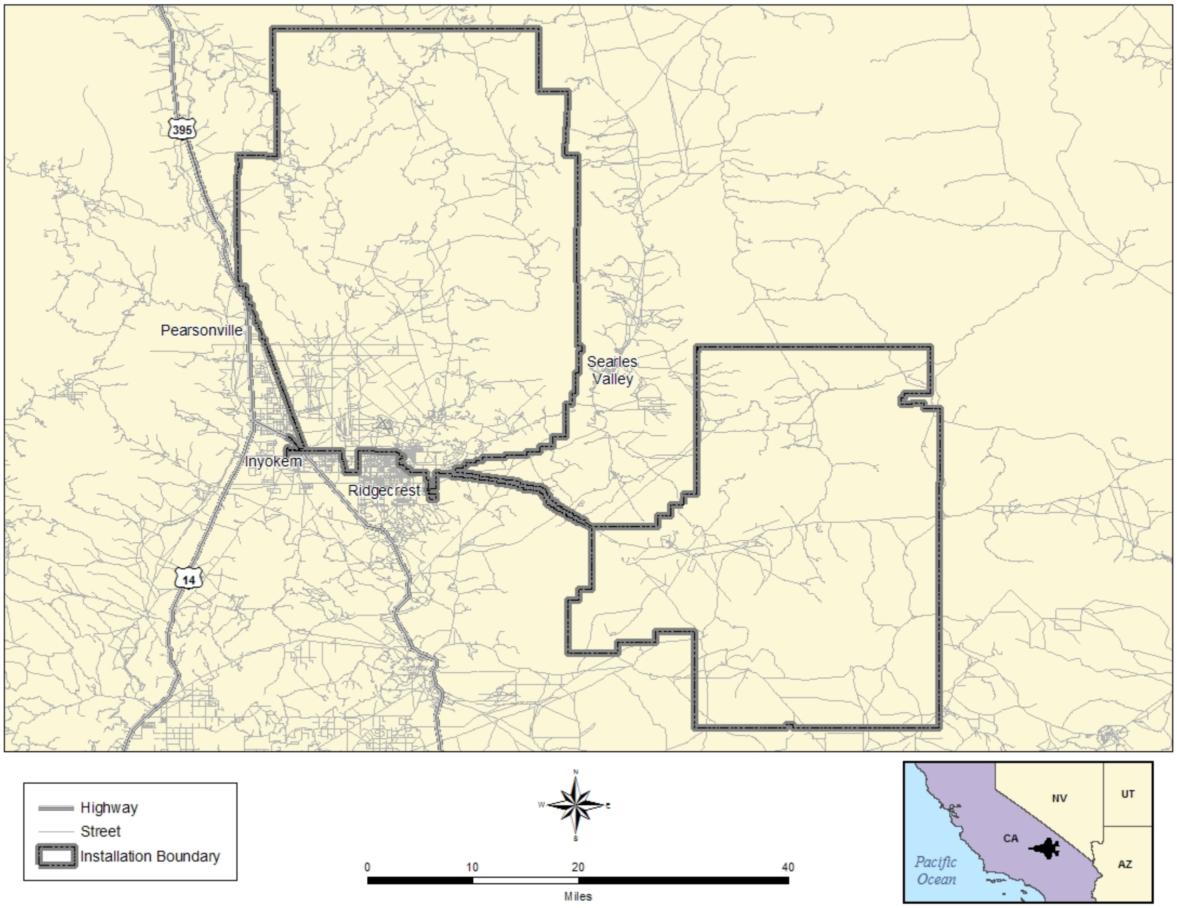


Figure 4.2.1-1: General Map of NAWCWD China Lake

4.2.2 Proposed JSF DT at NAWCWD China Lake

The purpose of the proposed JSF DT at NAWCWD China Lake would be to conduct mission systems, weapons separation & integration, and CTOL tests over a six year period. Planned flight tests would peak in Test Year 5. Table 4.2.2-1 lists the proposed flight tests and support aircraft. Table 4.2.2-2 lists the stores/expendables proposed for use. The proposed JSF DT is considered consistent with on-going operations and similar in scope with other aircraft programs using the facility and range capabilities of NAWCWD China Lake. All proposed flight tests would be conducted at altitudes both above and below 3,000 feet, and in compliance with NAWCWD China Lake airspace use restrictions and air operation procedures. Approximately 60% of the proposed test activities anticipated within NAWCWD China Lake ranges would be at and below 3,000 feet AGL, but of short duration in support of mission systems and weapons separation & integration tests. No supersonic flights are planned for the proposed mission system tests. All aircraft flights would begin and end at Edwards AFB with no landings planned at NAWCWD China Lake runways except in the event of an aircraft emergency. Transit flights between Edwards AFB and NAWCWD China Lake would be through non-military use airspace appropriately coordinated with the FAA. All proposed JSF DT activities would occur within the restricted and MOAs. These areas are governed by comprehensive operating procedures, which reduce the potential for aircraft accidents. The proposed JSF DT conducted within NAWCWD China Lake ranges and airspace, as well as non-military use airspace, would not result in any changes to the existing airspace areas or use parameters or require any new restrictions.

Table 4.2.2-1: Proposed JSF DT Profile at NAWCWD China Lake

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Fight Hours	Total No. Flights	Total Flight Hours
2	Mission Systems	10	19	F-16, KC-135	20	50	30	69
3	Weapons Separation & Integration, Mission Systems	17	34	F-16, KC-135	46	109	63	143
4	CTOL FQ, Weapons Separation & Integration, Mission Systems	27	54	F-16, KC-135	69	165	96	219
5	Same as Test Year 4	47	94	F-16, KC-135	55	132	102	226
6	Same as Test Year 3	19	38	F-16, KC-135	50	119	69	157
7	Same as Test Year 2	4	8	F-16, KC-135	6	16	10	24
2-6	CATB	0	0	Modified 737	20	60	20	60
	TOTAL	***124***	***247***		***266***	***651***	***390***	***898***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005).

Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Table 4.2.2-2: Proposed JSF DT Stores/Expendables at NAWCWD China Lake

Test Year	Stores/Expendables	
	Type	**Quantity***
2	AIM-120-CATM (1) AIM-120-AAVI (3)	4
3	2K JDAM 84-GTV (10) 1K JDAM 83-GTV (5)	15
4	JSOW (2) JSOW-GTV (10) GBU 12-GTV (18) WCMD-D4 (10) 2K JDAM 109-GTV (5) MK82 LDGP-inert (40)	85
5	AIM-120C-AAVI (4) JSOW-GTV (4) AIM-120 B-AAVI (8) AIM-9X-AAVI (4) 109 JDAM PGK-GTV (5) 82 JDAM PGK-GTV (5)	30
6	N/A	N/A
7	N/A	N/A

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005).

Note: Proposed stores/expendables reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

****Total for all types***

All SOPs in place for the safe use and release of stores/expendables would be adhered to during the proposed JSF DT activities at NAWCWD China Lake.

4.2.3 Air Quality at NAWCWD China Lake

4.2.3.1 Affected Environment

Section 3.3 of the *Final Environmental Impact Statement for Proposed Military Operational Increases and Implementation of Associated Comprehensive Land Use and Integrated Natural Resources Management Plans, NAWS China Lake (February 2004)* contains additional details on the regulatory environment, sources of air emissions, and baseline conditions at NAWS China Lake.

The California Air Resources Board (CARB) is responsible for enforcing regulations designed to achieve and maintain the state standards. The local agencies responsible for the administration and enforcement of air quality regulations affecting NAWS China Lake are Inyo County Great Basin Unified Air Pollution Control District (APCD), Kern County APCD (KCAPCD), and San Bernardino County Mojave Desert APCD (MDAPCD). The current state ambient air quality standards applicable to NAWS China Lake are provided in Table 4.2.3.1-1. There are no sulfate, hydrogen sulfide, or vinyl chloride emissions from the proposed JSF DT. These emissions are included in Table 4.2.3.1-1 to provide a comprehensive summary of California ambient air quality standards.

Table 4.2.3.1-1: California Ambient Air Quality Standards

Criteria Pollutant	Averaging Time	California Standard[a] µg/m³ (ppm)
CO[b]	8 hours 1 hour	10,000 (9) 23,000 (20)
Pb[c]	30-day average	1.5
NO_2	1 hour	470 (0.25)
O_3	1 hour 8 hour	180 (0.09) 137 (0.070)
PM_{10}	Annual 24 hours	20 50
$PM_{2.5}$	Annual	12
SO_2	24 hours 1 hours	105 (0.04) 655 (0.25)
Visibility Reducing Particles	8 hour	Extinction coefficient of 0.23 per kilometer—visibility of ten miles or more due to particles when relative humidity is less than 70%
Sulfates	24 hour	25
Hydrogen Sulfide	1 hour	42 (0.03)
Vinyl Chloride[c]	24 hour	26 (0.01)

µg/m³ = micrograms per cubic meter
ppm = parts per million

Notes:
- *a. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide [one and 24 hour], NO_2, suspended particulate matter (PM_{10}, $PM_{2.5}$), and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.*
- *b. Eight hour standard for CO at Lake Tahoe is 6 ppm (7,000 µg/m³).*
- *c. The CARB has identified lead and vinyl chloride as toxic air contaminants with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.*

Inyo and San Bernardino counties are in attainment for O_3. However, Eastern Kern County is classified as a serious nonattainment area for the Federal one-hour O_3 standards. In addition, portions of NAWS China Lake lie in five different nonattainment areas for Federal PM_{10}, as illustrated in Figure 4.2.3.1-1. Table 4.2.3.1-2 indicates the PMO attainment status.

Figure 4.2.3.1-1: NAWS China Lake Federal Nonattainment Areas for PM_{10}

Table 4.2.3.1-2: NAWS China Lake Federal Attainment and Nonattainment Areas for PM_{10}

Area	Attainment Status (*de minimis* threshold)	China Lake Coverage
Inyo County Attainment Area (Portion of Inyo County not included in Searles Valley and Owens Valley nonattainment areas)	Attainment	The northeastern potion of the North Range is designated as an attainment area for the Federal PM_{10} standard.
Cosco Junction, Trona, Indian Wells Valley and Mojave Desert Nonattainment Areas. The Mojave Desert Nonattainment Area includes the on-station portions of San Bernardino county outside of the *Trona Nonattainment Area.*	Moderate Nonattainment [100 tons per year (tpy)]	Most portions of the North Range and all of the South Range.
Owens Valley Nonattainment Area (encompasses a small on station portion of Inyo county)	Serious Nonattainment (70 tpy)	Northwestern corner of the North Range.

Source: Final Environmental Impact Statement for Proposed Military Operational Increases and Implementation of Associated Comprehensive Land Use and Integrated Natural Resources Management Plans, NAWS China Lake (February 2004).

In addition, the Kern County portion of NAWS China Lake, which lies in the Indian Wells Valley PM_{10} nonattainment area, is within the Federal one-hour O_3 nonattainment area. Portions in Kern County and San Bernardino County are also in the state O_3 nonattainment, while the Inyo County portion is unclassified for the state O_3 standard. For the eight-hour O_3 NAAQS, eastern Kern County was designated subpart 1 nonattainment with a general conformity *de minimis* threshold of 100 tpy, but all other portions of NAWS China Lake are in attainment areas.[43] The portion of Searles Valley in San Bernardino County (Trona) is the only area in the state designated as nonattainment for the California hydrogen sulfate air quality standard. Eastern Kern County and San Bernardino Counties are considered moderate nonattainment for the state O_3 standard. The entire state is considered nonattainment of the state PM_{10} standard.

Because portions of NAWS China Lake are in nonattainment areas, *de minimis* levels have been established under the general conformity rule for conformity with the CAA. Table 4.2.3.1-3 identifies the general conformity *de minimis* levels for NAWS China Lake nonattainment areas.

Table 4.2.3.1-3: *De Minimis* Levels for NAWS China Lake Nonattainment Areas

Pollutant	Nonattainment Status	Area	*de minimis* Level
1-hr O_3	Serious Nonattainment	Kern County	50 tpy per pollutant precursor [Nitrogen Oxides (NO_X) and Volatile Organic Compounds (VOCs)]
8-hr O_3	Subpart 1 Nonattainment	Kern County	100 tpy per pollutant precursor (NO_X and VOCs)
PM_{10}	Moderate Nonattainment	Searles Valley Nonattainment Area Mojave Desert Nonattainment Area	100 tpy
	Serious Nonattainment	Owens Valley Nonattainment Area	70 tpy

The dominant air emissions sources at NAWS China Lake are related to range flight operations, airfield flight operations, and range ground operations. There are also a number of activities that emit minor amounts of air pollutants. These activities include gasoline station use, welding, painting, vehicle and aircraft maintenance, propellant mixing and curing, research laboratory operations, and facilities maintenance. All of these operations are in full compliance with air quality regulations and are permitted in accordance with the respective APCDs in Kern, Inyo, or San Bernardino counties. Air emissions sources associated with the proposed JSF DT at NAWS China Lake are related to range flight operations. Table 4.2.3.1-4 identifies the annual baseline emissions for the air basins in which NAWS China Lake is located, and also includes the calculated 10% annual emissions. The general conformity rule requires that the action must not only have emissions less than the *de minimis* threshold, but also must be less than 10% of the emissions of the air basin.

[43] *The subpart 1 nonattainment designation means that the area is considered nonattainment but is not designated so under subpart 2 which sets attainment deadlines.*

Table 4.2.3.1-4: Baseline and 10% Air Basin Emissions Inventory

		Baseline Values tons/day [Metric Tons (MT)/day]			10% Threshold tons/year (MT/year)		
District	Baseline Year	NO_x[1]	VOC[1]	PM_{10}	NO_x	VOC	PM_{10}
Great Basin Unified APCD[2]	2003	N/A	N/A	216.66 (196.55)	N/A	N/A	7,914 (7,179)
Kern County Air Pollution Control District (KCAPCD)[3]	1990	46.85 (42.50)	27.90 (25.31)	N/A	1,711 (1552)	1,019 (924)	N/A
Mojave Desert Air Quality Management District (MDAQMD)[4]	2002	N/A	N/A	292.59 (265.44)	N/A	N/A	10,687 (9,695)

Notes: 1. Tons per day (metric tons per day) during the ozone season (May through September).
2. California Air Resources Board, Almanac Emissions Projection Data by EIC, 2003 Annual Average Emissions (tons/day), 2004.
3. Kern County Air Pollution Control District, Ozone Attainment Demonstration, Maintenance Plan, and Redesignation Request, Eastern Kern County Federal Planning Area, Amended May 1, 2003.
4. Mojave Desert Planning Area Federal Particulate Matter (PM_{10}) Attainment Plan, Final, July 1995.

The general conformity rule requires that potential emissions be determined on an annual basis and compared to the annual *de minimis* levels for those pollutants (or their precursors) for which the area is classified as nonattainment. The ROI for the Proposed Action at NAWS China Lake is comprised of several different nonattainment areas with different *de minimis* levels. Therefore, the *de minimis* levels applicable to each area must be analyzed. Since only a southwestern portion of the North Range at NAWS China Lake is classified as serious nonattainment for O_3, the *de minimis* standard applicable for conformity is set at 50 tpy per O_3 precursor pollutant [NO_x and VOCs] per action per year. However, with respect to nonattainment with Federal PM_{10} standards, NAWS China Lake is classified as both moderate and serious nonattainment. For the purposes of this analysis, the most stringent *de minimis* level used is 70 tpy of PM_{10} per action associated with the Owens Valley Nonattainment Area.

4.2.3.2 Environmental Consequences

Based on the results of the emissions analysis performed, the Proposed Action would not require a formal Conformity Determination because projected emission levels would be below the respective *de minimis* criteria. Furthermore, since the annual project-induced emissions do not make up 10% or more of the metropolitan region's projected emissions, the emissions from the implementation of the Proposed Action are not anticipated to be regionally significant. Table 4.2.3.2-1 lists only the emissions for aircraft operations. HC emissions are assumed to be VOCs. At this time, there would be no expectation of any other direct or indirect sources associated with the proposed JSF DT at NAWS China Lake, nor does it appear that there would be any significant environmental impacts. It is also expected the Proposed Action would not have a significant impact on the local air quality with respect to the California ambient air quality standards (refer to Table 4.2.3.1-1). Additional details that support Table 4.2.3.2-1 are provided in the JSF EA/OEA Administrative Record (AR) maintained by the JPO and JSF Environmental, Safety, and Occupational Health (ESOH) Lead.

Table 4.2.3.2-1: NAWS China Lake Preliminary Air Emissions

Test Year	CO tpy (MT/yr)	NOx tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
2	0.13 (0.12)	0.73 (0.66)	0.13 (0.12)	0.06 (0.05)	0.24 (0.22)
3	0.26 (0.24)	1.45 (1.32)	0.30 (0.27)	0.11 (0.10)	0.47 (0.43)
4	0.25 (0.23)	2.10 (1.91)	0.43 (0.39)	0.15 (0.14)	0.68 (0.62)
5	0.34 (0.31)	2.86 (2.59)	0.42 (0.38)	0.21 (0.19)	1.01 (0.92)
6	0.22 (0.20)	1.68 (1.52)	0.38 (0.34)	0.12 (0.11)	0.62 (0.56)
7	0.02 (0.02)	0.22 (0.20)	0.03 (0.03)	0.02 (0.02)	0.08 (0.07)
Highest Test Year (5)	0.34 (0.31)	2.86 (2.59)	0.42 (0.38)	0.21 (0.19)	1.01 (0.92)

tpy = tons per year, MT/yr = Metric Tons per year

4.2.4 Noise at NAWCWD China Lake

4.2.4.1 Affected Environment

Aircraft operations are conducted within the airspace above and surrounding NAWS China Lake, including restricted areas and MOAs. Airspace operations and coordination with surrounding air traffic control facilities are conducted according to FAA and DoN regulations. Restricted Area R-2505 overlies the North Range, while Restricted Area R-2524 overlies the South Range. Comprehensive operating procedures are employed to reduce the potential for aircraft accidents. Although the FAA requires a minimum of 1,000 feet AGL over inhabited areas (including Ridgecrest, Trona, and Inyokern), aircrews are encouraged to maintain a minimum altitude of 3,000 feet over these areas.

Requests for use of the North Range airspace, South Range airspace, and test and training events using the Electronic Combat Range (ECR) are made through the applicable test office responsible for that particular area. Use of military airspace outside of the Station's boundaries is scheduled through the R-2508 Central Coordinating Facility (CCF) located at Edwards AFB. The R-2508 Complex includes airspace presently managed by the three principal military activities: AFFTC, Edwards AFB; National Training Center (NTC) Fort Irwin; and NAWCWD China Lake. The R-2508 Complex is composed of a number of restricted areas, MOAs, Air Traffic Control Assigned Airspace (ATCAA) areas, and the Trona Controlled Firing Area (CFA).

The Trona CFA provides a contiguous operational airspace between the airspace above the North Range (R-2505) and the airspace above the South Range (R-2524) for conducting free flight weapons testing. The Trona CFA exists within the already established R-2508 Complex and coexists with currently defined military operations areas and ATCAAs. Testing in the Trona CFA goes through a thorough safety review. Ground and/or airborne radar, and experienced range personnel acting as visual observers monitor each test through the Trona CFA. To help advertise the activation of the CFA, notice is provided to Trona and Inyokern Airports at least 24 hours in advance of intended operations.

4.2.4.2 Environmental Consequences

As described in Section 4.2.2 of this EA/OEA, the proposed JSF DT at NAWCWD China Lake would be to conduct mission systems, weapons separation & integration, and CTOL tests. Transit flights between Edwards AFB and NAWCWD China Lake would be through nonmilitary use airspace appropriately coordinated with the FAA. All proposed JSF DT activities would occur within the restricted airspace and MOAs.

The Proposed Action would potentially add approximately 1% additional flight hours to the R-2505 and R-2524 Complex. This potential increase is below both the Limited (15% flight hour increase) and

Moderate (25% flight hour increase) Expansion Alternatives presented in the 2004 Final Environmental Impact Statement (FEIS) for NAWCWD China Lake. Peak activity from the proposed JSF DT would be in Test Year 5, as illustrated in Table 4.2.2-1, consisting of 226 flight hours total for both F-35 and support aircraft. This would be less than a 1% increase over the 2004 utilization of 17,568 hours reported to the FAA for both the R-2505 and R-2524 ranges.[44] This increase would be considered less significant than the Limited Expansion Alternative from the *Final Environmental Impact Statement for Proposed Military Operational Increases and Implementation of Associated Comprehensive Land Use and Integrated Natural Resources Management Plans, NAWS China Lake (February 2004),* which considered subsonic operations would increase by 15% over five years. Conclusions from the 2004 FEIS stated:[45]

> *"Implementation of the Moderate Expansion Alternative would result in a general increase in noise levels of about 5 dB [decibel] range-wide over baseline conditions (the minimum change in the time-averaged sound level of individual events which an average human ear can detect is about 3 dB). Projected noise levels from range flight activity would be 47 to 61 dB in the Baker, Charlie, and Airport Lake ranges, 47 dB in the Superior Valley range, and less than 52 dB elsewhere in the North and South Ranges. Overall projected noise levels at off-station locations resulting from the proposed increase in subsonic range flight operations would remain below 65-dB CNEL [Community Noise Equivalent Level] and would be compatible with land use compatibility criteria. Therefore, subsonic range flight operations under the Moderate Expansion Alternative would have less than significant noise impacts."*

Therefore, the proposed JSF DT conducted within NAWCWD China Lake ranges and airspace, as well as non-military use airspace, would not likely result in any significant changes to the existing noise environment; or require changes or restrictions to the existing airspace areas or use parameters.

Additionally, the Scheduling Agency coordinates the hour allocation for range use, and notifies the FAA Air Route Traffic Control Center when these areas are activated. Approximate accounting of all flight test programs and operations anticipated, including the proposed JSF DT, within the NAWCWD China Lake Range would be established months in advance. It is not anticipated that additional time would be allocated specifically for the proposed JSF DT.

4.2.5 Biological/Natural Resources at NAWCWD China Lake

4.2.5.1 Affected Environment

The *Final Environmental Impact Statement (FEIS) For Proposed Military Operational Increases and Implementation of Associated Comprehensive Land Use and Integrated Resources Management Plans (February 2004)* provides details on the potential biological/natural resources existing within the Station and the conclusions as to what potential impact and/or mitigation are necessary to protect biological / natural resources.

Land areas are divided into smaller units to facilitate operations planning and management. All land use management units (except Mainsite, Propulsion Laboratories, Main Magazines, and Armitage Airfield) are defined as active ranges per DoD Directive 4715.11, *Environmental and Explosives Safety Management on Department of Defense Active and Inactive Ranges Within the United State*s. Also defined by their principal function and operational uses, the areas are generally separated into two principal categories: those within the developed portions of the Station (Mainsite, Armitage Airfield, Main Magazines, and Propulsion Laboratories), and those that comprise the test and training areas of the

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[44] *FAA 2004 Range Utilization Report for Restricted Areas R-2505 and R-2524*

[45] *China Lake EIS 2004*

North and South Ranges (the two main categories are discussed in the sections below). A description of the specific management units is provided in Appendix D.1.

California is botanically divided into three floristic provinces: California, Great Basin, and Desert. All three provinces are present in the northern half of the North Range. The southern half of the North Range and all of the South Range are in the Desert floristic province. Animal and plant species are also influenced by the presence of numerous springs and seeps, as well as by a diverse topography and wide range of elevation changes. Minimum and maximum elevations on the South Range are 1,660 feet above MSL at the Movie Lake playa and 5,578 feet above MSL on Straw Peak. Most of the plants are representative of the Desert and Great Basin provinces, but a small number of plants that typically occur in the Sierra Nevada are also present. There is a variety of wildlife present at NAWCWD China Lake.

Information about plants and animals found at NAWCWD China Lake is provided in this subsection. The discussion on plants is to provide context for the animals that may be potentially affected by the Proposed Action. Table 4.2.5.1-1 is a list of threatened and endangered spcies that may occur at NAWCWD China Lake, as discussed in further detail within this subsection.

Table 4.2.5.1-1: Threatened and Endangered Species that May Occur at NAWCWD China Lake

Common Name (*Scientific Name*)	Federal Status	State Status
Mojave tui chub *(Gila bicolor mohavensis)*	E	E
Desert tortoise *(Xerobates[Gopherus] agassizii)*	T	T
Inyo California towhee *(Pipilo crissalis eremophilus)*	T	E
California brown pelican *(Pelecanus occidentalis californicus)*	E	E
Bald Eagle *(Haliaeetus leucocephalus)*	T	E
Western snowy plover *(Charadrius alexandrinus nivosus)*	T	
Southwestern willow flycatcher *(Empidonax traillii extimus)*	E	E
Least Bell's vireo *(Vireo bellii pusillus)*	E	E

Source: Final EIS for Proposed Military Operational Increases and Implementation of Associated Comprehensive Land use and Integrated natural Resources Management Plans, February 2004.

Legend: E=Endangered, T=Threatened

Plant Species

Sixteen different plant communities are present on the North and South Ranges. Transition zones occur between many of the different plant communities. The plant communities vary from barren playas, alkali sink, saltbush scrub, and creosote bush scrub at lower elevations to sagebrush scrub and pinyon woodland found in the Coso and Argus ranges. Mojave mixed woody scrub is the most common plant community type, followed by creosote bush scrub. Desert riparian areas are scattered throughout both ranges, in association with springs and seeps on the North and South Ranges. Primarily naturalized weeds are known to occur only in the NAWCWD China Lake main complex.

There are currently no known occurrences of Federally-listed threatened or endangered plant species. However, some areas of the station contain habitat that could support such listed species. One example is the Lane Mountain milk-vetch *(Astragalus jaegerianu*s) that was listed as an endangered species. This species has been identified approximately four miles south of the Station's boundary. Potential habitat is located on the South Range in Superior Valley and on the gentle slopes bordering the valley. Focused surveys have been conducted in this area of the Station, but no occurrences of the Lane Mountain milk-vetch have been confirmed.

Mammals

NAWCWD China Lake ranges support more than 80 mammal species. Many small mammals live in the driest portions of the desert. A number of wide-ranging carnivores are also relatively common in the desert including coyote *(Canis latrans*), desert kit fox *(Vulpes macrotis*), ringtail *(Bassariscus astutus*), long-tailed weasel *(Mustela frenata*), American badger *(Taxidea taxus*), mountain lion *(Felis concolor*), and bobcat *(Lynx rufus*). The common gray fox *(Urocyon cinereoargenteus*) occurs in the pinyon pine and other woodlands. Larger mammals include mule deer *(Odocoileus hemionus*), Nelson's bighorn sheep *(Ovis canadensis nelsoni*), as well as the feral burros *(Equus asinus*) and feral horses *(Equus caballus*). Twelve bat species have been identified.

Birds

Probably the most well documented wildlife species occurring at NAWCWD China Lake are its native and transient bird populations; the majority of birds occurring are migratory species. Riparian habitat is present along washes, around seeps and springs, and adjacent to ponds, wherever sufficient water is near the surface to sustain woody trees and dense shrubs. The riparian corridors and oasis of vegetation provide important migration corridors for neotropical migrants. Wetland and pond habitat provides a source of more permanent surface and open water and vegetation for resting, feeding, and nesting. Non-native vegetation found on the golf course and in residential and developed Station areas represents the disturbed habitat type. To date, 310 different bird species, including the Federally threatened Inyo California towhee (*Pipilo crissalis eremophilus*), have been identified. The Federally endangered southwestern willow flycatcher *(Empidonax traillii extimus*) is a known migrant but does not breed on the Station.

Five Federally-listed nonresident birds occur as migrants with varying degrees of abundance at NAWCWD China Lake: the California brown pelican *(Pelecanus occidentalis californicus*), bald eagle *(Haliaeetus leucocephalus*), least Bell's vireo *(Vireo bellii pusillus*), willow flycatcher, and western snowy plover.

Reptiles and Amphibians

Some of the most conspicuous wildlife species on NAWCWD China Lake's ranges are the reptiles. Thirty-one species of reptiles have been identified, including a variety of lizards and snakes. The Federally- and state-listed threatened desert tortoise *(Xerobates [Gopherus] agassizii*) occurs on the station, with higher densities on the South Range. Two snapping turtle species *(Chelydra serpentina*) have been found in the Lark Seep channels as an introduced exotic species.

Desert tortoise are known to occur at NAWCWD China Lake in creosote bush scrub and saltbush scrub communities; and in fact, a portion of the Superior-Cronese Critical Habitat Unit (one of four units of Critical Habitat designated by the United States Fish and Wildlife Services (USFWS) in the Western Mojave Recovery Unit) is in the southern portion of South Range.

Although the desert is characterized as an arid environment, there is enough moisture associated with naturally and artificially occurring water sources to support amphibious species. Only two species of native amphibians, the western toad *(Bufo boreas*) and Pacific tree frog *[Pseudacris (Hyla) regilla*], have been identified. Although the slender salamander *(Batrachoseps sp*.) has not been observed, its habitat is present, and it also may occur at the station. During the summer of 1998, an unsubstantiated report of slender salamanders was made immediately east of the Station boundary in Great Falls Basin. Bullfrogs *(Rana catesbeian*a) have been found in the Lark Seep channel as an introduced exotic species.

<u>*Fishes*</u>

There are more than 120 springs, two seeps (i.e., pools formed by water slowly percolating to the surface), and approximately 20 constructed ponds; however, only five fish species occur on the Station. The Federally endangered Mohave tui chub *(Gila bicolor mohavensi*s) has been present on the Station since its introduction; while the other species, mosquito fish *(Gambusia affini*s), bullhead catfish *(Ictalurus* sp.), goldfish *(Carassius auratu*s), and large mouth bass *(Micropterus salmoide*s), are introduced nonnative species. The Mojave tui chub, mosquito fish, and bullhead catfish are known to exist in the Lark Seep and G-1 Seep system located on the south-central portion of the North Range. Goldfish are present in the Lark Seep and G-1 Seep system and in a number of constructed ponds. Largemouth bass occur in ponds at Area R on the North Range.

4.2.5.2 Environmental Consequences

Proposed test activities under either Proposed Action alterative would occur at flights above and below 3,000 feet AGL. The greatest potential for impacts to biological/natural resources are from discrete individual flight tests conducted below 3,000 feet in relation to the weapons separation & integration and mission systems test activities, where short duration and low-angle flights may occur. No supersonic flights nor landings or takeoffs would be conducted at NAWCWD China Lake. Potential impacts to biological resources from the proposed JSF DT would be limited predominantly to noise-induced effects and impacts.

Biological species are expected to already be acclimated to the noise generated from RDT&E activities conducted on the Station and within the ranges used by NAWCWD China Lake. The initial temporary response to overflight noise from the F-35 or weapons separation tests would not likely have a negative impact on any species' population at NAWS/NAWCWD China Lake. The proposed JSF DT program would peak in Test Year 5 with a planned flight profile of 102 flights (47 for the F-35 and 55 for support aircraft) and 226 flights hours (94 for the F-35 and 132 for support aircraft). The proposed F-35 and associated support flights would represent a less than 1% increase over the projected baseline flight operations at NAWCWD China Lake (4,600 hours). The entire proposed JSF DT program would represent 1% or less of the operations conducted within NAWCWD China Lake [approximately 39,500 flight hours (range and airfield flights)]. The proposed JSF DT would be conducted in established MOAs consistent with established operating procedures. All proposed weapons separation tests would occur on established ranges. JSF DT store/expendable projections would be less than 3.5% of the typical stores released (missiles and bombs) at NAWCWD China Lake (based on the proposed 15% target use increase in the Limited Expansion Alternative in the FEIS).[46]

Based on annual operations and similar T&E Programs at NAWCWD China Lake, noise levels from F-35 and support aircraft flights would not likely affect the surrounding biological communities and no change in land area is anticipated from the proposed JSF DT. The potential to startle wildlife would likely be minimal because most of the proposed tests would occur above the 550-foot AGL zone that has been shown to account for most wildlife reactions. Any low-altitude flights associated with pullouts after dives would be of a very short duration on any given run.

46 *As depicted on page 3.1-16 of the NAWC China Lake DEIS, the 15% increase in missile and bomb baseline use in year of 1998 (2,277) equals 2,618. The peak year for proposed JSF DT is 2009 with 85 stores proposed for release.*

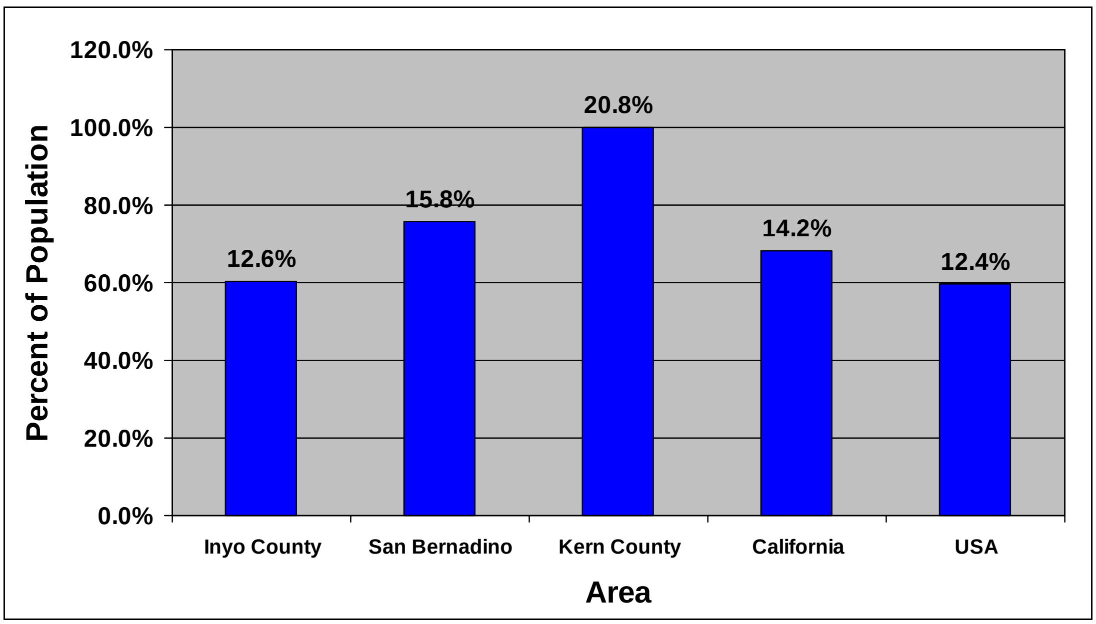
4.2.6 Socioeconomics at NAWCWD China Lake

4.2.6.1 Affected Environment

Socioeconomic impacts at NAWCWD China Lake is not anticipated as a result of the alternatives. No new people would be required to support the proposed JSF DT. However, impacts have been considered for environmental justice.

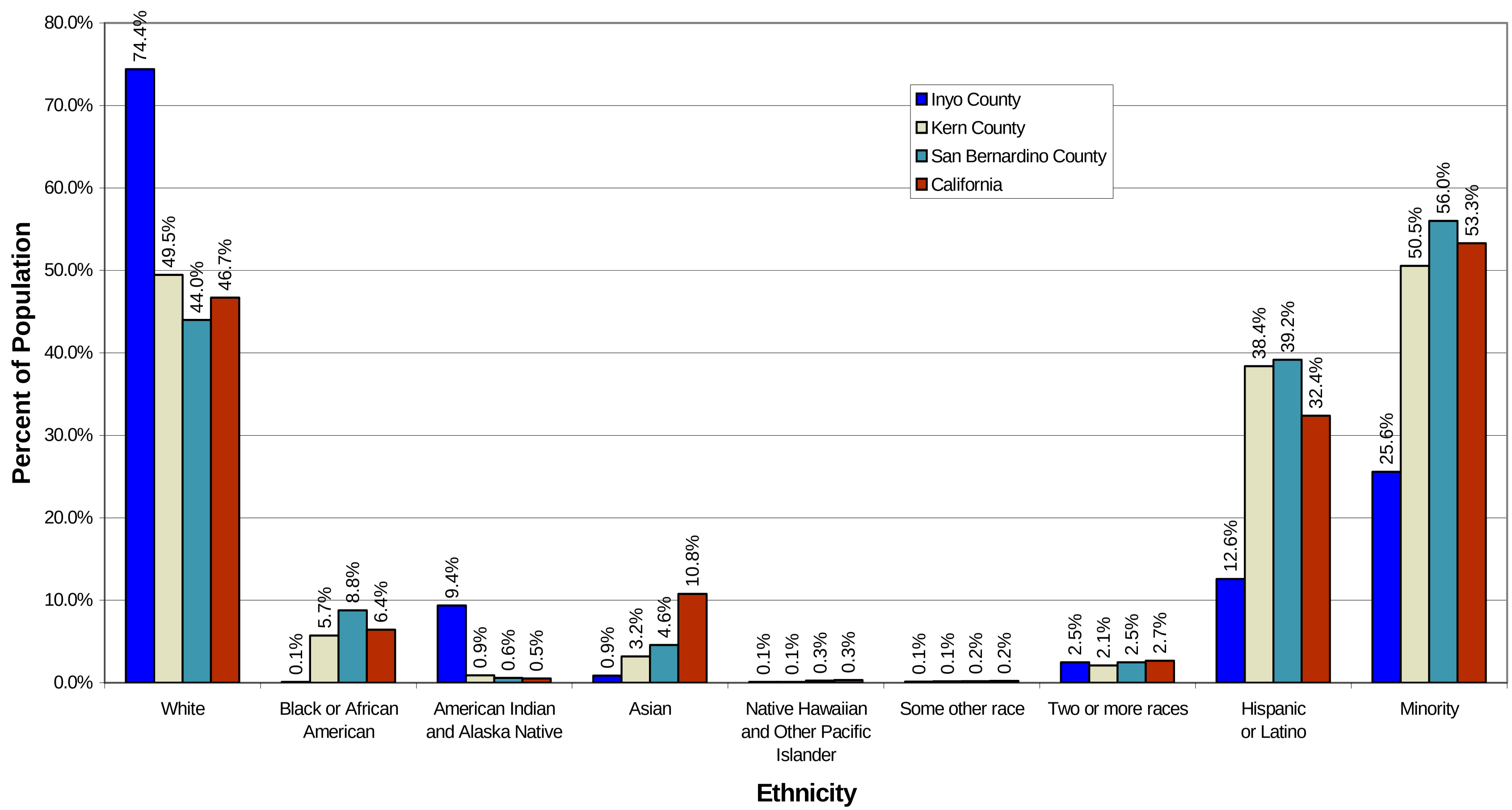
Poverty rates for the NAWCWD China Lake area are summarized in Figure 4.2.6.1-1. The poverty rate is 12.6% in Inyo County, 20.8% in Kern County, and 15.8% in San Bernardino County. The poverty rates in all three counties are below the set CEQ threshold of 25% for low-income populations, but poverty rates in San Bernardino and Kern Counties are higher than the California statewide estimates of 14.2%.

Population ethnicity is summarized in Figure 4.2.6.1-2. The three-county area shows a population that is predominantly white (45.7%) with a large Hispanic or Latino representation (38.7%). The remaining race distribution is Black or African American (7.9%), Asian (4.2%), two or more races (2.4%), American Indian or Native Alaskan (0.7%), some other race (0.2%), and Native Hawaiian or Pacific Islander (0.2%). The three-county area is similar to California with high Hispanic or Latino representations. Percent minority in San Bernardino and Kern counties exceeds the CEQ threshold of 50% and is similar to or exceeds statewide estimates of 53.3%.



Source: U.S. Census Bureau, 2000.

Figure 4.2.6.1-1: Poverty Rates for NAWCWD China Lake Socioeconomic Study Area (2000)



Source: U.S. Census Bureau, 2000.

Note: The percent of the population by ethnicity for the study area will not equal the average of the counties' percent of the population by ethnicity because denominators (county populations) are not common to all.

Figure 4.2.6.1-2: Ethnicity for NAWCWD China Lake Socioeconomic Study Area (2000)

4.2.6.2 Environmental Consequences

Based on the threshold criteria, there would be potential environmental justice populations present in the socioeconomic area that could be impacted by the proposed JSF DT. However, these environmental justice populations would not be significantly affected because no changes to existing noise levels and land use are expected. In addition, there would be no landings or takeoffs with the F-35 at the Station. As such, the proposed JSF DT would not likely cause disproportionate high or adverse human health or environmental affects to the environmental justice populations relative to other populations in the area. Any predicted impacts are anticipated to be negligible and the proposed JSF DT activities are similar in scope to the tests currently conducted at NAWCWD China Lake. Similarly, implementation of the proposed JSF DT at NAWCWD China Lake would cause no disproportionately adverse health or safety risks to children. No potential significant impacts to any sensitive receptors (including hospitals, schools, and daycare facilities) where a disproportionately large population of children may be present would be expected to occur.

4.3 NAWCWPNS POINT MUGU

4.3.1 Point Mugu General Information

NAWCWPNS Point Mugu, as depicted in Figure 4.3.1-1, is located approximately 50 miles northwest of Los Angeles, California, in Southern Ventura County. NAWCWPNS controls 36,000 square miles of Special Use Airspace (SUA) over the Pacific Ocean as a sea range. The deep ocean area and controlled airspace associated with the Sea Range parallels the California coastline for about 200 miles and extends seaward for more than 180 miles. The main station at Point Mugu consists of 4,490 acres on the Pacific Coast.

NAWCWPNS activities at Point Mugu are T&E of weapons systems, providing the U.S. and allied forces M&S capabilities and an area to perform actual operations and missile firings. The NAWCWPNS Point Mugu Sea Range provides operationally realistic climatological and physical features that closely simulate conditions in many of the primary threat regions of the world. The NAWCWPNS Point Mugu Sea Range is used primarily to test guided missiles and other weapons systems, as well as the ships and aircraft that serve as platforms for launching weapons/ordnance.

Figure 4.3.1-1: General Map of NAWCWPNS Point Mugu

4.3.2 Proposed JSF DT at NAWCWPNS Point Mugu

The purpose of the proposed JSF DT at NAWCWPNS Point Mugu would be to conduct FQ, mission systems, weapons separation & integration, flutter, and CTOL tests for a six-year time period. Planned flight tests would peak in Test Year 3. Table 4.3.2-1 summarizes the proposed flight tests and support aircraft. Most of the proposed test activities would be conducted outside of 12 NM (approximately 98%). Transit times between the shore and 12 NM would be about 2% of the total planned test activities (approximately 1% between the shore and 3 NM and the other 1% between 3 and 12 NM). Table 4.3.2-2 summarizes the stores/expendables proposed for use. The F-35s would be based at Edwards AFB with the proposed tests flights beginning and ending there. There would be no takeoffs or landings of the F-35 at NAWCWPNS Point Mugu except in the event of an aircraft emergency. The proposed JSF DT is considered consistent with on-going operations, and similar in scope with other aircraft programs using the facility and range capabilities of NAWCWPNS Point Mugu. All proposed flight tests would be conducted at altitudes both above and below 3,000 feet in compliance with NAWCWPNS Point Mugu airspace use restrictions and air operation procedures. Approximately 46% of the proposed test activities anticipated within NAWCWPNS Point Mugu ranges would be at and below 3,000 feet AGL, but of short duration in support of performance, mission systems, and weapons separation & integration tests.

Table 4.3.2-1: Proposed JSF DT Flight Profile at NAWCWPNS Point Mugu

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Fight Hours	Total No. Flights	Total Flight Hours
2	CTOL FQ, Loads, Flutter	20	39	F-16, KC-135	40	100	60	139
3	CTOL FQ, CTOL Performance, CTOL Propulsion, Loads, Flutter, Weapons Separation & Integration, Mission Systems	61	121	F-16, KC-135	46	109	107	230
4	Same as CY2008	21	42	F-16, KC-135	47	115	68	157
5	CTOL FQ, CTOL Propulsion, Weapons Separation & Integration, Mission Systems	33	66	F-16, KC-135	35	89	68	155
6	CTOL FQ, Loads, Flutter, Weapons Separation & Integration, Mission Systems	16	32	F-16, KC-135	32	80	48	112
7	Mission Systems	2	4	F-16, KC-135	3	8	5	12
TOTAL		***153***	***304***		***203***	***501***	***356***	***805***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005).

Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Table 4.3.2-2: Proposed JSF DT Stores/Expendables at NAWCWPNS Point Mugu

Test Year	Stores/Expendables	
	Type	Quantity*
2	N/A	N/A
3	AIM-120 C-AAVI (5) AIM-120-CATM (3)	8
4	AIM-120 C-AAVI (4)	4
5	AIM-120 C-CATM (2) JSOW (3) 2K JDAM 109-STV (2) AIM-120C-AAVI (4)	11
6	AIM-120-CATM (5) AIM-120-AAVI (8) JSOW-GTV (2) AIM 9X-AAVI (7) 109 JDAM PGK-STV (2)	24
7	N/A	N/A

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005).

Note: Proposed stores/expendables reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Total for all types

All SOPs in place for the safe use and release of stores/expendables would be adhered to during the proposed JSF DT activities at NAWCWPNS Point Mugu.

4.3.3 Air Quality at NAWCWPNS Point Mugu

4.3.3.1 Affected Environment

Section 3.2 of the *Final Environmental Impact Statement/Overseas Environmental Impact Statement, Point Mugu Sea Range (March 2002)* contains additional details on the regulatory environment, sources of air emissions, and baseline conditions at NAWCWPNS Point Mugu. The CARB is responsible for enforcing regulations designed to achieve and maintain the state standards, as well as the Federal NAAQS discussed in Section 3.1 of this EA/OEA. Current California standards are provided in Table 4.3.3.1-1. The local agency responsible for the administration and enforcement of air quality regulations affecting NAWCWPNS Point Mugu is the Ventura County Air Pollution Control District (VCAPCD). Portions of the Sea Range are located in Santa Barbara and Ventura counties. The portions of the Sea Range located in Santa Barbara County are governed by Santa Barbara County Air Pollution Control District (SBCAPCD) regulations.

Table 4.3.3.1-1: California Ambient Air Quality Standards.

Criteria Pollutant	Averaging Time	California Standard[a] $\mu g/m^3$ (ppm)
CO[b]	8 hours 1 hour	10,000 (9) 23,000 (20)
Pb[c]	30-day average	1.5
NO_2	1 hour	470 (0.25)
O_3	1 hour 8 hours	180 (0.09) 137 (0.070)
PM_{10}	Annual 24 hours	20 50
$PM_{2.5}$	Annual	12
SO_2	24 hours 1 hour	105 (0.04) 655 (0.25)
Visibility Reducing Particles	8 hours	Extinction coefficient of 0.23 per kilometer—visibility of ten miles or more due to particles when relative humidity is less than 70%
Sulfates	24 hours	25
Hydrogen Sulfide	1 hour	42 (0.03)
Vinyl Chloride[c]	24 hours	26 (0.01)

$\mu g/m^3$ = micrograms per cubic meter

ppm = parts per million

Notes: a. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide [one and 24 hour], NO_2, suspended particulate matter (PM_{10}, $PM_{2.5}$), and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

b. Eight hour standard for CO at Lake Tahoe is 6 ppm (7,000 $\mu g/m^3$).

c. The CARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Ventura County is classified as a severe nonattainment area for the Federal one-hour O_3 standard. Ventura is also designated nonattainment for the state PM_{10}, and $PM_{2.5}$ standards and moderate nonattainment for the state O_3 standard. San Nicolas Island and Santa Cruz Island are considered to be in attainment/unclassified for NAAQS. Santa Barbara County is classified as maintenance for the Federal one-hour O_3 standard and moderate nonattainment for state O_3 standard. Santa Barbara is also in nonattainment for the state PM_{10} standard, but is in attainment for the state $PM_{2.5}$ standard. Santa Barbara is in attainment for all other Federal NAAQS. Santa Barbara County and the Channel Islands would no longer be out of attainment and General Conformity would no longer apply.

Airborne sources of emissions in the Sea Range include military aircraft conducting exercises, contract aircraft making deliveries and transporting personnel, and missile and target launches. Tables 4.3.3.1-2 through 4.3.3.1-3 identify the baseline emissions at the Sea Range.

Table 4.3.3.1-2: Baseline and 10% Air Basin Emissions Inventory

		Basin Baseline Emissions[1] tons/day (MT/day)		10% of Summer Budget Annualized tons/year (MT/year)	
District	Baseline Year	NO_x	VOC	NO_x	VOC
VCAPCD[2]	1990	81.6 (74.0)	96.3 (87.4)	2,980 (2,703)	3,517 (3,191)
SBCAPCD[3]	1999	42.51 (38.57)	40.85 (37.06)	1,924 (1,745)	4,464 (4,050)

Notes: *1. Tons per day (metric tons per day) during the ozone season.*
2. Ventura County 2004 Air Quality Management Plan, Revision, March 2004.
3. Santa Barbara County Air Pollution Control District, 2001 Clean Air Plan, Final, November 2001.

Table 4.3.3.1-3: Summary of Baseline Air Emissions at NAWCWPNS Point Mugu

Emissions, Tons/Year (MT/Year)					
Location	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**
Sea Range Emissions					
Aircraft	7.09 (6.43)	1.71 (1.55)	2.19 (1.99)	0.10 (0.09)	1.04 (0.94)
Missile and Targets	197.72 (179.37)	6.78 (6.15)	6.12 (5.55)	0.26 (0.24)	13.93 (12.64)
Marine Vessels	108.29 (98.24)	259.25 (235.19)	16.23 (14.72)	168.13 (152.53)	28.06 (25.46)
Sea Range Total	313.10 (284.04)	267.74 (242.89)	24.54 (22.26)	168.49 (152.85)	43.03 (39.04)
NAWCWPNS Point Mugu					
Aircraft	103.77 (94.14)	89.29 (81.00)	37.65 (34.16)	6.04 (5.48)	29.38 (26.65)
Personal Vehicles	408.30 (370.41)	29.26 (26.54)	40.99 (37.19)	0.75 (0.68)	78.32 (71.05)
Government Vehicles	24.39 (22.13)	5.67 (5.14)	5.05 (4.58)	0.07 (0.06)	8.03 (7.28)
Other Sources	136.43 (123.77)	45.07 (40.89)	34.40 (31.21)	6.40 (5.81)	7.60 (6.89)
NAWCWPNS Total	672.89 (610.45)	170.45 (154.63)	118.09 (107.13)	13.26 (12.03)	123.33 (111.88)
Islands					
San Nicolas Island Total	33.92 (30.77)	151.75 (137.67)	11.45 (10.39)	5.17 (4.69)	11.65 (10.57)
Santa Cruz Island Total	0.30 (0.27)	0.45 (0.41)	0.07 (0.06)	0.19 (0.17)	0.16 (0.15)
Total For All NAWCWPNS Point Mugu Facilities	***1,020.21 (925.53)***	***590.39 (535.60)***	***154.15 (139.84)***	***187.11 (169.75)***	***178.17 (161.64)***

Source: Final Environmental Impact Statement/Overseas Environmental Impact Statement, Point Mugu Sea Range (March 2002).

The general conformity rule requires that potential emissions be determined on an annual basis and compared to the annual *de minimis* levels for those pollutants (or their precursors) for which the area is classified as nonattainment. The ROI for the Proposed Action at NAWCWPNS Sea Range is comprised of two local air districts having different *de minimis* levels. Therefore the *de minimis* levels applicable to each district must be analyzed. However, for the purposes of this analysis, the most stringent *de minimis* level (25 tons) is used per O_3 precursor pollutant (NO_x and VOCs) per action per year associated with the Ventura APCD.

4.3.3.2 Environmental Consequences

Table 4.3.3.2-1 lists the results of the emissions analysis performed. Based on this analysis, the Proposed Action would not require a formal conformity determination because projected emission levels would be below the *de minimis* criteria. Furthermore, since the annual project-induced emissions do not make up

10% or more of either county's emissions, the emissions from the implementation of the Proposed Action would not be expected to be regionally significant as defined by the general conformity regulation.

Table 4.3.3.2-1: NAWCWPNS Point Mugu Preliminary Air Emissions

Test Year	CO tpy (MT/yr)	NOx tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
2	0.07 (0.06)	0.68 (0.62)	0.03 (0.03)	0.05 (0.05)	0.28 (0.25)
3	0.19 (0.17)	1.96 (1.78)	0.07 (0.06)	0.15 (0.14)	0.88 (0.80)
4	0.09 (0.08)	0.91 (0.83)	0.04 (0.04)	0.07 (0.06)	0.40 (0.36)
5	0.13 (0.12)	1.27 (1.15)	0.04 (0.04)	0.09 (0.08)	0.58 (0.53)
6	0.07 (0.06)	0.68 (0.62)	0.03 (0.03)	0.05 (0.05)	0.41 (0.37)
7	0.01 (0.01)	0.08 (0.07)	0.00 (0.00)	0.01 (0.01)	0.03 (0.03)
Highest (Test Year 3)	0.19 (0.17)	1.96 (1.78)	0.07 (0.06)	0.15 (0.14)	0.88 (0.80)

tpy = tons per year, MT/yr = Metric Tons per year
Hydrocarbon emissions in the Appendix are assumed to be VOCs.

The emissions from proposed aircraft operations would be significantly lower than either the *de minimis* threshold or the 10% of the area's total emissions, so the emissions from the proposed JSF DT are unlikely to be significant. The preliminary emissions given in Table 4.3.3.2-1 represent all reasonably foreseeable direct and indirect emissions resulting from the Proposed Action. Additional details supporting Table 4.3.3.2-1 are provided in the JSF EA/OEA AR maintained by the JPO and JSF ESOH Lead.

4.3.4 Noise at NAWCWPNS Point Mugu

4.3.4.1 Affected Environment

Additional details regarding noise at NAWCWPNS Point Mugu can be found in Section 3.3 of the *Final Environmental Impact Statement/Overseas Environmental Impact Statement (FEIS/OEIS) Point Mugu Sea Range (March 2002)*. Noise sources in the NAWCWPNS Point Mugu Sea Range are transitory and widely dispersed. The Sea Range covers very little land area. Few structures occur within the area encompassed by the range (primarily San Nicolas Island), and no public communities are established beneath Sea Range airspace.

Airborne noise in the Sea Range is created by subsonic and supersonic flight activity of aircraft, aerial targets, and missiles. Civilian and military aircraft fly at altitudes ranging from hundreds to tens of thousands of feet above the surface. Airborne noise introduced by surface vessels is negligible compared to noise introduced by low-flying aircraft and targets.

4.3.4.2 Environmental Consequences

As described in Section 4.3.2 of this EA/OEA, the purpose of the proposed JSF DT at NAWCWPNS Point Mugu is to conduct mission systems, weapons separation & integration, flutter, and CTOL tests. The proposed JSF DT Program is considered consistent with on-going operations and similar in scope with other aircraft programs using the facility and range capabilities of NAWCWPNS Point Mugu. All proposed JSF DT activities would occur within the restricted airspace and MOAs.

No impacts from aircraft noise resulting from the proposed JSF DT would be anticipated in the vicinity of the NAWCWPNS Point Mugu airfield, since most of the proposed test activities would be conducted within the Sea Range at 12 NM and greater offshore. Peak activity from the proposed JSF DT would be in Test Year 3 with 121 F-35 and 109 support aircraft flight hours anticipated, as reflected in Table 4.3.2-1. This would constitute less than a 1% increase over the 2004 utilization of 17,748 sorties reported to the FAA for the W-289 warning area.[47] Considering the NAWCWPNS Point Mugu Sea Range is located primarily off-shore and over portions of channel islands, significant noise impacts to communities would not be likely from the Proposed Action. This is further supported by findings from the 2002 Point Mugu Sea Range EIS/OEIS, which considered an additional tempo of 150 aircraft sorties.[48] Findings for the FEIS/OEIS concluded:

> *Compared to aircraft activity modeled to generate baseline noise levels, proposed Sea Range aircraft activity corresponds to an increase of slightly more than 3%. Proposed sorties (130 annual operations) would use the same altitude structure as described under existing test and training scenarios. Most proposed sorties would be conducted in Range areas 4A, 4B, and 5A, although the majority would require transit through other range areas. Noise generating events modeled in any single range area would not result in perceptible changes to the overall noise environment. Proposed activities would result in increase in noise levels: However, the increase would be only fractions of 1 dB.*

The FEIS/OEIS concluded that noise generating events modeled in any single range area would not result in perceptible changes to the overall noise environment and that levels would be identical to those reported for baseline noise levels.[49] As such, the proposed JSF DT conducted within NAWCWPNS Point Mugu airspace, as well as non-military use airspace, would not likely result in any significant changes to the noise environment or require changes or restrictions to the existing airspace areas or use parameters.

Additionally, the scheduling agency coordinates the hour allocation for the range, and notifies the FAA Air Route Traffic Control Center when these areas are activated. Approximate accounting of all flight testing programs and operations anticipated, including the proposed JSF DT, during a CY within the Sea Range would be established months in advance. It is not anticipated that additional time would be allocated specifically for the proposed JSF DT.

4.3.5 Biological/Natural Resources at NAWCWPNS Point Mugu

4.3.5.1 Affected Environment

The *Final Environmental Impact Statement/Overseas Environmental Impact Statement (FEIS/OEIS) Point Mugu Sea Range (March 2002)* provides details on the potential resources existing within the installation and the conclusions as to what potential impact and/or mitigation are necessary to protect biological/natural resources.

4.3.5.1.1 Terrestrial Flora and Fauna

NAWCWPNS Point Mugu lies within the Southern California Bight (SCB). Several habitat types occur at NAWCWPNS Point Mugu, including beach and dunes, intertidal mudflats/sand flats, intertidal salt marsh, non-tidal salt marsh, tidal creek, salt panna, intermediate disturbed, and developed habitats. These habitats provide food, nesting, roosting, breeding, and nursery habitat for a diverse number of species. San Nicolas Island contains twelve different vegetative communities, including vernal pools. Over 195 species of birds may exist on or transit through NAWCWPNS Point Mugu. The California brown

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47 *FAA 2004 Range Utilization Report for Warning Area W-289. Sorties rather than flight hours was reported by the Navy to the FAA for the Warning Area W-289, therefore comparison of flight hours was not available.*

48 *DoN 2002, Chapter 2, Table 2-4*

49 *DoN 2002, Chapter 4.3, Page 4.3-1*

pelican, western gull (*Larus occidentalis*), Brandt's cormorant (*Phalacrocorax penicillatus*), and the black oystercatch (*Haematopus bachmani*) have all been known to frequent San Nicolas Island.

One Federally endangered plant species, the salt marsh bird's-beak (*Cordylanthus maritimus*) occurs on NAWCWPNS Point Mugu. Three additional state listed species, Trask's milkvetch (*Astragalus traskiae*), spectacle pod (*Dithyrea maritima*), and San Nicolas Island buckwheat (*Eriogonum grande timorum*), are also know to exist. One Federally threatened reptile, the island night lizard (*Xantusia riversiana*), is known to occur in all terrestrial habitats within NAWCWPNS Point Mugu. Four Federally endangered, one Federally threatened, and one state endangered bird species are found on Point Mugu and San Nicolas Island. These species include: the American peregrine falcon (*Falco peregrinus anatum*), California brown pelican (*Pelecanus occidentalis californicus*), light-footed clapper rail (*Rallus longirostrus levipes*), California least tern (*Sterna antillarum browni*), western snowy plover (*Charadius alexandrinus nivosus*), and Belding's savannah sparrow (*Passerculus sndwichensis beldingi*), respectively.

The island fox is found only on six of California's Channel Islands. Each island hosts a specific subspecies of the fox (*Urocyon littoralis*). The Channel Island fox populations are most stable on the islands under the Navy's jurisdiction, San Nicolas (estimated population = 500 individuals) and San Clemente (estimated population = 400 individuals). The most severely threatened fox populations occur on the three northern islands that make up the Channel Islands National Park. The Santa Cruz fox population has declined from 1,300 in 1993 to approximately 100 in 2004. San Miguel and Santa Rosa Island foxes are extinct in the wild, down from 450 and 1,500, respectively, in 1994. A National Park Service captive breeding program today (initiated in 1999) has 25 Santa Cruz foxes, 38 San Miguel foxes, and 46 Santa Rosa foxes. The Santa Cruz, San Miguel, Santa Rosa, and Santa Catalina foxes were Federally-listed as endangered in March 2004.

4.3.5.1.2 Marine Flora and Fauna

Most of the marine flora in the NAWCWPNS Point Mugu Sea Range is comprised of phytoplankton. The Sea Range also contains extensive stands of giant kelp (*Macrocystis*). Several different species of benthic marine invertebrates occur in the Sea Range and in the coastal areas of NAWCWPNS Point Mugu and San Nicolas Island.

Marine Species

Table 4.3.5.1.2-1 lists the marine species expected to occur, by season, in the Point Mugu Sea Range. Three distinct taxa of marine mammals are know to exist within the NAWCWPNS Point Mugu Sea Range, Installation, and San Nicolas Island: *Cetacea* (whales, dolphins, and porpoises); *Pinnipedia* (seals and sea lions); and *Carnivora* (sea otters in the *Mustelidae* family). Thirty-four species of cetaceans have been identified from sightings or strandings in the SCB. These include 26 species of odontocetes (toothed whales) (all beaked whale species are grouped), and eight species of mysticetes (baleen whales). Of the 34 species of marine mammals, six species of whales are as endangered and include the following: sperm whale (*Physeter macrocephalus*), northern right whale (*Eubalaena glacialis*), humpback whale (*Megapter novaeangliae*), blue whale (*Balaenoptera musculus*), fin whale (*Balaenopter physalus*), and sei whale (*Balaenoptera borealis*). Six species of pinnipeds occur in the Sea Range. The four most abundant include the harbor seal (*Phoca vitulina*), northern elephant seal (*Mirounga angustirostris*), California sea lion (*Salophus californianus*), and the northern fur seal (*Callorhinus ursinus*). The Federally-protected Guadalupe fur seal (*Arctocehalus townsendi*) and the Stellar sea lion (*Eumetopias jubatus*) are occasional visitors to the Sea Range. Also Federally-protected is the southern sea otter (*Enhydra lutris nereis*), which infrequently occurs along the coast at NAWCWPNS Point Mugu. A translocated, experimental population occurs on San Nicolas Island.

All four species of sea turtles known to occur at sea within the NAWCWPNS Point Mugu Sea Range and San Nicolas Island are Federally-protected. No sea turtle nesting sites have ever been detected on NAWCWPNS Point Mugu or San Nicolas Island.

Table 4.3.5.1.2-1: Protected Marine Species Expected in the Point Mugu Sea Range

Species	Winter	Spring	Summer	Fall
Mysticetes				
Blue whale–E (*Balaenoptera musculus*)	N	Y	Y	Y
Fin whale–E (*Balaenoptera physalus*)	Y	Y	Y	Y
Sei whale–E *(Balaenoptera borealis)*	N	N	N	Y
Minke whale *(Balaenoptera acutorostrata)*	Y	Y	Y	Y
Humpback whale–E *(Megaptera novaeangliae)*	Y	N	Y	Y
Northern right whale–E *(Eubalaena glacialis)*	N	M	M	N
Gray whale *(Eschrichtius robustus)*	Y	Y	Y	N
Brydes whale *(Balaenoptera edeni)*	U	U	U	U
Odontocetes				
Sperm whale–E *(Physeter macrocephalus)*	Y	Y	N	Y
Pygmy/dwarf sperm whale *(Kogia breviceps/Kogia simus)*	M	M	M	Y
All beaked whales *(Family Ziphiidae)*	Y	Y	Y	Y
Killer whale *(Orcinus orca)*	Y	Y	Y	Y
False killer whale *(Pseudorca crassidens)*	N	N	N	M
Pilot whale *(Globicephala spp.)*	M	M	M	M
Offshore bottlenose dolphin *(Tursiops truncates)*	Y	Y	N	Y
Pacific white-sided dolphin *(Lagenorhynchus obliquidens)*	Y	Y	Y	Y
Common or saddleback dolphin *(Delphinus delphis)*	Y	Y	Y	Y
Northern right whale dolphin (*Lissodelphis borealis*)	Y	Y	Y	Y

Source: Data is derived from the Final Environmental Impact Statement for the Point Mugu Sea Range, March 2002.
Legend: Y=Yes, N=No, M=May occur, U=Unlikely to occur

Table 4.3.5.1.2-1.—Protected Marine Species Expected in the Point Mugu Sea Range (Continued)

Species	Winter	Spring	Summer	Fall
Risso's dolphin *(Grampus griseus)*	Y	Y	Y	Y
Rough-toothed dolphin *(Steno bredanensis)*	N	N	N	M
Spotted dolphin *(Stenella frontalis)*	N	N	N	M
Striped dolphin *(Stenella coeruleoalba)*	Y	N	Y	Y
Spinner dolphin *(Stenella longirostris)*	N	N	N	M
Dall's porpoise *(Phocoenoides dalli)*	Y	Y	Y	Y
Harbor porpoise *(Phoncoena phocoena)*	Y	Y	Y	Y
Pinnepeds				
Harbor seal *(Phoca vitulina)*	Y	Y	Y	Y
Northern elephant seal *(Mirounga angustirostris)*	Y	Y	Y	Y
California sea lion *(Zalophus californianus)*	Y	Y	Y	Y
Northern fur seal *(Callorhinus ursinus)*	Y	Y	Y	Y
Guadalupe fur seal-T *(Arctocephalus townsendi)*	U	U	U	U
Steller sea lion-T *(Eumetopias jubatus)*	U	U	U	U
Mustelidae				
Southern sea otter–T *(Enhydra lutris nereis)*	Y	Y	Y	Y
Sea Turtles				
Loggerhead turtle–T *(Caretta caretta)*	Y	Y	Y	Y
Leatherback turtle–E *(Dermochelys coriacea)*	U	U	Y	Y
Green turtle–T/E *(Chelonia mydas)*	Y	Y	Y	Y
Olive ridley turtle–T *(Lepidochelys olivacea)*	U	U	U	U
Fish				
West coast steelhead–E (*Oncorhynchus mykiss*)	Y	Y	Y	Y
White abalone–E (*Haliotis sorenseni*)	M	M	M	M

Source: Data is derived from the Final Environmental Impact Statement for the Point Mugu Sea Range, March 2002.
Legend: Y=Yes, N=No, M=May occur, U=Unlikely to occur

4.3.5.1.3 Essential Fish Habitat for NAWCWPNS Point Mugu

As discussed in Section 3.6.1.1 of the NAWCWPNS Point Mugu Sea Range FEIS (March 2002), three Essential Fish Habitat (EFH) zones have been identified off the west coast of the U.S. These EFH include: 1) Coastal Pelagic Species, 2) Groundfish, and 3) Pacific Salmon. Two of the three EFH zones (Coastal Pelagic and Groundfish) occur within the NAWCWPNS Point Mugu Sea Range, both extending from the coastline out to the Exclusive Economic Zone (EEZ) (200 NM) offshore along the entire length of the U.S. West Coast. The Coastal Pelagic EFH includes surface waters or, more specifically, waters above the thermocline where sea surface temperatures range between 50^{o} F to 70^{o} F. The Groundfish EFH includes surface waters and benthos, encompassing all waters from the mean high water line, and the upriver extent of saltwater intrusion in river mouths seaward to the 200 mile boundary.

About 481 species of fish inhabit area waters. Of the fish species, the West Coast steelhead (*Oncorhynchus mykiss*) is listed as endangered. The California Evolutionary Significant Unit of the steelhead includes the marine waters of the Sea Range. The white abalone (*Haliotis sorenseni*) is a Federally-listed endangered species and may occur in the Sea Range.

4.3.5.2 Environmental Consequences

Proposed test activities under either Proposed Action alterative would occur at flights above and below 3,000 feet AGL/MSL. The greatest potential for impacts to biological/natural resources are from discrete individual flight tests conducted below 3,000 feet in relation to aircraft performance, weapons separation & integration, and mission systems test activities, where short duration and low-angle flights may occur. No landings or takeoffs with the F-35 would be conducted at NAWCWPNS Point Mugu. In addition, the majority of the proposed JSF DT would be conducted within the Sea Range. Potential impacts to biological resources from the proposed JSF DT would be limited predominantly to noise-induced effects and impacts.

Biological species are expected to already be acclimated to the noise generated from RDT&E activities conducted on the installation and within the Sea Range used by NAWCWPNS Point Mugu. The initial temporary response to overflight noise from the F-35 or weapons separation tests would not likely have a negative impact on any species' population at NAWCWPNS Point Mugu and in the Sea Range. The tempo or amount of proposed JSF DT test activities would be significantly less that those analyzed in the FEIS; 4,084 operational sorties and 405 missiles fired/ordnance dropped annually at NAWCWPNS Point Mugu vice 356 flights/805 flight hours proposed for F-35/support aircraft and 47 proposed stores total over a six-year period (< 1% of the total stores released at NAWCWPNS, see Table 2.4 in the FEIS). The maximum F-35/support aircraft flight hours would occur in Test Year 3 with 107 flights (61 for the F-35 and 46 for support aircraft) and 230 flight hours (121 for the F-35 and 109 for support aircraft), and the maximum of 24 stores/expendables would be released in Test Year 6. Proposed JSF DT activities would be conducted in the warning areas and MOA of NAWCWPNS Point Mugu and the Sea Range, consistent with established operating procedures. The proposed F-35 and associated support flights would represent less than 1% increase over the projected baseline flight operations at NAWCWPNS Point Mugu (8,412 hours). All proposed weapons separation tests would occur on established ranges.

Based on annual operations and similar T&E Programs at NAWCWPNS Point Mugu, noise levels from F-35 and support aircraft flights would not likley affect the surrounding biological communities and no change in land area is anticipated from the proposed JSF DT. The potential to startle wildlife would likely be minimal because most of the proposed tests would occur above the 550-foot AGL zone that has been shown to account for most wildlife reactions. Any low-altitude flights associated with pullouts after dives would be of a very short duration on any given run.

Impacts from planned JSF DT stores separation tests on the marine environment would likely be minimal. Stores used would break up on impact with the water. Fragments would settle to the bottom and provide substrate for epibiotic production, with minimal disturbance to the ocean sediments (see Section 4.5.2.2 of the FEIS). Although some hazardous constituents would enter the ocean as a result of the proposed testing, concentrations would be below criteria established for protection of aquatic life (see Section 4.4, Water Quality of the FEIS). The probability of a store colliding with a marine mammal or sea turtle is quite rare. Table 4.7.6 of the FEIS discusses the number of marine mammals expected to be exposed to injury, mortality, or temporary threshold shift per year. Impacts caused by missile debris, inert mine drops, and shock waves from stores used in the Sea Range by NAWCWPNS Point Mugu totaled 0.0069 animals per year. Given the very small quantity of stores/expendables planned for the proposed JSF DT, the potential for impacts would be even less than the impact determined for weapon related activities at NAWCWPNS Point Mugu. Similarly, no indirect or direct impact to resources necessary for fish to spawn, breed, feed, or grow to maturity would be anticipated, and no adverse affect to EFH would most likely to occur. Therefore, a consultation under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) is deemed not necessary for the proposed JSF DT Program.[50]

4.3.6 Socioeconomics at NAWCWPNS Point Mugu

4.3.6.1 Affected Environment

The socioeconomic area for NAWCWPNS Point Mugu in California encompasses Ventura County. A large amount of ocean traffic (both small and large vessels) occurs through the NAWCWPNS Point Mugu Sea Range. The Sea Range boundaries encompass major shipping lanes and approaches for ships to ports in southern California (approximately 7,000 vessel movements per year). Due to the distance from the mainland, the area around San Nicholas Island is primarily used by USN vessels and commercial and sport fishing boats. The number and types of USN vessels on the Sea Range vary from small workboats to major USN combatants, such as aircraft carriers. Operations are conducted in large subdivisions of the total Sea Range, and blocks of range times are allocated for these operations. Section 3.11.2.1 of the *Final Environmental Impact Statement/Overseas Environmental Impact Statement (FEIS/OEIS) Point Mugu Sea Range (March 2002)* provides more detailed information regarding the ocean vessel traffic near NAWCWPNS Point Mugu.

Civilian vessels fall into two categories: commercial and recreational. The Ship Traffic Study, Southern California Operations Area, Status Report (1996) provides data on ship traffic on and near the Sea Range. An estimate based on this information for 1995 indicated greater than 7,000 commercial vessels. The U.S. Coast Guard indicated there are no definitive studies on the recreational boating traffic in the Sea Range. Estimates can be based on a count of vessel movement at the nearest harbor frequented by recreational boaters, which indicates that on weekends approximately 500 vessels can be found and on weekdays and days of marginal weather, that count is substantially less. Commercial vessels enter and cross the Sea Range on a routine basis. For safety purposes, large vessel traffic on and through the Sea Range is tracked and controlled by the U.S. Coast Guard. The U.S. Coast Guard also provides traffic advisories to vessels transiting the Sea Range. In addition, the USN notifies airmen and mariners when testing activities are occurring in the Sea Range for safety precautions to commercial and recreational boaters.

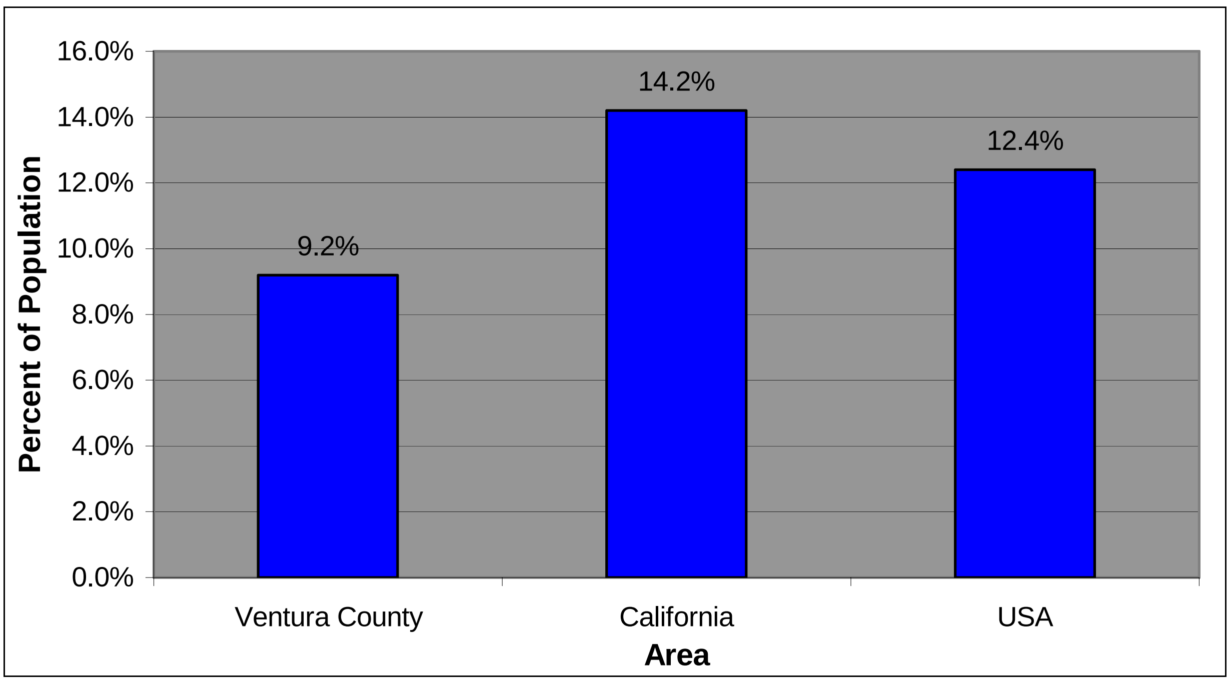
Socioeconomic data for commercial fishing was obtained from the National Marine Fisheries Service (NMFS), Fisheries Statistics Division. Annual monthly landing summaries were used to determine the volume and value of finfish and shellfish for specified states. These summaries were used to evaluate economic impacts on the marine fisheries within the NAWCWPNS Point Mugu. The area is accessible to

[50] *NMFS 2005*

commercial fishing from California coasts. Local members of the California coast rely on commercial fishing as a source of income. NMFS statistics show the 2003 commercial harvest of finfish and shellfish from waters off the California coast totaled 172,918 metric tons, for a reported retail value of approximately $135 million.[51] Section 3.12.2.1 of the *Final Environmental Impact Statement/Overseas Environmental Impact Statement (FEIS/OEIS) Point Mugu Sea Range (March 2002)* provides more detailed information regarding the commercial fishing for NAWCWPNS Point Mugu.

The NAWCWPNS Point Mugu Sea Range supports year-round recreational fishing. Recreational fishing includes charter and private boats, pier, and shore activities. In 1991, the California Coastal Commission reported that the California recreational passenger fishing fleets caught 666,547 combined finfish and shellfish from 73,988 anglers. Other popular Channel Islands recreational activities include diving, boating, bird watching, and marine mammal watching which includes whale watching from March through May.[52] Section 3.12.2.1 of the *Final Environmental Impact Statement/Overseas Environmental Impact Statement (FEIS/OEIS) Point Mugu Sea Range (March 2002)* provides more detailed information regarding recreational activities for NAWCWPNS Point Mugu.

Potential impacts have been considered for environmental justice. Ventura County in California has a poverty rate of 9.2%, which is much lower than the state poverty rate of 14.2% and well below the set CEQ threshold of 25% for low-income populations. Poverty rates are summarized in Figure 4.3.6.1-1.



Source: U.S. Census Bureau, 2000.

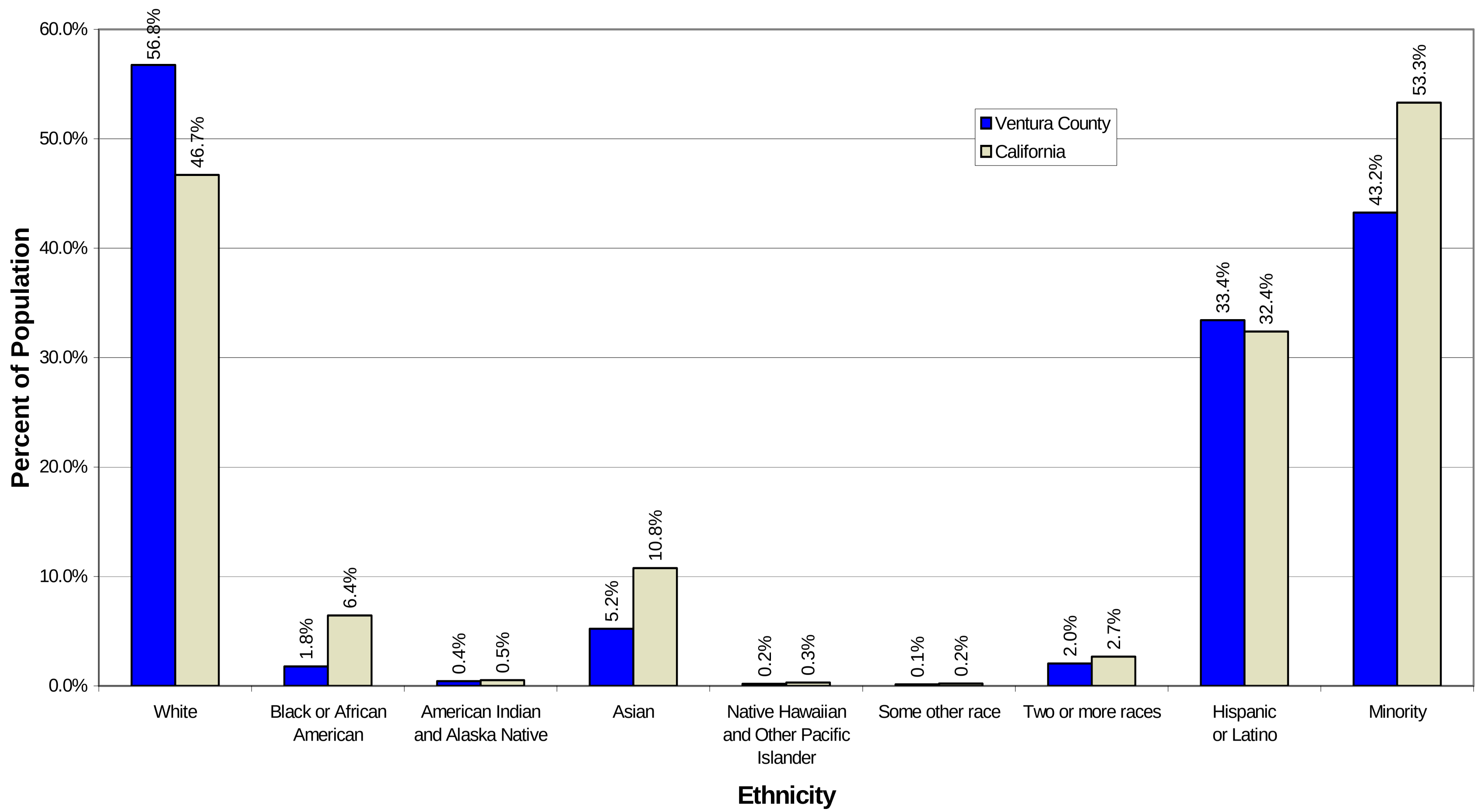
Figure 4.3.6.1-1: Poverty Rates for NAWCWPNS Point Mugu Socioeconomic Study Area (2000)

Population ethnicity for Ventura County is summarized in Figure 4.3.6.1-2. Ventura County is predominantly white (56.8%) and the remaining race distribution is Hispanic or Latino (33.4%), some

[51] *NMFS 2005*
[52] *FEIS 2002*

other race (0.1%), Asian (5.2%), two or more races (2.0%), Black or African American (1.8%), American Indian or Native Alaskan (0.4%), and Native Hawaiian or Pacific Islander (0.2%).[53] The race distributions for the Ventura County resemble California race distributions, but have lower Black or African American and Asian, and higher white percentages. Ventura County has a minority population of 43.2% which (is slightly below the CEQ threshold of 50%) and below the statewide average of 53.3%.

[53] *Census Bureau 2000*



Source: U.S. Census Bureau, 2000.
Note: The percent of the population by ethnicity for the study area will not equal the average of the counties' percent of the population by ethnicity because denominators (county populations) are not common to all.

Figure 4.3.6.1-2: Ethnicity for NAWCWPNS Point Mugu Socioeconomic Study Area (2000)

4.3.6.2 Environmental Consequences

Socioeconomic impacts are not anticipated as a result of the Proposed Action alternatives. No new people would be required to support the proposed JSF DT activities. Environmental justice populations are not expected to be significantly affected from the proposed JSF DT.

The proposed JSF DT is similar to activities analyzed under the *Final Environmental Impact Statement/Overseas Environmental Impact Statement (FEIS/OEIS) Point Mugu Sea Range (March 2002).* Proposed testing would be conducted sporadically and would be of a temporary nature throughout the life cycle of the proposed JSF DT. The frequency, location, and duration of proposed JSF DT activities would vary throughout the year. These variations are expected to allow commercial and recreational fisherman to minimize, recapture, or avoid revenue or quality of life loss from testing activities. Therefore, no significant impacts to the ocean transportation or commercial and recreational fishing occurring within the Sea Range are expected from the Proposed Action.

No takeoffs or landings with the F-35 would occur at NAWCWPNS Point Mugu. No significant changes to existing noise levels are expected and most of the proposed JSF DT would occur over the ocean which is typically void of people. Therefore, the proposed JSF DT would not likely cause disproportionate high or adverse human health and environmental affects to the environmental justice populations relative to other populations in the area. Proposed JSF DT activities are similar in scope to the tests currently conducted at NAWCWPNS Point Mugu, and any predicted impacts are expected to be negligible. Similarly, implementation of the proposed JSF DT would cause no disproportionately adverse health or safety risks to children. No potentially significant impacts to any sensitive receptors (including hospitals, schools, and daycare facilities) where a disproportionately large population of children may be present would likely occur considering the proposed JSF DT activities are conducted over the ocean in unpopulated areas.

4.3.7 Coastal Zone Management at NAWCWPNS Point Mugu

4.3.7.1 Affected Environment

The California Coastal Commission maintains jurisdiction over the California coastal zone, which includes areas adjacent to NAWCWPNS Point Mugu (from the mean high-tide line to 3,000 feet inland) and extends out to 3 NM offshore. The inland coastal zone at NAWCWPNS Point Mugu is to protect unique wildlife habitats present at Mugu Lagoon. In addition, the California coastal zone includes the Sea Range at NAWCWPNS Point Mugu. Under the CZMA of 1972, as amended (16 Code of Federal Regulation [CFR] §1451 et seq.), coastal states are provided the authority to evaluate projects conducted, funded, or permitted by the Federal government. Any Federal project or activity affecting the coastal zone must be consistent to the maximum extent practicable with the provisions of Federally approved state coastal plans.

4.3.7.2 Environmental Consequences

The majority of the proposed JSF DT (98%) would occur more than 12 NM offshore of California, within the Sea Range outside the coastal zone in open water and in a region that is routinely used for T&E and training. Military warning areas are typically offshore; the proposed JSF DT would avoid the California water/land boundary and coastal zone due to the high density of civil traffic that transits north/south along the coastline. The proposed JSF DT would only allow for shore crossings (less than 1% of proposed tests) to occur in the coastal zone.

No impacts to the coastal zone would be anticipated from conducting the proposed JSF DT, based on the results of the above air quality, biological/natural resources, and socioeconomic analyses. Noise generated from the Proposed Action would be similar to current RDT&E activities conducted on the Sea

Range. From the *Final Environmental Impact Statement/Overseas Environmental Impact Statement (FEIS/OEIS) Point Mugu Sea Range (March 2002),* potential impacts to marine animals from stores separation activities similar to the Proposed Action were found to be less than significant. The JSF PEO has determined that the proposed JSF DT would be consistent to the maximum extent practicable with the enforceable policies of the California Coastal Act and has completed a Negative CCD in accordance with the CZMA (See Appendix G.1).

4.4 WSMR

4.4.1 WSMR General Information[54]

WSMR is a DoD major range and test facility located near Las Cruces, New Mexico (as depicted in Figure 4.4.1-1). WSMR covers approximately 3,200 square miles in south-central New Mexico. WSMR is part of the Developmental Test Command, which reports to the U.S. Army Test and Evaluation Command (TECOM). The range possesses extensive capabilities and infrastructure, as well as unique characteristics used by the U.S. Army, USN, USAF, National Aeronautics and Space Administration (NASA), other Federal agencies, universities, private industry, and some foreign militaries.

The primary mission of WSMR is the operation of a national range in accordance with direction from the U.S. Army TECOM. This mission includes the conduct of range instrumentation research and development; development tests of U.S. Army, USN, and USAF air-to-air/surface and surface-to-air / surface weapons systems; dispenser and bomb drop programs; gun system testing; target systems; meteorological and upper atmospheric probes; equipment, component, and subsystem programs; high-energy laser programs; and special tasks. In addition to testing U.S. Army, USN, and USAF systems, WSMR develops and tests target drones and manned flight vehicles; develops and tests propulsion, guidance, support, and instrumentation systems; and evaluates the effects of environmental conditions (e.g., weather) on system performance. NASA's Lyndon B. Johnson White Sands Test Facility (WSTF) provides expertise and infrastructure to test and evaluate spacecraft materials, components, and propulsion systems. Various U.S. Army laboratories and test facilities, including the Temperature Test Facility, Army Research Laboratories, and Nuclear Effects Directorate, are located at WSMR.[55]

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[54] *WSMR 1998*

[55] *WSMR 1998*

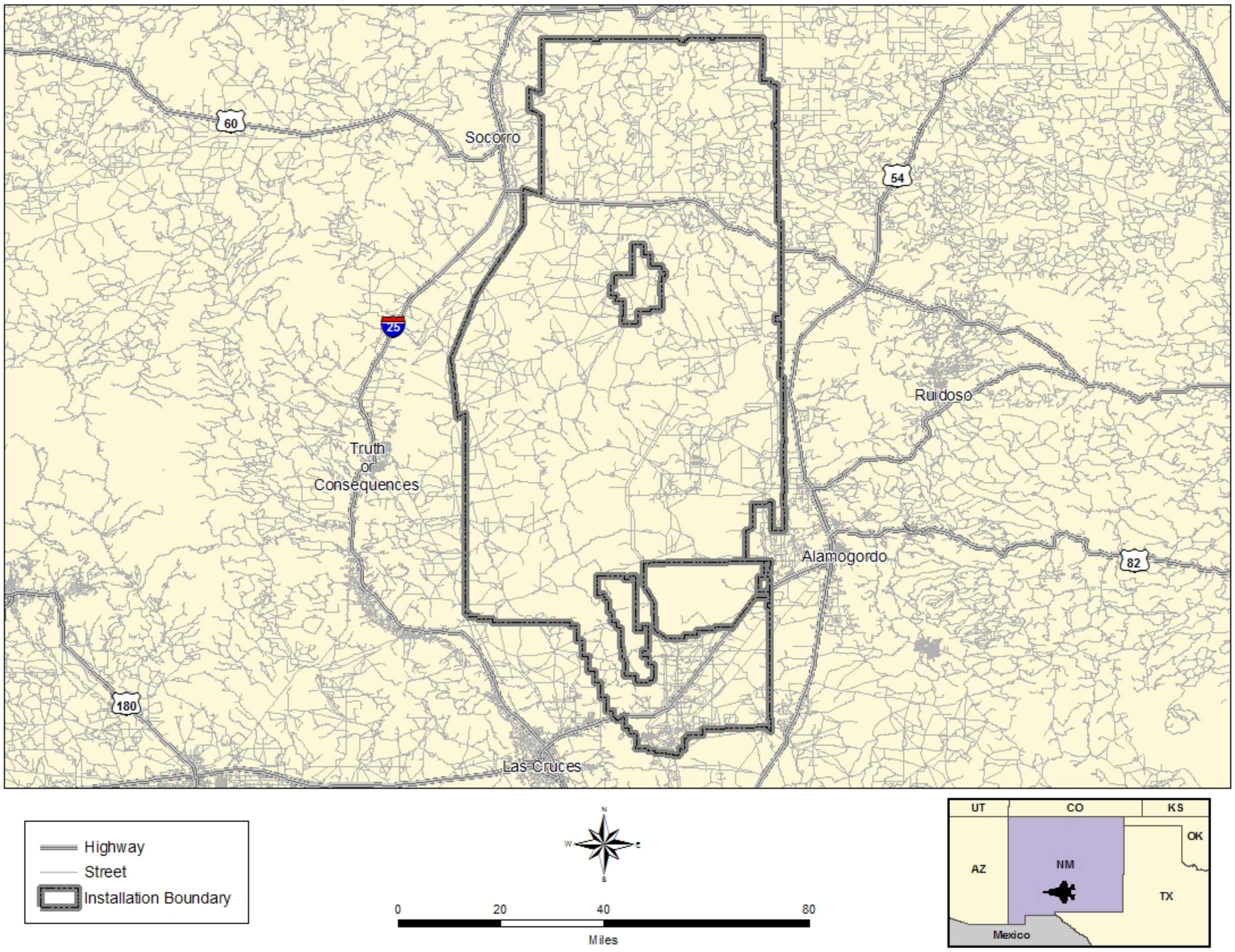


Figure 4.4.1-1: General Map of WSMR

A total of thirteen designated restricted airspace areas are controlled by WSMR and scheduled for research, development, testing and experimentation, military training, and civilian contract programs. Eighteen areas are charted as restricted airspace by the FAA, which allows these areas to be used for hazardous activities (live ordnance delivery, missile firings, laser shots, etc). Large areas of the airspace are used as safety buffer zones for missile and rocket firings. The main testing range is located in south-central New Mexico. This range is approximately 40 miles wide by 100 miles long, with other areas available for those tests requiring additional flight space and/or safety zones. At approximately 3,200 square miles, the range is the largest military installation in the country. It is surrounded by the communities of El Paso (40 miles south), Las Cruces (25 miles west), and Alamogordo (50 miles north east) as well as several mountain ranges. These mountains provide excellent locations for a variety of range instrumentation to support testing. The other test range, the Electronic Proving Ground, is located in southeastern Arizona near the foothills of the Huachuca Mountains at Ft. Huachuca, Arizona. This location provides excellent weather, visibility, open space, and a quiet electromagnetic environment to test electronic warfare systems as well as other communication systems.

4.4.2 Proposed JSF DT at WSMR

The purpose of the proposed JSF DT at WSMR would be to conduct mission systems and weapons separation & integration tests for a three-year time period. Planned flight tests would peak in Test Year 2. The proposed JSF DT is considered consistent with on-going operations at WSMR. Proposed test activities are similar in scope with other aircraft programs using the range capabilities of WSMR. The

JPO and JSF V&T Team would capitalize on the core mission of WSMR and the close proximity of WSMR to Edwards AFB. Table 4.4.2-1 summarizes the proposed flight tests and support aircraft. Approximately 60% of the proposed test activities anticipated with WSMR's ranges would be at and below 3,000 feet AGL, but of short duration. Table 4.4.2-2 summarizes the stores/expendables proposed for use at WSMR. Aircraft would be based at Edwards AFB and would fly over WSMR, using range space and target assets. There would be no F-35 landings or takeoffs at WSMR except in the event of an aircraft emergency. Proposed JSF DT activities are designed to demonstrate and verify the ability of the F-35 to safely release ordnance from the aircraft, assess any structural or other related effects to the aircraft from the release of ordnance, confirm the accuracy of missile delivery to targets and aircraft computer algorithms, demonstrate flight path accuracy of the released ordnance, assess the ability to acquire targets, etc. Proposed testing would involve the use of range and aircraft instruments to evaluate the F-35's weapon delivery performance at various altitudes, distances, and flight conditions.

Table 4.4.2-1: Proposed JSF DT Flight Profile at WSMR

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Fight Hours	Total No. Flights	Total Flight Hours
4	Weapons Separation & Integration, Mission Systems	12	24	F-16, KC-135	17	46	29	70
5	Same as Test Year 4	23	46	F-16, KC-135	27	65	50	111
6	Mission Systems	6	12	N/A	0	0	6	12
TOTAL		***41***	***82***		***44***	***111***	***85***	***193***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005).

Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate as the F-35 variants proceed through the various DT activities and time periods.

Table 4.4.2-2: Proposed JSF DT Stores/Expendables at WSMR

Test Year	Stores/Expendables[1]	
	Type	Quantity*
4	AIM-120C AAVI[2]	4
5	AIM-120C AAVI[2]	4
6	AIM-120C AAVI[2] (4) AIM-9X AAVI[2] (3) AIM-132 (3) AGM-154A/C GTV[4] (3)	13

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005).

Note: 1. Proposed stores/expendables reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

2. AIM-120 and AIM-9X weapons may be fired against drones (such as the MQM-107, AQM-34, AQM-74, and QF-4). AIM-120C is also configured with a flight termination system.

3. AIM-132 is the British Advanced Short Range Air-to-Air Missile (ASRAAM). Missiles would be full-up rounds with the warhead replaced by a telemetry and flight termination unit.

4. AGM-154 is the Joint Stand-Off Missile. The Guided Test Vehicles (GTVs) would have inert sub-munitions or an inert warhead for the A and C variants, respectively. A telemetry and flight termination unit would be installed in the GTV.

**Total for all types*

Proposed weapons and mission systems tests would be conducted predominantly in WSMR's dedicated airspace (such as 5107) in compliance with WSMR's airspace use restrictions and air operation procedures. One or two F-35 would be used for any one test activity; one F-16 per F-35 for photo/safety chase or other designated aircraft; and one KC-135 (or KC-10) for refueling needs. Flight altitudes of these aircraft would be predominantly at 25,000 feet. On average, single test activities would be five hours, with two hours spent within WSMR's airspace/ranges. Eight to eleven missile shots are proposed in WSMR's designated warning and restricted areas. Drones used in missile tests would be launched from and recovered at WSMR. The typical number of drones involved in any one test would be one or two. Chaff and flares from the current DoD inventory, and those typically used at WSMR, may be used for some of the proposed JSF DT activities. At this time, it is too early to project the exact type and number of these required expendables. All SOPs in place for the safe use and release of stores/expendables would be adhered to during the proposed JSF DT.

4.4.3 Air Quality at WSMR

4.4.3.1 Affected Environment

Air quality at WSMR has been analyzed in the *Final Whites Sands Missile Range Range-Wide Environmental Impact Statement* (FEIS*) (January 1998*). Section 3.3.2 of the FEIS provides a concise description of the existing environment at WSMR and assesses the significance of impacts to air quality resulting from the implementation of actions, including those similar to the proposed JSF DT.

Almost all of WSMR is located in New Mexico Air Quality Control Region (AQCR) 6. New Mexico AQCR 6 includes Doña Ana, Otero, Sierra, and Lincoln counties. Current New Mexico air quality standards are provided in Table 4.4.3.1-1. The extreme southeastern corner of Doña Ana County near Sunland Park is marginal nonattainment for the one-hour O_3 NAAQS and the area around Anthony, New Mexico is nonattainment for the PM_{10} NAAQS. Neither of these nonattainment areas includes any portion of WSMR. The northern part of the range in Socorro County is located in New Mexico AQCR 8. Socorro County is in EPA AQCR 156. All of WSMR is located in areas designated attainment for all six Federal criteria pollutants. The closest monitoring station to WSMR, located in the Las Cruces area, has exceeded the New Mexico air quality Total Suspended Particulates (TSP) standard.

Table 4.4.3.1-1: New Mexico Ambient Air Quality Standards

Criteria Pollutant	Averaging Time	New Mexico Standard [a]
CO	8 hours 1 hour	8.7 ppm 13.1 ppm
NO_2	Annual [b] 24 hour	0.05 ppm 0.10 ppm
PM (TSP)	Annual [c] 30-day 7-day 24 hours	60 $\mu g/m^3$ 90 $\mu g/m^3$ 110 $\mu g/m^3$ 150 $\mu g/m^3$
SO_2	Annual [b] 24 hours	0.10 ppm 0.02 ppm
Reduced Sulfur	½ hour	0.003 ppm
Hydrogen Sulfide	1 hour	0.010 ppm

$\mu g/m^3$ = micrograms per cubic meter
ppm = parts per million

Notes: a. New Mexico Administrative Code 20.2.3 “Ambient Air Quality Standards”. The preamble states “New Mexico Ambient Air Quality Standards are not intended to provide a sharp dividing line between air of satisfactory quality and air of unsatisfactory quality. They are, however, numbers that represent objectives, which would preserve our air resources.”
b. Arithmetic Average
c. Geometric Mean

4.4.3.2 Environmental Consequences

The potential air quality impacts arising from the Proposed Action are identified in Table 4.4.3.2-1.

Table 4.4.3.2-1: WSMR Air Emissions Estimates

Test Year	CO tpy (MT/yr)	NO_x tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
4	0.06 (0.05)	0.57 (0.52)	0.04 (0.04)	0.04 (0.04)	0.25 (0.23)
5	0.10 (0.09)	1.02 (0.99)	0.05 (0.05)	0.08 (0.07)	0.44 (0.40)
6	0.01 (0..01)	0.08 (0.07)	0.00 (0.00)	0.01 (0.01)	0.05 (0.05)
Highest (Test Year 5)	0.10 (0.09)	1.02 (0.99)	0.05 (0.05)	0.08 (0.07)	0.44 (0.40)

tpy = tons per year, MT/yr = Metric Tons per year
Hydrocarbon emissions in the Appendix are assumed to be VOCs.

WSMR is located in an area that is in attainment for all criteria pollutants. Therefore, conformity analysis is not applicable. Furthermore, the Proposed Action is considered consistent with the type and tempo of those activities occurring at WSMR on a routine basis. The Proposed Action would not likely have any significant adverse air quality impacts. Additional details supporting Table 4.4.3.2-1 are provided in the JSF EA/OEA AR maintained by the JPO and JSF ESOH Lead.

4.4.4 Noise at WSMR

4.4.4.1 Affected Environment

Noise at WSMR has been analyzed in the *Final Whites Sands Missile Range Range-Wide Environmental Impact Statement (January 1998)*. The following is a summary of the information contained within the FEIS. The USAF uses the airspace over the range areas of WSMR for approach and departure routing to Holloman AFB, flights transiting the area enroute to western and northern tactical training areas, gunnery pattern routes using the Red Rio and Oscura Gunnery ranges, and supersonic air combat training. Generally, flight activities are at a high-enough altitude and a low-enough frequency to generate sound levels anticipated to be no greater than 70 dB, which is equivalent to the sound level of freeway traffic. Other significant sources of noise in WSMR's operational testing areas include missile launches, ordnance explosions, aircraft drone overflights, gun firing, general vehicle traffic, and low-altitude military jet traffic.

Typical noise levels have been estimated to be 55 to 65, 45 to 55, and 45 dBA, respectively, at the WSMR Main Post area (the only populated center), the WSMR southern property boundary, and the San Andres National Wildlife Refuge (NWR), which is located approximately 12 miles north of the WSMR Main Post area.

4.4.4.2 Environmental Consequences

The proposed JSF DT is considered consistent with on-going operations and similar in scope with other aircraft programs using the facility and range capabilities of WSMR. The proposed JSF DT would be conducted at predominantly high altitudes with short duration flights occurring below 3,000 AGL. No aircraft related noise impacts from the proposed JSF DT activities would be anticipated in the vicinity of the WSMR airfield beyond the existing, baseline conditions. Any low-level flights and dives would be minimal, of short duration, and sporadic for the limited amount of proposed JSF DT flights/flight hours. Any noise associated with the firing and release of stores (ordnance) during the proposed JSF DT activities would be of short duration and transient within the confines of the ranges used by WSMR.

Peak activity from the proposed JSF DT would be in Test Year 5, as reflected in Table 4.4.2-1, consisting of approximately 50 flights and 111 flight hours for both F-35 and support aircraft. The overall tempo or amount of proposed JSF DT test activities over a three-year period (85 flights and 193 flight hours for both F-35 and support aircraft) would be less than similar related actions analyzed in the WSMR EIS (approximately a 10 to 15% increase over a ten-year period to a baseline of 4,366 scheduled T&E missions per year and an average of 200 air-to-air, 700 surface-to-air, 250 live fire, and 500 training missions for Patriot; and 250 surface to surface missile launches per year); and the *EA for Flight Testing of the Advanced Medium Range Air-To-Air Missile (AMRAAM)* (30 flights annually for a ten to fifteen-year period). Findings concluded there would be minor noise impacts and no adverse effects to human health with respect to aircraft flight operation noise levels. Other than minor ranching activities, most of the test facilities and range land areas are predominantly unpopulated.

In addition, proposed JSF DT flights would be conducted in compliance with WSMR airspace use restrictions and air operation procedures. Total activity conducted within WSMR on a day-to-day basis is dependent upon scheduling support limitations. Range scheduling limitations allows for only minimal, short duration surge increases in operations.[56] Therefore, the proposed JSF DT would be for the most part already accounted for when range usage times are scheduled. It is not anticipated that additional time would be allocated specifically for the proposed JSF DT. The potential for significant and cumulative noise effects is not anticipated considering schedule limits, the extensive range area over which test

[56] *WSMR 1998*

activities are conducted, and the limited population within WSMR Therefore, the proposed JSF DT conducted within WSMR airspace, as well as non-military use airspace, would not likely result in any significant changes to the noise environment or require changes or revisions to the existing airspace areas or use parameters.

4.4.5 Biological/Natural Resources at WSMR

4.4.5.1 Affected Environment

Section 3.4 of the *WSMR Range-wide Environmental Impact Statement* (1998) describes the existing biological resources including threatened and endangered species. The following is a brief synopsis of the existing biological resources at WSMR. WSMR has a variety of vegetation and habitat types that support a diversity of wildlife. These habitats are widely dispersed and form a mosaic of scrubs, grasslands, savannas, woodlands, forests, and wetlands. WSMR wildlife resources include mammals, birds, reptiles, amphibians, and numerous kinds of invertebrates.

Information about plants and animals found at NAWCWD China Lake is provided in this subsection. The discussion on plants is to provide context for the animals that may be potentially affected by the Proposed Action. Table 4.4.5.1-1 is a list of threatened and endangered species that may occur at WSMR, as discussed in further detail within this subsection.

Table 4.4.5.1-1: Protected or Sensitive Species that Potentially Occur on WSMR

Common Name Scientific Name	Federal Status	State Status
Birds		
Interior least tern *(Sterna antillarum athalassos)*	E	E
Northern Aplomado falcon *(Falco femoralis septentrionalis)*	E	E
Whooping crane *(Grus americana)*	E	E
Bald eagle *(Haliaeetus leucocephalus)*	T	E
Artic peregrine falcon *(Falco peregrinus tundrius)*	T	E
Piping plover *(Charadrius melodus circumcinctusp)*	T	E
Mexican spotted owl *(Strix occidentalis lucida)*	T	S
Southwestern willow flycatcher *(Empidonax traillii extimus)*	E	E
Western snowy plover *(Charadrius alexandrinus nivosus)*	T	S
Baird's sparrow *(Ammodramus bairdii)*		E
Northern goshawk *(Accipiter gentiles)*		S
Ferruginous hawk *(Buteo regalis)*		S

Source: White Sand Missile Range (WSMR) Range-Wide Environmental Impact Statement, 1998; and USFWS endangered species status tool http://www.fws.gov/endangered.

Legend: Legend: E=Endangered, T=Threatened; S=Sensitive

Table 4.4.5.1-1: Protected or Sensitive Species that Potentially Occur on WSMR (continued)

Common Name Scientific Name	Federal Status	State Status
Birds (Continued)		
Mountain plover *(Charadrius montanus)*		S
Loggerhead shrike *(Lanius ludovicianus)*		S
White-faced ibis *(Plegadis chihi)*		S
Arizona grasshopper sparrow *(Ammodramus savannarum ammolegus)*		E
Common black-hawk *Buteogallus anthracinus*		E
Varied bunting *(Passerina versicolor)*		E
Neotropic cormorant *(Phalacrocorax brasiliensis)*		E
Bell's vireo *(Vireo Bellii)*		E
Gray vireo *(Vireo vicinior)*		E
Mammals		
Mexican gray wolf *(Canis lupus baileyi)*	E	E
New Mexico meadow jumping mouse *(Zapus hudsonius luteus)*		E
Organ Mountain Colorado chipmunk *(Tamias quadrivittatus australis)*		E
Spotted bat *(Euderma maculatum)*		E
White Sands woodrat *(Neotoma micropus leucophaeus)*		S
Hot Springs cotton rat *(Sigmodon fulviventer goldmani)*		S
Arizona black-tailed prairie dog *(Cynomys ludovicianus arizonensis)*		S
White Sands pupfish *(Cyprinodon Tularosa)*		E
Greater western mastiff bat *(Eumops perotis californicus)*		S
Southwestern cave myotis (bat) *(Myotis velifer brevis)*		S
Little brown myotis (bat) *(Myotis lucifugus)*		S
Desert bighorn sheep *(Ovis canadensis mexicana)*		E
Reptiles and Amphibians		
Texas horned lizard *(Phrynosoma cornutum)*		S

Source: White Sand Missile Range (WSMR) Range-Wide Environmental Impact Statement, 1998; and USFWS endangered species status tool http://www.fws.gov/endangered.
Legend: Legend: E=Endangered, T=Threatened; S=Sensitive

Table 4.4.5.1-1: Protected or Sensitive Species that Potentially Occur on WSMR (continued)

Common Name Scientific Name	Federal Status	State Status
Invertebrates		
Land snail, no common name *(Ashmunella harrisi)*		S
Land snail, no common name *(Asmunella kochi caballoensis)*		S
Land snail, no common name *(Ashmunella kochi kochi)*		S
Land snail, no common name *(Ashmunella kochi sanandresensis)*		S
Land snail, no common name *(Ashmunella salinasensis)*		S
Oscura Mountain land snail *(Oreohelix socorroensis)*		S

Source: White Sand Missile Range (WSMR) Range-Wide Environmental Impact Statement, 1998; and USFWS endangered species status tool http://www.fws.gov/endangered.
Legend: Legend: E=Endangered, T=Threatened; S=Sensitive

4.4.5.1.1 Terrestrial Flora and Fauna

Plant Species

WSMR is located in south-central New Mexico near the northern edge of the Chihuahuan Desert region. The relatively warm, dry climate associated with this region is the primary factor influencing the vegetation. Most of the surface of WSMR is located on the floor of the Tularosa Basin and Jornado del Muerto where summer rainfall is low. The vegetation on these lowlands induces Chihuahuan desert scrub, closed-basin scrub, and desert grasslands. Rainfall increases and temperatures decrease with elevation in the Oscura and San Andres mountains.

At elevations above the desert scrub and grasslands regions, plains-mesa grasslands may occur. Both desert and plains-mesa grasslands form a broad savanna-like ecotone at higher elevations with the coniferous woodlands that dominate the cooler highlands of the Oscura and San Andres mountains. As slopes become steeper, the savanna develops a more woodland character and montane scrub vegetation forms part of the habitat mosaic. Gradually, pinyon pines (*Pinus edulis*) become more common until, near the summits of both mountain ranges, the coniferous woodlands are dominated by pinyon. Montane scrub continues to be present into the highlands. On Salinas Peak, montane coniferous forest dominated by ponderosa pine (*Pinus ponderosa*) is present.

Eleven vegetation/habitat types, as reflected in Table 4.4.5.1.1-1, have been defined for WSMR and represent land areas capable of supporting specific plants.

Table 4.4.5.1.1-1: Vegetation Types Occurring on WSMR

Vegetation Type	Acres
Coniferous Woodlands (Pinyon Pine Series)	
▪ Pinyon Pine	27,700
▪ Pinyon Pine and Mountain Mahogany	57,800
▪ Savanna and Plains-mesa Grassland	225,400
▪ Desert Grassland and Plains-mesa Sandscrub	430,000
Chihuahuan Desert Scrub	
▪ Creosote Bush	548,000
▪ Mesquite	283,200
▪ Lava	41,800
Closed Basin Scrub	
▪ Fourwing Saltbush and Targush	266,600
▪ Arroyo Riparian and Wetlands	24,700
▪ Barren Land	171,700
▪ Dune Land	88,000
Total	**2,167,300**

Notes: Does not includes 23,200 acres of WSMR, which NMNHP (1992) mapped as having no associated data. The New Mexico Natural Heritage Program (NMNHP) (1992) provides no acreage for the lower montane coniferous forest vegetation.

Appendix D, Table D-2 contains a complete list of protected plant species that occur or may occur on WSMR. USFWS and New Mexico Forestry Resource Conservation Division (NMFRCD) have indicated 38 plant species of concern may occur on WSMR. The WSMR Environmental Services Division lists 24 sensitive plant species that occur on WSMR. Habitat apparently suitable for an additional fourteen plant species also occurs on WSMR. Todson's pennyroyal (*Hedeoma todsonii*) is the only plant species listed as endangered by the USFWS that currently are known to occur on WSMR. Four other species listed by the USFWS as endangered potentially occur on WSMR. WSMR provides habitat for five plant species listed as Category 2 candidates for listing as threatened or endangered by USFWS. WSMR also has habitat apparently suitable for an additional nine plant species listed as threatened or endangered by the USFWS or that are candidates for listing. These nine species are not known currently to occur on the range.

WSMR provides habitat for fourteen plant species listed as endangered by NMFRCD. Habitat apparently suitable for nine more species listed as endangered by NMFRCD occurs on WSMR. An additional ten plant species listed as rare and sensitive by NMFRCD are known to occur on WSMR. Habitat apparently suitable for five other species listed as rare and sensitive by NMFRCD is present on WSMR.

A variety of exotic plants occur on WSMR. These plants include species that were intentionally planted (either by ranchers before the creation of WSMR, or for landscaping at WSMR), and species which are naturalized and spreading throughout southern New Mexico and other portions of the southwestern U.S. and Mexico. At least a dozen species of non-native vascular plants have been identified on WSMR. Most of these species are restricted to very limited areas on WSMR and do not appear to be a problem at present; they are being monitored by WSMR.

<u>*Mammal Species*</u>

The most common rodents are the Merriam's kangaroo rat (*Dipodomys merriami*), Ord's kangaroo rat (*Dipodomys ordii*), and deer mouse (*Peromyscus maniculatus*). Approximately 20 bats occur or are expected to occur on WSMR. These bats roost primarily in caves and crevices, though several species will use man-made structures. Carnivorous mammals also are well represented on WSMR. The most commonly observed carnivorous mammal is the coyote (*Canis latrans*), which can be found in almost any portion of WSMR. There are two types of native cats present on WSMR. The mountain lion (*Felis concolor*) is the object of a long-term study and are found in and adjacent to mountainous areas throughout most of WSMR. The other cat is the bobcat (*Lynx rufous*), generally found in desert, grassland, and mountainous habitats.

Several hoofed mammals inhabit WSMR. Native species include the mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), desert bighorn sheep (*Ovis canadensis mexicana*), and elk (*Cervus elaphus*). Mule deer are most common in mountain and foothill habitats, but do occur in desert shrub and grassland vegetative types. Elk are known only in small bands in the Oscura Mountains, and are probably part of a herd that centered on Chupadera Mesa. Pronghorn inhabit grassland and shrub vegetation types. The feral horse (*Equus caballus*) and the oryx (*Oryx gazella*) are two introduced species common on WSMR. The horse population has increased in spite of efforts to reduce its numbers on WSMR. These feral horses are not protected under the Wild and Free Roaming Horse and Burro Act (U.S.P.L. 92-195) because they do not occupy the U.S Department of Agriculture or the U.S. Department of Interior land. The oryx were released on WSMR by New Mexico Department of Game and Fish (NMDGF) beginning in 1969 and the population is currently estimated to be approximately 1,600 individuals. Oryx are great wanderers and are regularly sighted on virtually all major mountain ranges on WSMR; however, populations are largest at low elevations in grassland vegetation where most of their reproduction takes place.

<u>*Bird Species*</u>

There are 307 bird species found or expected to occur on WSMR. The large number of species is primarily related to the variety of vegetative types and the location of WSMR, which places it within or adjacent to portions of grassland and forest ecosystems other than the Chihuahuan desert. Spring and summer transect counts show the most common birds are the black-throated sparrow (*Amphispiza bilineata*), northern mockingbird (*Mimus polyglottos*), mourning dove (*Zenaida macroura*), and western kingbird (*Tyrannus verticalis*). There are some noticeable changes in bird species with a transition from desert scrub and grassland vegetation types found at lower elevations to the higher elevations, which support forest types. Probably the most noticeable bird species are scrub jays (*Aphelocoma coerulescens*), pinon jays (*Gymnorhinus cyanocephalus*), and rufous-crowned sparrows (*Aimophila ruficeps*).

Just as is the case with smaller birds, the diversity in land forms and vegetation types on WSMR leads to the diversity of raptors. The more common hawks are Swainson's hawk (*Buteo swainsoni*) and red-tailed hawk (*Buteo jamaicensis*). The bald eagle (*Haliaeetus leucocephalus*) has occurred on WSMR, but there is no nesting habitat available (fish prey base and large trees for nesting and roosting). Probably the most abundant raptor on WSMR is the American kestrel (*Falco sparverius*). With the exception of man-made structures, the American kestrel is generally restricted to nesting in habitats in the forested portions of WSMR. This bird is quite common during the winter, and is often observed on power poles and other perches. The merlin (*Falco columbarius*), prairie falcon (*Falco mexicanus*), peregrine falcon (*Falco peregrinus*), and aplomado falcon (*Falco femoralis*) occur or have been observed in the past within WSMR. The peregrine and aplomado falcons are both Federally-listed species.

Most of the habitat available for wetland birds is of a transitory nature. These areas are primarily playas and earthen stock tanks scattered throughout the Tularosa and Jornada basins. The presence of water, and accompanying species used by water birds for food, is highly dependent on rainfall, which is highly variable in the Chihuahuan desert. There are some permanent or semi-permanent water locations that provide habitat for water birds. Most notable are the sewage runoff ponds located southeast of the Main

Post of WSMR. Other locations for water birds to obtain more reliable habitat are springs located primarily in the Tularosa Basin.

Reptile and Amphibian Species

Reptiles comprise an abundant and diverse group of inhabitants at WSMR. The reptiles of WSMR include two genera of turtle, twelve genera of lizards, and 21 genera of snakes. The Texas horned lizard (*Phrynosoma cornutum*) is the only sensitive reptile species present. The ornate box turtle (*Terrapene ornata*) is the only turtle known to occur. The yellow mud turtle (*Kinosternon flavescens*) also is expected to occur on WSMR.

Amphibian populations at WSMR are quite limited because amphibians normally require water or extreme moisture during the early stages of their life cycle, and water resources are limited at WSMR. Isolated permanent water sources consisting of gypseous ponds and highly saline waters at Lake Lucero, Salt Creek, Malpais Spring, and Mound Spring do provide habitat for amphibian species. The amphibians of WSMR include one genus of salamander and five genera of frogs and toads for a total of ten species. There are no Federally- or state-listed sensitive amphibians present on WSMR.

Fish Species

The White Sands pupfish (*Cyprinidon tularosa*) is the only native fish known to occur on WSMR. This species is listed as endangered by the NMDGF and as a Federal category 2 candidate by the USFWS. The White Sands pupfish is known to occur in Salt Creek, Malpais Spring and its associated outflow, Mound Springs, and Malone Draw/Lost River. Introduced fishes that are considered a threat to the White Sands pupfish include the largemouth bass (*Micropterus salmonoides*) and the mosquitofish (*Gambusia affinis*).

Invertebrate Species

There are 22 orders and 97 families occurring at WSMR. Common insect orders include Orthoptera (grasshoppers and crickets), Hemiptera (bugs), Homoptera (cicadas, aphids), Coleoptera (beetles), Lepidoptera (butterflies, moths), Diptera (flies), and Hymenoptera (ants, bees, wasps). Other terrestrial invertebrates include Arachnida (scorpions, mites, ticks, spiders, and tarantulas).

Several studies of land snails have been conducted along the Oscura, Organ, Sacramento, San Andres and Black Brushy/Caballo mountain ranges; at least 23 species have been observed on WSMR. Six of these land snails are considered sensitive by NMDGF. Aquatic invertebrates identified at WSMR included ten orders, 20 families, and 16 genera. Mound Spring had the most families of invertebrates (twelve) of all the sites sampled. The dominant invertebrate in numbers and biomass at Malpais Spring was the water boatman (*Gammarus*).

4.4.5.2 Environmental Consequences

Proposed test activities under either Proposed Action alterative would occur at altitudes above and below 3,000 feet AGL. The greatest potential for impacts to biological/natural resources are from discrete individual flight tests conducted below 3,000 feet in relation to the aircraft weapons separation & integration and mission systems test activities, where short duration and low-angle flights may occur. No landings or takeoffs with the F-35 would be conducted at WSMR. Potential impacts to biological resources from the proposed JSF DT would be limited predominantly to noise-induce effects and impacts.

Biological species are expected to already be acclimated to the noise generated from RDT&E activities conducted at WSMR. The initial temporary response to overflight noise from the proposed F-35 or weapons separation tests would not be anticipated to have a negative impact on any species' population at WSMR. The tempo or amount of proposed JSF DT test activities over a three-year period would be similar to those actions analyzed in the *EA for Flight Testing of the Advanced Medium Range Air-To-Air Missile (AMRAAM)*. The maximum F-35/support aircraft flight hours would occur in Test Year 5 with 50 flights (23 for the F-35 and 27 for support aircraft) and 111 flight hours (46 for the F-35 and 65 for support aircraft), and the maximum of sixteen stores/expendables proposed would be released in Test Year 6. The tempo or amount of proposed tests is significantly less than those analyzed in the WSMR EIS. The WSMR EIS included analysis of an average of 200 air-to-air, 700 surface-to-air, 250 live fire, and 500 training missions for Patriot; and 250 surface to surface missile launches per year. The Final EA for AMRAAM testing analysis addressed 30 flights with 6 live launch tests with missiles annually for a ten to fifteen-year period (approximately 60 total missiles). The proposed JSF DT would include four AIM-120C AAVI air-to-air missile firings each for Test Years 4 and 5, and a total of thirteen air-to-air or air-guided missiles firings in Test Year 6. This would represent less than 1% of the total yearly missiles (1,900) analyzed in the WSMR EIS and in the Final EA for AMRAAM . Additionally, proposed DT events would be conducted in designated target areas and the airspace/MOA of WSMR, consistent with established operating procedures.

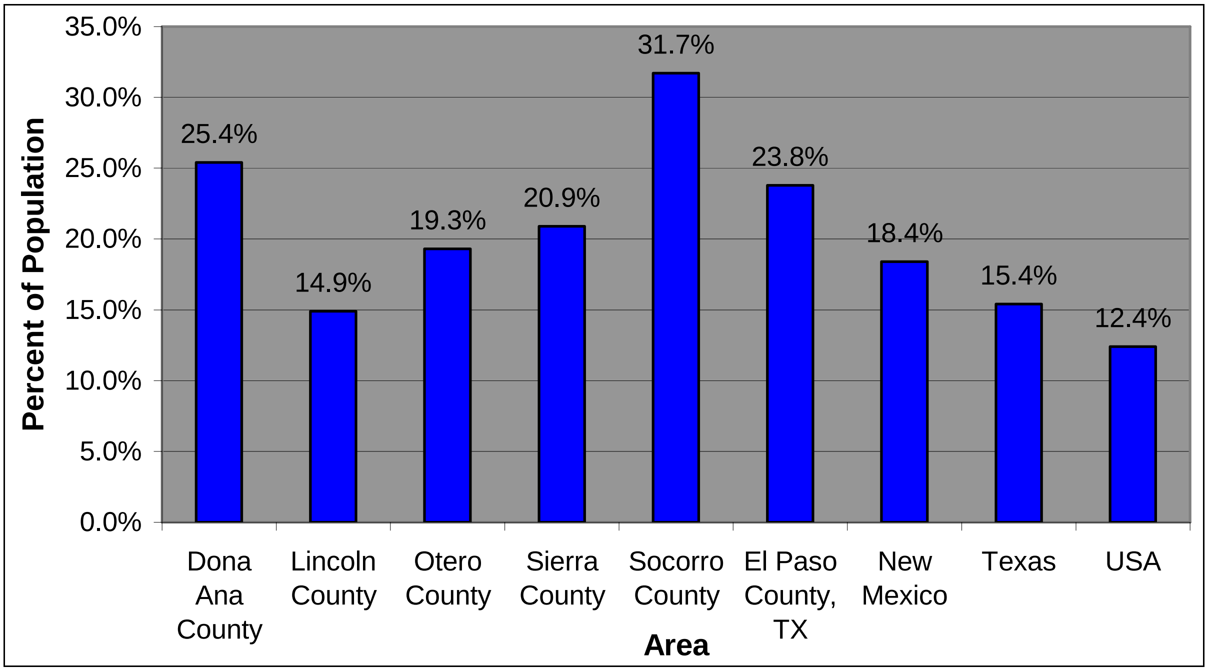
Based on annual operations and similar T&E Programs at WSMR, noise levels from F-35 and support aircraft flights would not likely affect the surrounding biological communities and no change in land area is anticipated from the proposed JSF DT. The potential to startle wildlife would likely be minimal because most of the proposed tests would occur above the 550-foot AGL zone that has been shown to account for most wildlife reactions. Any low-altitude flight levels associated with pullouts after dives would be of a very short duration on any given run. The conclusions of the Final EA for the AMRAAM determined, while there could be noise-induced effects, it was unlikely that a significant portion of any animal population would be adversely affected from proposed live fire missile tests conducted within the T&E areas of WSMR. Similarly, no significant impacts to biological/natural resources is expected over the three-year test period for the proposed JSF DT Program.

4.4.6 Socioeconomics at WSMR

4.4.6.1 Affected Environment

The socioeconomic area for WSMR encompasses six counties in two states: Doña Ana, Lincoln, Otero, Sierra, and Socorro Counties in New Mexico, and El Paso County in Texas. Environmental justice considerations are addressed while all other socioeconomic resource areas (such as economics) are not addressed in greater detail, since there would be no increase or relocation of personnel at WSMR in support of the proposed JSF DT.

Poverty rates within the WSMR study area are summarized in Figure 4.4.6.1-1. Poverty rates in Doña Ana and Socorro Counties exceed the set CEQ threshold of 25% for low-income populations, and only Lincoln County has a poverty rate below the state poverty rates for New Mexico (18.4%) and Texas (15.4%).

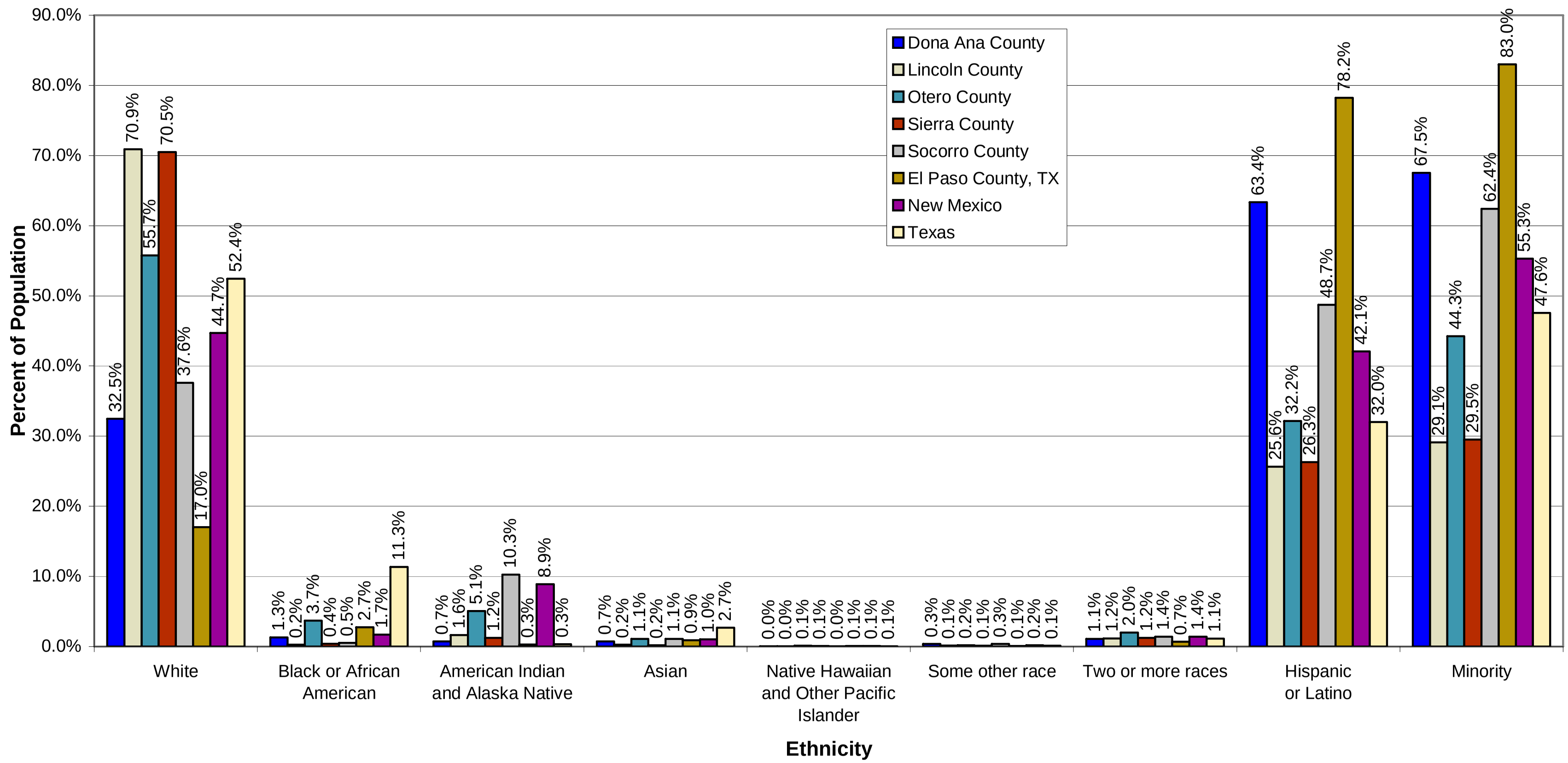


Source: U.S. Census Bureau, 2000.

Figure 4.4.6.1-1: Poverty Rates for WSMR Socioeconomic Study Area (2000)

Population ethnicity is summarized in Figure 4.4.6.1-2. The six-county area is predominantly Hispanic or Latino (70.3%). The remaining race distribution in the six-county area is white (24.5%), Black or African American (2.4%), two or more races (0.9%), American Indian or Native Alaskan (0.9%), Asian (0.9%), some other race (0.1%), and Native Hawaiian or other Pacific Islander (0.1%). Hispanic or Latino populations have the largest minority representation in three of the six counties. The ethnic representations in the area closely resemble estimates for New Mexico with a significantly larger Hispanic or Latino representation and a much smaller American Indian or Native Alaskan representation. Minority populations are 67.5% in Doña Ana County, 29.1% in Lincoln County, 44.3% in Otero County, 29.5% in Sierra County, 62.4% in Socorro County, and 83.0% in El Paso County, Texas.[57] The minority percentage in El Paso well exceeds the CEQ threshold of 50% and the Texas percent minority of 47.6%. Doña Ana County and Socorro County exceed the CEQ threshold and the New Mexico percent minority of 55.3%, while Lincoln County is slightly below the set threshold.

[57] *Census Bureau 2000*



Source: U.S. Census Bureau, 2000.

Note: The percent of the population by ethnicity for the study area will not equal the average of the counties' percent of the population by ethnicity because denominators (county populations) are not common to all.

Figure 4.4.6.1-2: Ethnicity for WSMR Socioeconomic Study Area (2000).

4.4.6.2 Environmental Consequences

The proposed JSF DT flights would be conducted mostly above 3,000 feet and higher with no takeoffs or landings and/or long standing low-altitude flight tests occurring at WSMR. As such, the proposed JSF DT would not likely cause disproportionate high or adverse human and environmental affects to the environmental justice populations relative to other populations in the area. Most of the proposed JSF DT activities would occur over large range areas that are typically void of people. Any predicted impacts are expected to be negligible and the proposed JSF DT activities are similar in scope to the tests currently conducted at WSMR. Similarly, implementation of the proposed JSF DT at WSMR would cause no disproportionately adverse health or safety risks to children. No potentially significant impacts to any sensitive receptors (including hospitals, schools, and daycare facilities) where a disproportionately large population of children may be present would be expected to occur considering that the proposed JSF DT activities are conducted predominantly over unpopulated areas.

4.5 NTTR NELLIS AFB

4.5.1 Nellis AFB General Information

NTTR Nellis AFB, also referred to as Nellis Range Complex (NRC), is located in southern Nevada, as depicted in Figure 4.5.1-1, and is comprised of airspace, land, and infrastructure designated for military uses. The withdrawn lands of Nellis Air Force Range (NAFR) are used for national testing and training for military equipment and personnel. The airspace of the NRC is comprised of FAA designated restricted areas and MOAs. The infrastructure includes airfields at Indian Springs and Tonopah Test Range (TTR) and simulated targets and threats throughout NAFR. Approximately 163 tactical target complexes containing more than 1,300 targets are included in the NAFR. These target complexes provide a realistic arena for operational training and testing of weapon systems, tactics, and combat readiness. The NAFR is divided into two functional areas, which both accommodate live and inert ordnance: the North Range and the South Range. The North Range includes the TTR air installation and additional weapon delivery subranges and electronic combat ranges. The South Range includes the Indian Springs Air Force Auxiliary Field, weapon-delivery areas, and sub-ranges.

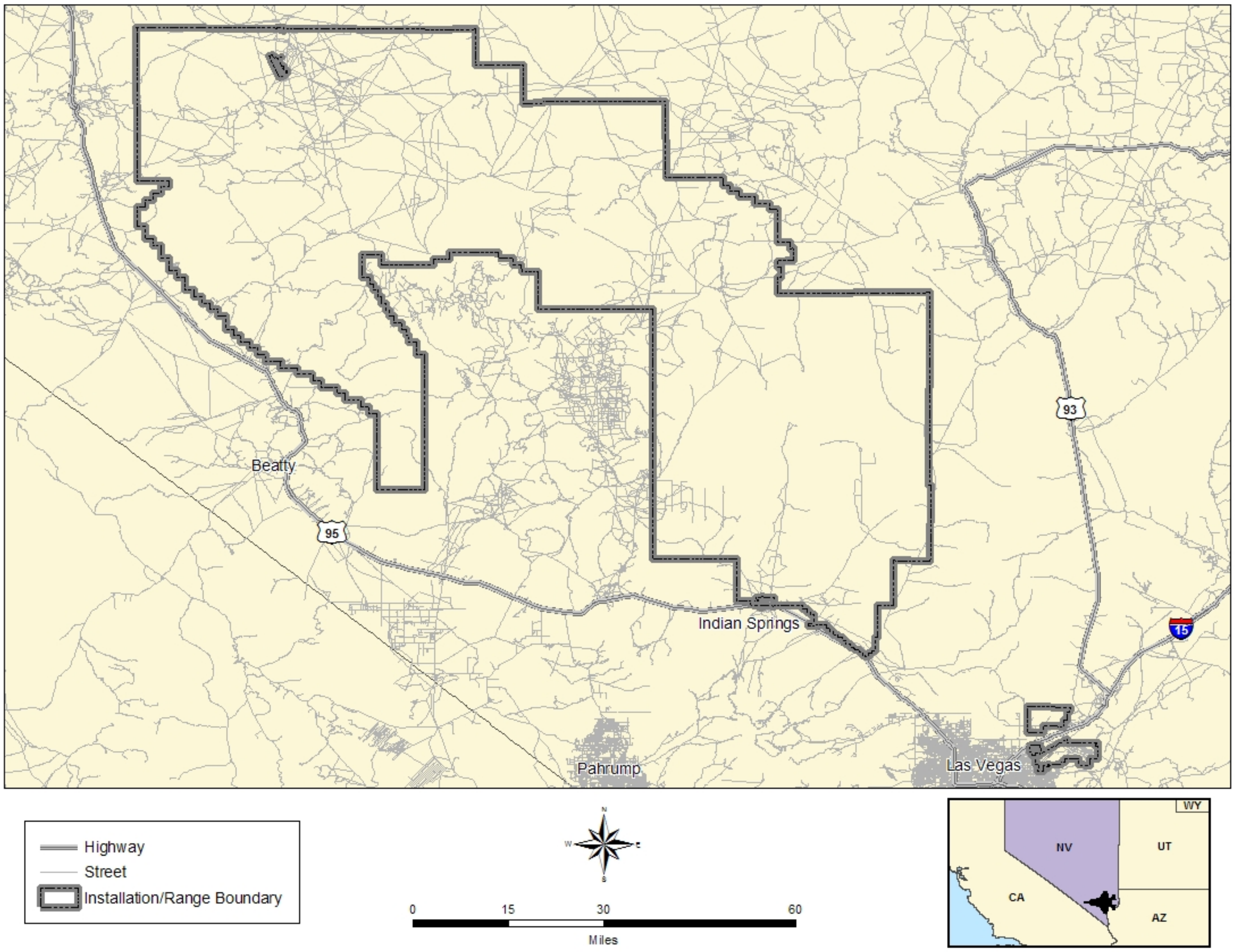


Figure 4.5.1-1: General Map of NTTR Nellis AFB

4.5.2 Proposed JSF DT at NTTR Nellis AFB

The purpose of the proposed JSF DT at NTTR Nellis AFB would be to conduct mission systems tests for a seven-year time period. Planned flight tests would peak in Test Year 5, and for every flight test, an F-16 would serve as a safety chase aircraft. KC-135s, for aerial refueling, would be less than 0.05% of the proposed JSF DT profile. Table 4.5.2-1 provides an overview of the proposed JSF DT by number of flights and flight hours for both the F-35 and support aircraft. Some flights may be conducted with captive carried inert weapons, but no weapon releases would be conducted. No additional stores/expendables are anticipated at this time for proposed JSF DT activities at NTTR Nellis AFB.

The proposed JSF DT is considered consistent with on-going operations and similar in scope with other aircraft programs using the facility and range capabilities of NTTR Nellis AFB. Mission systems tests would be comprised of sensor development, subsystem integration, core processor software integration, off-board integration demonstrations, RF compatibility, electronic warfare regression tests, electromagnetic environmental effects (E3) tests, tactical weapons deployment, etc. All of NTTR Nellis AFB would be used for the proposed JSF DT to include: Electronic Combat (EC) South, 4806, 4807, 4808, 4809, Caliente, Elgin, Coyote, Sally Corridor, Reveille, EC South, and Tolicha Peak Electronic Combat Range (TPECR). Proposed flight tests would be at altitudes predominantly above 3,000 feet. with about 2% of the total proposed flights occurring below 3,000 feet. No supersonic flights are planned for the proposed mission systems tests.

Table 4.5.2-1: Proposed JSF DT Flight Profile at NTTR Nellis AFB

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Fight Hours	Total No. Flights	Total Flight Hours
1	Mission Systems	5	10	F-16, KC-135	6	12	11	22
2	Same as Test Year 1	34	68	Same as Test Year 1	36	72	70	140
3	Same as Test Year 1	99	198	Same as Test Year 1	104	208	203	406
4	Same as Test Year 1	107	214	Same as Test Year 1	112	224	219	438
5	Same as Test Year 1	151	302	Same as Test Year 1	159	318	310	620
6	Same as Test Year 1	147	294	Same as Test Year 1	154	308	301	602
7	Same as Test Year 1	134	268	Same as Test Year 1	141	282	275	550
TOTAL		***677***	***1,354***		***712***	***1,424***	***1,389***	***2,778***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).

Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

All aircraft flights would begin and end at Edwards AFB with no landings planned at Nellis AFB's runways except in the event of an aircraft emergency. Transit flights between Edwards AFB and NTTR Nellis AFB would be primarily through SUA of the R-2508 complex with flights through a small portion of non-military use airspace that would be coordinated with the FAA. All flights would be conducted in compliance with NRC's airspace use restrictions and air operation procedures. These restrictions include low-altitude avoidance and noise-sensitive areas as identified in *Nellis AFB Supplements to AFI 13-212, Volume l Weapons Ranges and Volume II Weapons Range Management*s.

4.5.3 Air Quality at NTTR Nellis AFB

4.5.3.1 Affected Environment

The Las Vegas Valley portion of Clark County has been designated nonattainment for the CO, PM_{10}, and eight-hour O_3 NAAQS. Nellis AFB and the NRC lie within the Las Vegas Valley. The Las Vegas Valley has been designated as a serious CO and PM_{10} nonattainment area and subpart 1 nonattainment for the eight-hour O_3 standard. From 1999 to 2002, Clark County did not exceed the CO NAAQS. Elevated levels of PM_{10} are primarily associated with fugitive dust from construction activities.

4.5.3.2 Environmental Consequences

Because the majority of the proposed JSF DT activities at NTTR Nellis AFB would be above 3,000 feet, there would be no potential air quality impacts expected at and below the mixing layer.

4.5.4 Noise at NTTR Nellis AFB

4.5.4.1 Affected Environment

The withdrawn lands of NAFR or NRC serve as the dedicated lands used for national testing and training for military equipment and personnel. The airspace of the NRC is comprised of FAA-designated restricted areas and MOAs. Numerous USAF and other service aircraft operate on a regular basis within the NRC, participating in various combat-readiness training exercises. These exercises include both subsonic and supersonic activity. F-16s and F-15s are used to conduct approximately 70% of the sorties in the NRC. The DNL in all airspace is within normally acceptable land use compatibility guidelines, with the noise environment at the NRC ranging up to DNL 65 dB within a 25-square-mile area of uninhabited desert plains and mountains. The DNL in all other areas in the range is less than 65 dBA.

4.5.4.2 Environmental Consequences

The proposed JSF DT at NTTR Nellis AFB would be comprised of mission systems test activities. These proposed tests are considered consistent with on-going operations and similar in scope with other aircraft programs using the facility and range capabilities of NTTR Nellis AFB. Proposed flight tests would be conducted in compliance with NTTR Nellis AFB airspace use restrictions and air operation procedures. All proposed JSF DT activities would occur within restricted airspace and MOAs.

Most of the proposed JSF DT activities would be conducted at altitudes well above 3,000 feet AGL. Peak activity from the proposed JSF DT would occur in Test Year 5, as illustrated in Table 4.5.2-1, with a total of 620 flight hours for both JSF and support aircraft. This would constitute less than a 1% increase over the 2004 utilization of 37,009 hours reported to the FAA for the available NRC (R-4809, R-4806W, R-4807A/B, R-4808, R-4806E, Desert MOA, Silver MOA, Reveille N/S MOA).[58] This increase would be considered less than significant resulting in minimal to negligible changes to the existing baseline noise levels. Therefore, the proposed JSF DT conducted within NTTR Nellis AFB's ranges and airspace, as well as SUA and non-military use airspace, would not likely result in any significant increases to the existing noise environment, or cause changes or revisions to the existing airspace areas and use parameters.

Additionally, the Scheduling Agency coordinates the hour allocation for range and MOA usage, and notifies the FAA Air Route Traffic Control Center when these areas are activated. Approximate accounting of all flight testing programs and operations anticipated, including the proposed JSF DT, during a CY within the NAFR would be established months in advance. It is not anticipated that additional time would be allocated specifically for the proposed JSF DT Program.

4.5.5 Biological/Natural Resources at NTTR Nellis AFB

4.5.5.1 Affected Environment

The NRC contains diverse plant and animal communities within the Mohave and Great Basin Deserts. Six species are listed as endangered and three as threatened. Seventy species are listed as species of concern by the USFWS. The State of Nevada lists seven endangered and two threatened species, while an additional 38 species are afforded a degree of protection by the State of Nevada through the Nevada Revised Statutes and regulations set forth in the Nevada Administrative Code. One Federally-listed threatened bird species, the bald eagle (*Haliaeetus leucocephalus)*, may occur at the NRC. The bald eagle is not known to breed in the area; they are primarily spring and fall migrants and winter visitors. The bald eagle, which winters in the Pahranagat Valley and the Pahranagat NWR, is attracted to the marshes, ponds, and lakes along the riparian corridor of the White River. If and when bald eagles are on NAFR, they may be temporarily attracted to the small, ephemeral ponds, especially if waterfowl are present. The golden eagle (*Aquila chrysaetos*) is a year-round resident of NAFR.[59] The mountain plover (*Charadrius montanus*), a candidate proposed for listing as threatened or endangered, has the potential to occur within the NRC as a migrant, although its presence has not been confirmed.

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[58] *FAA 2004 Range Utilization Report*

[59] *U.S. Air Force 1997*

The range of wildlife supported by this diversity of habitat and commonly found within the NRC includes over 30 species of reptiles, 60 species of mammals, and over 240 species of birds. MOA airspace overlies important and relatively extensive riparian and wetland habitats. Although extremely small in total area, riparian communities in the Great Basin/Mojave Desert region are critical centers of biodiversity and provide migration pathways for many species. More than 75% of the species in the region, including 50% of the birds, are strongly associated with riparian vegetation.[60] Bird diversity is especially apparent in the fall and spring during migration when bird species tend to follow the generally north-south mountain ranges and are attracted to the infrequent ponds and riparian areas.[61] NAFR implements an aggressive BASH Program, for which there have been no Class A or B mishaps in recent years due to bird-aircraft strikes.

4.5.5.2 Environmental Consequences

Proposed test activities under either Proposed Action alterative would occur predominantly at altitudes well above 3,000 feet AGL (10,000 feet and higher altitudes), while only 2% of the entire proposed JSF DT would be conducted below 3,000 feet AGL. The greatest potential for impacts to biological/natural resources are from discrete individual flight tests conducted below 3,000 feet in relation to the aircraft mission systems test activities, where short duration and low-angle flights (such as dives) may occur. No landings or takeoffs with the F-35 would be conducted at NTTR Nellis AFB. Potential impacts to biological resources from the proposed JSF DT would be limited predominantly to noise-induced effects and impacts.

Biological species are expected to already be acclimated to the noise generated from RDT&E activities conducted at NTTR Nellis. The initial temporary response to overflight noise from the proposed F-35 mission systems tests is not anticipated to have a negative impact on any species' population at NTTR Nellis AFB. The tempo or amount of proposed JSF DT test activities over a seven-year period would be similar to those actions analyzed in the Legislative EIS for the Renewal of the Nellis AFB Range Land Withdrawal and the Final EIS for the F-22 development evaluation and weapons school beddown at Nellis AFB. Approximately 200,000 to 300,000 annual aircraft sortie operations are projected for the NRC with annual airfield operations at 76,944 flights/flight hours by 2008 and beyond; while approximately 4,400 sorties annually would be conducted within Nellis AFB and associated ranges by 2008 with the F-22. The proposed JSF DT is projected to peak in Test Year 5 with a planned flight profile of 310 flights (151 for the F-35 and 159 for support aircraft) and 620 flights hours (302 for the F-35 and 318 for support aircraft). Further, the entire seven-year test period for the proposed JSF DT (1,389 total flights/2,778 flight hours with both F-35 and support aircraft) would represent 1% or less of the sortie operations in the NRC or with the F-22. The proposed JSF DT would also be conducted in established restricted areas and MOAs at NTTR Nellis AFB consistent with established operating procedures.

Based on annual operations and similar T&E Programs at NTTR Nellis AFB, noise levels from proposed F-35 and support aircraft flights would not likely affect the surrounding biological communities and no change in land area is anticipated from the proposed JSF DT. The potential to startle wildlife would likely be minimal because most of the proposed tests would occur predominantly at altitudes above 3,000 feet and above the 550-foot AGL zone that has been shown to account for most wildlife reactions. Any low-altitude flight levels associated with pullouts after dives would be of a very short duration on any given run. The conclusions of the Final EIS for the F-22 concluded there would be no significant effect because aircraft operations and noise levels would not substantially increase over existing levels,

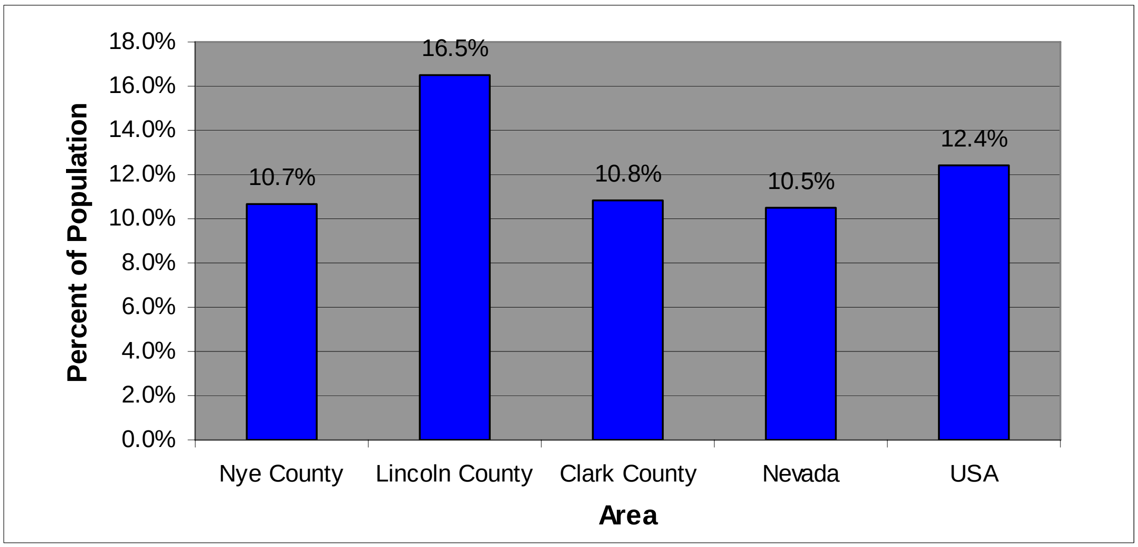
[60] *Brussard et.al. 1997*
[61] *U.S. Air Force 1997*

especially considering most operations would occur at high altitudes. Similarly, no significant impacts to biological/natural resources would be expected over the seven-year test period for the proposed JSF DT Program.

4.5.6 Socioeconomics at NTTR Nellis AFB

4.5.6.1 Affected Environment

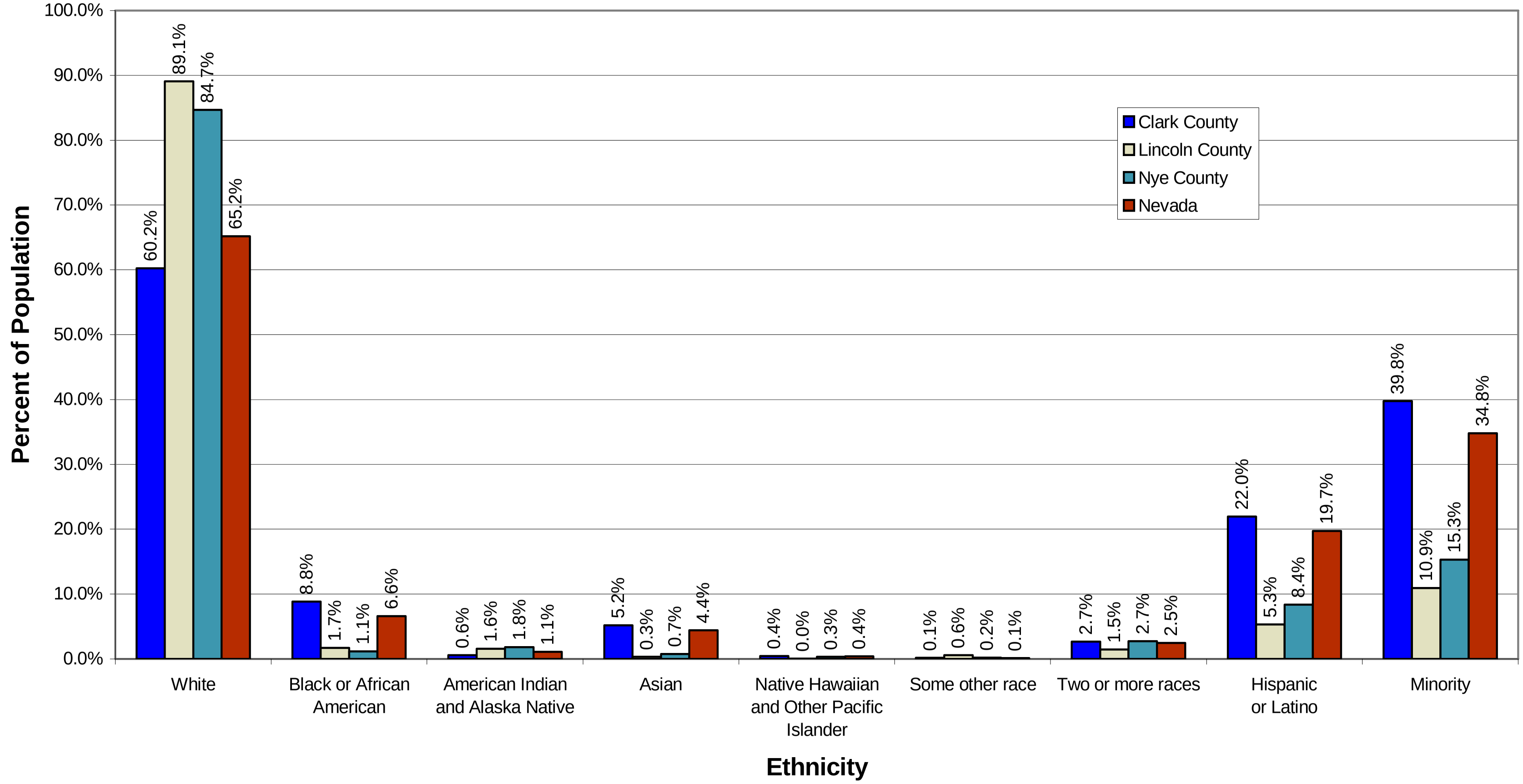
NTTR Nellis AFB encompasses Nye, Lincoln, and Clark Counties. The poverty rate is 10.7% in Nye County, 16.5% in Lincoln County, and 10.8% in Clark County. These rates are comparable with the Nevada poverty rate of 10.5%, and are well below the set CEQ threshold of 25% for low-income populations. Poverty rates are summarized in Figure 4.5.6.1-1.



Source: U.S. Census Bureau, 2000.

Figure 4.5.6.1-1: Poverty Rates for NTTR Nellis AFR Socioeconomic Study Area (2000)

Population ethnicity is summarized in Figure 4.5.6.1-2 for the socioeconomic study area. The three-county area is predominantly white (60.9%). The remaining race distribution in the three-county area are Hispanic or Latino (21.6%), Black or African American (8.6%), Asian (5.1%), two or more races (2.7%), American Indian or Native Alaskan (0.6%), Native Hawaiian (0.4%), and some other race (0.1%). Ethnicity in these three counties closely resembles ethnicity distribution in Nevada. The minority percentage in Nye County is 15.3%, 10.9% in Lincoln Counties, and 39.8% in Clark County. Nye and Lincoln Counties are well below the CEQ threshold of 50% and the state minority population of 34.8%. Clark County is slightly above the state minority population rate.



Source: U.S. Census Bureau, 2000.

Note: The percent of the population by ethnicity for the study area will not equal the average of the counties' percent of the population by ethnicity because denominators (county populations) are not common to all

Figure 4.5.6.1-2: Ethnicity for NTTR Nellis AFR Socioeconomic Study Area (2000)

4.5.6.2 Environmental Consequences

Socioeconomic impacts would not be anticipated because no new personnel are required to support the proposed JSF DT at NTTR Nellis AFB. Environmental justice populations are not expected be significantly affected from the proposed JSF DT. The proposed JSF DT flights would be conducted predominantly above 3,000 feet and higher, with no takeoffs or landings at NTTR Nellis AFB. As such, the proposed JSF DT would not likely cause disproportionate high or adverse human health and environmental affects to the environmental justice populations relative to other populations in the area. The proposed JSF DT activities would be similar in scope to the tests currently conducted at NTTR Nellis AFB, and any predicted impacts are expected to be negligible. Similarly, implementation of the proposed JSF DT at NTTR Nellis AFB would cause no disproportionately adverse health or safety risks to children. No potentially significant impacts to any sensitive receptors (including hospitals, schools, and daycare facilities) where a disproportionately large population of children may be present would be expected to occur.

4.6 VACAPES OPAREA

4.6.1 VACAPES OPAREA General Information

The VACAPES OPAREA of the AWA, as depicted in Figure 4.6.1-1, is under the control of the Fleet Area Control and Surveillance Facility (FACSFAC). The VACAPES OPAREA includes areas in the offshore mid-Atlantic Ocean, extending from the Delaware coast to the southern Virginia coast. Water depths range from zero miles to roughly 2.5 miles.

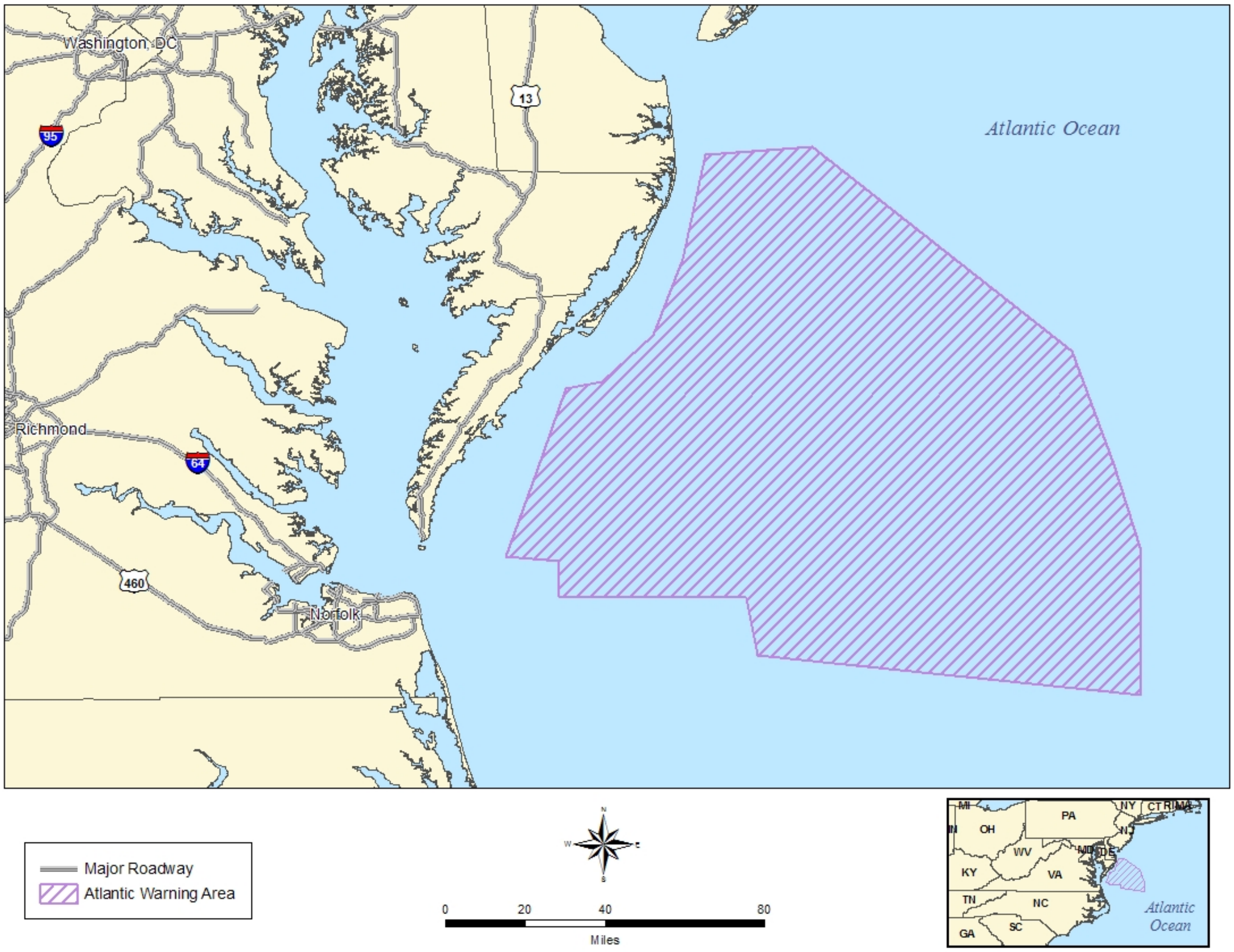


Figure 4.6.1-1: General Map of VACAPES OPAREA

4.6.2 Proposed JSF DT at VACAPES OPAREA

The VACAPES OPAREA has the necessary range and airspace to perform the proposed JSF DT. It is used on a regular basis by NAS Patuxent River since it is considered an existing weapons target area. In addition, the required distances for established safety hazard patterns of missiles can be achieved and maintained during proposed JSF DT activities. Table 4.6.2-1 summarizes the proposed flight tests and support aircraft, while Table 4.6.2-2 summarizes the stores/expendables proposed for use at the VACAPES OPAREA. Planned flight tests would peak in Test Year 4. Approximately 50% of the proposed flight tests would be conducted beyond 12 NM. Most of the proposed JSF DT activities would be conducted at altitudes greater than 3,000 feet AGL/MSL. Proposed stores used for some of the planned JSF DT activities would include the release of inert ordnance (such as bombs and missiles).

All aircraft flights would begin and end at NAS Patuxent River (in the event of an aircraft emergency while in the VACAPES OPAREA, the F-35 might divert to NASA Wallops Island, Virginia). Transit flights between NAS Patuxent River and VACAPES OPAREA would be through military and non-military use airspace appropriately coordinated with the FAA. All flights would be conducted in compliance with airspace use restrictions and air operation procedures.

Table 4.6.2-1: Proposed JSF DT Flight Profile at VACAPES OPAREA

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Fight Hours	Total No. Flights	Total Flight Hours
2	CTOL FQ, CTOL Performance, CTOL Propulsion, Loads, Flutter, Mission Systems	25	50	F/A-18 KC-130	47	94	72	144
3	CTOL FQ, CTOL Performance, CTOL Propulsion, Loads, Flutter, Weapons Separation & Integration, Mission Systems	111	222	F/A-18 KC-130 F-15 E3 E2 EP-3E EA-6 AH-66 V22 NIMROD ASTER EFA	227	454	338	676
4	Same as Test Year 3	183	366	Same as Test Year 3	379	758	562	1,124
5	Same as Test Year 3	172	344	Same as Test Year 3	352	704	524	1,048
6	Loads, Flutter, Weapons Separation & Integration, Mission Systems	131	262	Same as Test Year 3	273	546	404	808
7	Weapons Separation & Integration, Mission Systems	27	54	F/A18 KC130	55	110	82	164
TOTAL		***649***	***1,298***		***1,333***	***2,666***	***1,982***	***3,964***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).

Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Table 4.6.2-2: Proposed JSF DT Stores/Expendables at VACAPES OPAREA

Test Year	Stores/Expendables	
	Type	Quantity*
2	MK 83 JDAM (18) MK 84 JDAM (18)	36
3	AIM120 AMRAAM (12)	12
4	GBU-12 (30) BLU-109 JDAM (11) JSOW (12) WCMD (37)	90
5	MK82 (30) Fuel Tank (12)	42
6	AIM-120 AMRAAM (26) AIM-9 (8) LGTR (22)	56

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).

Note: Proposed stores/expendables reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Total for all types

All SOPs in place for the safe use and release of stores/expendables would be adhered to during the proposed JSF DT activities in the VACAPES OPAREA.

4.6.3 Air Quality at VACAPES OPAREA

4.6.3.1 Affected Environment

The VACAPES OPAREA of the AWA is a designated MOA located in the Atlantic Ocean off the coasts of Delaware, Maryland, and Virginia, and borders all of the coastal counties in these states. The available working airspace covers over 35,000 square miles and encompasses both the open ocean and open air.

4.6.3.2 Environmental Consequences

Because the majority of the proposed JSF DT activities occur outside of coastal state boundaries and at altitudes above 3,000 feet, this airspace is not subject to the regulatory provisions of the CAA. As such, the attainment status is not considered elevant and there is no need for a conformity analysis. Drifting of emissions from proposed JSF DT activities to state boundaries would not likely occur. If the emissions were to disperse over a large area outside the test operating area, they are not expected to result in a change to the state emission status. Air pollutant concentrations would be temporary in nature and quickly dissipate in a three-dimensional manner following normal plume dispersion dynamics. No potential air quality impacts would be expected at or below the mixing layer.

4.6.4 Noise at VACAPES OPAREA

4.6.4.1 Affected Environment

The proposed JSF DT areas are over open water. Noise sources adding to the ambient sounds associated with an ocean environment (e.g., natural movements of the water surface, wildlife, and wind) could include aircraft flights and human activity (commercial shipping, recreational boating, and/or commercial and recreational fishing). Sound levels vary and are highly-dependent on the extent of human activity in this expansive military range and operating area.

4.6.4.2 Environmental Consequences

All proposed test flights would be conducted in compliance with airspace use restrictions and air operation procedures. Peak activity from the proposed JSF DT would occur in Test Year 4 with 562 flights for both F-35 and support aircraft, as reflected in Table 4.6.2-1. Annualized, this operational tempo would constitute approximately 1.5 additional daily flights within the VACAPES OPAREA, and therefore is anticipated to have a negligible effect. Furthermore, considering the VACAPES OPAREA is located exclusively off-shore, significant noise impacts to communities would not be expected. Unessential personnel are not allowed to stay within an area during the conduct of tests. Therefore, the proposed JSF DT is not expected to result in any significant increases in noise, or cause changes or revisions to the existing airspace areas and use parameters for the VACAPES OPAREA.

4.6.5 Biological/Natural Resources at VACAPES OPAREA

4.6.5.1 Affected Environment

The VACAPES OPAREA of the AWA includes waters in the Mid-Atlantic Bight, extending from the Delaware coast to the southern Virginia coast seaward, with water depths ranging from zero to roughly 13,123 feet. Biological resources in the VACAPES OPAREA have been analyzed in the *Overseas Environmental Assessment of Testing the Hellfire Missile System's Integration with the H-60 Helicopter (May 2005), as well as the Marine Resources Assessment for the Virginia Capes (VACAPES) Operating Area (OPAREA), Final Report (October 2001),* and *the Estimation of Marine Mammal and Sea Turtle Densities in the VACAPES Operation Area, Technical Report, Naval Facilities Engineering Command, Norfolk, VA, Contract #N62477-00-D-0159, CTO 009 (13 November 2002).* These documents provide a concise description of the existing environment at VACAPES OPAREA. More detailed analyses of the VACAPES OPAREA's existing biological resources may also be found in Section 4.3 of the Hellfire OEA. The VACAPES OPAREA is comprised completely of water, so there is no terrestrial habitat contained within the VACAPES OPAREA. The following is a brief synopsis of the existing biological resources, and additional information on threatened and endangered species found within the VACAPES OPAREA, is derived from the above mentioned references.

Marine Life

The pelagic community consists of two basic types of organisms: plankton and nekton. Plankton are predominantly microscopic organisms that are incapable of making their way against a current and, hence, are passively transported by the currents in the sea. Plankton provides the organic matter required by the other component of the pelagic ecosystem, the nekton. The nekton is composed of the remaining organisms of the pelagic environment. These are free-swimming organisms that are able to move independently of water movements. This group includes fish, marine mammals, and sea turtles.

Plankton

The most important component of the plankton community in the area is the potential presence of Sargassum rafts. Sargassum rafts consist of pelagic brown algae, Sargassum natans and S. fluitans. Converging currents of the Gulf Stream, eddies, and weather fronts within warm waters of the North Atlantic tend to accumulate the two varieties of Sargassum weed which intertwine to form dynamic structural floating mats called rafts or windrows. Sargassum rafts provide an important habitat for a diverse assemblage of organisms, including fungi, micro- and macro-epiphytes, at least 145 species of invertebrates, over 100 species of fish, four species of sea turtles, and numerous marine birds.[62]

[62] *NAVAIR 2005*

Nekton

Forty-one species of marine mammals inhabit the North Atlantic Ocean, seven of these are listed as endangered or threatened under the ESA, and eleven others are listed as strategic stocks under the MMPA.[63] In addition, five species of sea turtles may occur in the VACAPES OPAREA, all of which are listed as endangered or threatened under the ESA. The Kemp's Ridley, leatherback, hawksbill and green sea turtles are all listed as endangered, while the loggerhead is listed as threatened.

Two fish species listed under the ESA inhabit U.S. Atlantic waters and are designated as endangered by the NOAA Fisheries Office of Protected Resources.[64] The shortnose sturgeon is an endangered estuarine and freshwater species that lives in large river systems from New Brunswick to Florida. In the mid-Atlantic, they occasionally enter marine waters near river mouths. The shortnose sturgeon is not expected to occur, based on the conclusions presented in the OEA for testing the Hellfire Missile System. The smalltooth sawfish was designated as an endangered species on April 1, 2003. The species is a tropical marine and estuarine animal formerly found from the Gulf of Mexico to North Carolina. They are now only known to occur in southern Florida.

Of the multiple species of pelagic/shore birds that may occur in the North Atlantic ocean, only four species of birds are classified as endangered or threatened: Bermuda petrel (endangered), Madeira's petrel or Freira (endangered), least tern (inland populations listed as endangered, coastal and offshore populations not listed), and roseate tern (endangered from New England to North Carolina and threatened south of North Carolina). None of these species is expected to occur in the off-shore areas where proposed JSF DT activities may occur, due to these species small population sizes and limited sighting data and habitat preferences.

Though not all of the marine mammals that may occur are listed under the ESA, all are protected under the MMPA. The MBTA provides additional protection for numerous migratory birds (16 USC § 703-712 Ch.128). A list of protected marine species potentially present in the VACAPES OPAREA is provided in Table 4.6.5.1-1.

[63] *DoN 2001, NAVFAC 2002, and NAVAIR 2005*
[64] *NOAA Fisheries 2004*

Table 4.6.5.1-1: Protected Marine Species Expected in the VACAPES OPAREA of the AWA from the Near Shore to Slope Stratum

Scientific Name	Common Name	Status*	Season			
			Winter	Spring	Summer	Fall
Suborder Mysticeti	**Baleen Whales**					
Family Balaenidae	**Right and Bowhead Whales**					
Eubalaena glacialis	North Atlantic right whale	E,S	L	L	L	L
Family Balaenopteridae	**Rorquals**					
Balaenoptera musculus	Blue whale	E,S	L	L	L	L
Balaenoptera edeni	Bryde's whale		A	A	A	A
Balaenoptera physalus	Fin whale	E,S	M	H	M	M
Megaptera novaeangliae	Humpback whale	E,S	M	M	M	M
Balaenoptera acutorostrata	Minke whale		M	M	M	M
Balaenoptera borealis	Sei whale	E,S	M	L	L	L
Suborder Odontoceti	**Toothed whales**					
Family Physeteridae	**Sperm whales**					
Physeter macrocephalus	Sperm whale	E,S	H	H	H	M
Family Kogiidae	**Pygmy Sperm whales**					
Kogia sima	Dwarf sperm whale		M	M	M	M
Kogia breviceps	Pygmy sperm whale	S	M	M	M	M
Family Ziphiidae	**Beaked whales**					
Mesoplodon densirostris	Blainville's beaked whale	S	M	M	H	M
Ziphius cavirostris	Cuvier's beaked whale	S	M	M	H	M
Mesoplodon europaeus	Gervais' beaked whale	S	M	M	H	M
Mesoplodon bidens	Sowerby's beaked whale	S	A	A	A	A
Mesoplodon mirus	True's beaked whale	S	M	M	H	M
Hyperoodon ampullatus	Northern bottlenose whale		A	A	A	A
Family Delphinidae	**Dolphins and Porpoises**					
Tursiops truncatus	Bottlenose dolphin	S	H	H	H	H
Grampus griseus	Risso's dolphin		M	H	H	H
Delphinus delphis	Common dolphin	S	H	H	H	H
Lagenorhynchus acutus	Atlantic white sided dolphin		L	L	L	L
Lagenorhynchus albirostris	White-beaked dolphin		L	L	L	L
Stenella frontalis	Atlantic spotted dolphin		M	M	H	M

Source: DoN 2001, NAVFAC 2002 and NAVAIR 2005.

Legend: E = Endangered under the ESA; S = Strategic under the MMPA; A (Absent) = Species is not expected; L (Low/Unknown) = Likelihood of encountering the species is rare or unknown; M (Moderate) = Expected distribution of a species; H (High) = Concentrated occurrence with the highest likelihood of species presence. Winter = January through March, Spring = April through June, Summer = July through September, and Fall = October through December

Table 4.6.5.1-1: Protected Marine Species Expected in the VACAPES OPAREA of the AWA from the Near Shore to Slope Stratum (Continued)

Scientific Name	Common Name	Status*	Season			
			Winter	Spring	Summer	Fall
Family Delphinidae (Continued)	**Dolphins and Porpoises**					
Stenella attenuata	Pan-tropical spotted dolphin		M	M	H	M
Stenella coeruleoalba	Striped dolphin		H	H	H	H
Stenella longirostris	Spinner dolphin		A	L	L	L
Stenella clymene	Clymene dolphin		A	L	L	L
Steno bredanensis	Rough-toothed dolphin		L	L	L	L
Lagenodelphis hosei	Fraser's dolphin		L	L	L	L
Globicephala melas	Long-finned pilot whale	S	M	M	H	H
Globicephala macrorhynchus	Short-finned pilot whale	S	M	M	H	H
Peponocephala electra	Melon-headed whale		A	L	L	L
Orcinus orca	Killer whale		L	L	L	L
Pseudorca crassidens	False killer whale		L	L	L	L
Feresa attenuata	Pygmy killer whale		A	L	L	L
Family Phocoenidae	**Porpoises**					
Phocoena phocoena	Harbor porpoise	S	M	M	L	M
Suborder Pinnipedia	**Seals and Sea Lions**					
Phoca vitulina concolor	Harbor seal		A	A	A	A
Pagophilus groenlandica	Harp seal		A	A	A	A
Halichoerus grypus gryous	Gray seal		A	A	A	A
Cystophora cristata	Hooded seal		A	A	A	A
Zalophus californianus	California sea lion		A	A	A	A
Order Sirenia	**Manatees and Dugongs**					
Family Trichechidae	**Manatees**					
Trichechus manatus latirostris	Florida manatee	E,S	A	A	A	A
Family Cheloniidae	**Hard-Shelled Sea Turtles**					
Chelonia mydas	Green sea turtle	E, T	L	L	L	L
Eretmochelys imbricate	Hawksbill sea turtle	E	A	L	L	L
Lepidochelys kempii	Kemp's Ridley sea turtle	E	L	L	L	L
Caretta caretta	Loggerhead sea turtle	T	M	M	M	M

Source: DoN 2001, NAVFAC 2002 and NAVAIR 2005.

Legend: E = Endangered under the ESA; S = Strategic under the MMPA; A (Absent) = Species is not expected; L (Low/Unknown) = Likelihood of encountering the species is rare or unknown; M (Moderate) = Expected distribution of a species; H (High) = Concentrated occurrence with the highest likelihood of species presence. Winter = January through March, Spring = April through June, Summer = July through September, and Fall = October through December

Table 4.6.5.1-1: Protected Marine Species Expected in the VACAPES OPAREA of the AWA from the Near Shore to Slope Stratum (Continued)

Scientific Name	Common Name	Status*	Season			
			Winter	Spring	Summer	Fall
Family Dermochelidae	**Soft-Shelled sea turtles**					
Demochelys coriacea	Leatherback sea turtle	E	L	M	M	M
Family Pristidae	**Sawfish**					
Pristiopsis leichardti	Smalltooth sawfish	E	Unknown	Seasonal	Distribution	
Family Acipenseridae	**Ray-Finned Fish**					
Acipenser brevirostrum	Shortnose sturgeon	E	Unknown	Seasonal	Distribution	
Family Procellariidae	**Petrel**					
Pterodroma p. cahow	Bermuda petrel	E	A	A	A	A
Pterodroma madeira	Madeira's petrel or Freira	E	A	A	A	A
Family Sternidae	**Terns**					
Sterna d. dougalli	Roseate tern	E,T	A	A	A	A

Source: DoN 2001, NAVFAC 2002 and NAVAIR 2005.

Legend: E = Endangered under the ESA; S = Strategic under the MMPA; A (Absent) = Species is not expected; L (Low/Unknown) = Likelihood of encountering the species is rare or unknown; M (Moderate) = Expected distribution of a species; H (High) = Concentrated occurrence with the highest likelihood of species presence. Winter = January through March, Spring = April through June, Summer = July through September, and Fall = October through December

<u>*Essential Fish Habitat*</u>

Thirty-three species of fish have designated EFH for at least one stage of their life cycle in the proposed JSF DT area of the VACAPES OPAREA. For fish species, EFH is classified on five life stages: eggs, larvae, juveniles, adults, and spawning adults. Shark EFH is classified on three life stages based on the general habitat shifts that accompany each developmental stage: neonate/early juvenile (including newborns and pups less than one year old), late juvenile/subadult (age one to adult), and adult (sexually mature). In addition, EFH for pelagic *Sargassum* includes the areas overlying the continental slope within the EEZ and state waters. The Gulf Stream is designated as EFH for *Sargassum* because it provides a mechanism for dispersion.[65] A full list of species and associated life cycle stages for which EFH has been designated is included in Table 4-3 of the OEA for testing the Hellfire Missile System.

4.6.5.2 Environmental Consequences

Potential environmental impacts could occur from the proposed JSF DT overflights and weapons separation tests. Because the majority of the proposed JSF DT would not be consistently at low-levels over the water of the VACAPES OPAREA, no impacts from noise would be anticipated to marine species. Weapons separation & integration would consist of inert stores, which would predominantly break apart upon impact with the water's surface and would settle to the bottom of the ocean. The maximum amount of stores proposed for the VACAPES OPAREA is 90 separations in Test Year 4 with a planned total of 271 during a six-year test period. *The Environmental Assessment (EA) for the F-18E/F Stores Separation Testing at NAS Patuxent River (January 1997)* analyzed the impacts of inert stores separations in the VACAPES OPAREA, similar in type and greater in tempo [approximately 2,825

[65] *NAVAIR 2005*

ordnance (missiles, bombs, and fuel tanks) over 2.25 years] to the Proposed Action, and determined that no impact to the marine environment, including marine mammals and sea turtles, would occur. Section 5.4.1 and Appendix D of the F-18E/F Stores Separation EA describe in detail the methodology used for determining the potential impact on marine mammals and sea turtles. As such, direct impacts to the marine environment are not likely from the proposed JSF DT.

4.6.6 Socioeconomics at VACAPES OPAREA

4.6.6.1 Affected Environment

Socioeconomic impacts from the Proposed Action pertain to the commercial fishing industry. Other sources of socioeconomic impacts at VACAPES OPAREA of the AWA are not expected from the proposed JSF DT. Impacts for environmental justice and children are also not expected since existing test range and operating patterns minimize impacts to general quality of life, health, and safety; and are in place to prevent members of any population, including minority or low-income populations, from being in the area during proposed JSF DT activities.

Socioeconomic data for commercial fishing was obtained from the NMFS, Fisheries Statistics Division website.[66] Annual monthly landing summaries were used to determine the volume and value of finfish and shellfish for specified states. These summaries were used to evaluate economic impacts on the marine fisheries within the VACAPES OPAREA. The VACAPES OPAREA area is accessible to commercial fishing from Maryland, Delaware, and Virginia. Local members of these states rely on commercial fishing as a source of income. NMFS statistics show the 2003 commercial harvest of finfish and shellfish from waters off the coasts of Maryland, Delaware, and Virginia totaled 227,340 metric tons for a reported retail value of approximately $185 million.[67]

4.6.6.2 Environmental Consequences

Socioeconomic impacts from the proposed JSF DT would not likely be significant in the VACAPES OPAREA. The frequency, location, and duration of proposed JSF DT activities would vary throughout the year in the VACAPES OPAREA. These variations would allow commercial fisherman to minimize, recapture, or avoid revenue loss during proposed JSD DT activities. Therefore, no significant impacts are expected to commercial fishing.

4.6.7 Coastal Zone Management at VACAPES OPAREA

4.6.7.1 Affected Environment

The VACAPES OPAREA of the AWA is a designated MOA located in the Atlantic Ocean off the coasts of Delaware, Maryland, and Virginia, and borders all of the coastal counties in these states. The VACAPES OPAREA is comprised completely of water; there is no terrestrial habitat contained within the VACAPES OPAREA. The available working airspace covers over 35,000 square miles and encompasses both the open ocean and open air. Under the CZMA of 1972, as amended (16 CFR §1451 et seq.), coastal states are provided the authority to evaluate projects conducted, funded, or permitted by the Federal government. Any Federal project or activity affecting the coastal zone must be consistent to the maximum extent practicable with the provisions of Federally approved state coastal plans.

Delaware's Coastal Management Program includes shoreline for the entire State of Delaware, as promulgated by the Delaware Coastal Zone Act (7 Del. Code, chapter 70). Maryland's Coastal Zone Management Program includes the inland boundary of the counties bordering the Atlantic Ocean,

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66 *http://www.st.nmfs.gov/st1/commercial/index.html*

67 *NMFS 2005*

Chesapeake Bay, and Potomac River, as far as the municipal limits of Washington, D.C., as established by EO and approved in 1978. Virginia's Coastal Resources Program includes most of Tidewater Virginia, as defined by Virginia Code §28.2-100. All three state programs include coastal waters of the U.S. extending out three NM from the shoreline.

4.6.7.2 Environmental Consequences

The majority of the proposed JSF DT activities occur outside of coastal state boundaries over open water. These activities are consistent with activities already occurring in the VACAPES OPAREA on a routine basis. Aircraft overflights associated with the Proposed Action within the VACAPES OPAREA would not likely affect the coastal resources of each state. Noise generated from the Proposed Action would not include low-level flights over the water of the VACAPES OPAREA on a regular basis (mostly in-frequent and usually above 1,000 feet AGL); therefore, no impacts from noise is anticipated to marine species. The *Environmental Assessment (EA) for the F-18E/F Stores Separation Testing at NAS Patuxent River (January 1997)* analyzed the impacts of inert stores separations in the VACAPES OPAREA, similar in type and greater in tempo than the Proposed Action. Potential impacts to marine animals were found to be less than significant. The JSF PEO has determined that the proposed JSF DT would be consistent to the maximum extent practicable with the enforceable policies of the Delaware, Maryland, and Virginia Coastal Management Programs and has completed a Negative CCD for each state in accordance with the CZMA (See Appendix G.2, G.3, and G.4).

4.7 CUMULATIVE EFFECTS

The CEQ's implementation of NEPA regulations defines cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."[68] Since the direct and indirect impact analysis focuses only on those resources that may be impacted by the Proposed Action (air quality, noise, biological/natural resources, socioeconomic factors, and coastal zone management), the cumulative impacts analysis addresses these same resources. It is reasonable to assume that if the Proposed Action is expected to have very minimal to negligible impact on the environment, then the potential to cause cumulative impacts is also negligible.

The proposed JSF DT is considered consistent with similar, on-going activities and operation constraints at Eglin AFB, NAWCWD China Lake, NAWCWPNS Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA of the AWA. All proposed JSF DT activities would be conducted in accordance with established operating procedures, and within established restricted airspace and MOAs requiring no changes or restrictions to the existing airspace and range use parameters. The proposed JSF DT at these proposed test locations does not threaten a violation of Federal, state, or local laws and regulations imposed for protection of the environment. The JPO, JSF V&T Team, and appropriate range, safety, and environmental organizations at the proposed test locations would ensure compliance with all safety and environmental laws and policies during proposed JSF DT activities. It is anticipated potential impacts would be minor to negligible at each of the above proposed test locations, as summarized in Table 4.7-1. As such, the implementation of the proposed JSF DT, along with any past, present or reasonably foreseeable actions, would not likely cause additional cumulative impacts to air quality, noise, biological/natural, socioeconomic, or coastal zone resources at any of the above proposed test locations.

[68] *40 CFR 1508.7*

Table 4.7-1: Associated Test Location Analysis Summary

Proposed Associated Test Location	Summary of Potential Environmental Impacts
Eglin AFB	The proposed JSF DT is limited to inside the McKinley Climatic Laboratory, other than the transit flights to and from Eglin AFB. Appropriate permits and procedures are in place for the laboratory and no air quality or noise impacts are expected from proposed JSF DT activities. The proposed testing would be conducted over temporary, short time periods. Socioeconomic impacts (both positive and negative) from the temporary DET of JSF test personnel is expected to be minor to negligible.
NAWCWD China Lake and NAWCWPNS Point Mugu	The proposed JSF DT would be consistent with the activities analyzed in the *Final EIS for Proposed Military Operational Increases and Implementation of Associated Comprehensive Land Use and Integrated Natural Resources Management, NAWS China Lake; and the Final Environmental Impact Statement/Overseas Environmental Impact Statement (FEIS/OEIS) Point Mugu Sea Range* for which no significant impact was found. The Proposed Action would represent approximately 1-2% or less of the operations conducted at both proposed test locations. No formal conformity determination is required because the projected emission levels would be below the *de minimis* criteria. Noise associated with the Proposed Action is not expected to result in significant impacts to the surrounding communities or wildlife; minimal to negligible impacts would be expected even with the short duration flights occurring below 3,000 feet AGL. Potential impacts from planned JSF DT stores separation tests is expected to be minimal to negligible, and would be conducted in established land and water ranges for these proposed test locations. Any personnel required to support DETs to these locations would transit to and from Edwards AFB, and environmental justice impacts are expected to be negligible. No significant impacts or harm to air quality, biological/natural resources, environmental justice populations (based on threshold criteria), and coastal zone resources (for NAWCWPNS Point Mugu) would be expected from the proposed JSF DT activities.
WSMR	The proposed JSF DT would be similar to those actions analyzed in the *EA for Flight Testing of the Advanced Medium Range Air-To-Air Missile*. The maximum F-35/support aircraft flight hours would be expected to occur in Test Year 5 and the maximum of sixteen stores/expendables proposed would be released in Test Year 6. The tempo or amount of proposed tests is significantly less than those analyzed in the WSMR EIS and Final EA for the AMRAAM. The maximum year of sixteen missile firings would represent less than 1% of the total yearly missiles (1,900) analyzed in the WSMR EIS. WSMR is located in an area that is in attainment for all criteria pollutants, therefore, conformity analysis is not applicable. Similarly, no significant impact to biological resources, including endangered or threatened species, would be anticipated. Based on annual operations and similar T&E Programs, noise levels from proposed F-35 and support aircraft flights is not expected to affect the surrounding communities nor startle wildlife, because most tests would occur at altitudes of 25,000 feet AGL (well above the 550-foot AGL zone that has been shown to account for most wildlife reaction). Socioeconomic impacts are not expected to occur, which is mainly because direct employment would not change. Similarly, environmental justice impacts are expected to be negligible. No significant impacts to air quality, biological/natural resources, and environmental justice populations (based on threshold criteria) would be expected from the proposed JSF DT activities.
NTTR Nellis AFB	The proposed JSF DT would have no impacts to air quality, biological/natural resources, or environmental justice populations (based on threshold criteria), since all proposed flight tests at NTTR Nellis AFB would be conducted at altitudes predominantly above 3,000 feet and higher and no supersonic flight tests are planned. Only 2% of the entire proposed JSF DT would be conducted below 3,000 feet. Air emissions from F-35 and support aircraft flights would be released predominantly above the mixing layer, thereby blocked from dispersion to the ground surface and/or released from such a height and over such a vast area that ground-level concentration resulting from downward dispersion would be negligible. Based on annual operations and similar T&E Programs at NTTR Nellis AFB, noise levels from proposed F-35 and support aircraft flights are not expected to affect the surrounding communities nor to startle wildlife, because most tests would occur at altitudes above 3,000 feet AGL (well above the 550-foot AGL zone that has been shown to account for most wildlife reaction). Socioeconomic and environmental justice impacts are expected to be negligible.
VACAPES OPAREA	The proposed JSF DT would be consistent with the activities analyzed in the *Environmental Assessment (EA) for the F-18E/F Stores Separation Testing at NAS Patuxent River (January 1997)* for which no significant impact was found. No significant impacts to air quality and biological/natural resources would be expected. The proposed JSF DT would be conducted outside the state coastal boundaries; therefore, air conformity analysis is not applicable. Direct impacts to the marine environment would likely be minimal to negligible from the proposed JSF DT. There would be no expected impacts from noise or to socioeconomics, including environmental justice populations. No significant impacts or harm to air quality, biological/natural resources, environmental justice populations (based on threshold criteria), and coastal zone resources are expected from the proposed JSF DT activities.

5.0 EDWARDS AFB

5.1 EDWARDS AFB GENERAL INFORMATION

Edwards AFB, as depicted in Figure 5.1-1, is located in the Antelope Valley region of the western Mojave Desert in Southern California, about 60 miles northeast of Los Angeles, California. The Base occupies an area of approximately 301,000 acres or 470 square miles. Portions of the Base lie within Kern, Los Angeles, and San Bernardino counties.

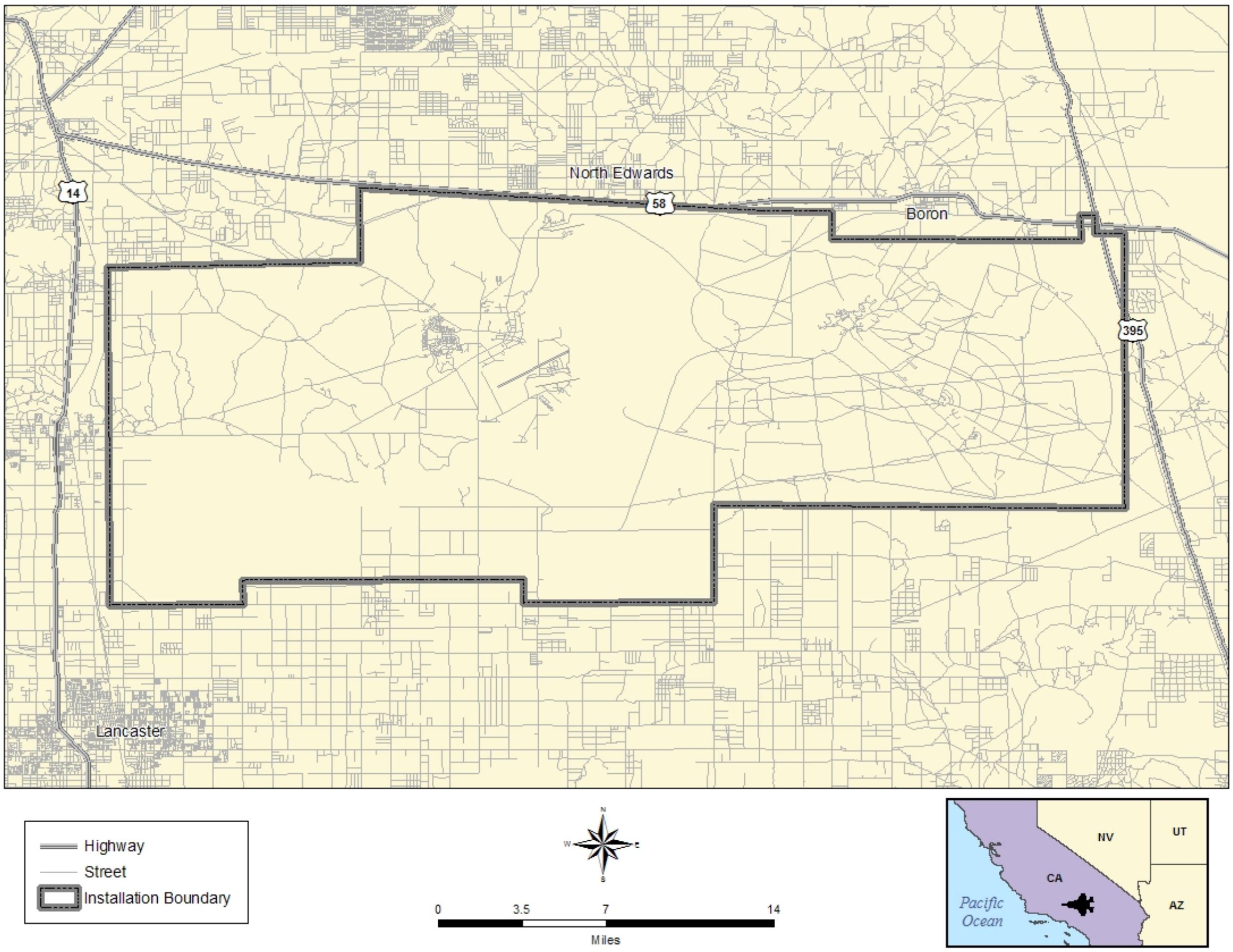

Figure 5.1-1: General Map of Edwards AFB

The AFFTC, located at Edwards AFB, is typically used to conduct aircraft ground and flight tests. It is the Air Force Materiel Command's center of excellence for RDT&E of aerospace systems for the U.S. and its allies. Other associated activities at Edwards AFB include supporting recovery operations of aerospace research vehicles; planning and conducting worldwide airborne research; developing telemetry acquisition and systems flight test methods; supporting DoD and other governmental agencies, including foreign and contractor T&E programs; and operating the USAF Test Pilot School. Edwards AFB provides a myriad of aircraft testing capabilities including, but not limited to, propulsion, performance, fuel systems, ECSs, human factors, reliability and maintainability, flutter, avionics integration, and all-weather/climate testing. Edwards AFB has (1) the required test equipment, (2) facilities expressly designed for flight test support, (3) laboratories, and (4) trained personnel necessary to conduct flight test operations.

5.2 PROPOSED JSF DT AT EDWARDS AFB

The AFFTC at Edwards AFB would be the primary responsible test organization for implementing the proposed JSF DT. The variant ranges and airspace (such as the Aircraft Overflight Test Area, Combat Arms Range Area, R-2515, Dry Lakebed, Precision Impact Range Area, etc.) would be used to conduct the various proposed JSF DT activities as available at the time of the proposed tests. Figure 5.2-1 illustrates the representative restricted areas, and MOAs of the Edwards AFB area. All proposed flights would be conducted in accordance with existing flight rules (e.g. airspeed, altitudes, patterns) established for operations conducted at Edwards AFB.

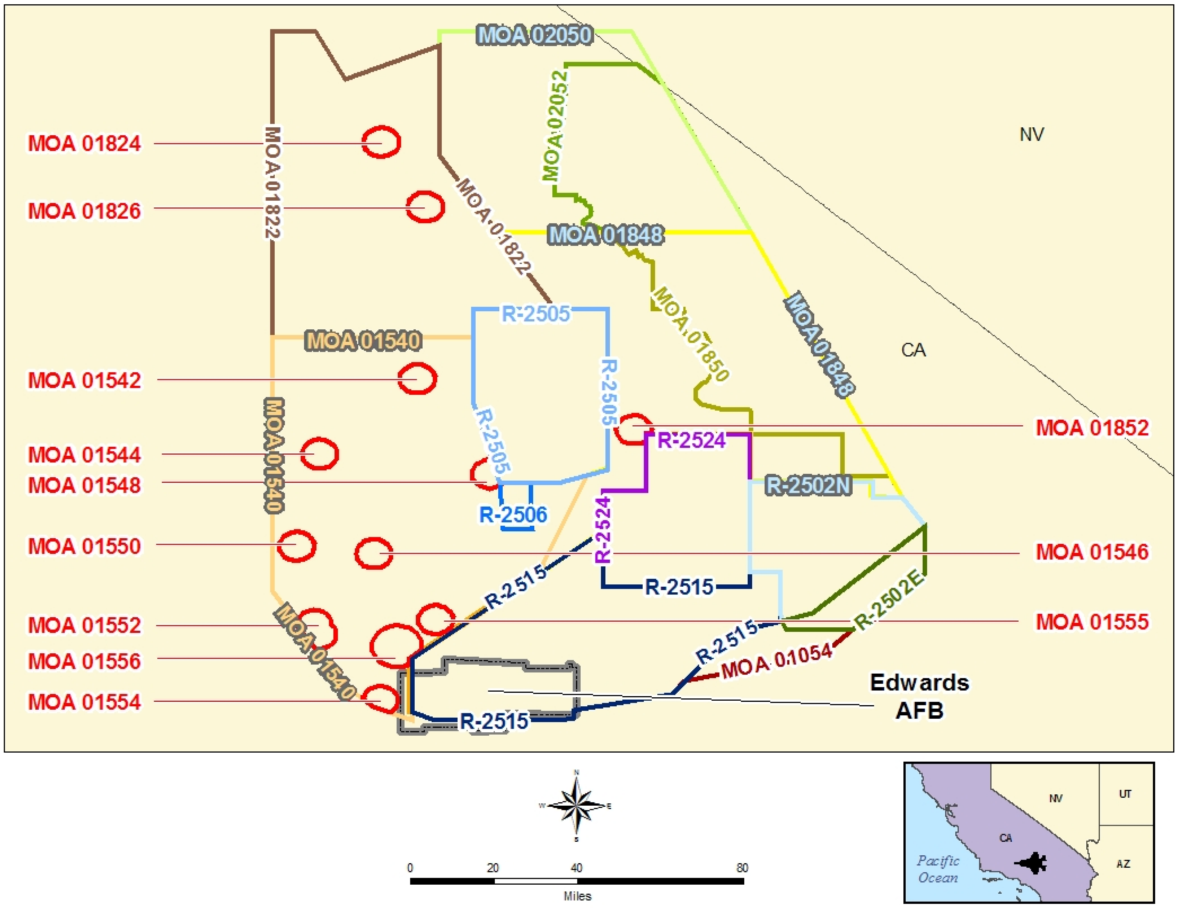

Figure 5.2-1: Representative Edwards AFB Airspace

The proposed JSF DT at Edwards AFB is the same for both Alternatives One and Two. The affected environment and environmental consequence discussions for this section are presented together, since the baseline and potential impacts would be the same for both alternatives. Tables 5.2-1 and 5.2-2 describe the proposed flight profiles, SE, and stores/expendables planned for Edwards AFB.

Table 5.2-1: Proposed JSF DT Flight Profiles Occurring at Edwards AFB

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
1	F-16 EO/DAS Program, F-35 Baseline Program Flights - STOVL & CTOL FQ, STOVL & CTOL Performance, STOVL & CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems, High AoA, F-16 Proficiency and Support Flights, KC-135 Flights	50	95	F-16 KC-135	331	565	381	660
2	Same as Test Year 1 with F-15 Flights	396	752	F-16 KC-135 F-15	454	979	850	1,731
3	Same as Test Year 1 without F-16 EO/DAS tests	224	426	Same as Test Year 2	667	1,471	891	1,897
4	Same as Test Year 1 without F-16 EO/DAS Tests; Would Be F-15 Flights	501	952	Same as Test Year 2	893	1,971	1,394	2,923
5	Same as Test Year 3	544	1,034	Same as Test Year 3	762	1,633	1,306	2,667
6	Same as Test Year 3	316	600	F-16 KC-135	756	1,547	1,072	2,147
7	Same as Test Year 3	43	82	F-16 KC-135	280	444	323	526
Total		***2,074***	***3,941***		***4,143***	***8,610***	***6,217***	***12,551***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005).
Note: This is reflective of both Alternatives One and Two. Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Table 5.2-2: Proposed JSF DT Support Equipment, Stores, and Expendables

Test Year	Support Equipment		Stores/Expendables	
	Type	Quantity*	Type	Quantity*
1	Hydraulics Cart, ECS Cooling Cart, PAO, Light cart, Tow tractor, Ground and Aircraft Generators, MJ2A Jammers, Flight Line Trucks, Fuel Trucks, Chillers, DASH-60, Oil Cart, Air Cart, TM Carts	176	N/A	N/A
2	Same as Test Year 1 without DASH-60, Oil Cart, Air Cart, or TM Cart	586	N/A	N/A
3	Same as Test Year 1 without DASH-60, Oil Cart, Air Cart, or TM Cart	515	JDAM 84-STV (10) JDAM 83-STV (2)	12
4	Same as Test Year 1 without DASH-60, Oil Cart, Air Cart, or TM Cart	1,089	AIM-9 L/Ms, AIM-120 A/Bs, Stingers, MK 82/84 Inert Munitions, BDUs, Flares, JDAM, WCMD, ASRAAM	75 (Any combination of these stores/expendables may be used in support of the various proposed JSF DT activities)
5	Same as Test Year 1 without DASH-60, Oil Cart, Air Cart, or TM Cart	1,338	Same stores/expendables mix as Test Year 4 (352) JDAM 84-STV (8) JDAM 83-STV (3) GBU-12 Inert (2) WCMD-D4 (24) JDAM 109 (9) MK82 LDGP (54) Tanks (18)	470
6	Same as Test Year 1 without DASH-60, Oil Cart, Air Cart, or TM Cart	1,128	Same stores/expendables mix as Test Year 4 (166) JDAM-84 (8) GBU-12 Inert (10) Small Diameter Bomb (48) JDAM-109 PGK (9) JDAM-82 PGK (7)	248
7	Same as Test Year 1 without DASH-60, Oil Cart, Air Cart, or TM Cart	527	Same stores/expendables mix as Test Year 4 (298)	298

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005).

Note: This is reflective of both Alternatives One and Two. Proposed support equipment and stores/expendables reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

*****_Total for all units and types_

In addition, there may be the potential for JSF engine run-ups during the proposed JSF DT at Edwards AFB (approximately three engine tests/runs per month with a total of 36 engine run-ups per year). These tests would be conducted in a Hush House, designed specifically for conducting indoor air testing on uninstalled aircraft engines. The Hush House is equipped with the necessary technical controls and technology to reduce air emissions and noise into the near-by vicinity of the Hush House. The proposed JSF engine tests in the Hush House would be similar in scope to those conducted for the F-22 Program, for which the overall flight-line operations were analyzed and found not to have a significant impact to the environment.[69] Therefore, no further analysis is included in this EA/OEA for proposed indoor JSF engine tests. All other proposed JSF DT activities are analyzed in this section.

5.3 AIR QUALITY AT EDWARDS AFB

5.3.1 Affected Environment

Edwards AFB is located in the Mojave Desert Air Basin which occupies portions of Kern, Los Angeles, San Bernardino, and Riverside Counties. The region is hot and dry in the summer with cool winters. Annual precipitation ranges from three to ten inches with most occurring during the winter months.[70]

Designated state and local agencies have the primary authority and responsibility to implement rules and regulations to control sources of criteria pollutants. Within the State of California, the CARB regulates mobile sources of air emissions, and the air quality management districts regulate emissions from stationary sources. Edwards AFB is located within the jurisdiction of three local air quality management districts:

- Kern County Air Pollution Control District (KCAPCD)—Responsible for Eastern Kern County, which includes most of Edwards AFB;
- Mojave Desert Air Quality Management District (MDAQMD)—Responsible for the majority of San Bernardino County, including the eastern portion of Edwards AFB; and
- Antelope Valley Air Pollution Control District (AVAPCD)—Responsible for the portion of Los Angeles County, in which the southern portion of Edwards AFB lies.

Figure 5.3.1-1 provides a graphical representation of these air districts to Edwards AFB.

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[69] *AFFTC 1997*

[70] *USDA Forest Service 2006*

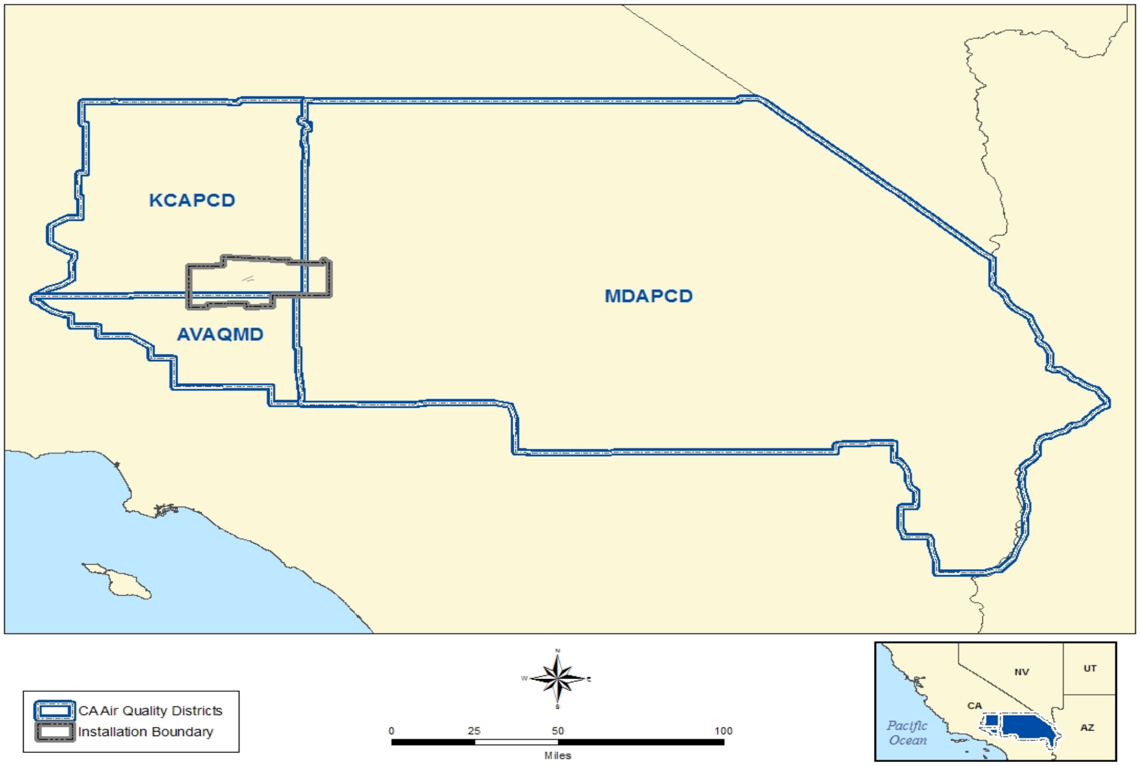

Figure 5.3.1-1: Edwards AFB Air Districts

Table 5.3.1-1 summarizes the Federal NAAQS attainment status for the Base. All three air quality management districts are in nonattainment for the eight-hour O_3 standard and only MDAQMD is in nonattainment for PM. The areas are in attainment for all other criteria pollutants.

Table 5.3.1-1: Edwards AFB Federal Attainment and Nonattainment Areas for O_3 and PM_{10}[71]

Area	O_3 Attainment Status	PM Attainment Status	Edwards AFB Coverage
Eastern Kern County Attainment Area	Subpart 1 nonattainment for the eight-hour	Attainment	The majority of Edwards AFB lies within Eastern Kern County
San Bernardino County (The Mojave Desert NAA)	Moderate nonattainment for the eight-hour	Moderate nonattainment for PM_{10}	The eastern end of Edwards AFB is in San Bernardino County
Los Angeles County (Antelope Valley NAA)	Moderate nonattainment for the eight-hour	Attainment	The southern portion of the base is in Los Angeles County

In addition to the Federal NAAQS, California has an approved set of Ambient Air Quality Standards (AAQS). The current California AAQS are provided in Table 5.3.1-2. Eastern Kern County and the MDAQMD portion of San Bernardino County are moderate nonattainment and AVAPCD portion of Los Angeles County is classified as extreme nonattainment of the state O_3 standard. The entire region is in nonattainment of the state PM_{10} standard, but only the portion of San Bernardino County (including the portion containing a part of Edwards AFB) is in nonattainment for the state $PM_{2.5}$ standard. The area is in

[71] *EPA 2005*

attainment for all of the other California AAQS. Even though California has adopted these AAQS, there are no general conformity requirements placed on Federal facilities because of these standards.

Table 5.3.1-2: California AAQS[72]

Criteria Pollutant	Averaging Time	California Standard[a] $\mu g/m^3$ (ppm)
CO[b]	8 hours 1 hour	10,000 (9) 23,000 (20)
Pb[c]	30-day average	1.5
NO_2	1 hour	470 (0.25)
O_3	1 hour 8 hour	180 (0.09) 137 (0.070)
PM_{10}	Annual 24 hours	20 50
$PM_{2.5}$	Annual	12
SO_2	24 hours 1 hours	105 (0.04) 655 (0.25)
Visibility Reducing Particles	8 hour	Extinction coefficient of 0.23 per kilometer -visibility of ten miles or more due to particles when relative humidity is less than 70%
Sulfates	24 hour	25
Hydrogen Sulfide	1 hour	42 (0.03)
Vinyl Chloride[c]	24 hour	26 (0.01)

$\mu g/m^3$ = micrograms per cubic meter

ppm = parts per million

Notes: *a. California standards for O_3, CO (except Lake Tahoe), SO_2 [one and 24 hour], NO_2, suspended particulate matter (PM_{10}, $PM_{2.5}$), and visibility reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.*

b. Eight hour standard for CO at Lake Tahoe is 6 ppm (7,000 $\mu g/m^3$).

c. The CARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

As specified in the air conformity requirements of 40 CFR 51.853/93.153 (b)(1) and applicable air district rules, the *de minimis* thresholds for subpart 1 and moderate O_3 nonattainment is 100 tpy for NO_x and VOCs. The *de minimis* level set for moderate PM_{10} nonattainment is 100 tpy. Table 5.3.1-3 below depicts the total emissions inventory for the air basins in which Edwards AFB is located, as included in the most recently approved SIPs. Also included in the table are the regionally-significant thresholds for the air districts**.**

72 *CARB 2005*

Table 5.3.1-3: SIP Emissions Budget and 10% Nonattainment Area Emissions Budget

		Baseline Emission Levels tons/day (MT/day)			Regionally Significant Threshold[a] tons/year (MT/year)		
District	Baseline Year	NO_x[b]	VOC[b]	PM_{10}	NO_x	VOC	PM_{10}
AVAPCD[c]	2002	27.48 (24.93)	20.93 (18.99)	N/A	1,037 (941)	764.5 (694)	N/A
KCAPCD[d]	1990	46.85 (42.50)	27.90 (25.31)	N/A	1,711 (1,552)	1,019 (924)	N/A
MDAQMD[e]	2002	144.58 (131.16)	39.34 (35.69)	292.59 (265.44)	5,281 (4,791)	1,437 (1,304)	10,687 (9,695)

Notes: a. Tons per year (metric tons per year) calculated based on duration of the ozone season.

b. Tons per day (metric tons per day) during the O_3 season (April through October).

c. AVAPCD 2004 Ozone Attainment Plan (State and Federal), Draft, February 2000.

d. Kern County Air Pollution Control District, Ozone Attainment Demonstration, Maintenance Plan, and Redesignation Request, Eastern Kern County Federal Planning Area, Amended May 1, 2003.

e. MDAQMD 2004 Ozone Attainment Plan (State and Federal), Draft, February 2004 and Mojave Desert Planning Area Federal Particulate Matter (PM10) Attainment Plan, Final, July 1995.

5.3.2 Emission Estimation Methodology

The emission estimates used to determine general conformity applicability were calculated for flight operations and GSE identified for the proposed JSF DT at Edwards AFB. Emissions from refueling operations and commuter vehicles associated with additional personnel were also included as part of the Proposed Action analysis. See Appendix E and E.1 for additional details on the methodology used to calculate emissions from all sources included in the Proposed Action.

Criteria pollutant emissions from sources in the Proposed Action alternatives were calculated following the procedures outlined in the *Air Force Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations*.[73] For all F-35 and support aircraft flight operations, emissions were calculated using emission factors for every throttle setting while the aircraft is operating below 3,000 feet AGL. The F-35 engine emission factors, provided by P&W, were used for gaseous emissions at non-AB conditions.[74] For AB operations, emission factors from F119 testing were used except for particulate emissions.[75] PM emission factors for AB operations were assumed to be the same as for the F100-PW-100 engine extracted from the *AF Institute for Environmental, Safety and Occupational Health Risk Analysis (AFIERA).*[76] Emission factors for the F100-PW-100 engine were used because it is also manufactured by P&W, is roughly the same size as the F135, and emissions data are readily available. PM emission factors for the F-35 engine during non-AB conditions were provided by the USN Aircraft Environmental Support Office (AESO) based on previously tested engines.[77] While engine tests would also be conducted in the Hush House, further analysis has not been included in this air quality analysis. Proposed JSF engine tests would be similar in scope to other test programs, such as the F-22, in which no impacts to the environment were expected; and all proposed tests would be conducted in compliance with applicable air permit conditions established for the Hush House.

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73 *O'Brien 2002*

74 *Graves 2002*

75 *Wade 2002*

76 *O'Brien 2002*

77 *AESO 2000-04*

Emissions from GSE were also calculated using the methodology outlined in the AF guidance documents. GSE includes all the equipment used to service the aircraft (such as electrical generators, jet engine start units, tow vehicles, and trucks). Emission factors for GSE were used from several sources and are based on the fuel use or the hours of operation.[78 79 80]

Emissions from additional commuter traffic associated with new personnel at Edwards AFB, as part of the Proposed Action, were also included in this analysis. It was assumed proposed personnel would travel an average distance of 70 miles round trip per day for 50 weeks a year at an average commuting speed of 55 miles per hour.[81] The EDMS Program has been used to estimate emissions from the additional vehicle traffic.[82] While emissions from refueling operations have been calculated using procedures recommended by the EPA in AP-42.[83]

5.3.3 Environmental Consequences

The general conformity rule requires potential emissions from the Proposed Action be determined on an annual basis and compared to the annual *de minimis* levels for those pollutants (or their precursors) for which the area is classified as nonattainment. All airfield operations (flight and ground), as well as the majority of commuter driving, would occur in Kern County. Therefore, the JPO has chosen to assess all emissions associated with the Proposed Action as if the emissions would occur only in Kern County. The estimated annual emissions [tons per year (tpy)/Metric Tons (MT) per year] for the Proposed Action (under either alternative) for Test Year 1 through Test Year 7 are shown in Table 5.3.3-1.

Table 5.3.3-1: Estimated Air Emissions for the Proposed JSF DT at Edwards AFB[1]

Test Year	CO tpy (MT/yr)	NO_x tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
1	159.46 (144.66)	32.56 (29.54)	12.07 (10.95)	1.28 (1.16)	2.39 (2.17)
2	161.11 (146.16)	30.97 (28.10)	11.60 (10.52)	1.30 (1.18)	4.82 (4.37)
3	159.74 (144.92)	35.02 (31.77)	11.78 (10.69)	1.67 (1.52)	5.74 (5.21)
4	127.69 (115.84)	38.53 (34.95)	10.95 (9.93)	2.01 (1.82)	6.59 (5.98)
5	121.31 (110.05)	35.49 (32.20)	10.00 (9.07)	1.86 (1.69)	6.18 (5.61)
6	115.50 (104.78)	30.25 (27.44)	9.53 (8.65)	1.59 1.44)	5.01 (4.55)
7	97.62 (88.56)	16.32 (14.81)	6.67 (6.05)	0.62 (0.56)	1.46 (1.32)
Highest Year[2]	161.11 (146.16) (Test Year 2)	38.53 (34.95) (Test Year 4)	12.07 (10.95) (Test Year 1)	2.01 (1.82) (Test Year 4)	6.59 (5.98) (Test Year 4)

Notes: This is reflective of both Alternatives One and Two.

1. See Appendix E.1 for additional details. Hydrocarbon emissions in the appendix are assumed to be VOCs.

2. The highest year represents the year most likely to produce the greatest estimated emissions.

3. Emissions include aircraft operations, GSE, and commuter vehicles.

Table 5.3.3-2 provides a comparison of estimated emissions for the years during which the greatest emissions are expected to occur to the *de minimis* and regionally significant thresholds. The comparison

78 *EDMS 2005*
79 *O'Brien 2002*
80 *Ambrosino 1999*
81 *Wilson 2005*
82 *EDMS 2005*
83 *EPA 1997*

shows the Proposed Action would not require a formal conformity determination, because the project-related emission levels are below the applicable *de minimis* thresholds and the annual project-related emissions do not make up 10% or more of the nonattainment area's total emissions budget. It is expected, therefore, that impacts on air quality would not be significant for either Alternative One or Two.

Table 5.3.3-2: Proposed JSF DT Peak Year Emission Comparison

Pollutant	Highest Year Emissions[1] tpy	*de minimis* Threshold tpy	Regionally Significant Threshold tpy
NO_x	38.53	100	1,711
VOC	12.07	100	1,019

Note: 1. The highest year represents the year (Test Years 1, 2, or 4) with the potential to produce the greatest estimated emissions from the Proposed Action (for both Alternatives One and Two)

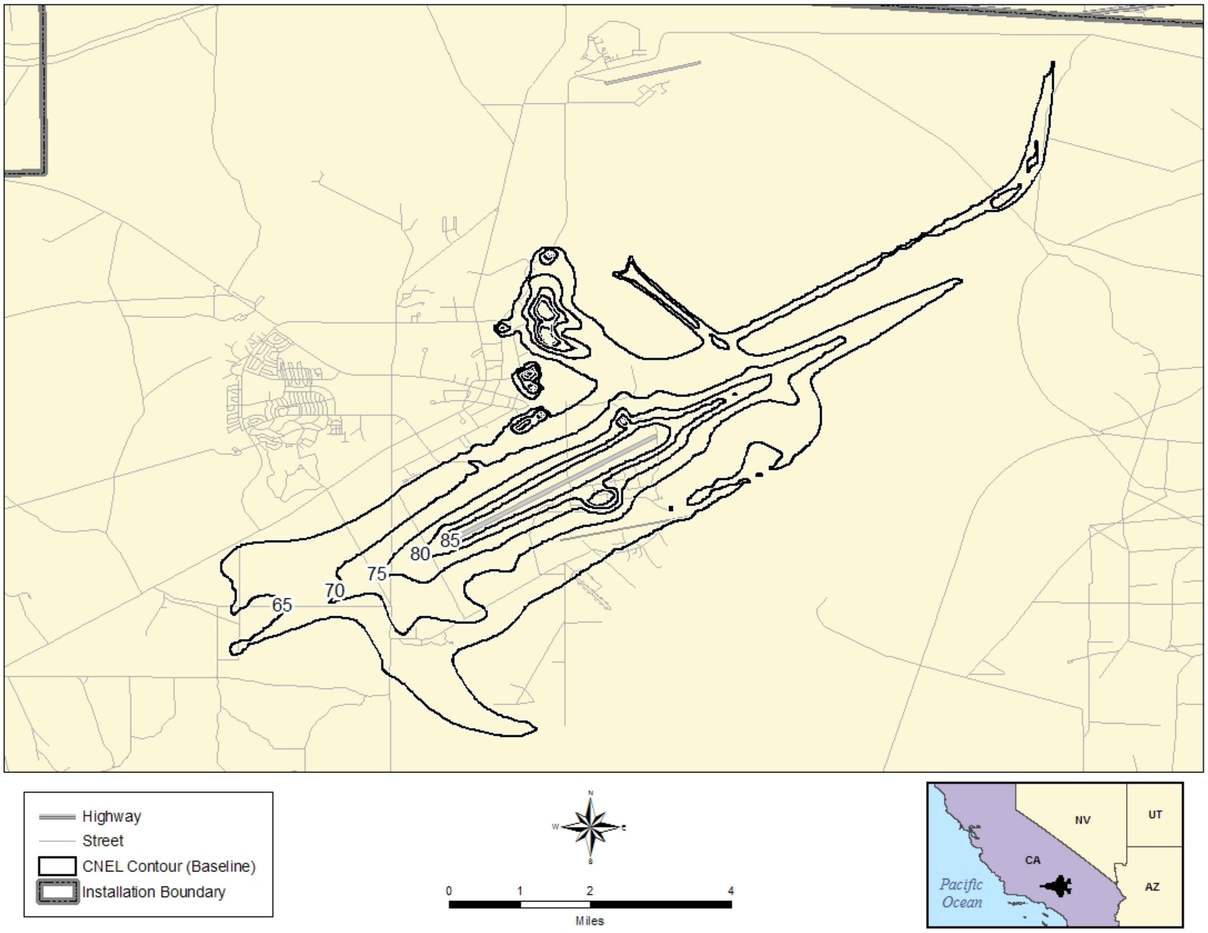
5.4 NOISE AT EDWARDS AFB

5.4.1 Affected Environment

Details regarding noise at Edwards AFB can be found in Sections 3.4.2 of both the *Environmental Assessment for the Concept Demonstration Phase of the JSF at Edwards Air Force Base, California (September 2000)* and the *Final Environmental Assessment for the Renovation and Construction of a Modern Flight Test Complex, Edwards Air Force Base, California (July 2003)*, as well as Section 3.2.4 of the *Final Environmental Assessment for the Continued Use of Restricted Area R-2515, Edwards Air Force Base, California (April 1998)*.

The Edwards AFB noise analysis is consistent with the noise modeling methodology presented in Section 3.2.1 for military bases located in the State of California. The primary difference between this location and the remaining proposed test locations is the examination of community noise exposure using CNEL, as outlined by the State of California. CNEL is similar to DNL in that it is a cumulative noise metric that characterizes the total collective noise exposure from multiple noise events for an average day, but CNEL adds a weighing factor to noise during the evening as well as at night.

Existing CNEL contours have been developed based upon the aircraft Fleet mix, number of operations, time of day of operations, and runway and flight track utilization from existing Air Installation Compatible Use Zone (AICUZ) documentation and previous noise modeling efforts. Appendix F.2 contains a detailed model development methodology for Edwards AFB. Existing CNEL contours (65, 70, 75, 80, and 85 dB) for Edwards AFB are presented in Figure 5.4.1-1.



Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005).

Figure 5.4.1-1: Existing Baseline CNEL Noise Contours for Edwards AFB

Analysis of aerial photography was used to determine populations affected by the existing Edwards AFB CNEL noise contours. Concentrated population centers in the vicinity of Edwards AFB are primarily north of the Base property. Within Edwards AFB, housing is primarily located in the central portions of the Base property, to the west of Lancaster Road. Table 5.4.1-1 lists the total acres within each of the existing baseline CNEL noise contours.

Table 5.4.1-1: Acres Within the Existing Baseline CNEL Contours at Edwards AFB

CNEL Contour Bands	Area Acres On-Base	Area Acres Off-Base
65–70 dB	6,740	0
70–75 dB	2,543	0
75–80 dB	1,049	0
80–85 dB	571	0
85+ dB	569	0
65 dB and greater (Total)	***11,472***	***0***

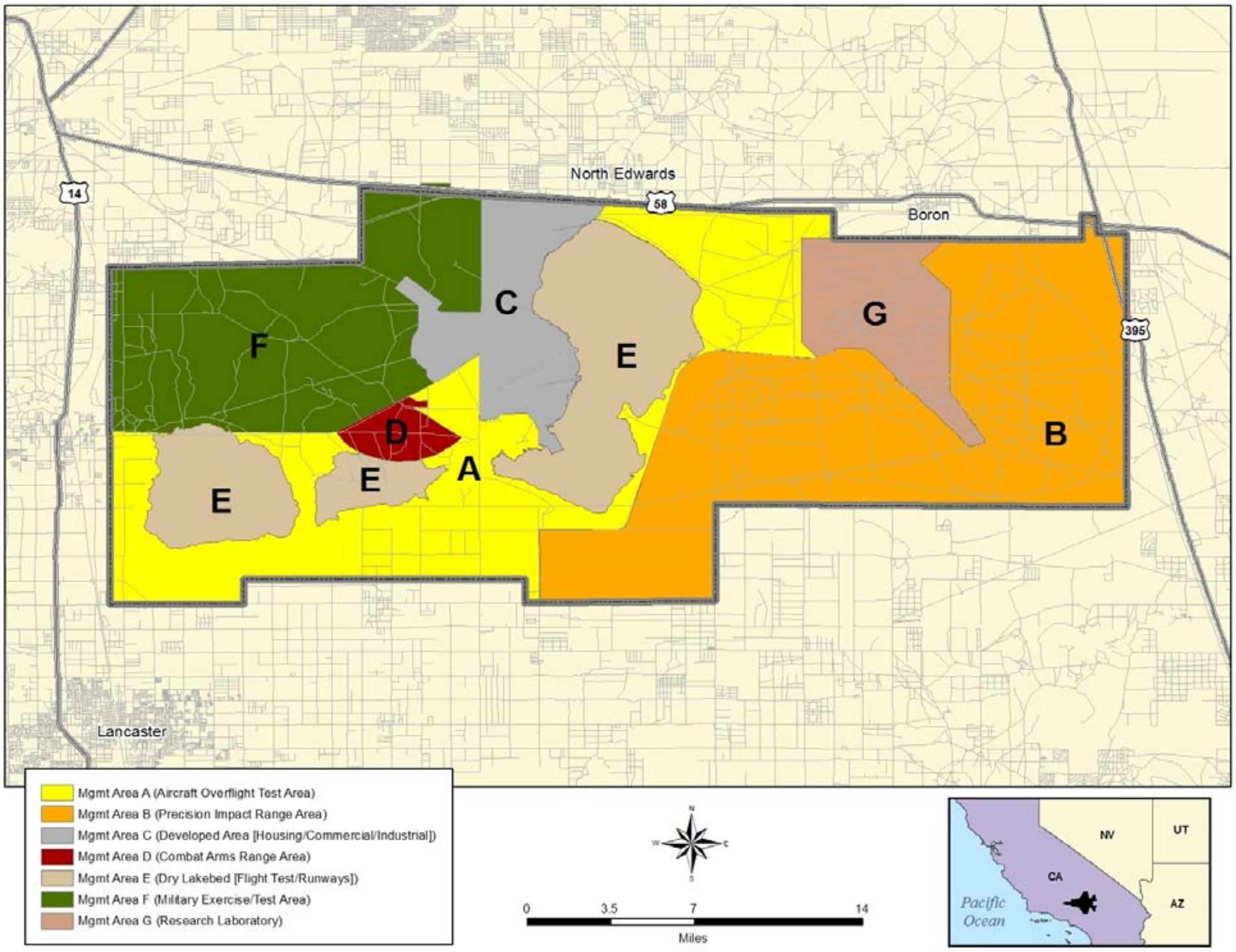
Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005).

As illustrated in Table 5.4.1-2 and Figure 5.4.1-2, land uses affected by the baseline existing CNEL noise contour consist of engineering, buffer zone, aircraft operations and maintenance, and industrial. There are no identifiable residential housing units or sensitive land uses identified within the baseline CNEL noise contours.

Table 5.4.1-2: Land Uses (Acres) Within the Existing Baseline CNEL Contours at Edwards AFB

Land Use Type	Existing CNEL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Administrative	1	1	0	0	0	2
Air Operations and Management (O&M)	1,357	530	424	397	527	3,235
Buffer Zone	2,431	1,242	431	105	9	4,218
Community Service	10	0	0	0	0	10
Engineering	532	212	0	25	27	796
Industrial	203	0	0	0	0	203
Lakebed	2,206	558	146	44	7	2,961
Medical	1	0	0	0	0	1
Outdoor Recreation	0	0	0	0	0	0
Housing	0	0	0	0	0	0

Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005).



Source: Final Integrated Natural Resource Management Plan for Edwards Air Force Base, California, Edwards AFB Plan 32-706, (September 2004).

Figure 5.4.1-2: Existing Land Use at Edwards AFB

5.4.2 Environmental Consequences

For the purposes of this evaluation, aircraft noise impacts are presented as land areas (acres) and populations exposed to aircraft noise above existing levels. This section discusses the physical characteristics of noise resulting from the Proposed Action. Contour lines representing average annual noise baselines for aircraft operations have been generated for the 65, 70, 75, 80, and 85 dB CNEL.

The Proposed Action was modeled for the largest predicted year of proposed JSF DT activity (Test Year 5). The proposed F-35 test activities reflected in Table 5.4.2-1 have been added to the existing aircraft Fleet mix within the existing baseline noise contours at Edwards AFB. Distinct performance profiles have been provided by the Lockheed Martin Flight Simulation Group regarding operational performance characteristics for the F-35. Conversations with the JSF V&T Team Lead and Edwards AFB operational personnel confirmed proposed support aircraft are currently accounted for in the existing Fleet mix.[84] These aircraft would be logging in the same amount of air time in support of other programs, even if the

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[84] *Crawford, Mark, 2004; and Hagenauer, Larry 2005*

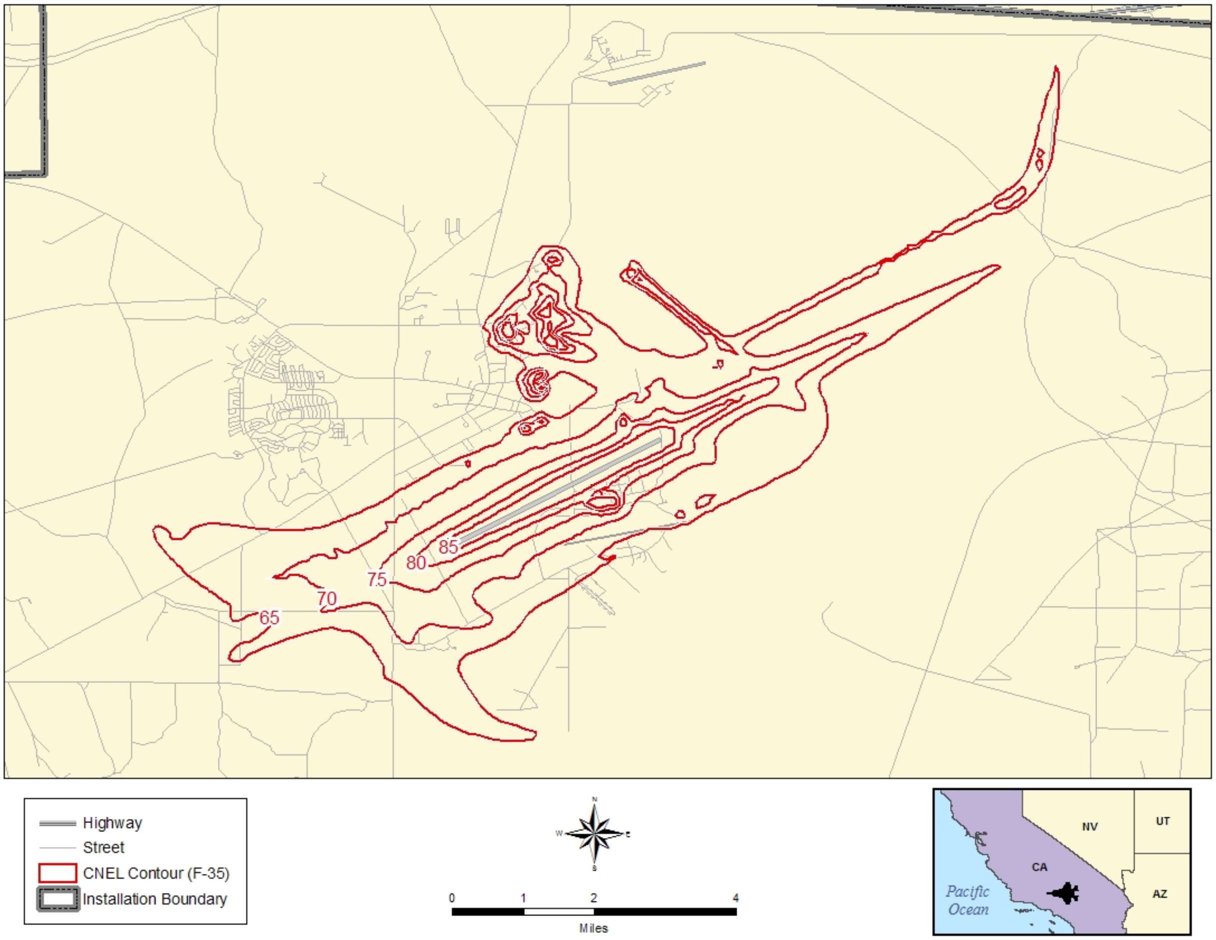
proposed JSF DT was not to occur. Therefore, proposed support aircraft for the JSF DT program have not been added to the overall noise model profile.

Table 5.4.2-1: Maximum Proposed JSF DT Year at Edwards AFB

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
5	F-35 Baseline Program (STOVL & CTOL FQ, STOVL & CTOL Performance, STOVL & CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Int., STOVL Environment, Mission Systems, High AoA), F-16 Proficiency Flights, KC-135 Flights	544	1,034	F-16 KC-135	762	1,633	1,306	2,667

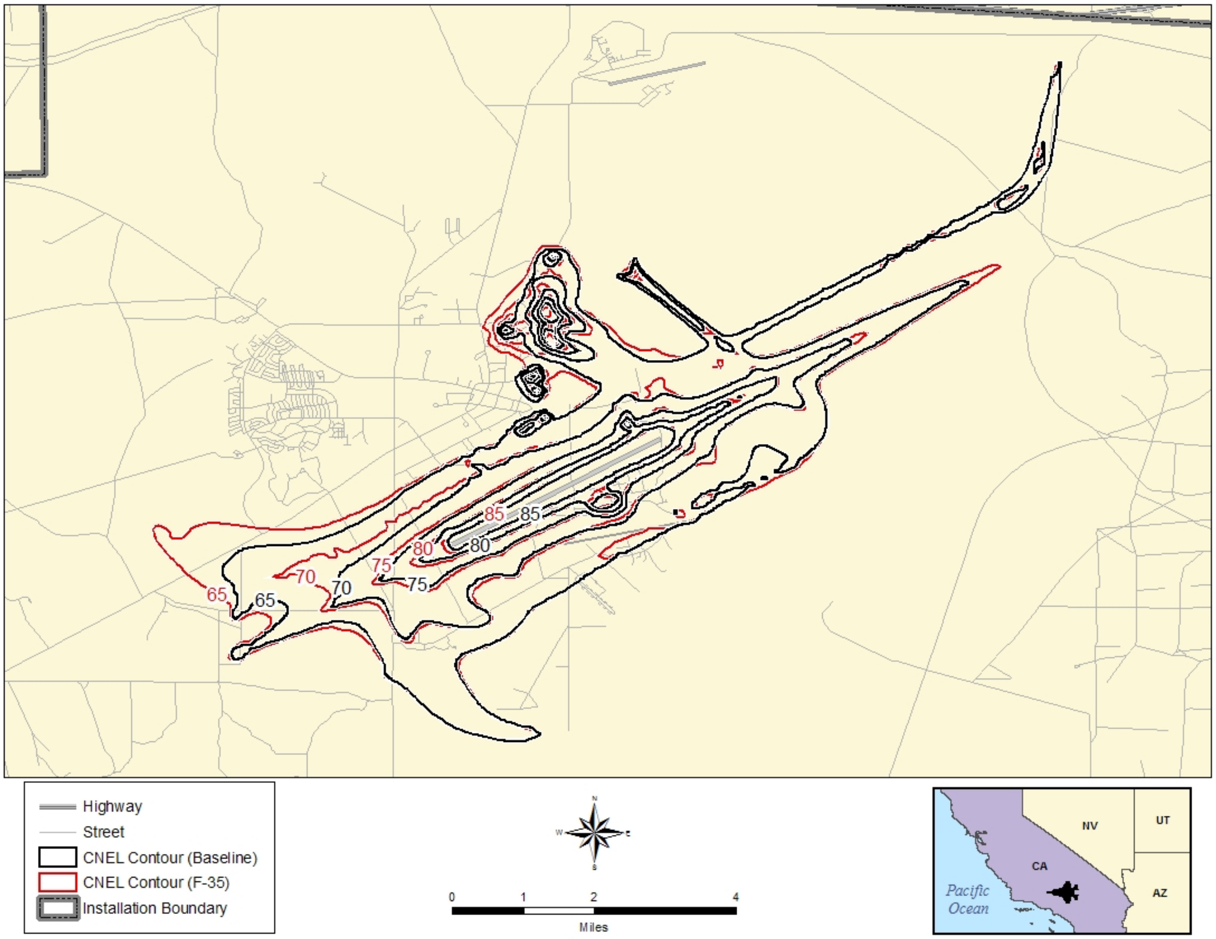
Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005).
Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Figure 5.4.2-1 illustrates the noise contours for the Proposed Action. The 65 dB CNEL and greater noise contour for the Proposed Action would not extend outside of Edwards AFB's boundaries. Figure 5.4.2-2 illustrates comparison contours showing the baseline CNEL contours overlaid with the Proposed Action noise contours.



Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005).
Note: This is reflective of both Alternatives One and Two.

Figure 5.4.2-1: CNEL Noise Contours with the Proposed JSF DT at Edwards AFB



Source: Edwards AFB NOISEMAP Model Outputs United States Air Force Acoustics Lab (August 2005).
Note: This is reflective of both Alternatives One and Two.

Figure 5.4.2-2: Existing and Proposed JSF DT CNEL Contours Comparison at Edwards AFB

As a result of the Proposed Action, areas on-base impacted by the 65 dB and greater CNEL contour would increase by approximately 1,405 acres (approximately 12.2%). Table 5.4.2-2 outlines a comparison of the Proposed Action CNEL contours contrasted to the baseline CNEL noise contours at Edwards AFB. Similar to the existing baseline, land uses exposed to noise from the Proposed Action at Edwards AFB would be comprised of engineering, buffer zone, aircraft operations and maintenance (O&M), and industrial. Identification of residential housing unit locations at Edwards AFB were identified using aerial photographs, and no residential housing units have been identified within the Proposed Action CNEL noise contours. Therefore, no populations or land uses are expected to be impacted by the Proposed Action.

Table 5.4.2-2: Acres Within the Existing Baseline and Proposed JSF DT CNEL Contours at Edwards AFB

CNEL Contour Bands	Area Acres (On-Base)		Acreage Change	
	Existing	With Proposed JSF DT	Change	%
65–70 dB	6,740	7,432	692	10.3
70–75 dB	2,543	3,033	490	19.3
75–80 dB	1,049	1,188	139	13.3
80–85 dB	571	642	71	12.4
85+ dB	569	582	13	2.3
65 dB and greater (Total)	***11,472***	***12,877***	***1,405***	***12.2***

Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005).
Note: This is reflective of both Alternatives One and Two.

As illustrated in Table 5.4.2-3, acres of housing, administrative, community service/commercial, and medical land uses would be expected to remain unchanged over existing baselines. Land use increases created by the Proposed Action would be for the lakebed by 377 acres (or 12.7%), outdoor recreation by 307 acres, industrial by 59 acres (or 28.9%), engineering by 158 acres (or 19.9%), buffer zone by 512 acres (or 12.1%), and air O&M by 42 acres (or 1.3%).

Table 5.4.2-3: Land Uses (Acres) Potentially Affected by the Proposed JSF DT within Edwards AFB Boundary

Land Use Type	Existing CNEL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Administrative	1	1	0	0	0	2
Air O&M	1,357	530	424	397	527	3,235
Buffer Zone	2,431	1,242	431	105	9	4,218
Community Service	10	0	0	0	0	10
Engineering	532	212	0	25	27	796
Industrial	203	0	0	0	0	203
Lakebed	2,206	558	146	44	7	2,961
Medical	1	0	0	0	0	1
Outdoor Recreation	0	0	0	0	0	0
Housing	0	0	0	0	0	0
Land Use Type	**With JSF CNEL Contour Bands**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Administrative	0	1	0	0	0	1
Air O&M	1,294	598	418	421	546	3,277
Buffer Zone	2,547	1,506	530	134	13	4,730
Community Service	10	0	0	0	0	10
Engineering	559	266	77	30	22	954
Industrial	246	11	5	0	0	262

Table 5.4.2-3: Land Uses (Acres) Potentially Affected by the Proposed JSF DT within Edwards AFB Boundary (Continued)

Land Use Type	With JSF CNEL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Lakebed	2,470	652	159	56	0	3,337
Medical	1	0	0	0	0	1
Outdoor Recreation	307	0	0	0	0	307
Housing	0	0	0	0	0	0
Land Use Type	**Change**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Administrative	-1	0	0	0	0	-1
Air O&M	-63	68	-6	24	19	42
Buffer Zone	116	264	99	29	4	512
Community Service	0	0	0	0	0	0
Engineering	27	54	77	5	-5	158
Industrial	43	11	5	0	0	59
Lakebed	264	94	13	13	-7	377
Medical	0	0	0	0	0	0
Outdoor Recreation	307	0	0	0	0	307
Housing	0	0	0	0	0	0

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005).
Note: This is reflective of both Alternatives One and Two.

Table 5.4.2-4 reflects the results of assessing potential impacts to noise sensitive receptors (e.g., residences, schools, hospitals) for locations close to or on Edwards AFB. The analysis identifies locations where a significant increase in aircraft noise exposure (1.5 dB or greater increases within the 65 dB CNEL noise contour or a 3.0 dB increase within the 60 dB CNEL contour) would occur when comparing the Proposed Action to the baseline existing environment. There would be slight changes in the noise environment anticipated as a result of the Proposed Action. However, none of the changes anticipated would occur in either the 60 dB or 65 dB and greater CNEL noise contours. Additionally, noise sensitive receptors and their distance from the Edwards AFB airfield are identified in Table 5.4.2-5. These receptors are distant enough from the main airfield that no further analysis is warranted in this EA/OEA. Therefore, no potentially significant noise impacts would be anticipated over non-residential noise sensitive receptors as a result of the proposed JSF DT at Edwards AFB.

Table 5.4.2-4: Edwards AFB Comparison Non-Residential Noise Sensitive Receptors

Name	Type	Existing dB	With Proposed JSF DT dB	Change dB
Bailey Avenue Elementary School	School	51.7	53.5	1.8
Desert High School	School	52.6	54.5	1.9
Forbes Avenue Elementary School	School	52.8	54.9	2.1
Irving Branch Elementary School	School	52.6	54.5	1.9
Muroc Golf Course	Public Park	56.1	57.9	1.8
Payne Avenue Middle School	School	52.2	53.9	1.7

Source: Booz Allen Hamilton Analysis (March 2006).
Note: This is reflective of both Alternatives One and Two.

Table 5.4.2-5: Edwards AFB Comparison Non-Residential Noise Sensitive Receptors (Continued)

Name	Type	Distance (Miles)
Boron Junior/Senior High School	School	14
Burro Schmidt's Tunnel	Historic	32
Indian Wells	Historic	51
Last Chance Canyon	Historic	33
Lynch School	School	8
Mule-Team Borax Terminus	Historic	19
Oak Creek Pass	Historic	36
Rand Mining District	Historic	34
Robert McGowan High School	School	8
Tehachapi Railroad Depot	Historic	35
West Boron Elementary School	School	13

Source: Booz Allen Hamilton Analysis (March 2006).
Note: This is reflective of both Alternatives One and Two.

In summary, no significant noise impacts would be expected to occur over non-residential noise-sensitive receptors; and as previously stated, there would be no discernable residential or incompatible land uses located within either the existing or Proposed Action 65 dB CNEL or greater noise contour. Therefore, no significant impacts from aircraft noise are anticipated from implementing the Proposed Action (Alternatives One or Two) at Edwards AFB.

5.5 BIOLOGICAL/NATURAL RESOURCES AT EDWARDS AFB

5.5.1 Affected Environment

Section 3.6 of the *Environmental Assessment for Low-level Flight Testing, Evaluation, and Training at Edwards AFB, California, May 2005*; Section 3.6 of the *Environmental Assessment for the Renovation and Construction of a Modern Flight Test Complex, Edwards Air Force Base California (July 2003)*; and Section 3.2.5 of the *Environmental Assessment for the Continued Use of Restricted Area R-2515, Edwards Air Force Base California (April 1998)* discuss the existing biological resources including threatened and endangered species.

Edwards AFB, as well as the R-2515 flight area, contain and manage biological resources that are typical of a desert environment. These resources include animal and plant species (including the associated habitats of each), floodplains, and watersheds. Some areas under R-2515 have reported or known occurrences of sensitive/endangered wildlife species listed in the California Natural Diversity Data Base (CNDDB) or habitat to support these species. A sensitive habitat is one that is considered rare, supports unique associations, or supports sensitive plants or wildlife.[85] Two plant communities, mesquite woodlands and Transmontane alkali marsh, that are considered sensitive occur within the area.

Mesquite woodlands are generally limited to desert washes in the south-central part of the area, serving as an important wildlife resource. Transmontane alkali marshes within the R-2515 area are limited to the southern edge of Harper Dry Lake. The Harper Dry Lake was designated by the Bureau of Land Management (BLM) as an Area of Critical Environmental Concern (ACEC) because of its substantial Transmontane alkali marsh that provides habitat for a variety of waterfowl and other water-associated species.

[85] *COE 1997*

The south-central portion of Edwards AFB has been designated a County of Los Angeles Significant Ecological Area (i.e., Area 47). In addition to the presence of desert tortoise, Mohave ground squirrel, and several sensitive plants, the area supports the County's only extensive, healthy mesquite woodlands. Rosamond Dry Lake on Edwards AFB has also been designated a County of Los Angeles Significant Ecological Area (i.e., Area 50) because it represents the best example of alkali playa and shadscale scrub in the country.

5.5.1.1 Terrestrial Flora and Fauna

Information about plants and animals found at Edwards AFB is provided in this subsection. The discussion about plants is to provide context for the animals that may be potentially affected by the Proposed Action. Table 5.5.1.1-1 is a list of threatened and endangered species that may occur on Edwards AFB, as discussed in further detail within this subsection.

Table 5.5.1.1-1: Threatened and Endangered Species that May Occur on Edwards AFB

Common Name Scientific Name	Federal Status	State Status
Birds		
Yuma clapper rail (*Rallus longirostris yumanensis*)	E	T
Bald eagle (*Haliaeetus leucocephalus*)	T	E
California least tern *(Sterna antillarum browni)*	E	E
Peregrine falcon *(Falco peregrinus anatum)*		E
Sainson's hawk *(Buteo swainsoni)*		T
Western snowy plover *(Charadrius alexandrinus nivosus)*	T[86]	
Mammals		
Mohave ground squirrel *(Spermophilus mohavensis)*	C	T
Reptiles		
Desert tortoise (*Gopherus agassizii*)	T	T
Fish		
Mohave tui chub (*Gila bicolor mohavensis)*	T	E
Plants		
Lane mountain milk-vetch *(Astragalus jaegerianus)*	E	

Sources: EA R-2515, Edwards AFB, April 1998; State of California, Department of Fish and Game, Habitat Division, State and Federally Listed endangered, Threatened, and Rare Plants and Animals of California, October 2005;
Final Administrative Draft, Environmental Assessment for the Integrated Natural Resources Management Plan for Edwards AFB, California, August 2001.

Legend: E=Endangered, T=Threatened, C=Candidate

86 *The western snowy plover is found in the area but only the coastal population is considered threatened. (AFFTC 1998)*

Plant Species

Two vegetation types are predominant in Edwards AFB and the R-2515 flight area: the Mojave creosote bush scrub and the desert saltbrush scrub. Joshua tree woodlands also occur in the area in relatively small patches. One proposed Federally-endangered plant, the Lane Mountain milk-vetch (*Astragalus jaegerianus*), can be found in the R-2515 area.

Mammal Species

Common mammals on Edwards AFB include rabbit, coyote, mice, kangaroo rat, and bat. For a full list of mammals at Edwards AFB see the *Biological Resources Environmental Planning and Technical Report Basewide Vegetation and Wildlife Surveys and Habitat Quality Analysis* (*Mitchell et al., 1993*).[87] The area under R-2515 supports a diverse assemblage of vertebrates and invertebrates. The Mohave ground squirrel (*Spermophilus mohavensis*), listed as a threatened species by the state, is found within the area. The Mohave ground squirrel is also a candidate for Federal listing.

Bird Species

Over 200 species of birds exist on Edwards AFB, including wading birds and migratory birds. For a list of birds at Edwards AFB, see the *Biological Resources Environmental Planning and Technical Report Basewide Vegetation and Wildlife Surveys and Habitat Quality Analysis (Mitchell et al., 1993).*[88] Most bird species and their active nests are protected under the MBTA, as amended. The area under R-2515 supports a diverse bird population, including resident, migratory, wintering, and transient species (e.g., the common raven, numerous types of sparrows, mourning doves, quail, thrashers and many types of raptors, including the golden eagle). Perennial water sources, such as the sewage treatment ponds at Edwards AFB, Piute Ponds, and the marsh at Harper Dry Lake, are important stopover areas for migratory and resident waterfowl and shore birds. The Yuma clapper rail (*Rallus longirostris yumanensis*), a Federally-listed endangered bird, lives in shallow freshwater marshes containing dense stands of cattails and bulrushes. Yuma clapper rails were recorded in the marsh at Harper Dry Lake in the 1970s. The Federally-listed threatened bald eagle (*Haliaeetus leucocephalus*) is found infrequently at the marsh at Harper Dry Lake. The western snowy plover (*Charadrius alexandrinus nivosus*), a threatened species for the coastal population such as those along the open coast of California, has been recorded at Rosamond Dry Lake and Harper Dry Lake.[89]

Other Animal Species of Concern

To date, the only amphibians identified on Base include the western toad (*Bufo boreas*), Pacific tree frog (*Hyla regilla*), red-spotted toad (*Bufo punctatus*), and African clawed frog (*Xenopus laevis*). These amphibians have been identified at Piute Ponds by U.S. Geological Survey (USGS) biologists during a 1997 survey. The African clawed frog is a problematic introduced species that feeds on native wildlife, including other amphibians, small reptiles, and fish.[90] Common reptiles include lizards and snakes. For a list of reptiles and amphibians at Edwards AFB, see the *Biological Resources Environmental Planning*

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[87] *AFFTC 2000*
[88] *AFFTC 2000*
[89] *AFFTC 1998*
[90] *AFFTC 1997*

and Technical Report Basewide Vegetation and Wildlife Surveys and Habitat Quality Analysis (Mitchell et al., 1993),[91]

Fish and amphibians in the R-2515 desert area are sparse due to the lack of perennial water sources. The only native fish in the area is the Mohave tui chub (*Gila bicolor mohavensis*). This Federally-listed threatened species was once found in deep pools and slough-like areas throughout the Mojave River drainage but has been declining through habitat alteration, water diversion, pollution, and hybridization with the non-native arroyo chub (*Gila orcutti*). The Mohave tui chub is now restricted to three highly-modified habitats in San Bernadino County, of which one habitat under R-2515 is the Desert Research Station, northwest of Barstow.[92]

The desert tortoise (*Gopherus agassizii*) is Federally-listed as threatened under the ESA and state-listed as threatened by the California Fish and Game Commission. The desert tortoise is native to western deserts, including the West Mojave Desert. Tortoises are known to occur at Edwards AFB and the R-2515 area; approximately half of the land area under R-2515 is listed as desert tortoise critical habitat.

Other species found in the R-2515 desert's scrub habitats include a variety of grasshoppers, crickets, beetles, ants, wasps, scorpions, spiders, butterflies, and moths; and other invertebrates including fairy shrimp, tadpole shrimp, and clam shrimp. These species exist within the more permanent playas and clay pans.

5.5.2 Environmental Consequences

Proposed JSF DT activities that would occur at Edwards AFB under either Proposed Action alternative include: STOVL and CTOL FQ, performance and propulsion; loads; flutter; land based ship suitability; weapons separation & integration; mission systems; CATB; F-16 EO/DAS Program; F-16 proficiency flights; high AoA; and KC-135 and/or KC-10 flights. Most of these proposed test activities would occur using existing ground support facilities and with flights predominantly above 3,000 feet AGL. They can be expected to have no effects on biological/natural resources. The greatest potential for impacts to biological/natural resources are from discrete individual flight tests conducted below 3,000 feet to include the following:

- During STOVL and CTOL FQ, some performance and propulsion tests flights would occur at 2,500 feet; low-angle FQ tests would come within 1,000 feet AGL at the bottom of the dive; some supersonic flights would occur; 5% of the total proposed single performance test activities/runs (not total flights/flight hours) would be between 150 and 2,500 feet AGL and 3% of these would occur as fly-bys over the airfield; and 2–3% of the single propulsion tests (not total flights/flight hours) would be between ground level and 2,500 feet AGL.

- During loads tests, weapon releases might occur during some test activities.

- During flutter tests, some (but less than 10%) of the flights would occur at 2,500 feet, and some of the flights might be supersonic or release weapons.

- During weapons separation & integration tests, gun strafing runs might comprise short duration flights at altitudes below 3,000 feet.

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[91] *AFFTC 2000*
[92] *AFFTC 1998*

- During CATB tests of aircraft electronics, less than 1 to 2% of the total flights/flight hours would occur below 3,000 feet.

Thus, potential impacts to biological resources from the proposed JSF DT would be limited to noise-induced effects and impacts from weapons separation tests.

A thorough analysis of impacts on wildlife and other biological resources from low altitude aircraft overflights was included in the *Environmental Assessment for Low-level Flight Testing, Evaluation, and Training at Edwards AFB, California* (*May 2005)*. Alternative A in this EA and associated analysis included low level flights of the F-35, F-18, F-22, and 41 other aircraft that are already flying or propsed to fly the low level routes associated with Edwards AFB. Based on this analysis, the proposed JSF DT is not expected to have a significant effect on any biological resources, since most flights would be at altitudes greater than 3,000 feet AGL, and most flights would not include supersonic flight and the accompanying sonic boom. The initial temporary response to noise from overflights at lower altitudes is not anticipated to have a negative impact on any species' population. As discussed in Section 5.4.2 of this EA/OEA, the change in land area impacted (as designated by 65 dB or higher contours) is not anticipated to be greater than 12.2% (the 65 db is not an established received sound threshold for impacts to wild animals, but rather is used to determine human sensitive receptor threshold impacts and thus represents a conservative impact footprint for wild animals). Figure 5.5.2-1 shows the baseline and proposed JSF DT contours over existing land use at Edwards AFB. New areas impacted by the proposed JSF DT are concentrated in the central portion of Edwards AFB. Land use under this area is comprised of aircraft buffer zones, urban land use including community and commercial areas, and outdoor recreational areas. No sensitive biological receptors are expected to be significantly impacted by the Proposed Action. No desert tortoise critical habitat nor known Mojave ground squirrel populations are located under the proposed JSF DT contours. Many of the species present in the newly affected area are believed to be transient in nature and would not be consistently exposed to the regularly occurring flight noise associated with on-going actions at Edwards AFB. Resident species in the area would already be acclimated or would quickly acclimate to the aircraft noise.

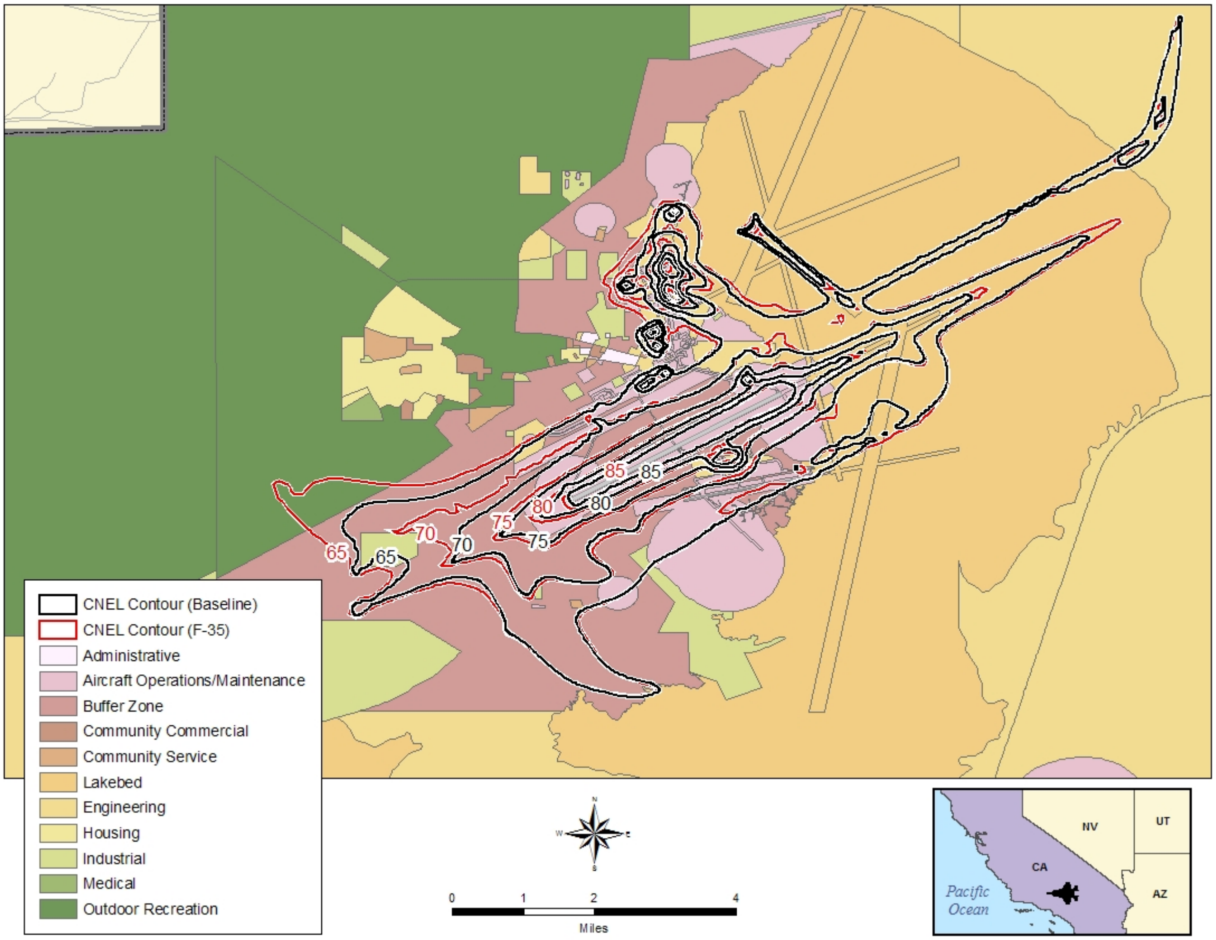


Figure 5.5.2-1: Land Use Within 65 dB Noise Difference

Additionally, the proposed JSF DT would consist primarily of flights occurring above 3,000 feet AGL. Total proposed flights occurring below 3,000 feet AGL would be associated with landings and takeoffs, and some weapons integration and mission systems tests. No potential primary impacts (direct physical impacts) would be anticipated. Potential temporary and minimal secondary impacts of a startle response may occur for resident individuals of some species during the initial proposed flight activities, but adaptation to the potential change in noise would be expected based on previous environmental analyses, such as the *Environmental Assessment for Low-Level flight Testing, Evaluation, and Training at Edwards AFB, California, May 2005*. Tertiary effects would not be anticipated, as most species present on Edwards AFB have already adapted to living with aircraft noise.

The proposed JSF DT at Edwards AFB would also include weapons separation tests on established ranges. Potential effects to biological resources may occur from the release of weapons. Direct effects from contact with the weapon, as well as physiological or behavioral effects from the noise associated with the weapons impact, would be possible, although unlikely. Effects to the desert tortoise would not be expected. Noise studies on desert tortoise have shown very little behavioral or physiological effects from loud noises that simulated jet overflights and sonic booms.[93] The desert tortoise sparsely populates Edwards AFB at an estimated density of fewer than twenty tortoises per one square mile on

[93] *AFFTC Armed Munitions Environmental Assessment, Draft*

approximately 80% of the base.[94] Though desert tortoises are active during spring and early summer when food is most abundant, they spend most of their time in underground burrows to avoid the desert heat. Noise of aircraft would be attenuated by the soil surrounding tortoise burrows. In addition, desert tortoises eat plants and tend to inhabit areas with vegetation, of which most target areas are void. Because of the lack of available habitat near the target areas and the sparse density of desert tortoises on Edwards AFB, no effect to desert tortoises would be anticipated from the proposed JSF DT weapons separation tests. Additionally, Edwards AFB is in the process of undergoing formal consultation with the USFWS to prepare a Biological Opinion (BO) for routine and recurring test activities, including testing of armed munitions (independent of the proposed JSF DT). During the proposed JSF DT, compliance with all terms and conditions of existing and any relevant BO requirements would be enforced, which would further minimize any potential affects to desert tortoise as a result of the Proposed Action. Thus, the proposed JSF DT would not be expected to have any significant affect on biological/natural resources, including no affect on Federally- and state-listed endangered or threatened species.

5.6 SOCIOECONOMICS AT EDWARDS AFB

5.6.1 Affected Environment

The socioeconomic study area for the Edwards AFB area extends up to 75 miles from the main Base, and includes portions of Los Angeles, Kern, and San Bernardino counties, as illustrated in Figure 5.6.1-1. In addition to the U.S. Census, BEA, and BLS sources, information from the following NEPA documents has been used to support the baseline information: Section 3.8 of the *Environmental Assessment for the Concept Demonstration Phase of the Joint Strike Fighter at Edwards Air Force Base, 2000 (September 2000),* the *Final Environmental Assessment for the Renovation and Construction of a Modern Flight Test Complex Edwards Air Force Base (July 2003)*, and Section 3.2.8 of the *Final Environmental Assessment for the Continued Use of Restricted Area R-2515, Edwards Air Force Base, California (April 1998)*.

[94] *Ibid*

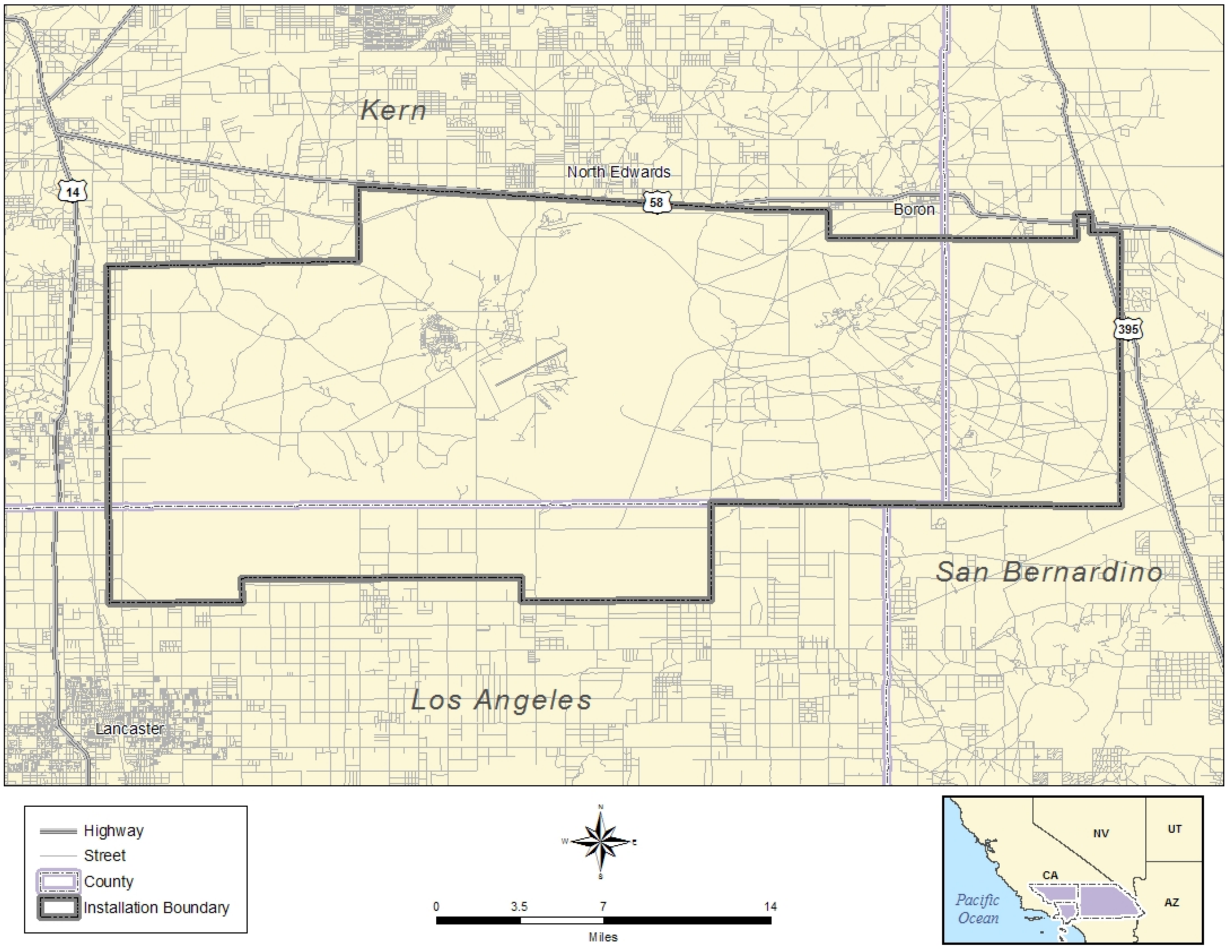


Figure 5.6.1-1: Edwards AFB Socioeconomic Study Area

5.6.1.1 Demographics

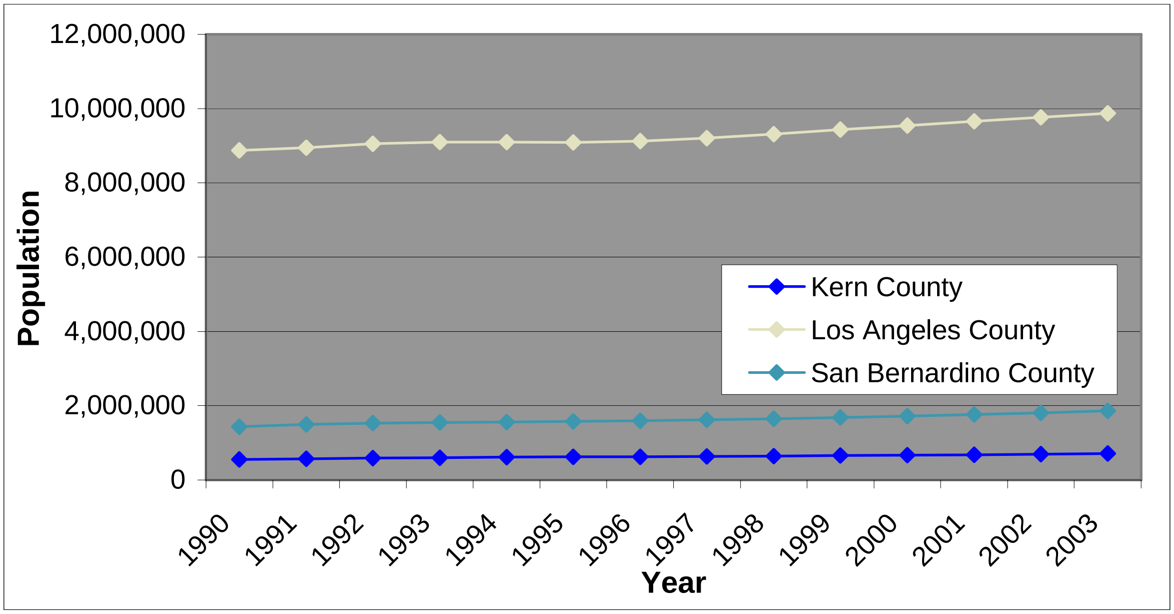
Total population within the three-county Edwards AFB socioeconomic area in 2003 was 12,444,271. This includes 9,871,506 in Los Angeles County, 713,087 in Kern County, and 1,859,678 in San Bernardino County. This three-county area comprises 35% of the total population of California. Overall, population in the three counties, as summarized in Figure 5.6.1.1-1, increased between 1990 and 2003 by 15%, with an 11.4% increase in Los Angeles County, 31.2% increase in Kern County, and 31.1% increase in San Bernardino County.[95] The median age of the population in 2000 was estimated to be 32 in Los Angeles County, 30.6 in Kern County, and 30.3 in San Bernardino County; all are slightly lower than the state median age of 33.3.[96]

Approximately 12,270 personnel comprise the stationed population at Edwards AFB. Of the total population, 4,389 are government civilian, 4,191 contractor, and 3,711 military personnel.[97] The Base also supports approximately 5,101 dependents.

95 *Bureau of Labor Statistics 2003*

96 *Census Bureau 2000*

97 *AFFTC 2004*



Source: Bureau of Labor Statistics, 2003.

Figure 5.6.1.1-1: Population Trends for Edwards AFB Socioeconomic Study Area (1990–2003)

5.6.1.2 Environmental Justice

In addition to the three-county Edwards AFB socioeconomic study area, more localized U.S. Census tract/block areas for poverty rates and ethnicity have been used to support the environmental justice analysis, as illustrated in Figure 5.6.1.2-1.[98] Edwards AFB is within the U.S. census tract 57, block group 9. The three other tracts are adjacent to Edwards AFB to the north (tract 005503, block group 3) and the south (tract 900200, block group 1 and tract 900200, block group 2). Each block group has a poverty rate that is below the threshold of 25% established in Section 3.4 of this EA/OEA.

98 *The environmental justice census tracts area is comprised of Census 2000 tract/block data where noise contours exceed 65 dB. Tracts/block data is aggregated to produce rates. Source of tracts/block data: 2000 Census; American FactFinder; 1999 Census Data by Tract number: Census 2000 Summary File 3 (SF 3) - Sample Data, Detailed Tables, P87.*

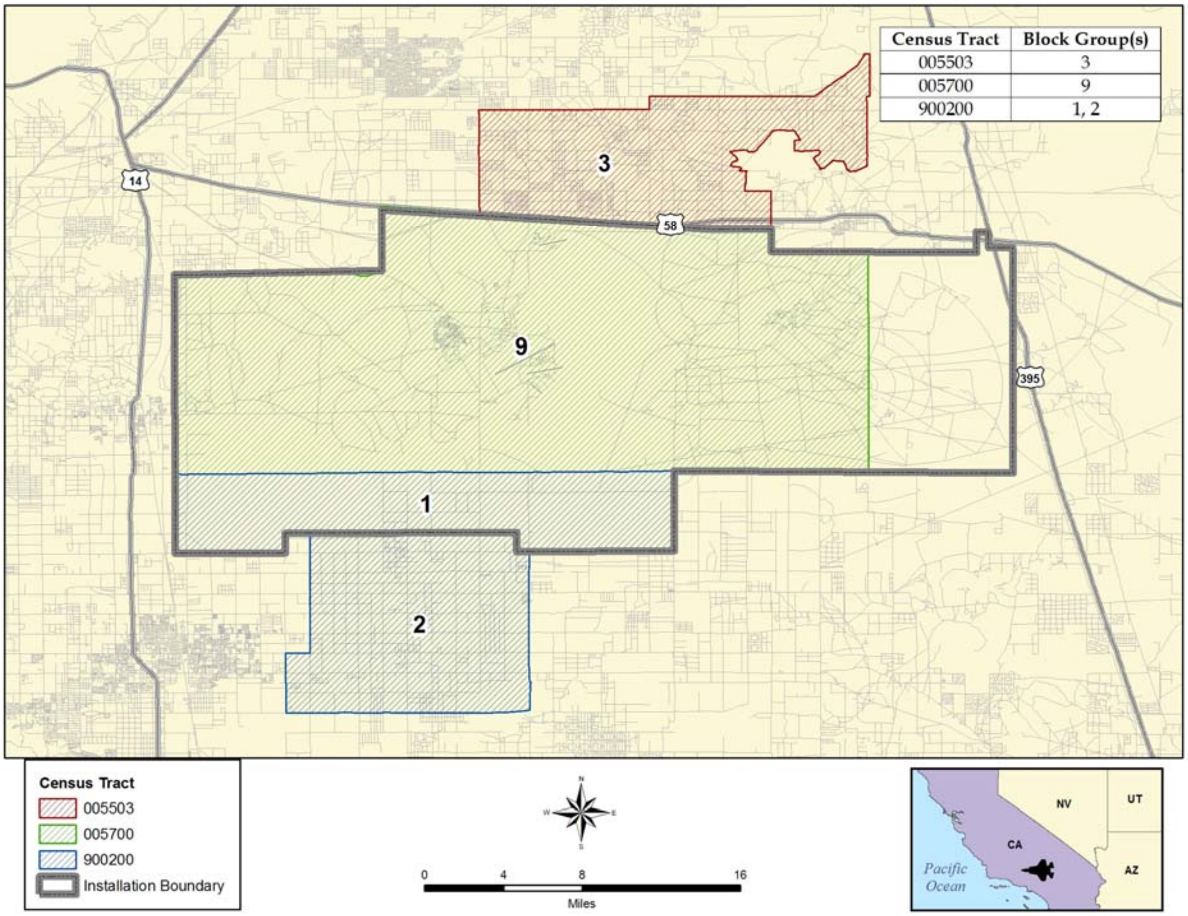


Figure 5.6.1.2-1: Environmental Justice Block Groups in Census Tracts for the Edwards AFB Socioeconomic Study Area

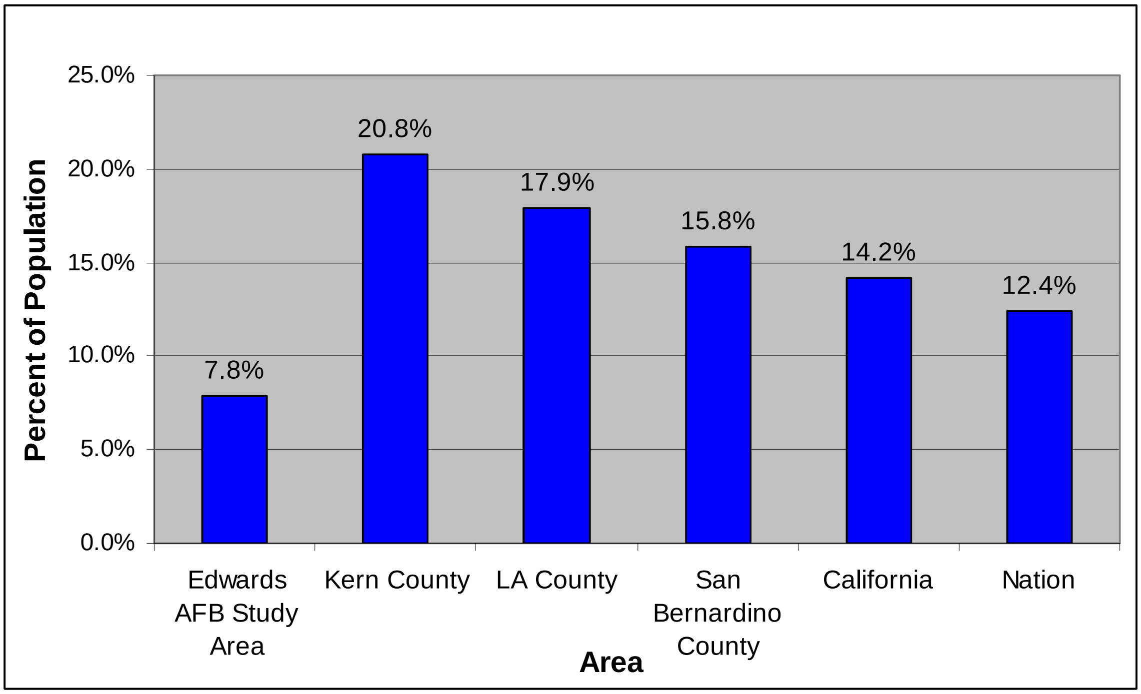
Poverty rates by the block groups for census tracts in the vicinity of Edwards AFB are summarized in Table 5.6.1.2-1.

Table 5.6.1.2-1: Poverty Rates by Block Groups for Census Tracts for Edwards AFB Socioeconomic Study Area (1999)

County	Census Tract #	Block Group #	Total Block Group Population (1999)	Persons Living in Poverty (1999)	Total Average Poverty Rate
Kern	57	9	1,343	187	13.92%
Kern	005503	3	6,013	169	2.81%
Los Angeles	900200	1	N/A	N/A	N/A
Los Angeles	900200	2	1,430	333	23.29%
Totals			***8,786***	***689***	***7.84%***

Source: U.S. Census Bureau, 2000. Source: 2000 Census; American FactFinder; 1999 Census Data by Tract number: Census 2000 Summary File 3 (SF 3) - Sample Data, Detailed Tables; P.87.

As depicted in Figure 5.6.1.2-2, the poverty rates for the environmental justice area is 7.8%, which is lower than all three surrounding counties' poverty rates, the California statewide estimate of 14.2%, and the National estimate of 12.4%. Kern County has the highest percent of the population below the poverty level at 20.8%. There are 17.9% of the population below poverty rates in Los Angeles County and 15.8% below poverty rates in San Bernardino County. The poverty rate for the environmental justice block group census tract area is below the set threshold of 25% used to identify environmental justice populations.



Source: U.S. Census Bureau 2000.

Figure 5.6.1.2-2: Poverty Rates for Edwards AFB Socioeconomic Study Area (1999)

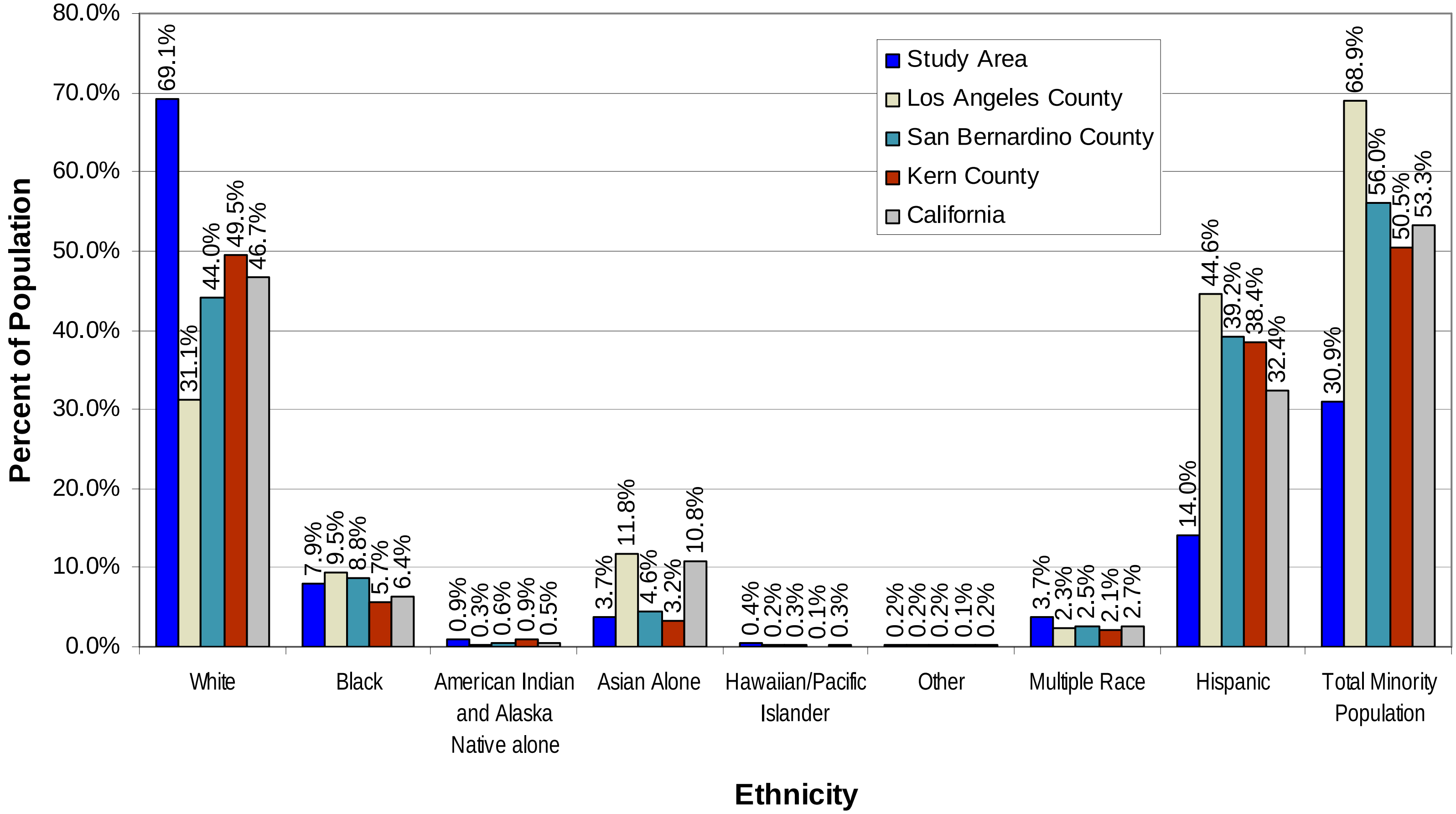
Population ethnicity in the Edwards AFB study area is summarized in Figure 5.6.1.2-3. The environmental justice area is comprised of predominantly white (69.1%) populations. The remaining population distribution in the three-county area is Hispanic or Latino (14.0%), Black or African American (7.9%), Asian (3.7%), two or more races (3.7%), American Indian or Native Alaskan (0.9%), Native Hawaiian or other Pacific Islander (0.4%), and some other race (0.2%).

Total minority population in the environmental justice block groups of the census tract (30.9%) is lower than surrounding counties and the State of California (53.3%) and does not exceed the CEQ threshold of 50% for minority populations, which is used to identify environmental justice populations. Ethnicity populations by blocks group are summarized in Table 5.6.1.2-2. Each block group is also below the CEQ threshold of 50% for minority populations.

Table 5.6.1.2-2: Ethnicity by Block Group for the Environmental Justice Census Tracts/Blocks Area within Edwards AFB Socioeconomic Study Area

Tract #	Block Group #	White	Black or African American	American Indian and Alaska Native Alone	Asian Alone	Hawaiian or other Pacific Islander	Other Race	Multiple	Hispanic	Total Minority Population
005503	3	82.8%	1.8%	2.4%	2.2%	0.6%	0.2%	2.5%	7.4%	17.2%
005700	9	67.4%	10.6%	0.5%	4.5%	0.5%	0.3%	4.4%	11.8%	32.6%
900200	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
900200	2	65.2%	1.0%	1.1%	1.1%	0.0%	0.0%	1.7%	29.9%	34.8%

Source: Census 2000, Summary File 1 - Detailed Table P4.



Source: U.S. Census Bureau, 2000.

Note: The percent of the population by ethnicity for the study area will not equal the average of the counties' percent of the population by ethnicity because denominators (county populations) are not common to all.

Figure 5.6.1.2-3: Ethnicity for the Edwards AFB Socioeconomic Study Area

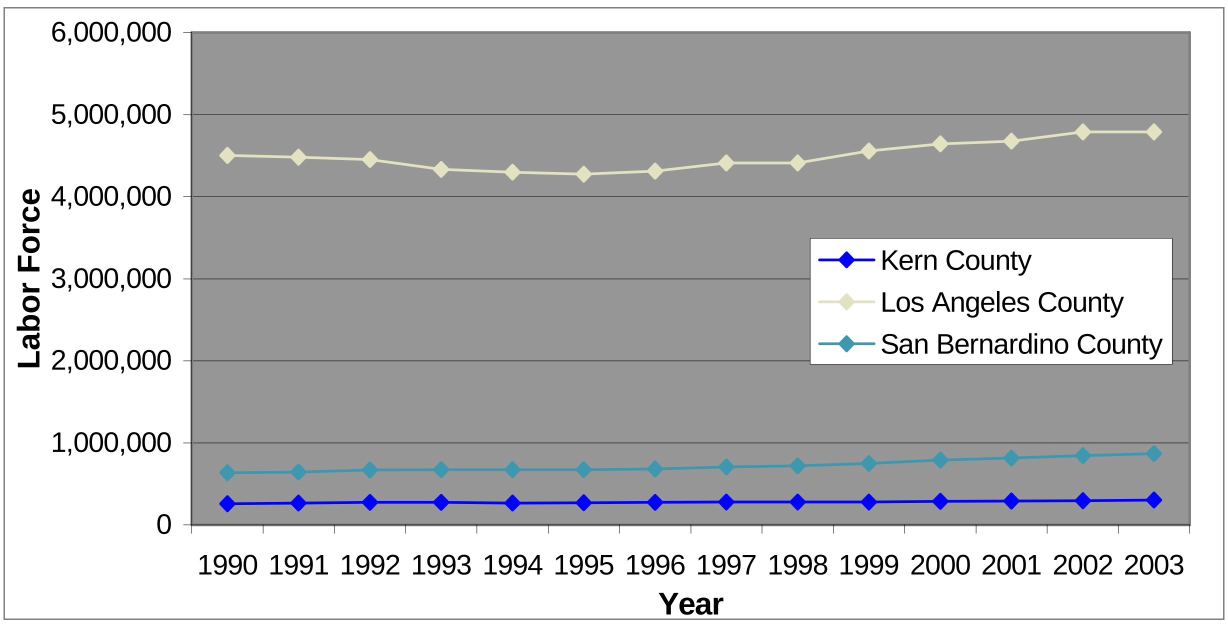
5.6.1.3 Economic Characteristics

Median Household Income

The median household income in Kern County ($35,446) is slightly lower than San Bernardino ($42,066) and Los Angeles ($42,189) counties, as well as below the median household income estimated for California ($47,493).[99]

Employment Trends

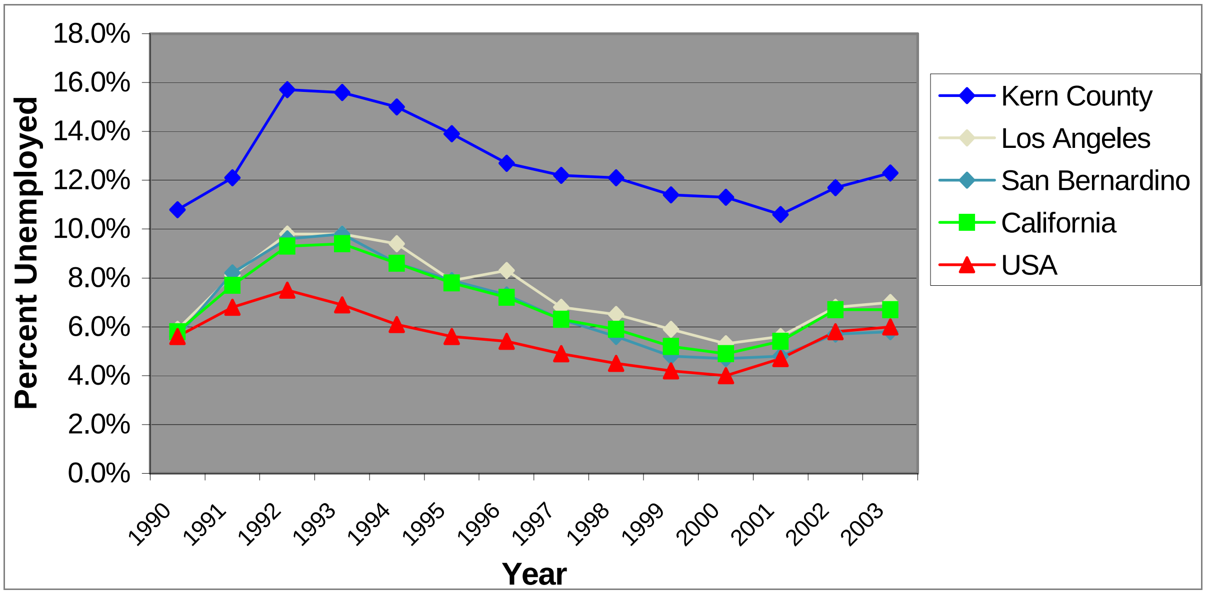
Employment information has been obtained from the BLS, as summarized in Figure 5.6.1.3-1. There were over 5.96 million workers in the three-county area labor force in 2003, consisting of 302,324 workers in Kern County, 4,788,827 workers in Los Angeles County, and 870,706 workers in San Bernardino County. The three-county area represents 33.7% of the California labor force. Unemployment rates for the Edwards AFB area, California, and the U.S. from 1990 through 2003 are summarized in Figure 5.6.1.3-2. Kern County has consistently reported higher levels of unemployment than the other areas. Los Angeles and San Bernardino counties show unemployment levels similar to California, but consistently higher than the U.S. unemployment rate of approximately 6.1% during this time period.



Source: Bureau of Labor Statistics, 2003–2004.

Figure 5.6.1.3-1: Labor Force Trends for Edwards AFB Socioeconomic Study Area (1990–2003)

99 *Census Bureau 2000*

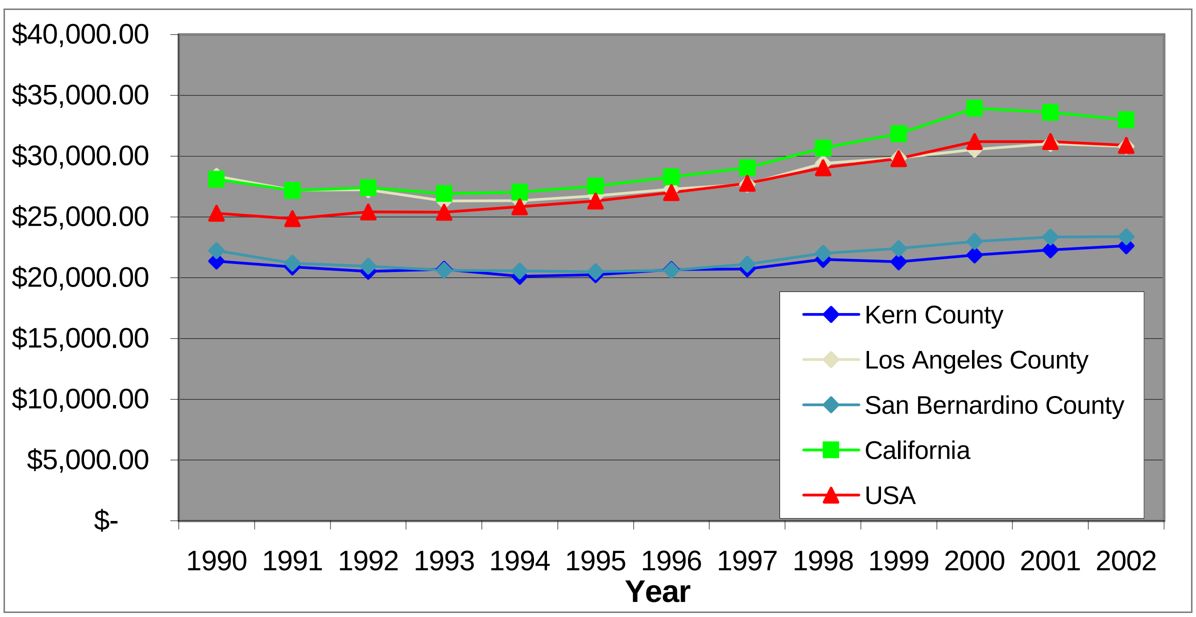


Source: Bureau of Labor Statistics, 2003.

Figure 5.6.1.3-2: Unemployment Trends for Edwards AFB Socioeconomic Study Area (1990–2003)

<u>*Per Capita Income*</u>

Information has been obtained from the BEA for per capita income as summarized in Figure 5.6.1.3-3, which was adjusted for inflation (2002). Kern and San Bernardino counties show a per capita income trend consistently lower than those of Los Angeles County, California, and the U.S. Los Angeles shows a trend slightly lower than the state and very close to the U.S. trend.

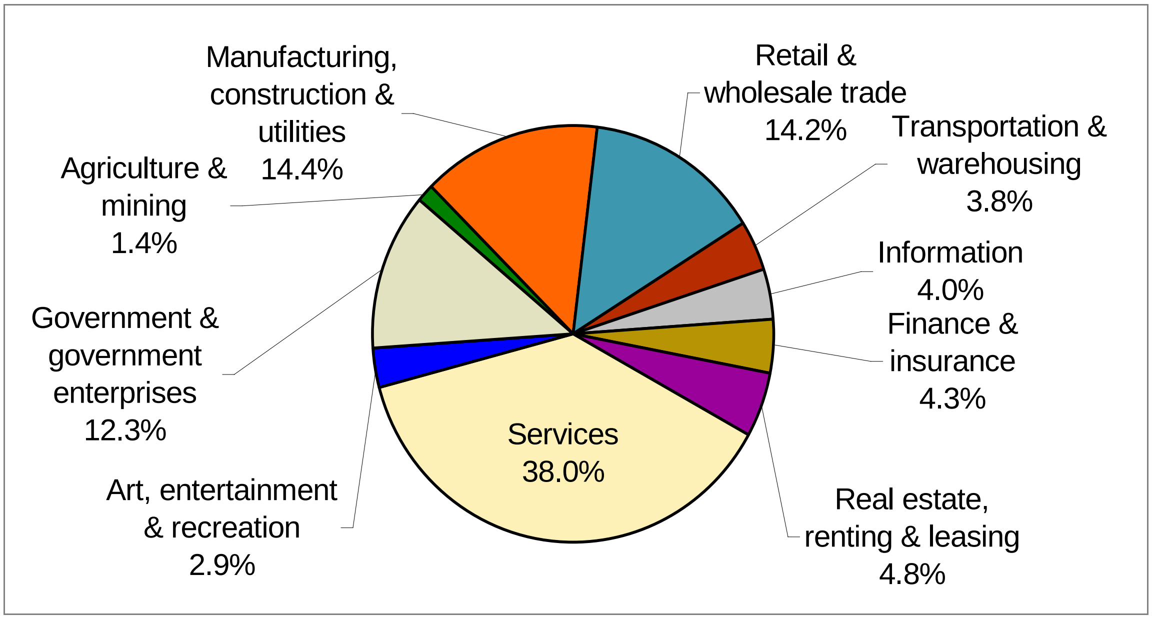


Source: Bureau of Economic Analysis, 2004 and adjusted for inflation (real 2002).

Figure 5.6.1.3-3: Per Capita Income Trends for Edwards AFB Socioeconomic Study Area (1990–2002)

Employment by Industry

Information has been obtained from the BEA regarding employment by industry in the Edwards AFB socioeconomic study area for 2002. There were approximately 6.6 million total jobs in the Edwards AFB area in 2002, which included approximately 316,778 jobs in Kern County, approximately 5,580,781 jobs in Los Angeles County, and approximately 740,605 in San Bernardino County [See Figure 5.6.1.3-4 for the distribution among industries and services in the three-county area]. Services (38%) and government and government enterprises (12.3%) comprised the largest percentage of jobs in the three-county Edwards AFB socioeconomic study area. Government and government enterprises are comprised of state and local government (86.1%), Federal civilian (9.0%), and military (4.9%). In the three-county area, the three largest service industries are health care and social services (21.9%), professional and technical services (18.6%), and administrative and waste services (17.6%).



Source: Bureau of Economic Analysis, 2004.

Figure 5.6.1.3-4: Employment by Industry for Edwards AFB Socioeconomic Study Area

Base Economic Contribution

Edwards AFB contributed approximately $1.3 billion to the surrounding communities within the Antelope Valley in Fiscal Year (FY) 1998. Annual operating expenditures include salaries, DoD acquisitions, and educational assistance. Contributions to the local economy by flight test wings of greater than 100 persons assigned to Edwards AFB are estimated at $1.0 million. Section 3.8.3 of the *Final Environmental Assessment for the Renovation and Construction of a Modern Flight Test Complex Edwards Air Force Base (July 2003)* and the *Final Environmental Assessment for the Continued Use of Restricted Area R-2515, Edwards Air Force Base, California (April 1998)* provide additional details regarding the economic contributions from the Base.

5.6.1.4 Housing

The average household size in the Edwards AFB socioeconomic study area is estimated to be 3.05 persons, and the average family size is 3.56 persons.[100] In the three-county area, 94% of the 4,103,842 housing units were occupied in 2000 with homeowners inhabiting 48% of these units (246,231 houses where vacant). All three counties have low homeowner vacancy rates with 1.6% in Los Angeles County, 2.6% in Kern County, and 3.1% in San Bernardino County. Rental vacancy rates for the three-county area are somewhat higher with 3.3% in Los Angeles County, 8.2% in Kern County, and 7.3% in San Bernardino County.[101]

Eighty-seven percent (87%) of the Base population lives off-base, primarily in Palmdale, Lancaster, and other larger cities near the Base. There are 2,261 housing units on-base, which includes a 188-space mobile home park for enlisted personnel, 390 family housing units, 674 bachelor quarters, and nine Senior Non-Commissioned Officers (NCO) quarters.[102] As of April 2004, there were 1,358 military personnel residing in government quarters and 187 in the mobile home park located on-base. The vacancy rate for Base housing is currently at 3.4% (approximately 119 vacancies). Section 3.8.1 in the *Final Environmental Assessment for the Renovation and Construction of a Modern Flight Test Complex Edwards Air Force Base (July 2003)* provides additional base housing information.

5.6.1.5 Infrastructure

Transportation

Primary access to Edwards AFB from the adjacent roadways is by way of three gates, each in operation 24 hours a day, seven days a week. Rosamond Boulevard provides the primary access to Edwards AFB from the west or north. Lancaster Boulevard/120th Street East provides access from the south. Internal circulation on-base is by way of paved and unpaved primary, secondary, and tertiary roads. Two rail spurs, one at Edwards AFB Station and the other at Boron Station, connect to the main base and Air Force Research Laboratory (AFRL), respectively. The spurs connect the two railroads adjacent to the Base. Section 3.9.2 of the *Final Environmental Assessment for the Renovation and Construction of a Modern Flight Test Complex Edwards Air Force Base (July 2003)* provides additional information regarding transportation systems.

Schools

Edwards AFB has two elementary schools, one middle school, and one high school, all of which are under the jurisdiction of the Muroc Unified School District. There are 967 elementary school students, 422 middle school students, and 400 high school students. The Edwards AFB Child Development Center, for families with preschool children of the ages six-weeks to four-years old, accommodates about 300 children on an annual basis. The Edwards AFB Youth Center provides before and after school activities for children of the ages five to twelve years. The Teen Center services children of the ages thirteen to eighteen years and can accommodate over 350 children on a daily basis. Attendance at the Edwards AFB Teen Center ranges from 60 to 70 children on a daily basis. The Base also provides Family Child Care Programs from approximately 30 accredited licensed homes. Section 3.8.2 of the *Final Environmental Assessment for the Renovation and Construction of a Modern Flight Test Complex Edwards Air Force Base (July 2003)* provides additional information on schools.

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100 *Census Bureau 2000*

101 *Census Bureau 2000*

102 *Crawford 2004*

5.6.2 Environmental Consequences

Socioeconomic impacts to local economies, schools, population levels, employment, housing availability, and recreational resources may occur with the implementation of the Proposed Action, which would require approximately 642 employees to manage and execute the proposed JSF DT. Of these 642 employees, approximately 234 (approximately 212 civilians and 22 military) are already employed at Edwards AFB and would transition from other programs to support the proposed JSF DT. The remaining 408 required employees (approximately 377 civilian and 31 military) would be new to Edwards AFB. This additional increase in population would equate to less than a 0.01% increase to the 2003 labor force in the Edwards AFB socioeconomic study area. The small increase in the labor force is not expected to cause significant impacts.

Potential socioeconomic impacts for Edwards AFB were evaluated using the EIFS model. This input-output model was developed specifically to analyze community impacts of Base activities and can be used to assess potential impacts and their significance on four elements of a local economy: business volume, employment, personal income and population.[103] Projected changes that fall outside of these accepted boundaries (referred to as established significance criteria ranges) are considered significant.

The projected number of military and civilian employees and their average salaries for the Edwards AFB socioeconomic study area is summarized in Table 5.6.2-1. Estimated employment is based on discussions with the JSF V&T Team Lead at Edwards AFB and December 2003 JSF Manning charts. Average civilian salaries were estimated with information from the BEA, while military salaries were estimated using the Monthly Basic Pay Table published by the Office of the Secretary of Defense (OSD) for Personnel and Readiness (P&R). Table 5.6.2-1 also summarizes the ROI where impacts would likely occur. The ROI was determined by considering a number of factors. In general, the definition requires local knowledge of the area and a general understanding of where people shop, work, play, and live. For example, a study by Gunther concluded USAF personnel tended to live within 50 miles of the Base where they worked.[104]

Table 5.6.2-1: Proposed JSF DT Military, Contractor, and Civilian Employment and Salaries at Edwards AFB

Study Area	Employees		Average Salary ($)		Region of Influence
	Civilian	Military	Civilian	Military	
Edwards AFB	377	31	$81,610	$62,623	Kern, Los Angeles, and San Bernardino Counties, CA

Results from the EIFS model are reflected in Table 5.6.2-2. The proposed JSF DT would add approximately 31 new military and 377 new civilian employees at Edwards AFB. Adding these jobs to the work force may increase the economic activity within the Edwards AFB socioeconomic study area defined as Kern, Los Angeles, and San Bernardino counties in California. This additional economic activity may increase local employment by 892 total jobs, which would represent a very small percentage of the total employment in the area (0.01%) based on employment levels discussed in Section 5.6.1.3 of this EA/OEA. Local population would be expected to increase by approximately 265 persons, which would also be a very small percentage of the population in the Edwards AFB socioeconomic study area as stated in Section 5.6.1.1. The EIFS model's low local population increase relative to the local employment increase created at Edwards AFB suggests that most new jobs would be filled by individuals

[103] *Bragdon, Katherine and Webster, Ron 2001*
[104] *Gunther, W. 1992*

already living in the area. Business volume and personal income would be expected to increase by 0.02%. All four elements (employment, population, business volume, and personal income) would fall within the significance criteria range established by the EIFS model, which means no significant impacts to socioeconomics would be expected from implementing the Proposed Action at Edwards AFB.

Table 5.6.2-2: Forecasted Output from the EIFS Model for Proposed JSF DT at Edwards AFB

Edwards AFB	
Business Volume	$125,090,600
Percent Change of Total Area Business Volume	0.02%
Business Volume Significance Criteria Range	-5.76% to 12.69%
Income	$49,670,670
Percent Change of Total Area Income	0.01%
Income Significance Criteria Range	-5.35% to 11.46%
Employment	892
Percent Change of Total Area Employment	0.01%
Employment Significance Criteria Range	-3.26% to 3.46%
Population	265
Percent Change of Total Area Population	0%
Population Significance Criteria Range	-1.03% to 1.51%

Relatively small changes in employment and population from the Proposed Action are not expected to cause significant impacts to housing, infrastructure, or schools in the local communities assuming schools are not at capacity (See Section 5.6.1.5 of this EA/OEA). Muroc Unified School District would not provide information regarding school capacities, thereby preventing further school capacity analysis.

Socioeconomic impacts from the Proposed Action are not expected to be significant for environmental justice populations within the community surrounding Edwards AFB. Based on the threshold criteria for minority or low-income populations presented in Section 5.6.1.2, there would be potential environmental justice populations present. However, the changes would be relatively small in employment and population from the proposed JSF DT alternatives, as well as no noise contours extend outside the Base's boundaries (discussed in Section 5.4 of this EA/OEA and depicted in Figure 5.6.2-1). Figure 5.6.2-1 further illustrates all noise contours, ranging from 65 to 85 dB DNL, would be confined within the Bases's boundary. Therefore, the proposed JSF DT would not likely cause disproportionate high or adverse human health and environmental affects to the environmental justice populations relative to other populations in the area.

Similarly, implementation of the proposed JSF DT at Edwards AFB would cause no disproportionately adverse health or safety risks to children. Noise and air quality analysis has shown that no potentially significant impacts to any sensitive receptors (including hospitals, schools, and daycare facilities) where a disproportionately large population of children may be present would be expected to occur.

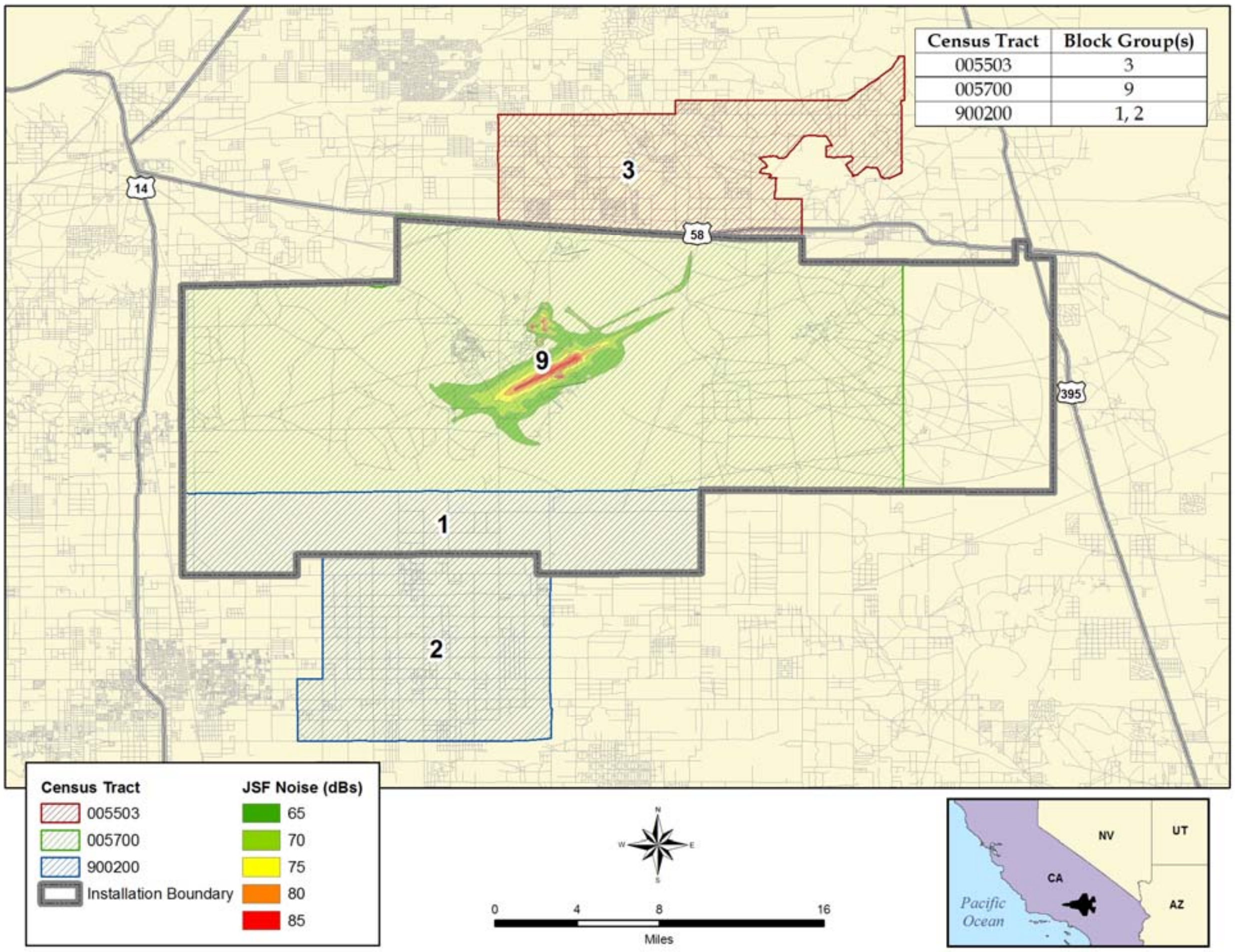

Figure 5.6.2–1: Proposed JSF DT Noise Contour to Census Tracts and Block Groups in the Edwards AFB Socioeconomic Study Area

5.7 CUMULATIVE IMPACTS

The CEQ's implementing regulations for NEPA define cumulative impacts as the impact on the environment which results from the incremental impact of the action, when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.[105]

[105] *40 CFR 1508.7*

Only activities that are reasonably foreseeable in the future, with the potential to interact with the Proposed Action, are addressed together with past and present activities. Because the level of detail varies among future actions, a qualitative analysis is used so that all projects can be evaluated consistently with the best available information. Since the direct and indirect impact analysis focused only on those resources (air quality, noise, biological/natural resources, and socioeconomic factors) that may be impacted by the Proposed Action, the cumulative impacts analysis addresses these same resources.

Current and future actions proposed at Edwards AFB are listed in Table 5.7-1 below. The impacts of past actions are reflected in the current baseline environment (the as is condition).

Table 5.7-1: On-Going and/or Future Actions at Edwards AFB[106]

Aircraft	Testing Period
B-1, B-2, B-52, C-12, C-130, C-17, F-117, F-16, F-22A, T-38, TANKER, VISTA	On-Going - FY 2011
C-5, CV-22	On-Going - FY 2007
F-15	On-Going - FY 2010
RQ-4, TROUT, X-45, YAL-1A	On-Going - FY 2010

Table 5.7-2 shows the approximate total sorties and flight hours projected for Edwards AFB for FY 2006 through 2011. Average annual flight hours at Edwards AFB are projected to decrease over the next five years, as reflected in Table 5.7-2. This decreased projection includes the proposed JSF DT, as well as other future programs at Edwards AFB.

Table 5.7-2: Projected Cumulative Flight Operations Outlook for Edwards AFB[107]

FY	Total Hours All Aircraft	Proposed JSF Hours	JSF % of Total Hours
2006	14,365	95	0.6%
2007	14,216	752	5.3%
2008	12,469	426	3.4%
2009	12,566	952	7.5%
2010	13,578	1,034	7.6%
2011	8,728	600	6.8%

Flight operations are expected to decrease by 37% from FY 2006 through FY 2011. Proposed JSF DT flight hours, of the total flight hours anticipated at Edwards AFB, would range from 3.4% (426 flight hours in Test Year 3) to 7.6 % (952 flight hours in Test Year 4). Current major test programs occurring at Edwards AFB are expected to lessen over the next few years; follow-on testing could be expected to continue but at a much lower rate than currently exists. Based on past and on-going levels of RDT&E, current and future actions at Edwards AFB would not be anticipated to exceed current flight operation levels. Flight operation levels are expected to decrease in the next five years, or at least not increase beyond current levels, and no significant deviations in flight lines or airspace use are anticipated, thus providing minimal potential for cumulative impacts.

106 *Based on AFFTC Edwards input of copy of 412 OG Fly FCST – G Kellog, April 2005*

107 *Based on AFFTC Edwards input of copy of 412 OG Fly FCST – G Kellog, April 2005, and Table 5.2-1*

Implementation of the Proposed Action alternatives at Edwards AFB would result in minimal site-specific cumulative impacts to air quality based on the number of proposed flights for reasonably foreseeable future activities. The qualitative cumulative air quality analysis conducted for this EA/OEA concluded JSF DT emissions would be predominantly transitory, site-specific, and not cumulatively significant. The additional landings and takeoffs would account for less than 10% of the reasonably foreseeable landings and takeoffs at the Base. The air quality impacts from these flights are small enough to be considered insignificant.

The primary criterion for determining whether an action has significant cumulative impacts on air quality is whether the project is consistent with an approved plan in place for the region where the pollutants are being emitted. The JSF DT would comply with approved air quality planning documents/permits at Edwards AFB that assist the area to attain and maintain the national and state ambient air quality standards for criteria pollutants.

Under either alternative, the proposed JSF DT would not produce any significant impacts to biological/natural resources. The proposed JSF DT may change the existing noise impact areas slightly on Edwards AFB. This change coupled with existing and other future flight actions may create more noise and result in a greater potential for increased disturbance to biological/natural resources. Edwards AFB operates a controlled airspace with standard procedures and published directives that establish minimum overflight altitudes for areas such as parks, wilderness areas, and populated areas. There are also restrictions placed on the altitude and direction of the flights that include supersonic operations. Therefore, no significant cumulative effect to any biological resource would be expected from the Proposed Action to include no affect to Federally- and state-listed endangered or threatened species.

Under either alternative, the proposed JSF DT would not produce any significant impacts to socioeconomic resources. The arrival of personnel supporting the proposed JSF DT, along with other future reasonably foreseeable actions, would not have the potential to cumulatively impact the immediate area surrounding the Base. The nature of the proposed JSF DT and other testing programs would result in a gradual increase of personnel and related workforce population, with peak years corresponding with peak testing years. A gradual decrease in personnel and associated workforce populations would also occur as the proposed JSF DT and other testing activities conclude. Though these changes in personnel would cause a positive temporary impact on employment income and other economic indicators, no significant or permanent impact would be anticipated. Additionally, no regional cumulative socioeconomic impacts would be anticipated to include environmental justice populations.

6.0 NAS PATUXENT RIVER

6.1 NAS PATUXENT RIVER GENERAL INFORMATION

NAS Patuxent River, as depicted in Figure 6.1-1, is located on 6,705 acres (10.48 square miles) in St. Mary's County, Maryland, on a peninsula between the Patuxent River to the north, and the Chesapeake Bay to the east and south. NAS Patuxent River is approximately 65 miles southeast of Washington, DC, and is located adjacent to the town of Lexington Park, Maryland. Highway access to NAS Patuxent River is provided via State Highways 5 and 235.

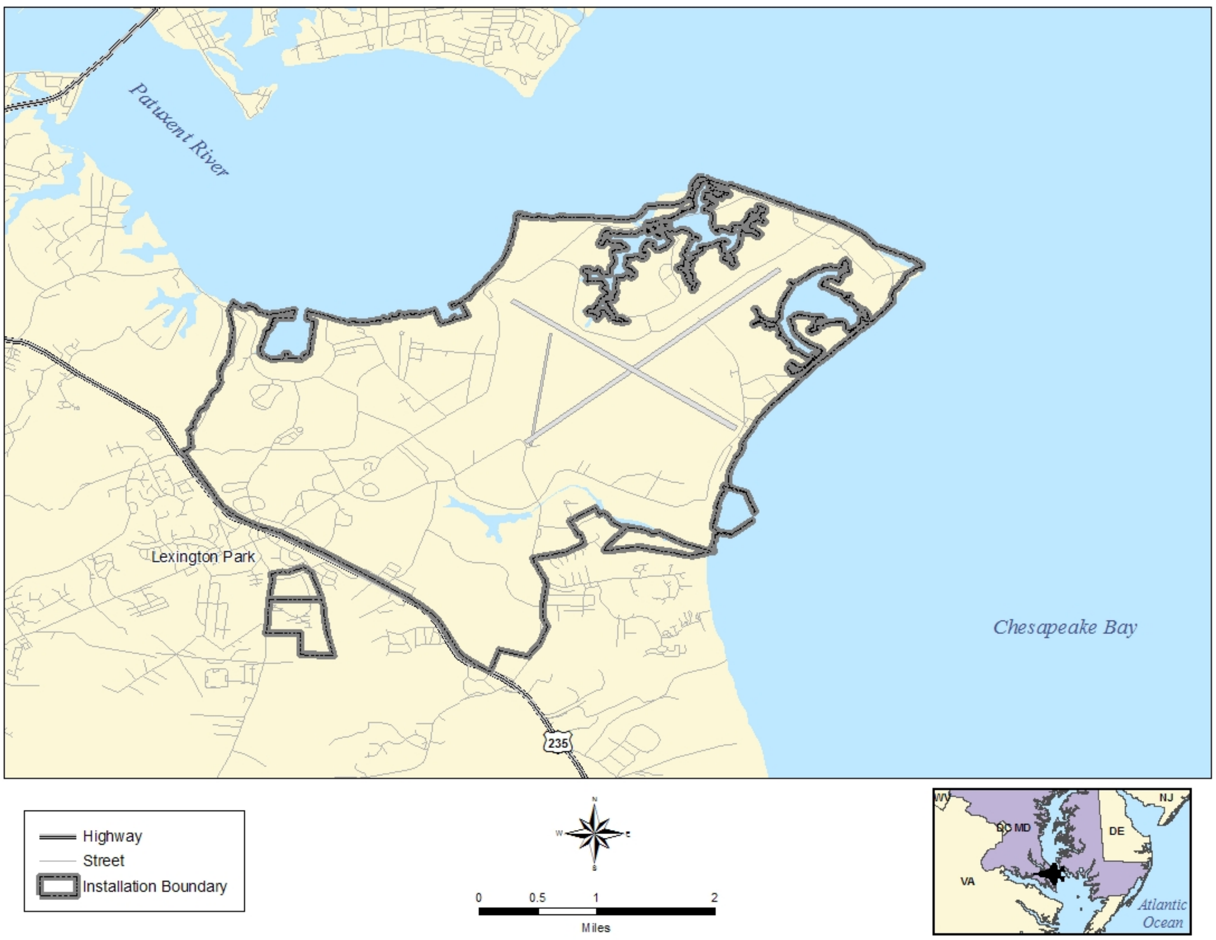

Figure 6.1-1: General Map of NAS Patuxent River

NAS Patuxent River is a principal test flight center with the specific mission to conduct developmental and follow-on testing of new and modified aircraft. A primary mission of NAS Patuxent River is to serve as the USN's principal RDT&E, engineering, and Fleet support center for Naval aircraft, engines, avionics, aircraft support systems, and ship/shore/air operations. NAS Patuxent River provides a realistic simulated carrier deck with existing catapult and arresting gear, qualified carrier suitability personnel, automatic carrier landing system (ACLS) equipment, and the Landing Systems Test Laboratory. Flight-test missions are flown within the Special Use Airspace over the Chesapeake Bay and the VACAPES OPAREA off the coast of Maryland, Delaware, and Virginia. In addition, NAS Patuxent River supports active participation in all phases of the aircraft system life cycle, including support of technology demonstration and validation, SDD, production and deployment, Fleet operations, and in-service engineering. NAS Patuxent River has: (1) the required test equipment; (2) facilities expressly designed for flight-test support; (3) laboratories; and (4) trained personnel necessary to conduct flight-test operations for the proposed JSF DT.

6.2 PROPOSED JSF DT AT NAS PATUXENT RIVER

Naval Air Warfare Center Aircraft Division (NAWCAD), a tenant command at NAS Patuxent River, would be the primary responsible test organization for implementing the proposed JSF DT. The proposed JSF DT would be flown with missions controlled from the Atlantic Test Range (ATR) Echo Control and/or FACSFAC VACAPES Giant Killer Control. All proposed flights would be conducted in accordance with existing flight rules (e.g., airspeed, altitudes, patterns) established for operations conducted at NAS Patuxent River. Figure 6.3.1-1 in the next section of this EA/OEA illustrates the representative restricted and warning areas of NAS Patuxent River.

Alternative One is to conduct the proposed JSF DT at the East and West Coast Primary Test Locations, LM Aero, and DETs from NAS Patuxent River to NAES Lakehurst and Eglin AFB. This allows the JPO and JSF V&T Team to capitalize on professional capabilities, technical expertise, and specialized test assets while accommodating the full proposed number of F-35s (15). Proposed flights occurring in the VACAPES OPAREA of the AWA would takeoff from and return to NAS Patuxent River.

Under Alternative Two, STOVL hover operations would be performed at both NAS Patuxent River and LM Aero. Under this proposed scenario, of the total STOVL operations planned for the East Coast Test Location, approximately 90% would be conducted at NAS Patuxent River and approximately 10% would transition to LM Aero. For ground-based operations, 64% would be conducted at NAS Patuxent River and 33% at LM Aero.

Table 6.2-1 reflects the overall proposed JSF DT at NAS Patuxent River under Alternative One, while Table 6.2-2 reflects Alternative Two. Additional information regarding Alternative Two for LM Aero is provided in Section 8 of this EA/OEA. Table 6.2-3 reflects the proposed SE and stores/expendables associated with both alternatives at NAS Patuxent River.

Table 6.2-1: Proposed JSF DT Flight Profile at NAS Patuxent River - Alternative One

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Fl;ght Hours	Total No. Flights	Total Flight Hours
2	STOVL & CTOL FQ, STOVL & CTOL Performance, STOVL & CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	188	322	F/A18, KC130	177	354	365	676
3	STOVL & CTOL FQ, STOVL & CTOL Performance, CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	767	1,307	F/A-18, KC-130, F-15, E3, E2, EP-3E, EA-6,	746	1,492	1,513	2,799

Table 6.2-1: Proposed JSF DT Flight Profile at NAS Patuxent River - Alternative One (Continued)

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
3 (cont.)				AH-66, V22, NIMROD, ASTER, & EFA				
4	Same as Test Year 3	796	1,358	Same as Test Year 3	947	1,894	1,743	3,252
5	STOVL & CTOL FQ, CTOL Performance, CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	557	950	Same as Test Year 3	683	1,366	1,240	2,316
6	STOVL FQ, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, Mission Systems	340	581	Same as Test Year 3	419	838	759	1,419
7	Land Based Ship Suitability, Weapons Separation & Integration, Mission Systems	67	115	F/A-18 KC-130	86	172	153	287
Total		***2,715***	***4,633***		***3,058***	***6,116***	***5,773***	***10,749***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).

Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Table 6.2-2: Proposed JSF DT Flight Profile at NAS Patuxent River - Alternative Two

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
2	STOVL & CTOL FQ, STOVL & CTOL Performance, STOVL & CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	178	305	F/A18, KC130	177	354	355	649

Table 6.2-2: Proposed JSF DT Flight Profile at NAS Patuxent River - Alternative Two (Continued)

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
3	STOVL & CTOL FQ, STOVL & CTOL Performance, CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	756	1,288	F/A-18, KC-130, F-15, E3, E2, EP-3E, EA-6, AH-66, V22, NIMROD, ASTER, & EFA	746	1,492	1,502	2,780
4	Same as Test Year 3	786	1,341	Same as Test Year 3	947	1,894	1,733	3,235
5	STOVL & CTOL FQ, CTOL Performance, CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	552	941	Same as Test Year 3	683	1,366	1,235	2,307
6	STOVL FQ, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, Mission Systems	335	572	Same as Test Year 3	419	838	754	1,410
7	Land Based Ship Suitability, Weapons Separation & Integration, Mission Systems	67	115	F/A-18 KC-130	86	172	153	287
Total		***2,674***	***4,562***		***3,058***	***6,116***	***5,732***	***10,678***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).

Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Table 6.2-3: Proposed JSF DT Support Equipment, Stores, and Expendables at NAS Patuxent River - Alternatives One and Two

Test Year	Support Equipment		Stores/Expendables	
	Type	Quantity*	Type	Quantity*
2	Hydraulics Cart (4) ECS Cooling Cart (4) Tow Tractor (3) Aircraft Power Generator (4) Weapons Loaders (2) Support Trucks (10) Light Cart (6) Fuel Chiller (2) Ground Support Generator (6)	41	MK 83 JDAM (18) MK 84 JDAM (18)	36
3	Same as Test Year 2	Same as Test Year 2	AIM-120 and/or AMRAAM (12)	12
4	Same as Test Year 2	Same as Test Year 2	GBU 12 (30) BLU 109 JDAM (11) JSOW (12) WCMD (37)	90
5	Same as Test Year 2 without ECS Cooling Cart	37	MK 82 (30) Fuel Tank (12)	42
6	Same as Test Year 2	Same as Test Year 2	AIM120 and/or AMRAAM (26) AIM 9 (8) LGTR (22)	56
7	Same as Test Year 2	Same as Test Year 2	GBU 12 (17) MK 84 JDAM (10) AIM 132 (8)	35

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).

Note: Proposed support equipment and stores/expendables reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT events and time periods.

Total for all units and types

6.3 AIR QUALITY AT NAS PATUXENT RIVER

6.3.1 Affected Environment

The climate of the area surrounding NAS Patuxent River and the Chesapeake Test Range (CTR) (tri-county region of St. Mary's, Calvert, and Charles County, Maryland) is categorized as humid subtropical, moderated by nearby water bodies. The region generally receives more than 40 inches of precipitation per year including fifteen inches of snow. The prevailing winds for NAS Patuxent River are northwesterly from October to April and southerly from May through September. The average temperature is 58° Fahrenheit, with January being the coldest month, and July the warmest month.[108]

Air quality in Maryland is defined and regulated with respect to conformity with the CAA by the Maryland Department of the Environment (MDE). Maryland has no state-specific AAQS so the NAAQS solely applies.

[108] *Ibid*

NAS Patuxent River is located in St. Mary's County, which is in the Maryland Tri-County region of St. Mary's, Calvert, and Charles Counties. Table 6.3.1-1 lists the attainment status of the Tri-County Region. Calvert and Charles Counties are included in the O_3 Metropolitan Washington Nonattainment Area (MWNAA) and are designated as moderate nonattainment for the eight-hour O_3 NAAQS. Charles County is also included in the MWNAA for $PM_{2.5}$, while Calvert County is in attainment for $PM_{2.5}$. St. Mary's County is in attainment for the eight-hour O_3 and $PM_{2.5}$ NAAQS. All three counties are in attainment for the criteria pollutants CO, NO_2, SO_2, PM_{10}, and Pb.

Table 6.3.1-1: NAS Patuxent River Attainment Status[109]

Criteria Pollutant	St. Mary's County	Calvert County	Charles County
CO	Attainment	Attainment	Attainment
Pb	Attainment	Attainment	Attainment
NO_2	Attainment	Attainment	Attainment
O_3	Attainment	Moderate Nonattainment	Moderate Nonattainment
PM_{10}	Attainment	Attainment	Attainment
$PM_{2.5}$	Attainment	Attainment	Nonattainment
SO_2	Attainment	Attainment	Attainment

The plan for achieving attainment for the MWNAA is prepared by the Metropolitan Washington Air Quality Committee (MWAQC) in cooperation with Maryland, Virginia, and the District of Columbia. MWAQC was established by the governors of Maryland and Virginia and the mayor of the District of Columbia to prepare a regionally coordinated air quality plan to comply with the requirements of the CAAA–90. MWAQC's Plan recommendations are forwarded to the three state environmental agencies. In turn, each state submits a SIP revision to EPA for review and approval. The MWNAA is currently developing a plan for attaining the O_3 and the $PM_{2.5}$ NAAQS, however, no emissions budgets have been established as of January 2006. The most recently approved plan for the one-hour O_3 NAAQS (now rescinded) concluded if the VOC and NO_x emissions during the O_3 season (May 1 to September 15) were less than 339.3 tons per day (tpd) and 539.0 tpd for VOC and NO_x, respectively, the area would attain the one-hour O_3 standard.[110] These emissions translate to 46,823 tpy of VOCs and 74,382 tpy of NO_x over the 138-day ozone season.[111] The MWAQC Technical Advisory Committee (TAC) is currently reviewing an estimate of the direct mobile source $PM_{2.5}$ emissions for the revised plan. The estimated budget for CY 2010 under review by the TAC is 932.82 tpy.[112] Table 6.3.1-2 below depicts the total NO_x and VOC emissions budget for the region from the exiting plan, as well as the estimated $PM_{2.5}$ mobile source budget currently under review; these values were used in the analysis since these are the best available data. Table 6.3.1-2 also includes the regionally significant thresholds based on the emission budgets.

109 *EPA 2005*
110 *MWCOG 2004*
111 *MWCOG 2005*
112 *Clifford 2005*

Table 6.3.1-2: Emissions Budget and 10% Nonattainment Area Emissions Budget for the MWNAA

	Baseline Emission Levels tons/day (MT/day)			Regionally Significant Threshold[a] tons/year (MT/year)		
Nonattainment Area	NO_x[b]	VOC[b]	PM_{10}[c]	NO_x	VOC	PM_{10}
MWAQC	539.0 (488.9)	339.3 (307.8)	2.6 (2.4)	7,438 (6,748)	4,682 (4,247)	93.3 (84.6)

Notes: a. Tons per year (metric tons per year) calculated based on duration of the O_3 season.

b. Tons per day (metric tons per day) during the O_3 season (May 1 through September 15).

c. $PM_{2.5}$ emission levels for baseline year 2010. Assuming 365 days per year.

The CTR, where the proposed JSF DT would be conducted, and as illustrated in Figure 6.3.1-1, covers portions of Caroline, Dorchester, Wicomico, and Somerset Counties in Maryland; a portion of Sussex County in Delaware; and Westmoreland, Northumberland, and Lancaster Counties in Virginia. Both Delaware and Virginia have adopted the NAAQS for the six criteria pollutants. The Virginia counties of Westmoreland and Northumberland, and the Maryland counties of Dorchester, Wicomico, and Somerset are all in attainment of all the NAAQS.[113] Sussex County, Delaware is included in the Philadelphia-Wilmington-Atlantic City moderate NAA for the eight-hour O_3 NAAQS, but is in attainment for all other criteria pollutant standards.[114] In addition to the NAAQS, Delaware has also established primary and secondary standards for HCs and hydrogen sulfide. HC emissions are emitted as unburned fuel and are included in the VOC emission estimates. It is not expected that measurable quantities of hydrogen sulfide would be emitted as a result of the Proposed Action.

113 *EPA 2005*

114 *EPA 2005*

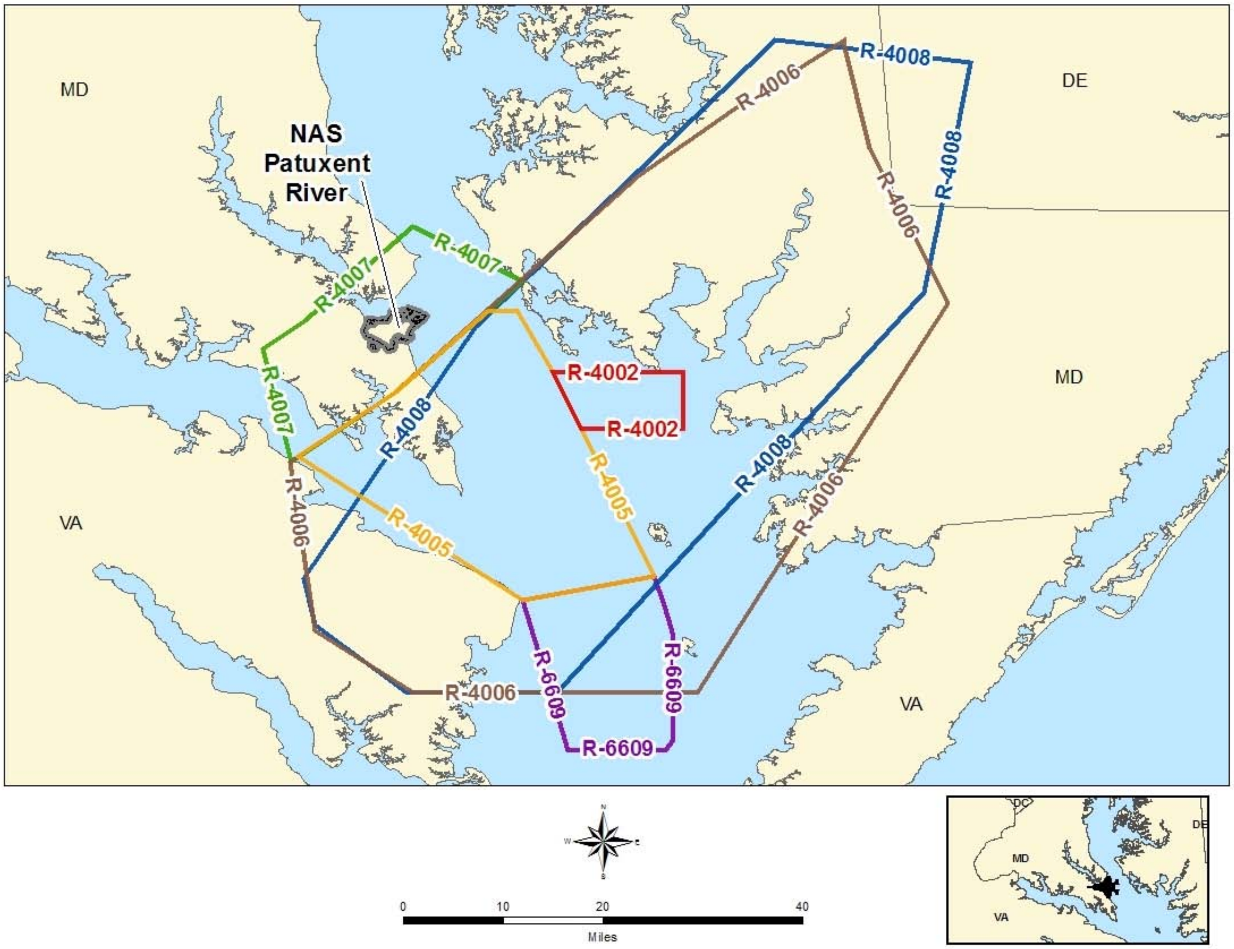

Figure 6.3.1-1: NAS Patuxent River CTR

6.3.2 Emission Estimation Methodology

The emission estimates used to determine general conformity applicability were calculated for flight operations and GSE identified for the proposed JSF DT at NAS Patuxent River. Emissions from refueling operations and commuter vehicles associated with additional personnel were also included as part of the Proposed Action analysis. See Appendixes E and E.2 for additional details for the methodology used to calculate emissions from all sources included in the Proposed Action.

Criteria pollutant emissions from sources in the Proposed Action alternatives were calculated following the procedures outlined in the AF *Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations*.[115] For all F-35 and support aircraft operations, emissions were calculated using emission factors for every throttle setting while the aircraft is operating below 3,000 feet AGL. The F-35 engine emission factors, provided by P&W, were used for gaseous emissions at non-AB conditions.[116] For AB operations, emission factors from F-119 testing were used except for particulate emissions.[117] PM emission factors for AB operations from AFIERA were assumed to be the same as for the

115 *O'Brien 2002*

116 *Graves 2002*

117 *Wade 2002*

F100-PW-100 engine.[118] Emission factors for the F100-PW-100 engine were used because it is manufactured by P&W (the same company producing the F135 for the F-35), is roughly the same size as the engine used in the F-35, and emissions data are readily available. PM emission factors for the F-35 engine during non-AB conditions were provided by the USN AESO, based on previously tested engines.[119] While there may be a need to conduct engine tests in the Hush House beginning in Test Year 2, the extent and details of these proposed test activities and operational profiles (e.g. engine operating times, power settings) are not well defined at this time for inclusion in this air quality analysis. In the event tests would be required, they would be conducted in accordance with all applicable air permit conditions established for the Hush House to maintain air quality and overall environment compliance. Potential emissions resulting from proposed JSF DT activities will be assessed by the JPO, JSF V&T Team, and NAS Patuxent River as data is made available, based on air quality standards and the Title V operating permit for the Hush House.

Emissions from GSE were also calculated using the methodology outlined in AF guidance documents. GSE includes all the equipment used to service the aircraft (such as electrical generators, jet engine start units, tow vehicles, and trucks). Emission factors for GSE were used from several sources and are based on the fuel use or the hours of operation.[120] [121] [122] Most emission factors for NAS Patuxent River GSE were derived from emission measurements conducted by the USN; and when no emission measurements have been made for the specific equipment in the Proposed Action, other data sources were used.[123] [124]

Emissions from additional commuter traffic associated with new personnel were also included in the analysis. It was assumed 67% of the proposed personnel would commute daily from St. Mary's County averaging 40 miles round trip at 40 miles per hour (mph), 12% from Calvert County averaging 60 miles round trip at 40 mph, 5% from Charles County averaging 80 miles round trip at 45 mph, and 16% from other counties averaging 90 miles round trip at 45 mph.[125] The EDMS Program was used to estimate personal vehicle emissions.[126] In addition, emissions from refueling operations were also included in this analysis, using the procedures recommended by the EPA in AP-42 to calculate the emissions.[127]

6.3.3 Environmental Consequences

The General Conformity Rule requires potential emissions from the Proposed Action be determined on an annual basis and compared to the annual *de minimis* levels for those pollutants (or precursors) for which the area is classified as nonattainment. General conformity does not apply to attainment areas (40 CFR Part 51), therefore, no analysis is necessary for portions of the Proposed Action that occur at the Installation since it is located in a county in attainment for all NAAQS. However, since neighboring counties are in nonattainment for one or more criteria pollutants and a portion of the proposed JSF DT below 3,000 feet AGL would occur in these neighboring counties, the JPO has decided to analyze the impacts as if all the emissions associated with proposed JSF DT at NAS Patuxent River would occur

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118 *O'Brien 2002*
119 *AESO 2000-04*
120 *EDMS 2005*
122 *O'Brien 2002*
123 *O'Brien 2002*
124 *EDMS 2005*
125 *Hales 2005b; Hales 2005c*
126 *EDMS 2005*
127 *EPA 1997*

within the MWNAA. The MWNAA is in an O_3 transport region, thus the applicable O_3 *de minimis* thresholds are 50 tpy for VOCs and 100 tpy for NO_x. The *de minimis* value for $PM_{2.5}$ is assumed to be the same *de minimis* threshold for PM_{10} (100 tpy). The total annual emissions from the Proposed Action are presented in Table 6.3.3-1.

Table 6.3.3-1: Estimated Emissions for the Proposed JSF DT at NAS Patuxent River

Test Year	CO tpy (MT/yr)	NO_x tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
Alternative One					
2	120.30 (109.12)	39.97 (36.25)	14.71 (13.34)	1.17 (1.06)	4.72 (4.28)
3	167.19 (151.65)	94.89 (86.07)	32.01 (29.03)	2.94 (2.67)	18.71 (16.97)
4	139.66 (126.68)	94.70 (85.90)	28.86 (26.18)	2.96 (2.68)	18.94 (17.18)
5	118.33 (107.33)	70.43 (63.88)	22.92 (20.79)	2.31 (2.10)	13.31 (12.07)
6	96.71 (87.72)	50.05 (45.40)	16.61 (15.07)	1.65 (1.50)	8.15 (7.39)
7	72.34 (65.61)	22.61 (20.51)	8.92 (8.09)	0.84 (0.76)	2.38 (2.16)
Highest Year[1]	167.19 (151.65) (Test Year 3)	94.89 (86.07) (Test Year 3)	32.01 (29.03) (Test Year 3)	2.96 (2.68) (Test Year 4)	18.94 (17.18) (Test Year 4)
Alternative Two					
2	120.09 (108.93)	38.88 (35.27)	14.69 (13.32)	1.16 (1.05)	4.57 (4.15)
3	166.80 (151.29)	92.86 (84.23)	31.97 (29.00)	2.91 (2.64)	18.45 (16.73)
4	139.38 (126.42)	93.19 (84.53)	28.83 (26.15)	2.94 (2.67)	18.75 (17.01)
5	118.14 (107.16)	69.44 (62.98)	22.90 (20.77)	2.30 (2.09)	13.19 (11.96)
6	96.54 (87.56)	49.17 (44.60)	16.59 (15.05)	1.64 (1.49)	8.04 (7.29)
7	72.34 (65.61)	22.61 (20.51)	8.92 (8.09)	0.84 (0.76)	2.38 (2.16)
Highest Year[1]	166.80 (151.29) (Test Year 3)	93.19 (84.53) (Test Year 4)	31.97 (29.00) (Test Year 3)	2.94 (2.67) (Test Year 4)	18.75 (17.01) (Test Year 4)

Notes: See Appendix E.2 for additional details. Hydrocarbon emissions in the appendix are assumed to be VOCs.
1. The highest year represents the year with the potential to produce the greatest emissions.

Table 6.3.3-2 provides a comparison of estimated emissions for the years during which the greatest emissions are expected to occur to the *de minimis* and regionally significant thresholds. The comparison shows neither Alternative One nor Two for the Proposed Action would require a formal Conformity Determination, because the project-related emission levels would be below the applicable *de minimis* thresholds and the annual project-related emissions do not make up 10% or more of the nonattainment area's total emissions budget. It is reasonable, therefore, to assume no significant air quality impacts would occur from the proposed JSF DT for either alternative at NAS Patuxent River.

Table 6.3.3-2: Proposed JSF DT Peak Year Comparison

Pollutant	Highest Year Emissions[1] tpy	*de minimis* Threshold tpy	Regionally Significant Threshold tpy
Alternative One			
NO_x	94.9	100	7,438
VOC	32.0	50	4,682
PM	18.9	100	93.3
Alternative Two			
NO_x	93.2	100	7,438
VOC	32.0	50	4,682
PM	18.8	100	93.3

Note: 1. The highest year represents the year (Test Years 3 or 4) with the potential to produce the greatest estimated emissions from the Proposed Action.

6.4 NOISE AT NAS PATUXENT RIVER

6.4.1 Affected Environment

For the purposes of this evaluation, aircraft noise impacts are presented as land areas (acres) and populations exposed to aircraft noise above existing levels. Contour lines representing average annual noise baselines for aircraft operations have been generated for 65, 70, 75, 80, and 85 dB DNL. Additional details regarding noise at NAS Patuxent River can be found in Section 3.6 of the *Final Environmental Impact Statement, Increased Flight and Related Operations in the Patuxent River Complex, Patuxent River, Maryland (December 1998)*, and Section 3.5.3 of the *Environmental Assessment, Joint Strike Fighter, United States Navy/United States Marine Corps, Variant Concept Demonstration Phase Flight Test Program (July 2000)*.

Areas potentially affected by noise from the proposed JSF DT include NAS Patuxent River and the nearby populated communities of St. Mary's and Calvert counties, such as Lexington Park and Solomons Island, Maryland, respectively. The number and type of daily aircraft operations directly affect the noise in the vicinity of NAS Patuxent River. About 97% of air operations are conducted between 7:00 a.m. and 10:00 p.m. The highest level of activity occurs at mid-morning with a lull at mid-day and a slight increase in operations in mid-afternoon. Existing noise at NAS Patuxent River is produced by a variety of sources including aircraft flight, ground tests and operations, vehicle operation, maintenance, and construction activities. The effect of these activities produces the ambient condition (baseline, existing environment) at any time and location. Individual noise sources can produce noises of varying duration and intensity. Noise sources may be of a transient nature, such as aircraft flights and vehicular traffic; or stationary traffic, such as construction activities. Test operations within buildings, ground tests, and maintenance activities may also contribute to ambient noise levels. Sonic booms may occur as the result of supersonic flight operations occurring in the CTR. All supersonic flights are coordinated with Air Operations before actual flights and usually include modeling to determine directivity of the potential sonic boom.

Existing baseline DNL contours have been developed based upon the aircraft Fleet mix, number of operations, time of day of operations, and runway and flight track use. Noise modeling for the proposed JSF DT used Alternative 3 in the *Final Environmental Impact Statement (FEIS), Increased Flight and Related Operations in the Patuxent River Complex, Patuxent River, Maryland (December 1998)* as the baseline for noise contours. Contours were produced using NOISEMAP from the inputs contained in the 1998 FEIS to maintain consistency between contours produced with and without the proposed JSF DT.

Figure 6.4.1-1 illustrates the existing baseline noise contour (65, 70, 75, 80, and 85 DNL) for operations at NAS Patuxent River. Table 6.4.1-1 lists the total acres within each of the existing baseline DNL noise contours. Appendix F.3 contains additional details on the noise modeling and analysis conducted for NAS Patuxent River.

Source: Alternative 3, 1998 Increased Flight and Related Operations in The Patuxent River Complex FEIS, and NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

Figure 6.4.1-1: Existing Baseline DNL Noise Contours for NAS Patuxent River

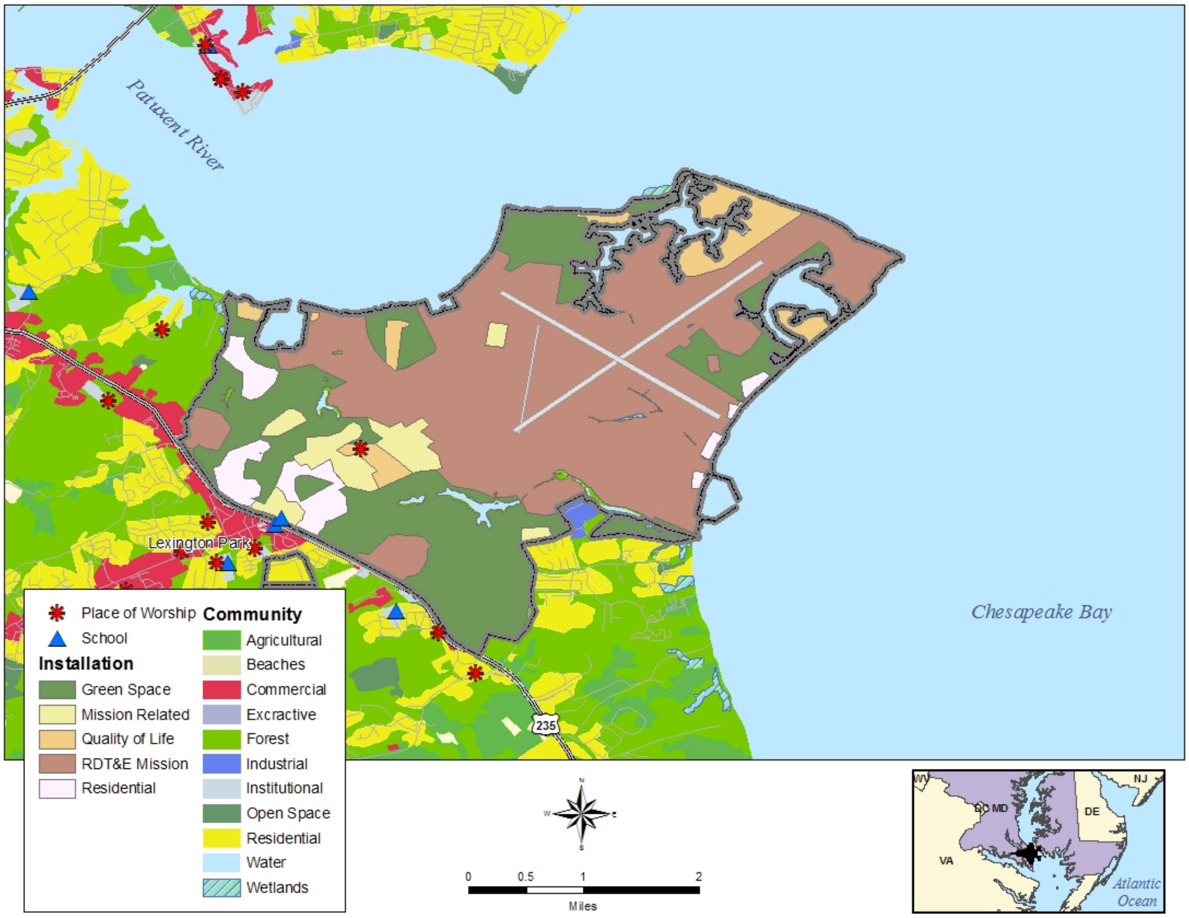
Table 6.4.1-1: Acres within the Existing Baseline DNL Contours at NAS Patuxent River

DNL Contour Bands	Area Acres On-Installation	Area Acres Off-Installation
65–70 dB	1,302	772
70–75 dB	1,750	36
75–80 dB	1,024	0
80–85 dB	569	0
85+ dB	797	0
65 dB and greater (Total)	***5,442***	***808***

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

Analysis of aerial photographs was used to determine the presence of incompatible land uses and populations affected by the existing NAS Patuxent River DNL noise contours. Due to NAS Patuxent

River's proximity to highly-developed areas of Lexington Park, St. Mary's County, and Calvert County Maryland, land use maps were obtained from St. Mary's and Calvert County to provide increased accuracy in the determination of land uses affected by the existing noise contours. Figure 6.4.1-2 illustrates the existing land uses within the vicinity of NAS Patuxent River.



Source: St. Mary's and Calvert County Planning Departments 2003.

Figure 6.4.1-2: Existing Land Use Around NAS Patuxent River

NAS Patuxent River's existing baseline noise contour affects areas in St. Mary's County directly adjacent to Installation property to the south and west (see Figure 6.4.1-1). Land uses on the south side of NAS Patuxent River, between Maryland Highway 235 and the Chesapeake Bay, consist mostly of vacant forested lands intermixed with small pockets of agricultural and residential land uses (see Figure 6.4.1-2). Land uses on the western side of NAS Patuxent River, between Maryland Highways 235 and 236, consist mostly of commercial, industrial, and residential uses. Table 6.4.1-2 presents the number of acres by land use types on-installation that are within the existing baseline noise contours, of which approximately 3,130 acres are of the RDT&E mission, 115 acres of residential development, 216 acres of mission-related, 382 acres of quality of life (such as parks, recreation areas, golf courses, etc.), and 1,449 acres of green space (undeveloped and open) lands. The total 65 dB and greater DNL noise contours off-installation property encompass approximately 12 acres of commercial, 32 acres of industrial, and approximately 347 acres of residential lands. The remaining off-installation areas (approximately 363 acres) currently impacted by the existing 65 dB and greater DNL noise contours are primarily forested and agricultural lands.

Table 6.4.1-2: NAS Patuxent River Existing Baseline Affected Land Uses (Acres)

Land Use Type	DNL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
On-Installation						
Green Space	659	491	215	75	9	1,449
Mission Related	143	54	19	0	0	216
Quality of Life	56	211	104	10	0	381
RDT&E Mission	280	951	647	469	783	3,130
Residential	71	0	27	13	4	115
Off-Installation						
Commercial	12	N/A	N/A	N/A	N/A	12
Industrial	26	6	N/A	N/A	N/A	32
Low Density Residential	5	N/A	N/A	N/A	N/A	5
Medium Density Residential	262	9	N/A	N/A	N/A	271
High Density Residential	69	2	N/A	N/A	N/A	71

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

Table 6.4.1-3 presents the populations affected by the existing noise contour. A count of residential housing units was conducted to determine the population exposure to the existing baseline noise contour at NAS Patuxent River. Residential housing units affected by the existing baseline 65 dB DNL noise contour were then assigned a median population density. In the case of St. Mary's County, Maryland, the average housing density is 2.72 persons per household.[128]

Table 6.4.1-3: Populations within the Existing Baseline DNL Contours at NAS Patuxent River

DNL Contour Bands	Estimated Housing		Estimated Population	
	On-Installation	Off-Installation	On-Installation	Off- Installation
65–70 dB	290	1,090	1,100	2,960
70–75 dB	0	0	0	0
75–80 dB	10	0	40	0
80–85 dB	10	0	40	0
85+ dB	0	0	0	0
65 dB and greater (Total)	***310***	***1,090***	***1,180***	***2,960***

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).
Notes: Housing and population rounded to nearest tenth
Assumes U.S. Census 2000, 2.72 persons as average housing density off-Installation
Assumes U.S. Census 2000, 3.8 persons as average housing density on-Installation

6.4.2 Environmental Consequences

For the purposes of this evaluation, aircraft noise impacts are presented as land areas (acres) and populations exposed to aircraft noise above existing baseline levels. This section discusses the physical characteristics of noise from the Proposed Action. Contour lines representing average annual noise conditions for aircraft operations have been generated for 65, 70, 75, 80, and 85 dB DNL.

The Proposed Action was modeled for the largest predicted year of activity, Test Year 4 under Alternative One, as reflected in Table 6.4.2-1.

[128] *Census Bureau 2000. St. Mary's County Maryland.*

Table 6.4.2-1: Maximum Proposed Year at NAS Patuxent River

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
4	STOVL & CTOL FQ, STOVL & CTOL Performance, CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	796	1,358	Same as Test Year 3	947	1,894	1,743	3,252

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).
Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

The proposed F-35 test activities reflected in Table 6.4.2-1 have been added to the Fleet mix within the existing baseline noise contours at NAS Patuxent River. Conversations with JSF V&T Team and NAS Patuxent River operational personnel confirmed proposed support aircraft are currently accounted for in the existing Fleet mix.[129] These aircraft would be logging in the same amount of air time (flights/flight hours) with or without the proposed JSF DT Program. Therefore, support aircraft for the proposed JSF DT Program have not been added to the overall noise model profile.

The major modeling input variables for this analysis are the number of aircraft operations, specifically the addition of proposed F-35 DT activities to the existing NAS Patuxent River Fleet mix. All other NOISEMAP input variables (such as runway utilization, time of day, and stage length) are constant and consistent with the existing baselines. Further information regarding the noise modeling, analysis, and rationales follows and is provided in Appendix F.3.

As discussed in Section 6.4.1, proposed F-35 DT activity levels and Fleet mix conditions at NAS Patuxent River have been based on Alternative 3 of the *Final Environmental Impact Statement, Increased Flight and Related Operations in the Patuxent River Complex, Patuxent River, Maryland (December 1998)*. Alternative 3 represents the maximum operational levels anticipated at NAS Patuxent River. Additional modeling assumptions have also been made regarding performance profiles and AB use for the F-35, as follows:

- Legacy Aircraft Substituted with F-35 Aircraft—An equal number of legacy aircraft were removed and substituted with F-35 aircraft in the model, so as not to exceed the total number of operations modeled in the existing baselines of Alternative 3. The existing Fleet mix contained approximately 25.5 daily operations of similar legacy aircraft. Approximately 4,598 annual, proposed F-35 DT operations (~12.6 daily) have been added to the baseline Fleet mix. This addition was performed, to reflect the anticipated Fleet mix during the F-35 DT, based on discussions with NAS Patuxent River air operations personnel, the JSF V&T Team, and Naval Air Systems Command (NAVAIR) Ranges Sustainability Office representatives.[130]

[129] *Briggs 2005, Maack 2004 and 2005, Nantz 2005, and Wiseman 2005*
[130] *Briggs 2005, Maack, Andrew 2004–2005, Nantz 2005, Gallant 2005, and Willis 2005*

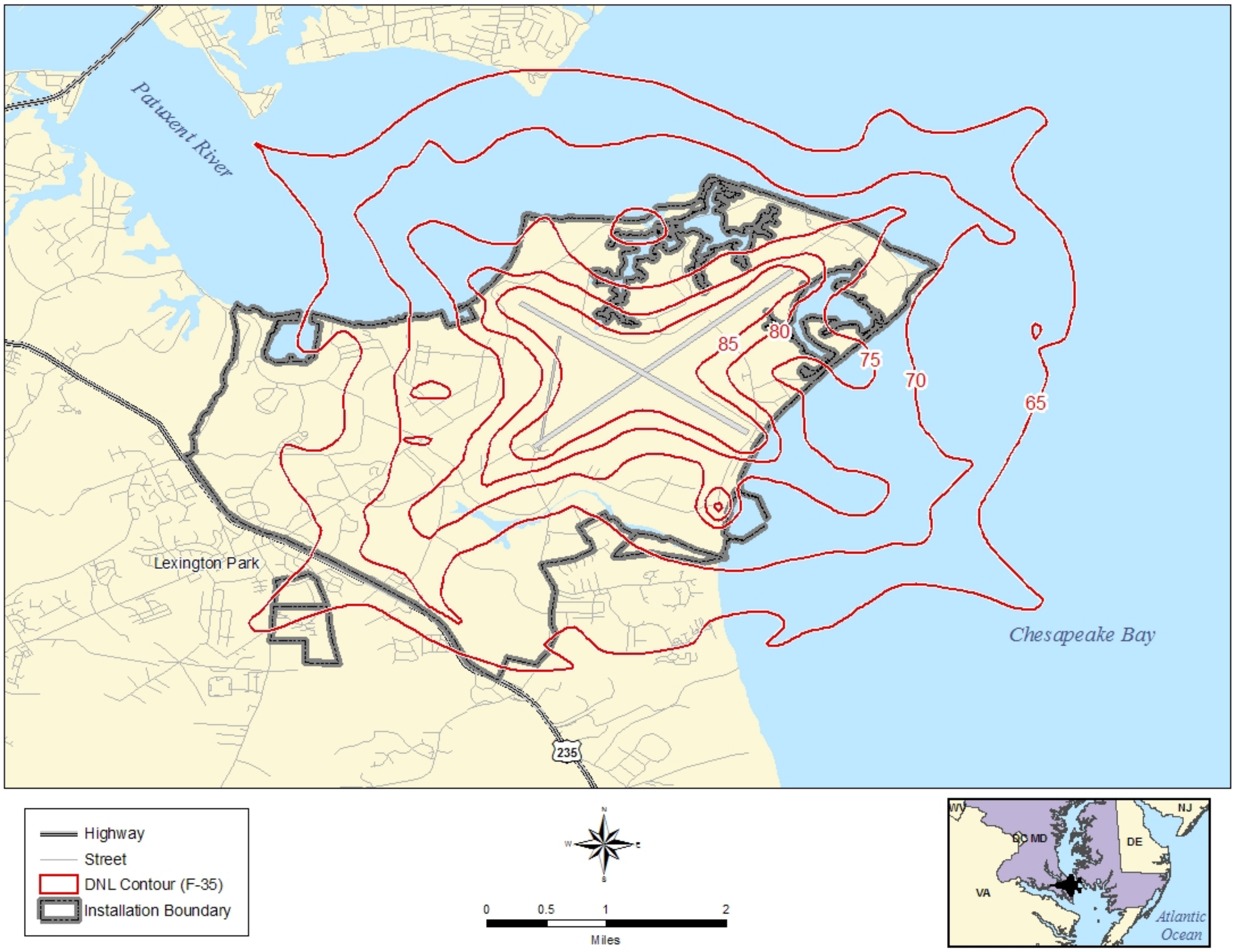
- Proposed F-35 VTOL DT Operations—The same flight tracks as those currently used by similar legacy aircraft in the existing baseline would be used by the F-35. All proposed F-35 VTOL DT activities would originate from the STOVL pad located in the middle of the northwest side of the Runway 6/24 and Runway 14/32 intersection. It has been assumed once aircraft rotation is achieved (forward flight), then VTOL departures would merge with existing flight tracks. NOISEMAP does not have the ability to model VTOL operations, therefore adjustments were required to best simulate such an activity. Proposed F-35 VTOL DT operations were modeled as very slow [~10 knots (kts)] with steep [150 feet AGL going four feet down track] departures and arrivals.

- F-35 Flight Profiles and AB Departures[131]—A predominant component of aviation noise exposure is climb and descent rates from contributing aircraft. Aircraft climb and descent rates can be influenced by aircraft weight, thrust settings (including AB departures), climb settings, and other parameters. When modeling noise impacts in NOISEMAP, climb and descent rates and the factors used to determine those rates are typically contained in performance profiles for each specific aircraft modeled. Lockheed Martin Flight Simulation Group provided three distinct performance profiles for the F-35 aircraft: Light Weight Profile (used for the departures with adequate fuel loads needed for proposed DT activities and little to no stores/expendables anticipated); and Medium and Heavy Weight Profiles (varying capacities of fuel, moderate to full stores/expendables loading, and the use of AB departures). Discussions with JSF V&T Team and mission/operational planning personnel at NAS Patuxent River indicated proposed JSF DT activities for Test Year 4 would be a Light Weight Profile. Therefore, the need for AB departures would be no greater than 10% of the total proposed flights.[132]

Figure 6.4.2-1 illustrates noise contours at NAS Patuxent River with the Proposed Action (both alternatives).

131 *AB is an increased engine thrust mode beyond typical thrust settings used by higher performance aircraft (predominantly fighter and trainer aircraft) in short durations to achieve higher speeds.*

132 *Briggs 2005, Maack, Andrew 2004–2005, Nantz 2005, and Wiseman 2005*

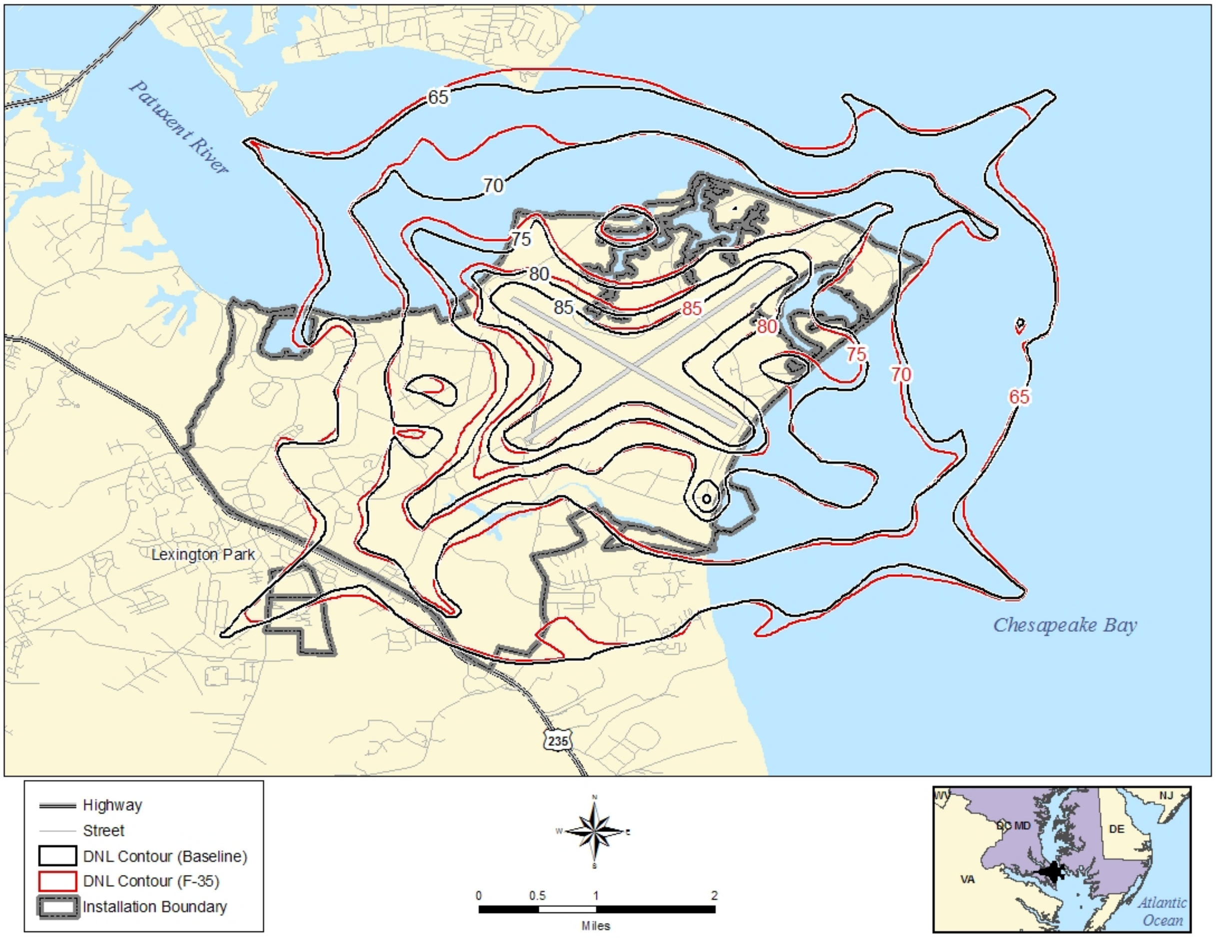


Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

Figure 6.4.2-1: DNL Noise Contours with the Proposed JSF DT at NAS Patuxent River

The comparison between the existing NAS Patuxent River noise contours and the Proposed Action alternatives is illustrated is Figure 6.4.2-2. As illustrated, the noise contours are very similar to the existing noise contours shown in Figure 6.4.1-1. One exception is associated with the areas in southern Calvert County at the mouth of the Patuxent River near Drum Point, which would be impacted by the Proposed Action. This is discussed further at the end of this section.

Table 6.4.2-2 summarizes the total acres within the Proposed Action noise contour (the 65 dB DNL and greater noise contour) with respect to the existing baseline. There would be a slight increase of 36 acres from approximately 5,442 to 5,478 (or less than 1.0%) of Installation property within the 65 dB and greater DNL noise contours. The total of 65 dB and greater DNL noise contours would encompass approximately 774 acres of land outside of NAS Patuxent River's boundary; a reduction of 4% or approximately 34 acres over the existing baseline. Similar to the existing baseline and illustrated in Figure 6.4.1-2, land uses on the south side of NAS Patuxent River, between Maryland Highway 235 and the Chesapeake Bay, consist mostly of vacant forested lands intermixed with small pockets of agricultural and residential land uses. Land uses on the western side of NAS Patuxent River, near Maryland Highways 235 and 236, consist mostly of commercial, industrial, and residential uses.



Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

Figure 6.4.2-2: Proposed JSF DT DNL Noise Contour Comparison at NAS Patuxent River

Table 6.4.2-2: Acres within the Existing Baseline and Proposed JSF DT DNL Contours at NAS Patuxent River

DNL Contour Bands	Existing Area Acres		Proposed JSF DT Area Acres		Change Area Acres			
	On- Installation	Off-Installation	On-Installation	Off-Installation	On-Installation		Off-Installation	
65–70 dB	1,302	772	1,235	752	-67	-5%	-20	-3%
70–75 dB	1,750	36	1,704	22	-46	-3%	-14	-39%
75–80 dB	1,024	0	1,044	0	20	2%	0	0
80–85 dB	569	0	621	0	52	9%	0	0
85+ dB	797	0	874	0	77	10%	0	0
65 dB and greater (Total)	***5,442***	***808***	***5,478***	***774***	***36***	***1%***	***-34***	***-4%***

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

Note: This is reflective of both Alternatives One and Two.

Table 6.4.2-3 presents the number of acres by land use type within the Installation boundary that are potentially affected by the Proposed Action, as well as reflecting the changes anticipated when compared to the existing baseline. Acres of residential development lands on-installation would increase by 14 acres (12.2%) from 115 to 129. Acres of RDT&E mission lands would increase by approximately 10 acres (less than 1.0%) from 3,130 to 3,140 acres. Acres of mission-related lands would increase by 4 acres (1.9%) from 216 to 220 acres, similarly acres of green space lands would increase by five acres (less than 1.0%) from 1,449 to 1,454 acres. Acres of quality of life lands would increase by 1 acre (less than 1%) from 381 to 382 acres.

Table 6.4.2-3: Land Uses (Acres) Potentially Affected by the Proposed JSF DT within NAS Patuxent River's Installation Boundary

Land Use Type	Existing DNL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Green Space	659	491	215	75	9	1,449
Mission Related	143	54	19	0	0	216
Quality of Life	56	211	104	10	0	381
RDT&E Mission	280	951	647	469	783	3,130
Residential	71	0	27	13	4	115
Land Use Type	**With Proposed JSF DT DNL Contour Bands**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Green Space	639	472	250	85	8	1,454
Mission Related	117	79	21	3	0	220
Quality of Life	53	215	103	11	0	382
RDT&E Mission	254	888	631	507	860	3,140
Residential	85	1	26	13	4	129
Land Use Type	**Change**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Green Space	-20	-19	35	10	-1	5
Mission Related	-26	25	2	3	0	4
Quality of Life	-3	4	-1	1	0	1
RDT&E Mission	-26	-63	-16	38	77	10
Residential	14	1	-1	0	0	14

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).
Note: This is reflective of both Alternatives One and Two

Table 6.4.2-4 presents the number of acres by land use type outside of the Installation boundary that would be potentially affected by the Proposed Action, as well as reflecting the changes anticipated when compared to the existing baseline. Acres of medium-density residential lands would decrease by 43 acres (15.9%) from 271 to 228 acres, while acres of high-density residential and commercial lands would increase by 1 acre (1.4%) from 71 to 72 acres, and 4 acres (33%) from 12 to 16 acres, respectively. Both industrial and low density residential lands would remain the same as the existing baseline.

Table 6.4.2-4: Land Uses (Acres) Potentially Affected by Proposed JSF DT Outside of NAS Patuxent River's Installation Boundary

Land Use Type	Existing DNL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Commercial	12	N/A	N/A	N/A	N/A	12
Industrial	26	6	N/A	N/A	N/A	32
Low-Density Residential	5	N/A	N/A	N/A	N/A	5
Medium-Density Residential	262	9	N/A	N/A	N/A	271
High-Density Residential	69	2	N/A	N/A	N/A	71
Land Use Type	**With Proposed JSF DT DNL Contour Bands**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Commercial	16	N/A	N/A	N/A	N/A	16
Industrial	28	4	N/A	N/A	N/A	32
Low-Density Residential	5	N/A	N/A	N/A	N/A	5
Medium-Density Residential	224	4	N/A	N/A	N/A	228
High-Density Residential	72	0	N/A	N/A	N/A	72
Land Use Type	**Change**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Commercial	4	N/A	N/A	N/A	N/A	4
Industrial	2	-2	N/A	N/A	N/A	0
Low-Density Residential	0	N/A	N/A	N/A	N/A	0
Medium-Density Residential	-38	-5	N/A	N/A	N/A	-43
High-Density Residential	3	-2	N/A	N/A	N/A	1

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).
Note: This is reflective of both Alternatives One and Two.

Table 6.4.2-5 presents the populations potentially affected by the existing and proposed JSF DT noise contours. A count of residential housing units was conducted to determine the population exposure to noise. Residential housing units affected by the 65 dB DNL contour were then assigned the median population density. In the case of St. Mary's County, Maryland, the average housing density is 2.72 persons per household.[133]

Potential housing and population impacts are expected to decrease outside of NAS Patuxent River's boundary as a result of the Proposed Action. Potential impacts to housing and population resources, respectively, would decrease by 50 households (4.5%) from 1,090 to 1,040 households; and 130 persons (4.4%) from 2,960 to 2,830 persons. It is anticipated that both housing and population potential impacts within NAS Patuxent River's boundary would remain the same under both the existing baseline and the Proposed Action.

[133] *Census Bureau 2000. St. Mary's County Maryland*

Table 6.4.2-5: Housing and Populations Potentially Affected by Proposed JSF DT at NAS Patuxent River

DNL Contour Bands	Estimated Housing Existing Baseline		Estimated Housing Proposed JSF DT	
	On-Installation	Off-Installation	On-Installation	Off-Installation
65–70 dB	290	1,090	290	1,040
70–75 dB	0	0	0	0
75–80 dB	10	0	10	0
80–85 dB	10	0	10	0
85+ dB	0	0	0	0
65 dB and greater (Total)	***310***	***1.090***	***310***	***1,040***
DNL Contour Bands	**Estimated Population Existing Baseline**		**Estimated Population Proposed JSF DT**	
	On-Installation	**Off-Installation**	**On-Installation**	**Off-Installation**
65–70 dB	1,100	2,960	1,100	2,830
70–75 dB	0	0	0	0
75–80 dB	40	0	40	0
80–85 dB	40	0	40	0
85+ dB	0	0	0	0
65 dB and greater (Total)	***1,180***	***2,960***	***1,180***	***2,830***

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).
Notes: Housing and population rounded to nearest tenth.
Assumes 2000 census, 2.72 persons as average housing density off Installation.
Assumes 2000 census, 3.8 persons as average housing density on-Installation.
This is reflective of both Alternatives One and Two.

Table 6.4.2-6 reflects the results of assessing potential impacts to noise sensitive receptors (e.g., schools, hospitals, historic land marks, and places of worship). The analysis identifies locations where a significant increase in aircraft noise exposure (1.5 dB or greater increases within the 65 dB DNL noise contour or a 3.0 dB increase within the 60 dB DNL contour) would occur when comparing the Proposed Action to the baseline existing environment. None of the non-residential noise sensitive receptors identified in Table 6.4.2-6 would experience a 1.5 dB or 3.0 dB increase in noise as a result of the Proposed Action. There is an area, however, in southern Calvert County at the mouth of the Patuxent River near Drum Point, which would experience a 1.5 dB increase within the 65 dB DNL contour by the Proposed Action. The land use type impacted, as previously illustrated in Figure 6.4.1-2, is zoned as open space by Calvert County, which would be compatible with a 1.5 dB increase. One structure located in this area is a club house for the Drum Point Residential Development (based on a real property search with the Calvert County Department of Taxation). The club house is not used as a residence and use occurs on intermittent weekends and evenings, primarily during summer months. The club house is unoccupied during other periods (the day, week, and year). This type of use is considered compatible with aviation noise, especially considering proposed JSF DT activities would occur on weekdays predominantly during daylight hours. Any potential impact would not be expected to occur during primary hours of club house use, further ensuring that this property would not be adversely impacted by a 1.5 dB increase. As previously stated, there would be no discernable residential or incompatible land uses located within either the existing baseline or Proposed Action 65 dB DNL noise contour. Therefore, no significant noise impacts would be anticipated for the proposed JSF DT (under either alternative).

Table 6.4.2-6: NAS Patuxent River Comparison Non-Residential Noise Sensitive Receptors

Name	Type	Existing (dB)	With Proposed JSF DT (dB)	Change (dB)
Appeal School	School	54.7	54.5	-0.2
Calvary Church	Place of Worship	54.9	55.5	0.6
Calvert Library, Southern Branch	Library	53.7	53.5	-0.2
Carver Elementary	School	53.2	52.3	-0.9
Carver School	School	64.8	64.7	-0.1
Cecil's Mill Historic District	Historic	49.4	48.6	-0.8
Church of Christ	Place of Worship	55.8	54.9	-0.9
Church of God	Place of Worship	44.9	45.4	0.5
Church of the Ascension	Place of Worship	55.9	57	1.1
Cove Point Lighthouse	Historic	52.4	52.2	-0.2
Drum Point Lighthouse	Historic	52.4	52.6	0.2
Eastern Church	Place of Worship	48.3	48.6	0.3
Ebenezer Church	Place of Worship	48.2	48.3	0.1
Esperanza School	School	46.9	47.2	0.3
Felix Johnson Education Center	School	61.1	62.5	1.4
First Church of Christ Scientist	Place of Worship	44	44.3	0.3
First Pentecostal Church	Place of Worship	56.3	57.7	1.4
First Presbyterian Church	Place of Worship	47.8	47.9	0.1
Frank Knox School	School	61.5	62.9	1.4
Gate of Heaven Church	Place of Worship	51.6	49.9	-1.7
Grace Bible Baptist Church	Place of Worship	61.1	62.1	1.0
Great Mills High School	School	51	50.7	-0.3
Green Holly School	School	50.4	50.6	0.2
Greenview Knolls School	School	49.1	49.3	0.2
Hollywood Baptist Church	Place of Worship	47.3	47.1	-0.2
Hollywood Church of the Nazarene	Place of Worship	40.2	39.4	-0.8
Hollywood School	School	40	39.3	-0.7
Holy Face Church	Place of Worship	47.7	46.9	-0.8
Immaculate Heart of Mary Church	Place of Worship	51.6	52	0.4
J.C. Lore Oyster House	Historic	57	57.1	0.1
Joy Chapel Cemetery	Cemetery	43.6	43	-0.6
Lexington Park Elementary	School	59.3	60.3	1.0
Little Flower School	School	48.3	47.4	-0.9
Middleham Chapel	Place of Worship	46.4	46.3	-0.1
Morgan Hill Farm	Historic	42	41.9	-0.1
Olivet School	School	52.4	52.3	-0.1
Olivet United Methodist Church	Place of Worship	49.6	50.6	1.0
Our Lady Star of the Sea School	School	56.2	56.3	0.1
Park Hall School	School	56.4	55	-1.4
Patterson Archeological District	Historic	43.6	43.4	-0.2

Table 6.4.2-5: NAS Patuxent River Comparison Non-Residential Noise Sensitive Receptors (Continued)

Name	Type	Existing (dB)	With Proposed JSF DT (dB)	Change (dB)
Piney Point Elementary School	School	42.8	41.4	-1.4
Preston-on-the-Patuxent	Historic	42	41.9	-0.1
Saint Andrews Church	Place of Worship	43	42.8	-0.2
Saint Cecelias Catholic Church	Place of Worship	44.7	43.1	-1.6
Saint Georges Church	Place of Worship	45.4	44.1	-1.3
Saint Johns Church	Place of Worship	40.1	39.9	-0.2
Saint Lukes Church	Place of Worship	45.8	45.6	-0.2
Saint Marys College	School	45.6	43.9	-1.7
Saint Nicholas Church	Place of Worship	68.4	68.7	0.3
Saint Pauls Church	Place of Worship	55	54.8	-0.2
Saint Peters Episcopal Church	Place of Worship	59.6	59.8	0.2
Saysf Church	Place of Worship	57.4	57.5	0.1
Solomons United Methodist Church	Place of Worship	59.1	59.2	0.1
Sotterley	Historic	52.5	52	-0.5
Southern School	School	45.1	44.9	-0.2
Spring Ridge School	School	51.3	49.8	-1.5
St. Richard's Manor	Historic	56.6	56.7	0.1
Town Creek School	School	50.1	50.2	0.1
Trinity Church	Place of Worship	59	59.9	0.9
Trinity Episcopal Church	Place of Worship	47.3	45.6	-1.7
William B. Tennison	Historic	53.2	53.2	0.0
Zion Church	Place of Worship	49	49	0.0

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

6.5 BIOLOGICAL/NATURAL RESOURCES AT NAS PATUXENT RIVER

6.5.1 Affected Environment

NAS Patuxent River consists of terrestrial, coastal, and near shore habitats, while the CTR includes terrestrial, coastal, near shore and marine environments. Sections 3.11 and 3.12 of the *Final Environmental Impact Statement* (*FEIS) for Increased Flights and Related Operations in the Patuxent River Complex, Patuxent River, Maryland* (*December 1998)*, and Sections 3.8 and 3.9 of the *NAS Patuxent River Integrated Natural Resources Management Plan (INRMP) (February 2002)* provide additional details regarding biological resources at NAS Patuxent River, including threatened and endangered species. The following is a brief synopsis of the existing biological resources at NAS Patuxent River and the CTR. All existing biological resources information is derived from the FEIS and the INRMP unless otherwise noted.

6.5.1.1 Terrestrial Flora and Fauna

NAS Patuxent River consists of various vegetative habitats, including open fields, shrub communities, marshes, various forests, agricultural fields, wetlands, and submerged, aquatic vegetation. Approximately 1,649 acres of NAS Patuxent River consists of deciduous, coniferous, and mixed forests. Agricultural land comprises 585 acres and approximately 889 acres of scrub/shrub habitat exists on NAS Patuxent River. About 818 acres of NAS Patuxent River is open water or wetland. Outlying Landing Field (OLF) Webster Field consists of habitat types similar to those which exist at NAS Patuxent River; similar species of wildlife occur there. Runway and ground management plans discourage birds and deer from approaching runways.

The CTR is a testing area whose airspace covers approximately 1,800 square miles over portions of southern Maryland, Maryland's eastern shore of the Chesapeake Bay, and the northern neck area of Virginia. Fifty percent (50%) of the area is over Chesapeake Bay waters, while the other 50% is over land. The CTR consists of 178,500 acres of forested land and 64,000 acres of wetlands.

Information about plants and animals is provided in this subsection. The discussion on plants is to provide context for the animals that may be potentially affected by the Proposed Action. Table 6.5.1.1-1 is a list of threatened and endangered species at NAS Patuxent River as discussed in further detail within this subsection.

Table 6.5.1.1-1: Threatened and Endangered Species on NAS Patuxent River

Common Name ***Scientific Name***	**Federal Status**	**State Status**
Mammals		
Humpback whale *Megaptera novaeangliae*	E	E
North Atlantic Right Whale *Balaena glacialis*	E	E
West Indian Manatee *Tichechus manatus*	E	E
Small-footed Myotis *Myotis subulatus*	C	I
Birds		
Bald Eagle *Haliaeetus leucocephalus*	T	T
Piping Plover[134] *Charadrius melodus*	T	
Black Skimmer *Rynchops niger*		E
Northern Goshawk *Accipiter gentillis*		E
Royal Tern *Sterna maxima*		E
Peregrine Falcon *Falco peregrinus*		E
Short-eared Owl *Asio flammeus*		I
Olive-sided Flycatcher *Contopus borealis*		E
Alder Flycatcher *Empidonax alnorum*		I

Legend: E=Endangered, T=Threatened, C=Candidate, I=In Need of Conservation, X= Extirpated, N=Rare, but not Listed

[134] *Piping plover is documented by a single migratory record dating from 1960*

Table 6.5.1.1-1: Threatened and Endangered Species on NAS Patuxent River (Continued)

Common Name ***Scientific Name***	**Federal Status**	**State Status**
Birds (Continued)		
Sedge Wren *Cistothorus platensis*		T
Loggerhead Shrike *Lanius ludovicianus*		E
Nashville Warbler *Vermivora ruficapilla*		I
Blackburnian Warbler *Dendroica fusca*		T
Mourning Warbler *Oporornis philadelphia*		E
Henslow Sparrow *Ammodramus henslowii*		T
Lark Sparrow *Chondestes grammacus*		X
Reptiles and Amphibians		
Leatherback Sea Turtle *Dermchelys coriacea*	E	E
Kemp's Ridley Sea Turtle *Lepidochelys kempii*	E	E
Loggerhead Sea Turtle[135] *Caretta caretta*	T	T
Eastern Spiny Softshell *Apalone s. spinifera*		I
Eastern Narrowmouth Toad *Gastrophryne carolinensis*		E
Fish		
Shortnose Sturgeon *Acipenser brevirostrum*	E	
Invertebrates		
Northeastern Beach Tiger Beetle *Cicindela dorsalis dorsalis*	T	E
Puritan Tiger Beetle *Cicindela puritan*	T	E
Frosted Elfin *Incisalia i.irus*		E
Plants		
Curtiss' Three-awn *Aristida curtissii*		N
Whorled Milkweed *Asclepias verticillata*		N
Wild False Indigo *Baptisia australis*		T

Legend: E=Endangered, T=Threatened, C=Candidate, I=In Need of Conservation, X= Extirpated, N=Rare, but not Listed

135 *Loggerhead sea turtles have never been observed alive on NAS Patuxent River. Occurrence is based on carcass records from installation beach area.*

Table 6.5.1.1-1: Threatened and Endangered Species on NAS Patuxent River (Continued)

Common Name ***Scientific Name***	**Federal Status**	**State Status**
Plants (Continued)		
Twining Bartonia *Bartonia paniculata*		N
Fescue Sedge *Carex brevior*		N
American Chestnut *Castanea dentata*		N
Pretty Dodder *Cuscuta indecora*		N
Lancaster's Sedge *Cyperus lancastriensis*		N
Needle-leaf Witchgrass *Dichanthelium aciculare*		N
Bristling Panicgrass *Dichanthelium leucothrix*		N
Engelmann Spikerush *Eleocharis engelmannii*		N
Pale Spikerush *Eleocharis flavescens*		N
Twisted Spikerush *Eleocharis tortilis*		N
Tobaccoweed *Elephantopus tomentosus*		E
Bent-awn Plumegrass *Erianthus contortus*		N
White Thoroughwort *Eupatorium album*		N
Pumpkin Ash *Fraxinus profunda*		N
Downy Milk Pea *Galactia volubilis*		N
Clasping-leaved St. John's-wort *Hypericum gymnanthum*		E
Short-fruited Ash *Juncus brachycarpus*		N
Beach Pinweed *Lechea maritima*		N
Long-awned diplachne *Leptochloa fascicularis*		N
Downy Bushclover *Lespedeza stuevei*		N
Sandplain Flax *Linum intercursum*		T
Angular-fruited Milkvine *Matelea gonocarpos*		N
Creeping Cucumber *Melothria pendula*		E
Whorled Water-milfoil *Myriophyllum verticillatum*		N

Legend: E=Endangered, T=Threatened, C=Candidate, I=In Need of Conservation, X= Extirpated, N=Rare, but not Listed

Table 6.5.1.1-1: Threatened and Endangered Species on NAS Patuxent River (Continued)

Common Name ***Scientific Name***	**Federal Status**	**State Status**
Plants (Continued)		
Roughish Panicgrass *Panicum leucothrix*		N
Purple Passionflower *Passiflora incarnata*		N
Seabeach Knotweed *Polygonum glaucum*		E
Shumard's Oak *Quercus shumardii*		T
Willow-Pagoda Oak hybrid *Quercus x leudoviciana*		N
Grass-like Beakrush *Rhynchospora globularis*		E
Clustered Beakrush *Rhynchospora glomerata*		N
Swamp Dock *Rumex floridanus*		E
Shortbeard Plumegrass *Saccharum brevibarbe var. contortum*		T
Papillose Nutrush *Scleria pauciflora*		N
Slender Sea-puslane *Sesuvium maritimum*		E
Branching Bur-reed *Sparganium androcladum*		N
Swamp-oats *Sphenopholis pensylvanica*		T

Sources: INRMP, NAS Patuxent River, Feb 2002.
GIS database for plant species provided by Jackie Smith, Natural Resources Specialist, NAS Patuxent River, October 2005.
Legend: E=Endangered, T=Threatened, C=Candidate, I=In Need of Conservation, X= Extirpated, N=Rare, but not Listed

<u>Plant species</u>

Although there are no Federally-listed threatened or endangered plant species known to occur at NAS Patuxent River, nine species are listed as rare by the State of Maryland: wild false indigo (*Baptisia australis*), seaside knotweed (*Polygonum glaucum Nutt*), grass-like beakrush (*Rhynchospora globularis*), swamp dock (*Rumex floridanus*), swamp-oats (*Sphenopholis pensylvanica*), tobaccoweed (*Elephantopus tomentosus*), clasping-leaved St. Johns-wort (*Hypericum gymnathum*), sandplain flax (*Linum intercursum*), and creeping cucumber (*Melothria pendula*).

Terrestrial plant communities underlying the CTR include forests (about 31% of total land area), agricultural fields, marshes or wetlands (about 10 to 12%), old fields, aquatic vegetation, and scrub/shrub habitats. While plant communities within the CTR contain a number of plant species considered rare, threatened, or endangered within the States of Delaware, Maryland, and Virginia, only two Federally-listed threatened species occur in the counties below the CTR: the swamp pink (*Helonias bullata*), which occurs in wetlands in Dorchester County, Maryland; and the sensitive joint-vetch (*Aeschynomene virginica*), which is found in intertidal zones in Somerset and Wicomico Counties in Maryland.

There are thirteen species of submerged aquatic vegetation (SAV) commonly found in the Chesapeake Bay or nearby rivers.[136]

Bird species

NAS Patuxent River is located within the Atlantic Flyway, an area along the east coast of the U.S. used by birds for north and south migrations. This location results in greatly increased numbers of birds at NAS Patuxent River during the migratory season. Over 285 bird species have been observed at NAS Patuxent River. Habitats on the Installation are managed to maintain bird species diversity, and to minimize BASH to aircraft.

The bald eagle (*Haliaeetus leucocephalus*), listed as threatened under the ESA of 1973, has nested within two miles of NAS Patuxent River, though no nests have been detected on the Installation. Ospreys have been observed nesting at NAS Patuxent River and within the CTR. The state-listed rare least tern (*Sterna antillarum*) (inland populations are Federally-listed), a colony nesting bird which nests from late spring through the summer, has used the Installation as the last known natural nesting colony on the western shore of the Chesapeake Bay, though no least terns have been observed nesting on NAS Patuxent River for several years.

The CTR covers a much larger area than NAS Patuxent River and is also located within the Atlantic Flyway. Approximately 40 species of waterfowl use the portion of the Atlantic Flyway that overlaps the CTR and NAS Patuxent River. The Martin and Blackwater NW are located beneath the CTR's airspace R-4006. Several wildlife management areas operated by the Maryland Department of Natural Resources also lie within the CTR. The NWRs are noted for their large flocks of overwintering waterfowl.

Nine species of wading birds nest on the islands of the Chesapeake Bay. Furthermore, as part of a cooperative agreement with the USFWS and the Maryland Department of Natural Resources, the northern part of Bloodsworth Island has been established as a no fire area. The peregrine falcon (*Falco peregrinus*), proposed for delisting under the ESA in 1999 but still protected under the MBTA, has been known to inhabit the Chesapeake Bay during spring and fall migration. In 1997, 27 pairs were confirmed in the Chesapeake Bay during nesting season which starts in late March and runs until June.[137]

Mammal Species

Mammal species are numerous at NAS Patuxent River, but no Federally- or state-listed species are known to inhabit the Installation. Approximately 30 species of mammals are known to exist at NAS Patuxent River. Twenty-three are considered common mammal species. The beaver and white-tailed deer populations are both managed to maintain these populations below a nuisance or DASH level.

Reptile and Amphibian Species

Twenty-one amphibian and 33 reptilian species have been confirmed to occur at NAS Patuxent River. Of these, two are abundant, 21 are common, and 31 are uncommon. Sea turtles occur in the waters surrounding NAS Patuxent River and are discussed in Section 6.5.1.2 of this document.

[136] *USEPA 1995*
[137] *USFWS 2004*

<u>*Other Species of Concern*</u>

Two species of rare beetle are known to exist within the vicinity of the Installation. The northeastern beach tiger beetle (*Cicindela d. dorsalis*), a Federally-listed threatened species, occurs at ten locations in Virginia and Maryland, including four sites in Calvert County, and sites in Somerset and St. Mary's counties. One of the Calvert County locations is the beach across from NAS Patuxent River. While the beetle has been sighted twice at NAS Patuxent River (once slightly east of Cedar Point and once at Fishing Point), it is not known to breed on the Installation. These beetles are believed to have originated from a location across the Patuxent River; the habitat of NAS Patuxent River is not typically conducive to supporting this particular subspecies of tiger beetle. The beetle is very susceptible to beach activities that disturb or compact the sand.

The puritan tiger beetle (*Cicindela puritana*) is also Federally-listed as a threatened species. Most populations occur on high, gradually eroding earthen-cliff faces and beaches. There are about ten locations in Calvert County that are known habitat for this species. While the beetle may be present at NAS Patuxent River, it does not breed on the Installation. The loss of beaches below the cliffs to erosion and development, as well as the modification of the cliffs, are the principal causes of endangerment.[138]

6.5.1.2 Marine and Freshwater Fauna

NAS Patuxent River encompasses aquatic environments that can support a wide variety of fish species. On the Installation there are six freshwater ponds, small perennial and intermittent streams, tidal creeks and associated wetlands, freshwater wetlands, and frontage directly on the Chesapeake Bay and the Patuxent River. Salinity levels vary considerably over these water bodies, creating a number of distinct habitats, each with its own assemblage of fish, shellfish, and mollusk species. The information in the remainder of this Section is derived from the NAS Patuxent River Final INRMP (2002).

Based on stranding and sighting data, Cetacea (whales, dolphins, and porpoises) and Pinnipedia (seals and sea lions) are considered occasional visitors to the Chesapeake Bay. Table 6.5.1.2-1 lists the marine mammals that may be present in the Bay. During certain times of the year (May through October), humpback whales and harbor porpoises visit regularly, as do bottlenose dolphins. In addition to the protections from takings that marine mammals receive under the MMPA, three marine mammal species that may be present in the Chesapeake Bay are Federally-listed as endangered under the ESA: the fin whale (*Balaenoptera physalus*), the humpback whale (*Megaptera novaeangliae*), and the West Indian manatee (*Trichechus manatus*). A single West Indian manatee has been documented in the Chesapeake Bay. Marine mammal numbers peak in June, consisting primarily of dolphins. While dolphins may be present in the Bay from April through November or December, they are most common from May through October. Whales are most common from December through February or March, and seals are becoming increasingly common during the winter months. The absolute number and diversity of animals in the Bay increases during the summer months.

[138] *DoN 1998*

Table 6.5.1.2-1: Marine Mammals Potentially Present in the Chesapeake Bay

Common Name	Latin Name	Legal Protection	Most Commonly Sighted
Bottlenose dolphin	*Tursiops truncatus*	MMPA (depleted)	May to October
Harbor porpoise	*Phocoena phocoena*	MMPA, proposed for listing under ESA	May to October
Minke whale	*Balaenoptera acutorostrata*	MMPA	December to March
Fin whale	*Balaenoptera physalus*	MMPA, ESA (endangered)	May to October ?
Humpback whale	*Megaptera novaeangliae*	MMPA, ESA (endangered)	May to October
West Indian manatee	*Trichechus manatus*	MMPA, ESA (endangered)	Irregular visitor
Harbor seal	*Phoca vitulina*	MMPA	Winter

As with marine mammals, sea turtles come into the Chesapeake Bay to feed during the summer months; there is no evidence of using the beaches for nesting. Some researchers believe that sea turtles are regular residents in the Chesapeake Bay, and that individuals spend entire summers there. All five east coast species of sea turtles listed in Table 6.5.1.2-2 can be found in the Chesapeake Bay: Atlantic loggerhead (*Caretta caretta*), Atlantic leatherback (*Dermochelys coriacea*), Kemp's Ridley (*Lepidochelys kempi*), Atlantic green sea turtle (*Chelonia mydas*), and Atlantic hawksbill (*Eretmochelys imbricata*). Loggerhead turtles are the most common sea turtle species found in Maryland waters, as they feed on horseshoe and blue crabs which are abundant in the Bay. Kemp's Ridley sea turtles appear in Maryland waters, but are most common in Virginia's portion of the Chesapeake Bay.

Table 6.5.1.2-2: Sea Turtle Species Found in the Chesapeake Bay

Common Name	Latin Name	Legal Protection	Most Commonly Sighted (Based on Strandings and Sightings)
Atlantic loggerhead	*Caretta caretta*	ESA (endangered)	June to September
Atlantic leather back	*Dermochelys coriacea*	ESA (endangered)	June to August
Kemp's Ridley	*Lepidochelys kempii*	ESA (endangered)	
Atlantic green	*Chelonia mydas*	ESA (threatened)	Transient
Atlantic hawksbill	*Eretmochelys imbricata*	ESA (endangered)	Transient

Finfish and shellfish population levels found in the middle part of the Chesapeake Bay under the CTR footprint are controlled largely by salinity levels. Waters here are considered moderately salty. This area is less diverse in both plant and animal species than either the upstream freshwater or the downstream ocean, and salinity levels shift with rainfall, currents, water depth, and location (the eastern side of the Bay is saltier). Almost 300 species of fish have been recorded in the Chesapeake Bay and its tributaries; about half are ocean fishes that enter the Chesapeake Bay to feed in warmer months before returning to the ocean. Ocean fishes are more likely to be found south of the CTR. While most of these summer visitors spawn in the ocean, their larvae and juveniles enter the Chesapeake Bay at an early age to grow rapidly on the dense populations of invertebrates and small forage fishes found in its shallow waters. Many fish species move into shallow waters in summer and out to deeper Chesapeake Bay waters in the fall months.

Freshwater species that can tolerate somewhat saline waters can often be found in shallow streams and protected coves of the larger estuarine rivers. Fish of the deeper, open waters include schooling predator fishes, bottom-feeding fishes, reef-type fishes, and small foraging species. Sharks, skates, and rays are found in the Chesapeake Bay, but are much more common in the more saline waters south of the CTR footprint.

The Chesapeake Bay also hosts a diversity of crabs, shrimp, clams, and oysters. Altogether, about 28 species of mollusks and 25 species of shrimp and crab are likely to be found in the portion of the Chesapeake Bay or its tributaries underlying the CTR. Crabs are particularly abundant in the shallow waters around Tangier, Smith, and Bloodsworth islands in the warmer months. Blue crabs mate from June through October in the mid-Bay salinities of the CTR. Oyster beds have declined from pollution, sedimentation, over harvesting, and diseases. Today, the most productive oyster bars are in the mid-Bay area with salinities low enough to reduce saltwater predators and diseases, yet high enough to sustain the oysters.

Once plentiful throughout the Chesapeake Bay and harvested in great numbers until the turn-of-the-century, the anadromous Atlantic sturgeon (*Acipenser oxyrhynchus*) is the largest fish to be found in the Chesapeake Bay. In 1996, natural resources staff at NAS Patuxent River reported that a dead specimen of Atlantic sturgeon was collected in 1994 on the beach near Fishing Point. The Atlantic sturgeon has a global ranking of G3 (very rare and local throughout its range). The small shortnose sturgeon (*Acipenser brevirostrum*), Federally-listed as endangered, is now very rare all along the Atlantic Coast, but able to sustain populations in the Patuxent River and the Chesapeake Bay.

The potential also exists that dwarf wedge mussel (*Alasmidonta heterodon*), a freshwater mussel, might be found in the river systems tributary to the Chesapeake Bay in areas underlying the CTR footprint. This freshwater mussel is Federally-listed as endangered and has declined over the last hundred years, suffering from the results of channelization, construction, removal of riparian vegetation, pollution, and sedimentation. In Chesapeake Bay tributaries, the mussel is known to live in Norwick Creek and Long Marsh Ditch in the Choptank River system located in Queen Anne and Talbot Counties. Historically, the mussel was found in the Potomac River system near Washington DC, in Nanjemoy Creek in Charles County, and McIntosh Run in St. Mary's County.[139]

6.5.1.3 Essential Fish Habitat

As mentioned in Section 3.3 of this document, the 1996 amendments to the MSFCMA[140] require the identification of EFH for Federally-managed fisheries species, and the implementation of measures to conserve and enhance this habitat. The Metropolitan Statistical Area (MSA) requires Federal agencies to consult with NMFS on activities within the U.S. EEZ that may adversely affect EFHs.[141] EFH has been designated for 12 species in the Chesapeake Bay, as listed in Table 6.5.1.3-1.

139 *DoN 1998*
140 *16 USC 1801 et seq.*
141 *MSA Section 301 (b)(2)*

Table 6.5.1.3-1: Designated Species for EFH in the Chesapeake Bay

Species	Life Cycle Stage
Red hake (*Urophycis chuss*)	Juveniles, Adult
Windowpane flounder (*Scopthalmus aquosus*)	Juveniles, Adult
Atlantic sea herring (*Clupea harengus*)	Adult
Bluefish (*Pomotomus saltatrix*)	Juveniles, Adult
Atlantic butterfish (*Peprilus triacanthus*)	Eggs, Larvae, Juveniles, Adult
Summer flounder (*Paralicthys dentatus*)	Larvae, Juveniles, Adult
Scup (*Stenotomus chrysops*)	Juveniles, Adult
Black sea bass (*Centropristus striata*)	Juveniles, Adult
King mackerel (*Scomberomorus cavalla*)	Eggs, Lavae, Juveniles, Adult
Spanish mackerel (*Scomberomorus maculatus*)	Eggs, Lavae, Juveniles, Adult
Cobia (*Rachycentron canadum*)	Eggs, Lavae, Juveniles, Adult
Red drum (*Sciaenop occelatus*)	Eggs, Lavae, Juveniles, Adult

Source: NOAA Website http://www.nero.noaa.gov/hcd/va1.html.

6.5.2 Environmental Consequences

Proposed JSF DT activities that would occur at NAS Patuxent River and the CTR under either alternative include: STOVL and CTOL FQ, performance and propulsion, loads, flutter, land-based ship suitability, weapons separation & integration, STOVL environment, mission systems, and CATB. Most of these proposed test activities would occur using existing ground support facilities and flights would be predominantly above 3,000 feet AGL. They can be expected to have no effects on biological/natural resources. The greatest potential for impacts to biological/natural resources are from discrete, individual flight tests conducted below 3,000 feet to include the following:

- During STOVL and CTOL FQ, some performance and propulsion tests flights would occur at 2,500 feet; low-angle FQ tests would come within 1,000 feet AGL at the bottom of the dive; some supersonic flights would occur; 5% of the total proposed single performance test events/runs (not total flights/flight hours) would be between 150 and 2,500 feet AGL and 3% of these would occur as fly-bys over the airfield; and 2 to 3% of the single propulsion test activities/runs (not total flights/flight hours) would be between ground level and 2,500 feet AGL.

- During loads tests, weapon releases might occur during some test activities.

- During flutter tests, some (but less than 10%) of the flights would occur at 2,500 feet, and some of the flights might be supersonic or release weapons.

- During weapons separation & integration tests, gun strafing runs might comprise short duration flights at altitudes below 3,000 feet.

- During CATB tests of aircraft electronics, less than 1–2% of the total flights/flight hours would occur below 3,000 feet.

Thus, potential impacts to biological resources on NAS Patuxent River and the CTR from the proposed JSF DT would be limited to potential noise-induced effects and impacts from weapons separation tests on terrestrial and marine animals, as well as EFHs. With regard to noise, the proposed JSF DT would use the flight paths analyzed for Alternative 3 in the *FEIS for the Increase Flight and Related Operations at Patuxent River Complex, Patuxent River, Maryland (December 1998)*. However, the proposed STOVL flight tests, which would occur predominantly on and over the airfield, were not analyzed in that FEIS. The number of proposed JSF DT activities, would be significantly less than those analyzed in the FEIS, with the maximum flight hours expected to occur in Test Year 4 (approximately 1,358 hours per year versus 24,400 hours per year in FEIS, or 6%). Actual flight hours at NAS Patuxent River between CY 2000 and 2004 averaged 19,244 annually. The addition of the proposed maximum year of proposed JSF DT flight hours (approximately 1,358) would not exceed the 24,400 hours analyzed in the FEIS.

Because the type and tempo of proposed JSF DT would be similar to the existing conditions at NAS Patuxent River and the CTR, the associated noise contours discussed in Section 6.4 of this EA/OEA would not be significantly different. The proposed STOVL flight tests, while not analyzed in the NAS Patuxent River FEIS, have been included in the modeling of noise contours for proposed JSF DT activities, represented below in Figure 6.5.2-1. The undeveloped/green space land area potentially affected by a 65 dB DNL or higher for the proposed JSF DT would be anticipated to increase by only 5.8%. Nearly all of the proposed noise at or above 80 dB DNL would occur over land. A somewhat greater change would occur over water, with expansion of the 65, 70, and 75 dB DNL contours. Although these sound levels would diminish when entering the water. The increase of noise impacts over potentially sensitive biological resource areas would be minimal or non-existent and any potential noise impacts to biological resources are not anticipated to exceed those already analyzed in the FEIS. As discussed in Section 4.12.2 of the FEIS, no effects on threatened or endangered species were anticipated from the level of flight activity currently existing at NAS Patuxent River and the CTR. Therefore, no significant effects to biological/natural resources would be anticipated at NAS Patuxent River or in the CTR.

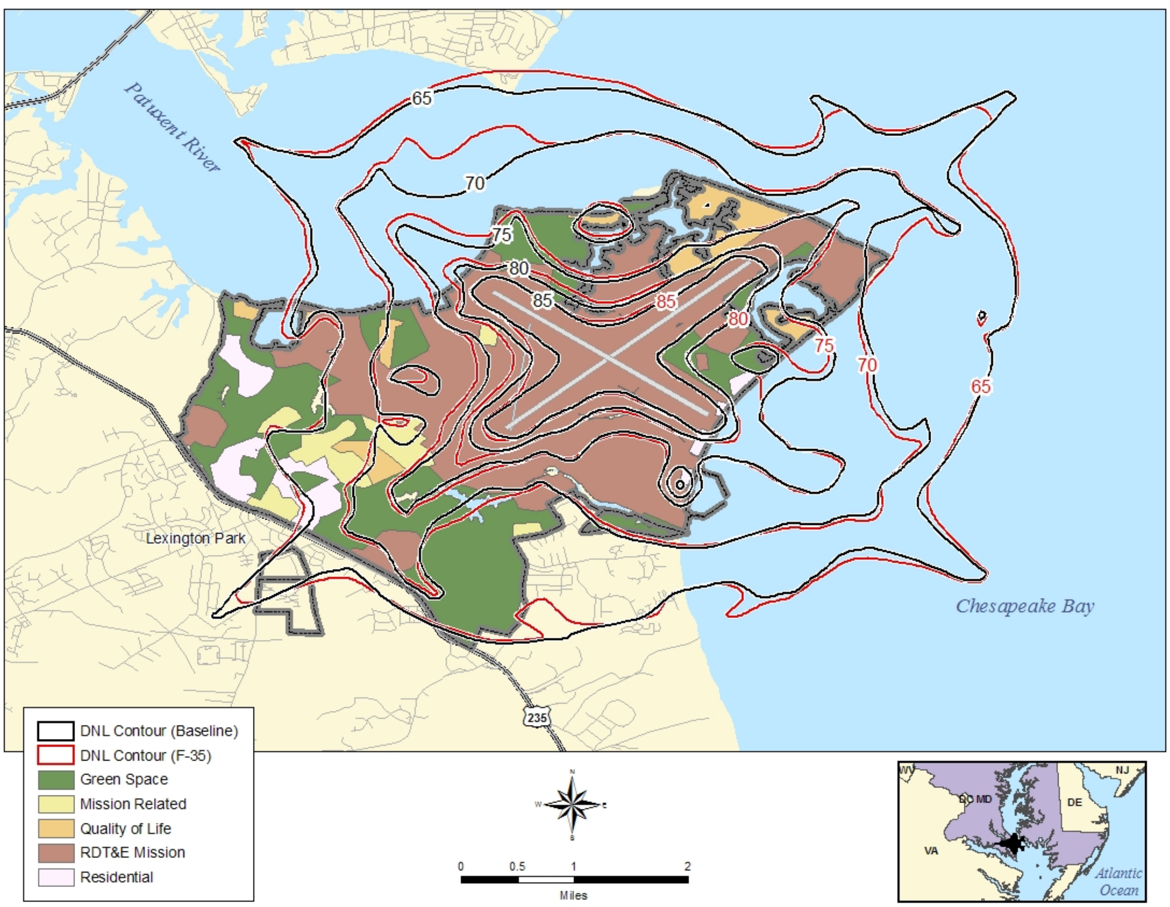


Figure 6.5.2-1: Noise Contour with Land Use Map

Additionally, the proposed JSF DT includes weapons separation & integration tests in the CTR, which might affect marine animals and EFH. Weapons separation & integration tests would consist of inert stores, which would predominantly break apart upon impact with the water's surface and settle to the bottom of the Bay. Impacts from these tests could include direct hits of marine vertebrates, or the release of contaminants into the ocean water or sediments. All of these possibilities were considered previously in the FEIS.

The maximum stores/expendables expected to be dropped in Test Year 4 is 90 stores/expendables per year (versus 2,516 stores and expendable per year in the FEIS, or less than 5%) for a planned total of 271 stores/expendables during a seven-year test period.[142] In addition, the *EA for the F/A-18E/F Stores Separation Testing at NAS Patuxent River (January 1997)* analyzed the impacts of inert stores separations in the CTR, similar in type and greater in number [approximately 2,825 ordnance (missiles, bombs, and fuel tanks) over 2.25 years] to the Proposed Action; and determined that no impact to the marine environment, marine mammals, or sea turtles would occur. Section 5.4.1 and Appendix D of the F/A-18E/F Stores Separation EA describe in detail the methodology used to determine the potential impact on marine mammals and sea turtles. Therefore, direct effects to marine animals from the proposed JSF DT are expected to be minimal. No takes of marine mammals would be anticipated.

In addition, the release of stores/expendables and the possibility of emergency fuel dumping in the CTR might impact Bay sediment and/or water quality, which may affect EFH. The inert stores proposed for use during the proposed JSF DT are similar in nature to those addressed in the NAS Patuxent River FEIS, and are composed of iron/steel casings filled with sand, concrete, or vermiculite, which would not affect water quality. Propellants from the few missiles that may be fired during weapons separation tests would typically be consumed within ten seconds of release from the aircraft; any residual propellant left on the missile when it entered the water would be minimal and have no significant impact. Section 4.13.1, Water and Sediment Quality, of the NAS Patuxent River FEIS states there would be no disturbances to surface water resources as a result of overflights. A 1991 study of *Water Quality and Sediment Sampling at Four Military Ranges in North Carolina*, conducted for the USN, analyzed the water quality around four targets off North Carolina, and did not identify any water quality impacts at the target ranges that could be attributed to their use for military training. As the stores break up on impact to the water, some of the fragments would settle in the Bay's sediment providing additional substrate for epibiotic growth. In addition, the three targets in the CTR might provide artificial reef habitat for marine life, as mentioned in the FEIS. Remaining floating fragments or stores would be recovered to the maximum extent possible.

Section 4.9.1.1 of the NAS Patuxent River FEIS also discusses the use of lithium iron disulfide batteries, which are considered more environmentally-friendly than nickel-cadmium batteries. This alternative battery would be used, whenever feasible, in the telemetry units for the proposed JSF DT. Finally, Section 4.9.1.1 states that fuel dumping is a rare occurrence in the CTR, happening only in an emergency situation where the pilot or aircraft are at jeopardy. FAA and DoN regulations prohibit the release of any fuel below 6,000 feet, except in emergency situations. If fuel were to be released above 6,000 feet, the fuel would completely vaporize before reaching the water surface. In the unlikely event an aircraft mishap occurs and fuel or hydraulic fluid is released into the CTR, the magnitude and duration of the spill would be controlled through rescue and spill response procedures in accordance with the EPA-approved *Emergency Spill Control and Countermeasures Plan*.[143]

Since the Proposed Action would be similar to or less than those actions analyzed in the NAS Patuxent River FEIS, impacts to water quality and Bay sediments in the CTR would not be anticipated to exceed

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[142] *DoN 1998, Table 4-9.1 in the FEIS*

[143] *DoN 1998, Section 4.13.1, Water and Sediment Quality of the Patuxent River Complex FEIS*

those already assessed. No indirect or direct effects to resources necessary to fish for spawning, breeding, feeding, or growth to maturity would be anticipated, and no adverse effect to EFH would likely occur. A consultation under the MSFCMA would not be needed for the proposed JSF DT.[144] Therefore, no significant effect on biological/natural resources would be expected including no affect on Federally- and stated-listed endangered or threatened species.

6.6 SOCIOECONOMICS AT NAS PATUXENT RIVER

6.6.1 Affected Environment

Most personnel working at NAS Patuxent River reside in either St. Mary's or Calvert County, whereby most of the social and economic interactions occur in these counties and the immediate surrounding areas of NAS Patuxent River. Therefore, the socioeconomic study area for NAS Patuxent River is comprised of St. Mary's and Calvert Counties, Maryland, as illustrated in Figure 6.6.1-1. In addition to the U.S. Census, BEA, and BLS sources, information from previous NEPA documents has been used to support the baseline information: *Final Environmental Impact Statement (FEIS) for Increased Flights and Related Operations in the Patuxent River Complex, NAS Patuxent River, Maryland* (*December 1998*); and the *Jacob France Institute, et al., Analysis of the Economic Impact of the Naval Air Station at Patuxent River and the Naval Surface Warfare Center at Indian Head (April 2002).*

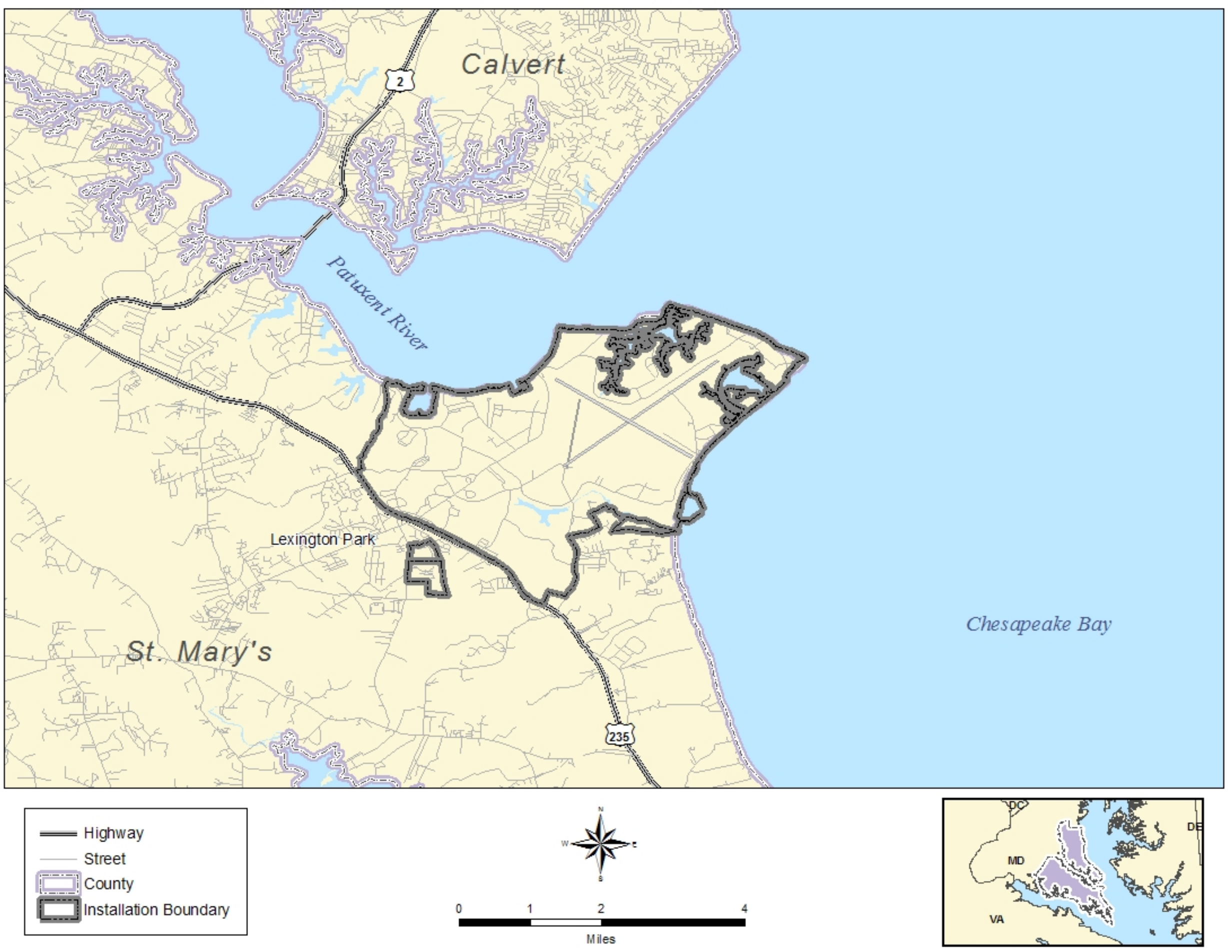
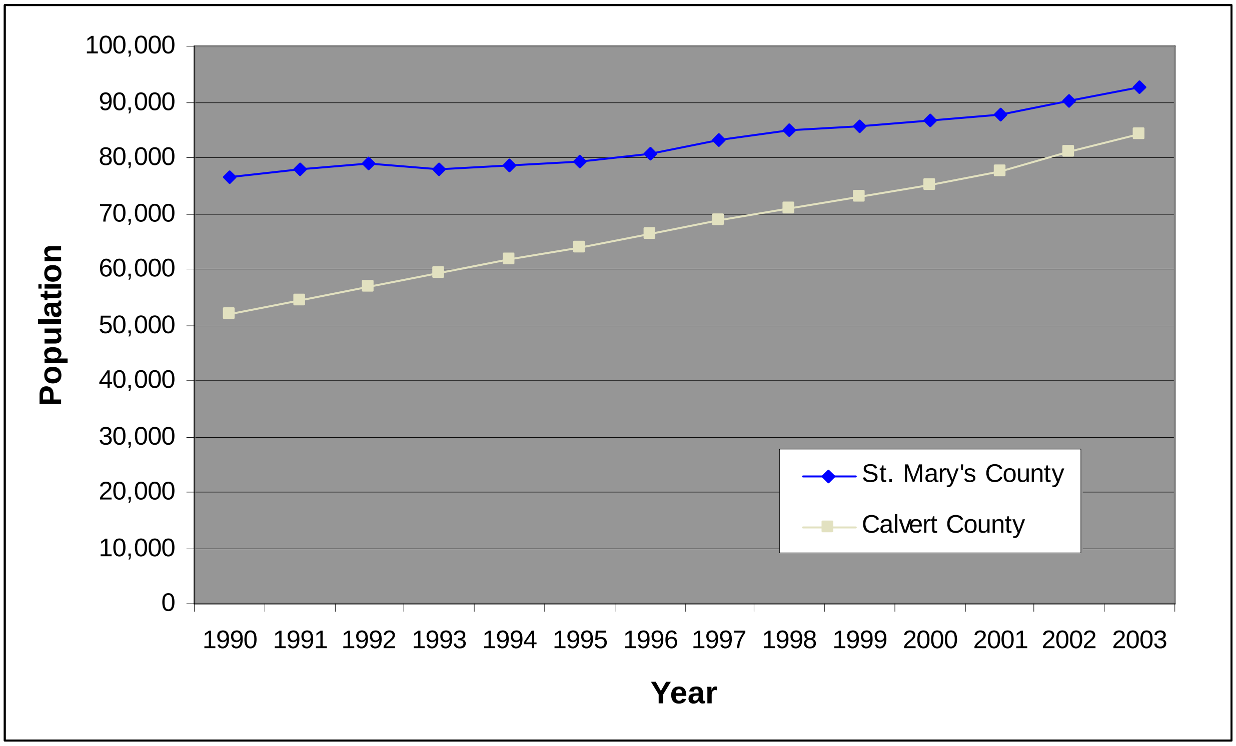


Figure 6.6.1-1: NAS Patuxent River Socioeconomic Study Area

144 *NMFS 1999*

6.6.1.1 Demographics

The population trend for St. Mary's and Calvert Counties between 1990 and 2003 is summarized in Figure 6.6.1.1-1. Total population in St. Mary's County in 2003 was 92,754 and comprised 1.7% of the population of Maryland. Total population in Calvert County in 2003 was 86,474 and comprised 1.5% of the population of Maryland. The population in St. Mary's County increased by 22.1% from 75,974 in 1990 to 92,754 in 2003, while population in Calvert County increased by 59.4% from 51,372 in 1990 to 86,474 in 2003.[145] The median age of the population in 2000 was estimated to be 34.2 in St. Mary's County and 35.9 in Calvert County, both slightly lower than the Federal median of 36.0.[146]



Source: Bureau of Labor Statistics 2003.

Figure 6.6.1.1-1: Population Trends for NAS Patuxent River Socioeconomic Study Area (1990–2003)

Approximately 19,800 personnel comprise the Installation population at NAS Patuxent River based on data provided in 2004 by the Public Affairs Office, NAS Patuxent River. Of the total population, 9,000 are contractors, 7,800 are government civilian, and 3,000 are military personnel.[147] The Installation also supports approximately 9,000 dependents and retirees, and 300,000 visitors annually.[148]

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145 *Bureau of Labor Statistics 2003–2004*
146 *Census Bureau 2000*
147 *Romer 2004*
148 *ibid*

6.6.1.2 Environmental Justice

In addition to the two county study area, more localized U.S. Census tracts/blocks for poverty rates and ethnicity, as illustrated in Figure 6.6.1.2-1, have been used to support the environmental justice analysis.

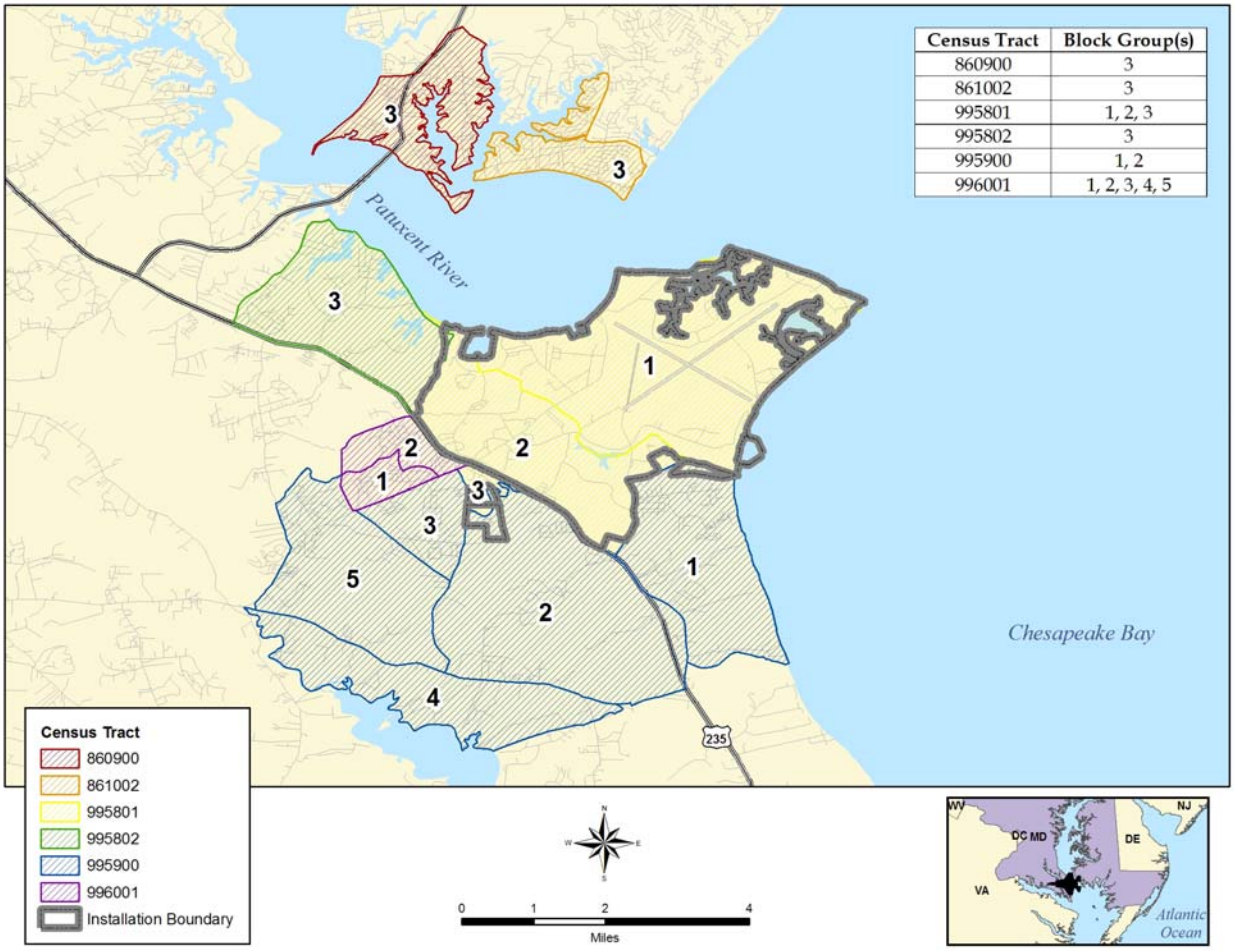


Figure 6.6.1.2-1: Environmental Justice Block Groups for Census Tracts in the NAS Patuxent River Socioeconomic Study Area

Poverty rates by the block groups in the census tracts for the vicinity of NAS Patuxent River are summarized in Table 6.6.1.2-1. Some tracts/block groups have higher poverty rates, notably block 3 in census tract 995801 with a poverty rate of 37.87%, which well exceeds the set threshold of 25%. It is important to note that a large percentage of block group 3 in census tract 9958.01 is an area referred to as Lexington Manor or "The Flat Tops Development." This development was acquired by St. Mary's County in December of 2004 for land use compatibility and safety requirements associated with the NAS Patuxent River AICUZ Program.[149] The 84-acre area is expected to be converted to compatible land uses and open/public space, requiring the relocation of approximately 100 families to other compatible areas.

149 *DC Military.com*

Table 6.6.1.2-1: Poverty Rates by Block Groups in Census Tracts for NAS Patuxent River Socioeconomic Study Area (2000)

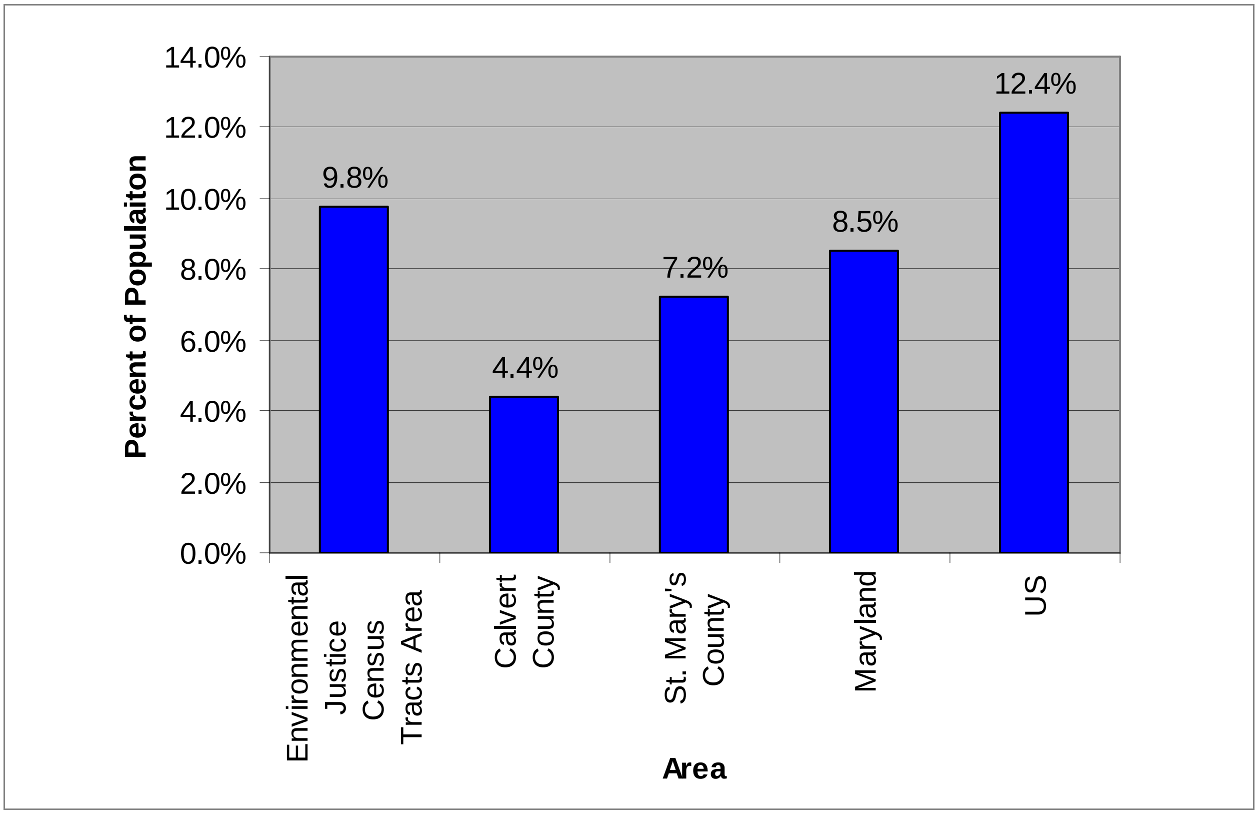
County	Census Tract #	Block Group #	Total Block Group Population (1999)	Persons Living in Poverty (1999)	Average Poverty Rate
Calvert	860900	3	1,035	43	4.15%
Calvert	861002	3	1,705	77	4.52%
St. Mary's	995801	1	58	0	0.00%
St. Mary's	995801	2	2,239	31	1.38%
St. Mary's	995801	3	441	167	37.87%
St. Mary's	995802	3	1,662	8	0.48%
St. Mary's	995900	1	1,575	62	3.94%
St. Mary's	995900	2	2,702	109	4.03%
St. Mary's	995900	3	2,084	320	15.36%
St. Mary's	995900	4	466	16	3.43%
St. Mary's	995900	5	2,488	480	19.29%
St. Mary's	996001	1	1,874	325	17.34%
St. Mary's	996001	2	1,396	289	20.70%
Totals			19,725	1927	9.77%

Sources: 2000 Census; American FactFinder; 1999 Census Data by Tract number: Census 2000 Summary File 3 (SF 3) - Sample Data, Detailed Tables; P87.

Figure 6.6.1.2-2 shows the poverty rates for environmental justice block groups for census tracts in Calvert County, St. Mary's County, the State of Maryland, and the U.S.[150] The poverty rate for the environmental justice block groups in the area rounds to 9.8%, higher than Calvert County at 4.4%, St. Mary's County at 7.2%, and the Maryland statewide estimate of 8.5%, but lower than the National rate of 12.4%.[151] The poverty rate for the environmental justice census tracts/blocks area is well below the set threshold of 25% used to identify environmental justice populations, as discussed in Section 3.4 of this EA/OEA.

150 *The environmental justice census tracts area is comprised of Census 2000 tract/block data where noise contours exceed 65 dB. Tract/block data is aggregated to produce rates. Source of tracts/block data: 2000 Census; American FactFinder; 1999 Census Data by Tract Number: Census 2000 Summary File 3 (SF 3) - Sample Data, Detailed Tables, P.87.*

151 *Census Bureau 2000*

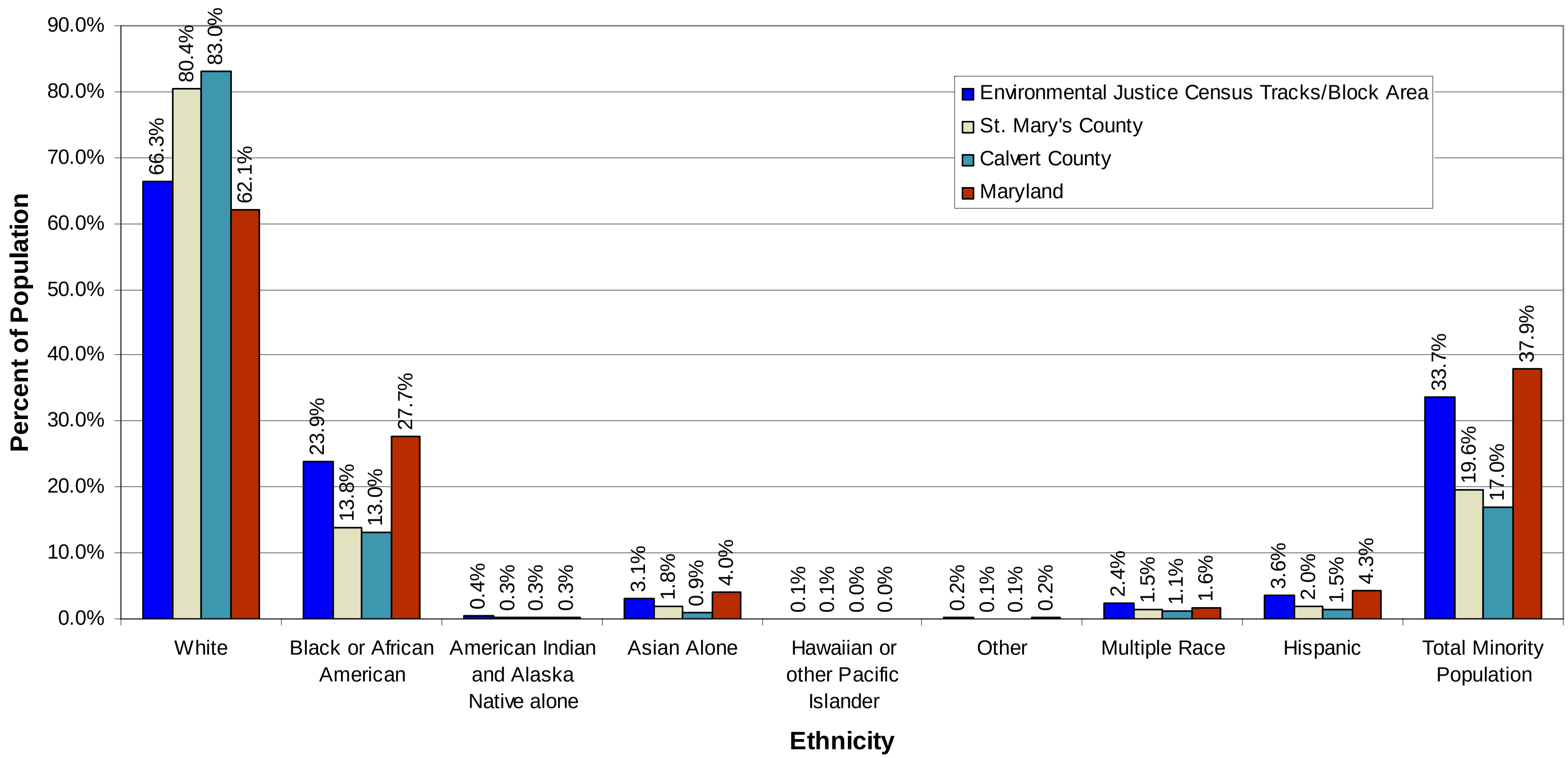


Source: U.S. Census Bureau 2000.

Figure 6.6.1.2-2: Poverty Rates for NAS Patuxent River Socioeconomic Study Area (2000)

Population ethnicity for the NAS Patuxent socioeconomic study area is summarized in Figure 6.6.1.2-3. The environmental justice census tract/block area is comprised of predominantly white (66.3%) populations. Black or African American (23.9%) populations have the second largest representation in the NAS Patuxent River area, followed by Hispanic or Latino (3.6%), Asian (3.1%), two or more races (2.4%), American Indian or Native Alaskan (0.4%), Native Hawaiian or other Pacific Islander (0.1%), and some other race (0.2%). The ethnic representations in the NAS Patuxent River area closely resembles race distribution for Maryland, but minority populations are greater than those of Calvert and St. Mary's Counties.

Total minority population (33.7%) is well below the CEQ threshold of 50% minority, which is used to identify environmental justice populations. Some block groups in the census tracts have larger minority populations than others, notably block group 3 of census tract 995801 (54.9%), block group 5 of tract 9959 (48.5%), and block group 2 of tract 996001 (55.7%). Each of these block groups have higher Black or African American populations. Ethnicity populations by block groups are summarized in Table 6.6.1.2-2.



Source: U.S. Census Bureau, 2000.

Note: The percent of the population by ethnicity for the study area will not equal the average of the counties' percent of the population by ethnicity because denominators (county populations) are not common to all.

Figure 6.6.1.2-3: Ethnicity for NAS Patuxent River Socioeconomic Study Area (2000)

Table 6.6.1.2-2: Ethnicity by Block Groups in Census Tracts for NAS Patuxent River Socioeconomic Study Area (2000)

Census Tract #	Block Group #	White	Black or African American	American Indian and Alaska Native Alone	Asian Alone	Hawaiian or other Pacific Islander	Other Race	Multiple Race	Hispanic	Total Minority Population
8609.00	3	87.2%	9.2%	0.2%	0.8%	0.0%	0.0%	2.0%	0.8%	12.8%
8610.02	3	88.3%	7.3%	0.7%	1.0%	0.0%	0.1%	1.1%	1.6%	11.7%
9958.01	1	81.3%	0.0%	0.0%	2.7%	0.0%	5.3%	0.0%	10.7%	18.7%
9958.01	2	65.7%	19.9%	0.4%	3.3%	0.2%	0.3%	3.3%	6.8%	34.3%
9958.01	**3**	**45.1%**	**39.6%**	**0.2%**	**7.0%**	**0.0%**	**0.4%**	**3.5%**	**4.2%**	**54.9%**
9958.02	3	87.3%	5.8%	0.5%	2.6%	0.1%	0.1%	1.1%	2.5%	12.7%
9959.00	1	83.5%	9.4%	0.4%	2.8%	0.0%	0.1%	1.3%	2.5%	16.5%
9959.00	2	59.1%	29.7%	0.2%	3.0%	0.1%	0.4%	2.8%	4.8%	40.9%
9959.00	3	58.1%	25.8%	0.2%	6.4%	0.0%	0.3%	3.9%	5.1%	41.9%
9959.00	4	83.6%	10.7%	1.1%	0.4%	0.0%	0.0%	1.7%	2.6%	16.4%
9959.00	**5**	**51.5%**	**40.8%**	**0.2%**	**1.8%**	**0.2%**	**0.4%**	**2.3%**	**3.0%**	**48.5%**
9960.01	1	56.3%	33.3%	0.5%	4.2%	0.0%	0.2%	2.6%	2.9%	43.7%
9960.01	**2**	**44.3%**	**46.9%**	**0.5%**	**3.3%**	**0.3%**	**0.3%**	**2.0%**	**2.4%**	**55.7%**

Source: U.S. Census Bureau 2000.

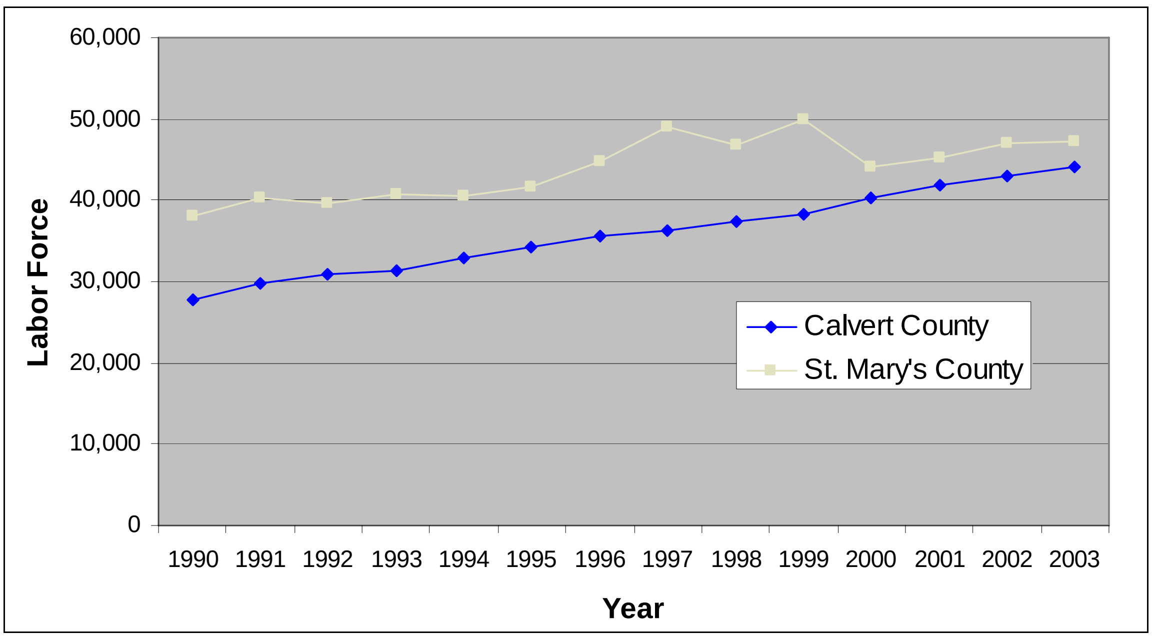
6.6.1.3 Economic Characteristics

Median Household Income

The median household incomes for Calvert and St. Mary's Counties was $65,945 and $54,706, respectively, in 2000, which are both higher than the median household income estimated for Maryland ($52,868).[152]

Employment Trends

Employment information was obtained for the BLS from the time period 1990 through 2003 as summarized in Figure 6.6.1.3-1. There were 47,136 and 44,121 workers, respectively, in the St. Mary's and Calvert Counties labor force in 2003. This represents 1.6% and 1.5%, respectively, of the Maryland labor force.



Source: Bureau of Labor Statistics 2003.

Figure 6.6.1.3-1: Labor Force Trends for NAS Patuxent River Socioeconomic Study Area (1990–2003)

Trends in unemployment for St. Mary's County, Calvert County, State of Maryland, and the U.S. are summarized in Figure 6.6.1.3-2. The unemployment rate in St. Mary's and Calvert Counties has remained well below the national unemployment rate and was slightly lower than the Federal unemployment estimates during this time period.

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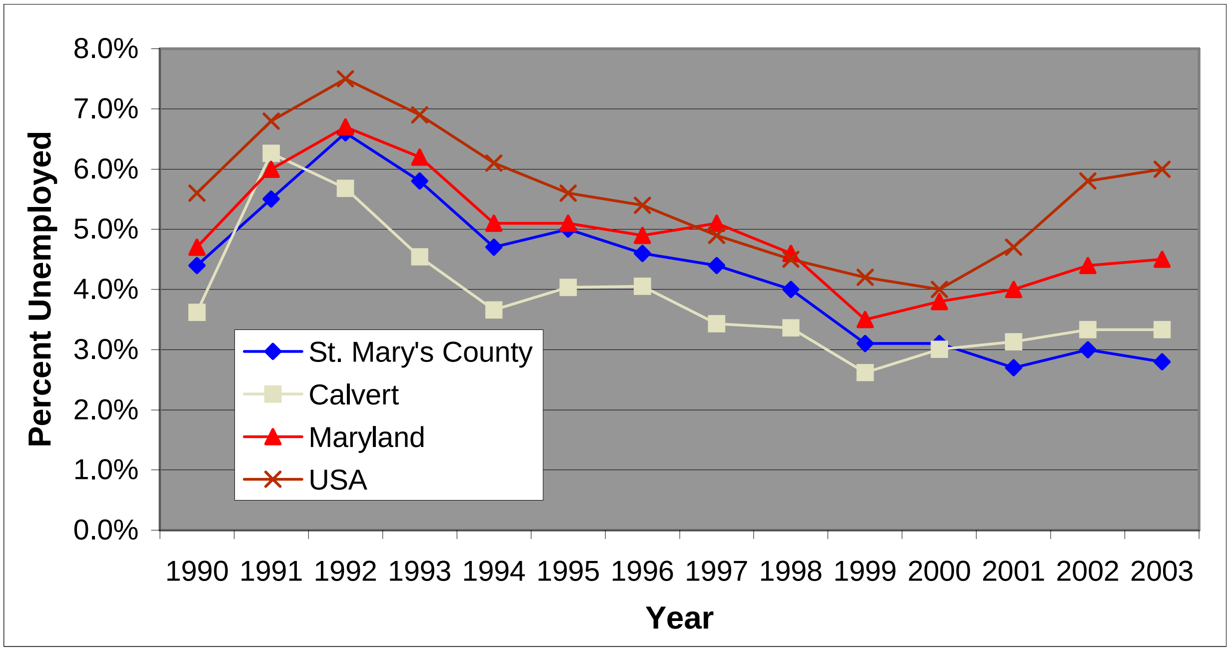
152 *Census Bureau 2000*

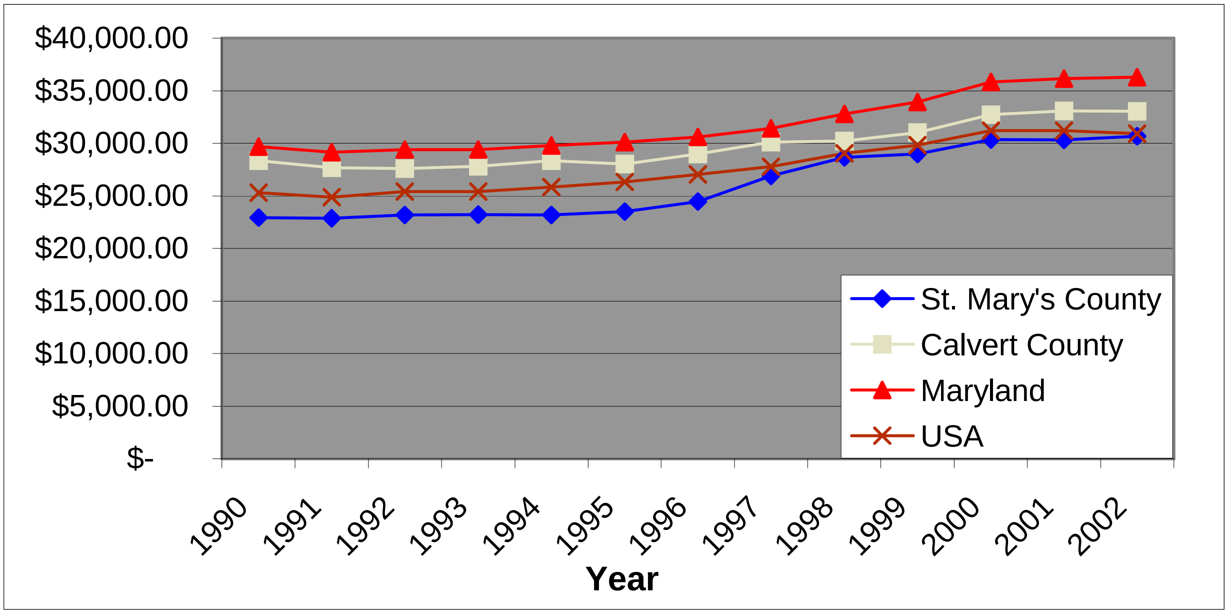


Source: Bureau of Labor Statistics 2003.

Figure 6.6.1.3-2: Unemployment Trends for NAS Patuxent River Socioeconomic Study Area

Per Capita Income

Information was obtained from the BEA on per capita income, which was adjusted for inflation and is summarized in Figure 6.6.1.3-3. Per capita income in St. Mary's County has been consistently lower than the Maryland average, but comparable to the U.S. average over this time period. Per capita income in Calvert County has been slightly below the Maryland average, but slightly higher than the U.S. average over this time period.

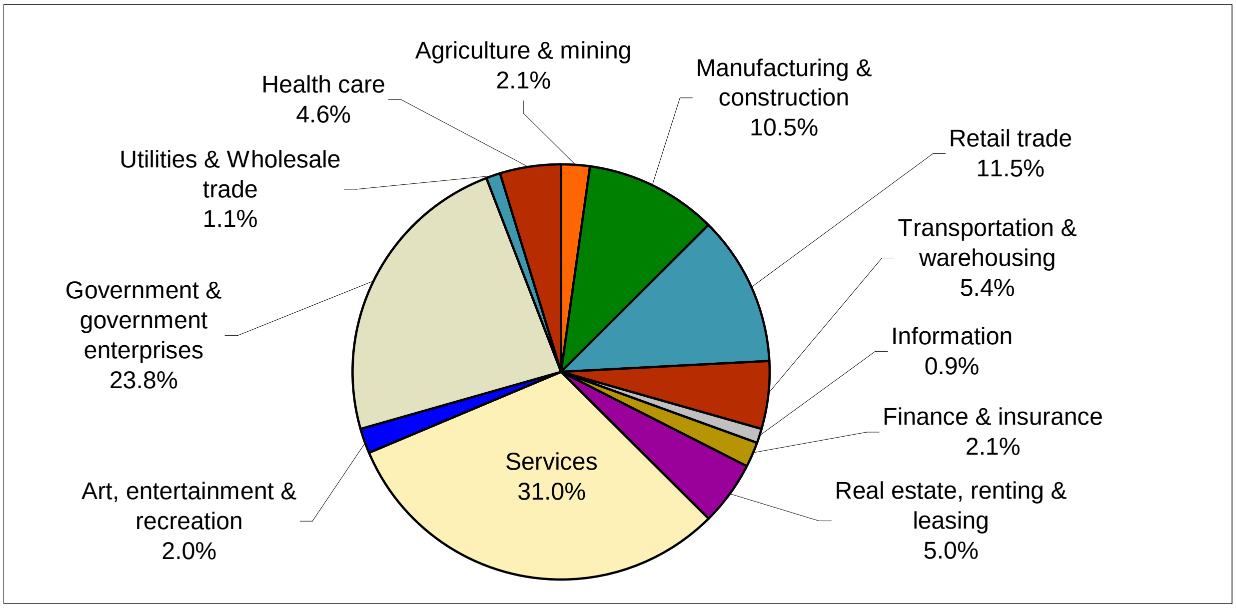


Source: Bureau of Economic Analysis 2004 and adjusted for inflation (2002).

Figure 6.6.1.3-3: Per Capita Income Trends for NAS Patuxent River Socioeconomic Study Area (1990–2002)

Employment by Industry

Information was obtained from the BEA regarding employment by industry for the NAS Patuxent socioeconomic study area for 2002. There were approximately 96,800 total jobs in St. Mary's and Calvert Counties in 2002, which were distributed among industries shown in Figure 6.6.1.3-4. Services comprised the largest percentage of private jobs. The three largest service industry employers include professional and technical services (32.6%), accommodation and food services (24.7%), and other services, except public administration (23.1%).



Source: Bureau of Economic Analysis 2004.

Figure 6.6.1.3-4: Employment by Industry for NAS Patuxent River Socioeconomic Study Area

Installation Economic Contribution

Military operations at the NAS Patuxent River provide an important economic stimulus for much of southern Maryland.[153] First, the Installation provides over 9,900 high paying direct jobs[154] in the area with an average wage estimated to be $54,747, which is $22,549 above a southern Maryland resident's average earning.[155] NAS Patuxent River also generates significant economic activity through the $1.1 billion in annual expenditures, which generates an additional $1.6 billion in economic activity as well as 18,200 jobs.[156]

6.6.1.4 Housing

St. Mary's County had 21,278 housing units in 1980, which grew 31% to 27,830 housing units in 1990 and then grew 29% to 34,081 units in 2000.[157] Calvert County had 10,731 housing units in 1980 which grew 63% to 16,986 housing units in 1990 and then grew 67% to 25,447 units in 2000.[158] The St. Mary's and Calvert County vacancy rate in 1990 was 8.5% and 10.5%, respectively, which in 2000 increased to 10.1% in St. Mary's County and decreased to 7.7% in Calvert County.[159] Homeowners inhabited 72% of the total occupied housing units for St. Mary's County in 2000, while in Calvert County, 85.2% of

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153 *Jacob France Institute, et al., "Analysis of the Economic Impact of the Naval Air Station at Patuxent River and the Naval Surface Warfare Center at Indian Head," 2002*

154 *Direct jobs represent the operation of military facilities for NAS Patuxent River. Additional economic jobs represent inter-industry jobs (e.g. the purchase of engineering services from a local supplier, in response to the change in demand from the military facility) and changes in local employment due to changes in production (Jacob France Institute 2002)*

155 *Jacob France Institute et. al 2002*

156 *Ibid*

157 *St. Mary's County Planning Commission 2003*

158 *Calvert County Comprehensive Plan 2004*

159 *Census Bureau 1990 and Census Bureau 2000*

housing units were owner-occupied in 2000. The average household size in 2000 for St. Mary's and Calvert Counties was estimated to be 2.97 persons, down from 3.03 persons in 1990.[160]

Approximately 98% of the NAS Patuxent River population lives off-installation, primarily in St. Mary's County. There are 777 family housing units on the Installation for military personnel. This includes 650 townhomes, 100 four-plex apartments, and 27 single family homes. Approximately 500 military personnel live on the Installation with an associated 1,300 dependants (as of June 2004). The vacancy rate for Installation housing was 13% (1,800 out of a total 2,069) in 2005.[161]

In 2003, St. Mary's County conducted a Housing Needs Assessment Study which found the apartment rental vacancy rate for 2002 was 0.3% and recommended the County develop 5,000 plus housing units (1,050 rental housing units and 4,000 for-sale housing units) over the next five years to meet the 2003 and future years housing needs.[162] The study also prescribed the County try to maintain an apartment rental vacancy rate between 4% and 6% to allow for some household mobility.[163] From 2000 to 2004, St. Mary's County had on average issued building permits for 1,005 new dwelling units.[164] Since the 2003 Housing Needs Assessment Study, the County has had substantial single family housing development.[165] From October 2004 to October 2005, the apartment rental vacancy rate averaged 4.5%.[166] Similarly, Calvert County completed a Comprehensive County Plan in 2004 that prescribed smart growth initiatives by encouraging clustering of developments over sprawl, but made no recommendations regarding maintaining housing market growth.[167]

6.6.1.5 Infrastructure

Transportation

Section 3.4 of the *Final Environmental Impact Statement (FEIS) for Increased Flights and Related Operations in the Patuxent River Complex, NAS Patuxent River, Maryland (December 1998)* provides more detailed information regarding the transportation network at NAS Patuxent River, including commercial shipping traffic. Primary access to NAS Patuxent River is via Maryland Highway 235, a six-lane, north-south route. Traffic congestion along Maryland Highway 235 in the Lexington Park area typically occurs during the morning and evening commutes, as well as during lunch-time hours. Primary access to Webster Field in St. Inigoes, Maryland is via Maryland Highway 5 (Point Lookout Road) through Leonardtown and St. Mary's City.

Schools

Section 6.6.1.4 of this EA/OEA states that the majority of Installation personnel live off-installation primarily in St. Mary's County. However, a large percent of the Installation civilian personnel (12%) reside in Calvert County. Logically then, the majority of school aged children from Installation personnel

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[160] *Census Bureau 2000 and St. Mary's County Planning Commission 2003*
[161] *Christman 2004–2005*
[162] *National Leaders in Real Estate Research 2003*
[163] *Ibid*
[164] *Savich 2005*
[165] *Ibid*
[166] *Phillips, C. 2005*
[167] *Calvert County Comprehensive Plan 2004*

families attend schools in St. Mary's or Calvert Counties. Both counties have been building or refurbishing public schools to meet demands from increased population growth over the past decade, with much of St. Mary's County's growth attributed to NAS Patuxent River.[168] St Mary's County plans to build two new elementary schools and one new high school in the next five years.[169] Calvert County is planning to build one new elementary school and replace an outdated middle school over the next five years.[170] Both counties anticipate school capacities would be able to accommodate the projected increases in school age children associated with each county's growth, including the growth from NAS Patuxent River.[171]

6.6.2 Environmental Consequences

Socioeconomic impacts to the local economy, schools, population levels, employment, and housing availability would occur with the implementation of the Proposed Action alternatives. Approximately 700 employees would manage and execute the proposed JSF DT Program. Of these 700 employees, approximately 260 (225 civilian and 35 military) are already employed at NAS Patuxent River and would transition from other programs to the proposed JSF DT. The remaining approximate 440 required employees (405 civilian and 35 military) would be new to NAS Patuxent River.[172] This additional increase in population would equate to less than 1% of St Mary's and Calvert County's 2003 labor force. The small increase in the labor force is not expected to cause significant impacts.

Potential socioeconomic impacts for NAS Patuxent River were evaluated using the EIFS model. This input-output model was developed specifically to analyze community impacts of Installation activities by evaluating the significance of impacts on four elements of a local economy: business volume, employment, personal income, and population.[173] Projected changes that fall outside of these accepted boundaries (referred to as established significance criteria ranges) are considered significant.

The projected number of military and civilian employees and their average salaries for the NAS Patuxent area is summarized in Table 6.6.2-1. Estimated employment is based on discussions with the JSF V&T Team Lead at NAS Patuxent River and December 2003 JSF Manning charts. Average civilian salaries were estimated with information from the BEA, while military salaries were estimated using the Monthly Basic Pay Table published by the OSD P&R. Table 6.6.2-1 also summarizes the ROI where impacts would likely occur. The ROI was determined by considering a number of factors. In general, the definition requires local knowledge of the area and a general understanding of where people shop, work, play, and live. For example, a study by Gunther concluded USAF personnel tended to live within 50 miles of the Base where they worked.[174]

168 *Bowling 2005*
169 *Hayden 2005*
170 *Leah 2005*
171 *Hayden 2005 and Leah 2005*
172 *Maack 2004*
173 *Bragdon, Katherine and Webster, Ron 2001*
174 *Gunther, W. 1992*

Table 6.6.2-1: Proposed JSF DT Military and Civilian Employment and Salaries at NAS Patuxent River

Study Area	Employees		Average Salary ($)		Region of Influence
	Civilian	Military	Civilian	Military	
NAS Patuxent River	405	35	$80,560	$62,623	St. Mary's County, MD Calvert County, MD

Results from the EIFS model are reflected in Table 6.6.2-2. These impacts would be considered insignificant according to the established significant criteria ranges.

Table 6.6.2-2: Forecasted Output from the EIFS Model for Proposed JSF DT at NAS Patuxent River

NAS Patuxent River Complex	
Business Volume	$63,766,530
Percent Change of Total Area Business Volume	2.21%
Business Volume Significance Criteria Range	-17.9% to 11.89%
Income	$44,216,150
Percent Change of Total Area Income	1.11%
Income Significance Criteria Range	-7.68% to 11.35%
Employment	842
Percent Change of Total Area Employment	1.22%
Employment Significance Criteria Range	-7.68% to 11.35%
Population	1008
Percent Change of Total Area Population	0.72%
Population Significance Criteria Range	-8.95% to 1.99%

The proposed JSF DT Program would add approximately 35 new military and 405 new civilian employees at NAS Patuxent River. Adding these jobs to the work force may increase economic activity within both St. Mary's and Calvert Counties. This additional economic activity may increase employment within the ROI by 842 total jobs, which represents 1.2% of the total work force. Population would be expected to increase by 1,008, which is 0.7% of the total population in the two counties. Business volume would be expected to increase by 2%, while personal income would be expected to increase by 1%. All four elements (employment, population, business volume, and personal income) fall within the established significance criteria range established by the EIFS model, which means no significant impacts to socioeconomics would be expected from implementing the Proposed Action alternatives at NAS Patuxent River.

Increases in population may cause other socioeconomic impacts associated with housing, infrastructure, utilities, and schools. While changes in the population would not likely be significant, as predicted by the EIFS model, there would be a potential for local impacts with an influx of employment associated with the proposed JSF DT. Even with the improvements to Maryland Highway 235 over the last few years, there is no reserve capacity, especially during peak evening commuting hours.[175] Since the traffic corridor for the NAS Patuxent River is at capacity, increases in employment in the region may add to

175 *Phillips, Greg 2005*

existing traffic congestion on local roads potentially causing longer commutes, especially during peak traffic hours, which may decrease the quality of life for some commuters using this corridor.

Population increases may also further strain the already crowded public school facilities servicing NAS Patuxent River. Section 6.6.1.5 of this EA/OEA states the majority of personnel live off-installation, primarily throughout St. Mary's County. However, another large percent of the Installation civilian personnel (12%) reside throughout Calvert County. Since NAS Patuxent River does not have primary or secondary schools, the majority of school aged children from Installation personnel families attend schools in St. Mary's or Calvert Counties; most likely in near proximity to where the families reside in the Counties. As such, the proposed increase in school aged children would probably be dispersed between both counties in close proximity to their residences.

Over the past decade, public school capacity levels in both counties have been able to meet increases in school aged children from increased population growth by using existing empty school space, refurbishing, and/or building new public schools. St Mary's increase in public school capacities from population growth over the decade have been largely attributed to personnel increases at NAS Patuxent River.[176] Both counties have plans for refurbishing and building new schools as necessary to meet anticipated future increases in school aged children (as reflected in Section 6.6.1.5 of this EA/OEA). Both counties anticipate these increased school capacities would be able to accommodate the projected increases in school age children associated with each county's growth, including the growth from NAS Patuxent River and the Proposed Action.[177] Thus, impacts to the public school systems for St. Mary's and Calvert Counties would be expected to be minimal.

The increase in population from the Proposed Action may impact housing. However, most of the military personnel live off-installation and the on-installation housing is expected to support approximately 268 additional personnel, as discussed in Section 6.6.1.4. St. Mary's County anticipates housing development in the area would be adequate for population increases associated with NAS Patuxent River, which would include the new personnel for the Proposed Action.[178] Also, St. Mary's County five-year housing unit development trend meets the recommendations for current and future housing needs made by the 2003 Housing Needs Assessment Study. The average apartment rental vacancy rate from October 2004 to October 2005 also indicates the County has high household mobility.[179] The continued housing development in St. Mary's County and the availability of on-installation housing should allow most new personnel from the proposed JSF DT Program to find adequate housing. Continued growth at NAS Patuxent River was not discussed in the Calvert County Comprehensive Plan. However, as presented in Section 6.6.1.4, Calvert County had a housing vacancy rate of 7.7% in 2000 and it is anticipated this vacancy rate should accommodate both the direct and indirect population changes as a result of the Proposed Action. Thus, impacts on housing would be expected to be minimal.

Socioeconomic impacts from the Proposed Action is not be expected to be significant for environmental justice populations within the community surrounding NAS Patuxent River. Based on the threshold criteria for minority or low-income populations presented in Section 6.6.1.2, there would be potential environmental justice populations present. However, the relatively small changes in employment and population from the proposed JSF DT alternatives would not likely cause disproportionate impacts to the environmental justice populations relative to other populations in the area. As discussed in Section 6.4.2

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176 *Bowling 2005*

177 *Hayden 2005 and Leah 2005*

178 *Savich 2005*

179 *National Leaders in Real Estate Research 2003*

and depicted in Figure 6.6.2-1of this EA/OEA, minimal noise contour changes would be anticipated outside the Installation boundaries; areas would be exposed to 65 dB or less. FICON prescribed thresholds of potential significant impacts would not be exceeded for the anticipated noise increases. Therefore, no disproportionately high or adverse human health and environmental effects to environmental justice populations would be anticipated from the Proposed Action alternatives.

Similarly, implementation of the proposed JSF DT at NAS Patuxent River would cause no disproportionately adverse health or safety risks to children. Noise and air quality analysis has shown that no potentially significant impacts to any sensitive receptors (including hospitals, schools, and daycare facilities) where a disproportionately large population of children may be present would be expected to occur.

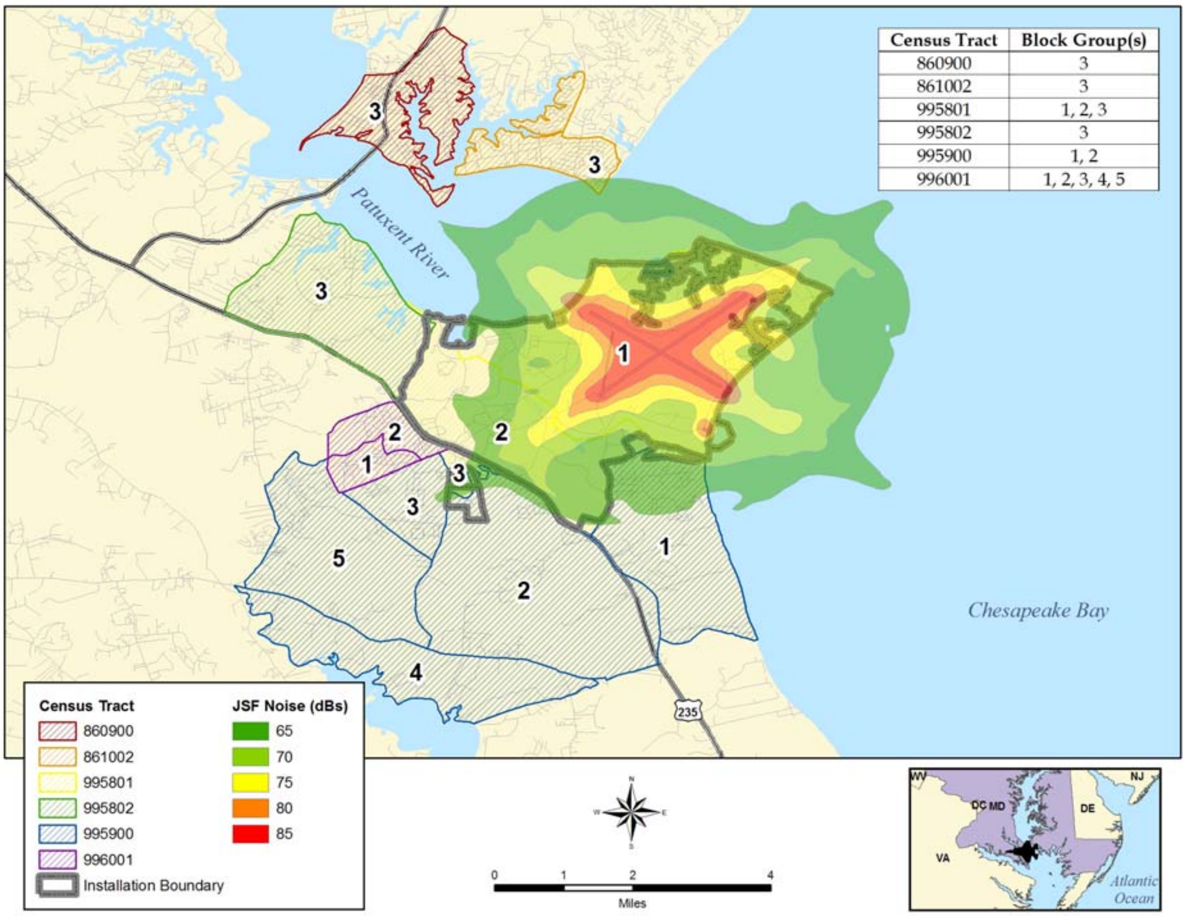

Figure 6.6.2-1: Proposed JSF DT Noise Contour to Census Tracts and Block Groups in the NAS Patuxent River Socioeconomic Study Area

6.7 COASTAL ZONE MANAGEMENT AT NAS PATUXENT RIVER

6.7.1 Affected Environment

The Maryland, Virginia, and Delaware Coastal Zone Management Programs maintain jurisdiction over the coastal zones, which include the inland boundary of the counties bordering the Atlantic Ocean and Chesapeake Bay, and contains areas adjacent to NAS Patuxent River. The Maryland, Virginia, and Delaware coastal zones extend out to 3 NM offshore.

As detailed in Section 6.1 of this EA/OEA, NAS Patuxent River is specifically designated as the USN's principal test flight center with the specific mission to conduct developmental and follow-on testing of new and modified aircraft. Under the CZMA of 1972, as amended (16 CFR §1451 et seq.), coastal states are provided the authority to evaluate projects conducted, funded, or permitted by the Federal government. Any Federal project or activity affecting the coastal zone must be consistent to the maximum extent practicable with the provisions of Federally approved state coastal plans. Potential coastal zone impacts at NAS Patuxent River include noise induced effects and stores separation tests potentially hitting marine animals and/or affects to EFH.

6.7.2 Environmental Consequences

No impacts to the coastal zone near NAS Patuxent would be anticipated from conducting the proposed JSF DT. Analyses from *The Environmental Assessment (EA) for the F-18E/F Stores Separation Testing at NAS Patuxent River (January 1997)* determined that the impacts of inert stores separations to marine animals, similar in type and greater in tempo than the Proposed Action, would be less than significant. The increase of noise impacts over potentially sensitive biological resource areas as a result of the proposed JSF DT would be minimal or nonexistent. Noise generated from the Proposed Action would be similar to current test activities conducted routinely in the CTR. Although the Proposed Action could potentially affect the marine environment, impacts would not be significant and biological productivity of coastal waters would be maintained. Species present in the affected area are believed to be transient in nature and accustomed to the regularly occurring flight noise associated with on-going actions in the CTR. The proposed JSF DT would be consistent with the type and tempo of aircraft overflights and stores separation already occurring in the CTR. Released stores would predominantly break apart upon impact with the water's surface and would settle to the bottom of the Chesapeake Bay. Similarly, no changes to water quality or other resources needed to support fish habitats would be expected. Therefore, the proposed JSF DT is not anticipated to produce any significant impacts to biological resources, including Federally- and state-listed endangered or threatened species and EFH. The Proposed Action would not result in unnecessary hardships for commercial or recreational fishing operations. The JPO PEO has determined that the proposed JSF DT would be consistent to the maximum extent practicable with the enforceable policies and objectives of the Maryland, Virginia, and Delaware Coastal Zone Management Programs, and has completed a Negative CCD in accordance with the CZMA (See Appendix G.2, G.3, and G.4).

6.8 CUMULATIVE IMPACTS

The CEQ's implementation of NEPA regulations defines cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."[180]

[180] *40 CFR 1508.7*

Since the direct and indirect impact analysis focuses only on those resources that may be impacted by the Proposed Action (air quality, noise, biological/natural resources, socioeconomic factors, and coastal zone management), the cumulative impacts analysis addresses these same resources. Only activities that are reasonably foreseeable in the future, with the potential to interact with the Proposed Action, are addressed, together with past and present activities. Because the level of detail varies among future actions, a qualitative analysis is used so that all projects can be evaluated consistently with the best available information. The following actions, listed in Table 6.8-1, are either on-going or reasonably foreseeable future proposed projects at NAS Patuxent River and the CTR. The impact of past actions are reflected in the current baseline environment (the as is condition).[181]

Table 6.8-1: On-Going and/or Future Actions at NAS Patuxent River/CTR

Aircraft	Testing Period
EA-18G	CY 2006-2008
VH-71A	CY 2007-2011
E-2D AHE	CY 2009-2010
MH-60R	CY 2006-2012
P-8A Mulit-mission Maritime Aircraft	CY 2009-2012
Fire Scout Vertical Take-Off And Landing Tactical Unmanned Aerial Vehicle	CY 2006-2008 (minimum time period; may extend beyond 2008)
V-22	On-Going Action
H-1 Upgrades	On-Going Action
MH-60S	On-Going Action
F/A-18	On-Going Action

Source: NAVAIR and NAS Patuxent River Representatives/Data 2005.

Average annual flight hours at NAS Patuxent River have historically been approximately 20% below the maximum analyzed annual flight hours of 24,000. Between the year 2000 and 2005, annual flight hours have decreased from 19,455 hours per year to 17,803 hours per year.[182] Current major test programs occurring at NAS Patuxent River would be expected to lessen over the next few years, though follow-on testing would continue but at a much lower rate than what currently exists. Based on past and on-going levels of RDT&E, current and future actions at NAS Patuxent River would not be expected to exceed the level of flights analyzed in Alternative 3 of the Final EIS. Flight operation levels are anticipated to peak at approximately 22,000 hours/year in CY 2009 and then gradually decrease, providing minimal potential for cumulative impacts.[183]

In addition to the proposed list of actions in Table 6.7-1, the Proposed Actions associated with the 2005 BRAC decisions for NAS Patuxent River may have the potential for cumulative impacts on the resources analyzed in this EA/OEA. These actions include (1) disestablishing the Aircraft Intermediate Maintenance Department at NAWCAD; (2) establishing the Fleet Readiness Center (FRS) Mid-Atlantic Site Patuxent River, NAS Patuxent River, MD; and (3) transferring all intermediate maintenance workload and capacity to FRS Mid-Atlantic Site Patuxent River, NAS Patuxent River, MD.[184] In

[181] *Ranges Sustainability Office, NAS Patuxent River, February 2006, comments provided in Review of February 2006 Draft JSF DT EA/OEA*

[182] *Ibid*

[183] *Ibid*

[184] *Draft FRC Business Plan, December 2005*

addition, NAVAIR will consolidate two offices from leased space to NAS Patuxent River. The Defense Finance Accounting Services and the Weapons and Armament Research, Development, Acquisition and Testing and Evaluation will be relocated from NAS Patuxent River. NAS Patuxent River is expected to have a net loss of three military personnel and a gain of 84 civilian and six contractor personnel related to BRAC 2005 decisions.[185] Specific construction and operational action information is not currently available, but impacts associated with the 2005 BRAC decisions for the realignment of NAS Patuxent River would be addressed in appropriate BRAC-related NEPA analysis documentation by the USN, as required.

Implementation of the proposed JSF DT activities at NAS Patuxent River would be expected to result in minimal site-specific cumulative impacts to air quality. The qualitative cumulative air quality analysis conducted for this EA/OEA concluded proposed JSF DT emissions would predominantly be transitory and not cumulatively significant. The air quality impacts are small enough to be considered *de minimis* and would leave environmental conditions essentially the same if the Proposed Action would be implemented. The primary criterion for determining whether an action has significant cumulative impacts is whether the project is consistent with an approved plan in place for the region where the pollutants are being emitted. The proposed JSF DT would comply with approved air quality planning documents/permits at NAS Patuxent River to assist the area in attaining and maintaining the national and state ambient air quality standards for criteria pollutants.

The aircraft projected for testing at NAS Patuxent River would be primarily rotorcraft and/or turbo propelled aircraft. Typically, the calculation of noise generated from such aircraft is minimal when compared to jet aircraft, such as the EA-18G. The primary testing years for the EA-18G (2006 through 2008) would not correspond with the maximum testing years for the F-35 (Test Years 4 and 5), therefore reducing the potential for cumulative noise impacts at NAS Patuxent River. Furthermore, the scope of the EA-18G maximum testing year (2008) would be approximately 5% of the maximum testing year for the F-35. Therefore, it could be assumed the cumulative noise impacts of the two projects during overlapping testing years would be less than the projected maximum F-35 Test Years.

Under either alternative, there may be a potential for minimal cumulative impact effects to biological and/or coastal zone resources from the combined reasonably foreseeable actions reflected in Table 6.7-1. No significant cumulative effects would be expected from the Proposed Action based on the reasonable, foreseeable projection of decreased flight operations and provided there are no changes to current flight operations and practices, flight tracks, and approved stores/expendables practices. Should the flight operation trends change (such as exceeding the approximate 24,000 hours annually under Alternative 3 of the NAS Patuxent River FEIS) or there are deviations to current, present day operations, then any combination of these actions could result in land use change and/or wildlife exposure to noise impacts, though not necessarily cumulatively significant. And in these cases, additional NEPA analysis would be performed by the USN, as required. Furthermore, as the projects reflected in Table 6.8-1 proceed with their test planning requirements, additional environmental analyses in compliance with NEPA may be performed for those projects and would include cumulative impacts assessments.

Under each alternative, the proposed JSF DT is not expected to result in any significant impacts to socioeconomic resources. The arrival of military and civilian personnel needed to support the proposed JSF DT, along with other future reasonably foreseeable actions, would have the potential to cumulatively impact the immediate area surrounding the Installation. The nature of the proposed JSF DT and other test projects would result in a gradual increase of personnel and related workforce population, with peak years corresponding with peak project years. A gradual decrease in personnel and associated workforce

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[185] *2005 DOD Recommendations forDefense Base Closure and Realignment Commission, Appendix C: BRAC 2005 Closure and Realignment Impacts by State*

populations would also occur as the proposed JSF DT and other projects conclude. Though these changes in personnel would cause a positive temporary impact on employment income and other economic indicators, no significant or permanent impact would be anticipated. No regional cumulative socioeconomic impacts would be expected from the Proposed Action Alternatives to include environmental justice populations.

7.0 NAES LAKEHURST

7.1 NAES LAKEHURST GENERAL INFORMATION

NAES Lakehurst, as depicted in Figure 7.1-1, is the largest Naval aviation facility in the northeast occupying 7,430 acres (11.68 square miles) of land. It is located 75 miles south of New York City, 54 miles east of Philadelphia, and 14 miles west of the New Jersey shoreline. NAES Lakehurst is located adjacent to the town of Lakehurst, New Jersey in the townships of Jackson and Manchester in Ocean County.

NAES Lakehurst provides engineering support for military weapons systems, including aircraft platform interface systems, technology development, developmental evaluation and verification, and systems integration. Unique to NAES Lakehurst are facility and test stand assets related to shipboards, engines, launching, landing aids, recovery, handling, avionics, and aircraft/weapons/ship compatibility.[186]

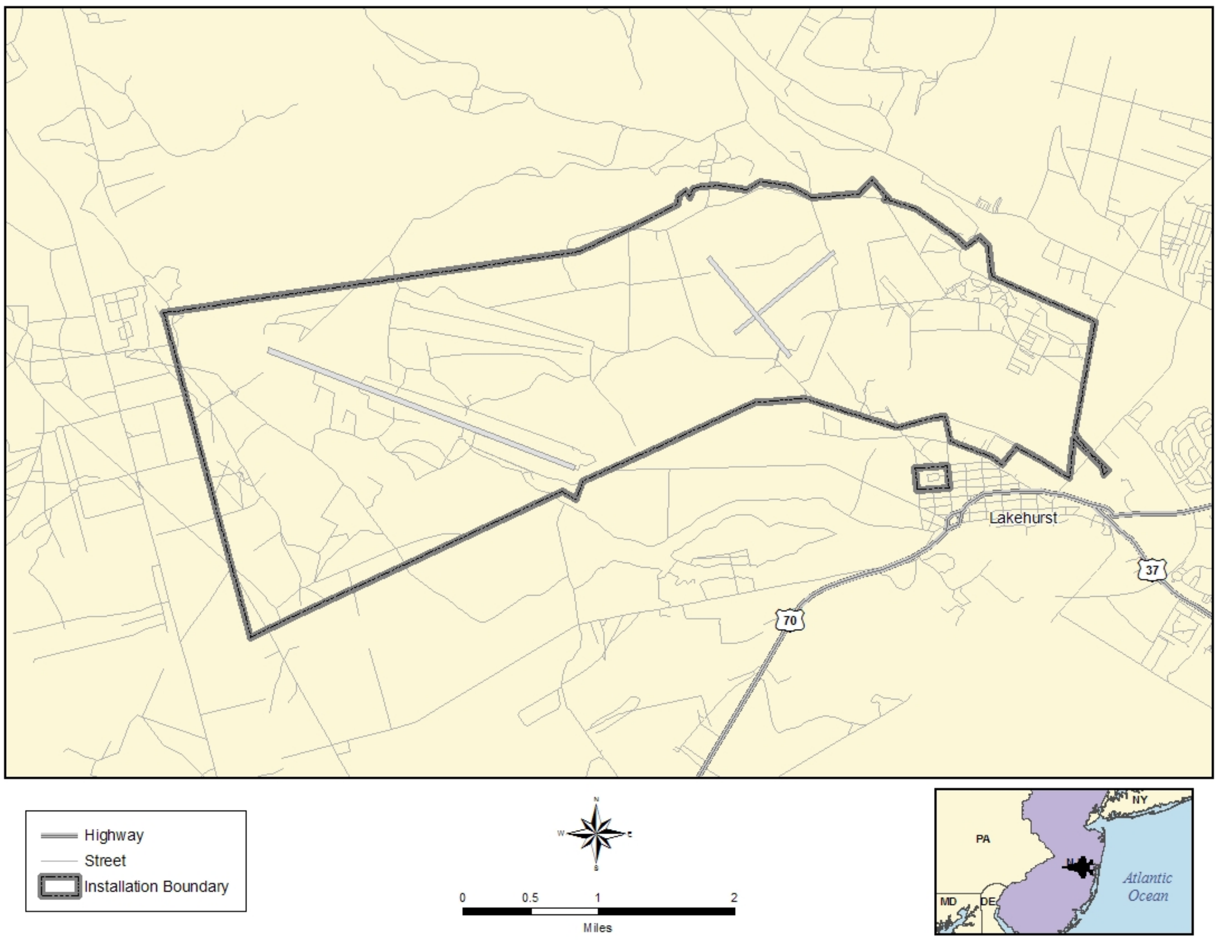

Figure 7.1-1: General Map of NAES Lakehurst

186 *NAVAIR 2003*

7.2 PROPOSED JSF DT AT NAES LAKEHURST

The unique shipboard compatibility and engine tests stands (e.g., catapults, arresting gear, jet cars) and personnel expertise at NAES Lakehurst are of special importance for the proposed JSF DT activities. Table 7.2-1 reflects the overall proposed JSF DT at NAES Lakehurst, while Table 7.2-2 reflects the proposed SE planned for both alternatives. Figure 7.2-1 illustrates the representative airspace of the NAES Lakehurst area. For the various proposed tests activities over the three-year period, DT personnel from NAS Patuxent River would DET to NAES Lakehurst. These DETs would be for a two to four week period at anytime during the test year. F-35 aircraft would be flown from NAS Patuxent River to NAES Lakehurst, and then returned to NAS Patuxent River at the conclusion of the DET. Proposed flights are minimal and are associated with either landings and takeoffs for the DET or specific shipboard/engine tests activities. All proposed flights would be conducted in accordance with existing flight rules (e.g., airspeed, altitudes, patterns) established for operations at NAES Lakehurst.

Table 7.2-1: Proposed JSF DT Flight Profile at NAES Lakehurst

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Number of Events	Number of Hours on Deck w/Engine Operating	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
3	JBD Testing, MK7 Roll-ins, Catapults Capability/Steam Ingestion, E28 Arresting Gear Roll-Ins	31	31	325	122	N/A	N/A	N/A	31	31
4	Barricade Tests	0	0	8		N/A	N/A	N/A	0	0
5	F136 JBD Testing, F136 Steam Ingestion	9	9	105	78	N/A	N/A	N/A	9	9
Total		***40***	***40***	***438***	***200***				***40***	***40***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).

Note: This is reflective of both Alternatives One and Two. Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Table 7.2-2: Proposed JSF DT Support Equipment at NAES Lakehurst

Test Year	Support Equipment	
	Type	**Quantity***
3	Hydraulics Cart (1) ECS Cooling Cart (1) Tow Tractor (1) Aircraft Power Generator (1)	4
4	Jet Car (1)	1
5	Weapons Loaders (1) Support Trucks (3)	4

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).

Note: This is reflective of both Alternatives One and Two. Proposed support equipment reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Total for all units

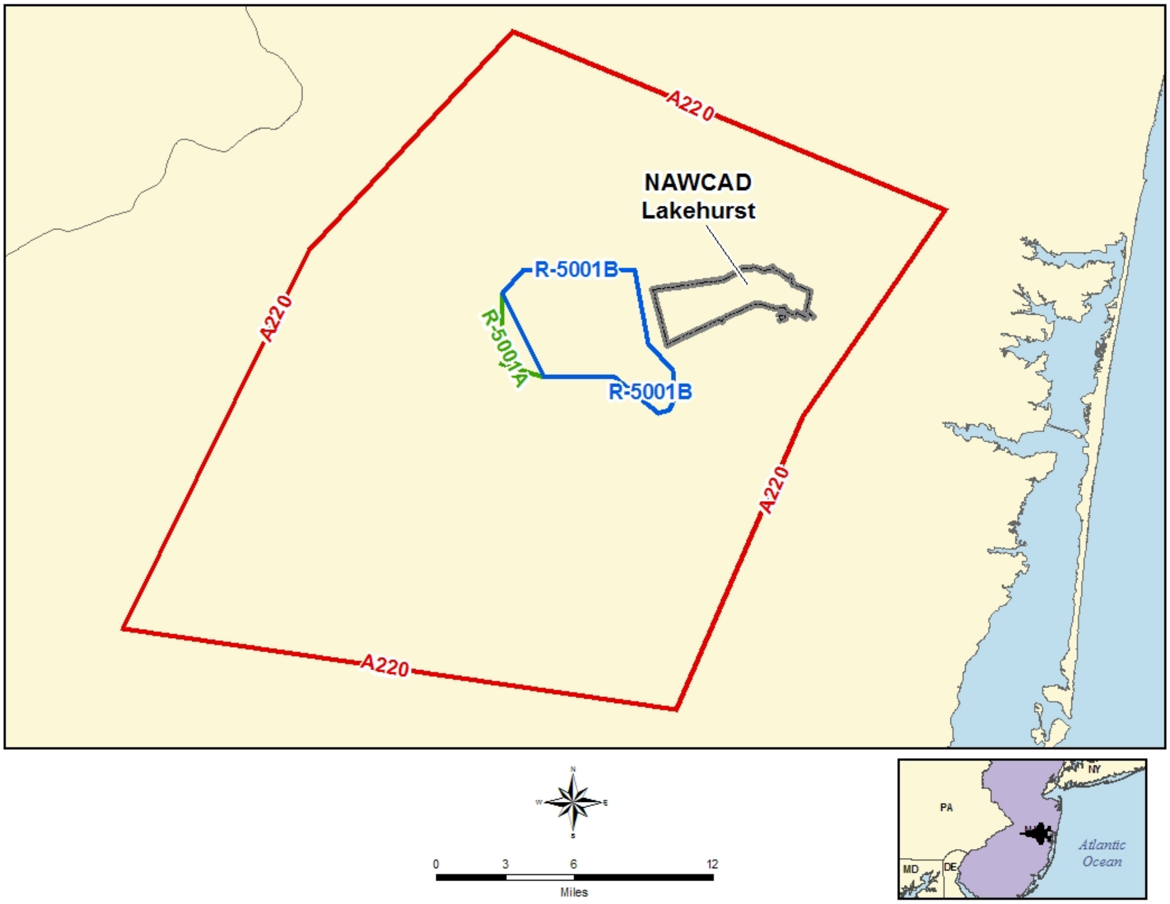

Figure 7.2-1: Representative NAES Lakehurst Airspace

7.3 AIR QUALITY AT NAES LAKEHURST

7.3.1 Affected Environment

Ocean County is located in the Atlantic Coastal Plain in central New Jersey. The region experiences an average temperature of 33° Fahrenheit during the winter and an average temperature of 72° Fahrenheit during the summer. Total annual precipitation is approximately 50 inches with an average seasonal snowfall of 17 inches.[187] New Jersey has analyzed the meteorology of the region, which lead to exceedences of the eight-hour O_3 NAAQS, and determined over 90% of the nonattainment periods occurred when winds come from the west.[188]

New Jersey's ambient air quality is generally improving, but is still not yet considered acceptable due to transport of pollutants from the New York City and/or Philadelphia areas. The ambient concentration of criteria pollutants is below the NAAQS for all pollutants except O_3. Ocean County, in which NAES Lakehurst resides, was located in the New York-Northern New Jersey-Long Island Severe-17 NAA for the one-hour O_3 NAAQS (now rescinded), but is now located in the Philadelphia-Wilmington-Atlantic City moderate NAA for the eight-hour O_3 NAAQS.[189] New Jersey is also in the O_3 Transport

187 *NAVAIR 2003*
188 *McGreevey 2003*
189 *McGreevey 2003*

Region that comprises states in the Northeast and Mid-Atlantic regions. New Jersey has no state-specific AAQS, which must be considered as part of this analysis.

As specified in the air conformity requirements of 40 CFR 51.853/93.153 (b)(1), the *de minimis* level for an area classified as moderate nonattainment for the eight-hour O_3 standard in an O_3 transport region is 100 tpy for NO_x and 50 tpy for VOCs. The total emissions budget for the New Jersey portion of the Northern New Jersey/New York City/Long Island Area Emissions Inventory contained in the most recently approved SIP and 10% of the emissions budget is shown in Table 7.3.1-1. Because states are not required to provide implementation plan emission budgets for the eight-hour O_3 NAAQS until 2007, the emissions contained in the existing SIP for the New Jersey portion of the Northern New Jersey/New York City/Long Island one-hour O_3 NAA was used for this analysis even though Ocean County is now in the Philadelphia/Wilmington/Atlantic City eight-hour O_3 NAA.

Table 7.3.1-1: New Jersey Portion of Northern New Jersey/New York City/Long Island Area SIP Emissions Budget[190]

	Baseline Emissions Levels[1] tons/day (MT/day)		**Regionally Significant Threshold tons/year (MT/year)**	
Year	NO_x	VOC	NO_x	VOC
1996	742.25 (673.37)	814.77 (739.16)	11,356 (10,301)	12,466 (11,307))
2007	515.86 (467.99)	573.04 (519.86)	7,893 (7,159)	8,768 (7,952)

Note: 1. Tons per day (MT per day) during the ozone season which runs from 1 May to 30 September (153 days).

7.3.2 Emission Estimation Methodology

The emission estimates used to determine general conformity applicability were calculated for flight operations, aircraft maintenance, aircraft test cells, and GSE identified for the proposed JSF DT at NAES Lakehurst. Emissions from refueling operations and commuter vehicles associated with additional personnel were also included as part of the Proposed Action analysis. See Appendix E and E.3 for additional details on the methodology used to calculate emissions from all sources included in the Proposed Action.

Criteria pollutant emissions from sources in the Proposed Action (for both alternatives) were calculated following the procedures outlined in the *Air Force Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations.*[191] For all F-35 and support aircraft flight operations, emissions were calculated using emission factors for every throttle setting while the aircraft is operating below the assumed average mixing height of 3,000 feet AGL. The F-35 engine emission factors, provided by P&W, were used for gaseous emissions at non-AB conditions. For AB operations, emission factors from F-119 testing were used except for those emission factors for particulate emissions.[192] The PM emission factors for AB operations from AFIERA were assumed to be the same as for the F100-PW-100 engine.[193] Emission factors for the F100-PW-100 engine were used because it is manufactured by P&W (who is also producing the F135 engine), is roughly the same size as the engine used in the F-35, and emissions data

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190 *NJDEP 2003*
191 *O'Brien 2002*
192 *Wade 2002*
193 *O'Brien 2002*

are readily available. PM emission factors for the F-35 engine during non-AB conditions were provided by the USN AESO, based on previously tested engines.[194]

Aircraft test cell emissions and emissions from GSE were also calculated using the methodology outlined in AF guidance documents. Emissions from test cell operations include emissions from special test equipment (catapults, steam ingestion, arresting gear, the JBD, and the MK 7) at NAES Lakehurst. GSE includes all the equipment used to service the aircraft (e.g., electrical generators, jet engine start units, tow vehicles, and trucks). Emission factors for GSE were used from several sources and are based on the fuel use or the hours of operation.[195] [196] [197]

Emissions from additional commuter traffic associated with new personnel added to NAES Lakehurst as part of the Proposed Action were also included in this analysis. It was assumed personnel would travel an average distance of 30 miles per day for four weeks a year at an average commuting speed of 35 mph.[198] [199] The EDMS Program was used to estimate emissions from the additional vehicle traffic.[200] Emissions from refueling operations have been calculated using the procedures recommended by the EPA in AP-42.[201]

7.3.3 Environmental Consequences

The General Conformity Rule requires potential emissions from the Proposed Action be determined on an annual basis and compared to the annual *de minimis* levels for those pollutants (or their precursors) for which the area is classified as nonattainment. The estimated annual emissions for the Proposed Action, under both alternatives, for Test Years 3 through 5 are shown in Table 7.3.3-1.

Table 7.3.3-1: NAES Lakehurst Air Emissions Estimates[1]

Test Year	CO tpy (MT/yr)	NO_x tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
3	5.26 (4.77)	11.14 (10.11)	0.58 (0.53)	0.66 (0.60)	2.01 (1.82)
4	0.58 (0.53)	0.24 (0.22)	0.05 (0.05)	0.01 (0.01)	0.06 (0.05)
5	4.40 (3.99)	7.02 (6.37)	0.33 (0.30)	0.45 (0.41)	1.29 (1.17)
Highest (Test Year 3)[2]	5.26 (4.77)	11.14 (10.11)	0.58 (0.53)	0.66 (0.60)	2.01 (1.82)

Notes: This is reflective of both Alternatives One and Two.

1. See Appendix E.3 for additional details. HC emissions in the appendix are assumed to be VOCs.

2. The highest year represents the year with the potential to produce the most emissions.

Table 7.3.3-2 provides a comparison of estimated emissions for Test Year 3 (the year during which the greatest emissions are expected to occur) to the *de minimis* and regionally significant thresholds. The comparison shows the Proposed Action would not require a formal conformity determination, because

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194 *AESO 2000–04*

195 *EDMS 2005*

196 *Ambrosino 1999*

197 *O'Brien 2002*

198 *Previte 2005*

199 *Hales 2005b*

200 *EDMS 2005*

201 *EPA 1997*

projected emission levels are below the applicable *de minimis* thresholds and the annual project-induced emissions do not make up 10% or more of the metropolitan region's projected emissions of O_3 precursors as specified in the SIP budget. It is expected, therefore, any impacts on air quality would not be significant for either Proposed Action Alternative.

Table 7.3.3-2: Proposed Action JSF DT Peak Year Comparison

Pollutant	Test Year 3 Emissions[1] tpy	*de minimis* Threshold tpy	Regionally Significant Threshold tpy
NO_x	11.14	100	7,893
VOC	0.58	50	8,768

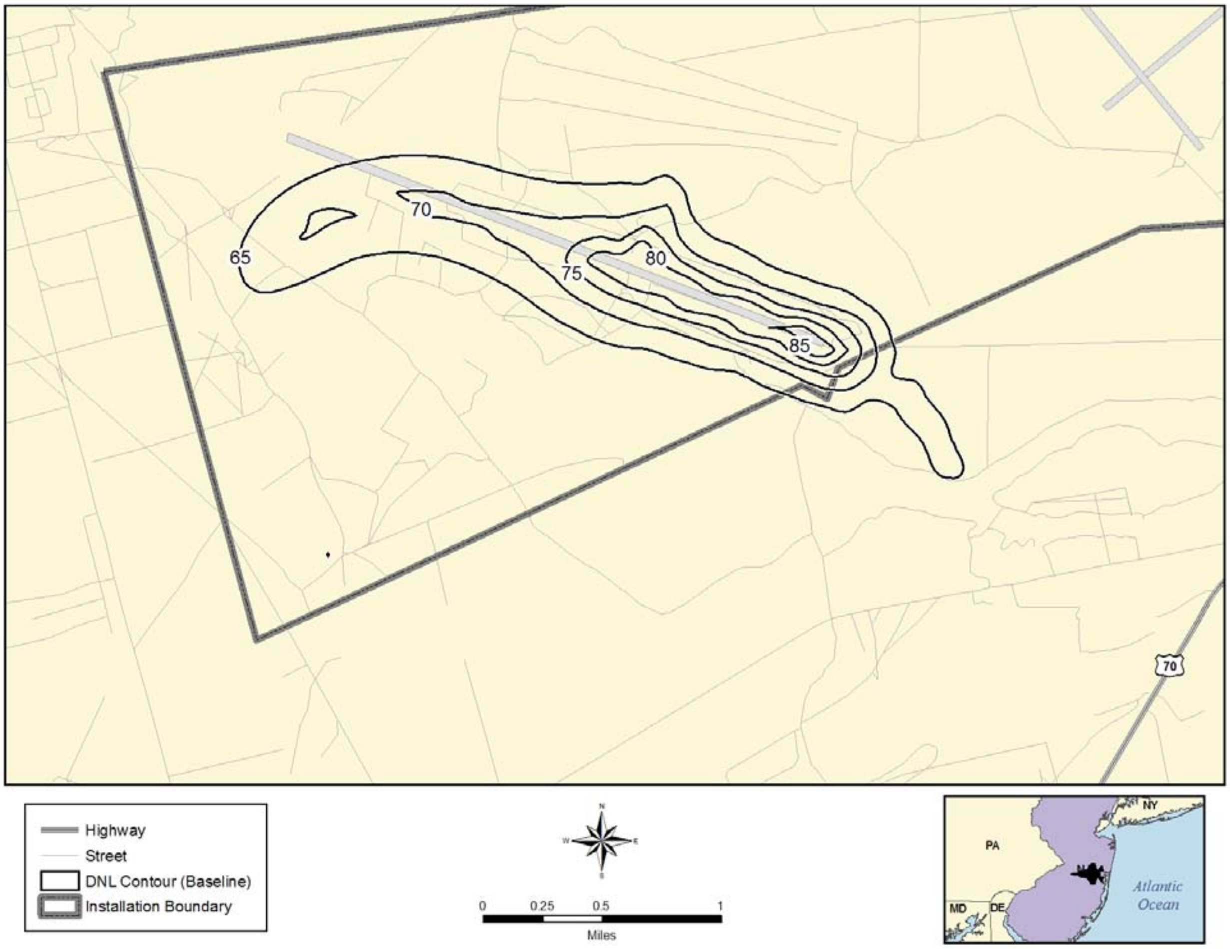
Note: 1. Test Year 3 represents the year with the potential to produce the greatest estimated emissions from the Proposed Action (both Alternatives One and Two).

7.4 NOISE AT NAES LAKEHURST

7.4.1 Affected Environment

Existing baseline DNL contours were developed by using an average annual operational level from a ten-year data sample (1993-2003) of catapult launch and arresting gear operations at NAES Lakehurst.[202] Appendix F.4 provides additional details on the noise model methodology for NAES Lakehurst, which includes the modeled Fleet mix, flight tracks, and runway utilization. The existing baseline DNL contours (65, 70, 75, 80, and 85 dB DNL) for NAES Lakehurst are presented in Figure 7.4.1-1. As illustrated, the NAES Lakehurst existing baseline noise affects areas in Ocean County directly adjacent to and south of the Installation property.

202 *Previte 2005*



Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).

Figure 7.4.1-1: Existing Baseline DNL Noise Contours for NAES Lakehurst

Table 7.4.1-1 presents the number of acres within the noise contours associated with the existing baseline. There are approximately 835 acres of Installation property and approximately 76 acres of off-installation property within the 65 dB and greater DNL noise contours.

Table 7.4.1-1: Acres within the Existing Baseline DNL Contours at NAES Lakehurst

DNL Contour Bands	Area Acres On Installation	Area Acres Off Installation
65–70 dB	476	65
70–75 dB	182	9
75–80 dB	87	2
80–85 dB	82	0
85+ dB	8	0
65 dB and greater (Total)	835	76

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).

Community land use for NAES Lakehurst was made available, however, the coverage and resolution was not adequate to be represented in a geospatial format. Consequently, analysis of aerial photographs was used to determine existing land uses and populations affected by the existing baseline NAES Lakehurst

DNL noise contours. Figure 7.4.1-2 illustrates the existing land uses within the vicinity of NAES Lakehurst. Table 7.4.1-2 presents the number of acres by land use types that are within the existing baseline noise contours. Areas within NAES Lakehurst's property boundaries, currently impacted by existing DNL contours, are comprised of 307 acres of vacant and 527 acres of RDT&E land uses, while areas outside NAES Lakehurst's property boundaries affected by the existing DNL contours are comprised of forested/vacant land uses.

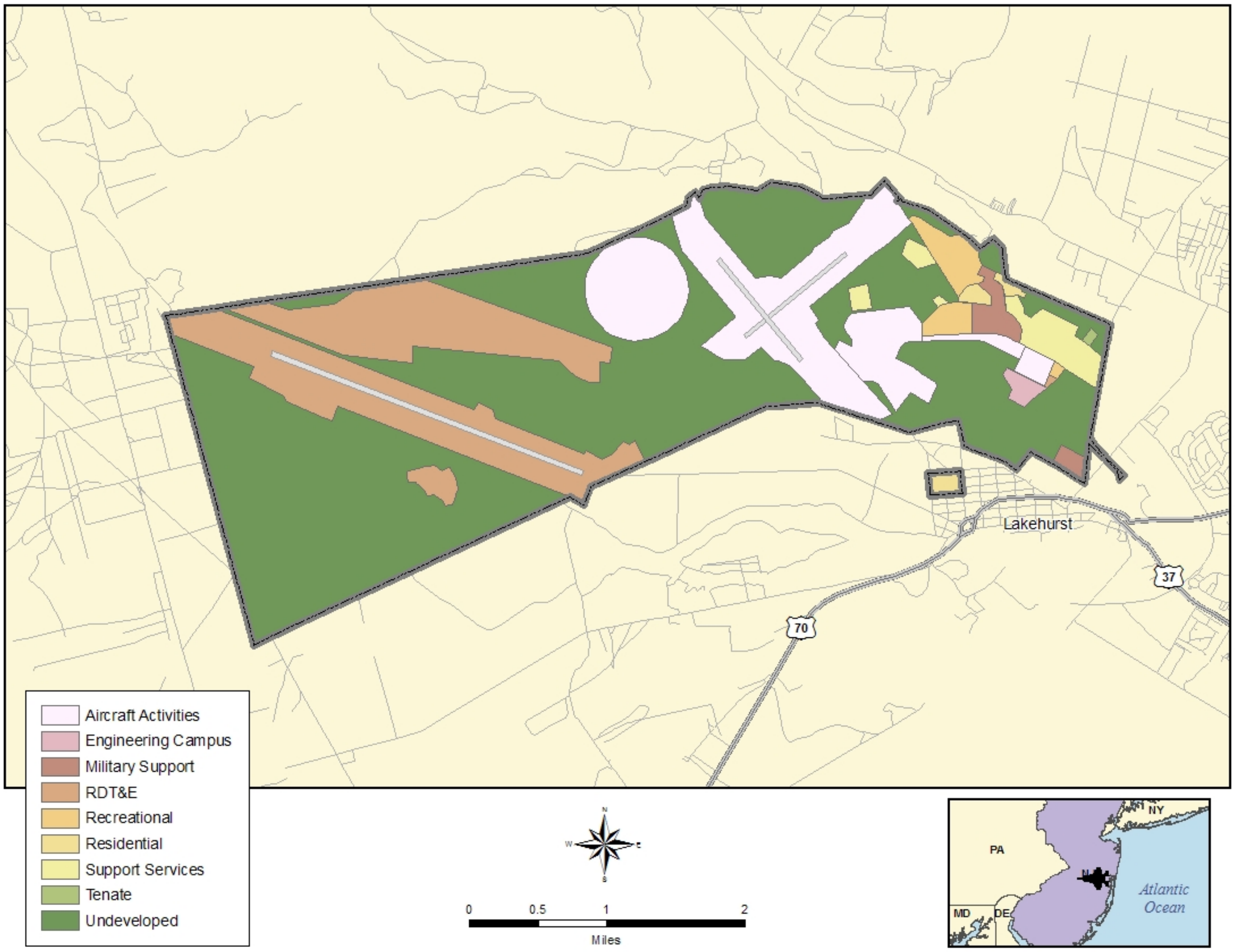


Figure 7.4.1-2: Existing Land Uses Around NAES Lakehurst

Table 7.4.1-2: NAES Lakehurst Existing Baseline Affected Land Uses (Acres)

Land Use Type	DNL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
On-Installation						
RDT&E Mission	194	156	87	82	8	527
Vacant	281	26	0	0	0	307
Total	475	182	87	82	8	834

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).

Concentrated population centers in the vicinity of NAES Lakehurst are located primarily to the east and southeast of the Installation property. On NAES Lakehurst, housing is primarily located on the eastern portions of Installation property, bounded by Lansdowne Road to the west and Moffet Road to the east.

There are no residential housing units identified on or off NAES Lakehurst within the existing DNL noise contours.

7.4.2 Environmental Consequences

For the purposes of this evaluation, aircraft noise impacts are presented as land uses (acres) and populations exposed to aircraft noise above existing baseline levels. Contour lines representing average annual noise baselines for aircraft operations are generated for 65, 70, 75, 80, and 85 dB DNL.

The Proposed Action was modeled for the largest predicted year of proposed JSF DT activities at NAES Lakehurst (Test Year 3). Table 7.4.2-1 illustrates the number and types of tests to be performed at NAES Lakehurst in Test Year 3. It is important to note, through discussions with NAES Lakehurst personnel, the frequency of aircraft catapult launches and arresting gear operations used to develop existing baseline noise contours are not anticipated to increase as a result of proposed F-35 testing at NAES Lakehurst.[203] The frequency of aircraft launches and arresting gear operations are extremely variable from year to year. Therefore, to be conservative in the analysis of the JSF DT noise environment, F-35 testing operations were added to existing operational levels. This leaves the total number of operations modeled for the proposed JSF DT greater than the number of operations modeled in the existing baseline condition. Furthermore, 90% of the proposed MK 7 Roll-Ins, E28 Arresting Gear Roll-Ins, and 100% of the JBD testing that are outlined in Table 7.4.2-1 would be performed on the ground and would not require F-35 flight time.[204] NOISEMAP does not have the capacity to model arrested or aircraft carrier landing operations. Therefore, to simulate aircraft speeds and arresting distances, MK 7 Roll-Ins and E28 testing were modeled as aircraft departures with the aircraft artificially stopped in the departure profile, to mimic these proposed tests. Proposed JBD testing were modeled as a ground engine run-up.

Table 7.4.2-1: Maximum Proposed JSF DT Year at NAES Lakehurst

Test Year	Test Activity/Description	No. F35 Flights	F35 Flight Hours	Number of Events	Number of Hours on Deck w/Engine Operating	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
3	JBD Testing, MK 7 Roll-Ins, Catapults Capability/Steam Ingestion, E28 Arresting Gear Roll-Ins	31	31	325	122	N/A	N/A	N/A	31	31

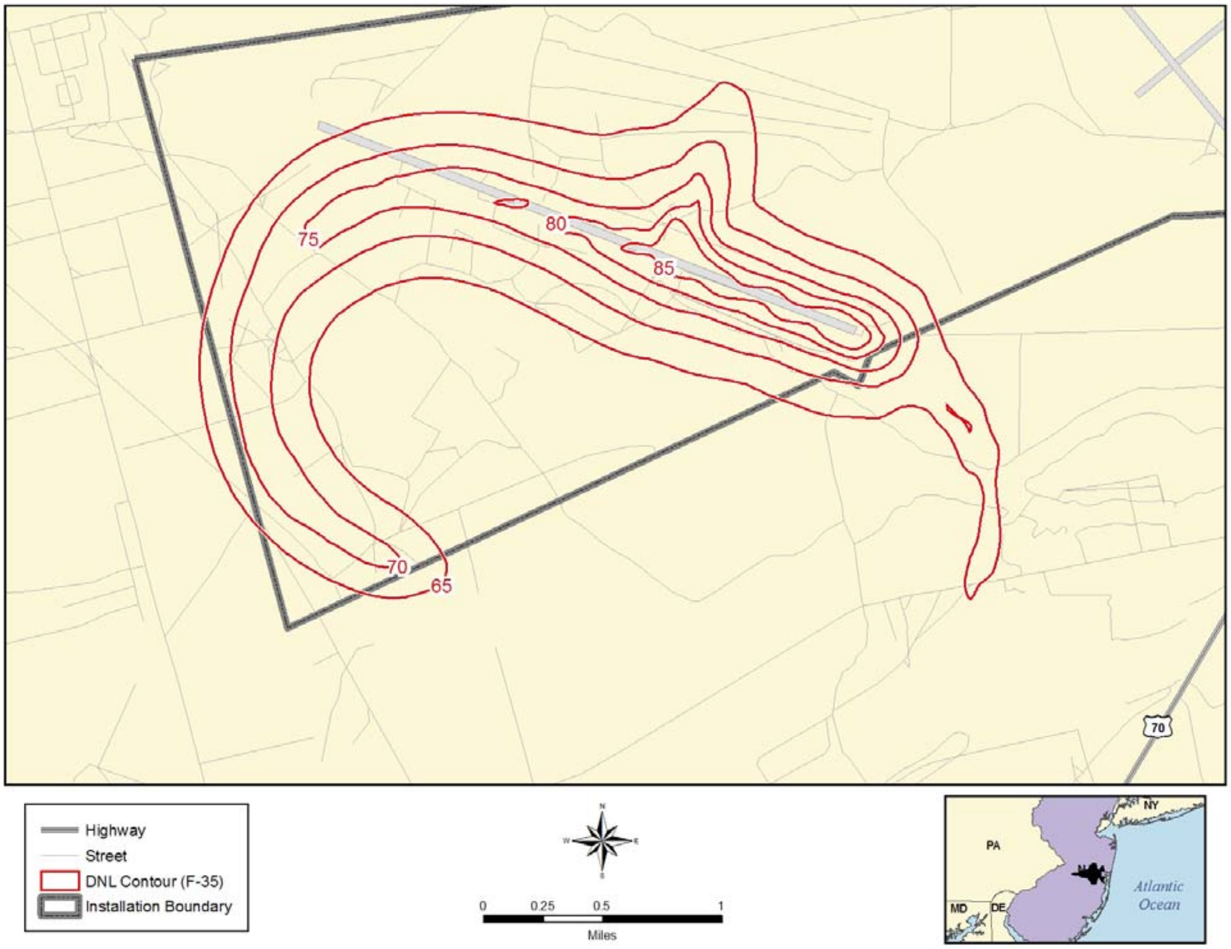
Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).

Notes: This is reflective for both Alternatives One and Two. Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT events and time periods.

Figure 7.4.2-1 illustrates the noise contours for the Proposed Action, while Figure 7.4.2-2 illustrates the comparison of the Proposed Action DNL contours contrasted to the existing DNL noise contours at NAES Lakehurst.

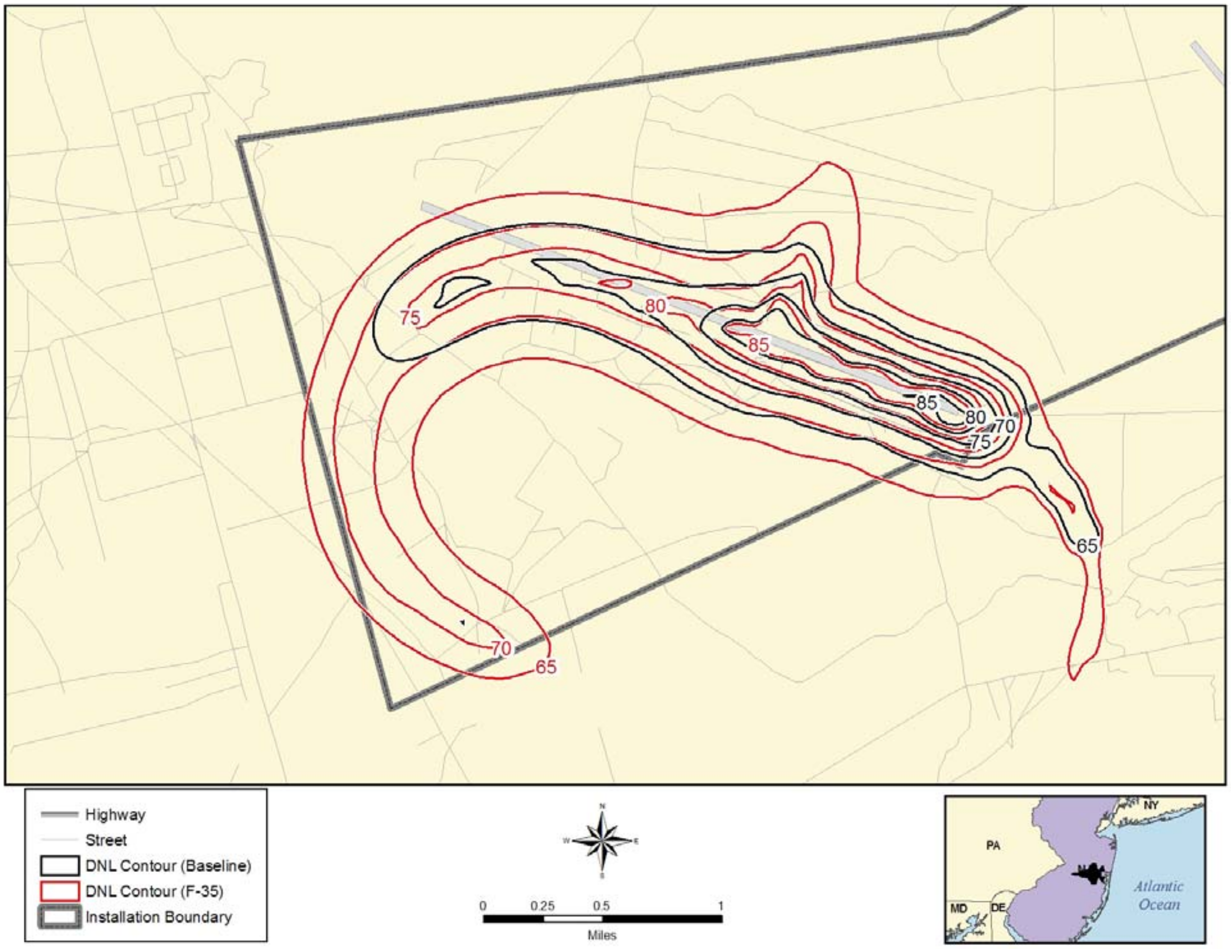
[203] *Previte 2005a*

[204] *JSF Flight Test Matrices 2003–2005*



Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).
Note: This is reflective for both Alternatives One and Two.

Figure 7.4.2-1: DNL Noise Contours with the Proposed JSF DT at NAES Lakehurst



Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).
Note: This is reflective for both Alternatives One and Two.

Figure 7.4.2-2: Existing and Proposed JSF DT DNL Noise Contours Comparison at NAES Lakehurst

As a result of the Proposed Action, reflected in Table 7.4.2-2, areas on-installation potentially impacted by the 65 dB and greater DNL noise contour would increase by approximately 889 acres (approximately 106%) from 835 to 1,724 acres. Similarly, off-installation areas impacted by the 65 dB and greater DNL noise contour would increase by approximately 150 acres (approximately 197%) from 76 to 226 acres.

Table 7.4.2-2: NAES Lakehurst Comparison Noise Impacts

DNL Contour Bands	Existing Area Acres		Proposed JSF DT Area Acres		Change Area Acres			
	On-Installation	Off-Installation	On-Installation	Off-Installation	On-Installation		Off-Installation	
65–70 dB	476	65	781	204	305	64%	139	214%
70–75 dB	182	9	528	16	346	190%	7	78%
75–80 dB	87	2	239	6	152	175%	4	200%
80–85 dB	82	0	104	0	22	26%	0	0%
85+ dB	8	0	72	0	64	800%	0	0%
65 dB and greater (Total)	835	76	1,724	226	889	106%	150	197%

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).
Note: This is reflective for both Alternatives One and Two.

Community land use for NAES Lakehurst was made available, however, the coverage and resolution was not adequate to be properly represented in a geospatial format. Consequently, identification of land use and residential housing units at NAES Lakehurst was performed through the use of aerial photography. As presented in Figure 7.4.1-2 and Table 7.4.2-3, land uses potentially exposed to noise as a result of the Proposed Action at NAES Lakehurst are comprised of 1,073 acres of vacant and 650 acres of RDT&E land. There would be no residential housing units impacted by the Proposed Action DNL noise contour outside NAES Lakehurst's property boundaries. Therefore, it is anticipated that both populations or incompatible land uses would not be impacted as a result of the Proposed Action.

Table 7.4.2-3: Land Uses (Acres) Affected by the Proposed JSF DT at NAES Lakehurst

Land Use Type	DNL Contour Bands (On-Installation)					
	65dB	70dB	75dB	80dB	85dB	65+dB
Existing Baseline DNL Contour Bands						
RDT&E Mission	194	156	87	82	8	**527**
Vacant	281	26	0	0	0	**307**
Total	**475**	**182**	**87**	**82**	**8**	**834**
With Proposed JSF DT DNL Contour Bands						
RDT&E Mission	132	143	203	100	72	**650**
Vacant	649	384	36	4	0	**1,073**
Total	**781**	**527**	**239**	**104**	**72**	**1,723**
Change						
RDT&E Mission	-62	-13	116	18	64	**123**
Vacant	368	358	36	4	0	**766**
Total	**306**	**345**	**152**	**22**	**64**	**889**

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).
Note: This is reflective for both Alternatives One and Two.

Further analysis was performed to assess potential impacts to noise sensitive receptors (e.g., residences, schools, hospitals) for locations close to or on NAES Lakehurst. This analysis identifies locations where a significant increase in aircraft noise exposure (1.5 dB or greater increases within the 65 dB DNL noise contour or a 3.0 dB increase within the 60 dB DNL contour) would occur when comparing the Proposed Action to the baseline existing environment. The non-residential noise sensitive receptors, as listed in Table 7.4.2-4, are all located far outside the 65 dB and 60 dB DNL noise contours for NAES Lakehurst and found to be significantly distant enough to warrant no further analysis in this EA/OEA. As previously stated, there would be no discernable residential or incompatible land uses located within the Proposed Action 65 dB DNL noise contour. Therefore, no potential significant noise impacts would be anticipated from the proposed JSF DT Program.

Table 7.4.2-4: NAES Lakehurst Non-Residential Noise Sensitive Receptors

Name	Type	Distance (Miles)	Name	Type	Distance (Miles)
B'Nai Israel Memorial Park	Park	10	Manchester Township High	School	5
Beth Medrash Govoha	School	11	North Dover School	School	11
Bethel Church	Historic	9	Oak Street School	School	10
Cassville Crossroads Historic District	Historic	6	Ocean County Jail	Historic	12
Clifton Avenue School	School	11	Rava Farms School	School	6
Community Medical Center	Hospital	11	Riverside Cemetery	Cemetery	11
Community Memorial Hospital	Hospital	10	Saint Gabriel College	School	10
Crawford House	Historic	12	Saint Marys Cemetery	Cemetery	9
DeBow's Church	Place of Worship	10	Saint Vladimir's Church	Place of Worship	6
Emley's Hill Church	Place of Worship	9	Spruce Street School	School	10
Evergreen Cemetery	Cemetery	11	Strand Theatre	Historic	11
Georgian Court	Historic	10	Switlik School	School	7
Georgian Court College	School	10	Sylvia Rosenauer School	School	10
Greenwood Cemetery	Cemetery	11	Toms River Cemetery	Cemetery	10
Hangar No. 1, Lakehurst Naval Air Station	Historic	4	Toms River North High School	School	11
Health South Rehab Hospital	Hospital	10	Torrey-Larrabee Store	Historic	5
Hope Church	Place of Worship	10	West Dover School	School	9
Kimball Medical Center	Hospital	10	Whitesbog Historic District	Historic	8
Lakehurst Elementary School	School	4	Woodlawn Cemetery	Cemetery	11
Manchester School	School	5			

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).
Note: This is reflective for both Alternatives One and Two.

7.5 BIOLOGICAL/NATURAL RESOURCES AT NAES LAKEHURST

7.5.1 Affected Environment

Section 6.3 of the *Environmental Assessment for the Electromagnetic Aircraft Launching System (EMALS) System Development and Demonstration (SDD) Phase at the Naval Air Engineering Station, Lakehurst New Jersey (8 September 2003)* provides additional details regarding biological resources at NAES Lakehurst.. The following is a brief synopsis of the existing biological resources at NAES Lakehurst. All existing biological resources information is derived from the EMALS EA, unless otherwise noted.

NAES Lakehurst is located in the Pinelands of New Jersey, which is one of the first National Reserves in the U.S. and since 1988 has been a U.S. Biosphere Reserve in the United Nations Special Commission

(UNESCO) Man and the Biosphere Program.[205] This internationally important ecological region covers 1.1 million acres and occupies 22% of New Jersey's land area. It is the largest body of open space on the Mid-Atlantic seaboard between Richmond and Boston and is underlain by aquifers containing 17 trillion gallons of water. In 1979, New Jersey formed a partnership with the Federal government to preserve, protect, and enhance the natural and cultural resources of the New Jersey Pinelands. Today, with the Pinelands Comprehensive Management Plan (CMP), the region is protected in a manner that maintains its unique ecology while permitting compatible development.[206]

7.5.1.1 Terrestrial Flora and Fauna

Much of the land within and adjacent to NAES Lakehurst is undeveloped and consequently inhabited by an abundance of wildlife. The New Jersey Pinelands, of which the Installation is a part, supports 39 species of mammals, 299 species of birds, 59 reptile species, 91 fish species, and an estimated 10,000 arthropod species.

Information about plants and animals is provided in this subsection. The discussion on plants is to provide context for animals that may be affected by the Proposed Action. Table 7.5.1.1-1 lists threatened and endangered species at NAES Lakehurst, as discussed in further detail within this subsection.

[205] *UNESCO 2003*
[206] *New Jersey Pinelands Commission 2004*

Table 7.5.1.1-1: Federal or State Listed Threatened or Endangered Species Occurring on NAES Lakehurst

Common Name ***Scientific Name***	**Federal Status**	**State Status**
Birds		
Bald eagle *Haliaeetus leucocephalus*	T	E
Barred owl *Strix varia*		T
Bobolink *Dolichonyx oryzivorus*		T
Cooper's hawk *Accipiter cooperii*		T
Dickcissel *Spiza americana*		EX
Grasshopper sparrow *Ammodramus savannarum*		T
Henlow's sparrow *Ammodramus henslowii*		E
Northern harrier *Circus cyaneus*		E
Osprey *Pandion haliaetus*		T
Savannah sparrow *Passerculus sandwichensis*		T
Upland sandpiper *Bartramia longicauda*		E
Vesper sparrow *Pooecetes gramineus*		E
Reptiles and Amphibians		
Bog turtle *Clemmys muhlenbergii*	T	E
Corn snake *Elaphe g. guttata*		E
Pine Barrens treefrog *Hyla andersonii*		E
Northern pine snake *Pituophis m. melanoleucus*	C2	T
Plants		
Knieskern's beaked rush *Rhynchospora knieskernii*	T	E
Two-flowered bladderwort *Utricularia biflora*		E

Source: Draft EA C-17 2005.

Legend: E = Endangered, T = Threatened, EX = Extracted, C2 = Candidate 2 Species

Plant Species

Principle types of timber in the NAES Lakehurst area are the pitch pine (Pinus rigida) and black oak (Quercus prinus). Runway areas are surrounded by old field/maintained grasslands.[207] Much of the grassland area is dominated by native warm season grass species, with few woody and broad-leaved herbaceous species present. Upland areas are dominated by native grasses including broom sedge (Andropogon virginicus), switchgrass (Panicum virgatum), and little bluestem (Schizachyrium scoparium). Weeping lovegrass, (Eragrostis curvula) a non-native species, had been widely planted at the test runway. The grasslands in the drop zone, and around Westfield and the test runway, constitute an important New Jersey breeding habitat for state-listed threatened and endangered grassland bird species. To reduce BASH, NAES Lakehurst maintains its grasslands surrounding the runways at a height of at least seven inches, which reduces the presence of larger birds that pose strike hazards. This grass height is also favorable to smaller ground nesting birds that are state-listed threatened or endangered species.

Two plant species of concern are known to occur on NAES Lakehurst: Knieskern's beaked rush (Federally-listed threatened and state-listed endangered) and the two-flowered bladderwort (state-listed endangered). The Knieskern's beaked rush occurs in early successional wetlands, often on bog-iron substrate or mud deposits, while the two-flowered bladderwort prefers the open waters of ponds and streams.

Mammal Species

Thirty-seven species of mammals are known or expected to occur on NAES Lakehurst.[208] The entire habitat surrounding the runway is considered undeveloped and comprised of maintained grasslands, upland forest, and some open water areas. The white-tailed deer (*Odocoileus virginianus*) is the most prominent large mammal of the Pine Barrens today. Deer are common throughout the region in nearly all habitat types. Though woodchucks (*Marmota monax*) are reportedly rare in the Pine Barrens, they are abundant in the open grassland habitat and roadsides at the Installation.

Bird species

At least 85 species of birds breed or overwinter on NAES Lakehurst, and some are listed by the state as endangered or threatened.[209] These birds include the Grasshopper sparrow (*Ammodramus savannarum*) (state-listed threatened), Upland Sandpiper (*Bartramia longicauda*) (state-listed endangered), Vesper Sparrow (*Pooecetes gramineus*) (state-listed endangered), Henslow's Sparrow (*Ammodramus henslowii*) (state-listed endangered), and Savannah sparrow (*Passerculus sandwichensis*) (state-listed threatened). A complete list of bird species of concern is included in Table 7.5.1.1-1.

Reptiles and amphibian species

Eighteen reptile and ten amphibian species have been observed on NAES Lakehurst. During a March 2002 field survey of the catapult test area, a single Northern Spring Peeper (tree frog) (*Pseudacris c. crucifer*) was heard near the water-saturated low areas adjacent to the wetlands on the south side of the test runway. This species breeds between March and June with the start of warm rains.[210] Reptile species

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207 *NJDEP 2003*

208 *Draft EA C-17 2005*

209 *Ibid*

210 *USGS*

include the Bog turtle (*Clemmys muhlenbergii*) and the Northern pine snake (*Pituophis m. melanoleucus*), as discussed in the next subsection.

Other Species of Concern

According to the New Jersey Natural Heritage Network Database, Federally- and state-listed threatened and endangered species are likely to occur at NAES Lakehurst; a complete list is included in Table 7.5.1.1-1. No critical habitat has been designated on NAES Lakehurst under ESA for any of the three Federally-listed species that may occur on the Installation. Additionally, none of the Federally-listed species have been documented within the grasslands associated with the existing runways, and the habitat immediately surrounding the runways is unlikely to support any of the Federally-listed species.[211]

The Bog turtle is a Federally-listed threatened and state-listed endangered species found in wetland habitats. The only known occurrence of the Bog turtle at NAES Lakehurst is approximately three miles northeast of the catapult site. The Northern pine snake, a state-listed threatened species, prefers sandy soils and pine forests. The Northern pine snake population is relatively abundant at NAES Lakehurst and snakes are occasionally sighted crossing taxiways and roads in the western portion of the Installation.[212] However, there are no known pine snake dens or nests within a quarter mile of the catapult site. Since the range of the Northern pine snake can be many miles, the fields may be used for foraging for food, such as field mice and other small rodents or birds.

A variety of state-listed grassland bird species may be present, primarily in grasslands surrounding the airfields and in the Drop Zone, including the Grasshopper sparrow (state-listed threatened), Upland Sandpiper (state-listed endangered), Vesper Sparrow (state-listed endangered), Henslow's Sparrow (state-listed endangered), and Savannah sparrow (state-listed threatened).[213] These birds nest in the extensive grassland areas on NAES Lakehurst, including those associated with the catapult test runway. Since 1999, standardized surveys covering 58 permanent survey points have been conducted annually to monitor populations of these birds by counting individual birds seen or heard. Results of these survey points have shown the grasshopper sparrow to be the most commonly found rare species. Upland sandpipers, savannah sparrow, vesper sparrow, and Henslow's sparrow have been observed but in much fewer numbers (one to nine individuals depending on the species). Migrant bobolinks and dickcissels have not been observed on the Installation in recent years.[214]

7.5.2 Environmental Consequences

Proposed JSF DT activities that would occur at NAES Lakehurst under either Proposed Action alternative include: catapults capability/steam ingestion, E28 arresting gear roll-ins/MK 7 roll-ins, and barricade. Most of the proposed JSF DT activities would occur on the ground using existing ground support facilities. No effect on biological/natural resources would be anticipated from these ground-related activities. Proposed JSF DT activities with the greatest potential for impacts to biological/natural resources, because they are expected to include F-35 flights below 3,000 feet, are as follows:

- During catapults capability/steam ingestion tests, approximately 13 short duration flights over the test stands on the airfield would occur.

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211 *Draft EA C-17 2005*
212 *Joyce 2002*
213 *enature.com 2003*
214 *Draft EA C-17 2005*

- During E28 arresting gear roll-ins/MK 7 roll-ins, approximately 18 short duration flights over the test stands on the airfield would occur.

Thus, potential effects on biological/natural resources on NAES Lakehurst from the proposed JSF DT would be limited to potential noise-induced effects and BASH during landings and takeoffs.

Due to the small number and short duration of flights at NAES Lakehurst and their localization above the test stands on the airfield, the proposed JSF DT would not likely have a significant impact on any biological/natural resources. As shown in Table 7.4.2-2 and Figure 7.5.2-1, the change in land area impacted by the 65 dB level or greater increases with the proposed JSF DT. The total amount of undeveloped space impacted by the proposed JSF DT at a 65 dB level or higher would more than triple from the existing baseline (from 308 acres to 1,073 acres). The proposed JSF DT would introduce noise to the southwest of the runway, where baseline noise currently does not occur at these levels. Individuals of the state-listed threatened and endangered and other grassland bird species that nest and forage in proximity of the runway might exhibit a startle response if they are not accustomed to aircraft noise. These species may be minimally impacted, but no permanent behavioral or physiological effects are anticipated from the proposed JSF DT. Though the proposed JSF DT associated noise contours would overlay existing open water areas, effects on bald eagles are not anticipated as no known nest sites or areas of frequent use occur in the area. Small portions of the JSF contour overlay the Manchester Fish and Wildlife Management Area to the south of the Installation. Habitats included in the management area are pitch-pine, scrub oak and cedar swamps. The area is managed for multiple uses including mountain biking, hiking, bird watching, and hunting for deer, small game and turkey. The proposed JSF DT at NAES Lakehurst is estimated to affect only 30.76 acres (1.0%) of the 2,396 acre management area. As such, no impact is anticipated to the management area, its wildlife, habitat, or multiple uses.

The proposed JSF DT noise impact areas are not associated with any known bog turtle habitat and, therefore, would have no expected affect on the species. Noise contours associated with the proposed JSF DT would introduce noise over the southwest portion of the Installation where three known Northern pine snake den sites occur within the proposed 65 dB–70 dB contour. Impacts on this species from noise related to aircraft overflights would likely be minimal to negligible. Food sources for the Northern pine snake might be temporarily startled by the overflight noise, but is expected to adapt quickly to the noise. Thus, no effects would be anticipated on any Federally- or state-listed endangered or threatened species.

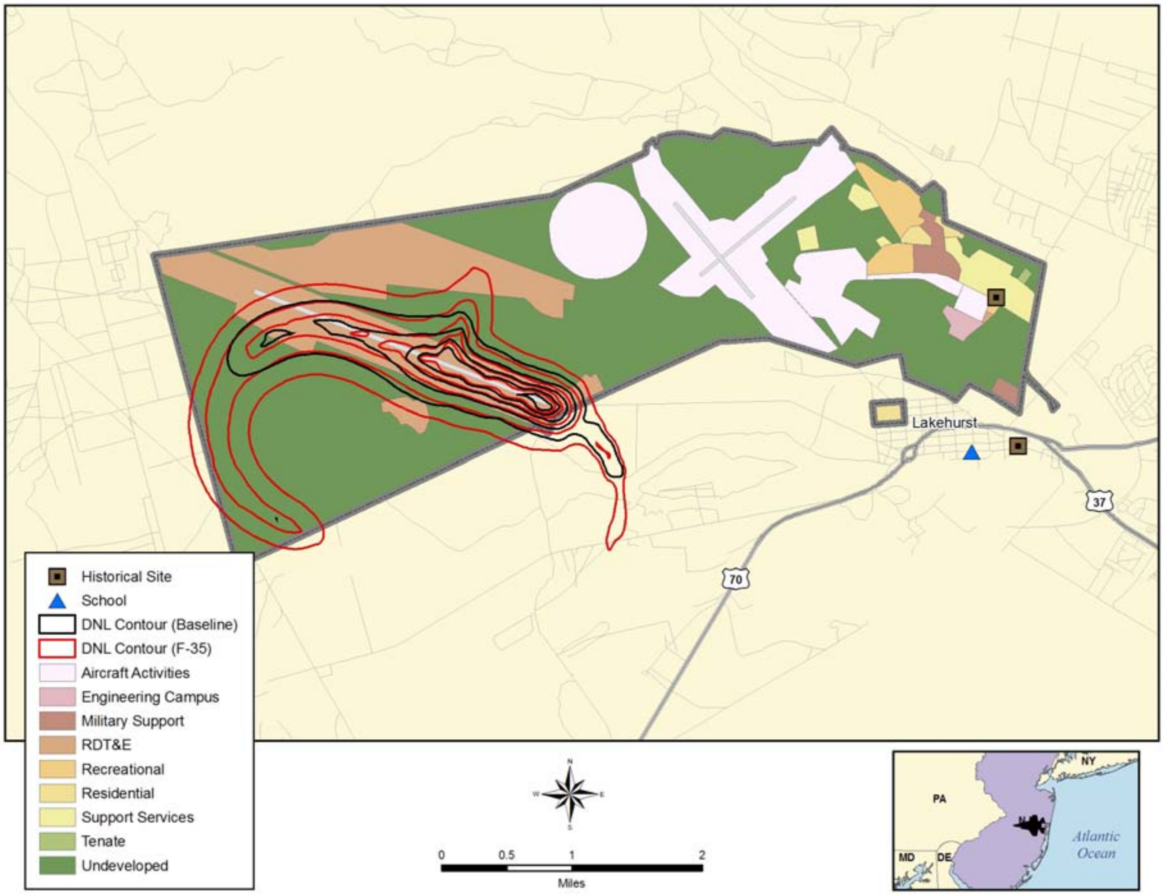


Figure 7.5.2-1: Noise Contour with Land Use Map

7.6 SOCIOECONOMICS AT NAES LAKEHURST

7.6.1 Affected Environment

The socioeconomic study area for NAES Lakehurst encompasses Burlington and Ocean Counties in New Jersey, as illustrated in Figure 7.6.1-1. The proposed JSF DT at NAES Lakehurst does not require permanent, dedicated employees stationed at the Installation. Rather, required DT personnel would DET from NAS Patuxent River during the varied two to four week test activities at NAES Lakehurst. Therefore, this Section of the EA/OEA does not address the existing baseline for demographics, housing, and schools. It focuses only on environmental justice, economic, and infrastructure existing baselines.

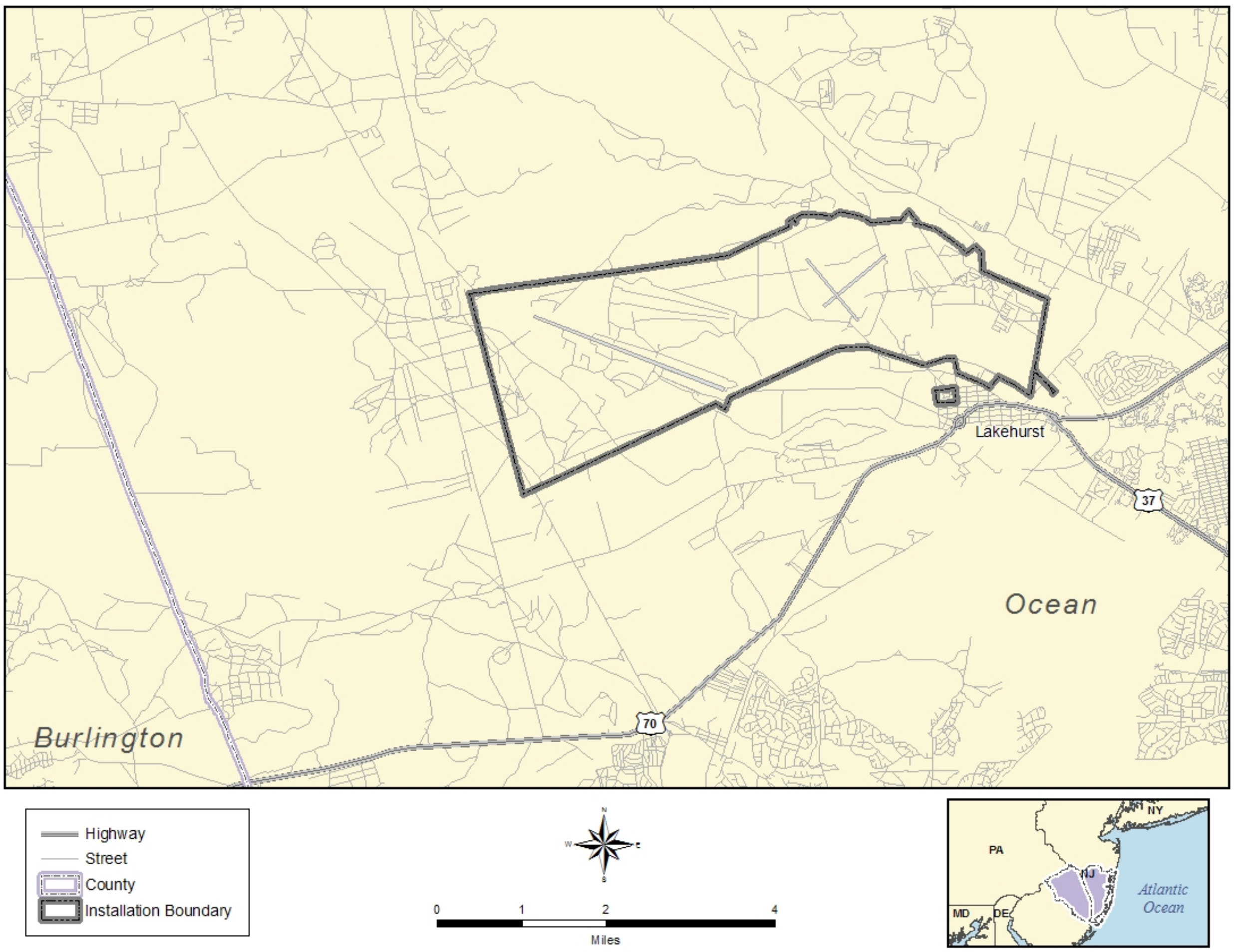


Figure 7.6.1-1: NAES Lakehurst Socioeconomic Study Area

7.6.1.1 Environmental Justice

Poverty rates, ethnicity, and census tracts/blocks, as illustrated in Figure 7.6.1.1-1, in the vicinity of NAES Lakehurst are used to support the environmental justice analysis.

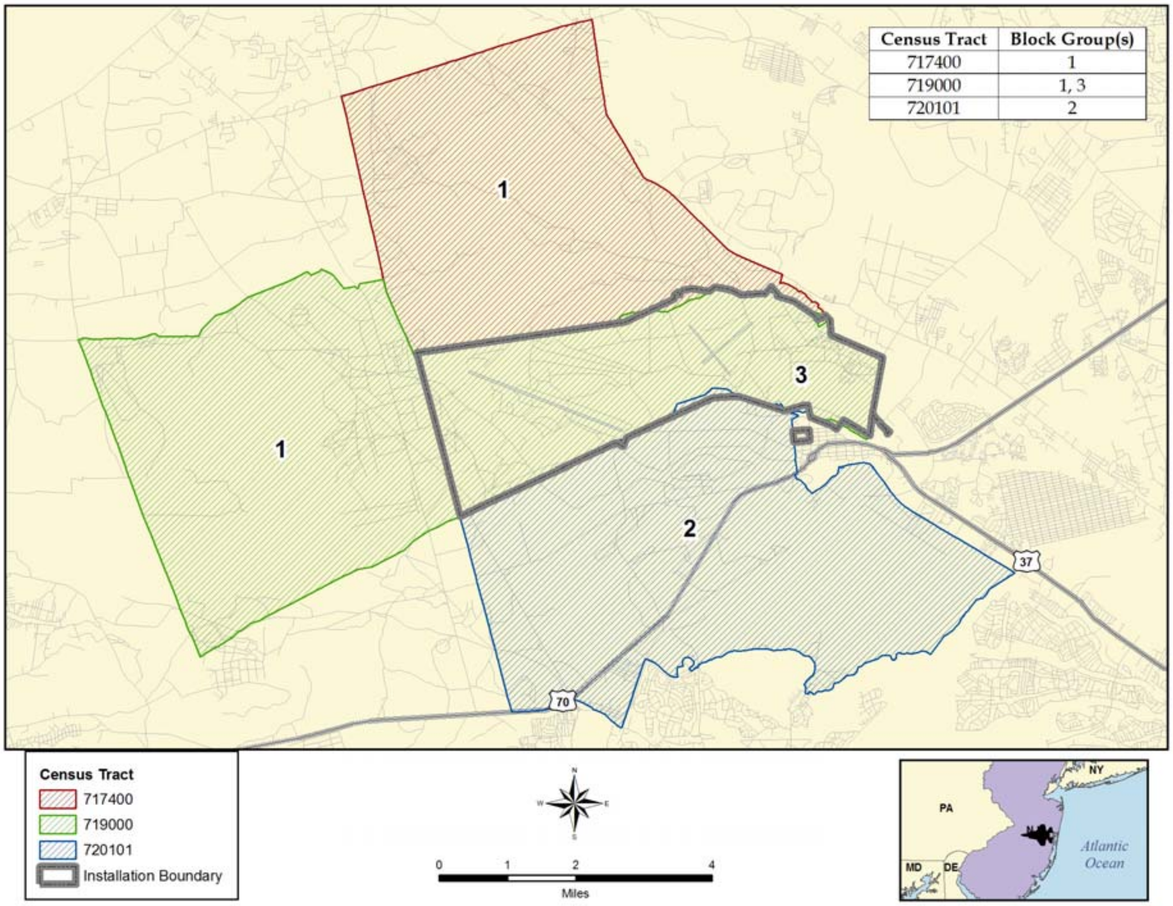


Figure 7.6.1.1-1: Environmental Justice Block Groups in Census Tracts for the NAES Lakehurst Socioeconomic Study Area

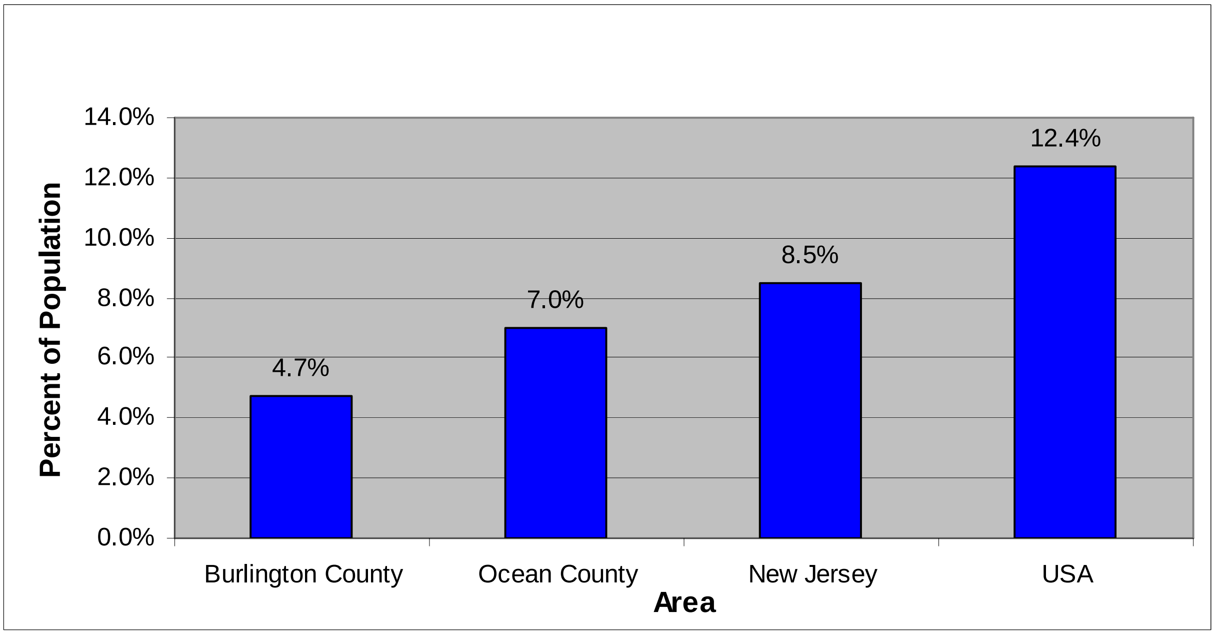
Poverty rates by the block groups in census tracts for the vicinity of NAES Lakehurst fall below the set threshold of 25% (See Section 3.4 of this EA/OEA) and are summarized in Table 7.6.1.1-1.

Table 7.6.1.1-1: Poverty Rates by Block Groups for Census Tracts for NAES Lakehurst Socioeconomic Study Area

County	Census Tract #	Block Group #	Total Block Group Population (1999)	Persons Living in Poverty (1999)	Total Average Poverty Rate
Ocean	717400	1	773	9	1.2%
Ocean	719000	1	N/A	N/A	N/A
Ocean	719000	3	290	47	16.2%
Ocean	720101	2	1,724	131	7.6%
Totals			***2787***	***187***	***6.7%***

Source: 2000 Census; American FactFinder; 1999 Census Data by Tract number: Census 2000 Summary File 3 (SF 3) - Sample Data, Detailed Tables; P.87.

The poverty rate in the NAES Lakehurst area is lower (4.7%) than the surrounding county (7.0%) and New Jersey statewide estimates (8.5%), as summarized in Figure 7.6.1.1-2. Poverty rates are well below the set threshold of 25% used to identify environmental justice populations.



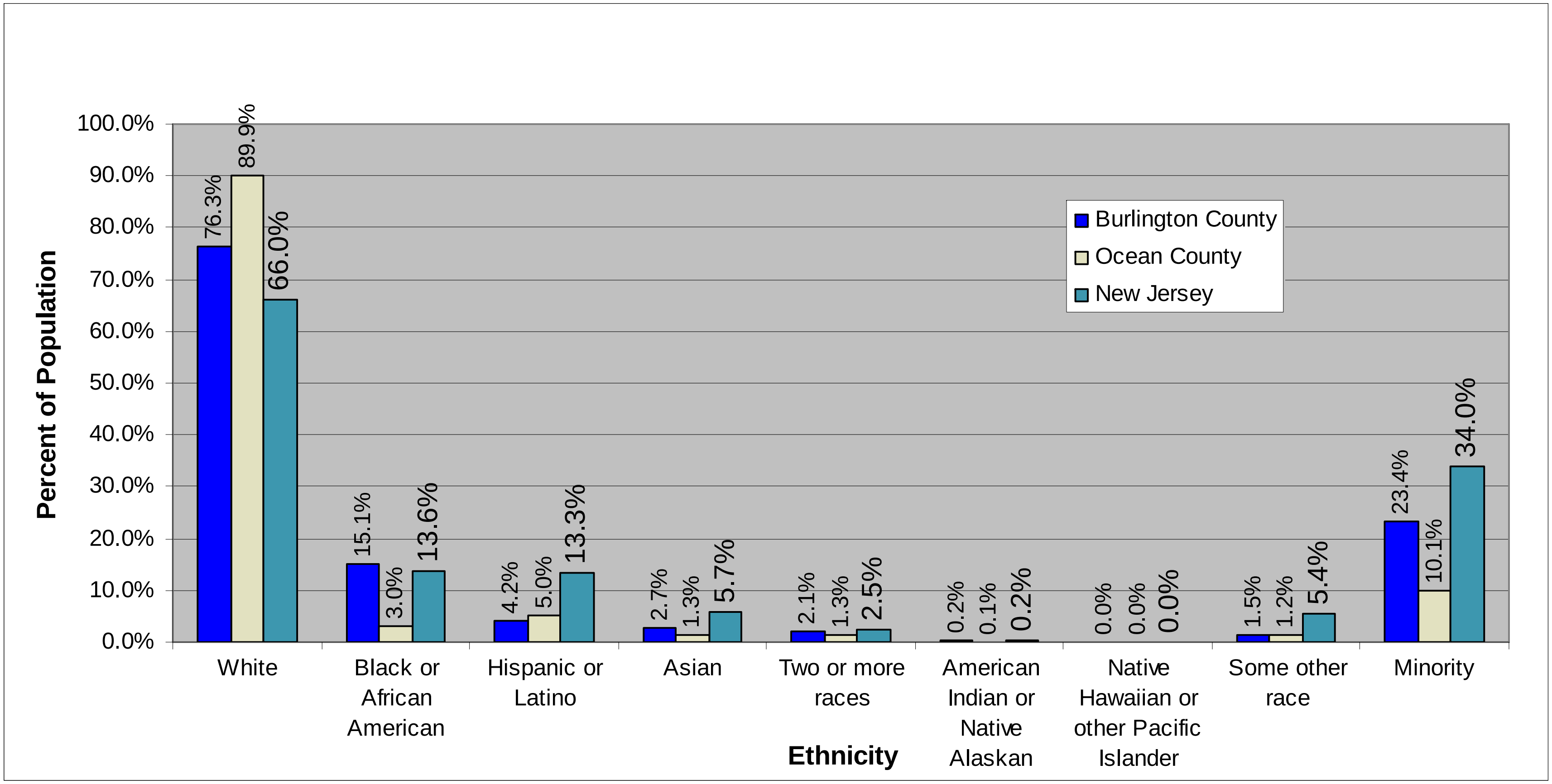
Source: U.S. Census Bureau 2000.

Figure 7.6.1.1-2: Poverty Rates for NAES Lakehurst Socioeconomic Study Area (2000)

Population ethnicity in the NAES Lakehurst area is summarized in Figure 7.6.1.1-3 and is comprised of predominantly White populations (82.6%). The remaining population distribution in the area is Black or African American (7.5%), Hispanic or Latino (5.9%), Asian (2.1%), two or more races (1.4%), American Indian or Native Alaskan (0.2%), Native Hawaiian or other Pacific Islander (0.1%), and some other race (0.0%). The ethnic representation in the area resembles race distribution for the greater Burlington and Ocean Counties and New Jersey.

The overall total minority populations in the NAES Lakehurst socioeconomic study area (17.4%) is lower than Burlington County (23.4%) and New Jersey (34%), but higher than the Ocean County minority population (10.1%).[215] These levels are well below the CEQ threshold of 50% for minority populations, which is used to identify environmental justice populations. Ethnicity populations by census tracts/blocks are also below the CEQ threshold of 50% for minority populations and are summarized in Table 7.6.1.1-2.

[215] *Census Bureau 2000*



Source: U.S. Census Bureau, 2000.

Note: The percent of the population by ethnicity for the study area will not equal the average of the counties' percent of the population by ethnicity because denominators (county populations) are not common to all.

Figure 7.6.1.1-3: Ethnicity for NAES Lakehurst Socioeconomic Study Area

Table 7.6.1.1-2: Ethnicity by Block Groups in Census Tracts for NAES Lakehurst Socioeconomic Study Area

Census Tract #	Block Group #	White	Black or African American	American Indian and Alaska Native alone	Asian Alone	Hawaiian or other Pacific Islander	Other	Multiple Race	Hispanic	Total Minority Population
717400	1	91.0%	0.6%	0.0%	0.8%	0.0%	0.0%	1.1%	6.5%	9.0%
719000	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
719000	3	62.3%	20.2%	0.9%	5.2%	0.4%	0.0%	2.0%	9.0%	37.7%
720101	2	86.4%	7.3%	0.0%	1.8%	0.0%	0.0%	1.4%	3.0%	13.6%

Source: Census Bureau 2000.

7.6.1.2 Economic Characteristics[216]

NAES Lakehurst and its tenants contribute approximately $781.03 million to the economy in and outside New Jersey. Economic contributions are attributed to $10.09 million from MILCON for renovations; $442.5 million for operating expenses such as supplies, construction, maintenance, and utilities; $202.04 million for the total payroll; an estimated $126 million in spouse income; and $0.4 million in Federal Impact Aid to the NAES Lakehurst School District. Approximately $370 million of the total contributions remain in New Jersey. Economic contributions that remain in New Jersey are attributed to $67.47 million in operating expenses such as supplies, construction, and maintenance; $176.08 million for the New Jersey payroll; $126 million in estimated spouse income; and $0.4 million in Federal Impact Aid to the NAES Lakehurst School District.

7.6.1.3 Infrastructure

Transportation[217]

NAES Lakehurst is accessible via Route 547 and/or State Route 70, which traverses Ocean County from east to west. Route 547 is a two-lane highway, which typically becomes crowded during rush hour traffic. State Route 70 is a two-lane highway that becomes heavily congested during the typical rush hour periods. Neither route is under construction at this time.

7.6.2 Environmental Consequences

Socioeconomic impacts to local economies and population levels may occur with the implementation of the Proposed Action alternatives, which is expected to temporarily send 75 personnel (25 military and 50 civilian) to NAES Lakehurst from NAS Patuxent River. Personnel are expected to reside at local hotels during the two to four week DETs.

Potential socioeconomic impacts for NAES Lakehurst were evaluated using the EIFS model. This input-output model was developed specifically to analyze community impacts of Installation activities and can be used to assess potential impacts and their significance on four elements of a local economy: business volume, employment, personal income and population.[218] Projected changes that fall outside of

216 *Previte 2004*
217 *ibid*
218 *Bragdon, Katherine and Webster, Ron 2001*

these accepted boundaries (referred to as established significance criteria ranges) are considered significant.

The projected number of military and civilian employees and their average salaries for the NAES Lakehurst socioeconomic study area is summarized in Table 7.6.2-1. Estimated employment is based on discussions with the JSF V&T Team Lead at NAS Patuxent River and the December 2003 JSF Manning charts. Average civilian salaries were estimated with information from the U.S. BEA, while military salaries were estimated using the Monthly Basic Pay Table published by the OSD for P&R. Table 7.6.2-1 also summarizes the ROI where impacts would likely occur. The ROI was determined by considering a number of factors. In general, the definition requires local knowledge of the area and a general understanding of where people shop, work, play, and live. For example, a study by Gunther concluded USAF personnel tended to live within 50 miles of the base where they worked.[219]

Table 7.6.2-1: Proposed JSF DT Military/Civilian Employment and Salaries at NAES Lakehurst

Study Area	Employees		Average Salary ($)		Region of Influence
	Civilian	Military	Civilian	Military	
NAES Lakehurst	50	25	$76,200	$62,623	Burlington and Ocean Counties, NJ

Results from the EIFS model are reflected in Table 7.6.2-2. These impacts would be considered insignificant according to the established criteria.

Table 7.6.2-2: Forecasted Output from the EIFS Model for Proposed JSF DT at NAES Lakehurst

NAES Lakehurst	
Business Volume	$14,243,160
Percent Change of Total Area Business Volume	0.03%
Business Volume Significance Criteria Range	-7.39% to 13.57%
Income	$6,824,870
Percent Change of Total Area Income	0.03%
Income Significance Criteria Range	-4.6% to 11.21%
Employment	122
Percent Change of Total Area Employment	0.03%
Employment Significance Criteria Range	-3.77 % to 3.63 %
Population	187
Percent Change of Total Area Population	0.02%
Population Significance Criteria Range	-0.43% to 3.47%

The short duration of the proposed JSF DT personnel into the NAES Lakehurst area would not likely cause large revenue or quality of life changes to economic characteristics or infrastructure in the local communities. The temporary additional economic activity would be a very small percentage of the total employment in the area (0.03%). Business volume and personal income would be expected to increase by 0.03%. All four elements (employment, population, business volume, and personal income) fall within the significance criteria range established by the EIFS model, which means no significant impacts to socioeconomics would be anticipated from implementing the Proposed Action at NAES Lakehurst.

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219 *Gunther, W., 1992*

Socioeconomic impacts from the Proposed Action is not expected to be significant for environmental justice populations within the communities surrounding NAES Lakehurst. Based on the threshold criteria for minority or low-income populations presented in Section 7.6.1.2 and the noise analysis in Section 7.4.2, the proposed JSF DT would not likely cause disproportionate high and adverse human health environmental affects to environmental justice populations relative to other populations in the area. Figure 7.6.2-1 further illustrates the noise contours in relation to the census tract and block groups for the surrounding populations at NAES Lakehurst. Land use within the noise contours reflected in Section 7.4.2 of this EA/OEA is predominantly comprised of RDT&E mission activities or vacant. Only one home would be located within the Proposed Action DNL. Therefore, negligible impacts to environmental justice populations would be anticipated from the Proposed Action. Similarly, implementation of the proposed JSF DT at NAES Lakehurst would cause no disproportionately adverse health or safety risks to children. Noise and air quality analysis has shown that no potentially significant impacts to any sensitive receptors (including hospitals, schools, and daycare facilities) where a disproportionately large population of children may be present would be expected to occur.

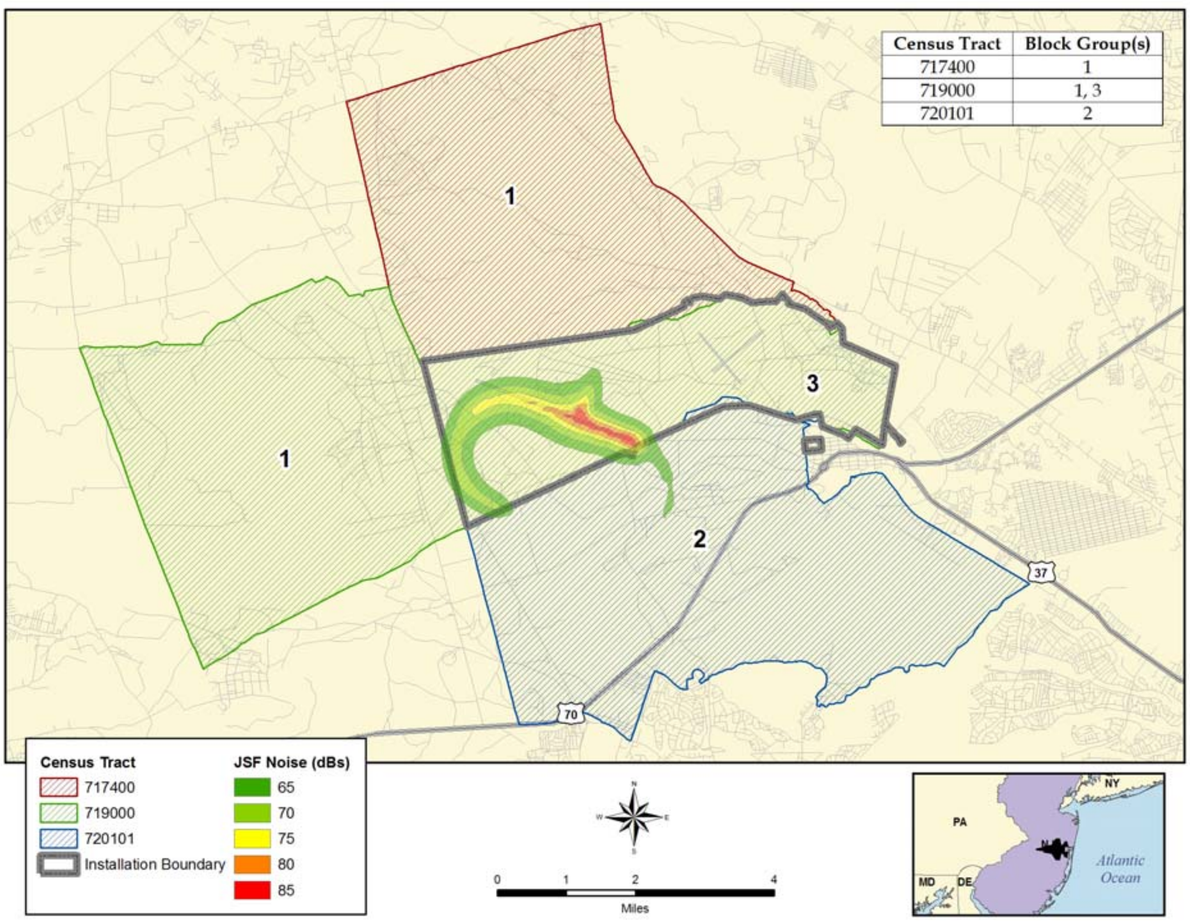

Figure 7.6.2-1: Proposed JSF DT Noise Contour to Census Tracts and Block Groups in the NAES Lakehurst Socioeconomic Study Area

7.7 CUMULATIVE IMPACTS

The CEQ's implementation of regulations for NEPA defines cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."[220]

Since the direct and indirect impact analysis focused only on those resources that may be impacted by the Proposed Action (air quality, noise, biological/natural resources, and socioeconomic factors), the cumulative impacts analysis addresses these same resources. Only activities with the potential to interact with the Proposed Action are addressed together with past and present activities. Because the level of detail varies among future actions, a qualitative analysis is used so that all projects can be evaluated consistently with the best available information. The following actions, listed in Table 7.7-1, are either on-going or reasonably foreseeable future proposed projects at NAES Lakehurst. The impacts of past actions are reflected in the current baseline environment (the as is condition).

Table 7.7-1: On-Going and/or Future Actions at NAES Lakehurst

Actions	Time Period
C-17 Assault Landing Zone	FY 2006
New Jersey Army National Guard Consolidated Logistics and Training Facility (CLTF)	Late FY 2006
Army National Guard Aviation Consolidation	January 2007
Electromagnetic Aircraft Launching System	On-Going

In addition to the proposed list of actions in Table 7.7-1, Proposed Actions associated with the 2005 BRAC decisions for NAES Lakehurst may have the potential for cumulative impacts on the resources analyzed in this EA/OEA. These actions include the consolidation of NAES Lakehurst Installation management functions; establishment of the Joint Base McGuire-Dix-Lakehurst, New Jersey; and the loss of activities associated with rotary wing air platform development, acquisition, and T&E functions. A net loss of 132 military and 54 civilian personnel would be anticipated.[221] No construction or operational changes associated with these BRAC decisions are anticipated at this time, so no cumulative significant negative impact would be expected.

For the above actions, associated EAs have been used in support of determining potential cumulative impacts from the proposed JSF DT. A brief synopsis of these EAs follows:

- *Environmental Assessment for the East Coast Basing of the C-17 Aircraft*—As part of this action, the construction of a proposed Landing Zone (LZ) is proposed. The LZ would be 3,500 feet long and 90 feet wide with 300 feet overruns at each end. The LZ would be constructed parallel to the existing Runway 06/24 with 300 feet between the edge of the runway and the edge of the LZ. Existing grassland is to the immediate north of Runway 06/24, an area in which two bird species listed by the State of New Jersey have been documented. NAES Lakehurst plans to establish

[220] *40 CFR 1508.7*

[221] *2005 DoD Recommendations for Defense Base Closure and Realignment Commission, Appendix C; BRAC 2005 Closure and Realignment Impacts by State*

habitat for these two birds in other areas of the Installation to offset the loss of grassland due to the construction of the LZ.[222]

- *Environmental Assessment for the Construction and Operation of the Proposed Consolidated Logistics and Training Facility (CLTF) at the Lakehurst Naval Air Engineering Station*—The primary potential minor impacts of concern are to biological habitat, wetlands, and a local traffic route. Minor, short-term impacts from vehicle noise and fugitive dust emissions are anticipated during construction of the CLTF, but no long-term impacts are expected. There are no airspace or aircraft noise issues associated with CLTF.[223]

- *Environmental Assessment for Relocation and Consolidation of the New Jersey Army National Guard (NJARNG) Army Aviation Support Facility (AASF)*—The NJARNG has proposed relocating aviation assets from both AASF's to Buildings 129, 307, and 608 at NAES Lakehurst, an action that would achieve consolidation of the modernized helicopter fleet. The AASF #1 facilities at Mercer County Airport will continue to operate fixed wing aircraft assets, including C-12 and C-23 aircraft, while the AASF #2 facilities at Picatinny Arsenal will be retained by the NJARNG for use as a Field Maintenance Shop to support ground vehicle maintenance operations. The proposed NJARNG consolidation is anticipated to achieve more efficient operation of the rotary wing aircraft, as well as bring supported units closer to their existing New Jersey training sites at Fort Dix, NAES Lakehurst, Warren Grove Range, and the Coyle Drop Zone. Under the NJARNG's Proposed Action, rotary wing aircraft training would continue at the existing training sites and specific training activities would not change.[224]

- *Environmental Assessment for the Electro-Magnetic Aircraft Launching System (EMALS) System Development and Demonstration Phase (SDD) at NAES Lakehurst*—This action involves constructing, testing, and operating a full-size EMALS. This action included construction of an underground facility to house the electromagnetic catapult, an above-ground control building, widening of the NAES Lakehurst test runway, installation of a brake-rail system, creating an access drive and service parking area, extension of utilities to the site, expansion of the existing equalization basin for the industrial wastewater treatment system, addition of a closed-loop cooling tower, construction of a 20 space parking lot, and the interior renovation of an existing office space. Testing would entail catapult shots of test vehicles and aircraft. During the first year of testing, a maximum of 6,000 test vehicle and 500 aircraft shots would be conducted. The proposed sites for EMALS are adjacent to current steam-based catapult operations, and noise and aircraft flights would be within existing contours.[225] Construction of this system would be completed prior to the proposed JSF DT.

Based on past and on-going levels of RDT&E, current and future actions at NAES Lakehurst are not anticipated to exceed current flight operation levels. Follow-on testing would continue, but at an expected lower rate than currently. Flight operation levels would not be expected to significantly increase beyond current levels, nor are significant deviations in flight lines or airspace use anticipated, thus providing minimal potential for cumulative impacts.

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222 *EAC-17 Aircraft* 2005
223 *New Jersey Army National Guard* 2005
224 *ibid*
225 *NAVAIR* 2003

Implementation of the proposed JSF DT at NAES Lakehurst would result in minimal cumulative impacts to air quality. The qualitative cumulative air quality analysis conducted for this EA/OEA concluded proposed JSF DT emissions would predominantly be transitory, site-specific, and not cumulatively significant. The air quality impacts are small enough to be considered *de minimis* and would leave the existing environmental conditions essentially the same if the Proposed Action is implemented for both alternatives. The primary criterion for determining whether an action has significant cumulative impacts is whether the project is consistent with an approved plan in place for the region where the pollutants are being emitted. The proposed JSF DT would comply with approved air quality planning documents/ permits at NAES Lakehurst to help the area attain and maintain the national and state ambient air quality standards for criteria pollutants.

Analysis of proposed future programs that potentially could result in additional aviation noise in the foreseeable future at NAES Lakehurst include basing of the C-17 aircraft, the relocation and consolidation of the NJARNG AASF, and EMALS SDD. Both the proposed C-17 and NJARNG AASF actions would be primarily confined to the main airfield at NAES Lakehurst. Furthermore, both actions were estimated to have negligible to no impact on the surrounding population or noise environment.[226] [227] Only the EMALS SDD would occur in the same location as the proposed JSF DT. In the EMALS SDD EA/OEA, it was anticipated EMALS equipment would generate high levels of noise during operation, which could be abated through both insulation and worker hearing protection. However, no noise impacts to the surrounding populations or noise environment would be anticipated.[228]

Development of NAES Lakehurst existing baseline and Proposed Action noise contours assumed an average catapult and arresting gear testing schedule based on the testing years of 1993-2003. The testing schedule presented in the EMALS EA established that testing of this system would be conducted in 2007, before the proposed JSF DT. Conversations with NAES Lakehurst personnel regarding planned and future aircraft testing operations confirmed that, by assuming an average testing schedule for NAES Lakehurst, additional unidentified testing programs would be reasonably accounted for in the Proposed Action testing years. Accordingly, any cumulative impacts of the proposed JSF DT, in addition to proposed future programs, would not likely result in significant noise impacts in the vicinity of NAES Lakehurst.

Under either alternative, the proposed JSF DT would not produce any significant cumulative impacts to biological/natural resources. The proposed East Coast Basing of the C-17 Aircraft EA analyzed the impacts of developing a LZ for the C-17 at NAES Lakehurst. Construction of the proposed LZ would begin in 2006. Approximately eight acres of maintained grassland would be converted to the LZ and associated taxiway. As long as the mitigation measures that are implemented for the C-17 action restore equivalent acreage of old degraded asphalt areas in other parts of the Installation, no significant impacts to biological/natural resources, including threatened and endangered species, would be anticipated from the C-17 actions. Similarly, new construction associated with the EMALS would occur on or adjacent to existing airfield paving. The resulting loss of approximately four acres of state-listed grassland bird habitat would be mitigated by removal of an equal area of former airfield paving, allowing a defragmentation of existing habitat. Therefore, there would be no significant impact to grassland bird habitat. Both NJARNG and CLTF proposed projects would not occur in the same location of NAES Lakehurst as the proposed JSF DT. Flight operations associated with the aviation consolidation would actually reduce overall transit time to existing training areas, and would not be anticipated to deviate from current NAES flight tracks. There is no affect anticipated to any protected species from the

[226] *New Jersey Army National Guard 2005*
[227] *Draft EA C-17 2005*
[228] *NAVAIR 2003*

Proposed Action, and no significant unmitigated impacts are anticipated from the actions described in Table 7.7-1. No significant cumulative effect to biological/natural resources, including Federally- and state-listed endangered and threatened species, would be anticipated from the Proposed Action and other past, present or reasonably foreseeable programs.

Under either alternative, the proposed JSF DT would not produce any significant impacts to socioeconomic resources. The temporary arrival of personnel supporting the proposed JSF DT, along with other reasonably foreseeable future actions (such as the C-17 Program), do have the potential to cumulatively impact the immediate area surrounding the Installation. The nature of the proposed JSF DT and other programs would result in gradual increases and decreases of personnel and related workforce population. Though the changes in personnel would cause a minor, positive temporary impact on employment income and other economic indicators from the proposed JSF DT DETs, no significant or permanent impact would be anticipated. No regional cumulative socioeconomic impacts would be anticipated as well. Based on the noise analysis, the proposed JSF DT and existing baseline for NAES Lakehurst is not anticipated to significantly impact the surrounding communities and environmental justice populations. The proposed JSF DT changes the existing noise impact areas slightly off-installation. Since there is no affect anticipated to any biological/natural resources (including protected species), as well to environmental justice populations, no significant cumulative effect would be expected from the Proposed Action alternatives.

8.0 LM AERO

8.1 LM AERO GENERAL INFORMATION

LM Aero is a Government-Owned, Contractor-Operated (GOCO) industrial facility contiguous with NAS Joint Reserve Base (JRB) Fort Worth, Texas. LM Aero, as depicted in Figure 8.1-1, is located in Tarrant County, Texas (an urban county located in the north central part of Texas). Fort Worth is the county seat for Tarrant County with a population of approximately 1.4 million citizens. Tarrant County is one of the fastest growing urban counties in the U.S.[229]

LM Aero is the leaseholder of Air Force Plant (AFP) #4, where manufacturing and production of the F-35 is occurring. These production activities were previously analyzed and categorically excluded by the JPO PEO. In addition, construction at AFP #4 to accommodate the manufacturing of the F-35 was also previously analyzed by the USAF in an EA resulting in a Finding of No Significant Impact (FONSI). LM Aero facilities and the airspace and runway of NAS JRB support a variety of aircraft tests, training, and operations. The STOVL facility, which would be used for the proposed JSF DT (Alternative Two), is located in the northeastern area of the AFP #4 property. Facility assets at LM Aero include a hover pit and harden tarmac space to support proposed F-35 STOVL tests.

[229] *Tarrant County 2004*

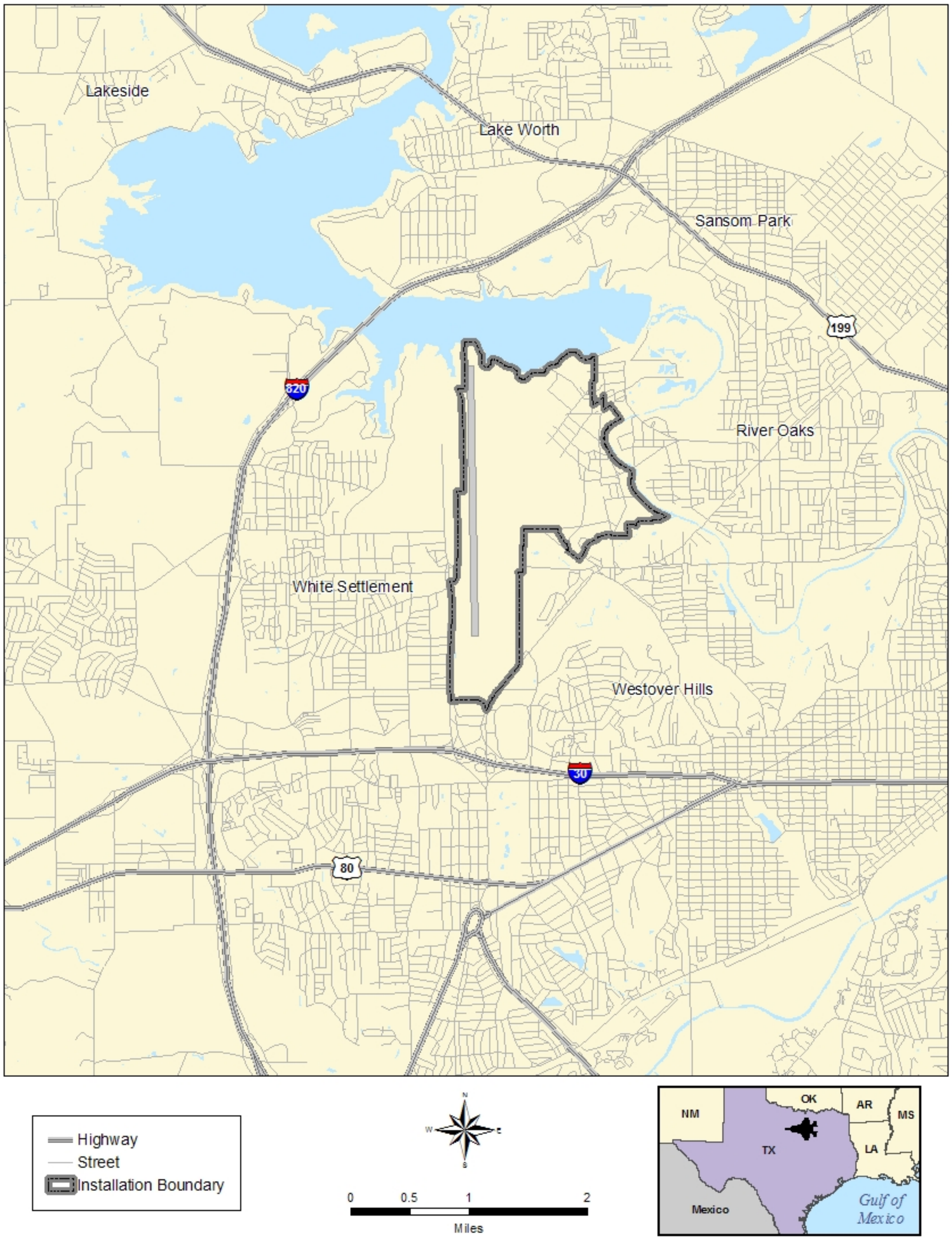


Figure 8.1-1: General Map of LM Aero

8.2 PROPOSED JSF DT AT LM AERO

LM Aero would be used for the proposed CATB testing in Alternative One. Alternative Two would include implementing 10% of the overall STOVL tests planned under Alternative One at NAS Patuxent River. For Alternative One, the overall proposed JSF DT test profile is 242 CATB flights (721 flight hours), as reflected in Table 8.2-1. Table 8.2-2 reflects the proposed test activities for Alternative Two. Proposed test flights would use the NAS JRB runway and all flights would be conducted in compliance with SOPs and air operation manuals of NAS JRB and/or LM Aero flight procedures.

Table 8.2-1: Proposed JSF DT Profile at LM Aero - Alternative One

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
1	CATB	0	0	CATB Boeing 737	6	18	6	18
2	Same as Test Year 1	0	0	CATB Boeing 737, Business Jet	82	244	82	244
3	Same as Test Year 1	0	0	Same as 2007	60	178	60	178
4	Same as Test Year 1	0	0	Same as 2007	51	153	51	153
5	Same as Test Year 1	0	0	Same as 2007	35	104	35	104
6	Same as Test Year 1	0	0	Same as 2006	7	21	7	21
7	Same as Test Year 1	0	0	Same as 2006	1	3	1	3
Total		***0***	***0***		***242***	***721***	***242***	***721***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).

Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Table 8.2-2: Proposed JSF DT Profile at LM Aero - Alternative Two

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
1	CATB	0	0	CATB Boeing 737	6	18	6	18
2	CATB STOVL FQ, Performance, Propulsion & Environnent	10	17	CATB Boeing 737, Business Jet	82	244	92	261
3	Same as Test Year 2	11	19	CATB Boeing 737, Business Jet	60	178	71	197
4	Same as Test Year 2	10	17	CATB Boeing 737, Business Jet	51	153	61	170
5	Same as Test Year 2	5	9	CATB Boeing 737, Business Jet	35	104	40	113
6	CATB STOVL FQ	5	9	CATB Boeing 737	7	21	12	30
7	CATB	0	0	CATB Boeing 737	1	3	1	3
Total		***41***	***71***		***242***	***721***	***283***	***792***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).

Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Table 8.2-3 lists the proposed SE associated with the Proposed Action. No stores/expendables would be required for Alternatives One or Two. No increase in ground support activities would be expected with either alternative. Neither alternative would require any additional new test personnel.

Table 8.2-3: Proposed JSF DT Support Equipment

Test Year	Support Equipment	
	Type	Quantity*
1	PAO Cart, Maintenance Lift, Ground Power Unit, Ground Air Conditioner, Flight Line Transport Vehicle	One each
2	Same as Test Year 1	Same as Test Year 1
3	Same as Test Year 1	Same as Test Year 1
4	Same as Test Year 1	Same as Test Year 1
5	Same as Test Year 1	Same as Test Year 1
6	Same as Test Year 1	Same as Test Year 1
7	Same as Test Year 1	Same as Test Year 1

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).

Note: This is reflective of both Alternatives One and Two. Proposed support equipment reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Total for all units

8.3 AIR QUALITY AT LM AERO

8.3.1 Affected Environment

The Dallas-Fort Worth area climate is classified as humid subtropical with hot summers. The daytime temperature during the summer months frequently exceeds 100° Fahrenheit. The highest temperatures of summer are associated with fair skies, westerly winds, and low humidity. The average length of the warm seasons (freeze-free period) is approximately eight months. Winters are mild with average low temperatures of 33° Fahrenheit occurring in mid-January. Precipitation varies considerably and ranges from less than 20 inches to more than 50 inches.[230]

The Dallas-Fort Worth area is classified as moderate nonattainment for the eight-hour O_3 NAAQS and in attainment for all other NAAQS.[231] Texas has no state-specific AAQS which must be considered as part of this analysis. Emissions primarily contributing to the nonattainment classification of the region are from on-road mobile sources. In accordance with the air conformity requirements of 40 CFR 51.853/93.153 (b)(1), the *de minimis* level for a moderate O_3 nonattainment area outside of a transport region is 100 tons each for NO_x and VOC per year per action.

The total emissions budget contained in the SIP for the Dallas-Fort Worth NAA, which includes Tarrant County where LM Aero is located, is shown in Table 8.3.1-1. As discussed in Section 3.1.3, a general conformity analysis is triggered if a Proposed Action is expected to have emissions greater than the *de minimis* levels or if the emissions from the Proposed Action are considered regional significant (greater than 10% of the emissions for the nonattainment area). Table 8.3.1-1 also includes the regionally significant thresholds for the Dallas-Fort Worth NAA.

230 *US Department of Commerce, National Oceanic and Atmospheric Administration, 2006*

231 *EPA 2005*

Table 8.3.1-1: Tarrant County 2007 Attainment SIP Emissions Estimate[232]

	Baseline Emission Levels tons/day (MT/day)		Regionally Significant Threshold[1] tons/year (MT/year)	
Source	**NO_x**	**VOC**	**NO_x**	**VOC**
On-Road Mobile	164.3 (149.0)	107.6 (97.60)	4,025 (3,651)	2,636 (2,391)
Area and Non-Road Mobile	106.6 (96.69)	285.0 (258.5)	2,612 (2,369)	6,983 (6,333)
Point	23.4 (21.2)	30.1 (27.3)	573 (520)	737 (669)
Biogenic	26.6 (24.1)	257.9 (233.9)	652 (591)	6,319 (5,731)
Total	***320.9 (291.1)***	***680.6 (617.3)***	***7,862 (7,131)***	***16,675 (15,124)***

Note: 1. Calculated based on 10% of the daily emissions for the ozone season running from 1 March to 31 October (245 days).

8.3.2 Emission Estimation Methodology

The emission estimates used to determine general conformity applicability were calculated for flight operations, aircraft test cell operations, and GSE identified for the proposed JSF DT at LM Aero. Emissions from refueling operations were also included as part of the Proposed Action analysis. It is expected that no new employees would be required at the LM Aero facility to support proposed JSF DT testing, therefore, emissions from sources associated with increased personnel were not included in this analysis. See Appendixes E and E.4 for additional details on the methodology used to calculate emissions from all sources included in the Proposed Action alternatives.

Criteria pollutant emissions from sources in the Proposed Action were calculated using the procedures outlined in the *Air Force Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations.*[233] For all F-35 and support aircraft flight operations, emissions were calculated using emissions factors for every throttle setting while the aircraft is operating below the assumed average mixing height of 3,000 feet AGL. The F-35 engine emission factors, provided by P&W, were used for gaseous emissions at non-AB conditions.[234] For AB operations, emission factors from F-119 testing were used except for particulate emissions.[235] The PM emission factors for AB operations from AFIERA were assumed to be the same as for the F100-PW-100 engine.[236] Emission factors for the F100-PW-100 engine were used because it was manufactured by P&W (who is producing the F-135 engine for the F-35), is roughly the same size as the engine used in the F-35, and emissions data is readily available. PM emission factors for the F-35 engine during non-AB conditions were provided by the USN AESO, based on previously tested engines.[237]

Aircraft test cell emissions and emissions from GSE were also calculated using the methodology outlined in AF guidance documents. Emissions from test cell operations include CATB testing that would be occurring on the ground with the engines operating.[238 239] GSE includes all the equipment used to service

232 *TCEQ 2005*
233 *O'Brien 2002*
234 *Graves 2002*
235 *Wade 2002*
236 *O'Brien 2002*
237 *AESO 2000-04*
238 *Laureano 2005a*

the aircraft (e.g., electrical generators, jet engine start units, tow vehicles, and trucks). Emission factors for GSE were used from several sources and are based on the fuel usage rates or the hours of operation.[240] [241] [242]

8.3.3 Environmental Consequence

The general conformity rule requires potential emissions from the Proposed Action be determined on an annual basis and compared to the annual *de minimis* levels for those pollutants (or their precursors) for which the area is classified as nonattainment. The estimated annual emissions for the Proposed Action under both alternatives are shown in Table 8.3.3-1.

Table 8.3.3-1: Estimated LM Aero Air Emissions for Alternatives One and Two

Test Year	CO tpy (MT/yr)	NO_x tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
Alternative One					
1	1.42 (1.29)	5.90 (5.35)	0.50 (0.45)	0.39 (0.35)	0.35 (0.32)
2	3.86 (3.50)	12.37 (11.22)	1.06 (0.96)	0.85 (0.77)	0.70 (0.64)
3	2.81 (2.55)	9.50 (8.62)	0.82 (0.74)	0.65 (0.59)	0.55 (0.50)
4	2.79 (2.53)	9.50 (8.62)	0.81 (0.73)	0.65 (0.59)	0.55 (0.50)
5	1.77 (1.61)	6.74 (6.11)	0.57 (0.52)	0.45 (0.41)	0.39 (0.35)
6	1.94 (1.76)	9.11 (8.26)	0.76 (0.69)	0.60 (0.54)	0.54 (0.49)
7	0.28 (0.25)	1.30 (1.18)	0.11 (0.10)	0.09 (0.08)	0.08 (0.07)
Highest (Test Year 2)	3.86 (3.50)	12.37 (11.22)	1.06 (0.96)	0.85 (0.77)	0.70 (0.64)
Alternative Two					
1	1.42 (1.29)	5.90 (5.35)	0.50 (0.45)	0.39 (0.35)	0.35 (0.32)
2	4.08 (3.70)	13.46 (12.21)	1.09 (0.99)	0.88 (0.80)	0.85 (0.77)
3	3.20 (2.90)	11.54 (10.47)	0.86 (0.78)	0.70 (0.64)	0.81 (0.73)
4	3.08 (2.79)	11.02 (10.00)	0.84 (0.76)	0.68 (0.62)	0.73 (0.66)
5	1.96 (1.78)	7.73 (7.01)	0.59 (0.54)	0.48 (0.44)	0.51 (0.46)
6	2.11 (1.91)	9.98 (9.05)	0.78 (0.71)	0.62 (0.56)	0.65 (0.59)
7	0.28 (0.25)	1.30 (1.18)	0.11 (0.10)	0.09 (0.08)	0.08 (0.07)
Highest (Test Year 2)	4.08 (3.70)	13.46 (12.21)	1.09 (0.99)	0.88 (0.80)	0.85 (0.77)

Notes: 1. See Appendix E.4 for additional details.
2. The highest year represents the year with the potential to produce the most emissions.

Table 8.3.3-2 provides a comparison of estimated emissions for Test Year 2 (the year during which the greatest emissions are expected to occur) to the *de minimis* and regionally significant thresholds. The comparison shows that neither Alternative One nor Alternative Two would require a formal conformity determination, because projected emission levels would be below the applicable *de minimis* thresholds

[239] *Laureano 2005b*
[240] *EDMS, 2005*
[241] *Ambrosino 1999*
[242] *O'Brien 2002*

and the annual project-related emissions would not make up 10% or more of the nonattainment area's total emissions budget. It is expected, therefore, any impacts on air quality would not be significant for either Alternative One or Two.

Table 8.3.3-2: Proposed JSF DT Peak Year Comparison for Alternative One and Two

Pollutant	Test Year 2 Emissions[1] tpy	*de minimis* Threshold tpy	Regionally Significant Threshold tpy
Alternative One			
NO_x	12.37	100	7,862
VOC	1.06	100	16,675
Alternative Two			
NO_x	13.46	100	7,862
VOC	1.09	100	16,675

Note: 1. Test Year 2 represents the year with the greatest potential to produce the most emissions from the Proposed Action.

8.4 NOISE AT LM AERO

8.4.1 Affected Environment

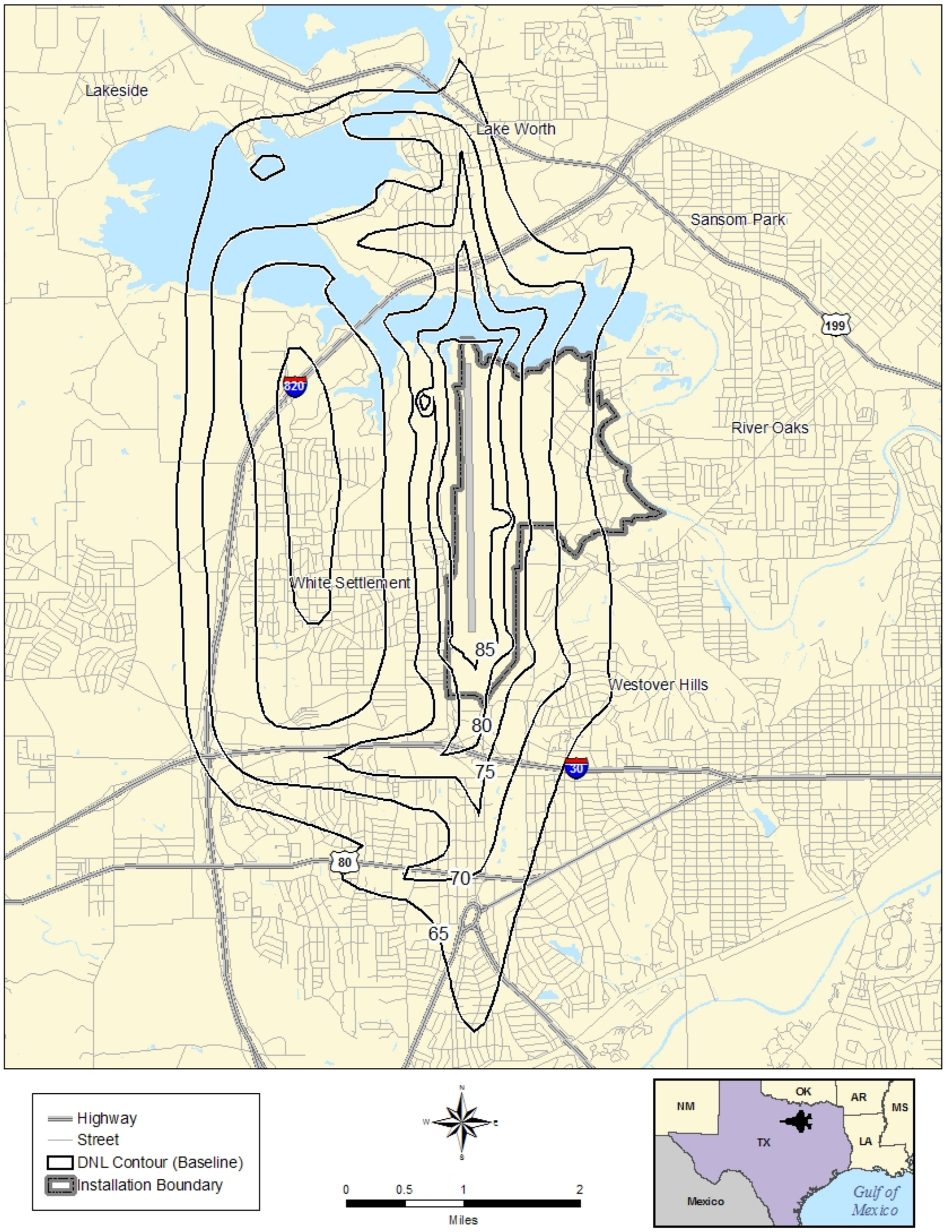
Additional details regarding noise at LM Aero can be found in Parts 4-6 of the *Environmental Assessment for the JSF SDD Facilities Expansion Project, Air Force Plant #4, LM Aero, Fort Worth, Texas, August 2002*. Noise at LM Aero is produced by a variety of sources including aircraft flight, ground tests and operations, vehicle operation, maintenance, and construction activities. The effect of these noises produces the ambient existing baseline at any time and location. The individual noise sources can produce noises of varying duration and intensity. Noise sources may be of a transient nature, such as aircraft flights and vehicular traffic, or stationary, such as construction activities. Test operations within buildings, ground tests, and maintenance activities may also contribute to ambient noise levels.

The number and type of daily aircraft operations directly affect the noise in the vicinity of LM Aero. Air operations are conducted between 7:00 a.m. and 10:00 p.m. NAS JRB has an approved AICUZ for the Base that includes AFP #4 operations; however, it does not take into account at this time the engine run-ups associated with the LM Aero's STOVL Operations Facility. In the next update, the AICUZ will be modified to include the STOVL Operations Facility, but no modifications are needed immediately since noise levels are not expected to change even with engine run-ups. Anticipated use of the STOVL Operations Facility is two operations per year with two F-35 aircraft, which accounts for less than 0.01% of total air operations on the airfield. Approximately 46% of airfield run-ups and 27% of total flight operations occurring at NAS JRB are from F-16 aircraft.[243]

Existing baseline noise contours were developed based on the aircraft Fleet mix, number of operations, time of day of operations, runway and flight track utilization, and other factors such as meteorological conditions and aircraft performance and operational length. The contours take into account run-up and testing operations, in addition to approximately 26,000 flight operations per year.[244] Figure 8.4.1-1 illustrates the existing baseline noise contour (65, 70, 75, 80, and 85 dB DNL) for LM Aero, while Table 8.4.1-1 lists the total acres within each of the existing baseline DNL noise contours. There are

243 *LM Aero 2002*
244 *Ibid*

approximately 1,566 acres of base property within the 65 dB and greater DNL noise contours. The total 65 dB and greater DNL noise contours encompass approximately 9,649 acres off-base. Appendix F.5 contains additional details on the noise modeling and analysis conducted for LM Aero.



Source: LM Aero/NAS JRB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

Figure 8.4.1-1: Existing Baseline DNL Noise Contours for LM Aero

Table 8.4.1-1: Acres within the Existing Baseline DNL Noise Contours at LM Aero

DNL Contour Bands	Area Acres (On-Base)	Area Acres (Off-Base)
65–70 dB	340	4,938
70–75 dB	211	3,254
75–80 dB	238	1,030
80–85 dB	269	286
85+ dB	508	141
65 dB and greater (Total)	***1,566***	***9,649***

Source: LM Aero/NAS JRB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

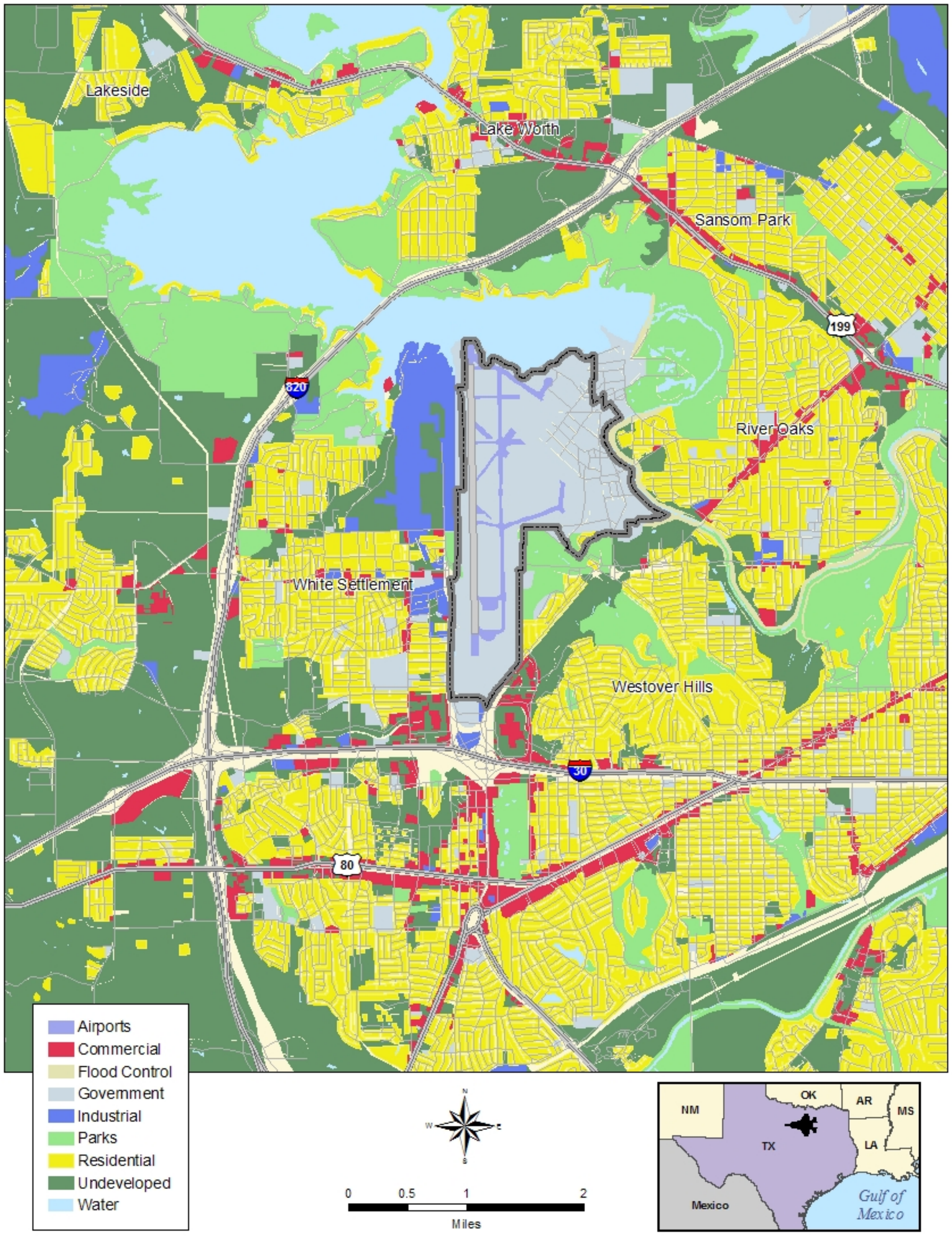
Analysis of aerial photographs was used to determine the presence of incompatible land uses and populations affected by the existing LM Aero DNL noise contours. Due to LM Aero's proximity to the highly developed areas of Ft. Worth, land use maps were obtained from the city to provide increased accuracy in the determination of land uses affected by the existing baseline noise contours. Figure 8.4.1-2 illustrates the existing land uses within the vicinity of LM Aero.

As illustrated in Figure 8.4.1-2, residential land uses are located in close proximity to LM Aero. Table 8.4.1-2 presents the number of acres of different land use types that are within the existing baseline noise: 2,323 are acres of residential development, 621 acres of commercial development, and 585 acres of industrial development.

Table 8.4.1-2: LM Aero Existing Baseline Affected Land Uses

Land Use Type	DNL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Commercial	251	287	79	4	0	621
Industrial	29	200	178	120	58	585
Residential	1,481	622	202	16	0	2,323

Source: LM Aero NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).



Source: City of Ft. Worth Planning Department, 2004.

Figure 8.4.1-2: Existing Land Uses Around LM Aero

Table 8.4.1-3 presents the housing and populations affected by the existing baseline noise contour. A count of residential housing units was conducted to determine the population exposure to the existing baseline noise contour at LM Aero. Residential housing units affected by the existing baseline 65 dB

DNL noise contour were then assigned the median population density. In the case of Ft. Worth, Texas, the average housing density is 2.67 persons per household.[245]

Table 8.4.1-3: Housing and Populations within the Existing Baseline DNL Noise Contours at LM Aero

DNL Contour Bands	Estimated Housing		Estimated Population	
	On-Base	Off-Base	On-Base	Off-Base
65–70 dB	30	5,600	80	14,950
70–75 dB	0	2,690	0	7,180
75–80 dB	0	490	0	1,310
80–85 dB	0	10	0	30
85+ dB	0	0	0	0
65 dB and greater (Total)	***28***	***8,790***	***80***	***23,470***

Source: LM AERO NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).
Notes: Housing and population rounded to nearest tenth.
Assumes 2000 census, 2.67 persons as average housing density.

8.4.2 Environmental Consequences

For the purposes of this evaluation, aircraft noise impacts are presented as land uses (acres) and populations exposed to aircraft noise above existing baseline levels. Contour lines representing average annual noise conditions for aircraft operations are generated for 65, 70, 75, 80, and 85 dB DNL.

The Proposed Action was modeled for the largest predicted year of activity (Test Year 2 and 4). The maximum testing year at LM Aero for proposed CATB testing is planned for Test Year 2, while the maximum year for proposed F-35 testing is planned for Test Year 4. Table 8.4.2-1 reflects the number and types of proposed tests to be conducted at LM Aero, as a composite of the two peak test years that were added to the existing baseline Fleet mix modeled for the proposed JSF DT. This composite profile was modeled to be overly conservative, so that any resultant noise exposure represented for potential impacts would be greater than any one potential year of activity at LM Aero. Table 8.4.2-2 is a break down of the Alternative Two proposed STOVL hover operations. Under this proposed scenario, approximately 90% of airborne STOVL hover operations would occur at NAS Patuxent River and approximately 10% at LM Aero. For ground-based operations, approximately 64% would be conducted at NAS Patuxent River and 33% at LM Aero. Proposed ground-based tests at LM Aero would be comprised of propulsion and performance related STOVL test events.

Table 8.4.2-1: Maximum Proposed JSF DT at LM Aero

Test Year	Test Activity/Description	No. F35 Flights	Support Aircraft Type	No. Support Aircraft Flights	Total No. Flights
2/4	CATB Alternative Two: STOVL FQ, Performance, Propulsion, & Environment	34	CATB Boeing 737, Business Jet	82	116

Note: Represents Composite Test Year 2 CATB test schedule and Test Year 4 F-35 DT at LM Aero.

245 *City of Fort Worth Census 2000*

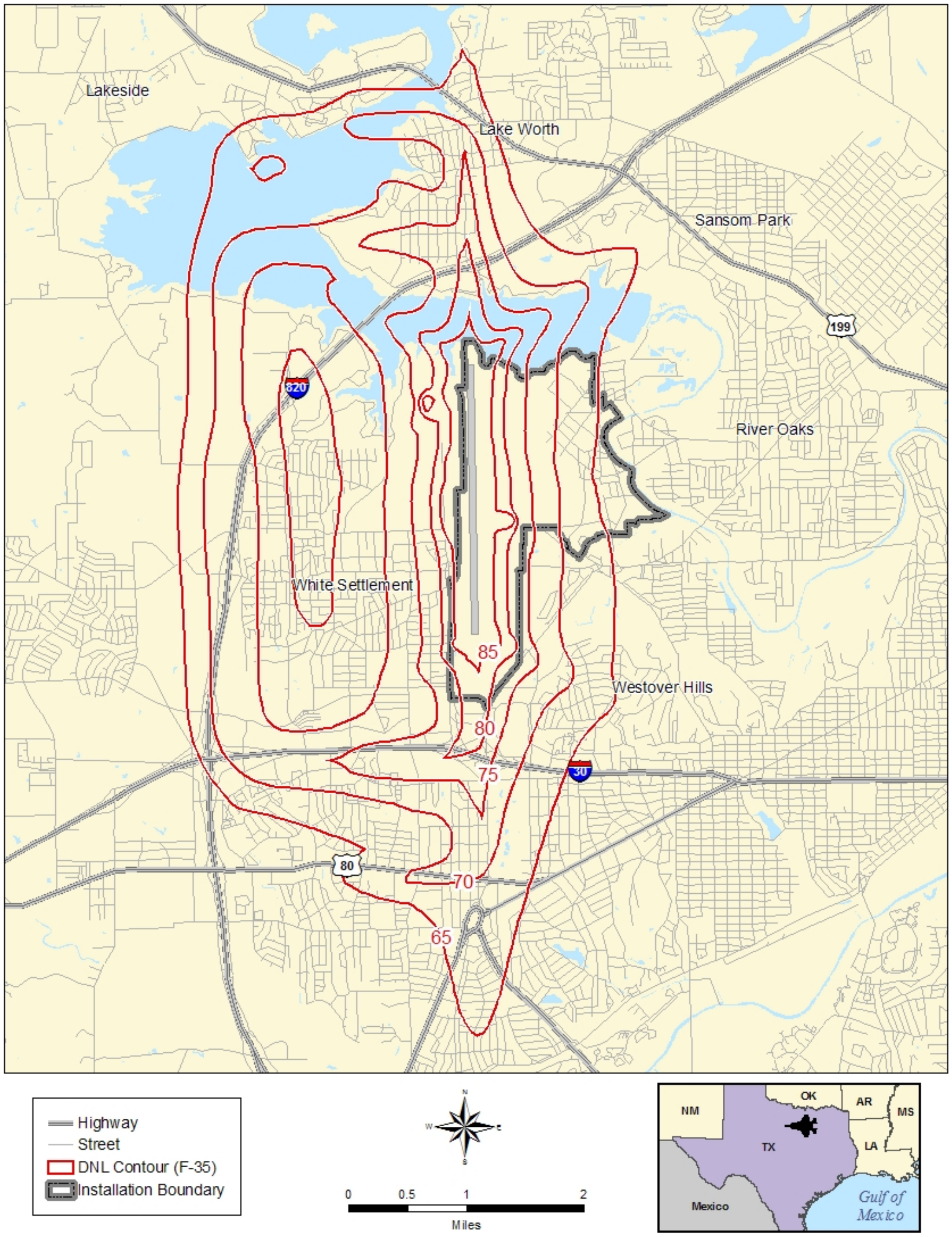
Table 8.4.2-2: Proposed STOVL Test Events at LM Aero

2009 LM Aero JRB	F-35 Operation Type								Total F-35
	Vertical TO	Short TO	Conv. TO	Conv. TG	Short TG	Conv. Landing	Short Landing	Vertical Landing	
STOVL FQ	1	4.5	0.5	0.5	3	1	2.5	2.5	**15.5**
STOVL Performance	1.5	4.5	0	0.5	2	0.5	3	2.5	**14.5**
STOVL Propulsion	0	0	0	0	0	0	0	0	**0**
STOVL Environment	13.2	3.3	0	1.65	3.3	1.65	4.95	9.9	**37.95**
Total F-35	**15.7**	**12.3**	**0.5**	**2.65**	**8.3**	**3.15**	**10.45**	**14.9**	**67.95**

Note: Values Represents Alternative 2 (Proposed Action) moved from NAS Patuxent River.

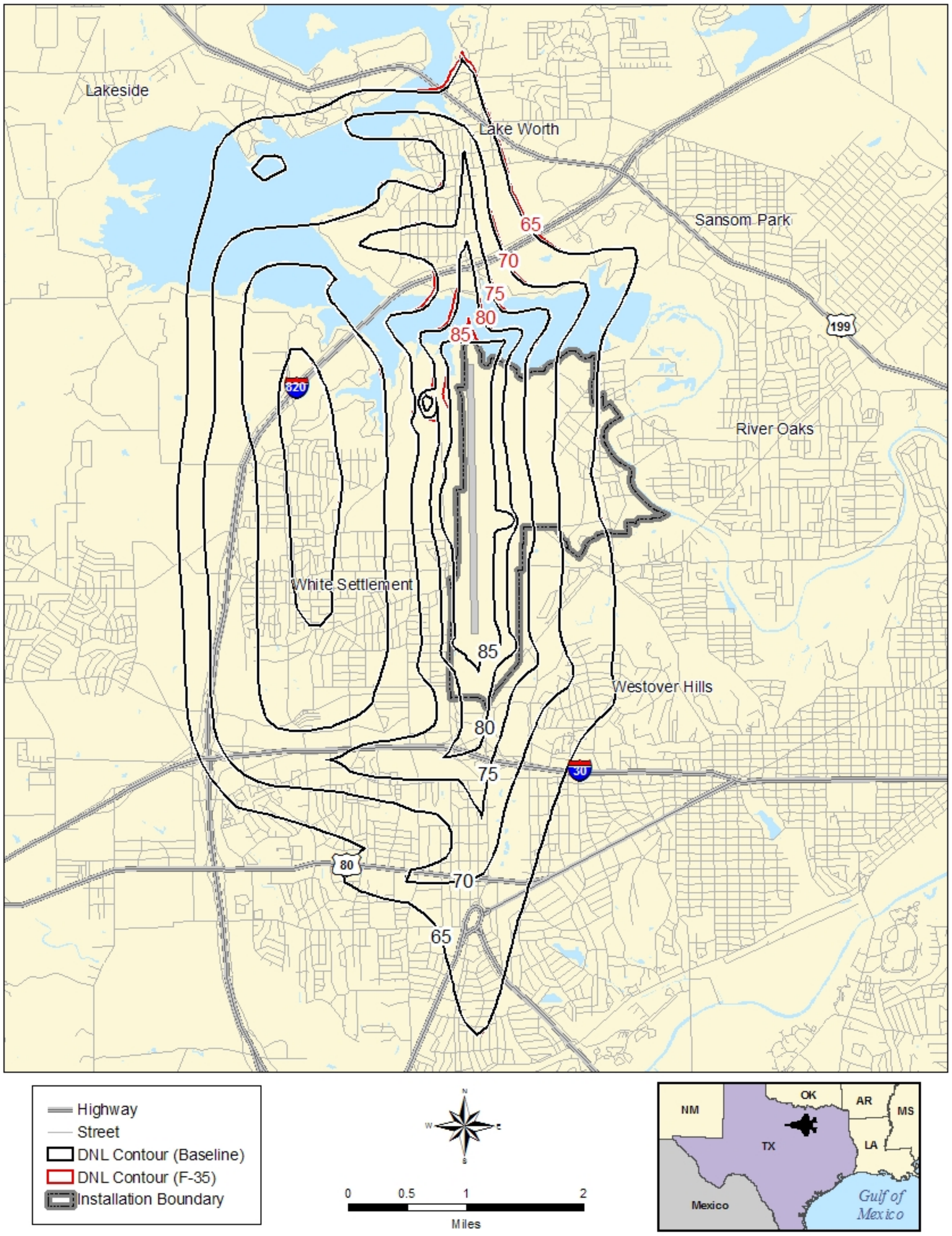
Since NOISEMAP does not have the ability to model VTOL operations, adjustments were required to best simulate such an activity. In the case of LM Aero, VTOL operations were modeled as very slow (~10 kts), with steep departures [150 feet AGL going four feet down track] and arrivals. This was performed to re-create the longer duration of the noise event that would be expected from a VTOL operation and would be considered relatively representative of a VTOL operation given the drift due to winds and control limits of the aircraft. During F-35 departures, it was assumed that once aircraft rotation is achieved (forward flight) then VTOL departures would merge with existing flight tracks. Therefore, there would be no additional aircraft flight tracks beyond those illustrated in the existing baselines.

Figure 8.4.2-1 illustrates the noise contours for the Proposed Action alternatives. The comparison between the existing LM Aero noise contours and the Proposed Action is illustrated in Figure 8.4.2-2. As reflected in the figure, the noise contours are virtually the same except for northern areas surrounding LM Aero and areas located directly west of Runway 17/35 on LM Aero property. The 65 DNL noise contour, as a result of the Proposed Action alternatives, would extend north of Texas Route 199 between Lake Worth and Farm to Market Road (F.M. 1220).



Source: LM Aero NOISEMAP Model Outputs, United States Air Force Acoustics Lab (March 2006).
Note: This is reflective of both Alternatives One and Two.

Figure 8.4.2-1: DNL Noise Contours with the Proposed JSF DT at LM Aero



Source: LM Aero NOISEMAP Model Outputs, United States Air Force Acoustics Lab (March 2006).
Note: This is reflective of both Alternatives One and Two.

Figure 8.4.2-2: Existing and Proposed JSF DT DNL Noise Contour Comparison for LM Aero

Table 8.4.2-3 summarizes the total acres within the Proposed Action DNL contours as contrasted to the existing baseline DNL noise contours at LM Aero. As a result of the Proposed Action, on-base areas potentially impacted by the 65 dB and greater DNL noise contour would increase slightly by approximately 5 acres (or less than 1%) from approximately 1,566 to 1,571 acres. Similarly, off-base areas potentially impacted by the 65 dB and greater DNL noise contour would increase by approximately 54 acres (or less than 1%) from 9,649 to 9,703 acres.

Table 8.4.2-3: Acres within the Existing Baseline and Proposed JSF DNL Noise Contours at LM Aero

DNL Contour Bands	Area Acres (On-Base)		Area Acres (Off-Base)		Acreage Change	
	Existing	Proposed JSF DT	Existing	Proposed JSF DT	On-Base	Off-Base
65–70 dB	340	340	4,938	4,963	0	25
70–75 dB	211	212	3,254	3,262	1	8
75–80 dB	238	238	1,030	1,037	0	7
80–85 dB	269	269	286	289	0	3
85+ dB	508	512	141	152	4	11
65 dB and greater (Total)	***1,566***	***1,571***	***9,649***	***9,703***	***5***	***54***

Source: LM Aero/NAS JRB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (March 2006).
Note: This is reflective of both Alternatives One and Two.

Table 8.4.2-4 presents the number of acres by land use types that would be within the noise contours associated with Proposed Action and the changes anticipated when compared to the existing baseline. There would be no change in commercial property within the 65 dB and greater DNL noise contours. Acres of residential development lands would increase by 17 acres (or less than 1%) from 2,323 to 2,340 acres. These specific increases over the residential land use would be less than 1.5 dB, so no noise impacts would be anticipated. Acres of industrial lands would remain unchanged.

As presented in Table 8.4.2-5, potential population and housing impacts are anticipated to increase slightly off LM Aero as a result of the Proposed Action. Housing and population increases would grow respectively by twenty households (0.3%) from 5,600 to 5,620 households and 60 persons (0.3%) from 14,950 to 15,010 persons within the 65 dB and greater DNL noise contour. As illustrated in Figure 8.4.2-2 and discussed further in Appendix F.5, changes in DNL noise contours from the Proposed Action on LM Aero property would occur in the vicinity of the STOVL test pit located to the southwest of Runway 17 end on Taxiway H North. On-base housing is located on the eastern portions of LM Aero in areas where DNL noise contours would remain unaffected by the Proposed Action. The nearest residential properties to the STOVL test pit are located approximately one mile to the north along the north shore of Lake Worth. These locations are not expected to be affected from proposed STOVL tests conducted at the pit. Therefore, it is anticipated that both population and housing impacts on LM Aero would remain the same for both the existing baseline and Proposed Action with no significant impacts anticipated from proposed STOVL tests.

Table 8.4.2-4: Land Use (Acres) Potentially Affected by the Proposed JSF DT at LM Aero

Land Use Type	Existing DNL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Commercial	251	287	79	4	0	621
Industrial	29	200	178	120	58	585
Residential	1,483	622	202	16	0	2,323
Land Use Type	**With Proposed JSF DT DNL Contour Bands**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Commercial	252	288	79	4	0	623
Industrial	29	194	176	118	67	584
Residential	1,493	624	205	18	0	2,340
Land Use Type	**Change**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Commercial	1	1	0	0	0	2
Industrial	0	-6	-2	-2	9	-1
Residential	10	2	3	2	0	17

Source: LM Aero NOISEMAP Model Outputs, United States Air Force Acoustics Lab (March 2006).
Note: This is reflective of both Alternatives One and Two.

Table 8.4.2-5: Existing Housing and Populations Potentially Affected by the Proposed JSF DT at LM Aero

DNL Contour Bands	Estimated Housing Existing Baseline		Estimated Housing Proposed JSF DT	
	On-Base	Off-Base	On-Base	Off-Base
65–70 dB	30	5,600	30	5,620
70–75 dB	0	2,690	0	2,690
75–80 dB	0	490	0	490
80–85 dB	0	10	0	10
85+ dB	0	0	0	0
65 dB and greater (Total)	***30***	***8,790***	***28***	***8,810***
DNL Contour Bands	**Estimated Population Existing Baseline**		**Estimated Population Proposed JSF DT**	
	On-Base	Off-Base	On-Base	Off-Base
65–70 dB	80	14,950	80	15,010
70–75 dB	0	7,180	0	7,180
75–80 dB	0	1,310	0	1,310
80–85 dB	0	30	0	30
85+ dB	0	0	0	0
65 dB and greater (Total)	***80***	***23,470***	***80***	***23,530***

Source: LM Aero NOISEMAP Model Outputs, United States Air Force Acoustics Lab (March, 2006).
Notes: Housing and population rounded to nearest tenth
Assumes U.S. Census 2000, 2.67 persons as average housing density.
This is reflective of both Alternatives One and Two.

Table 8.4.2-6 reflects the results of assessing potential impacts to noise sensitive receptors (e.g., residences, schools, hospitals). The analysis identifies locations where a significant increase in aircraft noise exposure (1.5 dB or greater increases within the 65 dB DNL noise contour or a 3.0 dB increases within the 60 dB DNL contour) would occur when comparing the Proposed Action to the baseline existing environment. None of the non-residential noise sensitive receptors identified would experience a 1.5 dB or 3.0 dB increase in noise as a result of the Proposed Action. As previously stated, there would be no discernable residential or incompatible land uses that would experience an increase of 1.5 dB located within either the existing or Proposed Action 65 DNL noise contour. Therefore, no significant noise impacts would be anticipated.

Table 8.4.2-6: LM Aero Comparison Non-Residential Noise Sensitive Receptors

Name	Type	Existing (dB)	With Proposed JSF DT (dB)	Change (dB)
Amon Carter Museum	Museum	40.5	40.6	0.1
Arlington Heights High School	School	47.9	47.9	0.0
Baylor All Saints Medical Center	Hospital	46.4	46.4	0.0
Bluff Springs School	School	44.9	45.1	0.2
Boaz Golf Course	Golf Course	67.7	67.7	0.0
Brewer School	School	71.8	71.8	0.0
Brooklyn Heights School	School	43.5	43.5	0.0
Bryce Building	Historic	50.3	50.3	0.0
Buck Oaks Farm	Historic	65.6	65.7	0.1
Carlson School	School	39.7	39.7	0.0
Castlebury School	School	49.7	49.7	0.0
Central School	School	72.5	72.5	0.0
Chapin School	School	52.9	52.9	0.0
Cherry Lane Hospital	Hospital	73.4	73.4	0.0
Circle Park School	School	35.0	35.0	0.0
Colonial Golf Course	Golf Course	41.6	41.6	0.0
Crestwood School	School	39.2	39.2	0.0
Denver Avenue School	School	34.2	34.2	0.0
Eagle Mountain School	School	46.0	46.0	0.0
Elder Junior High School	School	34.9	35.0	0.1
Elder Middle School	School	35.0	35.0	0.0
Elm Grove Church	Place of Worship	45.4	45.5	0.1
Friendship Church	Place of Worship	47.0	47.5	0.5
Fort Worth Zoo	Park	38.6	38.6	0.0
Fort Worth Museum Of Science	Museum	41.7	41.7	0.0
Greenwood Cemetery	Cemetery	37.9	37.9	0.0
Harris Methodist Fort Worth	Hospital	46.3	46.8	0.5
Harris Methodist Southwest	Hospital	47.5	47.5	0.0
HealthSouth Rehab Hospital	Hospital	44.5	44.5	0.0
Hebrew Cemetery	Cemetery	36.8	36.8	0.0
Highway Chapel	Place of Worship	47.5	47.9	0.4
Indian Oaks Church	Place of Worship	77.5	77.6	0.1
J W Turner Elementary School	School	46.4	46.4	0.0
Kimbell Art Museum	Museum	39.3	39.4	0.1
Kindred Hosp-Fort Worth SW	Hospital	49.8	49.8	0.0

Table 8.4.2-6: LM Aero Comparison Non-Residential Noise Sensitive Receptors (Continued)

Name	Type	Existing (dB)	With Proposed JSF DT (dB)	Change (dB)
Kirkpatrick Junior High School	School	38.3	38.3	0.0
Lake Como Cemetery	Cemetery	52.9	52.9	0.0
Lakeview Church	Place of Worship	45.2	45.3	0.1
Lifecare Hosp of Fort Worth	Hospital	48.1	48.2	0.1
Manuel Jara Elem. School	School	35.4	35.4	0.0
Marsh Junior High School	School	45.9	45.9	0.0
Modern Art Museum Of Ft. Worth	Museum	41.1	41.1	0.0
Monnig Junior High School	School	62.6	62.6	0.0
Mount Carmel School	School	33.7	33.7	0.0
North Fort Worth High School	School	34.7	34.8	0.1
North Hi-Mount School	School	41.7	41.7	0.0
North Side High School	School	39.3	39.4	0.1
Oakwood Cemetery	Cemetery	33.4	33.4	0.0
Osteopathic Med Ctr of Texas	Hospital	40.7	40.7	0.0
Phillips School	School	63.3	63.3	0.0
Rosen Elem. School	School	40.2	40.2	0.0
Saint Peters School	School	73.9	73.9	0.0
Sanguinet, Marshall R., House	Historic	49.0	49.0	0.0
Smith-Frazier Cemetery	Cemetery	47.5	47.9	0.4
South Hi-Mount School	School	45.6	45.6	0.0
Stripling Junior High School	School	45.3	45.3	0.0
Technical High School	School	34.8	34.9	0.1
Texas Christian University	School	38.6	38.6	0.0
Thomas Place School	School	45.2	45.3	0.1
Trinity Church	Place of Worship	44.6	44.7	0.1
Turner School	School	46.3	46.3	0.0
Washington Heights Elementary	School	36.9	36.9	0.0
Wesley Chapel	Place of Worship	47.5	47.9	0.4
West Side School	School	65.9	65.9	0.0
West Van Zandt School	School	38.8	38.9	0.1
Westcliff School	School	39.0	39.0	0.0
Westover Manor	Historic	54.9	54.9	0.0
Woolworth, F. W., Building	Historic	40.2	40.2	0.0

Source: LM Aero NOISEMAP Model Outputs, United States Air Force Acoustics Lab (March 2006).

8.5 BIOLOGICAL/NATURAL RESOURCES AT LM AERO

8.5.1 Affected Environment

LM Aero and the surrounding areas to the south and east are urbanized. Approximately 70% of the LM Aero surface area is covered by buildings, concrete, or asphalt. The remaining 30% of the surface area is primarily grass-covered soils. The area to the west-northwest of AFP #4 is primarily residential.[246] The 602-acre site is bordered by Lake Worth to the north and northwest, the community of White

[246] *Texas Department of Health 1998*

Settlement to the south and west, and Meandering Road Creek to the west. Meandering Road Creek discharges into Lake Worth. Except for areas adjacent to Meandering Road Creek and Lake Worth, the land surrounding LM Aero is flat. Elevations at the site range from 590 feet above MSL along Lake Worth to approximately 670 feet above MSL at the southwest corner of the site. Neither a 100- nor a 500-year flood event would directly affect the site. Information about animals is provided in this subsection.

Native flora and fauna that inhabit developed areas in this region of Texas are expected to be present on LM Aero. Song birds, small mammals, reptiles, amphibians and invertebrates for this location would be both migrant and/or resident species. Species of special concern are listed below.

8.5.1.1 Threatened and Endangered Species

The Texas Parks and Wildlife annotated list of rare species for Tarrant County indicates that the following Federally- and/or state-threatened and endangered species could occur within the vicinity of LM Aero: arctic peregrine falcon *(Falco peregrinus tundriu*s); bald eagle *(Haliaeetus leucocephalu*s); whooping crane *(Grus americana*); interior least tern *(Sterna antillarum athalasso*s); Texas horned lizard *(Phrynosoma cornutum*); and timber/canebrake rattlesnake *(Crotalus horridu*s).[247] Table 8.5.1.1-1 lists the potential threatened or endangered animals at or near LM Aero.

Table 8.5.1.1-1: Threatened and Endangered Species in the Vicinity of LM Aero

Common Name Scientific Name	Federal Status	Texas State Status
Birds		
Arctic peregrine falcon (*Falco peregrinus tundrius*)	T	
Bald eagle (*Haliaeetus leucocephalus*)	T	T
Whooping crane (*Grus americana*)	E	E
Interior least tern (*Sterna antillarum athalassos*)		E
Reptiles		
Texas horned lizard (*Phrynosoma cornutum*)		T
Timber (Canebrake) rattlesnake (*Crotalus horridus*)		T

Sources: (1) http://www.tpwd.state.tx.us/warden/endangered_species/endangered_species.phtml.
(2) http://www.tpwd.state.tx.us/huntwild/wild/species/endang/animals/reptiles_amphibians.
(3) http://www.tpwd.state.tx.us/huntwild/wild/species/endang/animals/birds.
Legend: E=Endangered, T=Threatened, C=Candidate

The arctic peregrine falcon is a state-listed threatened species. The peregrine falcon may be a migrant through Tarrant County. The bald eagle, found mainly near sea coasts, rivers, and large lakes, nests in tall trees or on cliffs near water. This Federally-listed threatened bird eats fish that it has caught or stolen from smaller birds, such as ospreys.[248] Since LM Aero is bordered by Lake Worth, there is the potential for bald eagles to be present on the lake and its edge habitat, though no known nest sites are present within the LM Aero boundaries. The whooping crane is listed as endangered under the ESA. It is a potential migrant in Tarrant County as it travels between southern wintering grounds and the northern

[247] *USAF 2002; Texas Parks and Wildlife 1999*
[248] *enature.com 2004; Texas Parks and Wildlife 1999*

freshwater bogs where it breeds. The interior least tern, a Federally-listed endangered bird, nests along streams and gravel bars within streams and rivers along the east and west U.S. coasts and the Mississippi valley. It has also been known to nest on man-made structures. Streamside and lakeside habitat that may support the interior least tern is present on LM Aero, though no known nest sites or occurrences have been reported in the recent past. The Texas horned lizard is a state-listed threatened reptile found in open, arid, and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees. This diurnal lizard burrows into soil, enters rodent burrows, or hides under a rock when inactive. It breeds from March to September. Since most of LM Aero is developed or maintained grass areas, the presence of the Texas horned lizard on LM Aero is unlikely. The timber/canebrake rattlesnake is a state-listed threatened rattlesnake, which can be found in swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland, or limestone bluffs. It prefers dense ground cover. This snake is active from April to October. It is diurnal during the spring and fall, and nocturnal during the summer. It mates in autumn or shortly after hibernation. Habitat that may support the timber/canebrake rattlesnake occurs on LM Aero, though no known denning sites or recorded sitings of the snake have occurred on LM Aero in the recent past. No designated critical habitat for any species exists at LM Aero.

8.5.2 Environmental Consequences

Proposed JSF DT activities that would occur at LM Aero under Alternative One are CATB tests, while Alternative Two would be comprised of both CATB and STOVL FQ performance and propulsion tests. Most components of these test activities would occur using existing ground support facilities. Proposed flights above 3,000 feet AGL would not likely have affects on biological/natural resources. The greatest potential for impacts to biological/natural resources would be from proposed JSF DT flights/activities conducted as follows:

- During STOVL FQ performance and propulsion tests, 5% of the total proposed single performance test events/runs (not total flights/flight hours) would be between 150 and 2,500 feet AGL and 2 to 3% of the single propulsion test events/runs (not total flights/flight hours) would be between ground level and 2,500 feet AGL.

- During CATB tests of aircraft electronics, less than 1 to 2% of the total flights/flight hours would occur below 3,000 feet.

Thus, potential impacts to biological resources from the proposed JSF DT would be limited to noise-induced effects. The noise analysis focused on the peak performance year proposed for LM Aero, which would include the Alternative Two STOVL tests. Impacts under Alternative One would be anticipated to be similar to or less than those analyzed for Alternative Two. As discussed in Section 8.4.2 of this EA/OEA, the Proposed Action would be anticipated to result in negligible noise impacts. For the Base areas impacted by the 65 dB and greater DNL noise contours, there would be a slight acreage increase (from 1,566 to 1,571 acres). Similarly, off-base areas impacted by the 65 dB and greater DNL noise contour would increase by approximately 54 acres (approximately 1%) from 9,649 to 9,703 acres (see Figure 8.4.2-2 and Table 8.4.2-4). Land use associated with these impact areas consists primarily of commercial, industrial, or residential use. No effects would be anticipated to wildlife or other biological resources other than transitory startle effects. No sensitive biological receptors are known to be present within the proposed JSF DT noise impact area and no effect would be expected to Federally- or state-listed threatened or endangered species.

8.6 SOCIOECONOMICS AT LM AERO

8.6.1 Affected Environment

The socioeconomic study area for LM Aero in Fort Worth, Texas encompasses Tarrant County, as illustrated in Figure 8.6.1-1. There would be no additional personnel required at LM Aero for the proposed JSF DT Program. As such, no socioeconomic impacts (demographics, economic characteristics, housing, and infrastructure) would be anticipated as a result of the proposed JSF DT and are not discussed further, however, the potential for environmental justice impacts are discussed in this section.

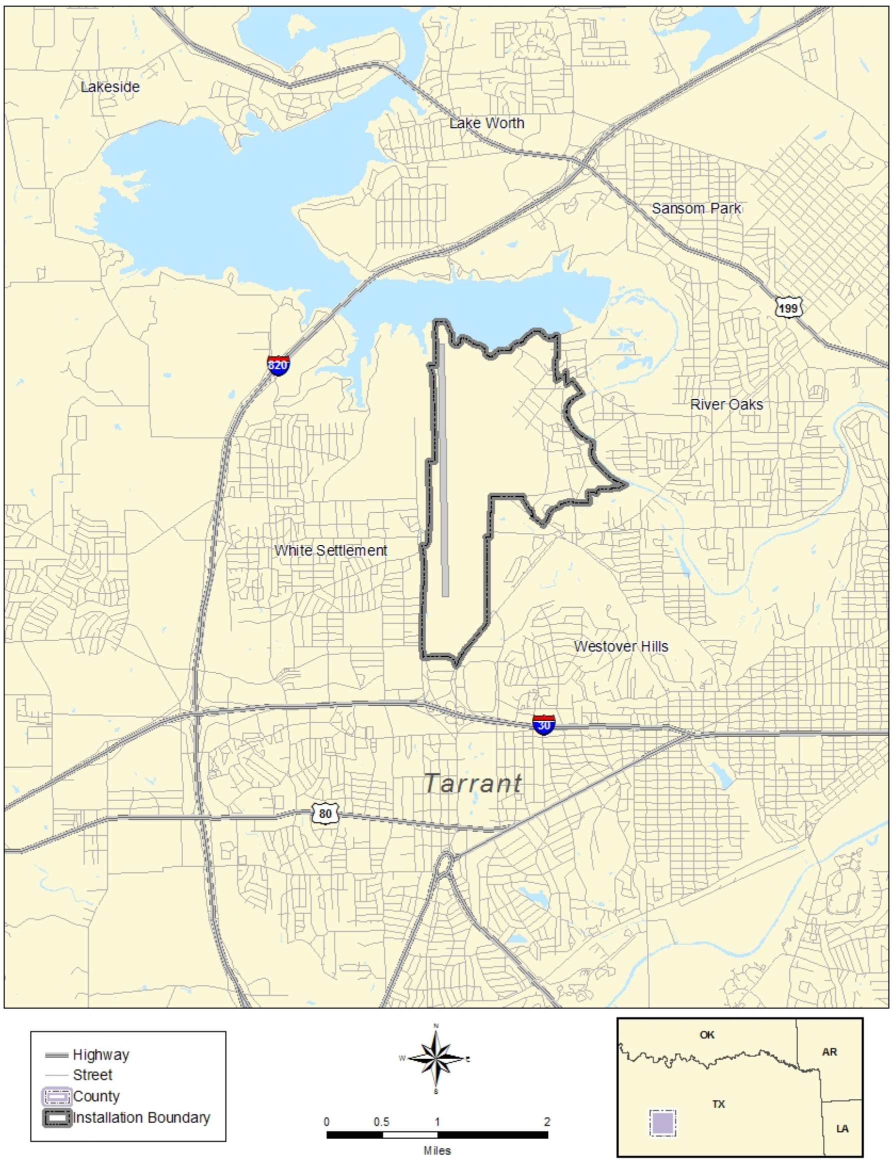


Figure 8.6.1-1: LM Aero Socioeconomic Study Area

8.6.1.1 Environmental Justice

Poverty rates, ethnicity, and census tracts/blocks, as illustrated in Figure 8.6.1.1-1, in the vicinity of LM Aero are used to support the environmental justice analysis.

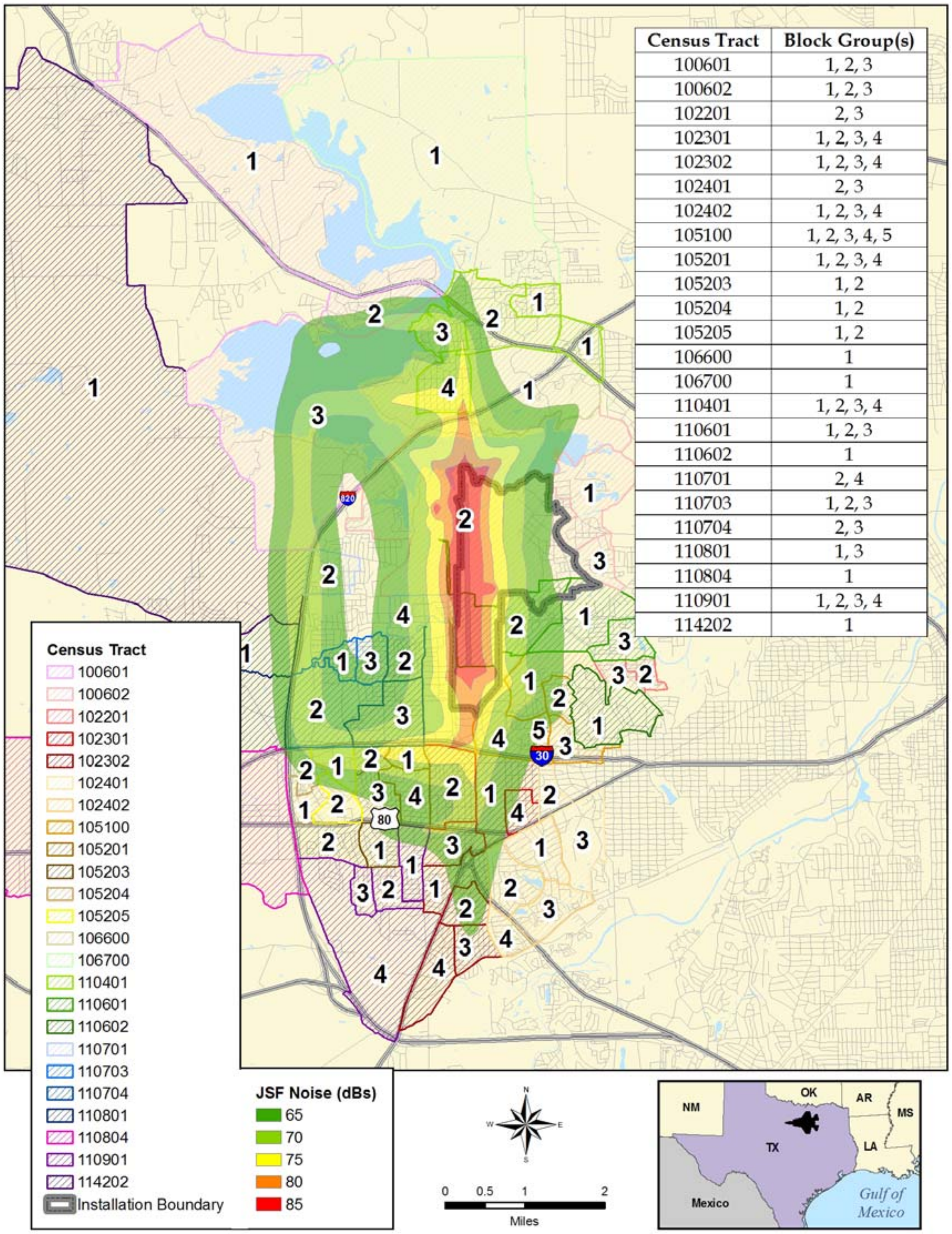


Figure 8.6.1.1-1: Census Tracts for the LM Aero Socioeconomic Study Area

Though the aggregate block groups in the LM Aero area do not exceed the poverty threshold, three individual block groups exceed the threshold and several groups come very close to the set threshold. Block 5 in census tract 105100 (32.15%), block group 1 in census tract 1052.01 (25.31%), and block group 2 census tract 105202 (36.25%) exceed the set threshold. Poverty rates by block group are summarized in Table 8.6.1.1-1.

Table 8.6.1.1-1: Poverty Rates by Block Groups in Census Tracts for LM Aero Area Socioeconomic Study Area (2000)

County	Census Tract #	Block Group #	Total Block Group Population (1999)	Persons Living in Poverty (1999)	Total Average Poverty Rate
Tarrant	100601	1	763	83	10.88%
Tarrant	100601	2	484	20	4.13%
Tarrant	100601	3	442	43	9.73%
Tarrant	100602	1	565	90	15.93%
Tarrant	100602	2	432	18	4.17%
Tarrant	100602	3	756	81	10.71%
Tarrant	102201	2	818	39	4.77%
Tarrant	102201	3	1,068	154	14.42%
Tarrant	102301	1	839	189	22.53%
Tarrant	102301	2	692	82	11.85%
Tarrant	102301	3	543	84	15.47%
Tarrant	102301	4	1,440	249	17.29%
Tarrant	102302	1	1,400	153	10.93%
Tarrant	102302	2	1,311	161	12.28%
Tarrant	102302	3	1,499	143	9.54%
Tarrant	102302	4	936	123	13.14%
Tarrant	102401	2	765	27	3.53%
Tarrant	102401	3	740	143	19.32%
Tarrant	102402	1	845	15	1.78%
Tarrant	102402	2	1,133	45	3.97%
Tarrant	102402	3	1,457	135	9.27%
Tarrant	102402	4	779	8	1.03%
Tarrant	105100	1	540	0	0.00%
Tarrant	105100	2	511	0	0.00%
Tarrant	105100	3	1,383	130	9.40%
Tarrant	105100	4	1,055	70	6.64%
Tarrant	105100	5	1,378	443	32.15%
Tarrant	105201	1	1,442	365	25.31%
Tarrant	105201	2	527	124	23.53%
Tarrant	105201	3	1,153	172	14.92%
Tarrant	105201	4	2,106	433	20.56%
Tarrant	105203	1	1,079	9	0.83%
Tarrant	105203	2	1,121	84	7.49%
Tarrant	105204	1	1,274	205	16.09%
Tarrant	105204	2	2,338	474	20.27%
Tarrant	105205	1	4,119	1,493	36.25%

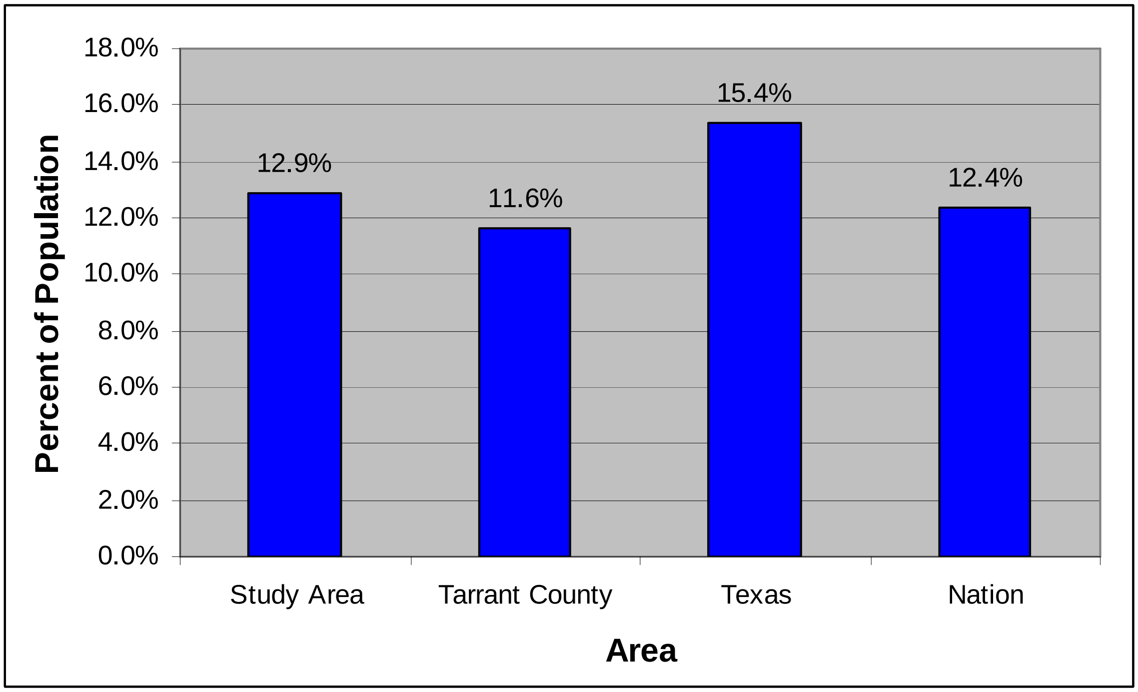
Table 8.6.1.1-1: Poverty Rates by Block Groups in Census Tracts for LM Aero Socioeconomic Study Area (2000) (Continued)

County	Census Tract #	Block Group #	Total Block Group Population (1999)	Persons Living in Poverty (1999)	Total Average Poverty Rate
Tarrant	105205	2	2,114	331	15.66%
Tarrant	106600	1	1,503	370	24.62%
Tarrant	106700	1	1,822	167	9.17%
Tarrant	110401	1	800	12	1.50%
Tarrant	110401	2	1,189	83	6.98%
Tarrant	110401	3	1,054	118	11.20%
Tarrant	110401	4	1,440	208	14.44%
Tarrant	110601	1	759	78	10.28%
Tarrant	110601	2	485	34	7.01%
Tarrant	110601	3	881	82	9.31%
Tarrant	110602	1	649	16	2.47%
Tarrant	110701	2	1,013	131	12.93%
Tarrant	110701	4	1,004	240	23.90%
Tarrant	110703	1	1,018	136	13.36%
Tarrant	110703	2	1,572	299	19.02%
Tarrant	110703	3	1,036	152	14.67%
Tarrant	110704	2	1,295	161	12.43%
Tarrant	110704	3	1,685	270	16.02%
Tarrant	110801	1	1,503	10	0.67%
Tarrant	110801	3	1,972	73	3.70%
Tarrant	1108.04	1	2,688	91	3.39%
Tarrant	1109.01	1	636	36	5.66%
Tarrant	1109.01	2	549	0	0.00%
Tarrant	1109.01	3	681	12	1.76%
Tarrant	1109.01	4	1,367	54	3.95%
Tarrant	1142.02	1	3,765	325	8.63%
Totals			***74213***	***9576***	***12.90%***

Source: 2000 Census; American FactFinder; 1999 Census Data by Tract number, Census 2000 Summary File 3 (SF3)—Sample Data, Detailed Tables; P.87.

The poverty rate in the LM Aero socioeconomic study area is 12.9% higher than the surrounding Tarrant County rate of 10.6% and National rate of 12.4%. But, the rate is lower than the statewide estimates for Texas (15.4%), as summarized in Figure 8.6.1.1-2.[249] The poverty rates in the LM Aero socioeconomic study area are well below the set threshold of 25% used to identify environmental justice populations, as discussed in Section 3.4 of this EA/OEA.

249 *Census Bureau 2000*



Source: U.S. Census Bureau 2000.

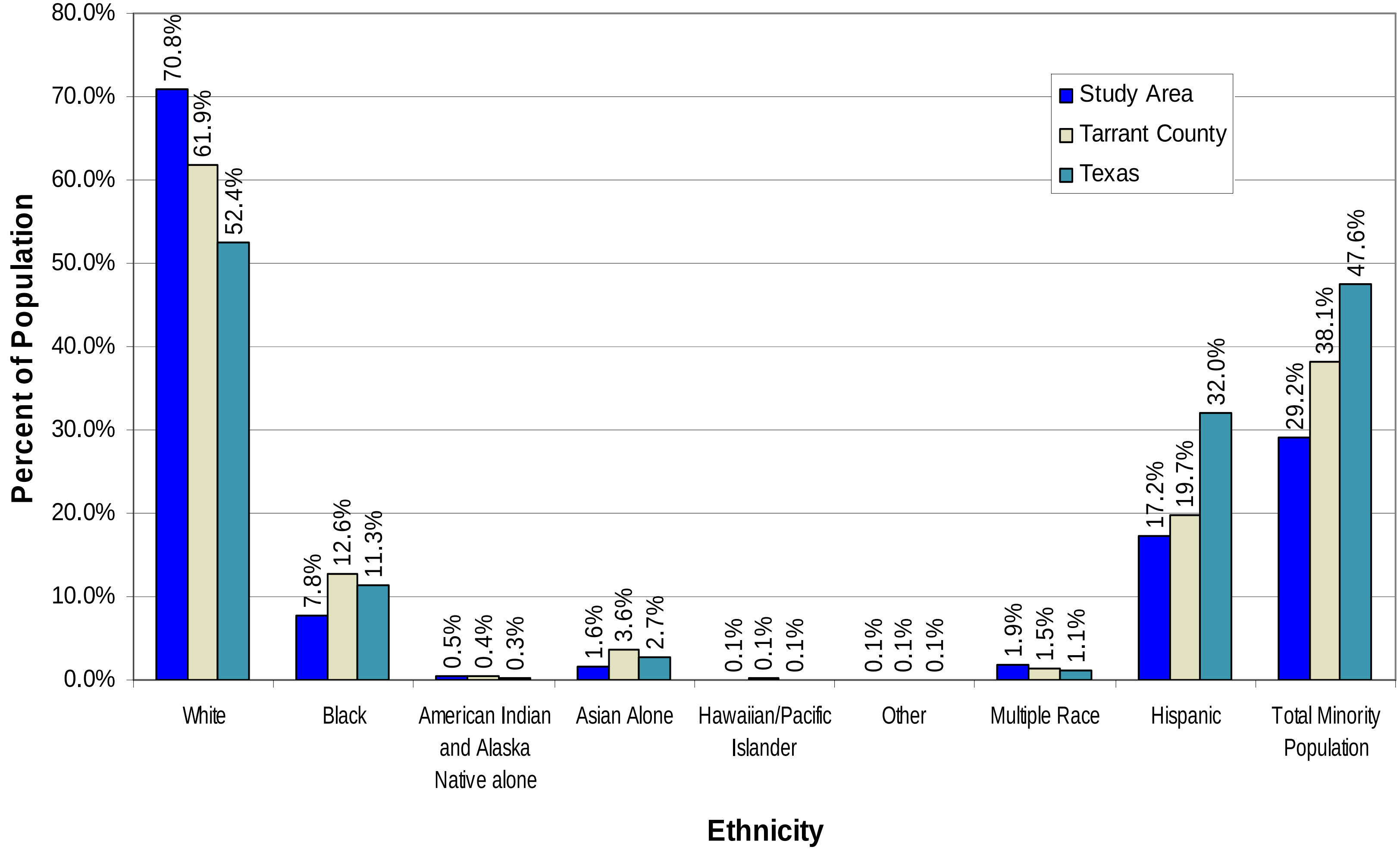
Figure 8.6.1.1-2: Poverty Rates for LM Aero Area Socioeconomic Study Area (2000)

Population ethnicity for the LM Aero area is summarized in Figure 8.6.1.1-3 and is comprised of predominantly white populations (70.8%). The remaining population distribution includes Hispanic or Latino (17.2%), Black or African American (7.8%), Asian (1.6%), two (2) or more races (1.9%), American Indian or Native Alaskan (0.5%), Native Hawaiian or other Pacific Islander (0.1%), and some other race (0.1%). The ethnic representations in the area resemble the ethnicity distribution for Texas, but Hispanic or Latino, Black or African American, and Asian populations are lower than Tarrant County and state estimates.[250]

Total minority populations (29.2%) in the LM Aero area is lower than Tarrant County (38.1%) and Texas (47.6%),[251] and is below the CEQ threshold of 50% for minority populations, which is used to identify environmental justice populations. Ethnicity by block groups in census tracts for the LM Aero socioeconomic study area is summarized in Table 8.6.1.1-2. Several individual block group rates exceed the CEQ threshold of 50%, such as block group 1 of census tract 1006.02 (60.3%), block 2 of census tracts 102301 and 105201 (53.3%), block group 5 of census tract 105100 (50.5%), block 1 of census tract 1052.01 (61.6%), and block group 1 of census tract 105205 (52.4%).

250 *Census Bureau 2000*

251 *Census Bureau 2000*



Source: U.S. Census Bureau, 2000.
Note: The percent of the population by ethnicity for the study area will not equal the average of the counties' percent of the population by ethnicity because denominators (county populations) are not common to all.

Figure 8.6.1.1-3: Ethnicity for LM Aero Socioeconomic Study Area (2000)

Table 8.6.1.1-2: Ethnicity by Census Tracts/Blocks for LM Aero Socioeconomic Study Area (2000)

Census Tract #	Block Group #	White	Black or African American	American Indian and Alaska Native Alone	Asian Alone	Hawaiian or other Pacific Islander	Other	Multiple Race	Hispanic	Total Minority Population
100601	1	87.8%	0.9%	1.7%	0.4%	0.0%	0.0%	0.5%	8.6%	12.2%
100601	2	90.3%	0.0%	1.8%	0.6%	0.0%	0.0%	3.0%	4.2%	9.7%
100601	3	93.5%	0.0%	0.0%	0.4%	0.0%	0.0%	1.1%	5.0%	6.5%
100602	**1**	**39.7%**	**24.3%**	**2.1%**	**0.9%**	**0.0%**	**0.0%**	**0.2%**	**32.8%**	**60.3%**
100602	2	68.3%	15.8%	1.3%	1.7%	0.0%	0.0%	2.9%	10.0%	31.7%
100602	3	80.6%	1.1%	0.3%	0.8%	0.0%	0.1%	0.7%	16.4%	19.4%
102201	2	73.3%	5.0%	0.0%	0.8%	0.0%	0.0%	1.9%	19.0%	26.7%
102201	3	72.1%	3.7%	0.6%	0.1%	0.1%	0.0%	1.7%	21.8%	27.9%
102301	1	56.2%	6.4%	1.0%	2.3%	0.0%	0.1%	1.8%	32.2%	43.8%
102301	**2**	**46.7%**	**4.0%**	**0.7%**	**0.6%**	**0.0%**	**0.1%**	**1.2%**	**46.6%**	**53.3%**
102301	3	61.1%	9.5%	0.4%	1.7%	0.0%	0.0%	2.0%	25.3%	38.9%
102301	4	50.1%	11.4%	0.0%	1.4%	0.0%	0.0%	1.7%	35.4%	49.9%
102302	1	71.1%	5.8%	0.2%	1.8%	0.0%	0.0%	1.6%	19.4%	28.9%
102302	2	67.8%	3.2%	0.7%	1.0%	0.1%	0.0%	1.6%	25.5%	32.2%
102302	3	61.5%	10.4%	0.6%	0.7%	0.2%	0.0%	1.9%	24.7%	38.5%
102302	4	73.5%	3.5%	0.3%	0.9%	0.0%	0.0%	2.0%	19.9%	26.5%
102401	2	86.6%	3.7%	0.8%	0.7%	0.0%	0.0%	0.7%	7.6%	13.4%
102401	3	50.1%	15.2%	0.3%	1.6%	0.0%	0.0%	1.1%	31.8%	49.9%
102402	1	90.8%	0.2%	0.0%	2.2%	0.0%	0.3%	1.0%	5.4%	9.2%
102402	2	93.8%	1.6%	0.5%	0.3%	0.0%	0.0%	0.7%	3.1%	6.2%
102402	3	82.9%	5.2%	0.8%	2.2%	0.1%	0.5%	0.5%	7.8%	17.1%
102402	4	86.4%	4.5%	0.1%	0.3%	0.0%	0.0%	1.2%	7.6%	13.6%
105100	1	95.6%	0.0%	0.2%	1.1%	0.0%	0.2%	0.4%	2.5%	4.4%
105100	2	96.8%	0.6%	0.0%	0.6%	0.0%	0.2%	0.2%	1.5%	3.2%
105100	3	72.5%	8.9%	0.1%	7.1%	0.0%	0.1%	0.9%	10.5%	27.5%
105100	4	60.5%	10.2%	0.3%	1.9%	0.0%	0.2%	1.6%	25.2%	39.5%

Table 8.6.1.1-2: Ethnicity by Census Tracts/Blocks for LM Aero Socioeconomic Study Area (2000) (Continued)

Census Tract #	Block Group #	White	Black or African American	American Indian and Alaska Native Alone	Asian Alone	Hawaiian or other Pacific Islander	Other	Multiple Race	Hispanic	Total Minority Population
105100	**5**	**49.5%**	**15.4%**	**0.3%**	**3.5%**	**0.0%**	**0.1%**	**1.9%**	**29.3%**	**50.5%**
105201	**1**	**38.4%**	**13.0%**	**0.9%**	**0.8%**	**0.1%**	**0.0%**	**1.4%**	**45.5%**	**61.6%**
105201	**2**	**46.7%**	**16.1%**	**0.2%**	**2.0%**	**0.0%**	**0.0%**	**0.8%**	**34.1%**	**53.3%**
105201	3	83.6%	5.7%	0.1%	1.5%	0.1%	0.1%	0.9%	8.0%	16.4%
1052.01	**4**	**38.6%**	**14.1%**	**0.7%**	**2.1%**	**0.0%**	**0.1%**	**1.2%**	**43.3%**	**61.4%**
1052.03	1	81.4%	5.8%	0.1%	0.6%	0.4%	0.0%	1.0%	10.8%	18.6%
1052.03	2	82.4%	3.9%	0.7%	1.0%	0.1%	0.0%	3.0%	8.9%	17.6%
1052.04	1	51.2%	20.7%	0.5%	2.0%	0.2%	0.0%	2.4%	23.1%	48.8%
1052.04	2	59.7%	18.5%	0.3%	1.9%	0.0%	0.2%	2.1%	17.3%	40.3%
1052.05	**1**	**47.6%**	**26.0%**	**0.3%**	**2.7%**	**0.0%**	**0.8%**	**4.2%**	**18.5%**	**52.4%**
1052.05	2	62.7%	18.3%	0.5%	1.1%	0.0%	0.1%	2.3%	14.9%	37.3%
106600	1	64.3%	6.7%	0.6%	1.3%	0.2%	0.0%	3.0%	24.0%	35.7%
106700	1	80.0%	1.8%	0.5%	0.8%	0.1%	0.1%	1.9%	14.8%	20.0%
1104.01	1	81.3%	2.0%	0.6%	1.1%	0.0%	0.1%	1.6%	13.3%	18.7%
1104.01	2	75.8%	0.6%	0.2%	1.4%	0.0%	0.2%	2.0%	19.9%	24.2%
1104.01	3	86.1%	0.3%	0.7%	1.1%	0.0%	0.0%	1.5%	10.3%	13.9%
1104.01	4	81.0%	0.7%	1.0%	0.4%	0.3%	0.0%	2.5%	14.1%	19.0%
1106.01	1	71.1%	2.1%	0.4%	1.6%	0.3%	0.0%	2.7%	21.9%	28.9%
1106.01	2	65.6%	10.8%	1.7%	1.2%	0.6%	0.0%	5.0%	15.1%	34.4%
1106.01	3	76.1%	2.1%	1.4%	1.1%	0.1%	0.1%	1.2%	17.8%	23.9%
1106.02	1	96.8%	0.0%	0.0%	0.8%	0.0%	0.0%	0.9%	1.5%	3.2%
1107.01	1	88.4%	1.1%	0.2%	0.5%	0.1%	0.0%	1.9%	7.8%	11.6%
1107.01	2	85.6%	1.1%	0.5%	0.4%	0.0%	0.0%	1.9%	10.5%	14.4%
1107.01	4	74.9%	3.8%	0.3%	5.5%	0.0%	0.2%	2.7%	12.6%	25.1%
1107.03	1	81.4%	2.1%	0.6%	1.6%	0.0%	0.0%	3.3%	11.0%	18.6%
1107.03	2	69.8%	6.0%	0.5%	2.1%	0.0%	0.3%	3.1%	18.2%	30.2%
1107.03	3	79.0%	1.4%	0.4%	0.0%	0.1%	0.0%	1.7%	17.3%	21.0%

Table 8.6.1.1-2: Ethnicity by Census Tracts/Blocks for LM Aero Socioeconomic Study Area (2000) (Continued)

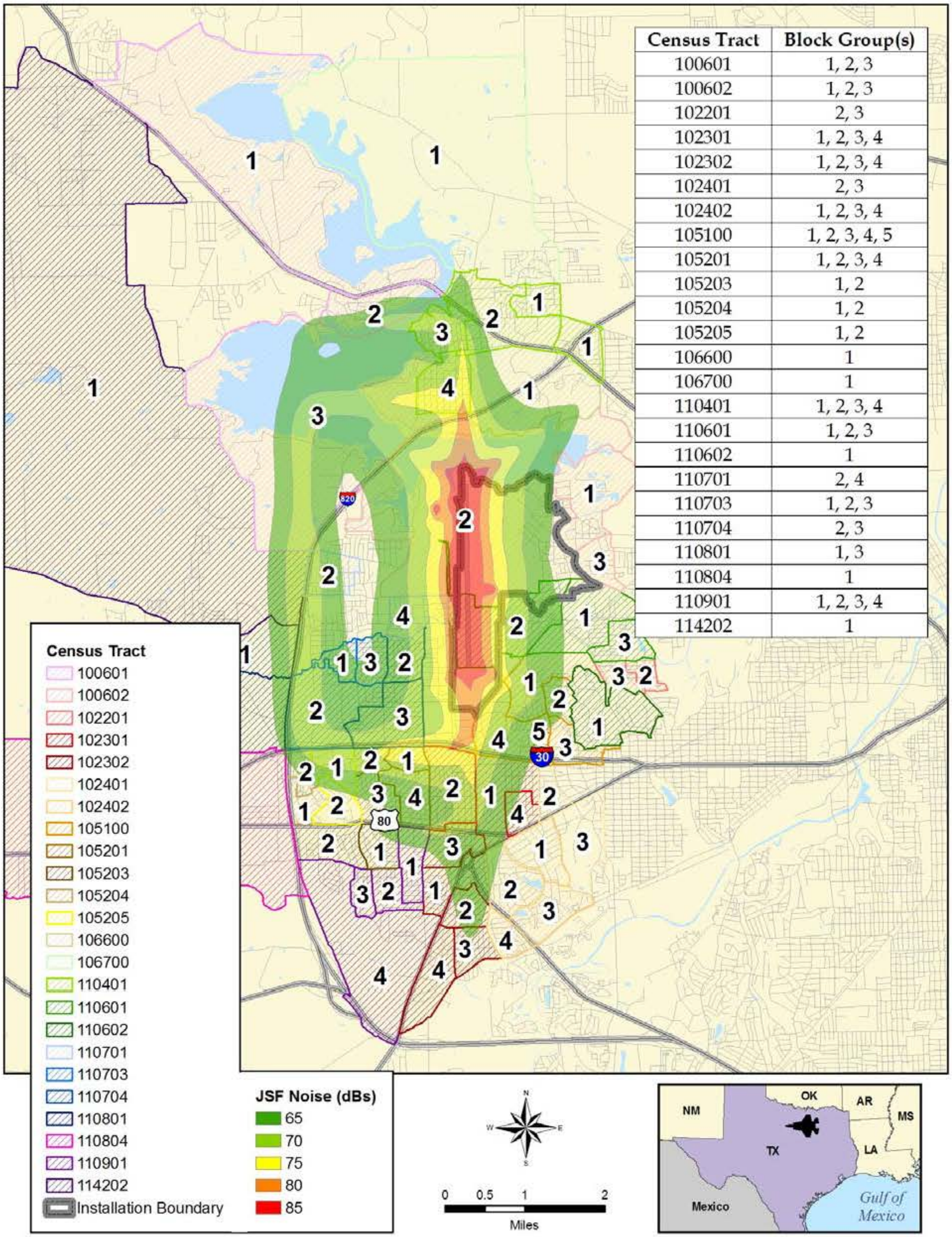
Census Tract #	Block Group #	White	Black or African American	American Indian and Alaska Native Alone	Asian Alone	Hawaiian or other Pacific Islander	Other	Multiple Race	Hispanic	Total Minority Population
1107.04	2	82.0%	1.5%	0.4%	0.9%	0.2%	0.0%	1.9%	13.2%	18.0%
1107.04	3	68.5%	11.0%	0.4%	1.6%	0.0%	0.0%	3.4%	15.1%	31.5%
1108.01	1	77.1%	6.5%	0.3%	3.2%	0.0%	0.1%	2.0%	10.8%	22.9%
1108.01	3	74.7%	6.1%	0.1%	2.3%	0.0%	0.1%	3.3%	13.5%	25.3%
1108.04	1	82.1%	3.2%	0.1%	2.4%	0.1%	0.0%	1.0%	11.0%	17.9%
1109.01	1	85.4%	3.4%	0.1%	2.6%	0.0%	0.0%	1.1%	7.4%	14.6%
1109.01	2	91.3%	0.5%	0.4%	0.2%	0.0%	0.0%	1.3%	6.3%	8.7%
1109.01	3	93.1%	0.6%	0.0%	0.9%	0.0%	0.0%	2.4%	3.0%	6.9%
1109.01	4	88.7%	1.0%	0.7%	0.9%	0.1%	0.0%	2.2%	6.3%	11.3%
1142.02	1	82.6%	2.8%	0.6%	1.7%	0.0%	0.0%	1.8%	10.4%	17.4%

Source: Census Bureau 2000.

8.6.2 Environmental Consequences

Socioeconomic impacts from the Proposed Action alternatives are not anticipated to be significant for environmental justice populations within the communities surrounding LM Aero. Based on the threshold criteria for minority or low-income populations presented in Section 8.6.1.1, there would be a few census tracts with low income and/or minority populations that could potentially be impacted by the proposed JSF DT at LM Aero. The minimal noise contour changes occurring outside LM Aero's boundaries (as discussed in Section 8.4.2 and depicted in Figure 8.6.2-1 of this EA/OEA) would not likely cause disproportionate high or adverse human health and environmental effects to environmental justice populations relative to other populations in the area. No discernable residential or incompatible land uses would experience an increase of 1.5 dB within either the existing or Proposed Action 65 dB DNL noise contour. Any predicted impacts would likely be small, and therefore, minimal to negligible socioeconomic impacts would be anticipated from the Proposed Action alternatives.

Similarly, implementation of the proposed JSF DT at LM Aero would cause no disproportionately adverse health or safety risks to children. No potentially significant impacts to any sensitive receptors (including hospitals, schools, and daycare facilities) where a disproportionately large population of children may be present would be anticipated based on noise and air quality analyses.



Census Tract	Block Group(s)
100601	1, 2, 3
100602	1, 2, 3
102201	2, 3
102301	1, 2, 3, 4
102302	1, 2, 3, 4
102401	2, 3
102402	1, 2, 3, 4
105100	1, 2, 3, 4, 5
105201	1, 2, 3, 4
105203	1, 2
105204	1, 2
105205	1, 2
106600	1
106700	1
110401	1, 2, 3, 4
110601	1, 2, 3
110602	1
110701	2, 4
110703	1, 2, 3
110704	2, 3
110801	1, 3
110804	1
110901	1, 2, 3, 4
114202	1

Source: U.S. Census Bureau 2000.

Figure 8.6.2-1: Proposed JSF DT Noise Contour to Census Tracts and Block Groups in the LM Aero Socioeconomic Study Area

8.7 CUMULATIVE IMPACTS

The CEQ's implementing regulations for NEPA define cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."[252]

Only activities that are reasonably foreseeable in the future, with the potential to interact with the Proposed Action are addressed. Because the level of detail varies between future actions, a qualitative analysis is used so that all projects can be evaluated consistently in accordance with the best available information. Since the direct and indirect impact analysis focused only on those resources that may be impacted by the Proposed Action (air quality, noise, biological/natural resources, and socioeconomic factors), the cumulative impacts analysis would address the same resources.

Annual aircraft activity (current flight operation levels) at NAS JRB is projected to increase slightly over the next five years, as reflected in Table 8.7-1. Air Traffic Control counts arrivals/departures/transitions which are recorded on a yearly air activity report. The numbers in Table 8.7-1 are based on previous air activity reports. Flight operations are expected to increase (by 13%) from 61,000 to 70,000 from CY 2006 through CY 2011 for the NAS JRB airfield. The increase in annual air activity at NAS JRB is attributed to the acquisition of six F-16s in CY 2007, as well as the possible addition of two squadrons and an Apache Aircraft Depot Level Maintenance Facility. The proposed CATB and F-35 flights would only comprise 0.1% of the total annual activity anticipated for LM Aero and NAS JRB. While flight operation levels are expected to increase slightly in the next five years, no significant deviations in flight lines or airspace use are anticipated, thus providing minimal potential for cumulative impacts.

Table 8.7-1: Annual Aircraft Activity Projection for LM Aero and NAS JRB[253]

CY	Forecasted Traffic	Notes
2006	61,000	Similar to present day traffic levels
2007	62,000	Acquisition of six F-16s
2008	70,000	Possible addition of two squadrons and an Apache Aircraft Depot Level Maintenance Facility
2009	70,000	No notes provided
2010	70,000	No notes provided
2011	70,000	No notes provided

Implementation of the Proposed Action under both alternatives at LM Aero would result in minimal cumulative impacts to air quality based on the reasonably foreseeable future activities. The qualitative cumulative air quality analysis conducted for this EA/OEA concluded proposed JSF DT emissions would predominately be transitory, site-specific, and not cumulatively significant. The additional landings and takeoffs would account for less than 0.1% of the reasonably foreseeable landings and takeoffs at LM Aero. The air quality impacts are small enough to be considered *de minimis.*

The primary criterion for determining whether an action has significant cumulative impacts is whether the project is consistent with an approved plan in place for the region where the pollutants are being emitted. The proposed JSF DT would comply with approved air quality planning documents/permits at LM Aero

[252] *40 CFR 1508.7*

[253] *Based on NAS JBR Input – LCDR D. Gomez, 21 October 2005*

that assist the area in attaining and maintaining the national and state ambient air quality standards for criteria pollutants.

Analysis of past, present, and future programs that could potentially provide additional aviation noise at LM Aero included impacts disclosed in the *EA for the JSF-SDD Facilities Expansion Project, Air Force Plant #4*, finalized in August 2002. The EA projected a minimal number of operations expected at the STOVL Operations Facility at LM Aero. Additionally, the EA anticipated that the amount of change created by this testing would have relatively no impact on the noise contours and no expected effect on total airfield noise.[254] Considering this and the results of the noise analysis presented in Section 8.4.2 of this EA/OEA, no cumulative noise impacts would be expected for either alternative.

Based on the noise analysis, the proposed JSF DT is not expected to significantly impact biological/natural resources, surrounding communities, or environmental justice populations under either alternative. Additionally, no regional cumulative socioeconomic impacts would be anticipated. The proposed JSF DT changes the existing noise impact areas slightly off- and on-base at LM Aero, but land use (primarily commercial, industrial, or residential use) remains essentially the same as the existing baseline. LM Aero operates a controlled airspace with standard procedures and published directives that establish minimum overflight altitudes for areas such as parks, wilderness areas, and populated areas. There are also restrictions placed on the altitude and direction of the flights including supersonic operations. Therefore, no significant cumulative effect to any biological resource, including Federally- and state-listed species, and environmental justice populations would be expected from the Proposed Action.

[254] *LM Aero 2002*

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9.0 CONCLUSIONS

In accordance with NEPA (40 CFR 1502.16), this section discusses irreversible and cumulative effects and irretrievable commitment of resources associated with the Proposed Action (for both alternatives). Irreversible and irretrievable commitments are related to the use of nonrenewable natural resources and the effects that the use of those resources will have on future generations. Irreversible impacts primarily result from the use or destruction of a specific resource that cannot be replaced within a reasonable time frame. For example, the use of energy (e.g. fuel), labor, and financial resources is considered irreversible. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of implementing and action (e.g., extinction of a rate or threatened species).

The Proposed Action is not expected to significantly impact or harm (directly, indirectly, or cumulatively) the natural or human environment at any of the proposed test locations. No loss or change of land use will occur, nor will significant degradation occur to air quality, the noise environment, biological/coastal zone resources, or quality of life for the surrounding communities at the proposed test locations. Therefore, no irreversible or irretrievable impacts are anticipated from the Proposed Action. A summary of the anticipated environmental impacts from the proposed JSF DT is provided in Table 9-1.

The JPO and JSF V&T Team will comply with all environmental and safety measures imposed by each proposed test location. All proposed flights will be conducted in accordance with all existing proposed test location airspace/range/flight protocols and manuals. In addition, the JPO and JSF V&T Team will ensure adherence to the flight profiles and assumptions used in the noise modeling analysis of this EA/OEA (as reflected in Sections 5.4.2, 6.4.2, 7.4.2, 8.4.2, and Appendix F). Any deviations from these protocols and modeled flight profiles will be analyzed and coordinated with the appropriate representatives (e.g., Air Operations, NAVAIR Ranges Sustainability Office, Environmental Office, NEPA Coordinator, Safety Office). In addition, to the maximum extent feasible, the JPO and JSF V&T Team will provide the NAVAIR Ranges Sustainability Office a monthly summary of F-35 departures in the AB mode to include the date, time, and runway used. This data will be reviewed by the NAVAIR Ranges Sustainability Office and any identified noise trends will be shared with the JPO and JSF V&T Team.

Prior to implementation of the proposed JSF DT, the JPO will coordinate with and support the Environmental and Public Affairs Offices, at the proposed test locations, with any needed press releases and public outreach requirements. As a minimum, based on discussions with NAVAIR Ranges Sustainability Office representatives, such coordination will required with the appropriate NAVAIR and NAS Patuxent River public affairs representatives.

Throughout the conduct of the proposed JSF DT, the JPO and JSF V&T Team will coordinate with the Air Operations, Range Sustainability, Environmental, Public Affairs, and other offices at the proposed test locations to further assure continued minimal environment impacts. For example, the JPO and JSF V&T Team will coordinate with Edwards AFB environmental representatives to identify if any terms and conditions of the pending BO (anticipated for CY 2007 or 2008) would be applicable to the proposed JSF DT activities to ensure compliance. The JPO and JSF V&T Team will also coordinate with the appropriate offices to determine if additional analysis would be warranted as a result of any substantial changes to the type or tempo of the proposed JSF DT activities analyzed in this EA/OEA.

Table 9-1: Summary of Environmental Impacts from Alternatives One and Two for the Proposed Action

Air Quality
Minimal to negligible impacts to air quality are expected from implementing either Proposed Action alternative at Eglin AFB, NAWCWD China Lake, NAWCWPNS Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA. A formal Conformity Determination is not required for either Proposed Action alternative at Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero. Project related emission levels will be below the applicable *de minimis* thresholds, and the annual project-related emissions do not make up 10% or more of the nonattainment area's total emissions budget. For NAES Lakehurst, the annual project-induced emissions do not make up 10% or more of the region's projected emissions of Ozone precursors, as specified in the State Implementation Plan budget. Therefore, the Proposed Action is not likely to result in significant air quality impacts to Edwards AFB, NAS Patuxent River, NAES Lakehurst, LM Aero, or the surrounding areas.
Noise
All proposed F-35 flight operations will be conducted in accordance with existing procedures approved within Air Installation Compatible Use Zone programs. Minimal to negligible impacts from noise is expected for implementing either Proposed Action alternative at Eglin AFB, NAWCWD China Lake, NAWCWPNS Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA. Proposed JSF DT activities at these locations represent approximately 1% or less of the overall tempo of operations conducted normally or for similar RDT&E programs. Specific noise analysis findings for Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero are as follows: • Edwards AFB: On-base areas potentially impacted by the 65 decibel (dB) and greater Community Noise Equivalent Level (CNEL) noise contour (applicable to the State of California) increase by approximately 1,405 acres (approximately 12.2%), from approximately 11,472 to 12,877 acres. There are no off-base areas impacted by the 65 dB and greater CNEL noise contour. • NAS Patuxent River: On-installation areas potentially impacted by the 65 dB and greater Day-Night Average Sound Level (DNL) noise contour increase by about 36 acres, from approximately 5,442 to 5,478 acres (less than 1%). Off-installation areas potentially impacted by the 65 dB and greater DNL noise contour decrease by approximately 34 acres (approximately 4%) from 808 to 774 acres of land outside of NAS Patuxent River's installation boundary. • NAES Lakehurst: On-installation areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 889 acres (approximately 106%), from 835 to 1,724 acres. As a result of the Proposed Action, off-installation areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 150 acres (approximately 197%) from 76 to 226 acres. • LM Aero: On-base areas potentially impacted by the 65 dB and greater DNL noise contour would increase by approximately 5 acres, from 1,566 to 1,571 acres (less than 1%). Off-base areas potentially impacted by the 65 dB and greater DNL noise contour would increase by approximately 54 acres (less than 1%), from 9,649 to 9,703 acres. None of the non-residential noise sensitive receptors identified will experience a 1.5 dB or 3.0 dB increase in noise as a result of the Proposed Action alternatives. There are no discernable residential or incompatible land uses located within the 65 db or greater CNEL and DNL noise contours for the Proposed Action alternatives. Therefore, no significant impacts from noise are expected at the proposed test locations.

Table 9-1: Summary of Environmental Impacts from Alternatives One and Two for the Proposed Action (Continued)

Biological/Natural Resources

Potential environmental impacts to biological/natural resources include noise-induced effects from aircraft overflights, ground-based testing at NAES Lakehurst, and weapons separation tests. Biological species are expected to be acclimated to the noise generated from T&E activities conducted at the proposed test locations. While some proposed flights will occur below 3,000 feet above ground level (AGL), most of those flights will be of short duration and above the 550-foot AGL zone that has been shown to account for most wildlife reaction. Minimal to negligible impacts to biological/natural resources are expected for implementing either Proposed Action alternative at Eglin AFB, NAWCWD China Lake, NAWCWPNS Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA. Specific findings for Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero are as follows:

- Edwards AFB: The proposed JSF DT activity may change the existing noise impact areas slightly, but the species present in the newly-affected area are believed to be transient in nature and accustomed to the regularly occurring flight noise associated with on-going actions at Edwards AFB. Potential impacts to biological resources, while possible, are not be expected since all weapon releases will be conducted in established ranges/impact areas, which in many instances lack available suitable habitat.
- NAS Patuxent River: The potential impacts to sensitive biological resource areas from noise are minimal to negligible. The proposed weapons separation & integration tests in the Chesapeake Test Range (CTR) would not likely impact the marine environment, including marine mammals and sea turtles. Similarly, no changes to water quality or other resources needed to support fish habitats are expected.
- NAES Lakehurst: The change in land area will increase with the proposed JSF DT (from 307 acres to 1,073 acres; and introduce noise to the southwest of the runway, where it does not exist currently). The area potentially impacted provides important habitat for threatened and endangered grassland bird species. These species, as well as other biological resources, may already be accustomed to aircraft noise, and species are expected to be minimally impacted with no permanent behavioral or physiological changes. In addition, only about 1% of the total acres in the Manchester Fish and Wildlife Management Area would fall within the projected noise contours; and there would be no change to its use. Therefore, no significant impacts are expected to the environment.
- LM Aero: No impacts to biological/natural resources are anticipated as no sensitive receptors would be present within the proposed JSF DT noise impact area.

The proposed JSF DT will not produce any significant impacts to biological/natural resources, including Federally- and state-listed endangered or threatened species or essential fish habitat. No consultation is required since affects to protected species are not anticipated.

Socioeconomics/Environmental Justice

The addition of personnel to support the proposed JSF DT Program at Edwards AFB and NAS Patuxent River, and the temporary relocation of personnel to NAES Lakehurst, have the potential to impact the immediate, surrounding areas. No additional, new personnel are required to support the Proposed Action at other proposed test locations. The gradual influx of personnel will result in small positive benefits to the economic region. Considering there are no discernable noise impacts to sensitive receptors or populations, no disproportionately high or adverse human health and environmental effects are expected to environmental justice populations or children.

Coastal Zones Resources

No impacts to the coastal zone resources of California, Maryland, Virginia, and Delaware are expected from implementing the Proposed Action at NAWCWPNS Point Mugu, NAS Patuxent River, and the VACAPES OPAREA based on the results of the air quality and noise analyses. Similarly, minimal impacts are expected to biological/natural resources, including marine species. The JPO PEO has determined the proposed JSF DT will be consistent to the maximum extent practicable with the enforceable policies and objectives of the California, Maryland, Virginia, and Delaware Coastal Zone Management Programs. A Negative Coastal Consistency Determination has been completed by the JPO.

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11.0 LIST OF CONTRIBUTORS AND REVIEWERS

This EA/OEA has been prepared by the JPO, with contractual assistance from Booz Allen Hamilton and Science Applications International Corporation. Jean Hawkins, JSF Environment, Safety, and Occupational Health Lead, has provided project management and oversight for this EA/OEA. This EA/OEA has been prepared, reviewed, and edited by an interdisciplinary team, as reflected in Table 11-1.

Table 11-1: EA/OEA Preparers

Name	Area of Specialty	Degree and Year
Booz Allen Hamilton		
Lori Hales	Project and Environmental Management	BS Biology, Grove City College MS Occupational Safety & Health Engineering, West Virginia University
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Table 11-1: EA/OEA Preparers (Continued)

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Table 11-2 identifies those who have contributed to the development of this EA/OEA by providing proposed JSD DT profile information, specific data relevant to each proposed test locations, and other related data pertinent to the assessment.

Table 11-2: Contributors

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JSF Environmental Safety and Occupational Health (ESOH) Working Group			
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Table 11-2: Contributors (Continued)

Name	Title	Organization	Location
Proposed Test Locations (Continued)			
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Rick Johnston	GIS Lead		Edwards AFB, CA
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Bryan Perdue	Geospatial Information Officer	Office of the Garrison Commander	White Sands Missile Range, NM

Table 11-3 identifies those agencies and public organizations provided a copy of the Draft EA/OEA in June and July 2006 for their review. The Draft EA/OEA was also made available in representative public libraries (See Table 11-4) for the four proposed test locations analyzed in detail in this document: Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero. Of the agencies and organizations receiving a copy of the Draft EA/OEA, were the Virginia Department of Environmental Quality, Pinelands Commission of the State of New Jersey, and Maryland Office of Planning provided written responses or inquiries.

Table 11-3: Agency and Public Organization Coordination on Draft JSF EA/OEA

Agency/Organization
Edwards AFB **No Responses Received**
California Department of Fish and Game, Sacramento, CA
Charles Fryell Mojave Desert AQMD, Victorville, CA
Fryell or Bank AV Air Pollution Control District, Lancaster, CA
Office of Research and Planning, California State Clearinghouse, Sacramento, CA
Regional Office R-5 U.S. Department of Agriculture Forest Service, Vallejo, CA
Thomas Paxson, Kern County APCD, Bakersfield, CA
Ventura Field Office, U.S. Fish and Wildlife Service, Ventura, CA
Honorable Howard McKeon, Palmdale, CA
Honorable William Thomas, Bakersfield, CA
Senator Roy Ashburn, Sacramento, CA
Senator George C. Runner, Sacramento, CA
NAS Patuxent River **No Responses Received Except for Virginia Department of Environmental Quality, Division of Environmental Enhancement, Office of Environmental Impact Review and Maryland Office of Planning**
U.S. Fish and Wildlife Service, Annapolis, MD
Maryland Office of Planning, Baltimore, MD—*This office requested confirmation that no associated construction or improvements were involved for the Proposed Action. The JSF ESOH Lead confirmed that no construction is required for the proposed JSF DT Program, and that no impacts to cultural resources are expected based on additional inquiry by this office.*
Maryland Department of the Environment, Wetlands and Waterways Program, Baltimore, MD
Maryland Department of Natural Resources, Environmental Review Unit, Annapolis, MD
State Clearinghouse and Plan Review Unit, Maryland Office of Planning, Baltimore, MD
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Coastal Resource Coordinator, Philadelphia, PA
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Northeast Regional Office, Regional Administrator, Gloucester, MA
Virginia Department of Environmental Quality, Office of Environmental Impact Review, Richmond, VA—*Comment: Due to the nature of the action, which does not involve development and construction activities in Virginia, a coordinated review of the document with other state agencies and organizations is not needed. However, it was recommended that the JPO provide the document to potentially affected local governments, such as Accomack-Northampton Planning District Commission and Virginia Department of Emergency Management, who may have an interest in noise impacts and emergency response issues.*
Virginia Department of Environmental Quality, Richmond, VA
Northern Neck Planning District Commission, Environmental Planner, Warsaw, VA
Honorable Thomas V. Mike Miller, Jr., State House H-107, Annapolis, MD
Senator Richards F. Colburn, James Senate Office, Annapolis, MD
Senator J. Lowell Stoltzfus, James Senate Office, Annapolis, MD
Senator Roy Dyson, James Senate Office, Annapolis, MD
Delegate John L. Bohanon, Lowe House of Office Building, Annapolis, MD
David F. Hale, Calvert County Board of Commissioners, Prince Frederick, MD
Thomas F. McKay, Board of County Commissioners, Leonardtown, MD

Table 11-3: Agency and Public Organization Coordination on Draft JSF EA/OEA (continued)

Agency/Organization (continued)
NAES Lakehurst No Responses Received Except for New Jersey Pinelands Commission
Director, Office of Program Coordination, New Jersey Department of Environmental Protection, Trenton, NJ
The New Jersey Natural Heritage Program, Office of Natural Lands Management, Division of Parks and Forestry, New Jersey Department of Environmental Protection, Trenton, NJ
New Jersey Pinelands Commission, New Lisbon, NJ—*Comment: Application with the Pinelands Commission not required, since no new development is proposed as part of this project.*
Ocean County Administrator Alan W. Avery, Jr., Toms River, NJ
Mayor Michael Fressola – No Response Received
Senator Leonard T. Connors – No Response Received
LM Aero No Responses Received
Texas Commission on Environmental Quality, Austin Headquarters, Austin, TX
Texas Commission on Environmental Quality, Regional Office Dallas/Forth Worth, Fort Worth, TX
TCEQ DFW Regional Office, Fort Worth, TX
Environmental Management Department, Fort Worth, TX
Honorable Jane Nelson, Austin, TX
Honorable Kim Brimer, Austin, TX
Honorable Chris Harris, Austin, TX

Table 11-4: Public Libraries Receiving Draft JSF EA/OEA

Edwards AFB	
Branch Librarian Inyo County Free Library, Death Valley, CA	Branch Librarian Kern County Library, Rosamond, CA
Branch Librarian Kern County, Ridgecrest, CA	Branch Librarian Kern County Library, Mojave, CA
Branch Librarian Kern County, California City, CA	Branch Librarian Kern County, Boron, CA
Branch Librarian Kern River Valley Library, Lake Isabella, CA	Coummity Library Manager, Lancaster, CA
AFFTC Technical Library, Edwards AFB, CA	Edwards AFB Library, CA
NAS Patuxent River	
Branch Librarian Calvert Library, Southern Branch, Lusby, MD	Branch Librarian Calvert Library, Twin Beaches Branch, Chesapeake Beach, MD
Talbot County Free Library, Main Library, Easton, MD	Wicomico County Free Library, Main Library, Salisbury, MD
Dorchester County Public Library, Central Library, Cambridge, MD	Brach Librarian St. Mary's Library, Le3xington Park Branch, Lexington Park, MD
Somerset County Public Library, Deal Island Branch, Deal Island School, Deal Island, MD	Corbin Memorial Library, Somerset County, Crisfield, MD
Somerset County Public Library, Ewell Branch, Smith Island, Ewell School, Ewell, MD	Somerset County Library, Main Branch, Princess Anne, MD
NAES Lakehurst	
Branch Librarian Ocean County Library, Toms River Branch, Toms River, NJ	Branch Librarian Ocean County Library, Manchester, NJ

Table 11-4: Public Libraries Receiving Draft JSF EA/OEA (Continued)

LM Aero	
Branch Librarian Tarrant County Library, Fort Worth Public Library, Fort Worth, TX	Branch Librarian Tarrant County Library, Benbrook Public Library, Benbrook, TX
Branch Librarian Tarrant County Library, Azle Public Library, Azle, TX	Branch Librarian Tarrant County Library, Mary Lou Reddick Public Library, Lake Worth, TX
Branch Librarian Tarrant County Library, Ridglea Branch Library, F ort Worth, TX	Branch Librarian Tarrant County Library, River Oaks Public Library, River Oaks, TX
Branch Librarian Tarrant County Library, White Settlement Public Library, Fort Worth, TX	

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APPENDIX TABLE OF CONTENTS

APPENDIX A
GLOSSARY OF TERMS AND GENERAL JOINT STRIKE FIGHTER PROGRAM-RELATED INFORMATION

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Aeroelastic Stability (Performance): Aerodynamic forces upon an aircraft's surfaces often induce instability (e.g., vibration). Aeroelastic stability performance is determined by an evaluation of the aircraft's stability under the influence of various aerodynamic forces (see definition for Flutter Tests).

AGM-154 Joint Standoff Weapon (JSOW): The AGM-154 is a smart bomb intended to strike a precise location. It uses a global positioning system/inertial navigation system to navigate to an exact point on the earth. The AGM-154 is intended to provide a low cost, highly lethal glide weapon with a standoff capability. The weight varies from 1,065–1,500 pounds depending on its combination. The length is approximately 160 inches.

AIM-132/Advanced Short Range Air-to-Air Missile (ASRAAM): AIM-132 is a maneuverable and combat effective weapon. It is high speed, heat-seeking missile with an infrared guidance system. Its approximate weight is 220 pounds and it is approximately 8 feet 11 inches long.

AIM-9 Sidewinder: The AIM-9 is a heat-seeking missile used for short-range combat. It has a high-explosive warhead, a rocket motor, an active optical target detector, and an infrared guidance system. The approximate length of the AIM-9 is 9 feet 5 inches and the launch weight is approximately 190 pounds.

Air Arresting Gear Roll-Ins: Roll-in arrestments are conducted to establish the limit engaging speed for the combination of test aircraft and arresting gear. The aircraft starts at a designated gross weight at a specified distance in front of the arresting gear. Military (MIL) power is applied and the aircraft is allowed to accelerate until the aircraft's arresting hook catches the arresting gear cross deck pendant. The distance the aircraft starts in front of the arresting gear is increased until the maximum engagement speed for either the aircraft or the arresting gear is reached. Roll-ins would be conducted both against the Mark (MK)-13 Modification 3 arresting gear (shipboard-compatible arresting gear) and the E-28 arresting gear (shore-based emergency arresting gear).

Air Intercept Missile (AIM)-120 Advanced Medium Range Air-to-Air Missile (AMRAAM): The AIM-120 has an all-weather, beyond-visual-range capability and is used for long-range engagements. The AMRAAM is a supersonic, air launched guided missile using active radar target tracking, a navigation guidance, and active radio frequency target detection. The AIM-120 weighs approximately 335 pounds and is approximately 12 feet in length.

Airfield Event: This is an aircraft operation on the surface or in the vicinity of an airfield. Examples include a departure, an arrival, a touch-and-go pass, a field carrier landing practice pass, or a low approach.

Airfield Operation: An airfield event that is a landing or a takeoff. Examples include a departure, an arrival, or a pad landing. Touch-and-go landings, field carrier landing practices, and low approaches count as two airfield operations each (e.g., the "touch" and the "go").

Airspace for Special Military Use: Airspace established in coordination with the Federal Aviation Administration (FAA) for support of certain military aviation training activities. Unlike "Special Use Airspace" (SUA) for military use, this type of airspace does not require use of either rulemaking or non-rulemaking for establishment (e.g., Military Training Routes).

Ambient Air Quality Standards: These are measures established on a Federal or state level defining limits for airborne concentrations of designated "criteria" pollutants [nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), lead (Pb), and particulate matter (PM)] to protect public health with an adequate margin of safety (primary standards) and to protect public warfare, including plant and animal life, visibility, and materials (secondary standards).

Arrival: An aircraft landing out of non-local traffic or from local training areas. The landing may be a full stop or may continue without stopping into, for example, a touch-and-go or low approach airfield event.

Autonomic Logistics (AutoLog): An integrated, knowledge-based system encompassing numerous functions associated with operating and maintaining the F-35 (i.e., maintenance planning, supply support, and pilot and maintenance training) to include an interface that facilitates coordination with mission planning, engineering, safety, and command and control functions.

Barricade Testing: Test operations are performed by propelling a non-flyable test article into a nylon barricade. Tests are begun at slower engage speeds and the speed is increased until the barricade engagement limit speed is reached. The test article to be used during F-35C System Development and Demonstration (SDD) would be the drop test article. No engine is installed, control surfaces are removed, and the landing gear is modified to keep the aircraft on a stable directional course after release from the jet car.

Bolter Performance: Bolter is a term used to describe an unintentional touch-and-go after a failed carrier arrested landing. Bolter performance evaluates an aircraft's ability to quickly transition from an approach/landing mode back to flight.

Carrier Suitability Flight Tests: These are test operations conducted to determine aircraft compatibility with ship-based takeoff, approach, and recovery equipment under various environmental conditions to include performance characteristics of the aircraft during taxi, takeoff, approach, and landing. Aircraft carrier launch catapult and recovery systems are built into some runways to simulate shipboard conditions. This equipment is used to determine the handling performance characteristics of an instrumented test aircraft during taxi, takeoff, approach, and landing. Only after careful evaluation of data collected at these uniquely configured land-based facilities can the aircraft be cleared for further testing aboard a ship.

Catapult Compatibility/Steam Ingestion: Catapults emit steam above the deck during launching operations. This can result in steam being ingested into the engine, causing it to run at an off-design condition. This gives way to the possibility of a blowout, compressor stall, and engine flameout. Thus, the effect of steam ingestion on an aircraft must be determined on land before shipboard operations. The test consists of a Fleet representative catapult that has been degraded to yield some of the worst possible steam conditions that could be encountered. The aircraft is launched under these conditions to ensure that no flameouts or compressor stalls occur and no more than 25% of the launches result in afterburner (AB) blowout.

Chaff: Aggregates of metal or metal-coated strips or cylinders used as efficient reflectors of radio frequency (RF) electromagnetic radiation. Chaff is launched from aircraft, drones, or ships to degrade the performance of radar and radar controlled weapons (e.g., missiles).

Cluster Bomb: A free-fall ordnance developed as an aircraft weapon for attacking tanks, armored vehicles, and soft targets. The bomb consists of a canister, bomblets, and a fuse. When released, the bomb free-falls and the casing opens above the ground, releasing the bomblets.

Conformity Rule: Federal agencies are required to review new actions and decide whether the actions would worsen an existing National Ambient Air Quality Standard (NAAQS) violation, cause a new NAAQS violation, delay the implementation plan attainment schedule of the NAAQS, or otherwise contradict implementation plan requirements.

Controlled Airspace: An airspace of defined dimensions within which air traffic control service is provided to instrument flight rules (IFR) and visual flight rules (VFR) flights in compliance with the airspace classification.

Criteria Pollutants: The Clean Air Act (CAA) required by the United States (U.S.) Environmental Protection Agency (EPA) establishes air quality standards for common and widespread pollutants based on scientific knowledge of their human health effects. Criteria pollutants include NO_2, SO_2, CO, O_3, Pb, and PM.

Critical Habitat: The area where the species of concern lives that contains physical or biological characteristics essential to the survival of the species, or the areas surrounding the habitat which are essential to the survival of the species. However, it does not include all habitat that could be used by the species.

Deck Handling (Simulated): Deck handling involves the movement and interface of an aircraft with other aircraft, support equipment (SE), and personnel aboard an aircraft carrier's flight deck. Simulated handling is performed to evaluate positioning, towing requirements, clearances, and other considerations to ensure personnel safety and to avoid aircraft damage during deck handling evolutions.

Decoy: Flares, chaff, or other expendables used to lure away infrared or radar guided weapons.

Departure: An aircraft taking off to non-local traffic or local training areas. The takeoff may be after taxiing from the flight line or after completing, for example, a touch-and-go or low approach airfield event.

Electronic Warfare (EW) Flight Tests: The evaluation of the aircraft EW system capabilities to detect, analyze, and/or counter electronic signals.

F-35 Aircraft Variant Dimensions and Weight: Representative dimensions for the three F-35 variations are listed in the following table.

Variant	Wing Span (ft)	Wing Area (square ft)	Length (ft)	Weight Empty (lb)[1]	Internal Fuel (lb)
Conventional Takeoff and Landing (CTOL) F-35A	35	460	50.5	28,975	18,431
Short Takeoff Vertical Landing (STOVL) F-35B	35	460	51.2	32,555	13,961
Carrier-Based Variant (CV) F-35C	43	620	50.8	34,468	20,327

Source: *Joint Strike Fighter Program Office Mass Properties, Electronic Message, Mr. Paul Kachurak, 22 November 05.*
Note: *Includes 6% uncertainty margin*

Field Carrier Landing Practice: A training event using the airfield to practice landings on an aircraft carrier before actually going to the carrier.

Flare: A burning pyrotechnic device formulated to maximize infrared radiation at wave lengths used by the seekers of infrared homing missiles. The flare is ejected from the aircraft as a decoy for the homing missiles. Flares are generally composed of powdered combustible materials, a binder, and a trace of other compounds required for ignition and control of flare burning dynamics.

Fleet: Refers to all the varying types of aircraft (F-16s, F-18s, F-15s, UH-60s, C-12s, etc.) operating at a facility, whether they are stationed at the facility or transient.

Fleet Mix: Similar to the term “Fleet,” except Fleet mix is generally used when discussing NOISEMAP model inputs, outputs, or components.

Flight Envelope: Flight envelope refers to an aircraft’s operational limits (i.e., maximum airspeed at various altitudes, altitude limitations for various weight configurations, maneuverability parameters at particular altitudes and speeds, etc.).

Flight Hour: An hour of airborne flight time, excluding ground taxi or other ground operations.

Flight: One or more aircraft departing at a base airfield and conducting one or more missions, possibly including takeoffs and landings at other airfields and returning to base.

Flutter Tests: Flutter tests are performed to evaluate an aircraft’s ability to handle various forces exerted on its control surfaces, and the precise control movements required to compensate for performance deviations/degradations caused by those forces.

Flying Qualities and Performance: Aircraft and their flight control systems are quantitatively and qualitatively evaluated to determine if the aircraft meets safety, performance, growth potential, and mission-technical requirements. Aircraft performance characteristics assessed include operating range, climb rates, etc. A slow, carefully monitored buildup with an instrumented aircraft is conducted to determine the edges of the safe flight envelope. This information is then used to develop a safety buffer, and these performance limits are announced to Fleet pilots through the Naval Air Training and Operating Procedure Standardization (NATOPS) Program.

Forward Looking Infrared (FLIR): This is a highly effective night vision or low visibility electro-optic system to assist in identification and targeting of opposition forces. FLIR units measure the amount of infrared energy (e.g., heat or thermal energy) that is emitted by objects and life forms. The thermal measurements are translated into an image for the user. When used on military platforms, the FLIR is mounted in a forward facing or trainable fixture on the aircraft and may incorporate an integrated laser designator. The FLIR provides laser tracking and guidance for missile systems.

Guided Bomb Unit (GBU)-12: This is an unpowered glide weapon with a 500-pound general purpose warhead that is used to destroy high-value enemy targets. The bomb is fitted with a laser seeker and mechanical control surfaces enabling it to self-guide to a target pinpointed by a laser designator. The bomb weighs approximately 800 pounds and is approximately 11 feet in length.

General Purpose Bomb (GPB): A device having a long, slender, aerodynamically shaped body to give a low drag profile, making it suitable for external and internal carriage and release from the aircraft. Its purpose is to produce blast and fragment impacts, causing deep cratering effects. It is available with or without guidance systems. GPBs are a free-fall, non-guided bomb usually equipped with tail fins and nose or tail fuzes. The MK 80 series low drag general purpose bombs (such as the MK 82 500-pound bomb and the MK 84 2,000-pound bomb) are used in the majority of bombing operations where maximum blast and explosive effects are desired. Their cases are relatively light and approximately 45%

of their complete weight is explosive. General purpose bombs may use both nose and tail fuzes and conical or retarded tail fins.

Hazard Space: A predefined air and/or surface area to be cleared of all uninvolved vehicles and people prior to conducting a controlled mission or test.

Human Factors/Aircrew Systems Flight Tests: The technical suitability of the aircrew station design, aircrew control and information display systems, operator workload, crew communication/coordination, survival and rescue systems, etc., is determined for the aircraft and its related systems.

In-Flight Refueling Support: Flights where fuel is provided from one aircraft to another while in flight.

Instrument Flight Rules: The procedures for conducting instrument flights.

Jammer: A countermeasures cartridge that is ejected from aircraft and emits radar-like signals to lure a radar-guided missile from its intended target.

Joint Direct Attack Munition (JDAM) [Bomb Live Unit (BLU)-109]: The BLU-109 is the primary weapon for the world's air and naval forces. The BLU-109 is a 2,000 pound bomb designed to penetrate through targets. It is intended to smash through concrete shelters and other hardened structures before exploding. The BLU-109 weighs approximately 1,950 pounds and is approximately 8 feet in length.

JDAM 84 & 83 Separation Test Vehicles (STV): The JDAM is a guidance tail kit under development for the U.S. Air Force and Navy that converts existing unguided free-fall bombs into accurate, adverse-weather smart munitions. The JDAM will upgrade the existing inventory of MK 83 and 84 GPBs by integrating a guidance kit consisting of an inertial navigation system/global positioning system.

Jet Blast Deflector (JBD) Compatibility Testing: JBD compatibility testing is conducted to ensure that the thermal and velocity stresses exerted by the engine exhaust gas do not cause the JBD harm, and to ensure that any hot gasses that flow forward and get re-ingested into the engine do not cause any engine surges or stalls. An additional test is made with the test aircraft behind the JBD to evaluate the effects of jet blast from another aircraft flowing over the JBD and impinging on the test aircraft. For testing in front of the JBD, the aircraft is secured in place and the engine cycled between Idle, MIL, and Maximum (MAX) power for runs of up to ten minutes at a time. Aircraft engine parameters and JBD water and surface temperatures are monitored for adverse trends. These ten-minute tests are repeated between six and ten times for several different distances in front of the JBD as well as some off-center alignments. For testing with the test article in front of the JBD, another aircraft is hooked up in front of the JBD and run up to both MIL and MAX power while the test aircraft engine and flight control surfaces are monitored. Additionally, both near and far field acoustic data is usually taken during these tests.

Landing: An aircraft approach to touch down on the airfield surface.

Laser Guided Training Round (LGTR): The LGTR provides a low cost training device permitting aircrews to realistically practice the employment of GBUs.

Low Speed Carrier Approach: Evaluations are conducted to determine safe approach airspeed to an aircraft carrier's arresting gear. Low-speed approaches are desirable for safety reasons and to minimize structural impact to the aircraft.

Military Operations Area: A type of SUA of defined vertical and lateral dimensions established outside Class A airspace [i.e., below 18,000 feet above mean sea level (MSL)] to separate/segregate certain military activities from IFR traffic and to identify VFR traffic where these activities are conducted.

Military Training Route: Airspace of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots.

Missile Tests: Used to practice releasing and targeting missiles, with or without the actual release (drop) of the weapon (such as weapons separation flights).

Missile: A device fired to strike some object at a distance. Air-to-air missiles include those designed to intercept aircraft targets. Air-to-surface missiles are for use against tanks and other hardened targets such as ships, bunkers, and aircraft shelters.

Mission System Flight Tests: Aircraft mission systems are those systems, subsystems, or components that enable the aircraft to perform its mission. Examples of mission systems include navigation, search sensors, communications, tactical control, and displays. Tests are conducted to verify proper operation of the mission systems as well as its interfacing with other aircraft systems.

Mission: A flight, or part of a flight, used for a specific purpose.

Mark (MK) 82: The MK 82 is a free-fall, guided GPB. These bombs are used in the majority of bombing operations where blast and explosive effects are needed. The MK 82 is the smallest of those GPBs in current use. The weight of a MK 82 can range anywhere from 500 to 570 pounds, depending on the configuration.

MK 83: The MK 83 is a 1,000 pound bomb modified with a high drag tail assembly. An air bag deploys from the tail to provide a high speed, low altitude delivery capability by slowing the bomb. The MK 83s are approximately 9 feet 9 inches in length with a diameter of about 14 inches

MK 84: This is the largest, free-falling, GPB out of the MK 80 series. The MK 84 has a nominal weight of 2,000 pounds, but its actual weight varies depending on its configuration. It can weigh between 1,972 and 2,083 pounds. MK 84s are approximately 11 feet 9 inches in length with a diameter of 18 inches.

Practice Bomb: An inert object designed to copy the shape and weight of a live, actual bomb. It does not contain any explosives, but may contain a signal (spotting charge) which releases smoke/flame for impact marking.

Propulsion Flight Tests: Engine operating characteristics and performance on the ground and in-flight are evaluated. Engine characteristics are first evaluated/validated in a ground test cell, and then ground run-ups are conducted with the engine installed in an instrumented test aircraft to evaluate the interface between the airframe and the propulsion system. Only after these tests are satisfactorily completed is engine performance evaluated in-flight on an instrumented aircraft.

Research, Development, Test and Evaluation (RDT&E) Flights: Flights are conducted in direct support of Department of Defense (DoD) weapon system acquisition programs or in association with potential commercial customers and other military programs, U.S. agencies, or foreign governments. RDT&E test activities are conducted to assess the performance, reliability, and safety of a new aircraft and/or its associated systems.

Restricted Area: A type of SUA where aircraft flight is subject to certain restrictions.

Sortie: Deployment of a military aircraft for the purposes of a specific mission/test, whether alone or with other aircraft.

Special Use Airspace (SUA): Airspace of defined dimensions identified by an area on the surface of the earth where aircraft tests/operations must be confined or limited.

Stores: Any device intended for internal or external carriage. Stores are mounted on the aircraft suspension and release equipment regardless of whether or not the item is intended to be separated in-flight from the aircraft. Examples include missiles, rockets, bombs, mines, torpedoes, decoys, fuel and spray tanks, dispensers, pods, targets, cargo-drop containers, and drones.

Structural Loads (Performance): Structural loads are stresses placed on an aircraft (flex of the airframe) by various load configurations (e.g., fuel weight, external tanks, and weapons) and aerodynamic forces. The aircraft's performance under different structural load situations is evaluated.

Takeoff: An aircraft lifting off the airfield surface.

Taxi: The movement of the aircraft under its own power on the surface of an airfield.

Temporary Detachment (DET): In this case, it is means when a portion of the overall tests to be performed at the primary test location is temporarily transferred and conducted at another location. Usually this occurs because the temporary DET location can provide a better environment for that particular portion of proposed tests.

Touch-and-Go: Practice landings and takeoffs where the aircraft does not stop at the airfield.

Traffic Pattern: The traffic flow set for aircraft landing at, taxiing on, or taking-off from an airfield.

Transition Evaluations: A transition evaluation, with respect to the Joint Strike Fighter (JSF), involving the evaluation of the STOVL variant's performance in converting from vertical flight to conventional flight, and vice versa.

Visual Flight Rules (VFRs): Procedures for conducting flights under visual conditions.

Wave-Off Performance: An evaluation conducted to assess an aircraft's ability to safely transition from an intended landing scenario to a resumption of flight. Wave-offs are often required when conditions on an aircraft carrier's deck preclude landing operations or when an aircraft's speed or altitude is not proper for an approach/landing.

Weapons Bay Flight Testing: A weapons bay is an internal storage space for holding the aircraft's weapons (e.g., missiles, bombs, rockets) before delivery. Weapons bay testing is performed to determine the effect of opening and closing the weapons bay doors on an aircraft's flight performance. This activity allows for an understanding of the adjustments that may be required to compensate for conditions created by operating the doors. In addition, weapons bay evaluations are conducted to determine the effect (i.e., radar visibility) of an aircraft's stealth profile. No weapons/stores are released during these tests.

Weapons Delivery (Simulated): Simulated weapons delivery is performed for data collection and aircraft performance purposes. Simulations may include weapons delivery runs, target acquisition, weapons bay operation and, at times, the delivery of inert stores (i.e., practice bombs). Data collected by the aircraft's computers and video recorded by the aircraft or a chase plane are analyzed for the purposes of determining aircraft, targeting, and pilot performance.

Weapons Separation Flight Tests: Evaluations to determine the safe and satisfactory carrying and releasing of weapons. The effects of weapon firings/releases is also assessed during these tests.

Wind Corrected Munition Dispenser (WCMD): A WCMD is a tail kit that helps with accuracy for inventory dispenser weapons. With a WCMD, a weapon will be capable of delivery from medium to high altitudes. The WCMD weapon will correct for wind effects and errors during the weapon's ballistic fall. Having a WCMD kit will turn dumb bombs (inaccurate bombs) into accurate smart weapons.

APPENDIX B
SITE SELECTION SUPPORTING INFORMATION FOR PROPOSED TEST LOCATIONS

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B.1 EAST COAST PRIMARY TEST LOCATION

Naval Air Station (NAS) Patuxent River—This is the United States (U.S.) Navy's recognized center of excellence for Research, Development, Test, and Evaluation (RDT&E) of Department of Defense (DoD) aircraft weapon systems. The facilities and equipment (e.g., hangars, multi-purpose instrumented ranges, telemetry stations, a shielded hangar, fully-integrated weapons system laboratories, a ship to ground station, range control room, etc.), as well as qualified personnel, can accommodate the expected level of effort required for the proposed Joint Strike Fighter (JSF) Developmental Test (DT). The airspace of the Atlantic Test Range (ATR), also referred to as the Chesapeake Test Range (CTR), overlies 1,800 square miles over land and water. The CTR is comprised of six restricted airspaces and three surface targets. The range and targets provide a safe, controlled location for weapons/stores separation testing, air-to-surface firing, and most of the test activities planned for the proposed JSF DT [e.g., flying qualities (FQs) and performance, carrier suitability, propulsion, mission systems, electronic warfare, logistics, weapons integration, aircrew systems, flight crew proficiency]. Unique and exclusive features of NAS Patuxent River includes facilities and capabilities to simulate shipboard catapult and arrestment, expeditionary field facilities for Short Takeoff Vertical Landing (STOVL) tests, and an out-of-ground effect hover pit for STOVL test work at sea-level conditions. Existing National Environmental Policy Act (NEPA) documents include the *Final Environmental Impact Statement (FEIS) for Increased Flight and Related Operations in the Patuxent River Complex (PRC), Patuxent River, Maryland*; *Environmental Assessment, Joint Strike Fighter, United States Navy/United States Marine Corps Variant Concept Demonstration Phase Flight Test Program*, and the *Environmental Assessment (EA) for F/A-18E/F Stores Separation Testing at NAS Patuxent River*.

Virginia Capes (VACAPES) Operating Area (OPAREA) of the Atlantic Warning Area (AWA)— The VACAPES OPAREA of the AWA covers approximately 35,000 square miles of over water restricted airspace and warning areas, accommodating a variety of DoD RDT&E and training requirements. The close proximity of the VACAPES OPAREA to NAS Patuxent River facilitates the ability of the JSF Verification and Test (V&T) Team to use nearby restricted and warning air space to accommodate various mission and weapons integration tests. The VACAPES OPAREA is used regularly by NAS Patuxent River for testing and training because it reduces transit times and test costs. Existing NEPA documents include the *Overseas Environmental Assessment of Testing the Hellfire Missile System's Integration with the H-60* and the *Environmental Assessment (EA) for F/A-18E/F Stores Separation Testing at NAS Patuxent River*.

B.2 WEST COAST PRIMARY TEST LOCATIONS

Edwards Air Force Base (AFB), Air Force Flight Test Center (AFFTC)—The AFFTC at Edwards AFB, California, is the Air Force Material Command's center of excellence for RDT&E of aerospace systems for the U.S. and its allies. It operates the U.S. Air Force (USAF) Test Pilot School and is home to National Aeronautics and Space Administration (NASA)'s Dryden Research Center. In addition, considerable test activities are conducted by America's commercial aerospace industry at Edwards AFB. The facilities/ranges in place and qualified personnel can host and accommodate the expected level of effort required for the proposed JSF DT. Edwards AFB capabilities include, but are not limited to: propulsion, performance, FQs, fuel systems, environmental control systems (ECSs), human factors, reliability and maintainability, flutter, and avionics integration. These capabilities can directly support proposed JSF DT activities. In addition, the large landable surface lakebeds at Edwards AFB greatly reduces the potential high safety risks associated with engine-out and high angle-of-attack (AoA) flight tests. Edwards AFB also has an array of ground test facilities. The Avionics Test and Integration Complex, which includes the massive Benefield Anechoic Facility, allows for complete testing of a fully integrated avionics suite in a simulated flight environment, including electronic threats and computer software checkout. Pertinent NEPA documents include, but are not limited to, the *Environmental Assessment for the Continued Use of Restricted Area R-2515*; the *Programmatic Environmental*

Assessment for Routine Flight-Line Activities; the Environmental Assessment for Low-level Flight Testing, Evaluation, and Training; the *Environmental Assessment to Extend the Supersonic Speed Waiver for Continued Operations in the Black Mountain Supersonic Corridor and Alpha Corridor/Precision Impact Range Area*; the *Environmental Assessment for F/A-22 Initial Operational Test and Evaluation (IOT&E)*; the *Final Environmental Assessment for the Renovation and Construction of a Modern Flight Test Complex*; and the *Environmental Assessment for the Repair, Reconstruction, and/or Replacement of the Main Base Runway*.

Naval Air Warfare Center, Weapons Division (NAWCWD) China Lake and Naval Air Warfare Center, Weapons (NAWCWPNS) Point Mugu at Naval Bases Ventura County Point Mugu[1]—Both NAWCWD China Lake at Naval Air Weapons Station (NAWS) China Lake and NAWCWPNS Point Mugu at Naval Bases Ventura County Point Mugu are the U.S. Navy's established RDT&E centers of excellence for weapons systems associated with air warfare, aircraft weapons integration, missiles and missile subsystems, and airborne electronic warfare systems. Both installations provide the Navy with a realistic operational environment for the safe conduct of controlled air, surface, and subsurface launched missile tests, aircraft test, and Fleet exercises involving aircraft, surface ships, and various targets. The combination of location (varied land-based features and sea range adjacently located), widespread instrumentation sites, unique test capabilities, and highly-skilled technical workforce provides the most advanced and efficient method for conducting the critical test and evaluation (T&E) and training necessary to maintain technical standards in the U.S. Navy. Close proximity of the range space and facility assets to Edwards AFB allow the JSF V&T to fly easily to and from these locations in conducting proposed JSF DT activities. Portions of the airspace used at Edwards AFB also extend into the airspace over NAWS/NAWCWD China Lake. The large over-water range, known as the Sea Range at NAWCWPNS Point Mugu, supports critical live missile and other weapon firings. Relevant, existing NEPA documents include the *Final Environmental Impact Statement* (*FEIS) for Proposed Military Operational Increases and Implementation of Associated Comprehensive Land Use and Integrated Natural Resources Management Plans for NAWS/NAWCWD China Lake*; the *FEIS/Overseas Environmental Impact Statement (EIS), NAWCWD Point Mugu Sea Range;* and the *Environmental Assessment for F-22 Low-Level Supersonic Over-Water Testing.*

White Sands Missile Range (WSMR)[2]—As the largest all-overland test range in the Western Hemisphere, WSMR's expansive and varied terrain is ideally suited to serve as the U.S. premier military testing site. Features important to the military mission of WSMR include its vast land area, mild climate, topographic relief, long-range visibility, restricted (land and air) use, and geology, soils, and vegetation. This suite of attributes allows testers to conduct safe, large-scale experiments on advanced weapons and space flight systems. The rugged and diverse landscape, ranging from relatively flat basin topography to extreme cliff faces and mountainous terrain, provides a setting well suited to testing and training missions. The mild climate of southern New Mexico allows year-round testing, and clear skies provide the long-range visibility necessary for observing missile flights and other activities. The large size of WSMR provides ample space for weapon impact areas and safety zones, and the mountain ranges for certain laser and missile tests. The large size, restricted access, and no-flight zones minimize mission impacts on adjacent properties and local populations. Of specific importance to the proposed JSF DT is the full scale drone capabilities in close proximity to Edwards AFB, as well as the superior air-to-ground weapon testing capabilities at WSMR. Relevant, existing NEPA documents include the *Final WSMR-Wide EIS* and the *Final Environmental Assessment for Flight Testing of the Advanced Medium Range Air-To-Air Missile*.

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[1] *NAWS China Lake and US Bureau of Land Management 2004; NAWCWPNS Point Mugu, 2002*
[2] *WSMR, 2001*

Nevada Test and Training Range (NTTR) Nellis AFB[3]—The secure nature of the NTTR permits testing of new weapons systems against specific configurations of targets with the air and ground defense that air crews would face in actual combat. The realistic training and tactical development provided by NTTR translates directly into success and survival when aircrews and aircraft are called upon to achieve national defense goals. The combined airspace and defense assets of NTTR provide the only place in the world where true, large scale, mission effectiveness testing can be accomplished. The proximity of the NTTR airspace to Edwards AFB and other West Coast ranges provides the large scale, varied environmental terrain and security needed to conduct the proposed JSF DT. The NTTR also has the existing space and capabilities to support live fire weapons separation tests, including the use of drones during such test events. Related NEPA documents include the *Legislative Environmental Impact Statement (EIS) for Renewal of the Nellis Air Force Range Land Withdrawal*, and the *Final EIS for F-22 Aircraft Force Development Evaluation and Weapons School Beddown*.

B.3 OTHER ANCILLARY TEST LOCATIONS

Naval Air Engineering Station (NAES) Lakehurst[4]—The Naval Air Systems Command (NAVAIR) at NAES Lakehurst is the leader in aircraft launch and recovery equipment (ALRE) and support equipment (SE), serving as the only provider of full spectrum support for aircraft launch, recovery, and SE systems for U.S. and Allied Naval Aviation Forces at sea and Marine Corps Expeditionary Aviation Forces ashore. Some of the inherent facility and test equipment include engineering, developmental evaluation and verification, and systems integration for aircraft and their related systems to include guidance, recovery, handling, engines, ship compatibility, and takeoff performance. Unique testing capabilities and equipment at NAES Lakehurst supporting shipboard suitability requirements include Barricade testing with Jet Cars, Arresting Gear Roll-Ins, Jet Blast Deflector (JBD) Compatibility Testing, and Catapult Compatibility/Steam Ingestion testing. The personnel and test equipment at NAES Lakehurst/NAVAIR is critical to any aircraft DT Program and necessary for the proposed JSF DT to ensure the F-35 can operate safely and effectively from aircraft carriers. Related NEPA documents include the *Draft Environmental Assessment for the East Coast Basing of C-17 Aircraft*, and the *Environmental Assessment for the Electro-Magnetic Aircraft Launching System (EMALS) System Development and Demonstration Phase (SDD) at NAES Lakehurst*.

Eglin AFB, Air Armament Center (AAC)[5]—This is the USAF's center of excellence for air armament and is the focal point for the acquisition, sustainment, and total life cycle management of essentially all conventional and non-conventional USAF air-delivered weapons. The ACC plans, directs, and conducts T&E of U.S. and allied air armament, navigation/guidance systems, and command and control (C2) systems. Eglin AFB is home to the McKinley Climatic Laboratory used for testing weapons systems under extreme environmental conditions (e.g., cold, heat, rain, ice, solar radiation, humidity, wind, snow, fog, sand and dust, pressure altitude, etc.). This climatic chamber is large enough to accommodate a fighter aircraft and has the ability to test low observable (LO) platforms based on Eglin AFB's robust security assets and specific LO legacy system experience. Environmental testing of a system, to include aircraft, is an essential requirement for validating system functionality and reliability. The features and assets of this laboratory allows DoD and other customers the benefit of being able to accomplish most, if not all, necessary environmental conditions in one proven facility. This allows a program to avoid costs that would occur if a weapon system had to go to multiple DoD facilities and ranges to verify the ability of the system to operate in extreme conditions. An applicable NEPA document includes the *AF-813 for F-22 Testing within the McKinley Climatic Laboratory*.

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[3] *U.S. Air Force 1999a*
[4] *NAVAIR Lakehurst 2005*
[5] *U.S. Air Force 2002a*

Lockheed Martin Aeronautics (LM Aero)—As the JSF system contractor, LM Aero facilities and the airspace and runway of NAS Joint Reserve Base (JRB) support a variety of the initial functionality tests of the F-35. The manufacturing plant is located across the runway from NAS JRB. LM Aero is the facility where the initial checkout of every F-35 would take place after being manufactured. Of particular importance is the hover pit and harden tarmac space at LM Aero designed specifically to support STOVL specific tests of the F-35. Applicable NEPA documents include the *Environmental Assessment for Facility Expansions at Air Force Plant #4* and *Memorandum For the Record, Record of Categorical Exclusion (CATEX) for Joint Strike Fighter System Development and Demonstration at Lockheed Martin Aeronautical and Pratt & Whitney*.

APPENDIX C
ENVIRONMENTAL RESOURCES NOT ANALYZED IN DETAIL

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This Appendix provides the overall rationale for why the following environmental resources were not analyzed in detailed in this Environmental Assessment (EA)/Overseas EA (OEA). The Joint Strike Fighter (JSF) Program Executive Officer reasonably concludes these resources would not likely be affected by the conduct of the proposed JSF Developmental Test (DT).

C.1 GEOLOGY AND SOILS

Weapon releases would occur as part of the proposed JSF DT, thus potentially disturbing surface and subsurface soils. All proposed weapon tests would be conducted in established ranges used for the expressed purpose of conducting weapons release tests, like the ones proposed for the JSF DT, and in accordance with existing test policies and procedures. In addition, proposed tests would be conducted in accordance with the Integrated Natural Resources Managements Plans (INRMPs), as applicable, for each test range. Therefore, disturbance to existing surface and subsurface soils would be within established levels, and would exert no impacts beyond those that are within the normal range of operating conditions.

C.2 LAND USE

Measurable impacts to land use resources would not be likely because the Proposed Action does not alter the use or designation of the land, and no new construction has been identified as part of the proposed JSF DT. Test facilities are established military complexes with land-use programs in effect, specifically designed to minimize potential environmental impacts.

C.3 WATER RESOURCES

Water resources can include water supply, water quality, and sole source aquifers, flood plains, wetlands, and wild and scenic rivers. Water supply sources at each proposed test location are unlikely to be impacted from implementation of the Proposed Action. Wastewater generation is expected to be similar to other aircraft related activities conducted on a regular basis at each proposed test location and is not expected to significantly affect the ability of each proposed test location to handle and manage any wastewater generated as part of the proposed JSF DT activities. In addition, no storm water runoff impacts are anticipated since the Proposed Action does not involve any construction related activities.

Planned weapon testing for either alternative at Naval Air Station (NAS) Patuxent River, Virginia Capes (VACAPES) Operating Area (OPAREA) of the Atlantic Warning Area (AWA), and Naval Air Warfare Center, Weapons (NAWCWPNS) Point Mugu would potentially impact water resources (primarily water quality). Released stores would predominantly break apart upon impact with the water's surface and would settle to the bottom of the ocean or Chesapeake Bay floor. The *Final Environmental Impact Statement (FEIS), Increased Flight and Related Operations in the Patuxent River Complex (December 1998);* the *Environmental Assessment (EA) for the F/A-18E/F Stores Separation Testing at NAS Patuxent River (January 1997);* and the *Final Environmental Impact Statement/Overseas Environmental Impact Statement, Point Mugu Sea Range (March 2002)* addressed the potential impacts to water resources from various stores, which are the same or similar to the type and tempo of stores planned for the proposed JSF DT. Analyses in these NEPA documents concluded small increases in contaminant concentrations (e.g., iron, heavy metals) would occur in the water and sediment surrounding the corroding store. Influences of the ocean and bay currents would disperse and/or dilute these concentrations, resulting in no readily measurable or distinctive changes in the water column or sediments around the settled, corroding stores.

The maximum number of stores released at NAS Patuxent River (including the VACAPES OPAREA of the AWA) under the proposed JSF DT is estimated to be 90 per year (Test Year 3). The EA for the F/A-18E/F analyzed the impacts of 120-220 stores separations per month (up to 2,640 per year) for NAS Patuxent River and the VACAPES OPAREA. The FEIS for NAWCWPNS Point Mugu analyzed a total of 33 missile tests and 34 target tests per year. The maximum amount of stores proposed for release as part of the proposed JSF DT in the Sea Range at NAWCWPNS Point Mugu is 24 in Test Year 5. The maximum stores proposed for release at NAS Patuxent River, VACAPES OPAREA, and NAWCWPNS Point Mugu are significantly less than those levels analyzed in the aforementioned documents, and analyzed levels were found to have no significant impact to water resources. It can be reasonably concluded the stores released for the proposed JSF DT would have no significant direct, indirect, or cumulative impact to the environment.

C.4 VEGETATION

Measurable impacts to vegetation would not be likely because the Proposed Action does not alter the use or designation of the land. Proposed JSF DT activities would occur at established military complexes and existing ranges with programs in effect, specifically designed to minimize potential environmental impacts. Adherence to the test range's programs, policies, and INRMPs would ensure no significant impact to vegetation occurs.

C.5 CULTURAL RESOURCES

Cultural resources can include archaeological (pre-historic and historic), architectural, and Native American significant sites. The Proposed Action would not likely impact existing significant cultural structures and sites. Aircraft flights are the only potential source of impact (noise, vibration, and audio/visual) to cultural resources. Studies indicate high decibel (dB) levels (above 130 dB) must be generated close to a structure (no more than 150 feet) and in a low frequency for a structure to be damaged. Hover and vertical landing and takeoff events for the F-35B short takeoff vertical landing (STOVL) variant would be conducted at established runways and facilities (i.e., the hover pit) located near the runways, and not in close proximity to any known cultural resources at proposal test locations. Noise from proposed F-35 test activities is not anticipated to have a significant impact to cultural resources.

C.6 HAZARDOUS MATERIALS (HAZMAT)/HAZARDOUS WASTE (HAZWASTE)

Measurable impacts associated with the Proposed Action is anticipated to be minimal to negligible because the HAZMAT/HAZWASTE required would be managed under established Federal, state, United States Navy (USN), and United States Air Force (USAF) requirements and operating procedures. The JSF Program Office (JPO) is coordinating the F-35 aircraft composition and HAZMAT/HAZWASTE use with each proposed test location to ensure that proper storage facilities, handling equipment, management procedures, and emergency response procedures are in place. Operating instructions and desktop procedures have been specifically prepared for F-35 Program Flight Test Support requirements (Environmental, Safety, and Health; Hazardous Communications, and Material Control), which provide direction for developing and maintaining a safe site-specific JSF HAZMAT/HAZWASTE Program. HAZMAT used on or for maintenance of the F-35 variants would be submitted by the JPO for approval by the local HAZMAT management organization and for inclusion in the test location's Authorized Materials/HAZMAT Use List. In addition to the above management controls, the JPO requires Lockheed Martin Aerospace (LM Aero) to reduce or eliminate to the maximum extent practicable many of the HAZMAT that are currently used in legacy aircraft.

C.7 AIRFIELD OPERATIONS AND FLIGHT SAFETY

Federal Aviation Administration (FAA) airspace designations allow the USN and USAF control of the airspace to restrict use to authorized tests and other flights. To ensure the safety of personnel and the public and to avoid loss of property around its installations/bases, the USN and USAF implement safety considerations in all aspects of flight operations. Programs, policies, procedures, and manuals are in place to ensure safe airfield operations and flight safety [e.g., NAS Patuxent River Instruction (NASPAXRIVINST) 3710.5R, Air Operations Manual, February 2000; Chesapeake Test Range (CTR)

Safety and Test Operation Manual; and Air Force Flight Test Center (AFFTC) Edwards Air Force Base (AFB) Mid-Air Collision Avoidance (MACA) Program].

Air operations (including subsonic and supersonic flights) and flight safety impacts are not anticipated to be significant because the Proposed Action would be conducted in compliance with established air and range operating procedures, in addition to those procedures and manuals designed to minimize sonic boom impacts. As a result, no changes to existing airspace use would be anticipated for the proposed JSF DT. Rigorous safety considerations, in addition to sonic boom monitoring procedures (applied when applicable), are employed in all test planning and test article preparation. Appropriate flight safety clearances are required prior to test flights. All JSF test personnel and pilots would be pre-briefed on airspace, air operations, and safety procedures [e.g., safety of flight, Bird/Aircraft Strike Hazard (BASH) and Deer/Aircraft Strike Hazards (DASH) Programs, supersonic flight requirements] prior to commencement of the proposed JSF DT. Safety records for similar flight test programs demonstrate that no significant impacts are expected. In addition, proposed JSF DT flights would be conducted as much as possible over unpopulated areas.

C.8 SAFETY AND OCCUPATIONAL HEALTH

The JPO has an established System Safety Program in compliance with Military Standard-882. A variety of safety hazard analyses are conducted to assure flight safety for the F-35 variants. Pre-Mishap Plans would be prepared as required and made available to proposed test locations. The JPO is capitalizing on lessons learned from the F-22 and the F/A-18E/F Programs to avoid or lessen the potential for significant safety and occupational health issues. In addition, proposed test locations maintain compliance with comprehensive Occupational Safety and Health Administration standards as implemented by various USN and USAF Occupational Safety and Health policies, instructions, and directives. With regard to the new Forward Looking Infrared (FLIR) system, extensive analyses are in process to address overall safety and any potential stray laser energy concerns. The JPO is already seeking Laser Safety Board approval and concurrence for testing and employment of this system, working with USN and USAF laser safety experts at Naval Surface Warfare Center Dahlgren Division and Brooks AFB. The JPO and JSF Verification and Test Team will obtain local approval from the Laser Safety and/or Range Safety Offices, at the proposed test locations. Therefore, health and safety impacts would not likely result in significant impacts based on JSF system safety efforts, a proactive focus by the JPO on minimizing risks, and emphasized adherence to safety and occupational health policies and procedures.

C.9 PRIME AND UNIQUE FARMLAND

Measurable impacts to prime and unique farmland are similar to potential impacts of vegetation; impacts are unlikely because the Proposed Action does not alter the use or designation of the land. Proposed JSF DT activities would occur at established military complexes and existing ranges with programs in effect, specifically designed to minimize potential environmental impacts.

C.10 PARKS AND FORESTS, INCLUDING NATIONAL PARKS

Although aircraft noise is a potential source of impact for animals, in addition to people visiting state and local parks, impacts to surrounding parks and forests as a result of the proposed JSF DT are unlikely. Operations from the Proposed Action would be conducted in compliance with established air and range operating procedures for areas where aircraft currently fly, and in most cases using the same flight tracks as those currently flown by F/A-18A/C/E/F aircraft. In addition, all resource management plan requirements for the protection of natural and wildlife management areas would be adhered to during the proposed JSF DT Program.

Potential impacts to parks and forests is not anticipated because of the minimal changes to existing baseline noise contours at the proposed test locations. Noise contour evaluations for Edwards AFB and

LM Aero indicate little change to the existing baseline when compared with the proposed JSF DT noise contour. Comparisons for NAS Patuxent River had a decrease (5%) in off-installation forestry acreage exposed to the Proposed Action. While the proposed JSF DT noise contour at Naval Air Engineering Station Lakehurst increases the amount of acreage (largely undeveloped space) potentially impacted both on and off the installation, effects would likely be minimal with no permanent impacts to animals or people (to include the adjacent fish and wildlife management area) expected.

C.11 UTILITIES

Impacts to utilities is not anticipated. Proposed JSF DT activities would occur at established military complexes and ground support laboratories. The increase in personnel needed to support the Proposed Action is not expected to impact the current residential utility use rates or requirements. Furthermore, utility use is not anticipated to increase at the proposed test locations, because as new programs are implemented other legacy programs are expected to phase-out.

APPENDIX D
SUPPORTING ENVIRONMENTAL RESOURCE RELATED DATA FOR ASSOCIATED TEST LOCATIONS

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The following is additional information supporting the discussions presented in Section 4 of this Environmental Assessment (EA)/Overseas Environmental Assessment (OEA) for the Joint Strike Fighter (JSF) System Development and Demonstration (SDD) Program.

D.1 NAVAL AIR WEAPONS CENTER, WEAPONS DIVISION (NAWCWD) CHINA LAKE

Table D.1-1 lists the specific management units for the two principal land use categories at NAWCWD China Lake: those within the developed portions of the Station (Mainsite, Armitage Airfield, Main Magazines, and Propulsion Laboratories), and those that comprise the test and training areas of the North and South ranges areas. These units have been established to assist the Installation in managing land use and biological/natural resources.

Table D.1-1: NAWCWD China Lake Management Units and Principle Functions

Management Unit	Principle Function
Mainsite	*Headquarters, most administrative and support functions, principal laboratories (Michelson, Thompson, and Lauritsen), and Missile Engagement Simulation Arena*
Armitage Airfield	*Armitage Airfield (operational airfield), aircraft maintenance facilities, hangars, ordnance handling, and storage facilities*
Main Magazines	*Magazine storage for ordnance*
Propulsion Laboratories	*Research and development laboratories (CLPL and Salt Wells Propulsion Laboratory).*
Ordnance T&E	*Weapons test sites, ordnance test areas*
Baker Range	*Weapons target sites, ordnance impact areas*
Charlie Range	*Weapon target sites, ordnance impact areas, and high-speed track testing (Supersonic Naval Ordnance Research Track)*
Baker/Charlie Range Approach Corridor	*Aircraft approach corridor to Baker/Charlie ranges*
Airport Lake	*Weapons target sites, ordnance impact areas, and ground troop training areas.*
George Range	*Weapons test and target sites, ordnance impact areas, Aircraft Survivability, and the Open Burn/Open Detonation facility*
George Range Approach Corridor	*Aircraft approach corridor to George Range*
Coso Range	*Weapons target sites, ordnance impact areas, aircrew training, and Junction Ranch test area that includes high-power microwave testing, Global Positioning System (GPS) jamming, and radar-cross-section*
Coso Test Range	*Weapons testing, inert ordnance impact areas, target sites, aircrew training, and light-infantry ground troop training*
Coso Geothermal	*Geothermal development generation of electricity (power plants), overflight for weapons testing, and safety/security buffer for weapons testing*
Randsburg Wash	*Test range and laboratory for electronic combat systems, weapons testing, target sites, Charlie Airfield target, ordnance impact areas, aircrew training, and ground troop training*
Mojave B North	*Weapons target sites, Wingate Airfield target, ordnance impact areas, aircrew training, and ground troop training*
Mojave B South	*Operating areas supporting South Range testing, and aircrew and ground troop training*
Superior Valley	*Aircrew training, weapons target sites, ordnance impact areas, and ground troop training*

D.2 WHITE SANDS MISSILE RANGE (WSMR) SENSITIVE PLANT SPECIES LIST

Table D-2 contains a list of sensitive plant species known or expected to occur on WSMR, and was obtained from the WSMR Range-Wide Environmental Impact Statement, 1998.

The following codes are used in Table D-2:

[a]*Federal Status*

FE	*Listed by the U.S. Fish and Wildlife Service (USFWS) as endangered*
FT	*Listed by the USFWS as threatened*
C2	*Category 2 candidate species for listing by the USFWS as threatened or endangered*
C3c	*Previously considered for listing by the USFWS but now considered to be to widespread or not threatened*
None	*Not currently of concern to the USFWS*

New Mexico Status

L1	*Listed by the New Mexico Forestry Resource Conservation Division (NMFRCD) as endangered (List 1)*
L2	*Listed by the NMFRCD as rare or sensitive (List 2)*

[b]*Rarity, Endangerment, and Distribution Code (R-E-D)*

Rarity

1	*Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction is low for the foreseeable future*
2	*Occurrence confined to several populations or to one extended population*
3	*Occurrence limited to one or a few highly restricted populations, or present in such small numbers that it is seldom reported*

Endangerment

1	*Not endangered*
2	*Endangered in a portion of its range*
3	*Endangered throughout its range*

Distribution

1	*More or less widespread outside New Mexico*
2	*Rare outside New Mexico*
3	*Endemic to New Mexico*

[c] *Occurrence on WSMR*

Yes	*Presently known to occur or to have occurred on WSMR*
No	*No known record of occurring or having occurred on WSMR*

[d] *Vegetation Types With Which the Species May Be Associated*

MCF	*Montane coniferous forest*
CWPP	*Coniferous woodland (pinyon pine)*
CWMS	*Coniferous forest and montane scrub*
SPMG	*Savanna and plains-mesa grassland*
DGPMS	*Desert grassland and plains-mesa sandscrub*
CDSC	*Chihuahuan desert scrub (creosote)*
CDSM	*Chihuahuan desert scrub (mesquite)*
CDSL	*Chihuahuan desert scrub (lava)*
CBSST	*Closed-basin scrub (saltbush and tarbush)*
CBSRW	*Closed-basin scrub (riparian and wetland)*
CBSBL	*Closed-basin scrub (barren land)*
CBSDL	*Closed-basin scrub (dune land)*

Table D-2: Sensitive Plant Species Known or Expected to Occur on WSMR

Name	Status[a]	R-E-D[b]	WSMR[c]	Substrate	Vegetation Type[d]
Sacramento Prickly Poppy *Argemone pleiacantha ssp. pinnatisecta*	FE/L1	2-2-3	no		CWPP, CWMS, SPMG
Sneed's Pincushion Cactus *Coryphantha sneedii var. sneedii*	FE/L1	2-2-2	no	limestone	CWMS, CDSC
Kuenzlers's Hedghog Cactus *Echinocereus fendleri var. kuenzleri*	FE/L1	2-3-3	no	limestone	SPMG, DGPMS
Lloyd's Hedgehog Cactus *Echinocereus lloydii X*	FE/L1	NA	no	limestone	DGPMS, CDSC
Todson's Pennyroyal *Hedeoma todsenii*	FE/L1	2-2-3	yes	limestone with gypsum	CWPP, CWMS, SPMG
Sacramento Mountain Thistle *Cirsium vinaceum*	FT/L1	2-3-3	no	limestone	MCF, CWPP
Night Blooming Cereus *Cereus greggii*	C2/L1	1-3-1	yes		DGPMS, CDSC
Duncan's Pincushion Cactus *Coryphantha duncanii*	C2/L1	2-2-2	no	limestone	DGPMS, CDSC
Organ Mountain Evening Primrose *Oenothera organensis*	C2/L1	2-2-3	yes	wetlands	CWPP, CWMS
Sand Prickly Pear *Opuntia arenaria*	C2/L1	2-2-2	no	sand	DGPMS
Grama Grass Cactus *Pediocactus papyracantha*	C2/L1	1-2-2	yes		CWPP, CWMS, SPMG, DGPMS
Alamo Penstemon *Penstemon alamosensis*	C2/L1	2-2-3	yes	limestone	CWPP, CWMS, SPMG

Table D-2: Sensitive Plant Species Known or Expected to Occur on WSMR (Continued)

Name	Status[a]	R-E-D[b]	WSMR[c]	Substrate	Vegetation Type[d]
Nodding Cliff Daisy *Perityle cernua*	C2/L1	3-2-3	no	"cliffs, igneous rock"	CWPP, CWMS, SPMG
Mescalero Milkwort *Polygala rimulicola var. mescalerorum*	C2/L1	3-2-3	yes	limestone cliffs	CWPP, CWMS, SPMG
Smooth Figwort *Scrophularia laevis*	C2/L2	2-1-2	no	"moist soil, shade"	MCF, CWPP, CWMS, SPMG
Cliff Brittlebush *Apacheria chiricahuensis*	C3c/L1	1-1-2	yes	cliffs	MCF, CWPP
Castetter's Milkvetch *Astragalus castetteri*	C3c/L2	1-1-3	yes	limestone	CWPP, CWMS, SPMG
Dune Unicorn Plant *Proboscidea sabulosa*	C3c/L2	1-1-2	no	"deep sands, dunes"	DGPMS, CDSM
Plank's Catchfly *Silene plankii*	C3c/L2	1-1-2	yes	granitic	CWPP, CWMS, SPMG
Guadalupe Mescal Bean *Sophora gypsophyla var. guadalupensis*	C3c/L2	2-1-2	no	limestone	CWMS, SPMG
Orcutt's Pincushion Cactus *Coryphantha orcuttii*	None/L1	2-2-2	no		CWMS, DGPMS, CDSC
Scheer's Pincushion Cactus *Coryphantha scheeri var. valida*	None/L1	2-2-1	yes	alluvial soils	DGPMS,CDSC
Standley's Whitlowgrass *Draba standleyi*	None/L2	2-1-2	no		MCF, CWPP, CWMS, SPMG
Button Cactus *Epithelantha micromeris var. micromeris*	None/L1	1-2-1	yes	limestone	CWMS, SPMG, DGPMS, CDSC
Sandberg's Pincushion Cactus *Escobaria sandbergii*	None/L1	2-2-3	yes		CWPP, CWMS, SPMG

Table D-2: Sensitive Plant Species Known or Expected to Occur on WSMR (Continued)

Name	Status[a]	R-E-D[b]	WSMR[c]	Substrate	Vegetation Type[d]
Tall Prairie Gentian *Eustoma exaltatum*	None/L1	1-2-1	yes	riparian and wetlands	SPMG, DGPMS, CDSC, CDSM, CBSS&T CBSR&W, CBSBL, CBSDL
Wright's Fishook Cactus *Mammillaria wrightii var. wrightii*	None/L1	1-2-2	yes		CWPP, CWMS, SPMG, DGPMS
Pineapple Cactus *Neolloydia intertexta var. dasyacantha*	None/L1	1-2-1	yes	limestone	DGPMS, CDSC
Mosquito Plant *Agastache cana*	None/L2	1-1-2	yes	"moist, wetlands"	CWMS, SPMG
Organ Mountain Pincushion Cactus *Coryphantha organensis*	None/L1	1-2-3	yes		CWPP, CWMS
Mescalero Pennyroyal *Hedeoma pulcherrimum*	None/L2	1-1-3	yes		MCF, CWPP, CWMS
Payson's Hiddenflower *Cryptantha paysonii*	None/L2	1-1-2	yes	limestone	SPMG
Vassey's Bitterweed *Hymenoxys* vaseyi	None/L2	3-1-3	yes		CWPP, CWMS, SPMG
San Andres Rock Daisy *Perityle staurophylla var. homoflora*	None/L2	1-1-3	yes	limestone cliffs	CWPP, CWMS, SPMG
Desert Parsley *Pseudocymopterus longiradiatus*	None/L2	1-1-2	yes	limestone	CWPP, CWMS, SPMG
Supreme Sage *Salvia summa*	None/L2	1-1-2	yes	limestone cliffs	CWPP, CWMS, SPMG
Smooth Cucumber *Sicyos glaber*	None/L2	1-1-2	no		CWPP, CWMS, SPMG
Long stemmed Flame Flower *Talinum longipes*	None/L2	1-1-3	yes	limestone	DGPMS, CDSC

Sources: WSMR Environmental Services Division (1993b); U.S. Department of the Interior (1979); COE (1987).

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APPENDIX E
BASIS OF AIR QUALITY EMISSION CALCULATIONS FOR THE PROPOSED ACTION

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This Appendix includes additional information on the methodology used to calculate emissions for the sources at the proposed test locations analyzed in greater detail for this Environmental Assessment (EA)/Overseas EA (OEA) [Edwards Air Force Base (AFB), Naval Air Station (NAS) Patuxent River, Naval Air Engineering Station (NAES) Lakehurst, and Lockheed Martin Aeronautics (LM Aero)]. Summary tables for each major category of emission source for these proposed test locations are also included in this Appendix. All references used in the air quality analysis are listed in this Appendix. Major areas of emission estimates include:

- Flight operations for the F-35 and support aircraft operations required by the Joint Strike Fighter (JSF) System Development and Demonstration (SDD) Developmental Test (DT)
- Aircraft test cell operations for aircraft engine testing
- Ground Support Equipment (GSE) operations including tow vehicles, mobile generators, or other equipment required to support aircraft flight operations
- Other emission sources such as refueling emissions and indirect emissions from personal commuter vehicles

It has been assumed no significant aircraft maintenance would be required for the proposed JSF DT and some proposed test locations would have only one aircraft variant or no landing or takeoff operations. In addition, the Record Of Non-Applicability (RONA) for Clean Air Act (CAA) Conformity is included in this Appendix for each proposed test location: Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero.

Emissions from Flight Operations

Aircraft engines emit pollutants during all phases of flight operations including idling, taxiing, takeoff, and approach to landing. Each phase of the flight operation is associated with a specific engine power setting and fuel flow rate. Emission factors have been developed for various engines operating at each power setting. The equation shown below was used to calculate the emissions for aircraft at each engine power setting for flight operations below 3,000 feet above ground level (AGL) that occur as part of the proposed JSF DT. As discussed previously in the EA/OEA, emission factors for similar aircraft engine types were used when emission factors were not available for the engines in the specific aircraft flown as part of the proposed JSF DT.

$$Ep_i = [(FF * t) / 1000] * EF_i$$

Where:

Ep = Emissions of a particular pollutant (i) resulting from aircraft engine operation at a specific power setting (pounds per year)

FF = Fuel flow rate at a particular engine power setting (pounds per hour)

t = Total annual time the engine operated at the specific power setting (hours per year)

EF_i = Emission factor or index for pollutant (i) for particular engine power setting (pounds pollutant/1,000 pounds fuel burned)

Additional details on the engine types, power settings, operating times, fuel flows and emission factors used to calculate the emissions from flight operations can be found in the EA/OEA administrative record (AR).

Aircraft Test Cell Operations

Test cell operations involve testing aircraft engines, typically after maintenance is performed, prior to flight to ensure proper operation. The engines are tested either on or off of the aircraft at various power settings. Engine testing conducted off the aircraft is performed either in a hush house or on outdoor test stands. Static firing tests at NAES Lakehurst were modeled as test cell engine tests. Emissions produced during engine testing are calculated using the following equation:

$$Ep_i = EF_i * FF * t / 1000$$

Where:

Ep_i = Emissions of a particular pollutant (i) resulting from aircraft engine testing operation at a specific power setting (pounds per year)

EF_i = Emission factor or index for pollutant (i) (pounds pollutant/1,000 pounds fuel burned)

FF = Fuel flow rate at a particular engine power setting (pounds per hour)

t = Total annual time the engine operated at the specific power setting (hours per year)

Additional details on the number of tests conducted, fuel flow rates, operating times, and emission factors used to calculate the emissions from engine testing can be found in the EA/OEA AR.

Ground Support Equipment

GSE is used to support flightline and base operations. This equipment can be either self-propelled, such as bomb loaders, tow vehicles, and service vehicles; or not self-propelled, such as electrical generators, jet engine start units, air conditioners, and light carts. Most of the equipment is designed to operate using JP-8 or diesel fuel, however, some use gasoline. Emissions from this equipment are calculated using one of the following methods depending on the information available (i.e., horsepower, load factor, fuel consumption, operating time):

Method 1: This method is for not self-propelled equipment and is used when fuel consumption and operating time is known. Emissions produced during engine testing are calculated using the following equation:

$$Ep_i = (FC * t) * [EF_i * HV]$$

Where:

Ep_i = Emissions of a particular pollutant (i) resulting from operation of the equipment (pounds per year)

FC = Fuel consumption (gallons per hour)

t = Operating time (hours per year)

EF_i = Emission factor or index for pollutant (i) (pounds pollutant per British Thermal Unit)

HV = Heating value of the fuel (British Thermal Unit per 1,000 gallons)

<u>Method 2:</u> This method is for self-propelled equipment and is used to calculate emissions from non-road vehicles/equipment using the engine's rated power output (maximum horsepower), a loading factor (LF), the engine's annual operating time, and emission factors which are based on mass of pollutant emitted per power output. Emissions produced during engine testing are calculated using the following equation:

$$Ep_i = [(PO * (LF / 100) * t)] * EF_i * 0.002205$$

Where:

Ep_i = Emissions of a particular pollutant (i) resulting from operation of the equipment (pounds per year)

PO = Rated power output of the vehicle/equipment engine (horsepower)

LF = Loading Factor (% of Maximum Power)

t = Operating time (hours per year)

EF_i = Emission factor or index for pollutant (i) (g pollutant/hp-hr)

0.002205 = Conversion Factor (pounds per g)

<u>Method 3:</u> This method is primarily for Navy GSE where emission factors were available for specific equipment. Emissions produced during engine testing are calculated using the following equation:

$$Ep_i = Ef_i * t$$

Where:

Ep_i = Emissions of a particular pollutant (i) resulting from operation of the equipment (pounds per year)

EF_i = Emission factor or index for pollutant (i) (pounds pollutant per hour)

t = Operating time (hours per year)

Additional details on the types of equipment used, operating times, load factors, and emission factors used to calculate the emissions from GSE can be found in the EA/OEA AR.

<u>Other Emissions</u>

Additional sources of emissions identified as part of the Proposed Action include aircraft refueling operations, commuter vehicles, and using stores and expendables. The total estimated emissions from these sources are shown on the summary tables under Other Emissions. The methods used to calculate emissions from these sources are discussed below and additional details can be found in the EA/OEA AR.

Emissions from aircraft refueling operations occur as fuel evaporates during transfer from tank trucks or storage tanks to aircraft fuel tanks. The calculated emissions from this source are based on the quantity of fuel transferred, physical properties of the fuel, the type of transfer method used, and atmospheric conditions. The following equation was used to calculate emissions:

$$E_L = [12.46 * S * P * M / T] * (F_L / \rho)$$

Where:

E_L = Hydrocarbon emissions due to aircraft refueling (pounds per year)

12.46 = Conversion factor (in^2-lb_{mol}-°R/lb_f-1,000 gallons)

S = Saturation factor (1.45 for splash loading)

P = True vapor pressure based on average temperature (pounds per square inch absolute)

M = Molecular weight of fuel (130 lb_m/lb_{mol} for jet kerosene)

T = Fluid temperature, assumed to be average ambient temperature (°R)

ρ = Density of the fuel (pounds per gallon)

F_L = Fuel loaded per year (1000 pounds per year)

Emissions from commuter vehicular traffic were calculated using the Federal Aviation Administration's Airport Air Quality Model EDMS Version 4.2. Inputs to the model included the number of round trips per day, average vehicle speed, and average distance traveled.

The estimated emissions generated from stores and expendables used during the Proposed Action were based on information contained in the Final Environmental Impact Statement for Naval Air Weapons Station/Naval Air Warfare Center Weapons Division China Lake (February 2004).

E.1 EDWARDS AFB

Detailed Emissions Calculations

Air Emissions for Edwards AFB

Fuel: JP-8

Test Year 1: Alternatives One and Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	7.89	1.94	6.45	0.45	1.23	502.97
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	0.91	0.30	0.91	0.08	0.17	
Other Emissions	148.17	9.00	15.12	0.07	0.41	
Total	**156.97**	**11.24**	**22.48**	**0.60**	**1.81**	**502.97**

Test Year 2: Alternatives One and Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	15.80	2.56	13.50	0.96	3.97	1065.84
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	1.60	0.57	3.49	0.27	0.47	
Other Emissions	143.72	8.47	13.98	0.07	0.38	
Total	**161.11**	**11.60**	**30.97**	**1.30**	**4.82**	**1065.84**

Test Year 3: Alternatives One and Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	19.65	3.31	16.65	1.19	4.74	1319.68
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	2.09	0.77	5.62	0.41	0.65	
Other Emissions	138.00	7.70	12.75	0.07	0.36	
Total	**159.74**	**11.78**	**35.02**	**1.67**	**5.74**	**1319.68**

Test Year 4: Alternatives One and Two

Emissions Summary

Emissions (tons/year)

	CO	HC	NOx	SO2	PM	Fuel Use (tons/year)
Flight	23.96	4.27	20.02	1.43	5.46	1593.59
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	2.42	0.91	6.89	0.51	0.79	
Other Emissions	101.30	5.77	11.62	0.07	0.33	
Total	**127.69**	**10.95**	**38.53**	**2.01**	**6.59**	**1593.59**

Test Year 5: Alternatives One and Two

Emissions Summary

Emissions (tons/year)

	CO	HC	NOx	SO2	PM	Fuel Use (tons/year)
Flight	21.76	3.75	18.29	1.31	5.13	1451.95
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	2.34	0.88	6.71	0.49	0.74	
Other Emissions	97.21	5.38	10.49	0.07	0.32	
Total	**121.31**	**10.00**	**35.49**	**1.86**	**6.18**	**1451.95**

Test Year 6: Alternatives One and Two

Emissions Summary

Emissions (tons/year)

	CO	HC	NOx	SO2	PM	Fuel Use (tons/year)
Flight	19.94	3.82	16.22	1.18	4.13	1307.09
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	1.88	0.69	4.65	0.35	0.58	
Other Emissions	93.67	5.02	9.37	0.07	0.30	
Total	**115.50**	**9.53**	**30.25**	**1.59**	**5.01**	**1307.09**

Test Year 7: Alternatives One and Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	6.39	1.66	5.33	0.37	0.93	407.78
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	1.22	0.43	2.59	0.19	0.24	
Other Emissions	90.01	4.58	8.40	0.07	0.28	
Total	**97.62**	**6.67**	**16.32**	**0.62**	**1.46**	**407.78**

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Record of Non-Applicability (RONA) for Clean Air Act Conformity
Edwards Air Force Base

Proposed Action:

Action Proponent:	Joint Strike Fighter Program Office (JPO)
Location:	Edwards Air Force Base (AFB)
Proposed Action Name:	Joint Strike Fighter (JSF) System Development and Demonstration (SDD) Developmental Test (DT) Program
Affected Air Basin:	Mojave Desert Air Basin which occupies portions of Kern, Los Angeles, San Bernardino and Riverside Counties in California
Date RONA Prepared:	January 2006
RONA Prepared by:	Jean Hawkins

Proposed Action and Emission Summary:

The JPO is proposing to conduct the JSF SDD DT Program (hereafter referred to as JSF DT) at Edwards AFB. Alternative One would conduct the proposed JSF DT at an East Coast Primary Test Location [Naval Air Station (NAS) Patuxent River and the Virginia Capes Operating Area of the Atlantic Warning Area], and West Coast Primary Test Locations [Edwards AFB, Naval Air Warfare Center Weapons Division (NAWCWD) China Lake, Naval Air Warfare Center, Weapons (NAWCWPNS) Point Mugu, White Sands Missile Range (WSMR), and Nevada Test and Training Range (NTRR) Nellis AFB], and Other Ancillary Test Locations of Naval Air Engineering Station Lakehurst, Eglin AFB, and Lockheed Martin Aeronautics (LM Aero). Alternative Two would include the activities associated with Alternative One, however some of the Short Takeoff Vertical Landing (STOVL) tests proposed in Alternative One would also occur at LM Aero. Additional details regarding the Proposed Action are available in Section 2 of the EA/OEA.

The proposed JSF DT at Edwards AFB would be conducted during Test Years 1 through 7, and would be comprised of a combination of laboratory, ground-based, and flight tests. Flight tests would be conducted within Edwards AFB airfield, airspace, and Western Ranges. Flights tests would be conducted five days a week in accordance with existing flight and airspace operating procedures. Flights to NAWCWD China Lake, NAWCWPNS Point Mugu, WSMR, and NTRR Nellis AFB would originate and return to Edwards AFB (only in the event of an emergency would the aircraft divert to a location other than Edwards AFB). Additional details regarding the proposed JSF DT at Edwards AFB and the alternatives are available in Section 5 of the EA/OEA.

The General Conformity Rule requires potential emissions from the Proposed Action be determined on an annual basis and compared to the annual *de minimis* levels for those pollutants (or their precursors) for which the area is classified as nonattainment. All airfield operations (flight and ground) as well as the majority of commuter driving would occur in Kern County. Therefore, the JPO has decided to assess all emissions associated with the Proposed Action as if the emissions would occur only in Kern County. Table E-1 reflects the estimated annual emissions for the Proposed Action for Test Years 1 through 7.

Table E-1: Estimated Air Emissions Estimates for the Proposed DT at Edwards AFB

Test Year	CO tpy (MT/yr)	NO_x tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
1	159.46 (144.66)	32.56 (29.54)	12.07 (10.95)	1.28 (1.16)	2.39 (2.17)
2	161.11 (146.16)	30.97 (28.10)	11.60 (10.52)	1.30 (1.18)	4.82 (4.37)
3	159.74 (144.92)	35.02 (31.77)	11.78 (10.69)	1.67 (1.52)	5.74 (5.21)
4	127.69 (115.84)	38.53 (34.95)	10.95 (9.93)	2.01 (1.82)	6.59 (5.98)
5	121.31 (110.05)	35.49 (32.20)	10.00 (9.07)	1.86 (1.69)	6.18 (5.61)
6	115.50 (104.78)	30.25 (27.44)	9.53 (8.65)	1.59 1.44)	5.01 (4.55)
7	97.62 (88.56)	16.32 (14.81)	6.67 (6.05)	0.62 (0.56)	1.46 (1.32)
Highest (Test Year)	161.11 (146.16) (Test Year 2)	38.53 (34.95) (Test Year 4)	12.07 (10.95) (Test Year 1)	2.01 (1.82) (Test Year 4)	6.59 (5.98) (Test Year 4)

tpy = tons per year, MT/yr = Metric Tons per year
CO = Carbon Monoxide, NO_x = Nitrogen Oxides, VOC = Volatile Organic Compound, SO_2 = Sulfur Dioxide, and PM = Particulate Matter
Hydrocarbon emissions are assumed to be VOCs.
Notes: a. The highest year represents the year most likely to produce the greatest estimated emissions.
b. Emissions include aircraft operations, ground support equipment, and commuter vehicles.

Proposed Action Exemption

General Conformity under the Clean Air Act, Section 1.76, has been evaluated for the Proposed Action described above according to the requirements of 40 Code of Federal Regulation (CFR) 93, Subpart B. The requirements of this rule are not applicable to this Proposed Action because the levels of total direct and indirect emissions are estimated to be below the conformity threshold values established at 40 CFR 93.153(b). In addition, the Proposed Action would not be considered regionally significant under 40 CFR 93.153(i).

Edwards AFB is located within the jurisdiction of three California local air quality management districts:

- Kern County Air Pollution Control District (KCAPCD)—Responsible for Eastern Kern County which includes most of Edwards AFB
- Mojave Desert Air Quality Management District (MDAQMD)—Responsible for the majority of San Bernardino County including the Eastern portion of Edwards AFB
- Antelope Valley Air Pollution Control District (AVAPCD)—Responsible for the portion of Los Angeles County in which the Southern portion of Edwards AFB lies

All three air quality management districts are in nonattainment for the eight-hour ozone (O_3) standard and only MDAQMD is in nonattainment for particulate matter (PM). The areas are in attainment for all other criteria pollutants. Eastern Kern County and the MDAQMD portion of San Bernardino County are moderate nonattainment and AVAPCD portion of Los Angeles County is classified as extreme nonattainment of the state O_3 standard. The entire region is in nonattainment for the state PM of 10 microns or less in diameter (PM_{10}) standard, but only the portion of San Bernardino County (including the portion containing a part of Edwards AFB) is in nonattainment for the state [PM of 2.5 microns or less in diameter ($PM_{2.5}$)] standard. The area is in attainment for all the other state Ambient Air Quality Standards (AAQS). Even though California has adopted these AAQS, there are no general conformity requirements placed on Federal facilities because of these standards.

Table E-2 provides a comparison of estimated emissions for the years during which the greatest emissions are expected to occur to the *de minimis* and regionally significant thresholds. The comparison shows the

Proposed Action would not require a formal Conformity Determination because the project-related emission levels would be below the applicable *de minimis* thresholds and the annual project-related emissions would not make up 10% or more of the nonattainment area's total emissions budget. No significant impact to air quality would be expected from implementing the proposed JSF DT at Edwards AFB.

Table E-2: Comparison of the Highest Years Estimated Annual Emissions for the Proposed Action to the *de minimis* and Regionally Significant Thresholds

Pollutant	Highest Year Emissions* tpy	*de minimis* Threshold tpy	Regionally Significant Threshold tpy
NO_x	38.53	100	1,711
VOC	12.07	100	1,019

** The highest year represents the year most likely to produce the greatest estimated emissions.*

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E.2 NAS PATUXENT RIVER

Detailed Emissions Calculations

Air Emissions for NAS Pax River Alternative One

Fuel: JP-5

Test Year 2: Alternative One

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	12.37	3.76	17.80	0.29	3.78	732.46
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	7.04	3.28	12.02	0.82	0.61	
Other Emissions	100.89	7.66	10.15	0.06	0.32	
Total	**120.30**	**14.71**	**39.97**	**1.17**	**4.72**	**732.46**

Test Year 3: Alternative One

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	63.51	20.74	64.00	1.32	17.34	3292.37
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	8.23	4.16	21.62	1.56	0.99	
Other Emissions	95.45	7.10	9.27	0.06	0.38	
Total	**167.19**	**32.01**	**94.89**	**2.94**	**18.71**	**3292.37**

Test Year 4: Alternative One

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	61.47	19.44	65.02	1.36	17.68	3393.38
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	8.16	4.14	21.23	1.54	0.98	
Other Emissions	70.04	5.28	8.45	0.06	0.28	
Total	**139.66**	**28.86**	**94.70**	**2.96**	**18.94**	**3393.38**

Air Emissions: Edwards AFB

Test Year 5: Alternative One

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	44.14	14.16	43.81	0.91	12.16	2281.77
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	7.91	3.91	18.98	1.34	0.88	
Other Emissions	66.27	4.85	7.64	0.06	0.27	
Total	**118.33**	**22.92**	**70.43**	**2.31**	**13.31**	**2281.77**

Test Year 6: Alternative One

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	26.14	8.56	27.85	0.53	6.94	1322.96
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	7.47	3.57	15.33	1.06	0.74	
Other Emissions	63.11	4.48	6.86	0.06	0.47	
Total	**96.71**	**16.61**	**50.05**	**1.65**	**8.15**	**1322.96**

Test Year 7: Alternative One

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	5.54	1.75	6.41	0.12	1.55	308.19
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	6.81	3.10	10.04	0.66	0.53	
Other Emissions	59.99	4.07	6.16	0.06	0.30	
Total	**72.34**	**8.92**	**22.61**	**0.84**	**2.38**	**308.19**

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Air Emissions for NAS Pax River Alternative Two

Fuel: JP-5

Test Year 2: Alternative Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	12.15	3.74	16.71	0.28	3.64	700.37
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	7.04	3.28	12.02	0.82	0.61	
Other Emissions	100.89	7.66	10.15	0.06	0.32	
Total	**120.09**	**14.69**	**38.88**	**1.16**	**4.57**	**700.37**

Test Year 3: Alternative Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	63.13	20.71	61.97	1.29	17.08	3235.04
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	8.23	4.16	21.62	1.56	0.99	
Other Emissions	95.45	7.10	9.27	0.06	0.38	
Total	**166.80**	**31.97**	**92.86**	**2.91**	**18.45**	**3235.04**

Test Year 4: Alternative Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	61.18	19.42	63.51	1.34	17.50	3352.41
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	8.16	4.14	21.23	1.54	0.98	
Other Emissions	70.04	5.28	8.45	0.06	0.28	
Total	**139.38**	**28.83**	**93.19**	**2.94**	**18.75**	**3352.41**

Test Year 5: Alternative Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	43.95	14.14	42.83	0.90	12.04	2254.74
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	7.91	3.91	18.98	1.34	0.88	
Other Emissions	66.27	4.85	7.64	0.06	0.27	
Total	**118.14**	**22.90**	**69.44**	**2.30**	**13.19**	**2254.74**

Test Year 6: Alternative Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	25.97	8.55	26.98	0.52	6.83	1298.68
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	7.47	3.57	15.33	1.06	0.74	
Other Emissions	63.11	4.47	6.86	0.06	0.47	
Total	**96.54**	**16.59**	**49.17**	**1.64**	**8.04**	**1298.68**

Test Year 7: Alternative Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	5.54	1.75	6.41	0.12	1.55	308.19
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	6.81	3.10	10.04	0.66	0.53	
Other Emissions	59.99	4.07	6.16	0.06	0.30	
Total	**72.34**	**8.92**	**22.61**	**0.84**	**2.38**	**308.19**

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Record of Non-Applicability (RONA) for Clean Air Act Conformity
Naval Air Station Patuxent River

Proposed Action:

Action Proponent:	Joint Strike Fighter Program Office (JPO)
Location:	Naval Air Station (NAS) Patuxent River
Proposed Action Name:	Joint Strike Fighter (JSF) System Development and Demonstration (SDD) Developmental Test (DT) Program
Affected Air Basin:	Maryland Tri-County Region of St. Mary's, Calvert, and Charles Counties and the Chesapeake Test Range (CTR) which covers portions of Caroline, Dorchester, Wicomico, and Somerset Counties in Maryland and a portion of Sussex County in Delaware and Westmoreland, Northcumberland, and Lancaster Counties in Virginia
Date RONA Prepared:	January 2006
RONA Prepared by:	Jean Hawkins

Proposed Action and Emission Summary:

The JPO is proposing to conduct the JSF SDD DT Program (hereafter referred to as JSF DT) at NAS Patuxent River, Maryland. Alternative One would conduct the proposed JSF DT at an East Coast Primary Test Location [NAS Patuxent River and the Virginia Capes Operating Area of the Atlantic Warning Area], West Coast Primary Test Locations [Edwards Air Force Base (AFB); Naval Air Warfare Center, Weapons Division China Lake; Naval Air Warfare Center, Weapons Point Mugu; White Sands Missile Range; and Nevada Test and Training Range Nellis AFB], and Other Ancillary Test Locations of Naval Air Engineering Station (NAES) Lakehurst, Eglin AFB, and Lockheed Martin Aeronautics (LM Aero). Alternative Two would include the activities associated with Alternative One, however some of the Short Takeoff Vertical Landings (STOVL) tests proposed in Alternative One would occur at LM Aero. Additional details regarding the Proposed Action are available in Section 2 of the EA/OEA.

The proposed JSF DT at NAS Patuxent River would be conducted during Test Years 2 through 7, comprised of a combination of laboratory, ground-based, and flight tests. Flight tests would be conducted within NAS Patuxent River's airfield and the CTR. Flights tests would be conducted five days a week in accordance with existing flight and airspace operating procedures. Only approximately 90% of airborne STOVL hover operations would occur at NAS Patuxent River under Alternative Two. Detachments to NAES Lakehurst and Eglin AFB would originate from and return to NAS Patuxent River. Additional details regarding the proposed JSF DT at NAS Patuxent River and the alternatives are available in Section 6 of the EA/OEA.

Table E-3 reflects the total annual emissions from the Proposed Action at NAS Patuxent River.

Table E-3: Estimated NAS Patuxent River Air Emissions for Alternatives One and Two

Test Year	CO tpy (MT/yr)	NO_x tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
Alternative One					
2	120.30 (109.12)	39.97 (36.25)	14.71 (13.34)	1.17 (1.06)	4.72 (4.28)
3	167.19 (151.65)	94.89 (86.07)	32.01 (29.03)	2.94 (2.67)	18.71 (16.97)
4	139.66 (126.68)	94.70 (85.90)	28.86 (26.18)	2.96 (2.68)	18.94 (17.18)
5	118.33 (107.33)	70.43 (63.88)	22.92 (20.79)	2.31 (2.10)	13.31 (12.07)
6	96.71 (87.72)	50.05 (45.40)	16.61 (15.07)	1.65 (1.50)	8.15 (7.39)
7	72.34 (65.61)	22.61 (20.51)	8.92 (8.09)	0.84 (0.76)	2.38 (2.16)
Highest (Test Year)	167.19 (151.65) (Test Year 3)	94.89 (86.07) (Test Year 3)	32.01 (29.03) (Test Year 3)	2.96 (2.68) (Test Year 4)	18.94 (17.18) (Test Year 4)
Alternative Two					
2	120.09 (108.93)	38.88 (35.27)	14.69 (13.32)	1.16 (1.05)	4.57 (4.15)
3	166.80 (151.29)	92.86 (84.23)	31.97 (29.00)	2.91 (2.64)	18.45 (16.73)
4	139.38 (126.42)	93.19 (84.53)	28.83 (26.15)	2.94 (2.67)	18.75 (17.01)
5	118.14 (107.16)	69.44 (62.98)	22.90 (20.77)	2.30 (2.09)	13.19 (11.96)
6	96.54 (87.56)	49.17 (44.60)	16.59 (15.05)	1.64 (1.49)	8.04 (7.29)
7	72.34 (65.61)	22.61 (20.51)	8.92 (8.09)	0.84 (0.76)	2.38 (2.16)
Highest (Test Year)	166.80 (151.29) (Test Year 3)	93.19 (84.53) (Test Year 4)	31.97 (29.00) (Test Year 3)	2.94 (2.67) (Test Year 4)	18.75 (17.01) (Test Year 4)

tpy = tons per year, MT/yr = Metric Tons per year
CO = Carbon Monoxide, NO_x = Nitrogen Oxides, VOC = Volatile Organic Compound, SO_2 = Sulfur Dioxide, and PM = Particulate Matter
Hydrocarbon emissions are assumed to be VOCs.
Note: a. The highest year represents the year most likely to produce the greatest estimated emissions.

Proposed Action Exemption:

General Conformity under the Clean Air Act, Section 1.76, has been evaluated for the Proposed Action described above according to the requirements of 40 Code of Federal Regulation (CFR) 93, Subpart B. The requirements of this rule are not applicable to this Proposed Action because the levels of total direct and indirect emissions are estimated to be below the conformity threshold values established at 40 CFR 93.153(b). In addition, the Proposed Action would not be considered regionally significant under 40 CFR 93.153(i).

NAS Patuxent River is located in the Maryland Tri-County Region of St. Mary's, Calvert, and Charles Counties. Calvert and Charles Counties are included in the ozone (O_3) Metropolitan Washington Nonattainment Area (MWNAA) and are designated as moderate nonattainment for the eight-hour O_3 National Ambient Air Quality Standards (NAAQS). Charles County is also included in the MWNAA for PM of 2.5 microns or less in diameter ($PM_{2.5}$) while Calvert County is in attainment for $PM_{2.5}$. St. Mary's County is in attainment for the eight-hour O_3 and $PM_{2.5}$ NAAQS. All three counties are in attainment for the criteria pollutants carbon monoxide, nitrogen dioxide (NO_x), sulfur dioxide, PM of 10 microns or less in diameter, and lead.

Table E-4 provides a comparison of estimated emissions for the years during which the greatest emissions are expected to occur to the *de minimis* and regionally significant thresholds. The comparison shows neither alternative for the Proposed Action would require a formal Conformity Determination because the project-related emission levels would be below the applicable *de minimis* thresholds and the annual project-related emissions would not make up 10% or more of the nonattainment area's total emissions budget. It is reasonable, therefore, to assume no significant air quality impacts would likely occur from the proposed JSF DT at NAS Patuxent River for either alternative.

Table E-4: Comparison of the Highest Year Estimated Annual Emissions for Alternative One and Two to the *de minimis* and Regionally Significant Thresholds

Pollutant	Highest Year Emissions* tpy	*de minimis* Threshold tpy	Regionally Significant Threshold tpy
Alternative One (Preferred)			
NO_x	94.9	100	7,438
VOC	32.0	50	4,682
PM	18.9	100	93.3
Alternative Two			
NO_x	93.2	100	7,438
VOC	32.0	50	4,682
PM	18.8	100	93.3

** The highest year represents the year most likely to produce the greatest estimated emissions.*

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E.3 NAES LAKEHURST

Detailed Emissions Calculations

Air Emissions for NAWCAD Lakehurst

Fuel: JP-8

Test Year 3: Alternatives One and Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.42	0.03	1.68	0.09	0.44	104.10
Aircraft Maintenance	0.00	0.00	0.00	0.00	0.00	0.00
Aircraft Test Cell	3.59	0.10	8.04	0.44	1.47	493.40
Ground Support Equipment	0.47	0.38	1.35	0.12	0.10	
Other Emissions	0.79	0.06	0.07	0.00	0.00	
Total	**5.26**	**0.58**	**11.14**	**0.66**	**2.01**	**597.50**

Test Year 4: Alternatives One and Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.00	0.00	0.00	0.00	0.00	0.00
Aircraft Maintenance						
Aircraft Test Cell	0.00	0.01	0.18	0.01	0.05	14.88
Ground Support Equipment						
Other Emissions	0.58	0.04	0.06	0.00	0.00	
Total	**0.58**	**0.05**	**0.24**	**0.01**	**0.06**	**14.88**

Test Year 5: Alternatives One and Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.21	0.01	0.65	0.03	0.14	38.49
Aircraft Maintenance	0.00	0.00	0.00	0.00	0.00	0.00
Aircraft Test Cell	3.40	0.08	5.64	0.35	1.10	394.20
Ground Support Equipment	0.23	0.19	0.67	0.06	0.05	
Other Emissions	0.56	0.04	0.06	0.00	0.00	
Total	**4.40**	**0.33**	**7.02**	**0.45**	**1.29**	**432.69**

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Record of Non-Applicability (RONA) for Clean Air Act Conformity
Naval Air Engineering Station Lakehurst

Proposed Action:

Action Proponent: Joint Strike Fighter Program Office (JPO)
Location: Naval Air Engineering Station (NAES) Lakehurst
Proposed Action Name: Joint Strike Fighter (JSF) System Development and Demonstration (SDD) Developmental Test (DT) Program
Affected Air Basin: Ocean County in Central New Jersey
Date RONA Prepared: January 2006
RONA Prepared by: Jean Hawkins

Proposed Action and Emission Summary:

The JPO is proposing to conduct the JSF SDD DT Program (hereafter referred to as JSF DT) at NAES Lakehurst. Alternative One would conduct the proposed JSF DT at an East Coast Primary Test Location [Naval Air Station (NAS) Patuxent River and Virginia Capes Operating Area of the Atlantic Warning Area], West Coast Primary Test Location [Edwards Air Force Base (AFB); Naval Air Warfare Center, Weapons Division China Lake; Naval Air Warfare Center, Weapons Point Mugu; White Sands Missile Range; and Nevada Test and Training Range Nellis AFB], and Other Ancillary Locations of NAES Lakehurst, Eglin AFB, and Lockheed Martin Aeronautics (LM Aero). Alternative Two would include the activities associated with Alternative One, however some of the Short Takeoff Vertical Landing (STOVL) tests proposed in Alternative One would occur at LM Aero. Additional details regarding the Proposed Action are available in Section 2 of the EA/OEA.

The proposed JSF DT at NAES Lakehurst would be conducted during Test Years 3 through 5, and would be comprised of a combination of ground-based and flight tests. Flights would be conducted in accordance with existing flight and airspace operating procedures. Most of the proposed JSF DT would be conducted at the test stands used for shipboard compatibility testing. Tests would be conducted over several two to four week periods during the span of the proposed JSF DT at NAES Lakehurst. Detachments to NAES Lakehurst would originate from and return to NAS Paxtuxent River. Additional details regarding the proposed JSF DT at NAES Lakehurst and the alternatives are available in Section 7 of the EA/OEA.

Table E-5 reflects the total annual emissions from the Proposed Action at NAES Lakehurst.

Table E-5: NAES Lakehurst Air Emissions Estimates

Test Year	CO tpy (MT/yr)	NO_x tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
3	5.26 (4.77)	11.14 (10.11)	0.58 (0.53)	0.66 (0.60)	2.01 (1.82)
4	0.58 (0.53)	0.24 (0.22)	0.05 (0.05)	0.01 (0.01)	0.06 (0.05)
5	4.40 (3.99)	7.02 (6.37)	0.33 (0.30)	0.45 (0.41)	1.29 (1.17)
Highest (Test Year 3)[a]	5.26 (4.77)	11.14 (10.11)	0.58 (0.53)	0.66 (0.60)	2.01 (1.82)

tpy = tons per year, MT/yr = Metric Tons per year
CO = Carbon Monoxide, NO_x = Nitrogen Oxides, VOC = Volatile Organic Compound, SO_2 = Sulfur Dioxide, and PM = Particulate Matter
Hydrocarbon emissions are assumed to be VOCs.
Note: a. The highest year represents the year most likely to produce the greatest estimated emissions.

Proposed Action Exemption:

General Conformity under the Clean Air Act, Section 1.76, has been evaluated for the Proposed Action described above according to the requirements of 40 Code of Federal Regulation (CFR) 93, Subpart B. The requirements of this rule are not applicable to this Proposed Action because the levels of total direct and indirect emissions are estimated to be below the conformity threshold values established at 40 CFR 93.153(b). In addition, the Proposed Action would not be considered regionally significant under 40 CFR 93.153(i).

NAES Lakehurst is located in the Air Quality Control Region 150 (which includes Cape May, Atlantic, Cumberland, and Ocean counties in New Jersey) within the Philadelphia-Wilmington-Atlantic City moderate nonattainment area for the eight-hour ozone (O_3) National Ambient Air Quality Standards. New Jersey is also in the O_3 Transport Region that comprises states in the Northeast and Mid-Atlantic regions. New Jersey has no state-specific Ambient Air Quality Standards (AAQS) which must be considered as part of this analysis.

Table E-6 provides a comparison of estimated emissions for Test Year 3 (the year during which the greatest emissions are expected to occur) to the *de minimis* and regionally significant thresholds. The comparison shows the Proposed Action would not require a formal Conformity Determination because projected emission levels would be below the applicable *de minimis* thresholds and the annual project-induced emissions would not make up 10% or more of the metropolitan region's projected emissions of O_3 precursors as specified in the State Implementation Plan budget. Therefore, no significant impacts on air quality would be expected from implementing the proposed JSF DT at NAES Lakehurst.

Table E-6: Comparison of the Highest Year Estimated Annual Emissions for the Proposed Action to the *de minimis* and Regionally Significant Thresholds

Pollutant	Test Year 3 Emissions* tpy	*de minimis* Threshold tpy	Regionally Significant Threshold tpy
NO_x	11.14	100	7,893
VOC	0.58	50	8,768

** The highest year represents the year most likely to produce the greatest estimated emissions.*

E.4 LM AERO

Detailed Emissions Calculations

Air Emissions for LM Aero Alternative One

Fuel: JP-8

Test Year 1: Alternative One

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.09	0.00	0.06	0.01	0.00	8.06
Aircraft Maintenance						
Aircraft Test Cell	0.15	0.01	0.02	0.00	0.00	4.80
Ground Support Equipment	1.19	0.48	5.82	0.38	0.34	
Other Emissions	0.00	0.00	0.00	0.00	0.00	
Total	**1.42**	**0.50**	**5.90**	**0.39**	**0.35**	**12.85**

Test Year 2: Alternative One

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	1.04	0.06	0.67	0.08	0.02	83.98
Aircraft Maintenance						
Aircraft Test Cell	0.45	0.03	0.06	0.01	0.00	14.39
Ground Support Equipment	2.37	0.97	11.64	0.76	0.69	
Other Emissions	0.00	0.01	0.00	0.00	0.00	
Total	**3.86**	**1.06**	**12.37**	**0.85**	**0.70**	**98.37**

Test Year 3: Alternative One

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.67	0.04	0.41	0.05	0.01	50.79
Aircraft Maintenance						
Aircraft Test Cell	0.30	0.02	0.04	0.01	0.00	9.59
Ground Support Equipment	1.85	0.75	9.05	0.59	0.54	
Other Emissions	0.00	0.00	0.00	0.00	0.00	
Total	**2.81**	**0.82**	**9.50**	**0.65**	**0.55**	**60.38**

Test Year 4: Alternative One

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.65	0.04	0.41	0.05	0.01	51.20
Aircraft Maintenance						
Aircraft Test Cell	0.30	0.02	0.04	0.01	0.00	9.59
Ground Support Equipment	1.85	0.75	9.05	0.59	0.54	
Other Emissions	0.00	0.00	0.00	0.00	0.00	
Total	**2.79**	**0.81**	**9.50**	**0.65**	**0.55**	**60.79**

Test Year 5: Alternative One

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.45	0.03	0.27	0.03	0.01	34.54
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	1.32	0.54	6.47	0.42	0.38	
Other Emissions	0.00	0.00	0.00	0.00	0.00	
Total	**1.77**	**0.57**	**6.74**	**0.45**	**0.39**	**34.54**

Test Year 6: Alternative One

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.09	0.01	0.05	0.01	0.00	6.59
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	1.85	0.75	9.05	0.59	0.54	
Other Emissions	0.00	0.00	0.00	0.00	0.00	
Total	**1.94**	**0.76**	**9.11**	**0.60**	**0.54**	**6.59**

Test Year 7: Alternative One

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.01	0.00	0.01	0.00	0.00	0.94
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	0.26	0.11	1.29	0.08	0.08	
Other Emissions	0.00	0.00	0.00	0.00	0.00	
Total	**0.28**	**0.11**	**1.30**	**0.09**	**0.08**	**0.94**

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Air Emissions for LM Aero Alternative Two

Fuel: JP-8

Test Year 1: Alternative Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.09	0.00	0.06	0.01	0.00	8.06
Aircraft Maintenance						
Aircraft Test Cell	0.15	0.01	0.02	0.00	0.00	4.80
Ground Support Equipment	1.19	0.48	5.82	0.38	0.34	
Other Emissions	0.00	0.00	0.00	0.00	0.00	
Total	**1.42**	**0.50**	**5.90**	**0.39**	**0.35**	**12.85**

Test Year 2: Alternative Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	1.26	0.08	1.76	0.10	0.16	116.05
Aircraft Maintenance						
Aircraft Test Cell	0.45	0.03	0.06	0.01	0.00	14.39
Ground Support Equipment	2.37	0.97	11.64	0.76	0.69	
Other Emissions	0.00	0.01	0.00	0.00	0.00	
Total	**4.08**	**1.09**	**13.46**	**0.88**	**0.85**	**130.43**

Test Year 3: Alternative Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	1.06	0.08	2.45	0.10	0.28	108.49
Aircraft Maintenance						
Aircraft Test Cell	0.30	0.02	0.04	0.01	0.00	9.59
Ground Support Equipment	1.85	0.75	9.05	0.59	0.54	
Other Emissions	0.00	0.01	0.00	0.00	0.00	
Total	**3.20**	**0.86**	**11.54**	**0.70**	**0.81**	**118.08**

Test Year 4: Alternative Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.93	0.06	1.92	0.08	0.19	92.42
Aircraft Maintenance						
Aircraft Test Cell	0.30	0.02	0.04	0.01	0.00	9.59
Ground Support Equipment	1.85	0.75	9.05	0.59	0.54	
Other Emissions	0.00	0.01	0.00	0.00	0.00	
Total	**3.08**	**0.84**	**11.02**	**0.68**	**0.73**	**102.01**

Test Year 5: Alternative Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.65	0.04	1.26	0.06	0.13	61.71
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	1.32	0.54	6.47	0.42	0.38	
Other Emissions	0.00	0.01	0.00	0.00	0.00	
Total	**1.96**	**0.59**	**7.73**	**0.48**	**0.51**	**61.71**

Test Year 6: Alternative Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.27	0.02	0.93	0.03	0.11	31.06
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	1.85	0.75	9.05	0.59	0.54	
Other Emissions	0.00	0.00	0.00	0.00	0.00	
Total	**2.11**	**0.78**	**9.98**	**0.62**	**0.65**	**31.06**

Test Year 7: Alternative Two

Emissions Summary

	Emissions (tons/year)					
	CO	**HC**	**NOx**	**SO2**	**PM**	**Fuel Use (tons/year)**
Flight	0.01	0.00	0.01	0.00	0.00	0.94
Aircraft Maintenance						
Aircraft Test Cell						
Ground Support Equipment	0.26	0.11	1.29	0.08	0.08	
Other Emissions	0.00	0.00	0.00	0.00	0.00	
Total	**0.28**	**0.11**	**1.30**	**0.09**	**0.08**	**0.94**

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Record of Non-Applicability (RONA) for Clean Air Act Conformity
Lockheed Martin Aeronautics

Proposed Action:

Action Proponent: Joint Strike Fighter Program Office (JPO)
Location: Lockheed Martin Aeronautics (LM Aero)
Proposed Action Name: Joint Strike Fighter (JSF) System Development and Demonstration (SDD) Developmental Test (DT) Program
Affected Air Basin: Dallas-Fort Worth area
Date RONA Prepared: January 2006
RONA Prepared by: Jean Hawkins

Proposed Action and Emission Summary:

The JPO is proposing to conduct the JSF SDD DT Program (hereafter referred to as JSF DT) at LM Aero. Alternative One would conduct the proposed JSF DT at an East Coast Primary Test Location [Naval Air Station (NAS) Patuxent River and Virginia Capes Operating Area of the Atlantic Warning Area], West Coast Primary Test Locations [Edwards Air Force Base (AFB); Naval Air Warfare Center, Weapons Division China Lake; Naval Air Warfare Center, Weapons Point Mugu; White Sands Missile Range; and Nevada Test and Training Range Nellis AFB], and Other Ancillary Test Locations of Naval Air Engineering Station Lakehurst, Eglin AFB, and LM Aero. Alternative Two would include the activities associated with Alternative One, however some of the Short Takeoff Vertical Landing (STOVL) tests proposed in Alternative One would occur at LM Aero. Additional details regarding the Proposed Action are available in Section 2 of the EA/OEA.

The proposed JSF DT at LM Aero would be conducted during Test Years 1 through 7, and would be comprised of a combination of ground-based and flight tests. Under Alternative One, the proposed JSF DT would be comprised of cooperative avionics test bed activities involving the use of a 737 aircraft. Alternative Two would add STOVL tests, approximately 10% over the course of the entire proposed JSF DT at LM Aero. Most of the proposed STOVL tests would occur in Test Years 2 through 4. Flights would be conducted in accordance with existing flight and airspace operating procedures for LM Aero and Naval Air Station Joint Reserve Base. Additional details regarding the proposed JSF DT at LM Aero and the alternatives are available in Section 8 of the EA/OEA.

Table E-7 reflects the total annual emissions from the Proposed Action at LM Aero.

Table E-7: Estimated LM Aero Air Emissions for Alternative One and Two

Test Year	CO tpy (MT/yr)	NO_x tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
Alternative One					
1	1.42 (1.29)	5.90 (5.35)	0.50 (0.45)	0.39 (0.35)	0.35 (0.32)
2	3.86 (3.50)	12.37 (11.22)	1.06 (0.96)	0.85 (0.77)	0.70 (0.64)
3	2.81 (2.55)	9.50 (8.62)	0.82 (0.74)	0.65 (0.59)	0.55 (0.50)
4	2.79 (2.53)	9.50 (8.62)	0.81 (0.73)	0.65 (0.59)	0.55 (0.50)

Table E-7: Estimated LM Aero Air Emissions for Alternative One and Two (Continued)

Test Year	CO tpy (MT/yr)	NO_x tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
Alternative One (Continued)					
5	1.77 (1.61)	6.74 (6.11)	0.57 (0.52)	0.45 (0.41)	0.39 (0.35)
6	1.94 (1.76)	9.11 (8.26)	0.76 (0.69)	0.60 (0.54)	0.54 (0.49)
7	0.28 (0.25)	1.30 (1.18)	0.11 (0.10)	0.09 (0.08)	0.08 (0.07)
Highest (Test Year 2)	3.86 (3.50)	12.37 (11.22)	1.06 (0.96)	0.85 (0.77)	0.70 (0.64)
Alternative Two					
1	1.42 (1.29)	5.90 (5.35)	0.50 (0.45)	0.39 (0.35)	0.35 (0.32)
2	4.08 (3.70)	13.46 (12.21)	1.09 (0.99)	0.88 (0.80)	0.85 (0.77)
3	3.20 (2.90)	11.54 (10.47)	0.86 (0.78)	0.70 (0.64)	0.81 (0.73)
4	3.08 (2.79)	11.02 (10.00)	0.84 (0.76)	0.68 (0.62)	0.73 (0.66)
5	1.96 (1.78)	7.73 (7.01)	0.59 (0.54)	0.48 (0.44)	0.51 (0.46)
6	2.11 (1.91)	9.98 (9.05)	0.78 (0.71)	0.62 (0.56)	0.65 (0.59)
7	0.28 (0.25)	1.30 (1.18)	0.11 (0.10)	0.09 (0.08)	0.08 (0.07)
Highest (Test Year 2)	4.08 (3.70)	13.46 (12.21)	1.09 (0.99)	0.88 (0.80)	0.85 (0.77)

tpy = Tons per year, MT/yr = Metric Tons per year
CO = Carbon Monoxide, NO_x = Nitrogen Oxides, VOC = Volatile Organic Compound, SO_2 = Sulfur Dioxide, and PM = Particulate Matter
Note: a. The highest year represents the year most likely to produce the greatest estimated emissions.

Proposed Action Exemption:

General Conformity under the Clean Air Act, Section 1.76, has been evaluated for the Proposed Action described above according to the requirements of 40 Code of Federal Regulation (CFR) 93, Subpart B. The requirements of this rule are not applicable to this Proposed Action because the levels of total direct and indirect emissions are estimated to be below the conformity threshold values established at 40 CFR 93.153(b). In addition, the Proposed Action would not be considered regionally significant under 40 CFR 93.153(i).

LM Aero is located in the Dallas-Fort Worth area. This area is classified as moderate nonattainment for the eight-hour Ozone (O_3) National Ambient Air Quality Standards (NAAQS) and in attainment for all other NAAQS. Texas has no state-specific Ambient Air Quality Standards (AAQS) which must be considered as part of this analysis. Emissions primarily contributing to the nonattainment classification of the region are from on-road mobile sources. In accordance with the air conformity requirements of 40 CFR 51.853/93.153 (b)(1), the *de minimis* level for a moderate O_3 nonattainment area outside of a transport region is 100 tons each for nitrogen oxides ($NO_{x)}$ and volatile organic compounds (VOCs) per year, per action.

Table E-8 provides a comparison of estimated emissions for Test Year 2 (the year during which the greatest emissions are expected to occur) to the *de minimis* and regionally significant thresholds. The comparison shows neither Alternative One or Alternative Two would require a formal Conformity Determination because projected emission levels would be below the applicable *de minimis* thresholds and the annual project-related emissions would not make up 10% or more of the nonattainment area's total emissions budget. Therefore, no significant impacts on air quality would be expected from implementing the proposed JSF DT at LM Aero.

Table E-8: Comparison of the Highest Year Estimated Annual Emissions for Alternative One and Two to the *de minimis* and Regionally Significant Thresholds

Pollutant	Test Year 2 Emissions* tpy	*de minimis* Threshold tpy	Regionally Significant Threshold tpy
Alternative One (Preferred)			
NO_x	12.37	100	7,862
VOC	1.06	100	16,675
Alternative Two			
NO_x	13.46	100	7,862
VOC	1.09	100	16,675

** The highest year represents the year most likely to produce the greatest estimated emissions.*

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APPENDIX F
NOISE METHODOLOGY AND ADDITIONAL SUPPORTING DATA

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This Appendix describes the technical approach used to quantify and analyze aircraft noise exposures and effects of the Proposed Action at each of the following proposed Joint Strike Fighter (JSF) Developmental Test (DT) locations for this Environmental Assessment (EA)/Overseas EA (OEA). A general overview of the methodology used to quantify aircraft noise exposure is presented and its relationship to the required analysis at the beginning of this Appendix. Individual analysis for each proposed test location follows in separate sections.

This Appendix is organized as follows:

Section F.1 – General Noise Overview
Section F.2 – Edwards Air Force Base (AFB) Noise Environment
Section F.3 – Naval Air Station (NAS) Patuxent River Noise Environment
Section F.4 – Naval Air Engineering Station (NAES) Lakehurst Noise Environment
Section F.5 – Lockheed Martin Aeronautics (LM Aero) Noise Environment

F.1 GENERAL NOISE OVERVIEW

The following sections provides a general discussion of noise and its relationship to human responses. Also discussed are the noise measurement metrics and regulatory context in which noise impacts are measured.

F.1.1 Human Responses to Noise

Sound Level and Frequency—Sound can be technically described in terms of sound pressure (amplitude) and frequency (similar to pitch). Sound pressure is a direct measure of the magnitude of a sound without consideration for other factors that may influence its perception. The range of sound pressures that occur in the environment is so large that it is convenient to express these pressures as Sound Pressure Levels (SPLs) on a logarithmic scale that compresses the wide range of sound to a more usable range of numbers. The standard unit of measurement of sound is the Decibel (dB), which describes the pressure of a sound relative to a reference pressure. The frequency (pitch) of a sound is expressed as Hertz (Hz) or cycles per second. The normal audible frequency for young adults is 20 Hz to 20,000 Hz. Community noise, including aircraft and motor vehicles, typically ranges between 50 Hz and 5,000 Hz. The human ear is not equally sensitive to all frequencies, with some frequencies judged to be louder for a given signal than others. As a result, various methods of frequency weighting have been developed. The most common weighting is the A-weighted dB scale (dBA). The dBA performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. In the dBA, every day sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). Most community noise analyses, such as the evaluation of aircraft noise exposure, are based upon the dBA.

Propagation of Noise—Outdoor sound levels decrease as the distance from the source to the receiver increases. This decrease in sound level is a result of wave divergence, atmospheric absorption, and ground attenuation. Sound radiating from a source in an undisturbed manner travels in spherical waves. As the sound wave travels away from the source, the sound energy is dispersed over a greater area decreasing the sound power of the wave. Spherical spreading of the sound wave reduces the noise level at a rate of six dB per doubling of the distance. Atmospheric absorption also influences the sound levels received by the observer. The greater the distance traveled, the greater the influence of the atmosphere and the resultant fluctuations. Atmospheric absorption becomes important at distances of greater than 1,000 feet. The degree of absorption varies depending on the frequency of the sound, as well as the humidity and temperature of the air. For example, atmospheric absorption is lowest (i.e., sound carries farther) at high humidity and high temperatures. Absorption effects in the atmosphere vary with frequency. Higher frequencies are more readily absorbed than lower frequencies. Over large distances, lower frequencies become the dominant sound as the higher frequencies are attenuated. Turbulence and gradients of wind, temperature, and humidity also play a significant role in determining the degree of attenuation. Certain conditions, such as inversions, can channel or focus the sound waves resulting in higher noise levels than would result from simple spherical spreading. In addition to atmospheric absorption, aircraft noise can also be affected by the physical properties of the surrounding terrain. The magnitude of this terrain-related absorption varies with the angle of the aircraft above the horizon as measured from the observer to the aircraft. Lateral attenuation is influenced by ground reflection, refraction, aircraft shielding, and engine aircraft installation effects. In general, the lower an aircraft is, the greater the lateral attenuation. Lateral attenuation is not considered to be a factor if the angle between the observer and aircraft, as measured from the horizon, is greater than 60°. In this case, the aircraft is essentially overhead of the observer.

Duration of Sound—Annoyance from a noise event rises with increased duration of the noise event (i.e., the longer the noise event, the more annoying it is). The effective duration of a sound is the time between when a sound rises above the background sound level until it drops below the background level. Psycho-acoustic studies have determined the relationship between duration and annoyance and the amount a sound must be reduced to be judged equally annoying for increased duration. Duration is an important factor in describing sound in a community setting. The relationship between duration and noise level is the basis of the equivalent energy principal of sound exposure. Reducing the acoustic energy of a sound by one-half results in a three dB reduction. Doubling the duration of the sound increases the total energy of the event by three dB. This equivalent energy principal is based upon the premise that the potential for a noise to impact a person is dependent on the total acoustical energy content of the noise. Defined in subsequent sections of this EA/OEA, noise metrics such as Community Noise Equivalent Level (CNEL), Day-Night Average Sound Level (DNL), Equivalent Noise Level (Leq), and Sound Exposure Level (SEL) are all based upon the equal energy principle.

Perceivable Changes in Noise—The human ear is a far better detector of relative differences in sound levels than absolute values of levels. For this reason, the human ear is much better at discerning changes between differing noise levels than determining absolute noise levels. Under controlled laboratory conditions, listening to a steady unwavering pure tone sound that can be changed to slightly different sound levels, a person can just barely detect a sound level change of approximately one dB for sounds in the mid-frequency region. When ordinary noises are heard, a young healthy ear can detect changes of two to three dB. A five dB change is readily noticeable, while a ten dB change is judged by most people as a doubling of the loudness of the sound.

Masking Effect—The ability of one sound to prevent or limit a listener from hearing another sound is known as the masking effect. The presence of one sound effectively raises the threshold of audibility for the hearing of a second sound. For a signal to be heard, it must exceed the threshold of hearing for that particular individual and exceed the masking threshold for the background noise. The masking characteristics of sound depend on many factors including the spectral (frequency) characteristics of the two sounds, the sound pressure levels, and the relative start time of the sounds. Masking effect is greatest when the frequencies of the two sounds are similar or when low frequency sounds mask higher frequency sounds. High frequency sounds do not easily mask low frequency sounds.

F.1.2 Noise Metrics

The description, analysis, and reporting of community sound levels, such as aircraft noise, is made difficult by the complexity of human response to sound and myriad sound-rating scales and metrics developed to describe acoustic effects. Various rating scales approximate the human subjective assessment to the loudness or noisiness of a sound. Noise metrics have been developed to account for additional parameters such as duration and cumulative effect of multiple events. Noise metrics are categorized as single event and cumulative. Single event metrics describe the noise from individual events, such as an aircraft flyover. Cumulative metrics describe the noise in terms of the total noise exposure throughout the day. Noise metrics used in this EA/OEA are summarized below.

Single Event Metrics

Single event metrics assess the components used in the development of cumulative noise metrics. These metrics are often used for a comparison purpose to illustrate the general contribution of individual events.

Frequency Weighted Metrics (dBA)—To simplify the measurement and computation of sound loudness levels, frequency weighted networks have obtained wide acceptance. The dBA scale has become the most prominent of these scales and is widely used in community noise analysis. It has shown good correlation with public response and can be easily measured. The metrics used in this EA/OEA are all based upon the dBA scale.

Maximum Noise Level (Lmax)—The highest noise level reached during a noise event is called the Lmax. For example, as an aircraft approaches, the sound of the aircraft begins to rise above ambient noise levels. The closer the aircraft approaches, the louder it is until the aircraft is at its closest point directly overhead that the maximum noise level is generated. As the aircraft passes, the noise level decreases until the sound level again settles to ambient levels. This metric best reflects what people generally and instantaneously respond to when an aircraft flyover occurs.

Sound Exposure Level (SEL)—Another metric that is reported for aircraft flyovers is the SEL. It is computed from dBA sound levels. Speech and sleep interference research can be assessed relative to single event SEL data. The SEL metric takes into account the maximum noise level and duration of an event by integrating the acoustic energy of the flyover event into 1 second. For aircraft flyovers, the SEL value is typically about 10 dBA higher than the Lmax. Single event metrics are a convenient method for describing noise from individual aircraft events. In addition, cumulative noise metrics (such as CNEL, DNL, and Leq) can be computed from SEL data.

Cumulative Metrics

Cumulative noise metrics assess community response to noise by including the loudness of the noise, the duration of the noise, the total number of noise events, and the time of day these events occur into one single number rating scale.

Equivalent Noise Level (Leq)—This is the sound level corresponding to a steady state A-weighted sound level containing the same total energy as several SEL events during a given sample period. Leq is the "energy" average noise level during the time period of the sample. It is based on the observation that the potential for noise annoyance is dependent on the total acoustical energy content of the noise. Leq can be measured for any time period, but is typically measured for fifteen minutes, one hour, or 24-hours.

Day-Night Noise Level (DNL) and Community Noise Equivalent Level (CNEL)—DNL/CNEL is a 24-hour time-weighted energy average noise level based on the A-weighted dB measuring the overall noise experienced during an entire day. The term time-weighted refers to the weightings or penalties attached to noise events occurring during certain sensitive time periods. In the DNL scale, sound that takes place during the night (10 p.m. to 7 a.m.) is weighted by ten dB. This penalty accounts for the greater potential for noise to cause sleep awakening or communication interference, as well as typically lower ambient noise levels during these hours. CNEL adds a five dB penalty for evening operations (7 p.m. to 10 p.m.). The ten dB and five dB penalties attempts to account for the higher sensitivity to noise in the night and in the evening, and the expected further decrease in background noise levels that typically occurs during these periods.

Regulatory Context

Federal Interagency Committee on Noise (FICON) Report of 1992—The use of the DNL metric and the 65 dB DNL criteria has been reviewed by various interest groups concerning its usefulness in assessing aircraft noise impacts. At the direction of the Environmental Protection Agency (EPA) and the Federal Aviation Administration (FAA), FICON was formed to review specific elements of the assessment of airport noise impacts and to make recommendations regarding potential improvements. FICON includes representatives from the Departments of Transportation, Defense, Justice, Veterans Affairs, Housing and Urban Development, and Council on Environmental Quality (CEQ).

FICON was formed to review Federal policies used to assess airfield noise impacts and on the manner in which noise impacts are determined. This included whether aircraft noise impacts are fundamentally different from other transportation noise impacts, the manner in which noise impacts are described, and the extent to which impacts outside of 65 dB DNL should be reviewed in Federal Environmental Impact Statements (FEIS). The committee determined that there are no new descriptors or metrics of sufficient scientific standing to substitute for DNL. The DNL noise exposure metric and the dose-response relationships used to determine noise impact were determined to be proper for assessing noise from civil and military aviation in the general vicinity of airports.

The report supported agency discretion in the use of supplemental noise analysis. The report recommended improvement in public understanding of the DNL, supplemental methodologies, and aircraft noise impacts. FICON recommended that if screening analysis determines noise-sensitive areas at or above 65 dB DNL show an increase of 1.5 dB or more, then further analysis should be conducted of noise sensitive areas between 60 to 65 dB DNL having an increase of 3.0 dB or more.

F.1.3 Noise Model Inputs

The methods used here for describing baseline noise and forecasting the future noise environment rely extensively on computer noise modeling. The noise environment is commonly depicted in terms of lines of equal noise levels or noise contours. These noise contours are supplemented here with specific noise data for selected points on the ground.

NOISEMAP Version 8 and BaseOps 7.294 have been used to model aviation operations at each of the proposed JSF DT locations for purposes of identifying the extent of aircraft noise exposure. Both programs are suites of computer software developed to assist in plotting noise contours for airfields. The programs assist in modeling noise exposure produced by aircraft operations in and around military airfields. The programs use aircraft noise spectra and performance data for over hundreds of aircraft types that can be tailored to the characteristics of an individual airfield.

The NOISEMAP Program requires the input on the physical and operational characteristics of an airfield. Physical characteristics include runway coordinates, airfield altitude, temperature, and optionally, topographical data. Operational characteristics include various types of aircraft data. This includes not only the aircraft types and flight tracks, but also departure and arrival procedures that are specific to the operations at a facility. Aircraft data needed to generate noise contours include:

- Number of aircraft operations by type
- Types of aircraft
- Day/Night time distribution by type

- Flight tracks
- Flight track and runway utilization by type
- Flight profiles
- Typical operational procedures
- Average meteorological conditions

The following sections describe the three primary data categories used in generating existing and future aircraft noise exposure contours at airfields.

Flight Tracks

Flight tracks refer to the actual track projected over the ground used by aircraft for arrival or departure to/from the facility. Flight tracks are obviously related to runway utilization and are a large factor in determining the shape of the noise contours. This data is critical to the noise analysis as cumulative noise metrics, such as CNEL and DNL, are based upon the total noise exposure occurring during a 24-hour period. Safety considerations, airfield layout, aircraft performance, runway length requirements, direction of destination, and meteorological conditions influence the runway utilization at airfields.

Runway Utilization

Runway utilization refers to the percentage of total arrival or departure operations occurring on a specific runway. Runway utilization is determined by several factors including runway length, proximity to the terminal, and meteorological conditions, as well as the performance capabilities of specific aircraft. Runway utilization is greatly influenced by meteorological conditions, since aircraft generally takeoff and land into the prevailing wind.

Fleet Mix and Operational Levels

Aircraft operations and Fleet mix are important components of this analysis as cumulative noise levels in the environs of the airfield are a function of the loudness of the aircraft and the number of aircraft operations. Jet aircraft operations are the most important determinant of cumulative noise levels, as comparatively jet aircraft are significantly louder than rotor craft and propeller aircraft. Additionally important is the number of annual operations per aircraft type considered.

General F-35 Profile Description

Representative aircraft flight profiles for the F-35 aircraft are presented to provide information regarding the aircraft's flight characteristics. The specific profiles modeled at Edwards AFB, NAS Patuxent River, NAES Lakehurst , and LM Aero are included as the “project condition” in the BaseOps computer files and full report BaseOp summaries. These files and summary reports are part of the JSF EA/OEA administrative record.

LM Aero provided the F-35 profiles used in the noise analysis for this EA/OEA. The profiles include predicted thrust, altitude, airspeed, and corresponding noise levels for the F-35 with the F119-Pratt & Whitney (P&W)-611 engine during departure and arrival, as estimated during preliminary development of the F-35 airframe.

Additional operating parameters were obtained through interviews with program developers and installation personnel to provide clarity on the anticipated breadth of testing and/or procedures to be employed at each proposed test location. Figures F.1-1 and F.1-2 and Tables F.1-1 and F.1-2 are provided as representative examples of modeled F-35 performance during vertical takeoff and landing

(VTOL) departures and arrivals. Each example provides a depiction of the F-35 profile in operation and description of profile segments including altitude, throttle/thrust settings, airspeed, and distance (to/from the runway end).

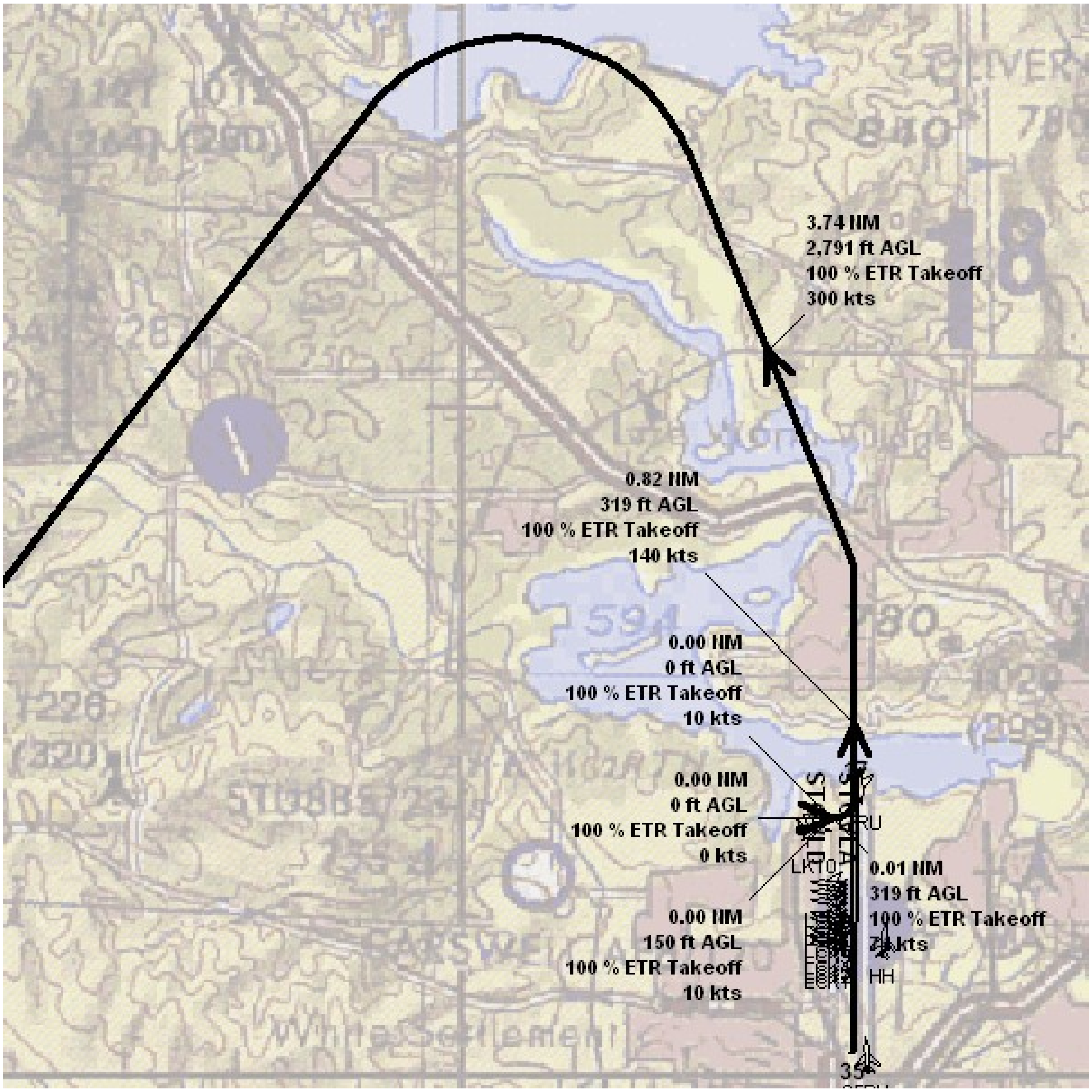

Figure F.1-1: Example F-35 VTOL Departure Depiction

Table F.1-1 Example F-35 VTOL Departure Description

STOVL35D1 Aircraft: Based F-35 (VTOL)				
Notes	Standard VTOL Departure			
Aircraft	F-35			
Engine	JSF119-P&W-611			
A/C Category	Based			
Runway/Pad	STOVLD - STOVL Operations			
Track	STOVL35D1			
Run-up Time	1 second			
Takeoff Displacement	0 feet			
Landing Displacement	0 feet			
Profile Segments				
Point	**Distance [Nautical Miles (NM)]**	**Height (feet)**	**Power % [Engine Thrust Ration (ETR)]**	**Speed (knots)**
a	0.00	0 above ground level (AGL)	100 Takeoff	0
b	0.00	0 AGL	100 Takeoff	10
c	0.00	150 AGL	100 Takeoff	10
d	0.01	319 AGL	100 Takeoff	74
e	0.82	319 AGL	100 Takeoff	140
f	3.74	2,791 AGL	100 Takeoff	300
g	14.15	8,000 AGL	70 Variable	300
h	24.69	20,000 AGL	70 Variable	300

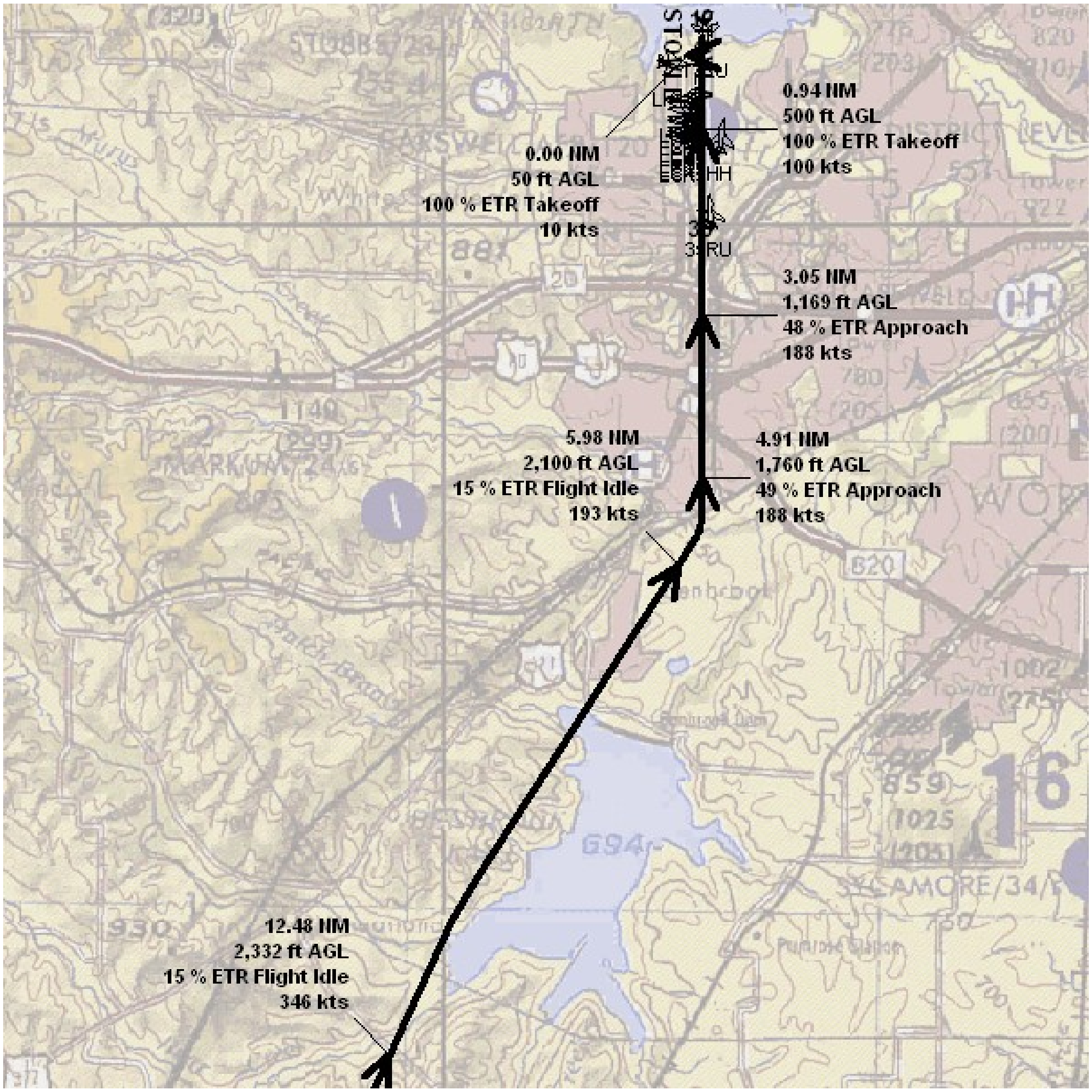

Figure F.1-2: Example F-35 VTOL Arrival Depiction

Table F.1-2 Example F-35 VTOL Arrival Description

STOVL5A11 Aircraft Based F-35 (VTOL)				
Notes	Standard VTOL Arrival			
Aircraft	F-35			
Engine	JSF119-P&W-611			
A/C Category	Based			
Runway/Pad	STOVLA – STOVL Operations			
Track	STOVL5A11			
Profile Segments				
Point	**Distance (NM)**	**Height (feet)**	**Power % (ETR)**	**Speed (knots)**
a	32.92	8,000 AGL	15 Flight Idle	350
b	12.48	2,332 AGL	15 Flight Idle	346
c	5.98	2,100 AGL	15 Flight Idle	193
d	4.91	1,760 AGL	49 Approach	188
e	3.05	1,169 AGL	48 Approach	188
f	0.94	500 AGL	100 Takeoff	100
g	0.00	50 AGL	100 Takeoff	10

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F.2 EDWARDS AFB NOISE ENVIRONMENT

The purpose of this section is to document the analysis of the noise environment at Edwards AFB (See Figure F-2.1). The noise modeling methodology for Edwards AFB is consistent with the methodology presented in Section 3.2 of this EA/OEA. The primary difference between this location and the remaining proposed test locations is the examination of community noise exposure as outlined by the state of California. In California, the primary means of evaluating noise exposure from aircraft operations on the surrounding community is CNEL. As discussed in the previous section, CNEL is similar to DNL in that it is a cumulative noise metric which characterizes the total collective noise exposure from multiple noise events for an average day. Contours were produced using NOISEMAP from the inputs contained in the existing Air Installation Compatible Use Zone (AICUZ) for Edwards AFB to maintain consistency between contours produced with and without the proposed JSF DT.

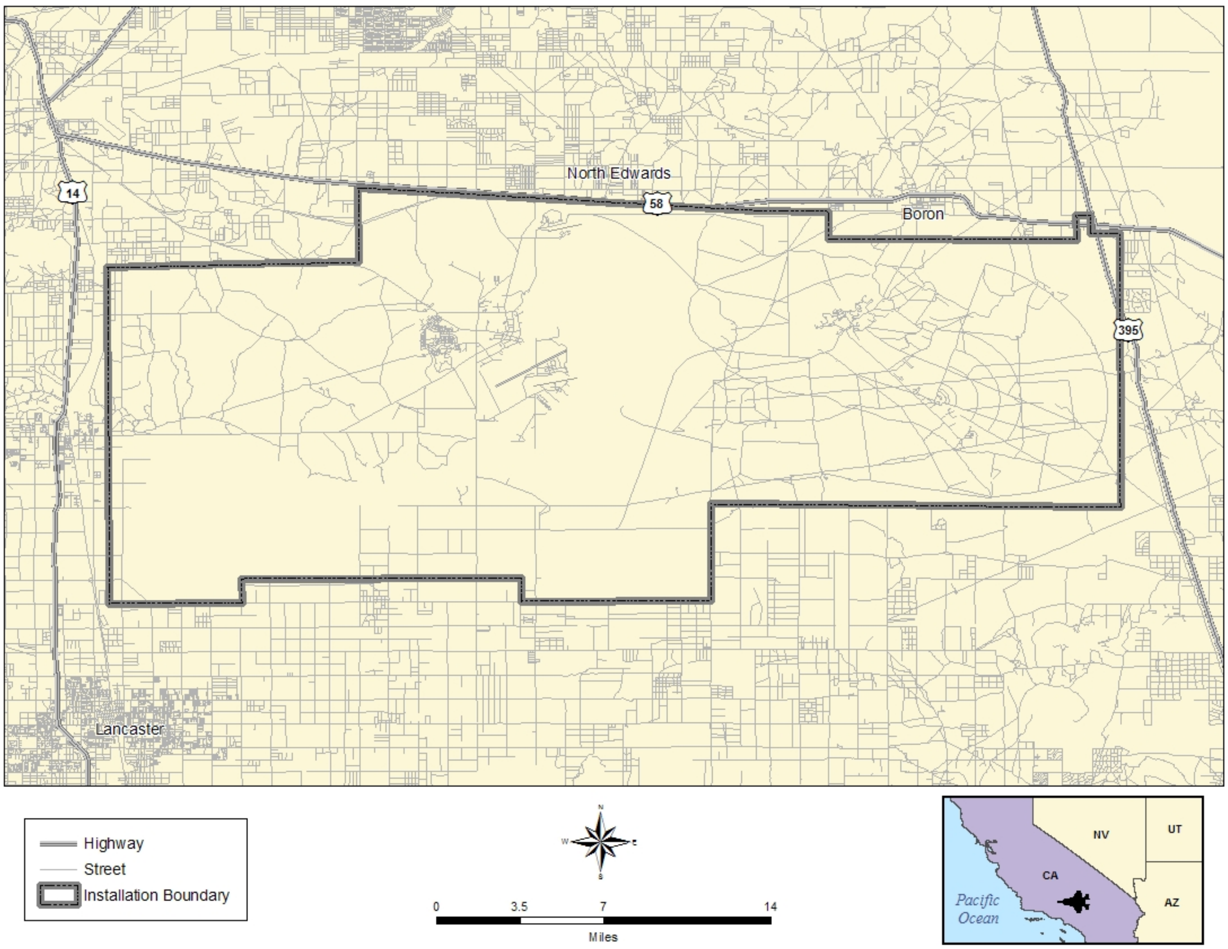

Figure F-2.1: Edwards AFB Location Map

F-2.1 Edwards AFB Existing Baseline

The purpose of this section is to document the analysis of the existing baseline noise environment at Edwards AFB. For purposes of noise analysis and comparison, operations data from previous noise studies have been analyzed as the baseline for this study. The following subsections describe the operational levels, Fleet mix, runway, and flight track utilization used in the development of the Edwards AFB existing baseline.

Table F.2-1 illustrates the average daily arrival, departure, closed pattern, and inter-facility runway use currently existing at Edwards AFB. Runway use is expressed as a percentage and is illustrated to present the commonly used runway preference. The existing baseline Fleet mix and average daily operations for each modeled aircraft are presented in Table F.2-2, while average day time, evening, and night time flight track utilization by aircraft is presented in Tables F.2-3, F.2-4, and F.2-5.

Table F.2-1: Baseline Runway Use at Edwards AFB

Arrivals				
	Day	**Evening**	**Night**	**Total**
Runway 04	6.18%	7.52%	11.98%	6.33%
Runway 06S	0.65%	0.00%	1.62%	0.64%
Runway 22	72.92%	72.90%	8.54%	71.74%
Runway 22f	4.75%	1.54%	3.32%	4.62%
Runway 24S	12.79%	0.77%	31.23%	12.72%
Runway H2f	2.71%	17.28%	43.31%	3.96%
Total	***94.72%***	***3.44%***	***1.83%***	***100%***
Departures				
	Day	**Evening**	**Night**	**Total**
Runway 04	6.92%	3.84%	6.16%	6.80%
Runway 06S	0.69%	0.00%	2.27%	0.68%
Runway 22	69.45%	47.77%	41.93%	68.26%
Runway 22f	6.38%	10.77%	5.74%	6.53%
Runway 24S	13.60%	0.75%	43.90%	13.54%
Runway H2f	2.96%	36.87%	0.00%	4.19%
Total	***94.87%***	***3.75%***	***1.38%***	***100%***
Closed Patterns				
	Day	**Evening**	**Night**	**Total**
Runway 04	3.64%	12.00%	7.80%	4.11%
Runway 06S	1.46%	0.00%	0.00%	1.38%
Runway 22	58.41%	63.87%	0.00%	58.53%
Runway 22TF	4.29%	3.89%	0.00%	4.25%
Runway 24S	32.20%	20.24%	92.20%	31.73%
Total:	***94.24%***	***5.46%***	***0.30%***	***100%***
Inter-Facilities				
	Day	**Evening**	**Night**	**Total**
Runway 12L	23.92%	0.00%	0.00%	23.25%
Runway 22	26.99%	72.77%	90.00%	28.39%
Runway 25P	49.08%	27.23%	10.00%	48.36%
Total	***97.16%***	***2.25%***	***0.58***	***100%***

Source: Existing Edwards AFB AICUZ 2003.

Table F.2-2: Baseline Aircraft Fleet Mix and Operations by Day/Evening/Night

Aircraft	Day Ops	Evening Ops	Night Ops
B-1	6.70	1.10	0.00
B-2A	1.69	0.13	0.10
B-52H	3.46	0.51	0.09
B-747-400	0.45	0.01	0.01
B-757-200-RR	0.41	0.01	0.00
BL212 (UH-1N)	0.13	0.00	0.01
C-12	7.02	0.00	0.01
C-130H&N&P	1.71	0.00	0.01
C-17	1.80	0.05	0.03
C-21A	0.52	0.01	0.00
C-5A	0.12	0.00	0.00
CH-46E	3.42	1.13	0.42
CH-53E	2.71	0.92	0.35
COMPOS 1985 PISTON	0.09	0.00	0.02
E-8A	3.55	0.00	0.00
F-117A	0.14	0.00	0.00
F-15A	6.09	0.06	0.03
F-16C	29.87	1.34	0.01
F/A-18A/B/C	8.91	0.22	0.01
F-22	5.76	0.09	0.02
GASEPF FIX PITCH	25.28	0.04	0.75
GASEPV VAR PITCH	3.52	0.00	0.00
KC-10A	0.27	0.00	0.00
KC-135R	8.99	0.10	0.02
T-38A	23.73	1.04	0.08
T-45	11.46	0.32	0.12
UH60A	0.57	0.00	0.01
Total	***158.37***	***7.08***	***2.10***

Source: Existing Edwards AFB AICUZ 2003.

Table F.2-3: Existing Edwards AFB Daytime Flight Track Utilization

Track	Aircraft Name																											Total
	B-1	B-2A	B-52H	B-744	B752	UH-1N	C-12	C-130H	C-17	C-21A	C-5A	CH-46E	CH-53E	COMPOS	E-8A	F-117A	F-15A	F-16C	F-18A/C	F-22	GASEPF	GASEPV	KC-10A	KC-135	T-38A	T-45	UH60A	
04A1	0.04	0.03	0.03	0.02			0.09	0.30	0.04						0.06		0.03	0.22	0.55	0.05				0.15	0.16	0.06		1.82
04A1MAN					0.01		0.03		0.01	0.01								0.01	0.01				0.01	0.04	0.01			0.12
04A2	0.01																0.09	0.24	0.09	0.05					0.25	0.09		0.80
04A2MAN																		0.01	0.01						0.01			0.02
04AH1MAN						0.07						0.07	0.05														0.14	0.32
04AH2MAN												0.01																0.01
04AH3MAN												0.00																0.00
04AH4MAN												0.04	0.05														0.14	0.23
04AH5MAN												0.02	0.05															0.07
04AH6MAN												0.08	0.05															0.12
04C1							0.06	0.00	0.00								0.05	0.20	0.17	0.02					0.25			0.76
04C2	0.06		0.04												0.05									0.02				0.17
04C3		0.01																										0.01
04C4	0.11	0.10	0.10																					0.07				0.37
04C5	0.04	0.10																										0.14
04C6							0.03											0.04										0.07
04C7																		0.01							0.01			0.01
04C8																		0.10										0.10
04D1	0.05	0.01	0.03	0.02			0.09	0.03	0.03						0.06		0.12	0.53	0.12	0.12				0.15	1.01	1.23		3.60
04D1MAN					0.01		0.03		0.01	0.01								0.02	0.01				0.01	0.04	0.01			0.14
04HA1MAN												0.26	0.19															0.46
04HA2MAN												0.03																0.03
04HA3MAN												0.02																0.02
04HA4MAN												0.18	0.19															0.37
04HA5MAN												0.09	0.19															0.28
04HA6MAN												0.31	0.19															0.50
06A1MAN																					0.18	0.02						0.20
06A2MAN																					0.18	0.02						0.20
06C1MAN																					0.56	0.09						0.65
06D1MAN																					0.18	0.02						0.20
06D2MAN																					0.18	0.02						0.20
12D1																										1.20		1.20
22A0																		0.95							0.95			1.90
22A1							0.88																			0.20		1.08
22A1MAN							0.52				0.06												0.13					0.71
22A2																		0.30							2.14	1.24		3.67
22A3																	0.41	0.38		0.62								1.41
22A4																	1.24	2.12		0.92					4.19	1.64		10.10
22A4MAN																		0.17	0.13						0.12			0.42
22A5							0.88										0.14	1.42							2.14	2.47		7.05
22A5MAN									0.17	0.25								0.17	0.13						0.12			0.84
22A6	0.24																0.41	3.57	1.65	0.61								6.48
22A7	0.75	0.48	0.63	0.18				0.30	0.53							0.06		1.24	0.55	0.62				2.18				7.52
22A7MAN																								0.66				0.66
22A8															0.29													0.29

Table F.2-3: Existing Edwards AFB Daytime Flight Track Utilization (Continued)

Track	Aircraft Name																											Total
	B-1	B-2A	B-52H	B-744	B752	UH-1N	C-12	C-130H	C-17	C-21A	C-5A	CH-46E	CH-53E	COMPOS	E-8A	F-117A	F-15A	F-16C	F-18A/C	F-22	GASEPF	GASEPV	KC-10A	KC-135	T-38A	T-45	UH60A	
22A8MAN					0.19			0.06																				0.26
22A9		0.09													0.29													0.38
22AD									0.07																			0.07
22AP	0.38	0.03		0.03			0.35	0.30	0.07						0.57		0.00							0.73				2.46
22C1							1.23	0.03	0.03							0.02	0.94	3.14	3.03	0.21					2.00			10.62
22C2	1.19		0.10												0.43									0.02				1.73
22C3		0.10																										0.10
22C4	1.99	0.10	1.90					0.02	0.02						0.29		0.20	0.43						1.24	0.30			6.47
22C5	0.79	0.10																										0.89
22C6							0.53	0.02	0.02						0.42		0.05	0.16		0.11				0.16	0.41			1.87
22C7																	0.15	0.68		0.11					0.14			1.07
22C8																		1.91										1.91
22D1				0.16														0.41	0.28	1.16								2.01
22D2		0.28					1.51		0.06						0.23		0.13	4.26	1.10	1.16					3.77	1.23		13.73
22D2MAN							0.52	0.06	0.17		0.06							0.35	0.26						0.23			1.66
22D3							0.13												0.55						0.15	0.29		1.12
22D4																		0.08	0.28									0.35
22D5																								0.90				0.90
22D6									0.57						0.06		2.14	4.84							3.77	1.23		12.61
22D6MAN					0.19																							0.19
22D7															0.23									0.90				1.13
22D7MAN										0.25													0.13	0.66				1.03
22D8																										0.16		0.16
22D9	0.67	0.28	0.63															0.43										2.00
22DC								0.30																				0.30
22DD								0.30																				0.30
22DH1MAN						0.06						0.07	0.05														0.14	0.32
22DH2MAN												0.01																0.01
22DH3MAN												0.01																0.01
22DH4MAN												0.05	0.05														0.14	0.24
22DH5MAN												0.02	0.05															0.07
22DH6MAN												0.08	0.05															0.13
22DI																								0.90				0.90
22DP	0.38						0.13								0.57	0.06	0.00							0.20				1.35
22DPD				0.03																								0.03
22HD1MAN												0.27	0.20															0.47
22HD2MAN												0.03																0.03
22HD3MAN												0.02																0.02
22HD4MAN												0.18	0.20															0.38
22HD5MAN												0.09	0.20															0.29
22HD6MAN												0.32	0.20															0.51
24A1																										0.20		0.20
24A2MAN																					3.34	0.42						3.76
24A3MAN														0.04							3.34	0.42						3.80
24C1MAN																					10.65	1.67						12.32
24C2MAN												1.20	0.75															1.95
24D1																										0.04		0.04
24D2																										0.20		0.20
24D3MAN																					3.34	0.42						3.76
24D4MAN														0.04							3.34	0.42						3.80
TFC1																		0.57							1.33			1.90
TFC2																		0.95							0.29			1.24
Total	6.70	1.69	3.46	0.45	0.41	0.13	7.02	1.71	1.80	0.52	0.12	3.42	2.71	0.09	3.55	0.14	6.09	29.87	8.91	5.76	25.28	3.52	0.27	8.99	23.73	11.46	0.56	158.35

Table F.2-4: Existing Edwards AFB Evening Flight Track Utilization

Track	Aircraft Name																											Total
	B-1	B-2A	B-52H	B-744	B752	UH-1N	C-12	C-130H	C-17	C-21A	C-5A	CH-46E	CH-53E	COMPOS	E-8A	F-117A	F-15A	F-16C	F-18A/C	F-22	GASEPF	GASEPV	KC-10A	KC-135	T-38A	T-45	UH60A	
04A1	0.01	0.00	0.00	0.00			0.00	0.00	0.00						0.00		0.00	0.01	0.01	0.00				0.00	0.01	0.00		0.04
04A1MAN					0.00		0.00		0.00	0.00								0.00	0.00				0.00	0.00	0.00			0.00
04A2	0.00																0.00	0.01	0.00	0.00					0.01	0.00		0.03
04A2MAN																		0.00	0.00						0.00			0.00
04AH1MAN						0.00						0.02	0.01														0.00	0.03
04AH2MAN												0.00																0.00
04AH3MAN												0.00																0.00
04AH4MAN												0.01	0.01														0.00	0.02
04AH5MAN												0.01	0.01															0.02
04AH6MAN												0.02	0.01															0.03
04C1							0.00	0.00	0.00								0.00	0.01	0.00	0.00					0.01			0.02
04C2	0.01		0.00												0.00									0.00				0.02
04C3		0.00																										0.00
04C4	0.02	0.01	0.21																					0.00				0.24
04C5	0.01	0.01																										0.02
04C6							0.00											0.00										0.00
04C7																		0.00							0.00			0.00
04C8																		0.01										0.01
04D1	0.01	0.00	0.00	0.00			0.00	0.00	0.00						0.00		0.00	0.01	0.02	0.00				0.00	0.01	0.03		0.08
04D1MAN					0.00		0.00		0.00	0.00								0.00	0.00				0.00	0.00	0.00			0.00
04HA1MAN												0.06	0.05															0.11
04HA2MAN												0.01																0.01
04HA3MAN												0.00																0.00
04HA4MAN												0.04	0.05															0.09
04HA5MAN												0.02	0.05															0.07
04HA6MAN												0.07	0.05															0.12
06A1MAN																					0.00	0.00						0.00
06A2MAN																					0.00	0.00						0.00
06C1MAN																					0.00	0.00						0.00
06D1MAN																					0.00	0.00						0.00
06D2MAN																					0.00	0.00						0.00
12D1																										0.00		0.00
22A0																		0.05							0.05			0.10
22A1							0.00																			0.00		0.00
22A1MAN							0.00				0.00												0.00					0.00
22A2																		0.02							0.11	0.07		0.19
22A3																	0.00	0.00		0.03								0.03
22A4																	0.00	0.08		0.01					0.20	0.03		0.32
22A4MAN																		0.00	0.01						0.00			0.01
22A5							0.00										0.00	0.06							0.11	0.13		0.30
22A5MAN									0.01	0.00								0.00	0.01						0.00			0.02
22A6	0.04																0.00	0.16	0.03	0.01								0.24
22A7	0.13	0.05	0.07	0.00				0.00	0.00							0.00		0.07	0.01	0.03				0.00				0.37
22A7MAN																								0.01				0.01
22A8															0.00													0.00

Table F.2-4: Existing Edwards AFB Evening Flight Track Utilization (Continued)

Track	Aircraft Name																											Total
	B-1	B-2A	B-52H	B-744	B752	UH-1N	C-12	C-130H	C-17	C-21A	C-5A	CH-46E	CH-53E	COMPOS	E-8A	F-117A	F-15A	F-16C	F-18A/C	F-22	GASEPF	GASEPV	KC-10A	KC-135	T-38A	T-45	UH60A	
22A8MAN					0.00			0.00																				0.00
22A9		0.01													0.00													0.01
22AD									0.00																			0.00
22AP	0.03	0.00		0.00			0.00	0.00	0.00						0.00		0.00							0.00				0.03
22C1							0.00	0.00	0.00							0.00	0.00	0.21	0.07	0.00					0.06			0.34
22C2	0.21		0.01												0.00									0.00				0.22
22C3		0.01																										0.01
22C4	0.35	0.01	0.21					0.00	0.00						0.00		0.00	0.01						0.07	0.01			0.66
22C5	0.14	0.01																										0.15
22C6							0.00	0.00	0.00						0.00		0.00	0.01		0.00				0.01	0.01			0.03
22C7																	0.00	0.03		0.00					0.01			0.04
22C8																		0.11										0.11
22D1				0.01														0.02	0.01	0.00								0.04
22D2		0.00					0.00		0.00						0.00		0.00	0.20	0.02	0.00					0.18	0.03		0.43
22D2MAN							0.00	0.00	0.01		0.00							0.00	0.01						0.00			0.02
22D3							0.00												0.01						0.00	0.01		0.02
22D4																		0.00	0.01									0.01
22D5																								0.00				0.00
22D6									0.03						0.00		0.00	0.18							0.18	0.03		0.42
22D6MAN					0.00																							0.00
22D7															0.00									0.00				0.00
22D7MAN										0.00													0.00	0.01				0.01
22D8																										0.00		0.00
22D9	0.12	0.00	0.00															0.00										0.12
22DC								0.00																				0.00
22DD								0.00																				0.00
22DH1MAN						0.00						0.03	0.03														0.00	0.06
22DH2MAN												0.00																0.00
22DH3MAN												0.00																0.00
22DH4MAN												0.02	0.03														0.00	0.05
22DH5MAN												0.01	0.03															0.04
22DH6MAN												0.04	0.03															0.06
22DI																								0.00				0.00
22DP	0.03						0.00								0.00	0.00	0.06							0.00				0.09
22DPD				0.00																								0.00
22HD1MAN												0.13	0.10															0.23
22HD2MAN												0.01																0.01
22HD3MAN												0.01																0.01
22HD4MAN												0.09	0.10															0.19
22HD5MAN												0.04	0.10															0.14
22HD6MAN												0.16	0.10															0.25
24A1																										0.00		0.00
24A2MAN																					0.01	0.00						0.01
24A3MAN																					0.01	0.00						0.01
24C1MAN																					0.00	0.00						0.00
24C2MAN												0.32	0.20															0.52
24D1																										0.00		0.00
24D2																										0.00		0.00
24D3MAN																					0.01	0.00						0.01
24D4MAN														0.00							0.01	0.00						0.01
TFC1																		0.03							0.07			0.10
TFC2																		0.05							0.02			0.07
Total	1.10	0.13	0.51	0.01	0.01	0.00	0.00	0.00	0.05	0.01	0.00	1.13	0.92	0.00	0.00	0.00	0.06	1.34	0.22	0.09	0.04	0.00	0.00	0.10	1.04	0.32	0.00	7.05

Table F.2-5: Existing Edwards AFB Nighttime Flight Track Utilization

Track	Aircraft Name																											Total
	B-1	B-2A	B-52H	B-744	B752	UH-1N	C-12	C-130H	C-17	C-21A	C-5A	CH-46E	CH-53E	COMPOS	E-8A	F-117A	F-15A	F-16C	F-18A/C	F-22	GASEPF	GASEPV	KC-10A	KC-135	T-38A	T-45	UH60A	
04A1	0.00	0.00	0.00	0.00			0.00	0.00	0.00						0.00		0.00	0.00	0.00	0.00				0.00	0.00	0.00		0.00
04A1MAN					0.00		0.00		0.00	0.00								0.00	0.00				0.00	0.00	0.00			0.00
04A2	0.00																0.00	0.00	0.00	0.00					0.00	0.00		0.00
04A2MAN																		0.00	0.00						0.00			0.00
04AH1MAN						0.00						0.02	0.02														0.00	0.04
04AH2MAN												0.00																0.00
04AH3MAN												0.00																0.00
04AH4MAN												0.01	0.02														0.00	0.03
04AH5MAN												0.01	0.02															0.02
04AH6MAN												0.02	0.02															0.04
04C1							0.00	0.00	0.00								0.00	0.00	0.00	0.00					0.00			0.00
04C2	0.00		0.00												0.00									0.00				0.00
04C3		0.00																										0.00
04C4	0.00	0.00	0.01																					0.00				0.01
04C5	0.00	0.00																										0.00
04C6							0.00											0.00										0.00
04C7																		0.00							0.00			0.00
04C8																		0.00										0.00
04D1	0.00	0.00	0.00	0.00			0.00	0.00	0.00						0.00		0.00	0.00	0.00	0.00				0.00	0.01	0.03		0.05
04D1MAN					0.00		0.00		0.00	0.00								0.00	0.00				0.00	0.00	0.00			0.00
04HA1MAN												0.08	0.06															0.14
04HA2MAN												0.01																0.01
04HA3MAN												0.01																0.01
04HA4MAN												0.05	0.06															0.11
04HA5MAN												0.03	0.06															0.09
04HA6MAN												0.09	0.06															0.15
06A1MAN																					0.01	0.00						0.01
06A2MAN																					0.01	0.00						0.01
06C1MAN																					0.00	0.00						0.00
06D1MAN																					0.01	0.00						0.01
06D2MAN																					0.01	0.00						0.01
12D1																										0.00		0.00
22A0																		0.00							0.00			0.00
22A1							0.00																			0.00		0.00
22A1MAN							0.00				0.00												0.00					0.00
22A2																		0.00							0.00	0.00		0.00
22A3																	0.00	0.00		0.00								0.00
22A4																	0.00	0.00		0.00					0.02	0.03		0.05
22A4MAN																		0.00	0.00						0.00			0.01
22A5							0.00										0.00	0.00							0.00	0.00		0.00
22A5MAN									0.01	0.00								0.00	0.00						0.00			0.02
22A6	0.00																0.00	0.00	0.00	0.00								0.00
22A7	0.00		0.00	0.00				0.00	0.00							0.00		0.00	0.00	0.00				0.00				0.00
22A7MAN																								0.01				0.01
22A8															0.00													0.00

Table F.2-5: Existing Edwards AFB Nighttime Flight Track Utilization (Continued)

Track	Aircraft Name																										Total
	B-1	B-2A	B-52H	B-744	B752	UH-1N	C-12	C-130H	C-17	C-21A	C-5A	CH-46E	CH-53E	COMPOS	E-8A	F-117A	F-15A	F-16C	F-18A/C	F-22	GASEPF	GASEPV	KC-10A	KC-135	T-38A	T-45	UH60A	
22A8MAN					0.00			0.00																				0.00
22A9		0.00													0.00													0.00
22AD									0.00																			0.00
22AP	0.00	0.00		0.00			0.00	0.00	0.00						0.00		0.00							0.00				0.00
22C1							0.00	0.00	0.00							0.00	0.00	0.00	0.00	0.00					0.00			0.00
22C2	0.00		0.00												0.00									0.00				0.00
22C3		0.00																										0.00
22C4	0.00	0.00	0.00					0.00	0.00						0.00		0.00	0.00						0.00	0.00			0.00
22C5	0.00	0.00																										0.00
22C6							0.00	0.00	0.00						0.00		0.00	0.00		0.00				0.00	0.00			0.00
22C7																	0.00	0.00		0.00					0.00			0.00
22C8																		0.00										0.00
22D1				0.01														0.00	0.00	0.01								0.02
22D2		0.05					0.00		0.00						0.00		0.00	0.00	0.00	0.01					0.01	0.03		0.10
22D2MAN							0.00	0.00	0.01		0.00							0.01	0.00						0.00			0.03
22D3							0.00												0.00						0.00	0.01		0.01
22D4																		0.00	0.00									0.00
22D5																								0.00				0.00
22D6									0.00						0.00		0.00	0.00							0.03	0.03		0.05
22D6MAN					0.00																							0.00
22D7															0.00									0.00				0.00
22D7MAN										0.00													0.00	0.01				0.01
22D8																										0.00		0.00
22D9	0.00	0.05	0.07															0.00										0.12
22DC								0.00																				0.00
22DD								0.00																				0.00
22DH1MAN						0.00						0.00	0.00														0.00	0.01
22DH2MAN												0.00																0.00
22DH3MAN												0.00																0.00
22DH4MAN												0.00	0.00														0.00	0.00
22DH5MAN												0.00	0.00															0.00
22DH6MAN												0.00	0.00															0.00
22DI																								0.00				0.00
22DP	0.00						0.00								0.00	0.00	0.03							0.00				0.03
22DPD				0.00																								0.00
22HD1MAN												0.00	0.00															0.00
22HD2MAN												0.00																0.00
22HD3MAN												0.00																0.00
22HD4MAN												0.00	0.00															0.00
22HD5MAN												0.00	0.00															0.00
22HD6MAN												0.00	0.00															0.00
24A1																										0.00		0.00
24A2MAN																					0.18	0.00						0.18
24A3MAN														0.01							0.18	0.00						0.19
24C1MAN																					0.00	0.00						0.00
24C2MAN												0.08	0.05															0.13
24D1																										0.00		0.00
24D2																										0.00		0.00
24D3MAN																					0.18	0.00						0.18
24D4MAN														0.01							0.18	0.00						0.19
TFC1																		0.00							0.00			0.00
TFC2																		0.00							0.00			0.00
Grand Total	0.00	0.10	0.09	0.01	0.00	0.01	0.01	0.01	0.03	0.00	0.00	0.42	0.35	0.02	0.00	0.00	0.03	0.01	0.01	0.02	0.75	0.00	0.00	0.02	0.08	0.12	0.01	2.08

Established paths for aircraft arriving to and departing from Edwards AFB are presented in Figures F.2-2 thru F.2-5. These paths are not precisely defined ground tracks, but represent a broad area over which aircraft generally fly. The resulting flight tracks are representative of the most common flight tracks used at Edwards AFB. These tracks are not inclusive of all tracks potentially used as they are designed to represent the most common paths used by aircraft arriving and departing the base. For purposes of noise prediction and analysis, including determination of CNELs, the flight tracks presented in this analysis accurately reflect all flight operations.

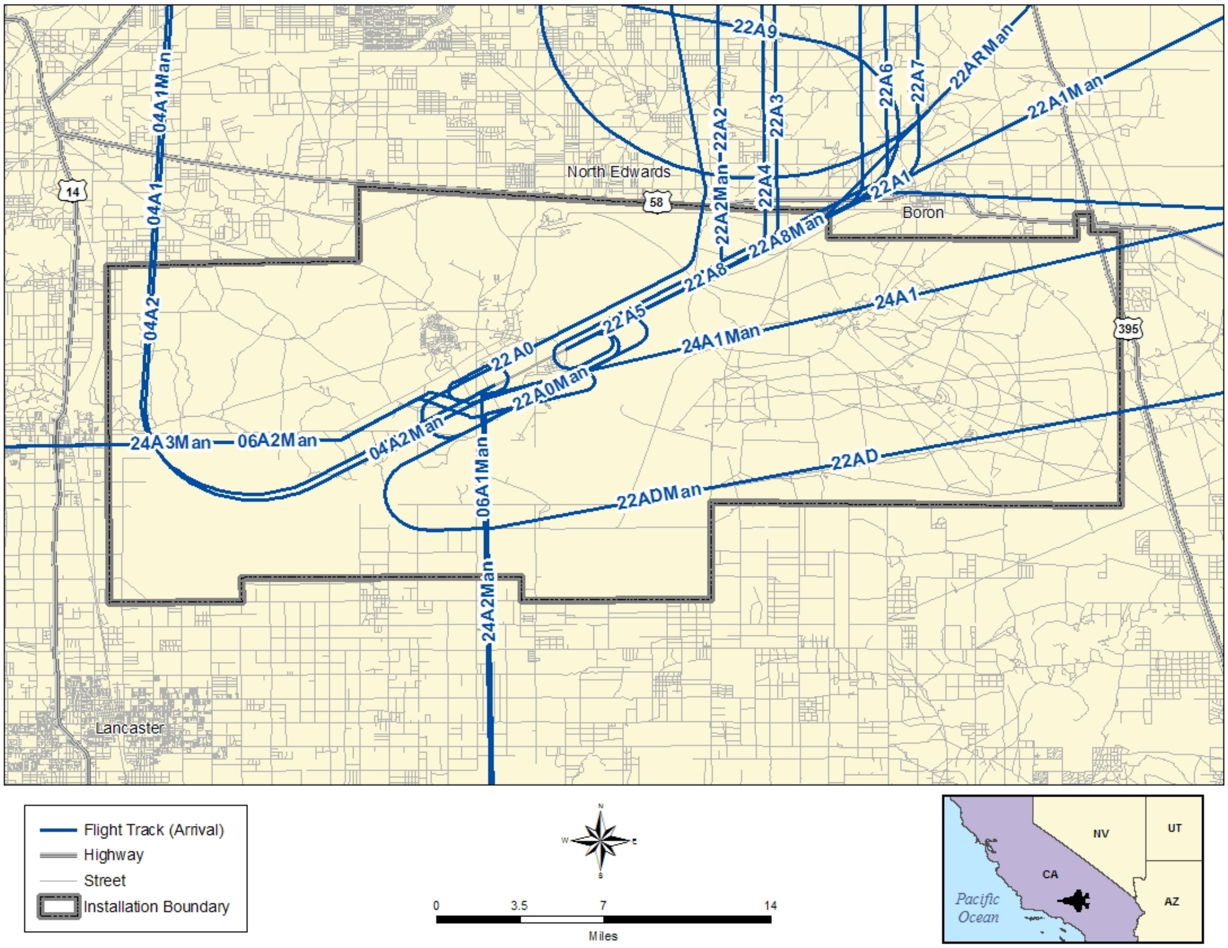

Figure F.2-2: Baseline Arrival Flight Tracks

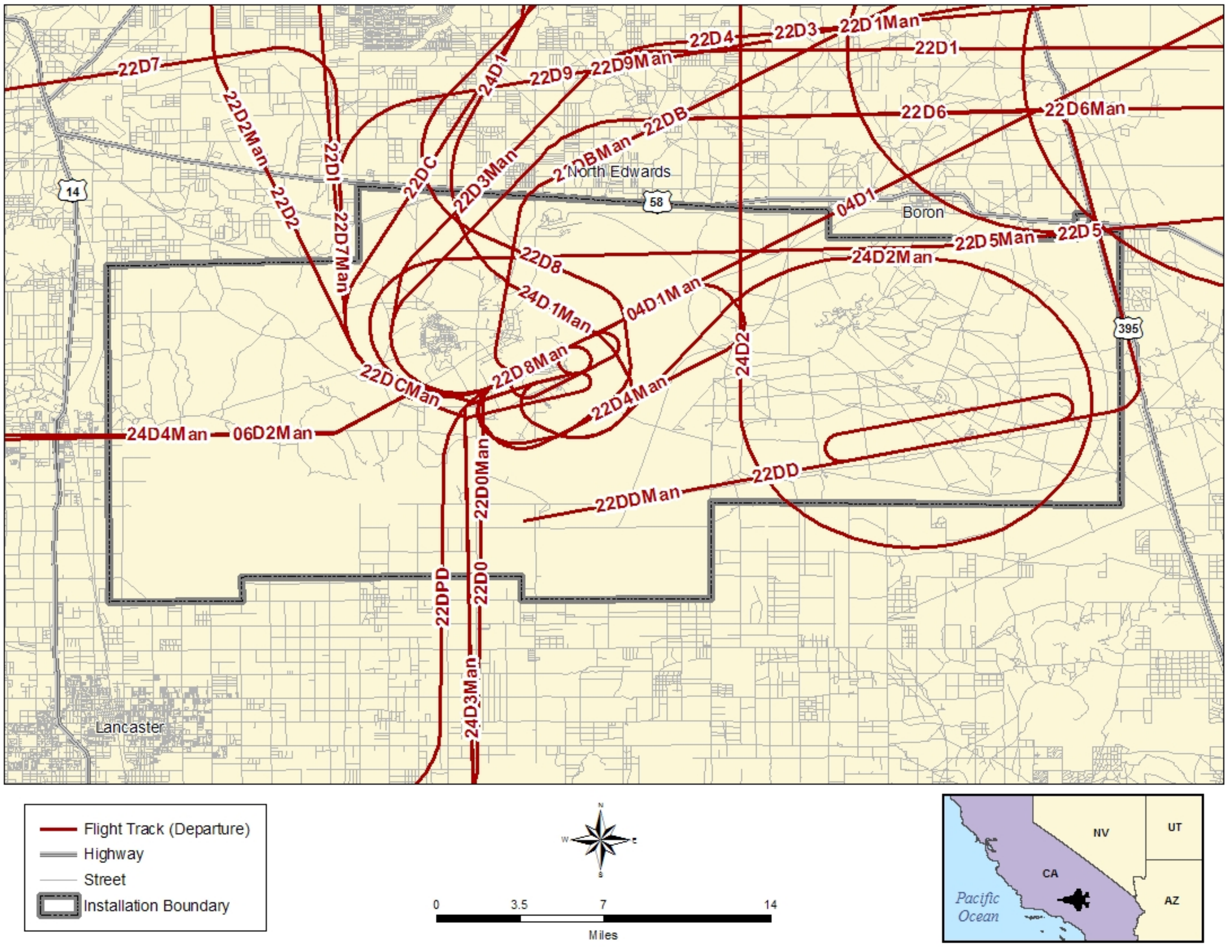

Figure F.2-3: Baseline Departure Flight Tracks

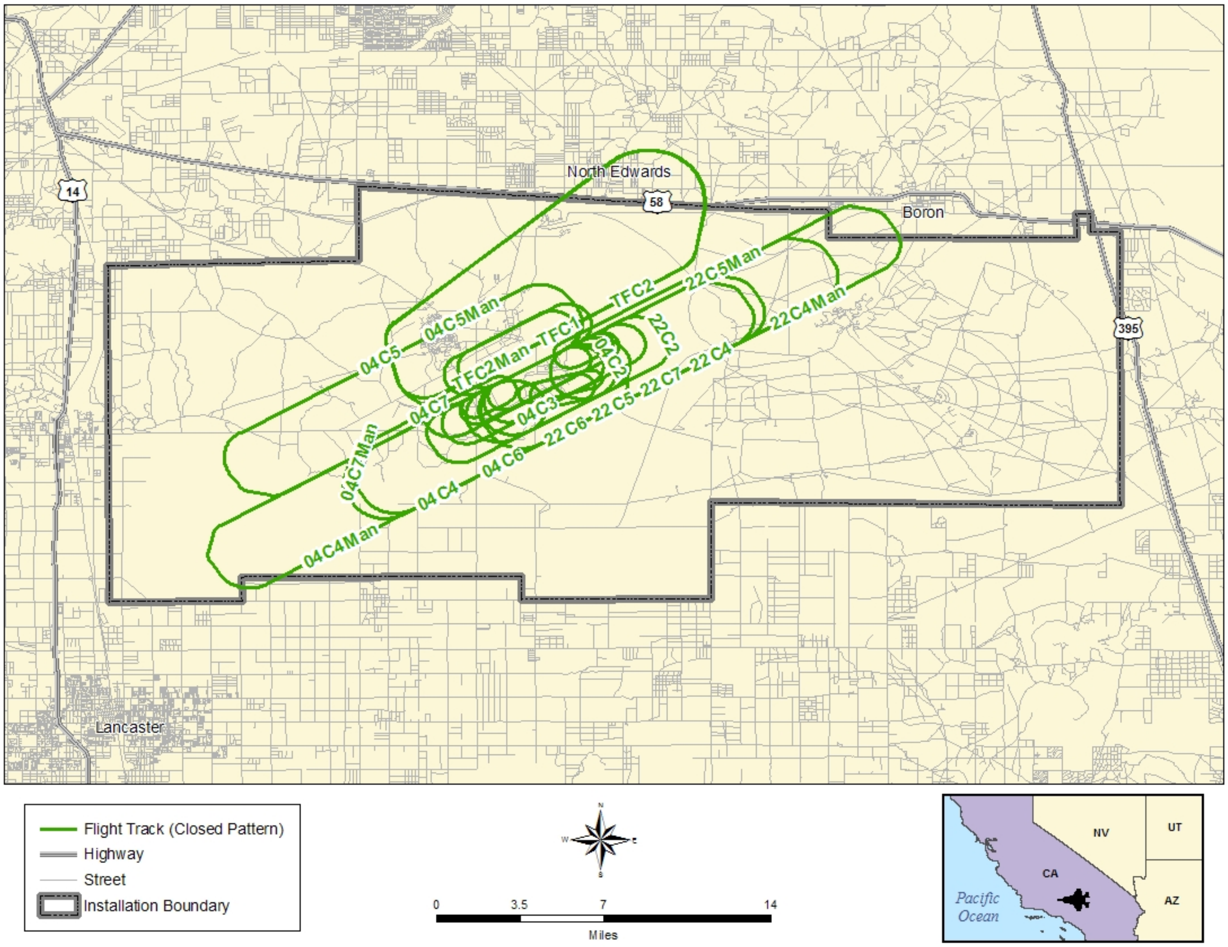

Figure F.2-4: Baseline Closed Pattern Flight Tracks

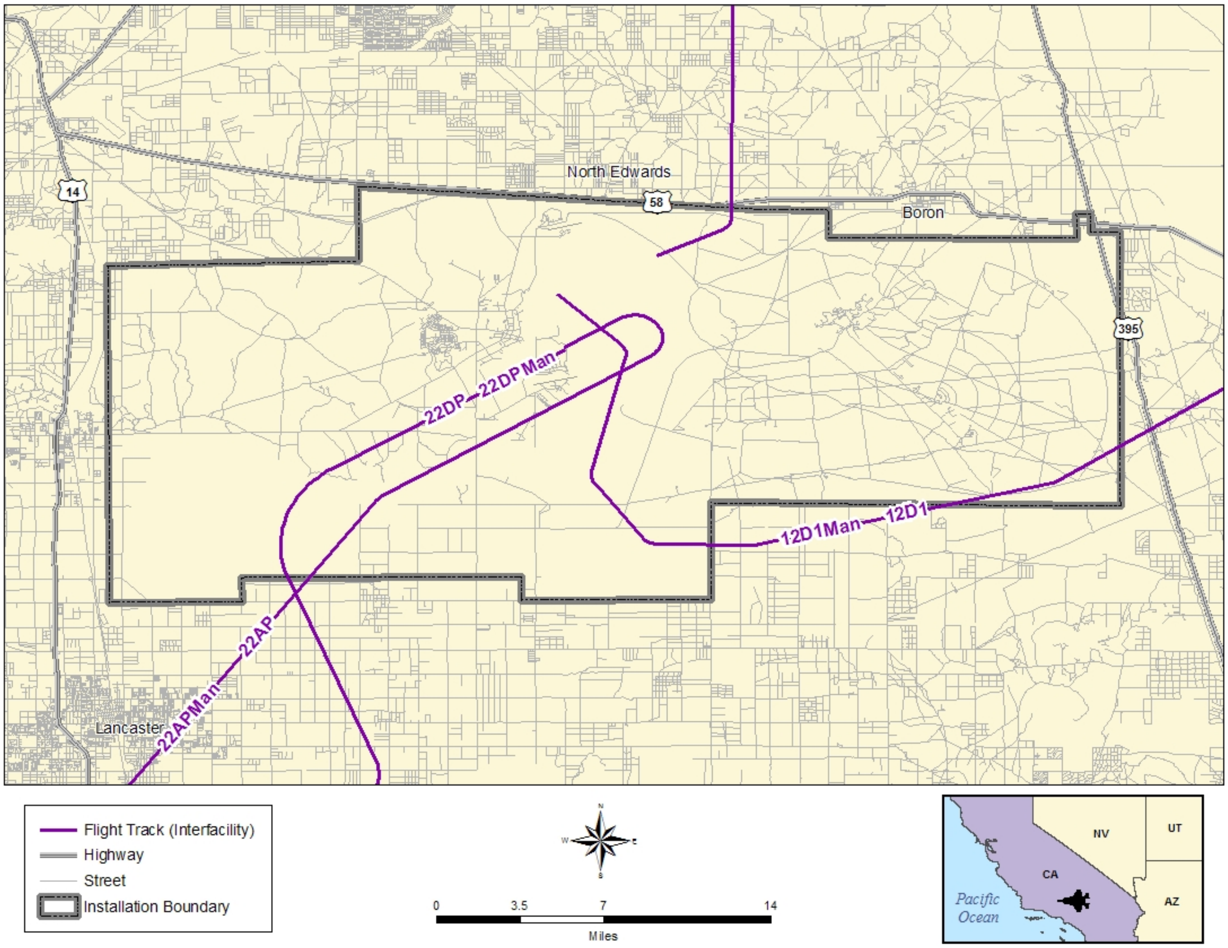

Figure F.2-5: Baseline Inter-Facility Flight Tracks

F.2.1.2 Baseline Edwards AFB Noise Contours

Existing baseline CNEL contours have been developed based upon the aircraft Fleet mix, number of operations, time of day of operations, and runway utilization presented above. Figure F.2-6 illustrates the existing baseline noise contour for operations at Edwards AFB. Areas affected by the existing CNEL contours (65, 70, 75, 80, and 85 dB) for Edwards AFB are presented in Table F.2-6.

Analysis of aerial photography has been used to determine existing populations affected by the existing baseline Edwards AFB CNEL noise contours. Concentrated population centers in the vicinity of Edwards AFB are located primarily to the north of the base property. At Edwards AFB, on-base housing is primarily located in the central portions of the base’s property, to the west of Lancaster Road.

Illustrated in Table F.2-7 and Figure F.2-7, land uses that are affected by the existing baseline noise contours comprise of engineering, buffer zone, aircraft operations and maintenance, and industrial land uses. No identifiable residential housing units or sensitive land uses have been identified within the existing baseline CNEL noise contours, therefore, no populations or sensitive land uses would likely be affected.

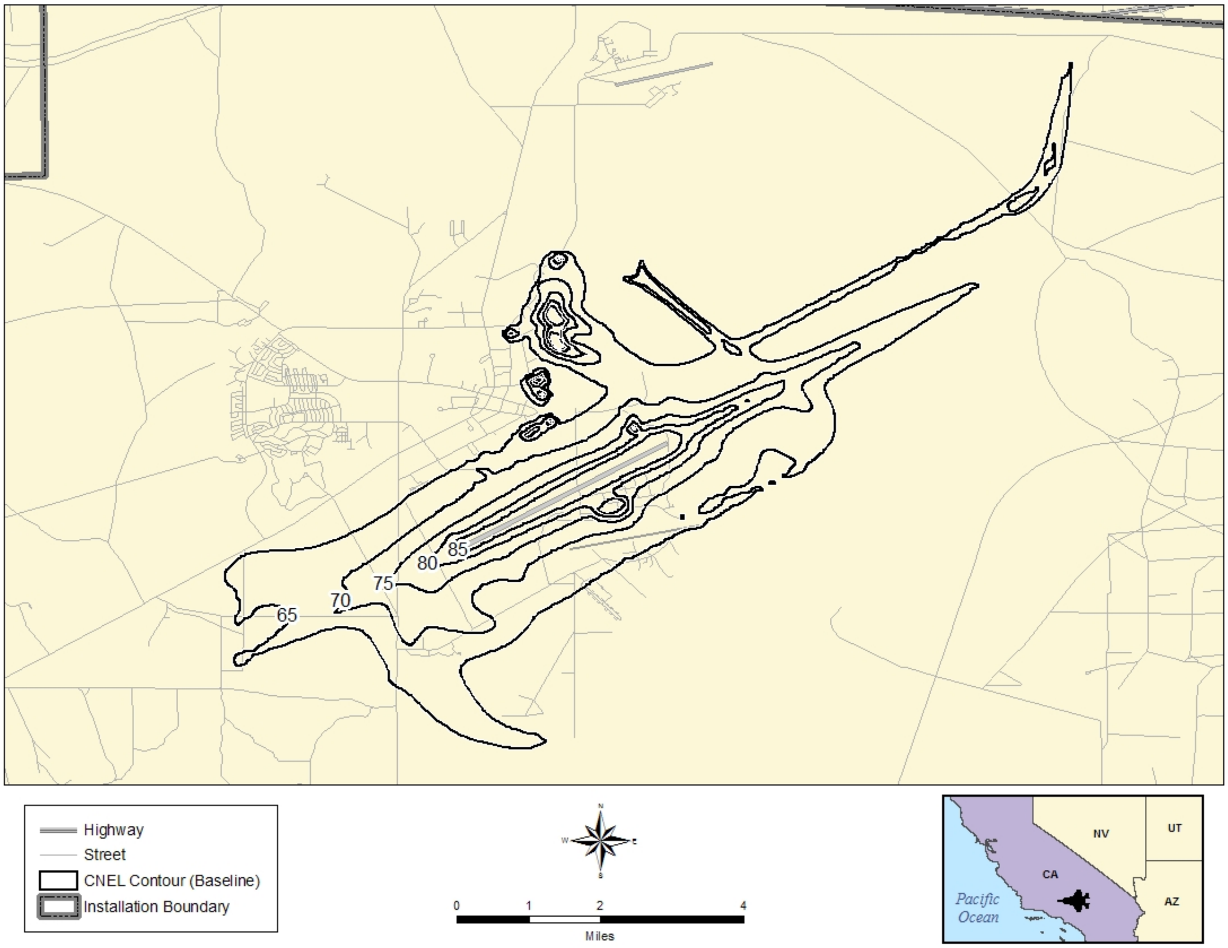

Figure F.2-6: Existing Baseline Noise Contours at Edwards AFB

Table F.2-6: Edwards AFB Existing Baseline Noise Impacts

CNEL Contour Bands	Area Acres (On-Base)	Area Acres (Off- Base)
65-70 dB	6,740	0
70-75 dB	2,543	0
75-80 dB	1,049	0
80-85 dB	571	0
85+ dB	569	0
65 dB and greater (Total)	11,472	0

Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005).

Table F.2-7: Land Uses (Acres) Within the Existing Baseline CNEL Contours at Edwards AFB

Land Use Type	Existing CNEL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Administrative	1	1	0	0	0	2
Air Operations & Maintenance	1,357	530	424	397	527	3,235
Buffer Zone	2,431	1,242	431	105	9	4,218
Community Service/Commercial	10	0	0	0	0	10
Engineering	532	212	0	25	27	796
Industrial	203	0	0	0	0	203
Lakebed	2,206	558	146	44	7	2,961
Medical	1	0	0	0	0	1
Outdoor Recreation	0	0	0	0	0	0
Housing	0	0	0	0	0	0

Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005).

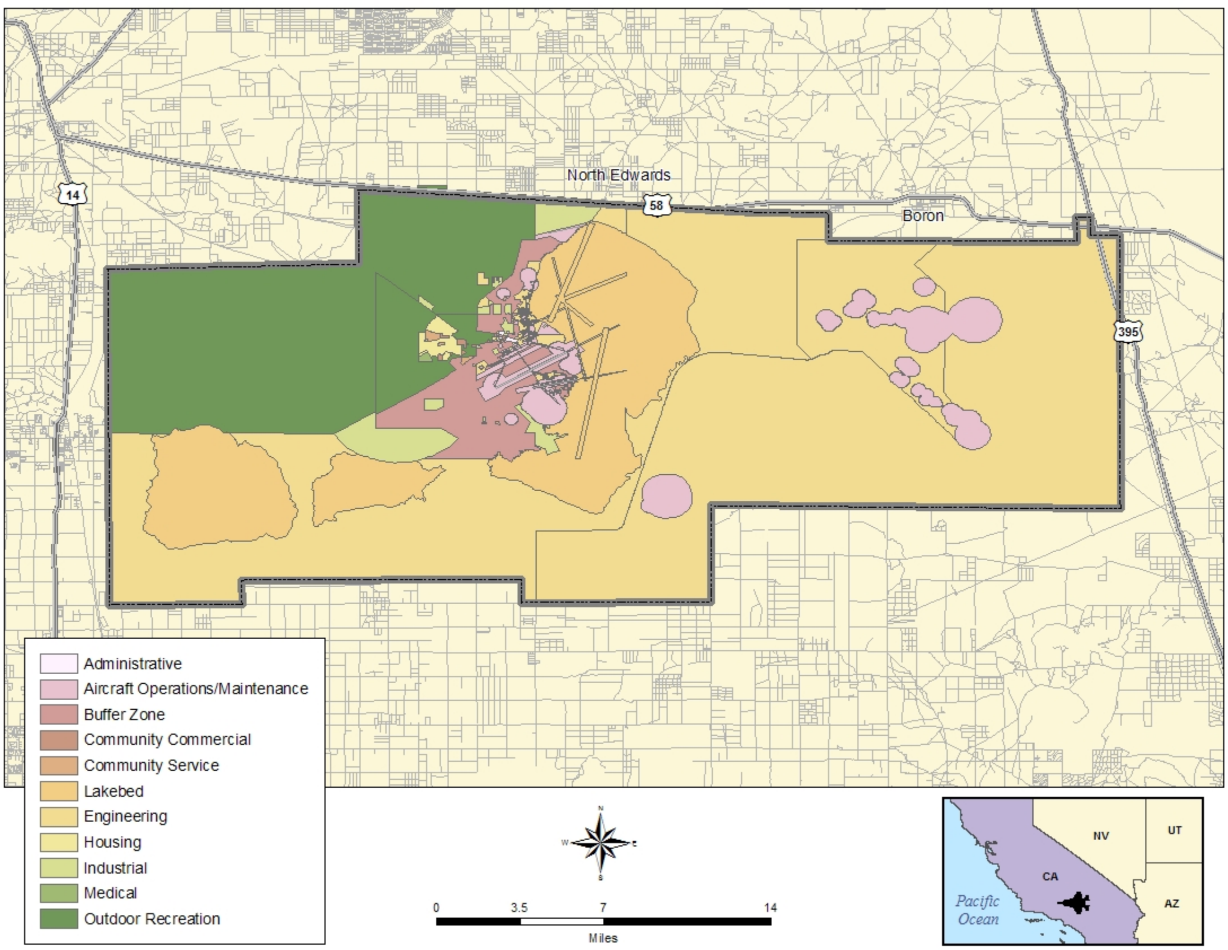

Figure F.2-7: Edwards AFB Land Use

F.2.2 Analysis

The major modeling input variables for this analysis are the number of aircraft operations, specifically the addition of proposed F-35 operations to the existing Edwards AFB Fleet mix. All other NOISEMAP input variables, such as runway utilization, time of day and stage length, are constant and consistent with existing baselines. The number and type of aircraft operations for this analysis are presented in Table F.2-8. Support aircraft associated with proposed F-35 testing operations at Edwards AFB are assumed to be the same aircraft used currently in other on-going test programs. Therefore, as previously stated, only proposed F-35 operations are added to the existing Fleet mix.

The major modeling input variables for this analysis are the number of aircraft operations, specifically the addition of proposed F-35 operations to the existing Edwards AFB Fleet mix. Distinct performance profiles have been provided by the Lockheed Martin Flight Simulation Group regarding operational performance characteristics for the F-35 Operational Levels, Runway Use, and Fleet Mix. As illustrated in Table F.2-8 and F.2-9, 886 annual F-35 operations or approximately 3.4 daily operations have been added to the existing Fleet mix. As illustrated in Tables F.2-10, F.2-11, and F.2-12, the Proposed Action would use the same flight tracks as those currently used by legacy aircraft in the existing baseline. An average operational year for United States Air Force (USAF) is considered 260 days, where as with the United States Navy (USN) and other Service branches, an average operational year is considered 365 days.

Table F.2-8: Edwards AFB F-35 Aircraft Projected Annual Operations by Mission (Test Year 3)

Operation	No. of Operations	% of Total
Departures		
CTOL FQ	70	16%
CTOL Performance	5	1%
STOVL Propulsion	10	2%
CTOL Propulsion	8	2%
Loads	30	7%
Flutter	22	5%
Weapons Separation and Int.	21	5%
Mission Systems	201	45%
High AOA	76	17%
Total	**443**	**100%**
Arrivals		
CTOL FQ	70	16%
CTOL Performance	5	1%
STOVL Propulsion	10	2%
CTOL Propulsion	8	2%
Loads	30	7%
Flutter	22	5%
Weapons Separation and Int.	21	5%
Mission Systems	201	45%
High AOA	76	17%
Total	**443**	**100%**
Grand Total	***886***	**-**

Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (September 2005).

Table F.2-9: F-35 Aircraft Fleet Mix and Operations by Day/Evening/Night

Aircraft	Day Ops	Evening Ops	Night Ops
B-1	6.70	1.10	0.00
B-2A	1.69	0.13	0.10
B-52H	3.46	0.51	0.09
B-747-400	0.45	0.01	0.01
B-757-200-RR	0.41	0.01	0.00
BL212 (UH-1N)	0.13	0.00	0.01
C-12	7.02	0.00	0.01
C-130H&N&P	1.71	0.00	0.01
C-17	1.80	0.05	0.03
C-21A	0.52	0.01	0.00
C-5A	0.12	0.00	0.00
CH-46E	3.42	1.13	0.42
CH-53E	2.71	0.92	0.35
COMPOS 1985 PISTON	0.09	0.00	0.02
E-8A	3.55	0.00	0.00
F-117A	0.14	0.00	0.00
F-15A	6.12	0.06	0.03
F-16C	34.25	1.34	0.01
F-18A/C	8.91	0.22	0.01
F-22	5.76	0.09	0.02
GASEPF FIX PITCH	25.28	0.04	0.75
GASEPV VAR PITCH	3.52	0.00	0.00
KC-10A	0.27	0.00	0.00
KC-135R	10.42	0.10	0.02
T-38A	23.73	1.04	0.08
T-45	11.46	0.32	0.12
UH60A	0.56	0.00	0.01
F-35	3.30	0.10	0.00
Total	***167.50***	***7.18***	***2.10***

Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (September 2005).

Table F.2-10: JSF Edwards AFB Daytime Flight Track Utilization

Track	Aircraft Name																												Total
	B-1	B-2A	B-52H	B-744	B752	UH-1N	C-12	C-130H	C-17	C-21A	C-5A	CH-46E	CH-53E	COMPOS	E-8A	F-117A	F-15A	F-16C	F-18A/C	F-22	GASEPF	GASEPV	KC-10A	KC-135	T-38A	T-45	UH60A	F-35	
04A1	0.04	0.03	0.03	0.02			0.09	0.30	0.04						0.06		0.03	0.26	0.55	0.05				0.20	0.16	0.06		0.03	1.94
04A1F					0.01		0.03		0.01	0.01								0.01	0.01				0.01	0.04	0.01				0.12
04A2	0.01																0.09	0.31	0.09	0.05					0.25	0.09		0.03	0.90
04A2F																		0.01	0.01						0.01				0.02
04AH1F						0.07						0.07	0.05														0.14		0.32
04AH2F												0.01																	0.01
04AH3F												0.00																	0.00
04AH4F												0.04	0.05														0.14		0.23
04AH5F												0.02	0.05																0.07
04AH6F												0.08	0.05																0.12
04C1							0.06	0.00	0.00								0.05	0.20	0.17	0.02					0.25				0.76
04C2	0.06		0.04												0.05									0.02					0.17
04C3		0.01																											0.01
04C4	0.11	0.10	0.10																					0.07					0.37
04C5	0.04	0.10																											0.14
04C6							0.03											0.04											0.07
04C7																		0.01							0.01				0.01
04C8																		0.10											0.10
04D1	0.05	0.01	0.03	0.02			0.09	0.03	0.03						0.06		0.12	0.64	0.12	0.12				0.19	1.01	1.23		0.08	3.83
04D1F					0.01		0.03		0.01	0.01								0.02	0.01				0.01	0.04	0.01				0.14
04HA1F												0.26	0.19																0.46
04HA2F												0.03																	0.03
04HA3F												0.02																	0.02
04HA4F												0.18	0.19																0.37
04HA5F												0.09	0.19																0.28
04HA6F												0.31	0.19																0.50
06A1F																					0.18	0.02							0.20
06A2F																					0.18	0.02							0.20
06C1F																					0.56	0.09							0.65
06D1F																					0.18	0.02							0.20
06D2F																					0.18	0.02							0.20
12D1																										1.20			1.20
22A0																		0.95							0.95				1.90
22A1							0.88																			0.20			1.08
22A1F							0.52				0.06												0.13						0.71
22A2																		0.30							2.14	1.24		0.01	3.69
22A3																	0.42	0.78		0.62								0.37	2.19
22A4																	1.25	2.76		0.92					4.19	1.64		0.50	11.25
22A4F																		0.17	0.13						0.12				0.42
22A5							0.88										0.14	1.82							2.14	2.47			7.45
22A5F									0.17	0.25								0.17	0.13						0.12				0.84
22A6	0.24																0.42	4.21	1.65	0.61								0.35	7.47
22A7	0.75	0.48	0.63	0.18				0.30	0.53							0.06		1.24	0.55	0.62				2.84				0.37	8.55
22A7F																								0.66					0.66
22A8															0.29														0.29

Table F.2-10: JSF Edwards AFB Daytime Flight Track Utilization (Continued)

Track	Aircraft Name																												Total
	B-1	B-2A	B-52H	B-744	B752	UH-1N	C-12	C-130H	C-17	C-21A	C-5A	CH-46E	CH-53E	COMPOS	E-8A	F-117A	F-15A	F-16C	F-18A/C	F-22	GASEPF	GASEPV	KC-10A	KC-135	T-38A	T-45	UH60A	F-35	
22A8F					0.19			0.06																					0.26
22A9		0.09													0.29														0.38
22AD									0.07																				0.07
22AP	0.38	0.03		0.03			0.35	0.30	0.07						0.57		0.00							0.73					2.46
22C1							1.23	0.03	0.03							0.02	0.94	3.14	3.03	0.21					2.00				10.62
22C2	1.19		0.10												0.43									0.02					1.73
22C3		0.10																											0.10
22C4	1.99	0.10	1.90					0.02	0.02						0.29		0.20	0.43						1.24	0.30				6.47
22C5	0.79	0.10																											0.89
22C6							0.53	0.02	0.02						0.42		0.05	0.16		0.11				0.16	0.41				1.87
22C7																	0.15	0.68		0.11					0.14				1.07
22C8																		1.91											1.91
22D1				0.16														0.41	0.28	1.16								0.78	2.80
22D2		0.28					1.51		0.06						0.23		0.13	4.65	1.10	1.16					3.77	1.23		0.79	14.91
22D2F							0.52	0.06	0.17		0.06							0.35	0.26						0.23				1.66
22D3							0.13												0.55						0.15	0.29			1.12
22D4																		0.15	0.28										0.43
22D5																								1.13					1.13
22D6									0.57						0.06		2.16	6.01							3.77	1.23			13.79
22D6F					0.19																								0.19
22D7															0.23									1.13					1.36
22D7F										0.25													0.13	0.66					1.03
22D8																										0.16			0.16
22D9	0.67	0.28	0.63															0.87											2.45
22DC								0.30																					0.30
22DD								0.30																					0.30
22DH1F						0.06						0.07	0.05														0.14		0.32
22DH2F												0.01																	0.01
22DH3F												0.01																	0.01
22DH4F												0.05	0.05														0.14		0.24
22DH5F												0.02	0.05																0.07
22DH6F												0.08	0.05																0.13
22DI																								1.13					1.13
22DP	0.38						0.13								0.57	0.06	0.00							0.20					1.35
22DPD				0.03																									0.03
22HD1F												0.27	0.20																0.47
22HD2F												0.03																	0.03
22HD3F												0.02																	0.02
22HD4F												0.18	0.20																0.38
22HD5F												0.09	0.20																0.29
22HD6F												0.32	0.20																0.51
24A1																										0.20			0.20
24A2F																					3.34	0.42							3.76
24A3F														0.04							3.34	0.42							3.80
24C1F																					10.65	1.67							12.32
24C2F												1.20	0.75																1.95
24D1																										0.04			0.04
24D2																										0.20			0.20
24D3F																					3.34	0.42							3.76
24D4F														0.04							3.34	0.42							3.80
TFC1																		0.57							1.33				1.90
TFC2																		0.95							0.29				1.24
Total	6.70	1.69	3.46	0.45	0.41	0.13	7.02	1.71	1.80	0.52	0.12	3.42	2.71	0.09	3.55	0.14	6.12	34.25	8.91	5.76	25.28	3.52	0.27	10.42	23.73	11.46	0.56	3.30	167.49

Table F.2-11: JSF Edwards AFB Evening Flight Track Utilization

Track	Aircraft Name																												Total
	B-1	B-2A	B-52H	B-744	B752	UH-1N	C-12	C-130H	C-17	C-21A	C-5A	CH-46E	CH-53E	COMPOS	E-8A	F-117A	F-15A	F-16C	F-18A/C	F-22	GASEPF	GASEPV	KC-10A	KC-135	T-38A	T-45	UH60A	F-35	
04A1	0.01	0.00	0.00	0.00			0.00	0.00	0.00						0.00		0.00	0.01	0.01	0.00				0.00	0.01	0.00		0.00	0.04
04A1F					0.00		0.00		0.00	0.00								0.00	0.00				0.00	0.00	0.00				0.00
04A2	0.00																0.00	0.01	0.00	0.00					0.01	0.00		0.00	0.03
04A2F																		0.00	0.00						0.00				0.00
04AH1F						0.00						0.02	0.01														0.00		0.03
04AH2F												0.00																	0.00
04AH3F												0.00																	0.00
04AH4F												0.01	0.01														0.00		0.02
04AH5F												0.01	0.01																0.02
04AH6F												0.02	0.01																0.03
04C1							0.00	0.00	0.00								0.00	0.01	0.00	0.00					0.01				0.02
04C2	0.01		0.00												0.00									0.00					0.02
04C3		0.00																											0.00
04C4	0.02	0.01	0.21																					0.00					0.24
04C5	0.01	0.01																											0.02
04C6							0.00											0.00											0.00
04C7																		0.00							0.00				0.00
04C8																		0.01											0.01
04D1	0.01	0.00	0.00	0.00			0.00	0.00	0.00						0.00		0.00	0.01	0.02	0.00				0.00	0.01	0.03		0.00	0.09
04D1F					0.00		0.00		0.00	0.00								0.00	0.00				0.00	0.00	0.00				0.00
04HA1F												0.06	0.05																0.11
04HA2F												0.01																	0.01
04HA3F												0.00																	0.00
04HA4F												0.04	0.05																0.09
04HA5F												0.02	0.05																0.07
04HA6F												0.07	0.05																0.12
06A1F																					0.00	0.00							0.00
06A2F																					0.00	0.00							0.00
06C1F																					0.00	0.00							0.00
06D1F																					0.00	0.00							0.00
06D2F																					0.00	0.00							0.00
12D1																										0.00			0.00
22A0																		0.05							0.05				0.10
22A1							0.00																			0.00			0.00
22A1F							0.00				0.00												0.00						0.00
22A2																		0.02							0.11	0.07			0.19
22A3																	0.00	0.00		0.03								0.01	0.04
22A4																	0.00	0.08		0.01					0.20	0.03		0.02	0.33
22A4F																		0.00	0.01						0.00				0.01
22A5							0.00										0.00	0.06							0.11	0.13			0.30
22A5F									0.01	0.00								0.00	0.01						0.00				0.02
22A6	0.04																0.00	0.16	0.03	0.01								0.01	0.25
22A7	0.13	0.05	0.07	0.00				0.00	0.00							0.00		0.07	0.01	0.03				0.00				0.01	0.38
22A7F																								0.01					0.01
22A8															0.00														0.00

Table F.2-11: JSF Edwards AFB Evening Flight Track Utilization (Continued)

Track	Aircraft Name																												Total
	B-1	B-2A	B-52H	B-744	B752	UH-1N	C-12	C-130H	C-17	C-21A	C-5A	CH-46E	CH-53E	COMPOS	E-8A	F-117A	F-15A	F-16C	F-18A/C	F-22	GASEPF	GASEPV	KC-10A	KC-135	T-38A	T-45	UH60A	F-35	
22A8F					0.00			0.00																					0.00
22A9		0.01													0.00														0.01
22AD									0.00																				0.00
22AP	0.03	0.00		0.00			0.00	0.00	0.00						0.00		0.00							0.00					0.03
22C1							0.00	0.00	0.00							0.00	0.00	0.21	0.07	0.00					0.06				0.34
22C2	0.21		0.01												0.00									0.00					0.22
22C3		0.01																											0.01
22C4	0.35	0.01	0.21					0.00	0.00						0.00		0.00	0.01						0.07	0.01				0.66
22C5	0.14	0.01																											0.15
22C6							0.00	0.00	0.00						0.00		0.00	0.01		0.00				0.01	0.01				0.03
22C7																	0.00	0.03		0.00					0.01				0.04
22C8																		0.11											0.11
22D1				0.01														0.02	0.01	0.00								0.02	0.06
22D2		0.00					0.00		0.00						0.00		0.00	0.20	0.02	0.00					0.18	0.03		0.02	0.46
22D2F							0.00	0.00	0.01		0.00							0.00	0.01						0.00				0.02
22D3							0.00												0.01						0.00	0.01			0.02
22D4																		0.00	0.01										0.01
22D5																								0.00					0.00
22D6									0.03						0.00		0.00	0.18							0.18	0.03			0.42
22D6F					0.00																								0.00
22D7															0.00									0.00					0.00
22D7F										0.00													0.00	0.01					0.01
22D8																										0.00			0.00
22D9	0.12	0.00	0.00															0.00											0.12
22DC								0.00																					0.00
22DD								0.00																					0.00
22DH1F						0.00						0.03	0.03														0.00		0.06
22DH2F												0.00																	0.00
22DH3F												0.00																	0.00
22DH4F												0.02	0.03														0.00		0.05
22DH5F												0.01	0.03																0.04
22DH6F												0.04	0.03																0.06
22DI																								0.00					0.00
22DP	0.03						0.00								0.00	0.00	0.06							0.00					0.09
22DPD				0.00																									0.00
22HD1F												0.13	0.10																0.23
22HD2F												0.01																	0.01
22HD3F												0.01																	0.01
22HD4F												0.09	0.10																0.19
22HD5F												0.04	0.10																0.14
22HD6F												0.16	0.10																0.25
24A1																										0.00			0.00
24A2F																					0.01	0.00							0.01
24A3F														0.00							0.01	0.00							0.01
24C1F																					0.00	0.00							0.00
24C2F												0.32	0.20																0.52
24D1																										0.00			0.00
24D2																										0.00			0.00
24D3F																					0.01	0.00							0.01
24D4F														0.00							0.01	0.00							0.01
TFC1																		0.03							0.07				0.10
TFC2																		0.05							0.02				0.07
Total	1.10	0.13	0.51	0.01	0.01	0.00	0.00	0.00	0.05	0.01	0.00	1.13	0.92	0.00	0.00	0.00	0.06	1.34	0.22	0.09	0.04	0.00	0.00	0.10	1.04	0.32	0.00	0.10	7.15

Table F.2-12: JSF Edwards AFB Nighttime Flight Track Utilization

Track	Aircraft Name																												Total
	B-1	B-2A	B-52H	B-744	B752	UH-1N	C-12	C-130H	C-17	C-21A	C-5A	CH-46E	CH-53E	COMPOS	E-8A	F-117A	F-15A	F-16C	F-18A/C	F-22	GASEPF	GASEPV	KC-10A	KC-135	T-38A	T-45	UH60A	F-35	
04A1	0.00	0.00	0.00	0.00			0.00	0.00	0.00						0.00		0.00	0.00	0.00	0.00				0.00	0.00	0.00			0.00
04A1F					0.00		0.00		0.00	0.00								0.00	0.00				0.00	0.00	0.00				0.00
04A2	0.00																0.00	0.00	0.00	0.00					0.00	0.00			0.00
04A2F																		0.00	0.00						0.00				0.00
04AH1F						0.00						0.02	0.02														0.00		0.04
04AH2F												0.00																	0.00
04AH3F												0.00																	0.00
04AH4F												0.01	0.02														0.00		0.03
04AH5F												0.01	0.02																0.02
04AH6F												0.02	0.02																0.04
04C1							0.00	0.00	0.00								0.00	0.00	0.00	0.00					0.00				0.00
04C2	0.00		0.00												0.00									0.00					0.00
04C3		0.00																											0.00
04C4	0.00	0.00	0.01																					0.00					0.01
04C5	0.00	0.00																											0.00
04C6							0.00											0.00											0.00
04C7																		0.00							0.00				0.00
04C8																		0.00											0.00
04D1	0.00	0.00	0.00	0.00			0.00	0.00	0.00						0.00		0.00	0.00	0.00	0.00				0.00	0.01	0.03			0.05
04D1F					0.00		0.00		0.00	0.00								0.00	0.00				0.00	0.00	0.00				0.00
04HA1F												0.08	0.06																0.14
04HA2F												0.01																	0.01
04HA3F												0.01																	0.01
04HA4F												0.05	0.06																0.11
04HA5F												0.03	0.06																0.09
04HA6F												0.09	0.06																0.15
06A1F																					0.01	0.00							0.01
06A2F																					0.01	0.00							0.01
06C1F																					0.00	0.00							0.00
06D1F																					0.01	0.00							0.01
06D2F																					0.01	0.00							0.01
12D1																										0.00			0.00
22A0																		0.00							0.00				0.00
22A1							0.00																			0.00			0.00
22A1F							0.00				0.00												0.00						0.00
22A2																		0.00							0.00	0.00			0.00
22A3																	0.00	0.00		0.00									0.00
22A4																	0.00	0.00		0.00					0.02	0.03			0.05
22A4F																		0.00	0.00						0.00				0.01
22A5							0.00										0.00	0.00							0.00	0.00			0.00
22A5F									0.01	0.00								0.00	0.00						0.00				0.02
22A6	0.00																0.00	0.00	0.00	0.00									0.00
22A7	0.00	0.00	0.00	0.00				0.00	0.00							0.00		0.00	0.00	0.00				0.00					0.00
22A7F																								0.01					0.01
22A8															0.00														0.00

Table F.2-12: JSF Edwards AFB Nighttime Flight Track Utilization (Continued)

Track	Aircraft Name																												Total
	B-1	B-2A	B-52H	B-744	B752	UH-1N	C-12	C-130H	C-17	C-21A	C-5A	CH-46E	CH-53E	COMPOS	E-8A	F-117A	F-15A	F-16C	F-18A/C	F-22	GASEPF	GASEPV	KC-10A	KC-135	T-38A	T-45	UH60A	F-35	
22A8F					0.00			0.00																					0.00
22A9		0.00													0.00														0.00
22AD									0.00																				0.00
22AP	0.00	0.00		0.00			0.00	0.00	0.00						0.00		0.00							0.00					0.00
22C1							0.00	0.00	0.00							0.00	0.00	0.00	0.00	0.00					0.00				0.00
22C2	0.00		0.00												0.00									0.00					0.00
22C3		0.00																											0.00
22C4	0.00	0.00	0.00					0.00	0.00						0.00		0.00	0.00						0.00	0.00				0.00
22C5	0.00	0.00																											0.00
22C6							0.00	0.00	0.00						0.00		0.00	0.00		0.00				0.00	0.00				0.00
22C7																	0.00	0.00		0.00					0.00				0.00
22C8																		0.00											0.00
22D1				0.01														0.00	0.00	0.01									0.02
22D2		0.05					0.00		0.00						0.00		0.00	0.00	0.00	0.01					0.01	0.03			0.10
22D2F							0.00	0.00	0.01		0.00							0.01	0.00						0.00				0.03
22D3							0.00												0.00						0.00	0.01			0.01
22D4																		0.00	0.00										0.00
22D5																								0.00					0.00
22D6									0.00						0.00		0.00	0.00							0.03	0.03			0.05
22D6F					0.00																								0.00
22D7															0.00									0.00					0.00
22D7F										0.00													0.00	0.01					0.01
22D8																										0.00			0.00
22D9	0.00	0.05	0.07															0.00											0.12
22DC								0.00																					0.00
22DD								0.00																					0.00
22DH1F						0.00						0.00	0.00														0.00		0.01
22DH2F												0.00																	0.00
22DH3F												0.00																	0.00
22DH4F												0.00	0.00														0.00		0.00
22DH5F												0.00	0.00																0.00
22DH6F												0.00	0.00																0.00
22DI																								0.00					0.00
22DP	0.00						0.00								0.00	0.00	0.03							0.00					0.03
22DPD				0.00																									0.00
22HD1F												0.00	0.00																0.00
22HD2F												0.00																	0.00
22HD3F												0.00																	0.00
22HD4F												0.00	0.00																0.00
22HD5F												0.00	0.00																0.00
22HD6F												0.00	0.00																0.00
24A1																										0.00			0.00
24A2F																					0.18	0.00							0.18
24A3F														0.01							0.18	0.00							0.19
24C1F																					0.00	0.00							0.00
24C2F												0.08	0.05																0.13
24D1																										0.00			0.00
24D2																										0.00			0.00
24D3F																					0.18	0.00							0.18
24D4F														0.01							0.18	0.00							0.19
TFC1																		0.00							0.00				0.00
TFC2																		0.00							0.00				0.00
Total	0.00	0.10	0.09	0.01	0.00	0.01	0.01	0.01	0.03	0.00	0.00	0.42	0.35	0.02	0.00	0.00	0.03	0.01	0.01	0.02	0.75	0.00	0.00	0.02	0.08	0.12	0.01	0.00	2.08

Table F.2-13 illustrates the average daily arrival, departure, closed pattern, and inter-facility activity and runway use currently existing at Edwards AFB. Runway use is expressed as a percentage and is illustrated to present the commonly used runway preference.

Table F.2-13: F-35 Runway Use at Edwards AFB

Arrivals				
	Day	**Evening**	**Night**	**Total**
Runway 04	6.18%	7.52%	11.98%	6.33%
Runway 06S	0.65%	0.00%	1.62%	0.64%
Runway 22	72.92%	72.90%	8.54%	71.74%
Runway 22f	4.75%	1.54%	3.32%	4.62%
Runway 24S	12.79%	0.77%	31.23%	12.72%
Runway H2f	2.71%	17.28%	43.31%	3.96%
Total	94.72%	3.44%	1.83%	100%
Departures				
	Day	**Evening**	**Night**	**Total**
Runway 04	6.92%	3.84%	6.16%	6.80%
Runway 06S	0.69%	0.00%	2.27%	0.68%
Runway 22	69.45%	47.77%	41.93%	68.26%
Runway 22f	6.38%	10.77%	5.74%	6.53%
Runway 24S	13.60%	0.75%	43.90%	13.54%
Runway H2f	2.96%	36.87%	0.00%	4.19%
Total	94.87%	3.75%	1.38%	100%
Closed Patterns				
	Day	Evening	Night	Total
Runway 04	3.64%	12.00%	7.80%	4.11%
Runway 06S	1.46%	0.00%	0.00%	1.38%
Runway 22	58.41%	63.87%	0.00%	58.53%
Runway 22TF	4.29%	3.89%	0.00%	4.25%
Runway 24S	32.20%	20.24%	92.20%	31.73%
Total:	94.24%	5.46%	0.30%	100%
Inter-facilities				
	Day	Evening	Night	Total
Runway 12L	23.92%	0.00%	0.00%	23.25%
Runway 22	26.99%	72.77%	90.00%	28.39%
Runway 25P	49.08%	27.23%	10.00%	48.36%
Total	97.16%	2.25%	0.58	100%

Source: *Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (September 2005).*

Established paths for existing aircraft arriving to and departing from Edwards AFB were previously presented in Figures F.2-2 thru F.2-5. Figures F.2-8 and F.2-9 illustrate the specific arrival and departure tracks in which proposed F-35 operations have been modeled. The illustrated tracks are the primary arrival and departure tracks used by legacy aircraft operating at Edwards AFB. These tracks represent the tracks with the highest existing aircraft utilization and provide the most direct route to adjoining testing ranges and military operating areas.

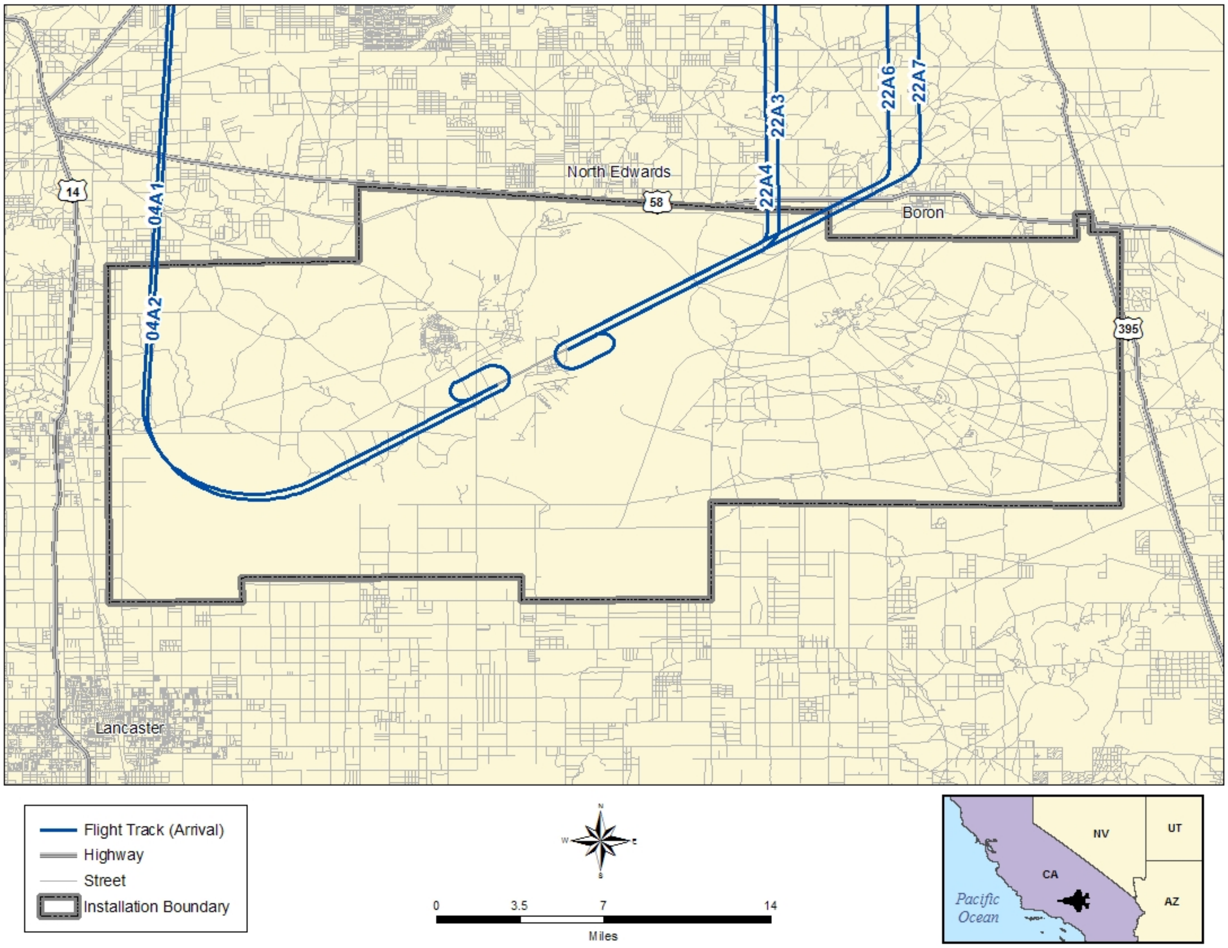

Figure F.2-8: F-35 Arrival Flight Tracks

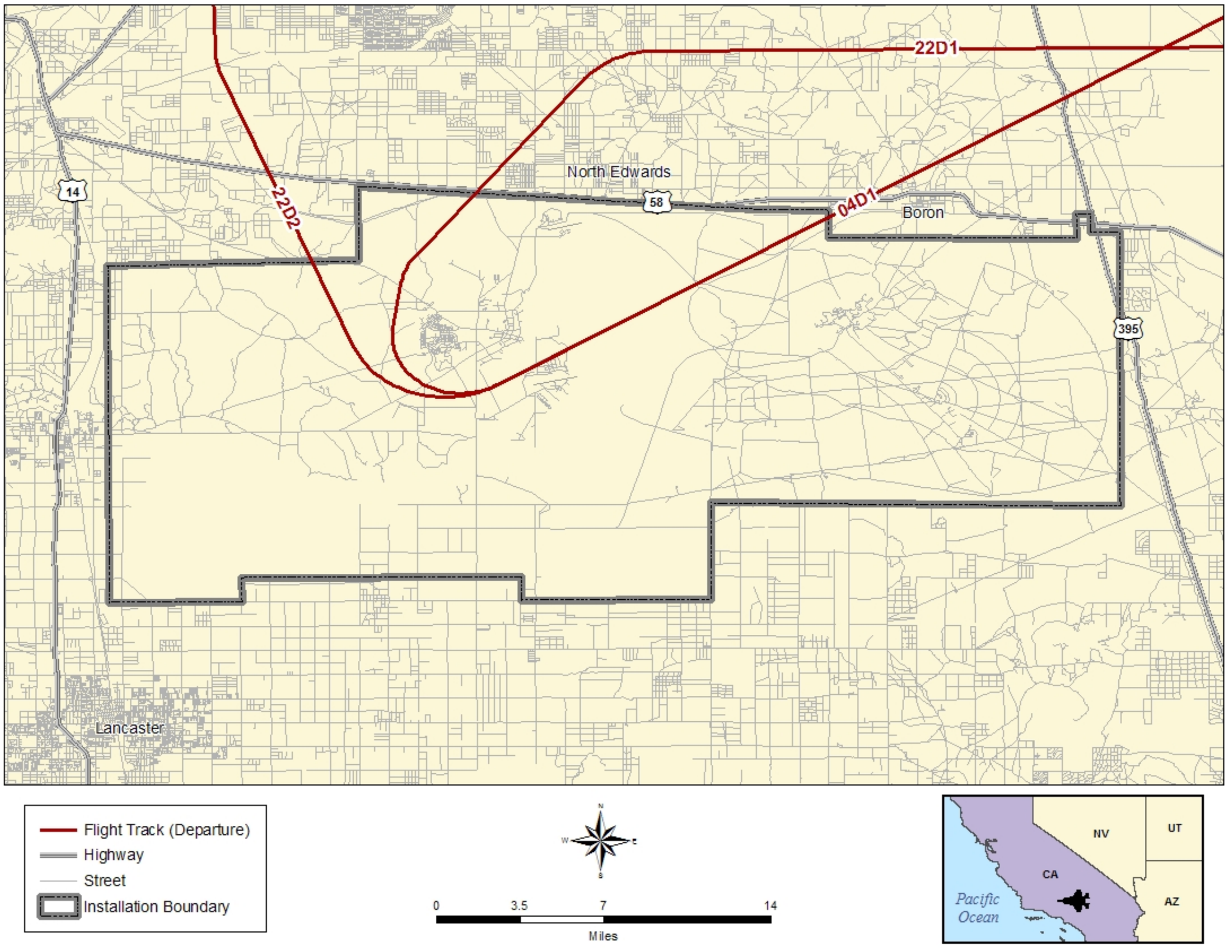

Figure F.2-9: F-35 Departure Flight Tracks

F.2.2.2 F-35 Edwards AFB Noise Contours

For the purposes of this evaluation, aircraft noise impacts are presented as land use areas and populations exposed to aircraft noise above existing baseline levels. This section discusses the physical characteristics of noise resulting from the Proposed Action. Contour lines representing average annual noise conditions for aircraft operations are generated for 65, 70, 75, 80, and 85 dB CNEL. This section presents a general quantification of the area exposed to noise expressed in acres and population.

The Proposed Action has been modeled for the largest predicted year of test events, Test Year 3. The proposed JSF DT test operations contained in Table F.2-14 have been added to the existing baseline Fleet mix. Conversations with Edwards AFB test personnel confirmed that support aircraft are currently accounted for in the existing Fleet mix, therefore support aircraft have not been added into the model.

Table F.2-14: Maximum Year of Proposed JSF DT at Edwards AFB

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Fight Hours	Total No. Flights	Total Flight Hours
3	F-35 Baseline Program (STOVL & CTOL FQ, STOVL & CTOL Performance, STOVL & CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Int., STOVL Environment, Mission Systems, High AoA), F-16 Proficiency Flights, KC-135 Flights	224	426	F-16 KC-135	667	1,471	891	1,897

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).
Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT events and time periods.

Figure F.2-10 illustrates the noise contours for the Proposed Action. Figure F.2-11 illustrates comparison contours showing the baseline CNEL contours overlaid with the Proposed Action noise contours. The 65 dB CNEL and greater contour for the Proposed Action would not leave the boundaries of Edwards AFB. Table F.2-15 outlines a comparison of the Proposed Action CNEL contours contrasted to the baseline CNEL noise contours at Edwards AFB. As a result of the Proposed Action, on-base areas impacted by the 65 dB and greater CNEL noise contour would increase by approximately 1,405 acres (approximately 12.2%).

Table F.2-15: Edwards AFB Comparison Noise Impacts

CNEL Contour Bands	Area Acres (On-Base)		Acreage Change	
	Existing	With F-35[1]	Change	%
65-70 dB	6,740	7,432	692	10.3
70-75 dB	2,543	3,033	490	19.3
75-80 dB	1,049	1,188	139	13.3
80-85 dB	571	642	71	12.4
85+ dB	569	582	13	2.3
65 dB and greater (Total)	***11,472***	***12,877***	***1,405***	***12.2***

Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (September 2005).
Note: This is reflective of both Alternatives One and Two.

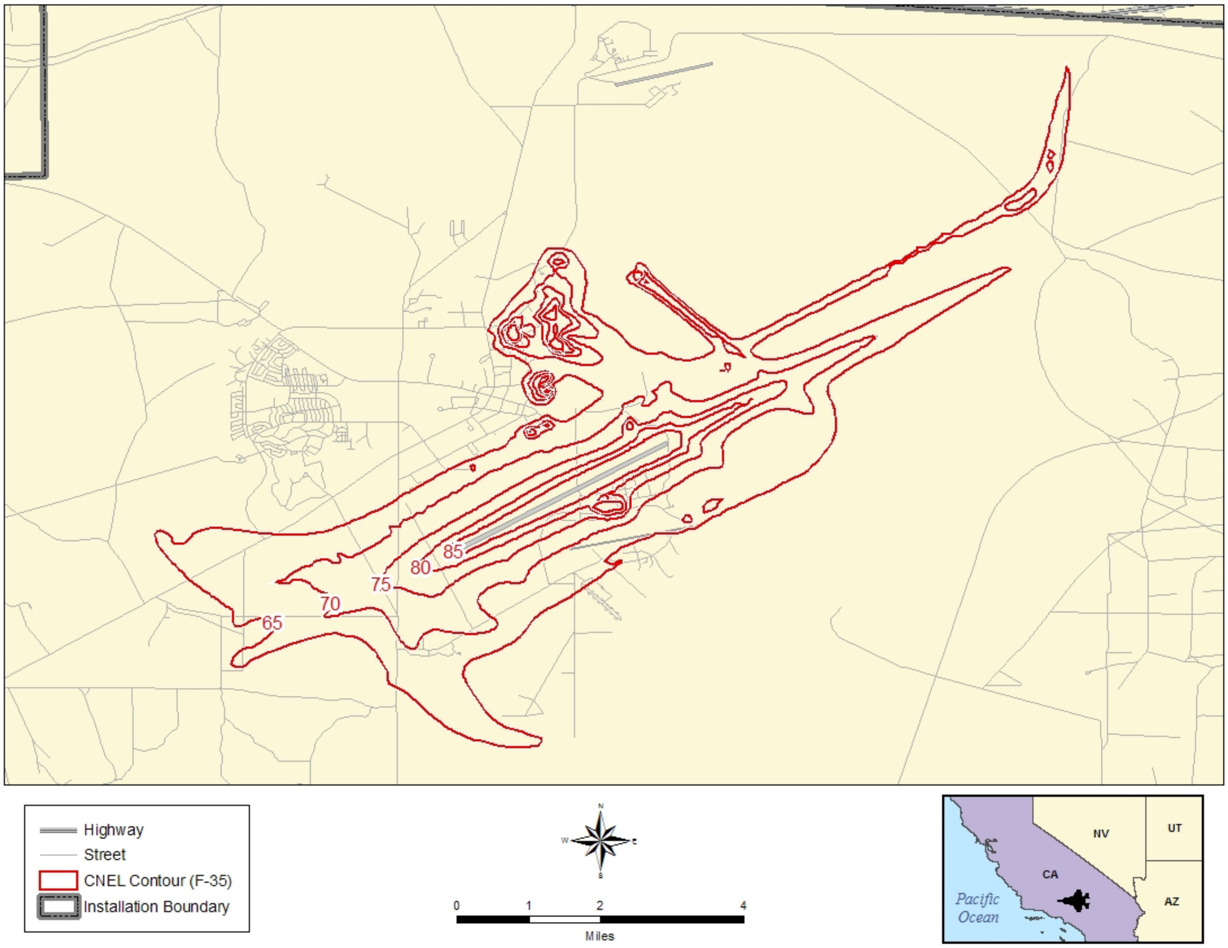

Figure F.2-10: CNEL Noise Contours with F-35 Operations for Edwards AFB

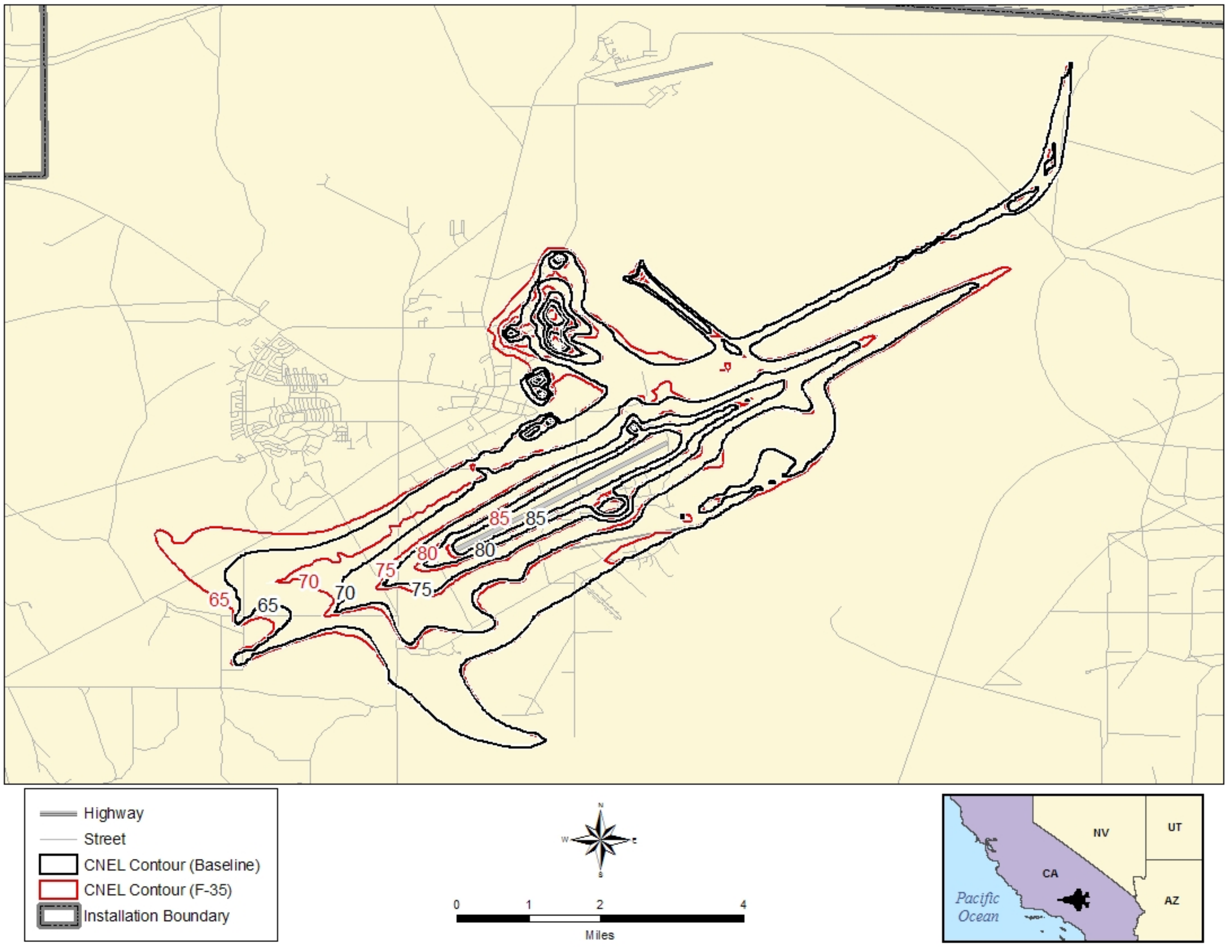

Figure F.2-11: CNEL Comparison Contours with F-35 Vs. Baseline Operations for Edwards AFB

In accordance with FICON guidance, further analysis was performed to identify areas where 1.5 dB increases occur within the 65 dB CNEL and greater noise contour and 3.0 dB increases occur within to 60 CNEL noise contour. Incompatible land uses, residential units, and noise sensitive receptors were specifically searched for when performing this analysis. Presented previously, Figure F.2-7 illustrates land uses on Edwards AFB, while Figures F.2-12 and F.2-13 illustrate 1.5 dB and 3.0 dB increase contours. Only areas in which the respective dB increase contour overlaps the corresponding CNEL contour band were analyzed. Similar to the existing baseline, land uses that would be exposed to noise as a result of the Proposed Action at Edwards AFB comprise engineering, buffer zone, aircraft operations and maintenance, and industrial land uses. Additionally, there would be no residential housing units identified within the Proposed Action CNEL noise contours.

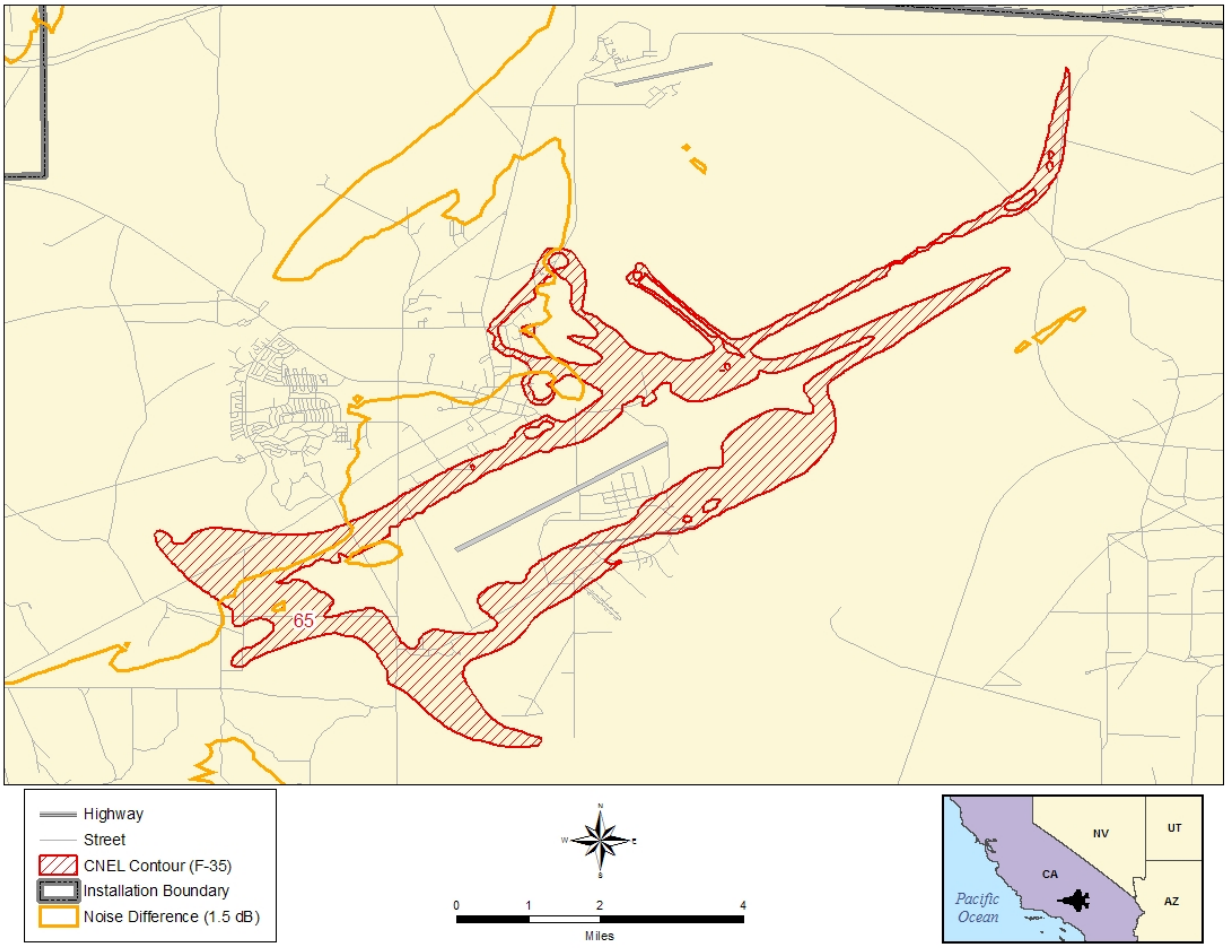

Figure F.2-12: 1.5 dB Increases within the 65 dB CNEL Contour

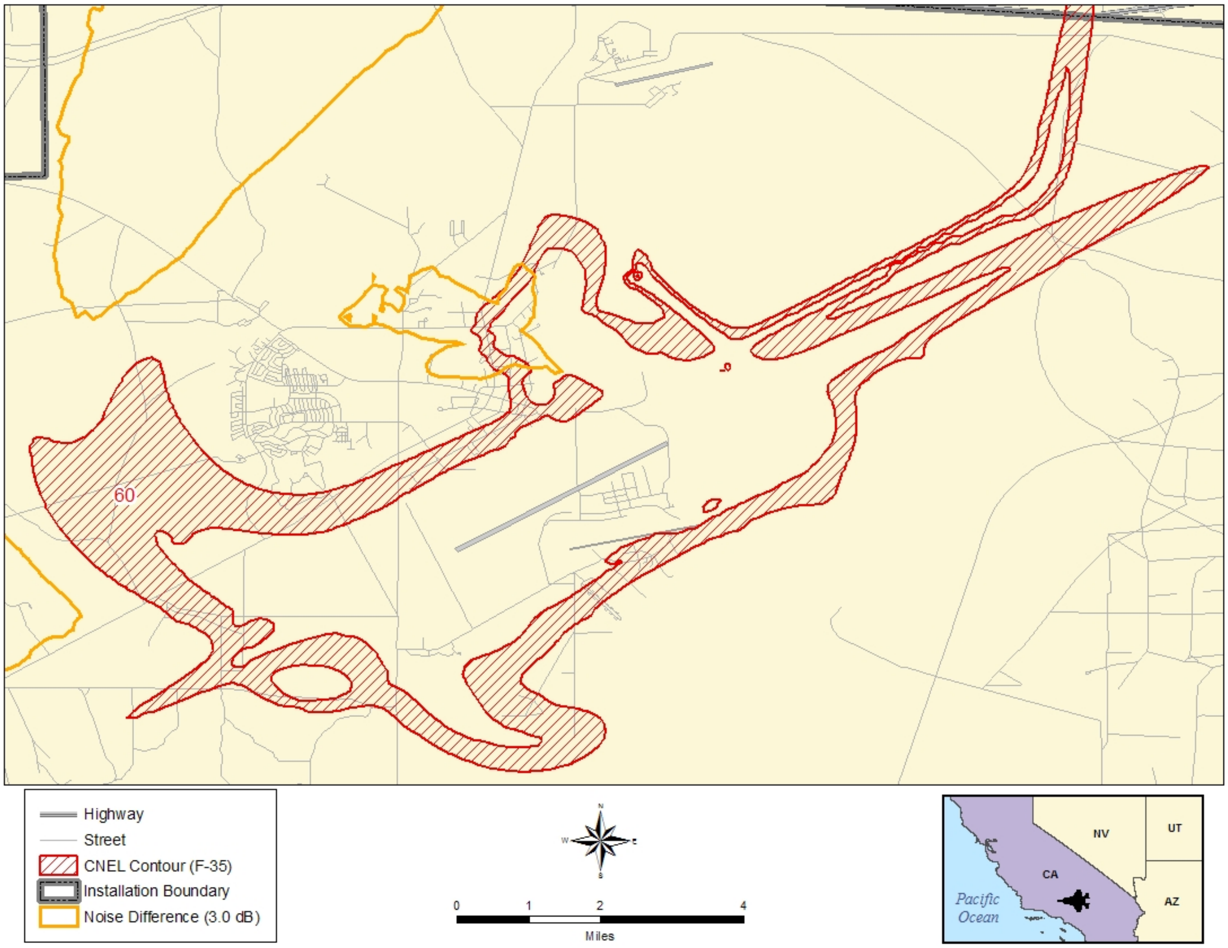

Figure F.2-13: 3.0 dB Increases within the 60 CNEL Contour

As illustrated in Table F.2-16, acres of housing, administrative, community service/commercial, and medical land uses would be anticipated to remain unchanged over existing baselines. Land use increases created by the Proposed Action would be for the lakebed by 377 acres (12.7%), outdoor recreation by 307 acres, industrial by 59 acres (28.9%), engineering by 158 acres (19.9%), buffer zone by 512 acres (12.1%), and air operations and maintenance by 42 acres (1.3%).

Table F.2-16: Land Uses (Acres) Potentially Affected by the Proposed JSF DT within Edwards AFB Boundary

Land Use Type	Existing CNEL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Administrative	1	1	0	0	0	2
Air Operations & Maintenance	1,357	530	424	397	527	3,235
Buffer Zone	2,431	1,242	431	105	9	4,218
Community Service/Commercial	10	0	0	0	0	10
Engineering	532	212	0	25	27	796
Industrial	203	0	0	0	0	203
Lakebed	2,206	558	146	44	7	2,961

Table F.2-16: Land Uses (Acres) Potentially Affected by the Proposed JSF DT within Edwards AFB Boundary (continued)

Land Use Type	Existing CNEL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Medical	1	0	0	0	0	1
Outdoor Recreation	0	0	0	0	0	0
Housing	0	0	0	0	0	0
Land Use Type	**With Proposed JSF DT CNEL Contour Bands**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Administrative	0	1	0	0	0	1
Air Operations & Maintenance	1,294	598	418	421	546	3,277
Buffer Zone	2,547	1,506	530	134	13	4,730
Community Service/Commercial	10	0	0	0	0	10
Engineering	559	266	77	30	22	954
Industrial	246	11	5	0	0	262
Lakebed	2,470	652	159	56	0	3,337
Medical	1	0	0	0	0	1
Outdoor Recreation	307	0	0	0	0	307
Housing	0	0	0	0	0	0
Land Use Type	**Change**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Administrative	-1	0	0	0	0	-1
Air Operations & Maintenance	-63	68	-6	24	19	42
Buffer Zone	116	264	99	29	4	512
Community Service/Commercial	0	0	0	0	0	0
Engineering	27	54	77	5	-5	157
Industrial	43	11	5	0	0	59
Lakebed	264	94	13	13	-7	377
Medical	0	0	0	0	0	0
Outdoor Recreation	307	0	0	0	0	307
Housing	0	0	0	0	0	0

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005).

Notes: This is reflective of both Alternatives One and Two.

For noise sensitive receptors (e.g., historic sites, schools, hospitals, etc..), specific locations have been analyzed for 1.5 dB and 3.0 dB increases by obtaining specific latitude and longitude locations and plotting dB deltas for both the existing baseline and Proposed Action noise conditions. These locations are identified along with the existing and Proposed Action dB values in Table F.2-17 for locations close to or on Edwards AFB. Additionally, noise sensitive receptors and their distance from the Edwards AFB airfield are identified in Table F.2-18 and are considered to be significantly distant enough from the airfield to warrant no further analysis.

Table F.2-17: Edwards AFB Comparison Non-Residential Noise Sensitive Receptors

Name	Type	Existing dB	With Proposed JSF DT dB	Change dB
Bailey Avenue Elementary School	School	51.7	53.5	1.8
Desert High School	School	52.6	54.5	1.9
Forbes Avenue Elementary School	School	52.8	54.9	2.1
Irving Branch Elementary School	School	52.6	54.5	1.9
Muroc Golf Course	Public Park	56.1	57.9	1.8
Payne Avenue Middle School	School	52.2	53.9	1.7

Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005).
Note: This is reflective of both Alternatives One and Two.

Table F.2-18: Additional Edwards AFB Non-Residential Noise Sensitive Receptors Distance from Airfield

Name	Type	Distance (Miles)
Boron Junior/Senior High School	School	14
Burro Schmidt's Tunnel	Historic	32
Indian Wells	Historic	51
Last Chance Canyon	Historic	33
Lynch School	School	8
Mule-Team Borax Terminus	Historic	19
Oak Creek Pass	Historic	36
Rand Mining District	Historic	34
Robert McGowan High School	School	8
Tehachapi Railroad Depot	Historic	35
West Boron Elementary School	School	13

Source: Booz Allen Hamilton Analysis (March 2006).

As illustrated in Table F.2-16, there would be slight changes in the noise environment anticipated as a result of the Proposed Action. However, no increases of 1.5 dB within the 65 dB CNEL and greater noise contour, or 3.0 dB increases within the 60 CNEL noise contour would be anticipated over non-residential noise sensitive locations. As previously stated, there would be no residential or incompatible land uses located within either the baseline or Proposed Action 65 dB CNEL or greater noise contour.

F.2.3 Additional Noise Comparisons

For reference purposes, a SEL table has been created to compare the proposed F-35 noise levels to the F-16C, a similar single engine aircraft and a predominant legacy aircraft at Edwards AFB. As previously described in Section F.1.2, SEL is another metric that is reported for aircraft flyovers. It is computed from dBA sound levels and is a convenient method for describing noise from individual aircraft events. In addition, cumulative noise metrics such as equivalent noise level, community noise equivalent level, and day-night noise level are computed from SEL data.

Table F.2-19 illustrates a SEL values based on military thrust departure. This analysis is for comparison purpose only and is intended to provide a general comparison of the anticipated noise contribution for the two aircraft. It should be noted that SEL illustrates noise exposure depicted for a specific second of duration.

Table F.2-19: Edwards AFB SEL Values for Legacy and JSF Aircraft

Lateral Distance (ft)	Military Power Throttle Setting	
	F-16C SEL (dB)	F-35 SEL (dB)
100	107	124
125	107	123
160	107	123
200	107	123
250	107	123
315	107	123
400	106	123
500	106	123
630	106	122
800	105	121
1,000	104	120
1,250	103	119
1,600	101	118
2,000	100	116
2,500	98	114
3,150	96	112
4,000	93	109
5,000	91	107
6,300	88	104
8,000	85	100
10,000	82	97
12,500	78	93
16,000	74	89
20,000	69	84
25,000	62	77

Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).
Note: Lateral Distance is feet from point of departure on Runway 4/22 with fixed altitude of 1,000 feet.
Assumes temperature of 51˚F, relative humidity of 46%, and no winds.

As illustrated, the relative noise contribution of the F-35 compared to the F-16C is larger at specific distances from the airfield at Edwards AFB. Therefore, a single F-35 departure would contribute more noise than a single F-16C departure. However when annualized, as depicted in the cumulative CNEL noise metric, the greater number of total F-16C operations, compared to the relatively infrequent F-35 operations, would be expected to have a larger impact on the overall noise environment at Edwards AFB.

F.3 NAS PATUXENT RIVER NOISE ENVIRONMENT

The purpose of this section is to document the analysis of the noise environment at NAS Patuxent River (See Figure F.3-1). The following subsections describe the operational levels, Fleet mix, runway and flight track utilization used in the development of the NAS Patuxent River existing baseline.

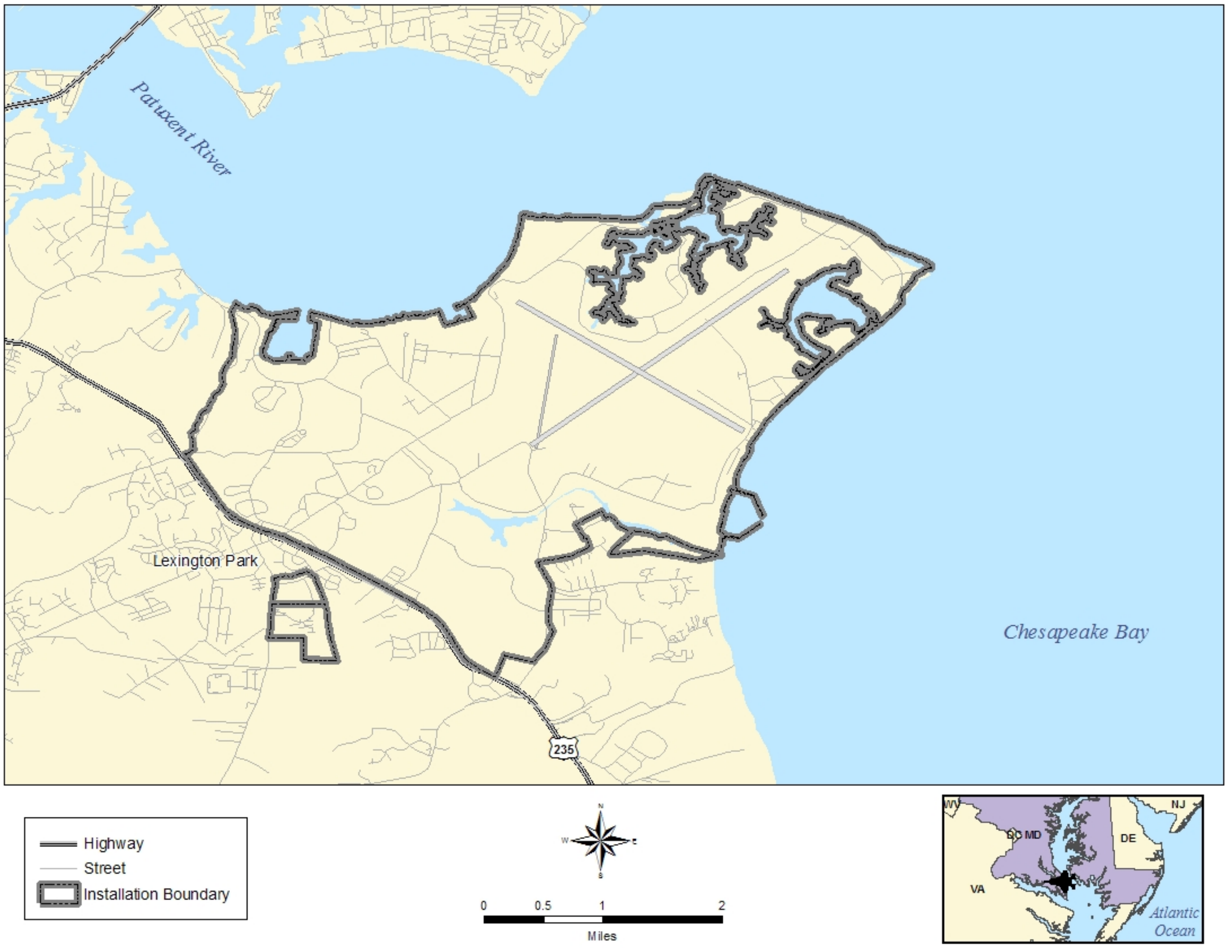

Figure F.3-1: NAS Patuxent River Location Map

F.3.1 NAS Patuxent River Existing Baseline

Alternative Three from the 1998 Final EIS (FEIS) for Increased Flight and Related Operations in the Patuxent River Complex has been used as the existing baseline for NAS Patuxent River. Alternative 3 assumed a total of 24,404 annual flight hours. This annual flight hour total is expressed in number of annual sorties in the following sections. Contours were produced using NOISEMAP Version 7.2 from the inputs contained in the 1998 FEIS to maintain consistency between contours produced with and without the proposed JSF DT.

F.3.1.1 Existing Operational Levels, Runway Use, and Fleet Mix

Table F.3-1 illustrates the average daily arrival, departure, and closed pattern runway use currently existing at NAS Patuxent River. Runway use is expressed as a percentage and is illustrated to present the commonly used runway preference. The existing baseline Fleet mix and average daily operations for each modeled aircraft are presented in Table F.3-2, while average day time and night time flight track utilization by aircraft is presented in Tables F.3-3 and F.3-4.

Table F.3-1: Existing Runway Use at NAS Patuxent River

Arrivals			
	Day	**Night**	**Total**
Runway 06	25.97%	23.68%	25.87%
Runway 14	14.60%	13.16%	14.54%
Runway 18	9.70%	13.82%	9.88%
Runway 24	17.35%	15.13%	17.25%
Runway 32	22.67%	20.39%	22.57%
Runway 36	9.70%	13.82%	9.88%
Total	***95.61%***	***4.39%***	***100%***
Departures			
	Day	**Night**	**Total**
Runway 06	26.14%	3.33%	25.76%
Runway 14	15.89%	3.33%	15.68%
Runway 18	8.58%	80.00%	9.79%
Runway 24	16.76%	0.00%	16.47%
Runway 32	22.89%	3.33%	22.56%
Runway 36	9.73%	10.00%	9.74%
Total	***98.30%***	***1.70%***	***100%***
Closed Patterns			
	Day	**Night**	**Total**
Runway 06	13.84%	33.80%	14.81%
Runway 14	23.99%	12.68%	23.44%
Runway 18	12.16%	4.23%	11.77%
Runway 24	13.84%	33.80%	14.81%
Runway 32	16.00%	5.99%	15.52%
Runway 36	20.18%	9.51%	19.66%
Total	***95.12%***	***4.88%***	***100%***

Source: Final EIS (FEIS) for Increased Flight and Related Operations in the Patuxent River Complex (1998).

Table F.3-2: Existing Aircraft Daily Fleet Mix and Operations by Day/Night Operations

Aircraft	Day	Night
A-10A	4.62	0.00
AH64	0.43	0.24
B-707-320B	3.78	0.04
C-135A	1.00	0.00
C-5A	0.26	0.00
CH-53E	3.42	0.18
EA-6B	2.88	0.00
F-14A	6.30	0.02
F-15E	0.54	0.00
F-16A	4.32	0.00
F/A-18A/B/C	16.85	0.57
F/A-18E/F	8.73	0.00
P-3A	12.92	0.49
S-3A&B	5.40	0.29
T-2C	9.95	0.05
T-38A	11.26	0.00
T-45	0.00	0.00
UH-1N	4.32	0.68
UH60A	24.74	2.40
Total	***123.72***	***4.96***

Source: Final EIS (FEIS) for Increased Flight and Related Operations in the Patuxent River Complex (1998).

Table F.3-3: Existing NAS Patuxent River Daytime Flight Track Utilization

Track	Aircraft																			Total
	A-10	AH-64	B-707-320B	C-135A	C-5A	CH-53E	EA-6B	F-14A	F-15E	F-16A	F-18A/C	F-18E/F	P-3A	S-3 A&B	T-2C	T-38A	T-45	UH-1N	UH-60A	
02T1						0.42												0.70	6.54	7.66
06A1	0.49	0.03	0.60	0.16	0.04	0.25	0.04	0.10	0.06	0.46	0.39	0.51	0.95	0.10	0.08			0.03		4.29
06D1	0.49		0.61	0.16	0.04	0.00	0.04	0.10	0.06	0.45	0.47	0.43	0.44	0.23	0.00	0.12				3.64
06D2		0.11				0.26	0.12	0.31		0.01	1.47	0.93	0.66	0.10	0.69	0.67		0.11		5.44
06F1							0.02	0.00				0.01								0.03
06F2							0.19	0.04			0.01	0.13								0.37
06G1	0.49					0.05	0.03	0.02	0.06	0.45	0.21		0.71	0.09	0.21	0.28		0.10	0.44	3.14
06O1							0.06	0.23		0.01	1.13	0.64	0.03	0.15	0.58	0.59				3.42
06O2							0.06	0.08			0.38	0.21	0.03	0.06	0.03	0.03				0.88
06T1							0.27	1.60			1.63		0.99	0.83	1.52	1.64				8.48
06T2							0.09	0.17			0.29		0.33	0.21	0.08	0.09				1.26
06T3																				0.00
06T4																				0.00
14A1	0.28	0.02	0.34	0.09	0.02	0.14	0.02	0.06	0.03	0.26	0.22	0.29	0.53	0.05	0.05			0.02		2.42
14D1	0.28		0.34	0.09	0.02	0.00	0.02	0.06	0.03	0.26	0.26	0.24	0.66	0.13	0.00	0.07				2.46
14D2		0.06				0.15	0.07	0.18		0.00	0.82	0.52	0.37	0.06	0.39	0.38		0.06		3.06
14F1							0.01				0.00	0.01								0.02
14F2							0.11	0.02			0.01	0.07								0.21
14G1	0.28					0.05	0.02	0.01	0.03	0.26	0.12		0.40	0.05	0.12	0.16		0.10	0.44	2.04
14O1							0.04	0.01			0.04	0.02	0.02		0.02	0.02				0.17
14O2							0.04	0.16			0.80	0.45	0.02	0.12	0.32	0.33				2.24
14T1							0.02				0.16		0.08	0.58	0.04	0.05				0.93
14T2							0.18				0.91		0.67		0.85	0.92				3.53
14T3																				0.00
14T4																				0.00
18A1						0.13												0.35	1.15	1.63
18A2						0.01												0.04	0.33	0.38
18A3						0.05												0.11	1.04	1.20
18D1						0.05												0.14	0.02	0.21
18D2						0.03												0.08	0.20	0.31
18D3						0.12												0.33	2.01	2.46
20T1						0.42												0.70	6.54	7.66
24A1	0.34	0.02	0.41	0.11	0.03	0.17	0.03	0.07	0.04	0.31	0.27	0.35	0.65	0.07	0.06			0.02		2.95
24D1	0.34		0.42	0.11	0.03	0.00	0.03	0.07	0.04	0.31	0.32	0.29	0.30	0.16	0.00	0.08				2.50
24D2		0.07				0.18	0.08	0.22		0.01	1.01	0.64	0.04	0.07	0.47	0.46		0.07		3.32
24F1							0.01	0.00			0.00	0.01								0.02
24F2							0.13	0.03			0.01	0.09								0.26
24G1	0.34					0.05	0.02	0.01	0.04	0.31	0.15		0.49	0.06	0.14	0.20		0.10	0.44	2.35
24O1							0.04	0.05			0.26	0.15	0.02		0.02	0.02				0.56
24O2							0.04	0.16			0.77	0.44	0.02		0.40	0.40				2.23
24T1							0.12	0.19			0.33		0.45	0.36	0.05	0.06				1.56
24T2							0.12	0.58			0.99		0.45	0.36	1.04	1.13				4.67
24T3													0.00		0.00	0.00				0.00
24T4													0.00		0.00	0.00				0.00
32A1	0.43	0.03	0.52	0.14	0.04	0.22	0.03	0.09	0.05	0.40	0.34	0.44	0.83	0.09	0.07			0.02		3.74
32D1	0.43		0.54	0.14	0.04		0.04	0.09	0.05	0.40	0.41	0.37	0.38	0.20		0.11				3.20
32D2		0.09				0.23	0.11	0.27		0.01	1.28	0.82	0.57	0.09	0.60	0.59		0.09		4.75
32F1							0.02	0.00			0.00	0.01								0.03
32F2							0.17	0.04			0.01	0.11								0.33
32G1	0.43					0.05	0.03	0.02	0.05	0.40	0.19		0.63	0.08	0.18	0.25		0.10	0.44	2.85
32O1							0.05	0.23		0.01	1.12	0.63	0.02	0.17	0.51	0.52				3.26
32O2							0.05	0.04			0.20	0.11	0.02	0.02	0.03	0.03				0.50
32T1							0.23	0.74			1.26		0.87	0.73	1.33	1.43				6.59
32T2							0.08	0.25			0.42		0.29	0.18	0.07	0.08				1.37
32T3																				0.00
32T4																				0.00
36A1						0.13												0.35	1.15	1.63
36A2						0.01												0.04	0.33	0.38
36A3						0.05												0.11	1.04	1.20
36D1						0.05												0.14	0.42	0.61
36D2						0.03												0.08	0.20	0.31
36D3						0.12												0.33	2.01	2.46
Total	4.62	0.43	3.78	1.00	0.26	3.42	2.88	6.30	0.54	4.32	18.66	8.92	12.92	5.40	9.95	10.71	0.00	4.32	24.74	123.67

Source: Final EIS (FEIS) for Increased Flight and Related Operations in the Patuxent River Complex (1998).

Table F.3-4: Existing NAS Patuxent River Nighttime Flight Track Utilization

Track	Aircraft																			Total
	A-10	AH-64	B-707-320B	C-135A	C-5A	CH-53E	EA-6B	F-14A	F-15E	F-16A	F-18A/C	F-18E/F	P-3A	S-3 A&B	T-2C	T-38A	T-45	UH-1N	UH-60A	
02T1						0.05												0.16	0.75	0.96
06A1		0.08	0.01			0.01					0.01		0.10	0.01				0.08		0.30
06D1																				0.00
06D2						0.01							0.01							0.02
06F1																				0.00
06F2																				0.00
06G1													0.01						0.02	0.03
06O1											0.03			0.01	0.01					0.05
06O2											0.01									0.01
06T1								0.01			0.14		0.04	0.07	0.01					0.27
06T2											0.03		0.01	0.02						0.06
06T3																				0.00
06T4																				0.00
14A1		0.04	0.01			0.01							0.06	0.01				0.04		0.17
14D1													0.01							0.01
14D2													0.01							0.01
14F1																				0.00
14F2																				0.00
14G1																			0.02	0.02
14O1																				0.00
14O2											0.02			0.01						0.03
14T1											0.01			0.03						0.04
14T2											0.05		0.01							0.06
14T3																				0.00
14T4																				0.00
18A1																		0.04	0.04	0.08
18A2																			0.02	0.02
18A3						0.01												0.01	0.09	0.11
18D1																		0.01	0.44	0.45
18D2																			0.01	0.01
18D3																			0.02	0.02
20T1						0.05												0.16	0.75	0.96
24A1		0.05	0.01			0.01							0.07	0.01				0.05		0.20
24D1																				0.00
24D2																		0.00		0.00
24F1																				0.00
24F2																				0.00
24G1																			0.02	0.02
24O1											0.01									0.01
24O2											0.02									0.02
24T1											0.02		0.01	0.02						0.05
24T2											0.06		0.01	0.02	0.01					0.10
24T3																				0.00
24T4													0.00							0.00
32A1		0.07	0.01			0.01							0.09	0.01				0.07		0.26
32D1																				0.00
32D2						0.01							0.01							0.02
32F1																				0.00
32F2																				0.00
32G1																			0.02	0.02
32O1											0.03			0.01	0.01					0.05
32O2																				0.00
32T1								0.01			0.10		0.03	0.05	0.01					0.20
32T2											0.03		0.01	0.01						0.05
32T3																				0.00
32T4																				0.00
36A1																		0.04	0.04	0.08
36A2																			0.02	0.02
36A3						0.01												0.01	0.09	0.11
36D1																		0.01	0.02	0.03
36D2																			0.01	0.01
36D3																			0.02	0.02
Total	0.00	0.24	0.04	0.00	0.00	0.18	0.00	0.02	0.00	0.00	0.57	0.00	0.49	0.29	0.05	0.00	0.00	0.68	2.40	4.96

Source: Final EIS (FEIS) for Increased Flight and Related Operations in the Patuxent River Complex (1998).

Established paths for aircraft arriving to and departing from NAS Patuxent River are presented in Figures F.3-2 through F.3-4, based on Alternative 3 of the 1998 FEIS. Meetings with the JSF Verification and Test (V&T) Team, NAS Patuxent River Air Operations, and NAVAIR Ranges Sustainability Office personnel indicated the flight tracks presented are representative of the aircraft routing currently used at NAS Patuxent River. No modifications to flight tracks or track utilization have been made beyond what was presented in the 1998 FEIS.

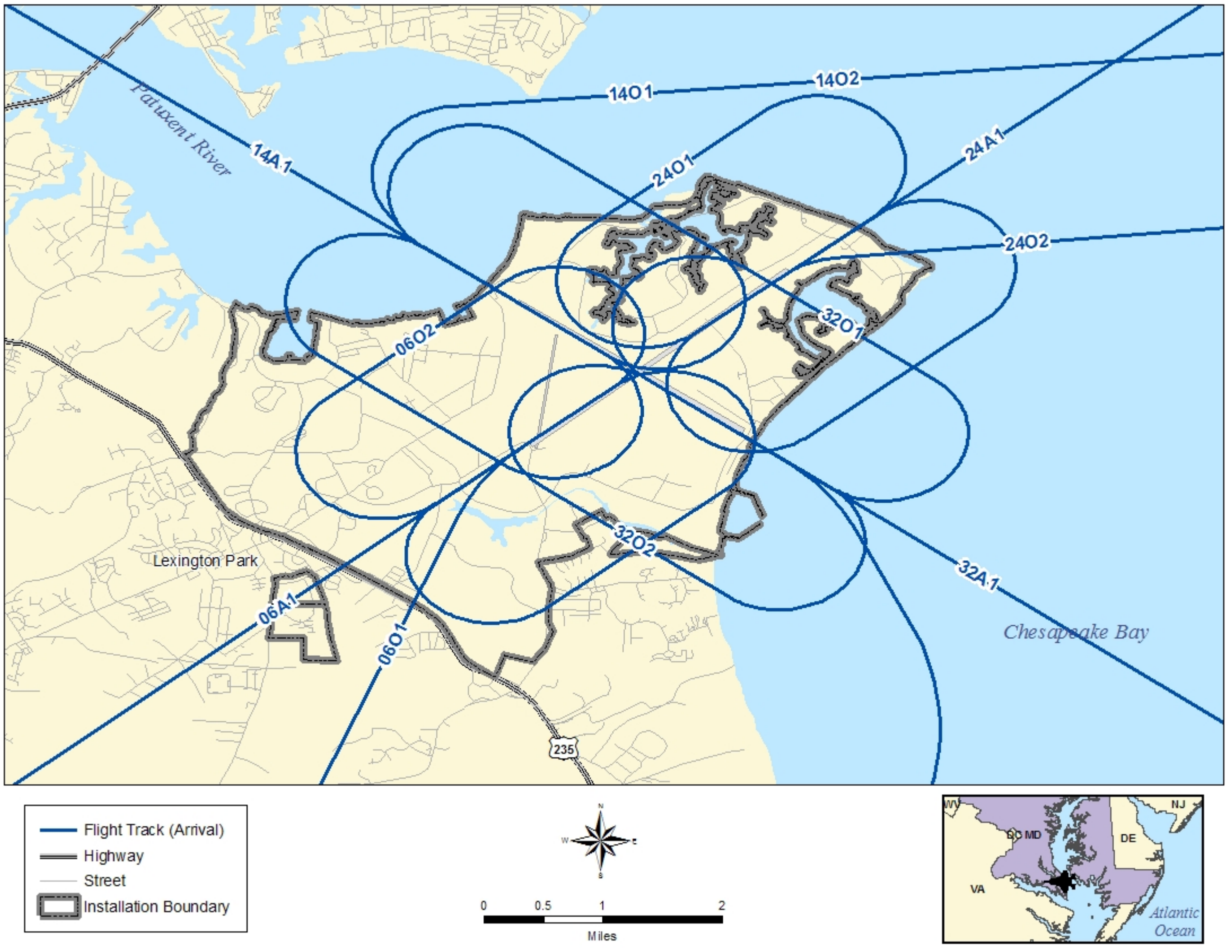

Figure F.3-2: Existing Arrival Flight Tracks

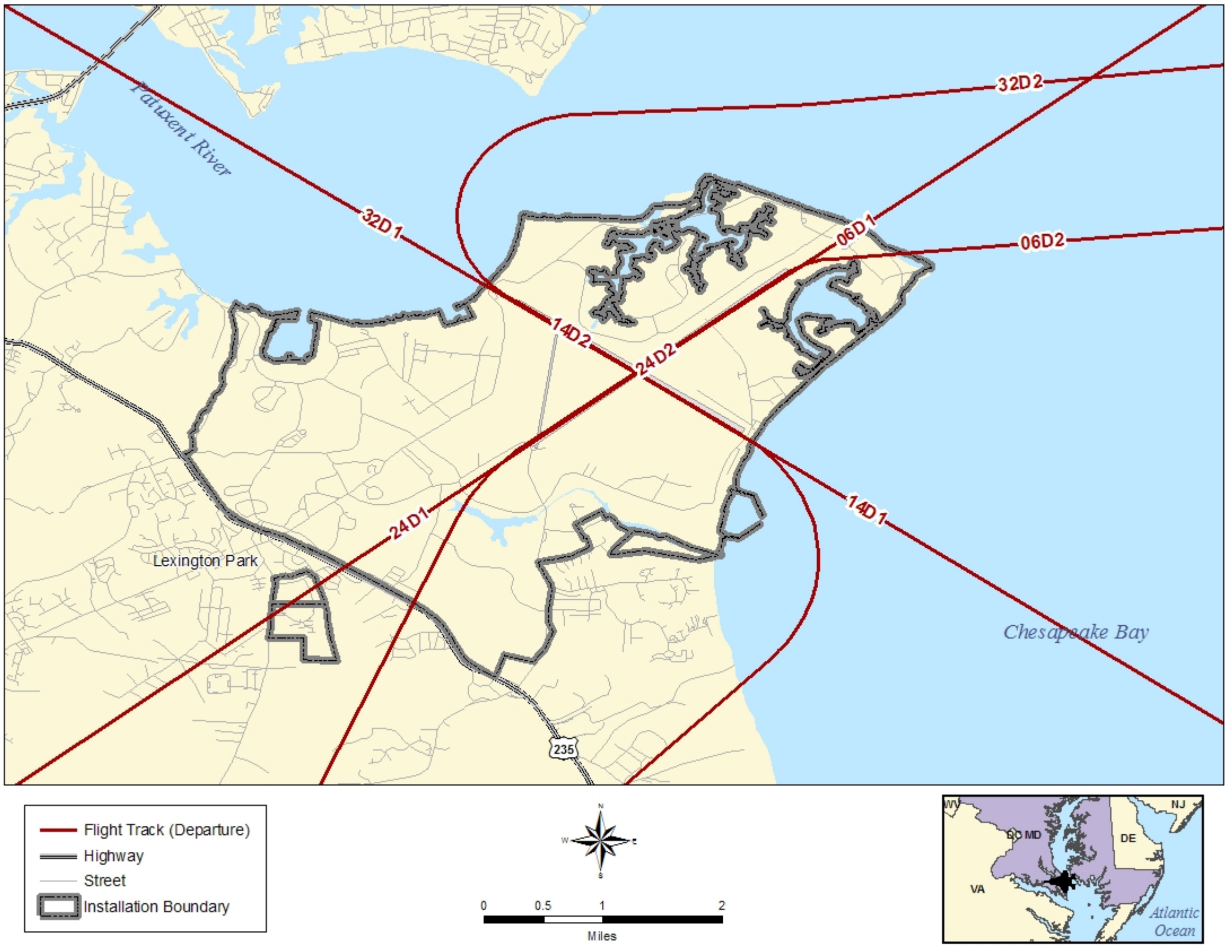

Figure F.3-3: Existing Departure Flight Tracks

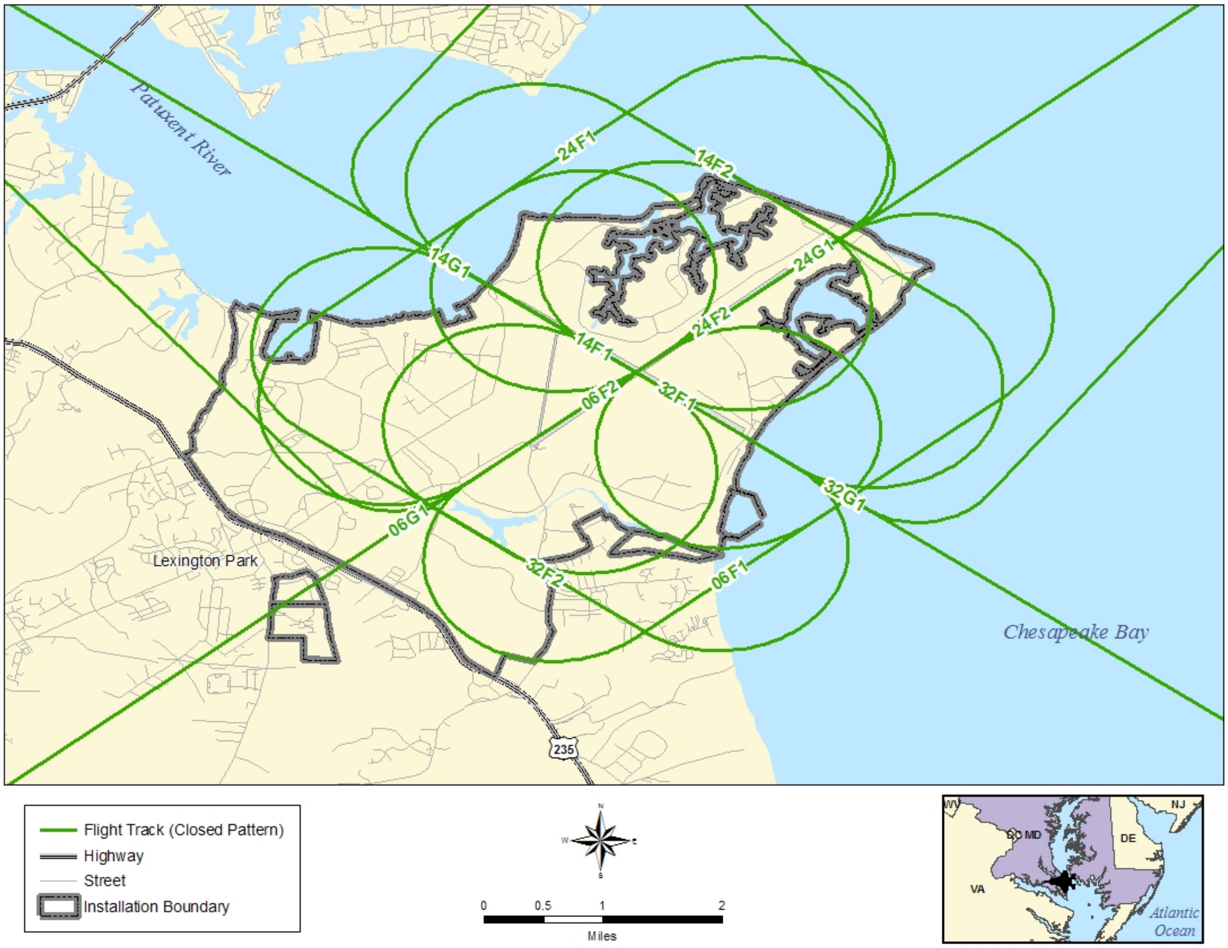

Figure F.3-4: Existing Closed Pattern Flight Tracks

F.3.1.2 Existing NAS Patuxent River Noise Contours

Existing baseline DNL contours have been developed based upon the aircraft Fleet mix, number of operations, time of day of operations, and runway utilization presented above. Figure F.3-5 illustrates the existing baseline noise contour for operations at NAS Patuxent River. Areas affected by the existing DNL contours (65, 70, 75, 80, and 85 dB) for NAS Patuxent River are presented in Table F.3-5.

Figure F.3-5: Existing Noise Contours at NAS Patuxent River

Table F.3-5: NAS Patuxent River Existing Baseline Noise Impacts

DNL Contour Bands	Area Acres (On-Installation)	Area Acres (Off-Installation)
65-70 dB	1,302	772
70-75 dB	1,750	36
75-80 dB	1,024	0
80-85 dB	569	0
85+ dB	797	0
65 dB and greater (Total)	***5,442***	***808***

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

As illustrated in Figure F.3-5, NAS Patuxent River existing baseline noise affect areas in St. Mary's County directly adjacent to the installation property to the south and west. As illustrated in Figure F.3-6, land uses on the south side of NAS Patuxent River, between Maryland Highway 235 and the Chesapeake Bay, consist mostly of vacant forested lands inter-mixed with small pockets of agricultural and residential land uses. Land uses on the western side of NAS Patuxent River, between Maryland Highways 235 and 246, consist mostly of commercial, industrial, and residential uses.

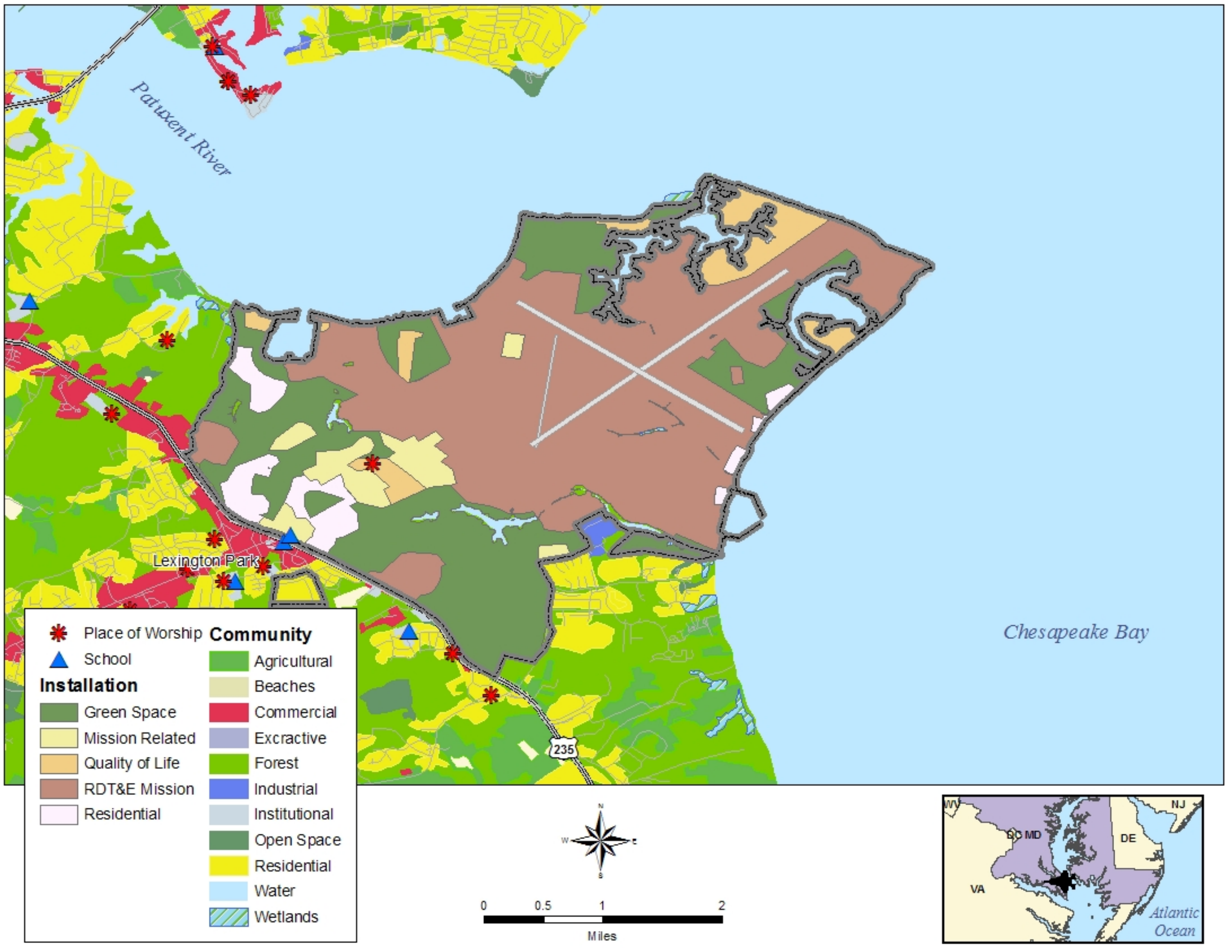

Figure F.3-6: NAS Patuxent River Land Use

Table F.3-6 presents the number of acres of different land use types that are within the noise contours associated with the existing baseline. For installation property within the 65 dB and greater DNL noise contours, approximately 115 acres are residential development, 3,130 acres are Research, Development, Test, and Evaluation (RDT&E) mission, 381 acres are quality of life, 216 acres are mission related, and 1,449 acres are green space lands. The total 65dB and greater DNL noise contours off-installation encompass approximately 12 acres of commercial, 32 acres of industrial, and approximately 347 acres of residential lands. The remaining areas currently impacted by the existing 65 dB and greater DNL noise contours are primarily forested and agricultural lands.

Table F.3-6: NAS Patuxent River Existing Baseline Affected Land Uses (Acres)

Land Use Type	DNL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
On-Installation						
Green Space	659	491	215	75	9	1,449
Mission Related	143	54	19	0	0	216
Quality of Life	56	211	104	10	0	381
RDT&E Mission	280	951	647	469	783	3,130
Residential	71	0	27	13	4	115
Off-Installation						
Commercial	12	N/A	N/A	N/A	N/A	12
Industrial	26	6	N/A	N/A	N/A	32
Low Density Residential	5	N/A	N/A	N/A	N/A	5
Medium Density Residential	262	9	N/A	N/A	N/A	271
High Density Residential	69	2	N/A	N/A	N/A	71

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

F.3.2 Analysis

F.3.2.1 Operational Levels, Runway Use, and Fleet Mix

Table F.3-7 illustrates the average daily arrival, departure, and closed pattern runway use for the proposed JSF DT at NAS Patuxent River. Alternative Three of the 1998 FEIS represents the maximum operational levels anticipated at NAS Patuxent River, therefore substitutions of legacy aircraft have been performed with F-35 aircraft. Additional assumptions have also been made regarding performance profiles and after-burner (AB) utilization for the F-35. The major modeling input variables for this analysis are the number of aircraft operations, specifically the addition of the proposed F-35 operations to the existing NAS Patuxent River Fleet mix.

Table F.3-7: Proposed JSF DT Condition Runway Use at NAS Patuxent River

Arrivals			
	Day	**Night**	**Total**
Runway 06:	24.74%	23.68%	24.70%
Runway 06VTOL:	0.43%	0.00%	0.41%
Runway 14:	13.92%	13.16%	13.89%
Runway 14VTOL:	0.24%	0.00%	0.23%
Runway 18:	9.70%	13.82%	9.88%
Runway 24:	16.53%	15.13%	16.46%
Runway 24VTOL:	0.29%	0.00%	0.28%
Runway 32:	24.08%	20.39%	23.92%
Runway 32VTOL:	0.37%	0.00%	0.35%
Runway 36:	9.70%	13.82%	9.88%
Total	95.61%	4.39	100%
Departures			
	Day	**Night**	**Total**
Total:	34.726	0.600	35.326
Runway 06:	25.52%	3.33%	25.14%
Runway 06VTOL:	0.42%	0.00%	0.41%
Runway 14:	15.55%	3.33%	15.34%
Runway 14VTOL:	0.23%	0.00%	0.23%
Runway 18:	8.58%	80.00%	9.79%
Runway 24:	16.33%	0.00%	16.05%
Runway 24VTOL:	0.29%	0.00%	0.28%
Runway 32:	22.35%	3.33%	22.03%
Runway 32VTOL:	0.37%	0.00%	0.36%
Total	***98.30%***	***1.70%***	***100%***
Closed Patterns			
	Day	**Night**	**Total**
Runway 06	13.84%	33.80%	14.81%
Runway 14	23.98%	12.68%	23.43%
Runway 18	12.17%	4.23%	11.78%
Runway 24	13.84%	33.80%	14.81%
Runway 32	16.04%	5.99%	15.55%
Runway 36	20.14%	9.51%	19.62%
Total	***95.12%***	***4.88%***	***100%***

As illustrated in Table F.3-8 and F.3-9, 4,598 annual (~12.6 daily) F-35 operations have been added to the baseline Fleet mix. In order to not exceed the baseline operational level, an equal number of legacy aircraft currently operating at NAS Patuxent River have been removed, meaning, the same number of total aircraft operations have been modeled for both the existing baseline and the Proposed Action. F/A-18 aircraft have substituted because this aircraft type is representative of the most common aircraft being tested at NAS Patuxent River, during the period of time in which the existing baseline was compiled for the 1998 FEIS. The existing Fleet mix contained approximately 25.5 daily operations of similar legacy aircraft. This action was performed (based on discussion with representatives from NAS

Patuxent River Air Operations, NAVAIR Ranges Sustainability Office, and JSF V&T Team) to reflect the anticipated Fleet mix during the proposed F-35 DT.[1]

Table F.3-8: Proposed F-35 Aircraft Operations by Mission (Test Year 4)

Operation	No. of events	% of Total	% AB used (Departures Only)
Departures			
Vertical	165	9%	N/A
Short	280	16%	N/A
Conventional	1237	70%	10%
Catapult	80	5%	27%
Total	***1,762***	***100%***	***37%***
Arrivals			
Vertical	160	9%	N/A
Short	240	14%	N/A
Conventional	1062	60%	N/A
Arrested	300	17%	N/A
Total	***1,762***	***100%***	-
Closed Patterns			
Short	180	17%	N/A
Conventional	894	83%	N/A
Total	***1,074***	***100%***	-
Grand Total	***4,598***	-	-

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

Table F.3-9: F-35 Aircraft Daily Fleet Mix and Operations by Day/Night Operations

Aircraft	Day	Night
A-10A	4.62	0.00
AH64	0.43	0.24
B-707-320B	3.78	0.04
C-135A	1.00	0.00
C-5A	0.26	0.00
CH-53E	3.42	0.18
EA-6B	2.88	0.00
F-14A	6.30	0.02
F-15E	0.54	0.00
F-16A	4.32	0.00
F/A-18A/B/C	10.25	0.57
F/A-18E/F	4.73	0.00

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

[1] *Briggs 2005; Maack, Andrew 2004–2005, Nantz 2005, Gallant 2005, and Willis 2005.*

Table F.3-9: F-35 Aircraft Daily Fleet Mix and Operations by Day/Night Operations (Continued)

Aircraft	Day	Night
P-3A	12.92	0.49
S-3A&B	5.40	0.29
T-2C	9.95	0.05
T-38A	11.26	0.00
T-45	0.00	0.00
UH-1N	4.32	0.68
UH60A	24.74	2.40
F-35	12.60	0.00
Total	***123.72***	***4.96***

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

As illustrated in Tables F.3-10 and F.3-11, the Proposed Action would use the same flight tracks as those currently used by similar legacy aircraft in the existing baseline. Runway use is expressed as a percentage. VTOL of the F-35 aircraft would originate from the STOVL pad located in the middle of the northwest side of the Runway 6/24 and Runway 14/32 intersection. During F-35 departures, it is assumed that once aircraft rotation is achieved (forward movement) that VTOL departures would merge with existing flight tracks. Therefore, there are no additional aircraft flight tracks beyond those illustrated in the existing baselines.

NOISEMAP does not have the ability to model VTOL operations, therefore adjustments were required to best simulate such an activity. In the case of NAS Patuxent River, VTOL operations have been modeled as very slow departures and arrivals [~10 knots (kts)], with steep [150 feet above ground level (AGL) going four feet down track]. This has been performed to recreate the longer duration of the noise event that would be expected from a VTOL operation and should be considered relatively representative of a VTOL operation given the drift due to winds and control limits of the aircraft.

A predominate component of noise exposure from aviation noise is a result of climb and descent rates from contributing aircraft. Aircraft rates of climb and descent can be influenced by the weight of the aircraft, thrust settings, including AB departures and climb settings, among others. When modeling noise impacts in NOISEMAP, rates of climb and descent and the factors that are used to determine these rates are typically contained in performance profiles for each specific aircraft modeled.

Three distinct performance profiles have been provided by the Lockheed Martin Flight Simulation Group regarding operational performance characteristics for the F-35. Each of the three profiles are appropriate for use under different loading/stores conditions. The first profile is a Light Weight Profile used for the departures with mission adequate fuel loads and little to no stores anticipated. The Medium and Heavy Weight Profiles assume varying capacities of fuel and moderate to full stores loading. The Heavy Weight profile would most commonly be associated with AB departures, while the Medium Weight and particularly the Light Weight performance profiles would be less common in AB departures.

Conversations with the JSF V&T Team indicated, based on missions planned during the proposed Test Year 4 JSF DT, the F-35 would involve only light stores requirements and the need for AB departures would be no greater than 10% of the total proposed flights. This led to the decision to use the Light Weight operational profile for proposed F-35 operations.

Table F.3-10: NAS Patuxent River Daytime Flight Track Utilization

Track	Aircraft																				Total
	A-10A	AH64	B-707-320B	C-135A	C-5A	CH-53E	EA-6B	F-14A	F-15E	F-16A	F-18A/C	F-18E/F	P-3A	S-3A&B	T-2C	T-38A	T-45	UH-1N	UH60A	X-35	
02T1						0.42												0.7	6.54		**7.66**
06A1	0.49	0.03	0.6	0.16	0.04	0.25	0.04	0.1	0.06	0.46	0.20	0.27	0.95	0.1	0.08	0.18	0	0.03		0.35	**4.39**
06AVTOLR																				0.14	**0.14**
06D1	0.49		0.61	0.16	0.04	0	0.04	0.1	0.06	0.45	0.25	0.23	0.44	0.23	0	0.12	0			0.34	**3.56**
06D2		0.11				0.26	0.12	0.31		0.01	0.78	0.49	0.66	0.1	0.69	0.67	0	0.11		0.99	**5.30**
06F1							0.02	0			0.00	0.01								0.07	**0.09**
06F2							0.19	0.04			0.01	0.08								0.87	**1.18**
06G1	0.49					0.05	0.03	0.02	0.06	0.45	0.12		0.71	0.09	0.21	0.28	0	0.1	0.44		**3.05**
06O1							0.06	0.23		0.01	0.59	0.34	0.03	0.15	0.58	0.59	0			0.65	**3.23**
06O2							0.06	0.08		0	0.20	0.11	0.03	0.06	0.03	0.03	0			0.14	**0.74**
06T1							0.27	1.6			0.96		0.99	0.83	1.52	1.64	0				**7.81**
06T2							0.09	0.17			0.17		0.33	0.21	0.08	0.09	0				**1.14**
06T3													0		0	0					**0.00**
06T4													0		0	0					**0.00**
06VTOLDEP																				0.14	**0.14**
14A1	0.28	0.02	0.34	0.09	0.02	0.14	0.02	0.06	0.03	0.26	0.12	0.15	0.53	0.05	0.05	0.1	0	0.02		0.20	**2.48**
14D1	0.28		0.34	0.09	0.02	0	0.02	0.06	0.03	0.26	0.14	0.13	0.66	0.13	0	0.07	0			0.50	**2.73**
14D2		0.06				0.15	0.07	0.18		0	0.43	0.28	0.37	0.06	0.39	0.38	0	0.06		0.24	**2.67**
14F1							0.01	0			0.00	0.01								0.07	**0.08**
14F2							0.11	0.02			0.01	0.04								0.47	**0.65**
14G1	0.28					0.05	0.02	0.01	0.03	0.26	0.07		0.4	0.05	0.12	0.16	0	0.1	0.44		**1.99**
14O1							0.04	0.01		0	0.02	0.01	0.02	0	0.02	0.02	0			0.01	**0.16**
14O2							0.04	0.16		0	0.42	0.24	0.02	0.12	0.32	0.33	0			0.43	**2.07**
14T1							0.02				0.09		0.08	0.58	0.04	0.05	0				**0.86**
14T2							0.18				0.54		0.67	0	0.85	0.92	0				**3.16**
14T3													0		0	0					**0.00**
14T4															0	0					**0.00**
14VTOL DEP																				0.08	**0.08**
14VTOLArr																				0.08	**0.08**
18A1						0.13												0.35	1.15		**1.63**
18A2						0.01												0.04	0.33		**0.38**
18A3						0.05												0.11	1.04		**1.20**
18D1						0.05												0.14	0.02		**0.21**
18D2						0.03												0.08	0.2		**0.31**
18D3						0.12												0.33	2.01		**2.46**
20T1						0.42												0.7	6.54		**7.66**

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

Table F.3-10: NAS Patuxent River Daytime Flight Track Utilization (Continued)

Track	Aircraft																				Total
	A-10A	AH64	B-707-320B	C-135A	C-5A	CH-53E	EA-6B	F-14A	F-15E	F-16A	F-18A/C	F-18E/F	P-3A	S-3A&B	T-2C	T-38A	T-45	UH-1N	UH60A	X-35	
24A1	0.34	0.02	0.41	0.11	0.03	0.17	0.03	0.07	0.04	0.31	0.14	0.18	0.65	0.07	0.06	0.12	0	0.02		0.24	**3.02**
24D1	0.34		0.42	0.11	0.03	0	0.03	0.07	0.04	0.31	0.17	0.15	0.3	0.16	0	0.08	0			0.62	**2.83**
24D2		0.07				0.18	0.08	0.22		0.01	0.54	0.34	0.04	0.07	0.47	0.46	0	0.07		0.30	**2.84**
24F1							0.01	0			0.00	0.01								0.07	**0.08**
24F2							0.13	0.03			0.01	0.05								0.60	**0.82**
24G1	0.34					0.05	0.02	0.01	0.04	0.31	0.09		0.49	0.06	0.14	0.2	0	0.1	0.44		**2.29**
24O1							0.04	0.05		0	0.14	0.08	0.02	0	0.02	0.02	0			0.10	**0.47**
24O2							0.04	0.16		0	0.40	0.23	0.02	0	0.4	0.4	0			0.45	**2.10**
24T1							0.12	0.19			0.19		0.45	0.36	0.05	0.06	0				**1.42**
24T2							0.12	0.58			0.58		0.45	0.36	1.04	1.13	0				**4.26**
24T3													0		0	0					**0.00**
24T4													0		0	0					**0.00**
24VTOLArr																				0.10	**0.10**
24VTOLDep																				0.10	**0.10**
32A1	0.43	0.03	0.52	0.14	0.04	0.22	0.03	0.09	0.05	0.4	0.18	0.23	0.83	0.09	0.07	0.15	0	0.02		1.12	**4.64**
32D1	0.43		0.54	0.14	0.04	0	0.04	0.09	0.05	0.4	0.22	0.20	0.38	0.2	0	0.11	0			0.30	**3.13**
32D2		0.09				0.23	0.11	0.27		0.01	0.68	0.43	0.57	0.09	0.6	0.59	0	0.09		0.87	**4.63**
32F1							0.02	0			0.00	0.01								0.07	**0.09**
32F2							0.17	0.04			0.01	0.06								0.74	**1.02**
32G1	0.43					0.05	0.03	0.02	0.05	0.4	0.11		0.63	0.08	0.18	0.25	0	0.1	0.44		**2.77**
32O1							0.05	0.23		0.01	0.59	0.33	0.02	0.17	0.51	0.52	0			0.62	**3.04**
32O2							0.05	0.04		0	0.11	0.06	0.02	0.02	0.03	0.03	0			0.08	**0.43**
32T1							0.23	0.74			0.74		0.87	0.73	1.33	1.43	0				**6.07**
32T2							0.08	0.25			0.25		0.29	0.18	0.07	0.08	0				**1.20**
32T3													0		0	0					**0.00**
32T4													0		0	0					**0.00**
32VTOLArr																				0.12	**0.12**
32VTOLDep																				0.13	**0.13**
33D2																				0.22	**0.22**
36A1						0.13												0.35	1.15		**1.63**
36A2						0.01												0.04	0.33		**0.38**
36A3						0.05												0.11	1.04		**1.20**
36D1						0.05												0.14	0.42		**0.61**
36D2						0.03												0.08	0.2		**0.31**
36D3						0.12												0.33	2.01		**2.46**
Total	**4.62**	**0.43**	**3.78**	**1**	**0.26**	**3.42**	**2.88**	**6.3**	**0.54**	**4.32**	**10.2488**	**4.73192**	**12.92**	**5.4**	**9.95**	**11.26**	**0**	**4.32**	**24.74**	**12.6**	**123.7**

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

Table F.3-11: NAS Patuxent River Nighttime Flight Track Utilization

Track	Aircraft																				Total
	A-10A	AH64	B-707-320B	C-135A	C-5A	CH-53E	EA-6B	F-14A	F-15E	F-16A	F-18A/C	F-18E/F	P-3A	S-3A&B	T-2C	T-38A	T-45	UH-1N	UH60A	X-35	
02T1						0.05												0.16	0.75		**0.96**
06A1	0.00	0.08	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.10	0.01	0.00	0.00	0.00	0.08		0.00	**0.30**
06AVTOLR																				0.00	**0.00**
06D1	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	**0.00**
06D2		0.00				0.01	0.00	0.00		0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00		0.00	**0.02**
06F1							0.00	0.00			0.00	0.00								0.00	**0.00**
06F2							0.00	0.00			0.00	0.00								0.00	**0.00**
06G1	0.00					0.00	0.00	0.00	0.00	0.00	0.00		0.01	0.00	0.00	0.00	0.00	0.00	0.02		**0.03**
06O1							0.00	0.00		0.00	0.03	0.00	0.00	0.01	0.01	0.00	0.00			0.00	**0.05**
06O2							0.00	0.00		0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00			0.00	**0.01**
06T1							0.00	0.01			0.14		0.04	0.07	0.01	0.00	0.00				**0.27**
06T2							0.00	0.00			0.03		0.01	0.02	0.00	0.00	0.00				**0.06**
06T3													0.00		0.00	0.00					**0.00**
06T4													0.00		0.00	0.00					**0.00**
06VTOLDEP																				0.00	**0.00**
14A1	0.00	0.04	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.00	0.00	0.00	0.04		0.00	**0.17**
14D1	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00			0.00	**0.01**
14D2		0.00				0.00	0.00	0.00		0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00		0.00	**0.01**
14F1							0.00	0.00			0.00	0.00								0.00	**0.00**
14F2							0.00	0.00			0.00	0.00								0.00	**0.00**
14G1	0.00					0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.02		**0.02**
14O1							0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	**0.00**
14O2							0.00	0.00		0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00			0.00	**0.03**
14T1							0.00				0.01		0.00	0.03	0.00	0.00	0.00				**0.04**
14T2							0.00				0.05		0.01	0.00	0.00	0.00	0.00				**0.06**
14T3													0.00		0.00	0.00					**0.00**
14T4															0.00	0.00					**0.00**
14VTOL DEP																				0.00	**0.00**
14VTOLArr																				0.00	**0.00**
18A1						0.00												0.04	0.04		**0.08**
18A2						0.00												0.00	0.02		**0.02**
18A3						0.01												0.01	0.09		**0.11**
18D1						0.00												0.01	0.44		**0.45**
18D2						0.00												0.00	0.01		**0.01**
18D3						0.00												0.00	0.02		**0.02**
20T1						0.05												0.16	0.75		**0.96**

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

Table F.3-11: NAS Patuxent River Nighttime Flight Track Utilization (Continued)

Track	Aircraft																				Total
	A-10A	AH64	B-707-320B	C-135A	C-5A	CH-53E	EA-6B	F-14A	F-15E	F-16A	F-18A/C	F-18E/F	P-3A	S-3A&B	T-2C	T-38A	T-45	UH-1N	UH60A	X-35	
24A1	0.00	0.05	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.01	0.00	0.00	0.00	0.05		0.00	**0.20**
24D1	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	**0.00**
24D2		0.00				0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	**0.00**
24F1							0.00	0.00			0.00	0.00								0.00	**0.00**
24F2							0.00	0.00			0.00	0.00								0.00	**0.00**
24G1	0.00					0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.02		**0.02**
24O1							0.00	0.00		0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00			0.00	**0.01**
24O2							0.00	0.00		0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00			0.00	**0.02**
24T1							0.00	0.00			0.02		0.01	0.02	0.00	0.00	0.00				**0.05**
24T2							0.00	0.00			0.06		0.01	0.02	0.01	0.00	0.00				**0.10**
24T3													0.00		0.00	0.00					**0.00**
24T4													0.00		0.00	0.00					**0.00**
24VTOLArr																				0.00	**0.00**
24VTOLDep																				0.00	**0.00**
32A1	0.00	0.07	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.01	0.00	0.00	0.00	0.07		0.00	**0.26**
32D1	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	**0.00**
32D2		0.00				0.01	0.00	0.00		0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00		0.00	**0.02**
32F1							0.00	0.00			0.00	0.00								0.00	**0.00**
32F2							0.00	0.00			0.00	0.00								0.00	**0.00**
32G1	0.00					0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.02		**0.02**
32O1							0.00	0.00		0.00	0.03	0.00	0.00	0.01	0.01	0.00	0.00			0.00	**0.05**
32O2							0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	**0.00**
32T1							0.00	0.01			0.10		0.03	0.05	0.01	0.00	0.00				**0.20**
32T2							0.00	0.00			0.03		0.01	0.01	0.00	0.00	0.00				**0.05**
32T3													0.00		0.00	0.00					**0.00**
32T4													0.00		0.00	0.00					**0.00**
32VTOLArr																				0.00	**0.00**
32VTOLDep																				0.00	**0.00**
33D2																				0.00	**0.00**
36A1						0.00												0.04	0.04		**0.08**
36A2						0.00												0.00	0.02		**0.02**
36A3						0.01												0.01	0.09		**0.11**
36D1						0.00												0.01	0.02		**0.03**
36D2						0.00												0.00	0.01		**0.01**
36D3						0.00												0.00	0.02		**0.02**
Total	**0.00**	**0.24**	**0.04**	**0.00**	**0.00**	**0.18**	**0.00**	**0.02**	**0.00**	**0.00**	**0.57**	**0.00**	**0.49**	**0.29**	**0.05**	**0.00**	**0.00**	**0.68**	**2.40**	**0.00**	**4.96**

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

F.3.2.2 F-35 NAS Patuxent River Noise Contours

For the purposes of this evaluation, aircraft noise impacts are presented as land use areas and populations exposed to aircraft noise above existing baselines. This section discusses the physical characteristics of noise resulting from the Proposed Action. Contour lines representing average annual noise conditions for aircraft operations are generated for 65, 70, 75, 80, and 85 dB DNL. This section presents a general quantification of the area exposed to noise expressed in acres and population.

The Proposed Action has been modeled for the largest predicted year of activity, Test Year 4 (see Table F.3-12). Figure F.3-7 illustrates the noise contours for the Proposed Action. Figure F.3-8 illustrates comparison contours showing the existing DNL contours overlaid with the Proposed Action noise contours. The 65 dB DNL and greater contour for the Proposed Action would not leave the boundaries of NAS Patuxent River. Table F.3-13 outlines a comparison of the Proposed Action DNL contours contrasted to the existing DNL noise contours at NAS Patuxent River.

Table F.3-12: Maximum Proposed Year at NAS Patuxent River

Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
4	STOVL & CTOL FQ, STOVL & CTOL Performance, CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	796	1,358	Same as Test Year 3	947	1,894	1,743	3,252

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).
Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

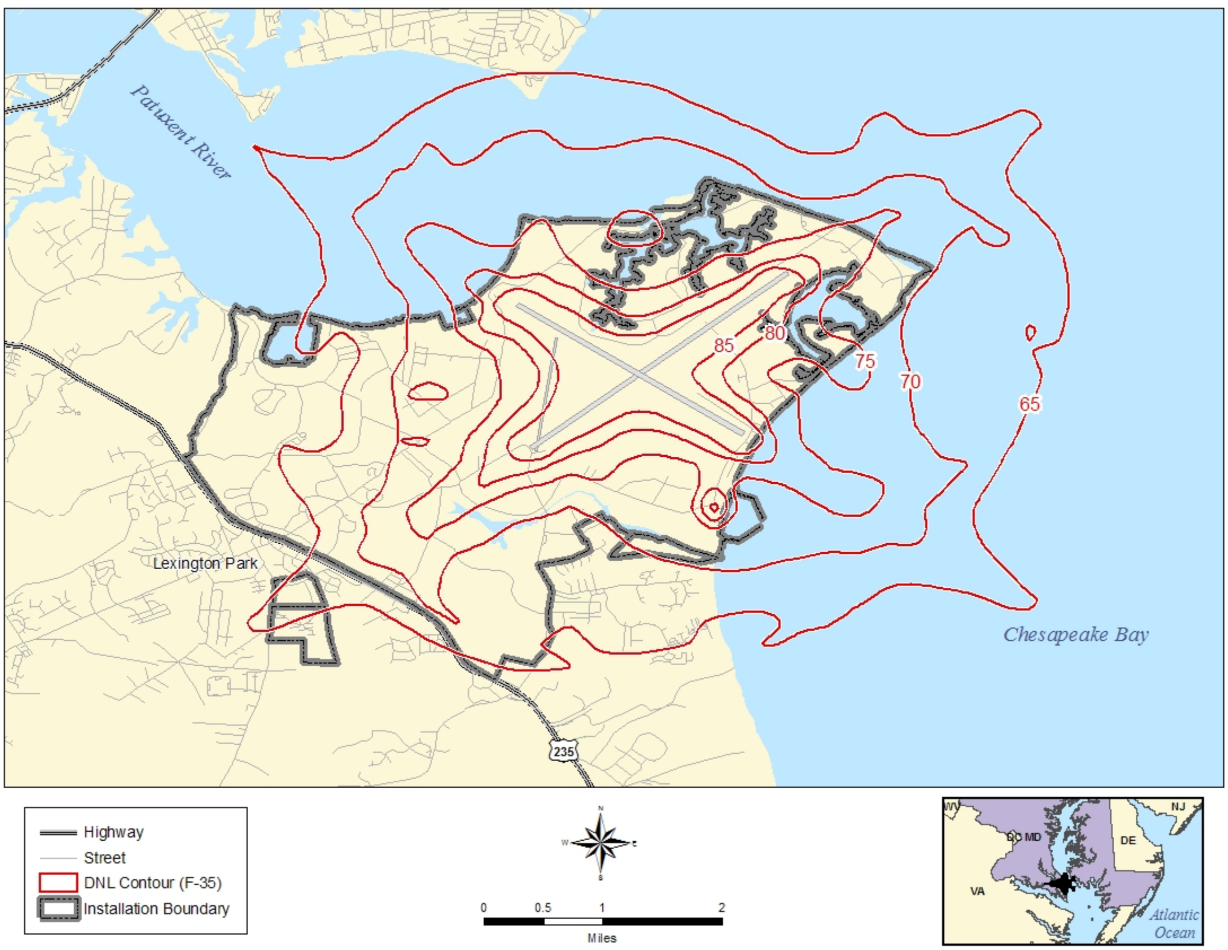

Figure F.3-7: DNL Noise Contours with F-35 Operations for NAS Patuxent River

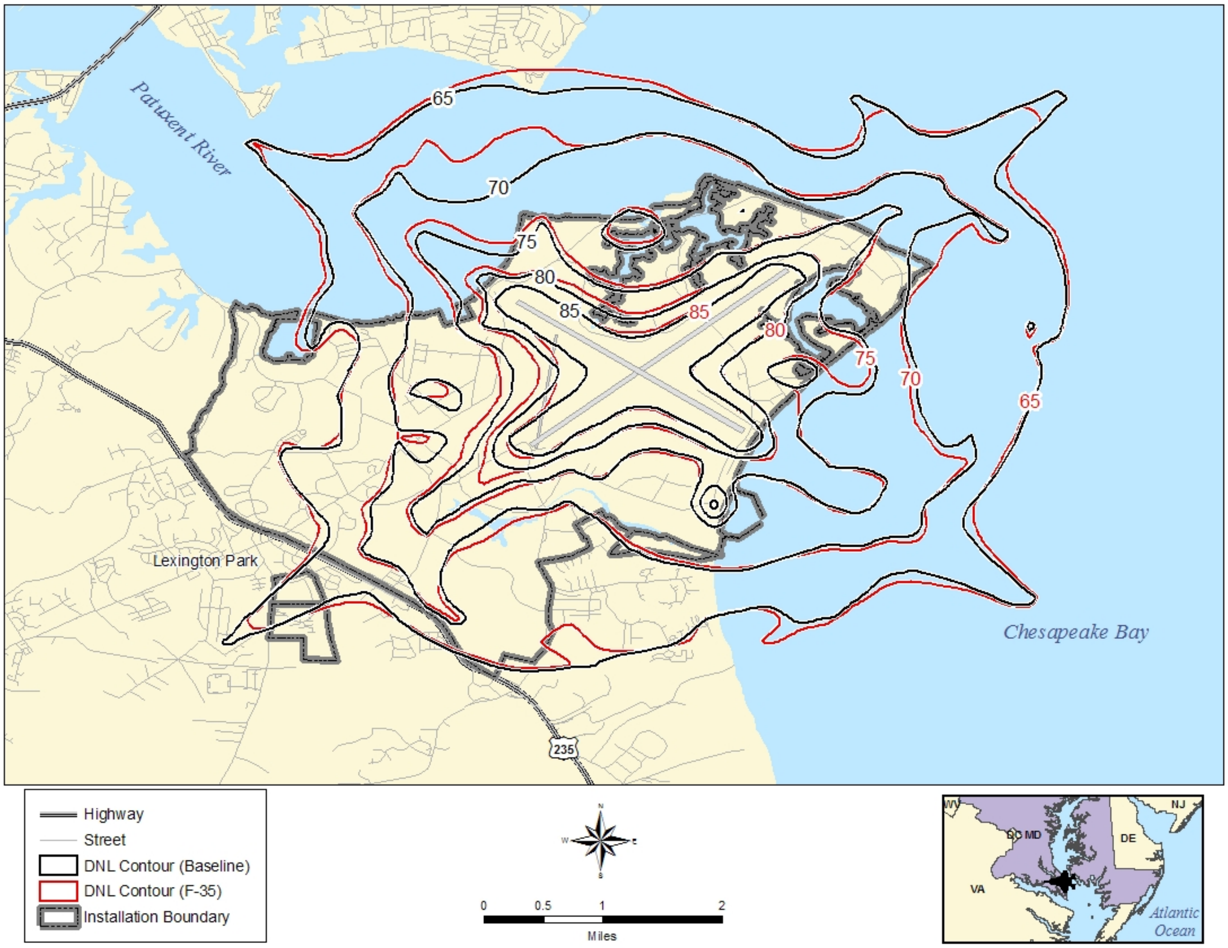

Figure F.3-8: DNL Comparison Contours with F-35 Vs. Existing Operations for NAS Patuxent River

Table F.3-13: Acres within the Existing Baseline and Proposed JSF DT DNL Contours at NAS Patuxent River

DNL Contour Bands	Existing Area Acres		Proposed JSF DT Area Acres		Change Area Acres			
	On-Installation	Off-Installation	On-Installation	Off-Installation	On-Installation		Off-Installation	
65-70 dB	1,302	772	1,235	752	-67	-5%	-20	-3%
70-75 dB	1,750	36	1,704	22	-46	-3%	-14	-39%
75-80 dB	1,024	0	1,044	0	20	2%	0	0
80-85 dB	569	0	621	0	52	9%	0	0
85+ dB	797	0	874	0	77	10%	0	0
65 dB and greater (Total)	***5,442***	***808***	***5,478***	***774***	***36***	***1%***	***-34%***	***-5%***

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).
Note: This is reflective of both Alternatives One and Two.

As a result of the Proposed Action, there would be a slight increase of 36 acres from approximately 5,442 to 5,478 acres of installation property within the 65 dB and greater DNL noise contours. As illustrated in

Table F.3-14, acres of residential development lands on-installation would increase by 14 acres (12.2%) from 115 to 129 acres. Acres of RDT&E mission lands would increase by approximately 10 acres (less than 1%) from 3,130 to 3,140 acres. Acres of quality of life lands would increase by 1 acre (less than 1%) from 381 to 382 acres. Acres of mission related lands would increase by 4 acres (1.9%) from 216 to 220 acres, similarly acres of green space lands would increase by five acres (less than 1%) from 1,449 to 1,454 acres.

Table F.3-14: Land Uses (Acres) Potentially Affected by the Proposed JSF DT at NAS Patuxent River

Land Use Type	Existing DNL Contour Bands					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Green Space	659	491	215	75	9	1,449
Mission Related	143	54	19	0	0	216
Quality of Life	56	211	104	10	0	381
RDT&E Mission	280	951	647	469	783	3,130
Residential	71	0	27	13	4	115
Land Use Type	**With Proposed JSF DT DNL Contour Bands**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Green Space	639	472	250	85	8	1,454
Mission Related	117	79	21	3	0	220
Quality of Life	53	215	103	11	0	382
RDT&E Mission	254	888	631	507	860	3,140
Residential	85	1	26	13	4	129
Land Use Type	**Change**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Green Space	-20	-19	35	10	-1	5
Mission Related	-26	25	2	3	0	4
Quality of Life	-3	4	-1	1	0	1
RDT&E Mission	-26	-63	-16	38	77	10
Residential	14	1	-1	0	0	14

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).
Note: This is reflective of both Alternatives One and Two.

The total of 65 dB and greater DNL noise contours would encompass approximately 774 acres of land outside of NAS Patuxent River's installation boundary; a reduction of approximately 4% or approximately 34 acres over the existing baseline. As illustrated in Table F.3-15, acres of medium-density residential lands would decrease by 43 acres (or 15.9%) from 271 to 228 acres, while acres of high-density residential and commercial lands would increase by 1 acre (or 1.4%) from 71 to 72 acres and 4 acres (33%) from 12 to 16, respectively. Both industrial and low density residential lands would remain the same as existing conditions. The remaining areas currently impacted by the existing 65 dB and greater DNL noise contours would be primarily forested and agricultural lands.

Table F.3-15: Residential Uses (Acres) Potentially Affected by Proposed JSF DT Outside of NAS Patuxent River's Installation Boundary

Land Use Type	Existing DNL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Commercial	12	N/A	N/A	N/A	N/A	12
Industrial	26	6	N/A	N/A	N/A	32
Low Density Residential	5	N/A	N/A	N/A	N/A	5
Medium Density Residential	262	9	N/A	N/A	N/A	271
High Density Residential	69	2	N/A	N/A	N/A	71
Land Use Type	**With Proposed JSF DT DNL Contour Bands**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Commercial	16	N/A	N/A	N/A	N/A	16
Industrial	28	4	N/A	N/A	N/A	32
Low Density Residential	5	N/A	N/A	N/A	N/A	5
Medium Density Residential	224	4	N/A	N/A	N/A	228
High Density Residential	72	0	N/A	N/A	N/A	72
Land Use Type	**Change**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Commercial	4	N/A	N/A	N/A	N/A	4
Industrial	2	-2	N/A	N/A	N/A	0
Low Density Residential	0	N/A	N/A	N/A	N/A	0
Medium Density Residential	-38	-5	N/A	N/A	N/A	-43
High Density Residential	3	-2	N/A	N/A	N/A	1

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).
Note: This is reflective of both Alternatives One and Two.

In accordance with FICON guidance, further analysis was performed to identify areas where 1.5 dB increases occur within the 65 dB DNL and greater noise contour and 3.0 dB increases occur within the 60 DNL noise contour. Incompatible land uses, residential units, and noise sensitive receptors were specifically searched for when performing this analysis. Figure F.3-6 illustrates land uses on NAS Patuxent River, while Figures F.3-9 and F.3-10 illustrate 1.5 dB and 3.0 dB increase contours. Only areas in which the respective dB increase contour overlaps the corresponding DNL contour band were analyzed. Similar to the existing baseline, land uses that would be exposed to noise as a result of the Proposed Action at NAS Patuxent River are vacant/forested and RDT&E. Additionally, there would be no residential housing units identified within the Proposed Action DNL noise contours. There is an area, however, in southern Calvert County at the mouth of the Patuxent River near Drum Point, which would experience a 1.5 dB increase within the 65 dB DNL contour (see Figure F.3-9) by the Proposed Action. The land use type impacted, as previously illustrated in Figure F.3-6, is zoned as open space by Calvert County, which would be compatible with a 1.5 dB increase. One structure located in this area is a club house for the Drum Point Residential Development, based on a real property search with the Calvert County Department of Taxation. The club house is not used as a residence and use occurs on intermittent weekends and evenings primarily during summer months. The club house is unoccupied during other periods of the day, week, and year. This type of use is considered compatible with aviation noise, especially considering F-35 flight operations would only occur predominantly on weekdays during daylight hours. Potential impacts would not be expected to occur during primary hours of use, further ensuring that this property would not be adversely impacted by a 1.5 dB increase.

For noise sensitive receptors (e.g., historic sites, schools, hospitals, etc.), specific locations have been analyzed for 1.5 dB and 3.0 dB increases by obtaining specific latitude and longitude locations and plotting dB deltas for both the existing baseline and Proposed Action noise conditions. These locations are identified along with the existing and Proposed Action dB values in Table F.3-16.

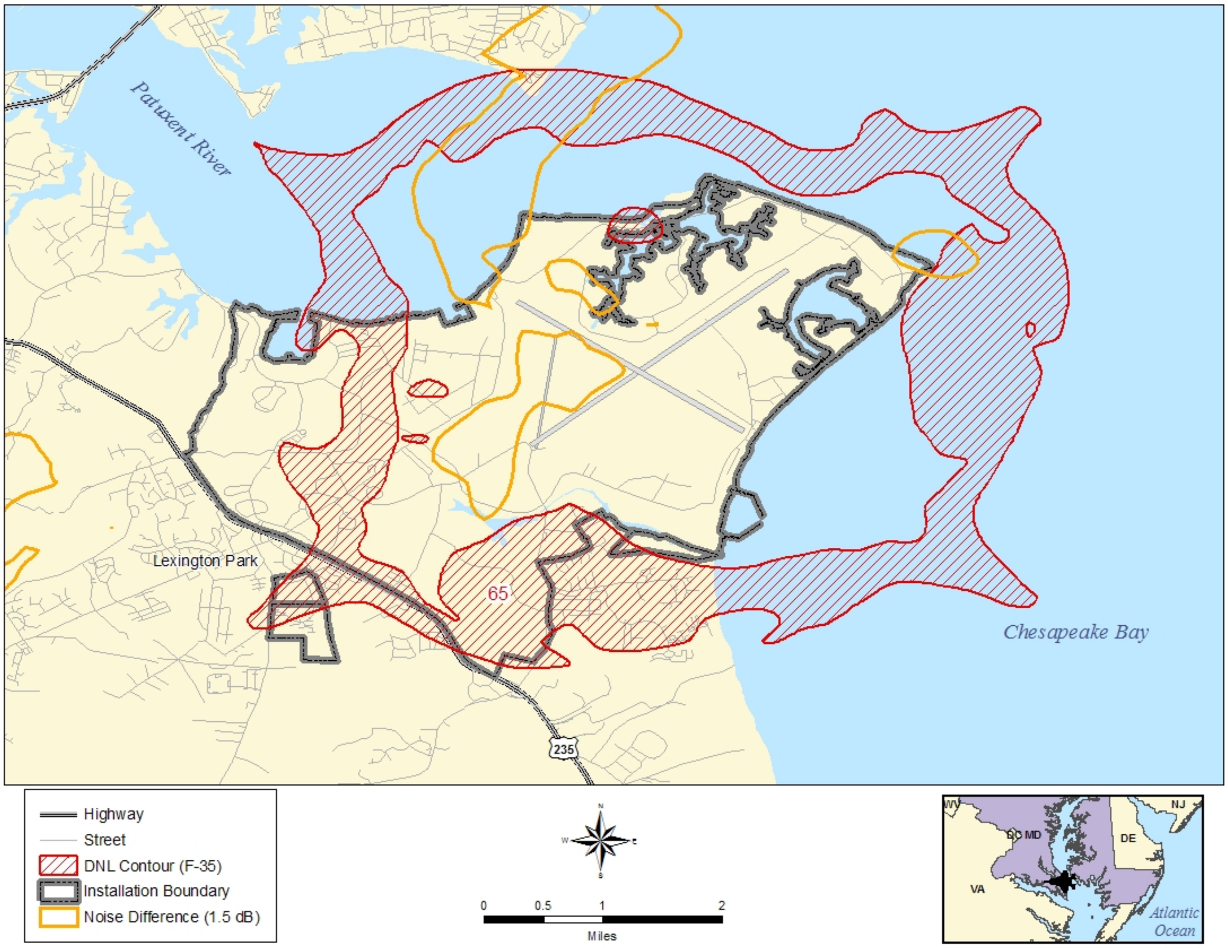

Figure F.3-9: 1.5 dB Increases within the 65 dB DNL Contour

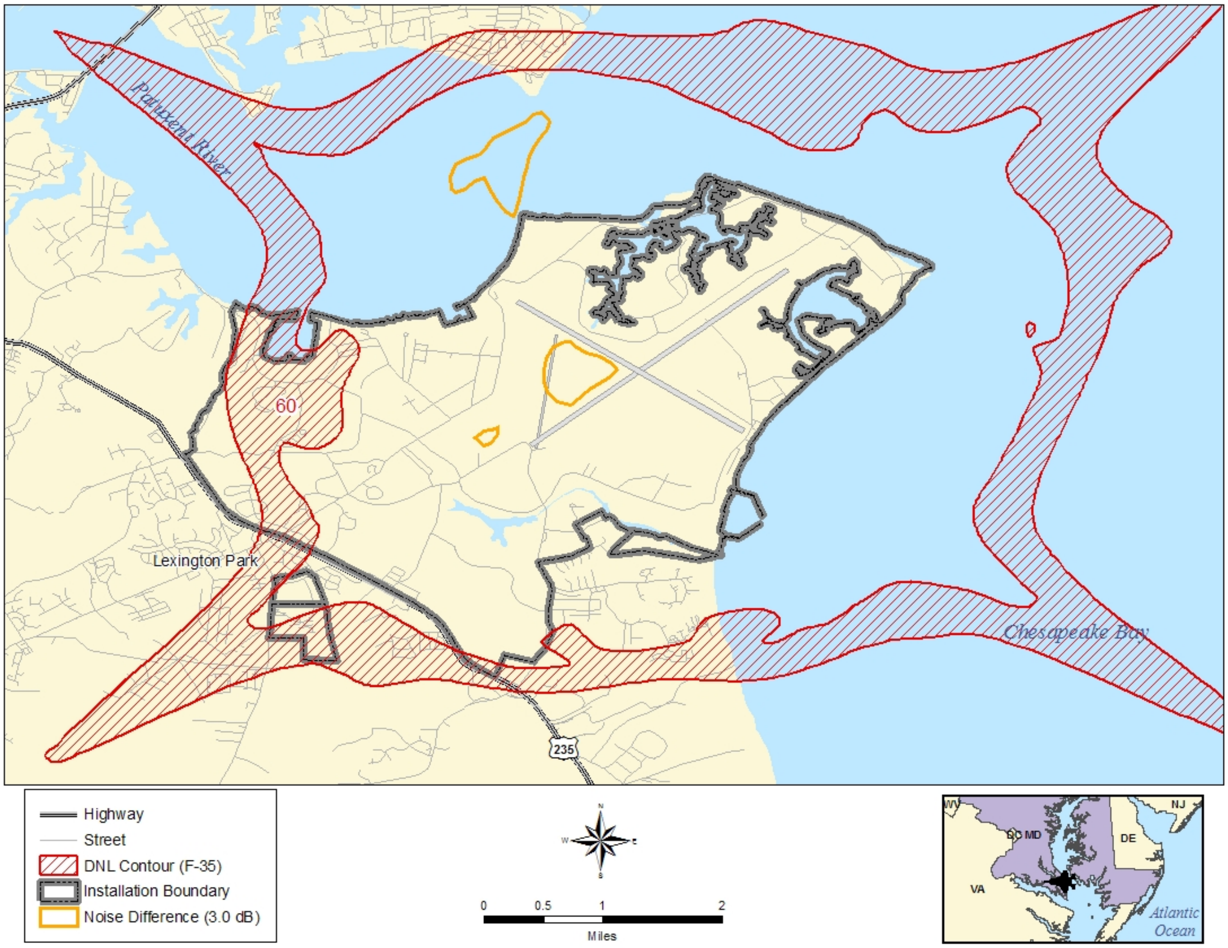

Figure F.3-10: 3.0 dB Increases within the 60 DNL Contour

Table F.3-16: NAS Patuxent River Comparison Non-Residential Noise Sensitive Receptors

Name	Type	Existing (dB)	With Proposed JSF DT (dB)	Change (dB)
Appeal School	School	54.7	54.5	-0.2
Calvary Church	Place of Worship	54.9	55.5	0.6
Calvert Library, Southern Branch	Library	53.7	53.5	-0.2
Carver Elementary	School	53.2	52.3	-0.9
Carver School	School	64.8	64.7	-0.1
Cecil's Mill Historic District	Historic	49.4	48.6	-0.8
Church of Christ	Place of Worship	55.8	54.9	-0.9
Church of God	Place of Worship	44.9	45.4	0.5
Church of The Ascension	Place of Worship	55.9	57	1.1
Cove Point Lighthouse	Historic	52.4	52.2	-0.2
Drum Point Lighthouse	Historic	52.4	52.6	0.2
Eastern Church	Place of Worship	48.3	48.6	0.3

Table F.3-16: NAS Patuxent River Comparison Non-Residential Noise Sensitive Receptors (Continued)

Name	Type	Existing (dB)	With Proposed JSF DT (dB)	Change (dB)
Ebenezer Church	Place of Worship	48.2	48.3	0.1
Esperanza School	School	46.9	47.2	0.3
Felix Johnson Education Center	School	61.1	62.5	1.4
First Church of Christ Scientist	Place of Worship	44	44.3	0.3
First Pentecostal Church	Place of Worship	56.3	57.7	1.4
First Presbyterian Church	Place of Worship	47.8	47.9	0.1
Frank Knox School	School	61.5	62.9	1.4
Gate of Heaven Church	Place of Worship	51.6	49.9	-1.7
Grace Bible Baptist Church	Place of Worship	61.1	62.1	1.0
Great Mills High School	School	51	50.7	-0.3
Green Holly School	School	50.4	50.6	0.2
Greenview Knolls School	School	49.1	49.3	0.2
Hollywood Baptist Church	Place of Worship	47.3	47.1	-0.2
Hollywood Church of The Nazarene	Place of Worship	40.2	39.4	-0.8
Hollywood School	Place of Worship	40	39.3	-0.7
Holy Face Church	Place of Worship	47.7	46.9	-0.8
Immaculate Heart of Mary Church	Place of Worship	51.6	52	0.4
J.C. Lore Oyster House	Historic	57	57.1	0.1
Joy Chapel Cemetery	Cemetery	43.6	43	-0.6
Lexington Park Elementary	School	59.3	60.3	1.0
Little Flower School	School	48.3	47.4	-0.9
Middleham Chapel	Place of Worship	46.4	46.3	-0.1
Morgan Hill Farm	Historic	42	41.9	-0.1
Olivet School	School	52.4	52.3	-0.1
Olivet United Methodist Church	Place of Worship	49.6	50.6	1.0
Our Lady Star of The Sea School	School	56.2	56.3	0.1
Park Hall School	School	56.4	55	-1.4
Patterson Archeological District	Historic	43.6	43.4	-0.2

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

As illustrated in Table F.3-16, there would be slight changes in the noise environment anticipated as a result of the Proposed Action; however, no increases of 1.5 dB within the 65 dB DNL and greater noise contour, or 3.0 dB increases within the 60 DNL noise contour, would be anticipated over non-residential noise sensitive locations. As previously stated, there would be no residential or incompatible land uses located within either the existing or Proposed Action 65 dB DNL or greater noise contour.

F.3.3 Additional Noise Comparisons

For reference purposes, a SEL table has been created to compare the proposed F-35 noise levels to the F-18E/F, a similar aircraft and one of the predominant legacy aircraft at NAS Patuxent River. As previously described in Section F.1.2, SEL is another metric that is reported for aircraft flyovers. It is computed from dBA sound levels and is a convenient method for describing noise from individual aircraft events. In addition, cumulative noise metrics such as equivalent noise level, community noise equivalent level, and day-night noise level are computed from SEL data.

Table F.3-17 illustrates SEL values based on a military thrust departure. This analysis is for comparison purposes only and is intended to provide a general comparison of the anticipated noise contribution for the two aircraft. It should be noted that SEL illustrate noise exposure depicted for a specific second of duration.

Table F.3-17: NAS Patuxent River SEL Values for Legacy and JSF Aircraft

Lateral Distance (ft.)	Military Power Throttle Setting	
	F-18E/F SEL (dB)	F-35 SEL (dB)
100	115.7	125
125	115.6	124.9
160	115.6	124.9
200	115.5	124.8
250	115.4	124.7
315	115.3	124.5
400	115.1	124.3
500	114.7	123.9
630	114.2	123.3
800	113.6	122.5
1,000	112.8	121.6
1,250	111.6	120.3
1,600	110	118.6
2,000	108.3	116.7
2,500	106.3	114.6
3,150	104.1	112.2
4,000	101.5	109.5
5,000	98.8	106.7
6,300	95.9	103.7
8,000	92.5	100.1
10,000	89	96.6
12,500	85.1	92.6
16,000	80.1	87.4
20,000	74.7	81.9
25,000	67.3	74.8

Source: NAS Patuxent River NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).
Note: Lateral Distance is feet from point of departure on either runway with fixed altitude of 1,000 feet.
Assumes temperature of 66˚F, relative humidity of 70%, and no winds

As illustrated in the previous table, the relative noise contribution of the F-35 compared to the F-18E/F is larger at specific distances from the NAS Patuxent River airfield. Therefore, a single F-35 departure would contribute more noise than a single F-18E/F departure. However when annualized, as depicted in the cumulative DNL noise metric, the greater number of total F-18E/F operations, compared to the less prevalent F-35 operations, would be expected to have a larger impact on the overall noise environment at NAS Patuxent River.

F.4 NAES LAKEHURST NOISE ENVIRONMENT

The purpose of this section is to document the analysis of the noise environment at NAES Lakehurst (see Figure F.4-1).

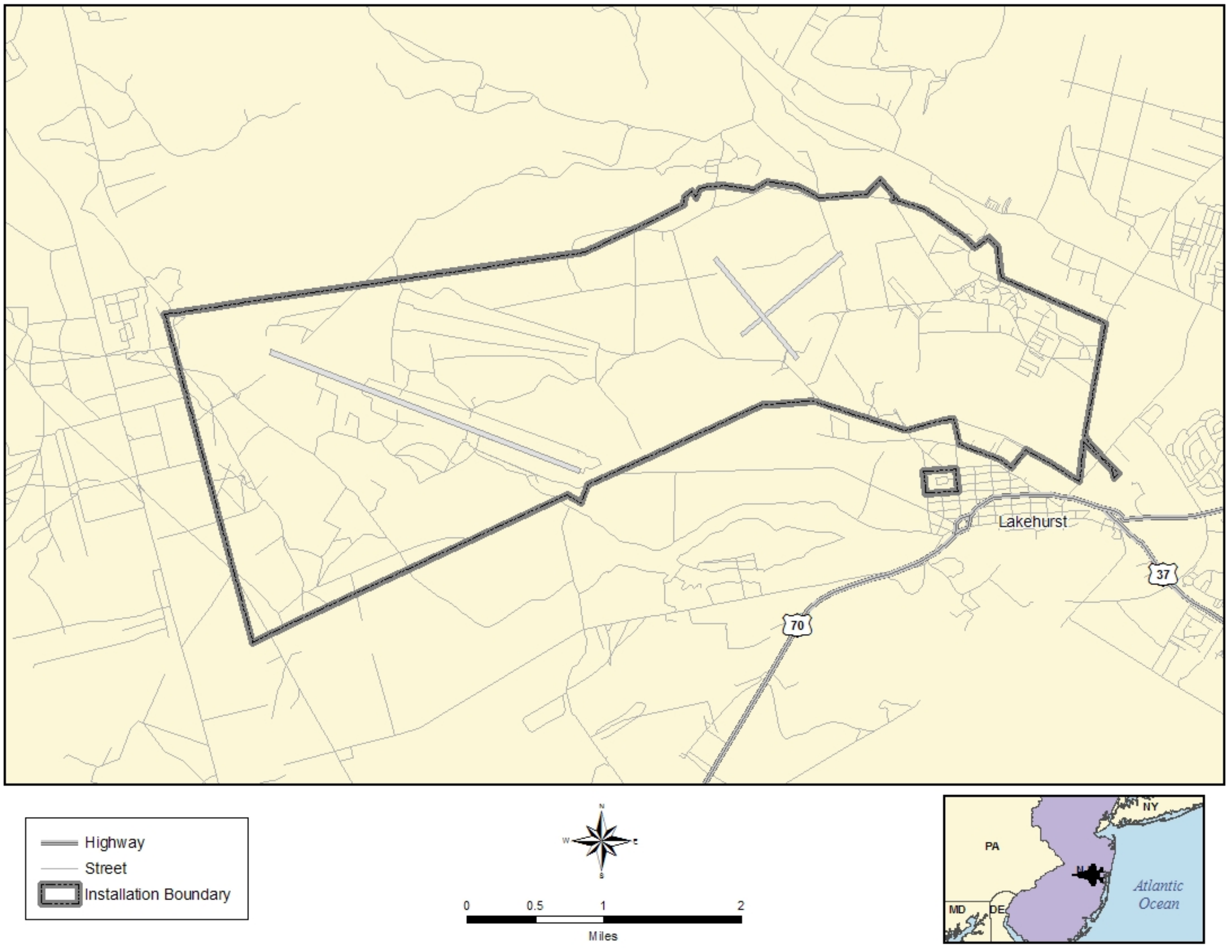

Figure F.4-1: NAES Lakehurst Location Map

F.4.1 NAES Lakehurst Existing Baseline

A previous AICUZ study from 1990 for NAES Lakehurst was used to develop flight tracks, however the Fleet mix and operational level data contained in the study were considered dated for use in establishing a baseline noise environment. Therefore, as illustrated in Table F.4-1, a ten-year composite from 1993 to 2003 for catapult and arresting gear operations has been used to develop baseline operational levels. The ten-year period of operational data is considered representative, since it captures the cyclical nature (both high and low operational levels) of testing events at NAES Lakehurst. The following subsections describe the operational levels, Fleet mix, runway, and flight track utilization used in the development of the NAES Lakehurst existing baseline.

Table F.4-1: NAES Lakehurst Composite Operations Data

	TC13-2		TC13-0		RALS M-31/E28		RALS MOD 4/MOD3		JBD		Total Operations	
FY	Events	Days	Events	Days	Events	Days	Events	Days	Events	Days	Events	Days
93	18	10	45	13	0	0	191	20	48	1	302	44
94	63	21	22	10	35	2	87	5	0	0	207	38
95	21	3	25	4	0	0	158	15	0	0	204	22
96	54	20	3	2	0	0	285	16	30	3	372	41
97	20	3	0	0	44	7	157	20	0	0	221	30
98	86	13	0	0	54	7	543	12	98	10	781	42
99	183	19	0	0	0	0	160	15	477	19	820	53
00	10	3	0	0	27	2	64	3	38	1	139	9
01	0	0	0	0	0	0	8	1	0	0	8	1
02	0	0	0	0	284	11	62	5	0	0	346	16
03	35	6	0	0	0	0	12	1	20	1	67	8
Average									**65**	**3.2**	**250**	**24.5**

Source: NAES Lakehurst, October 2005.
Notes: Jet Blast Deflector (JBD) operations are separated from other testing operations since these operations are statically performed.

F.4.1.1 Baseline Operational Levels, Runway Use, and Fleet Mix

An average operational level for NAES Lakehurst has been derived from the information contained in Table F.4-1. The operational activity information provided by NAES Lakehurst included types of aircraft performing tests, but did not tie individual aircraft to specific test events. Therefore, NAES Lakehurst personnel recommended modeling only F/A-18E/F aircraft to generate the baseline noise contours. This decision was reached since the F/A-18E/F is the predominant aircraft performing catapult launches and arresting gear landings over the last couple of years at NAES Lakehurst, in addition to providing a conservative approach for establishing a baseline noise contour. All proposed JSF DT activities would be performed during daylight hours and on one runway, therefore runway use is considered to be 100%. As discussed previously, the baseline Fleet mix would consist of one type of aircraft, the F/A-18E/F.

The established closed pattern flight track for aircraft operating on Runway 12/30 at NAES Lakehurst is depicted in Figure F.4-2. This track is a product of NAES Lakehurst's mission as an engineering and flight testing facility and is the primary purpose of this runway.

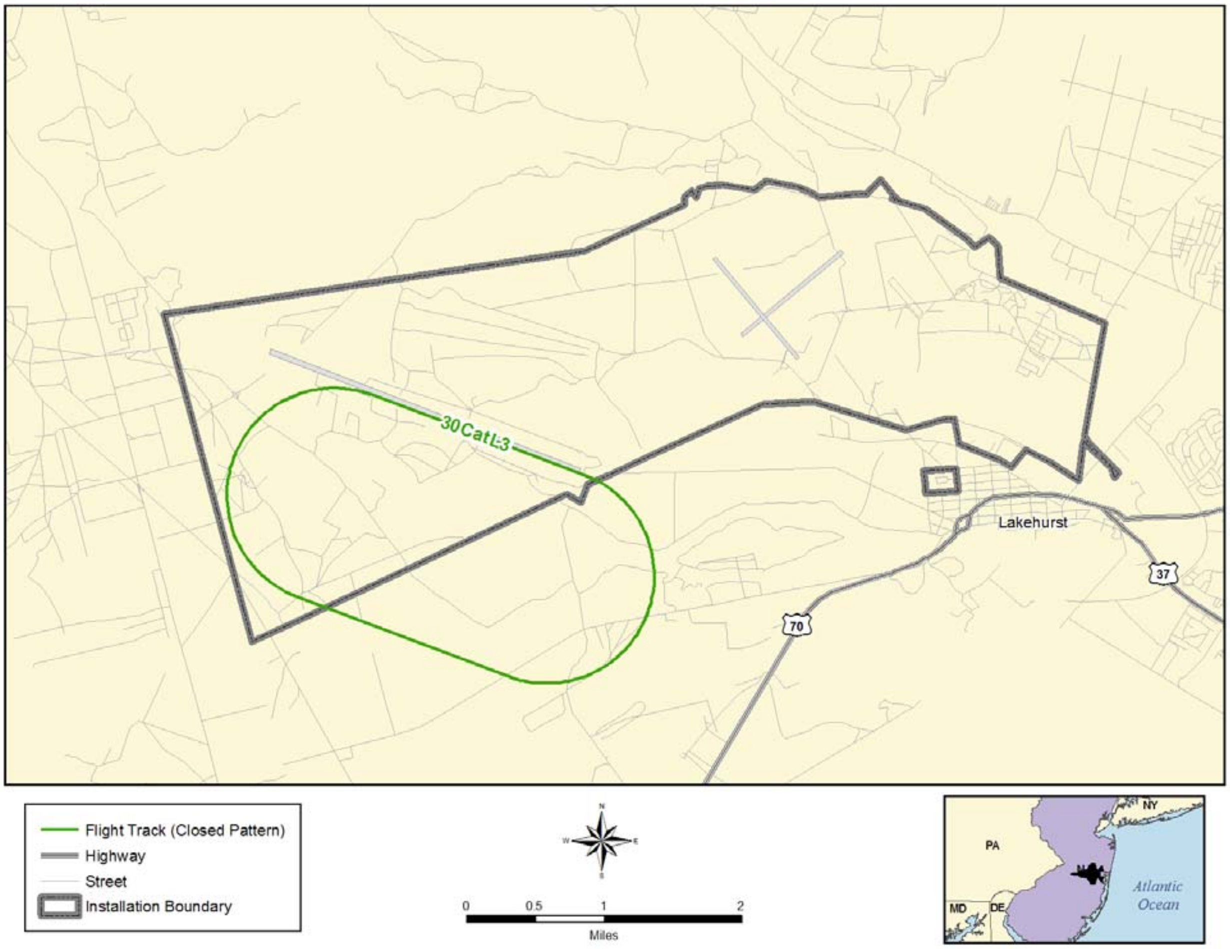

Figure F.4-2: Baseline Closed Pattern, Flight Tracks

F.4.1.2 Baseline NAES Lakehurst Noise Contours

Existing baseline DNL contours have been developed based upon the aircraft Fleet mix, number of operations, time of day of operations, and runway utilization presented above. Figure F.4-3 illustrates the existing baseline noise contour for operations at NAES Lakehurst. Areas affected by the existing DNL contours (65, 70, 75, 80, and 85 dB) are presented in Table F.4-2. There are approximately 835 acres of installation property and approximately 76 acres of off-installation property within the 65 dB and greater DNL noise contours.

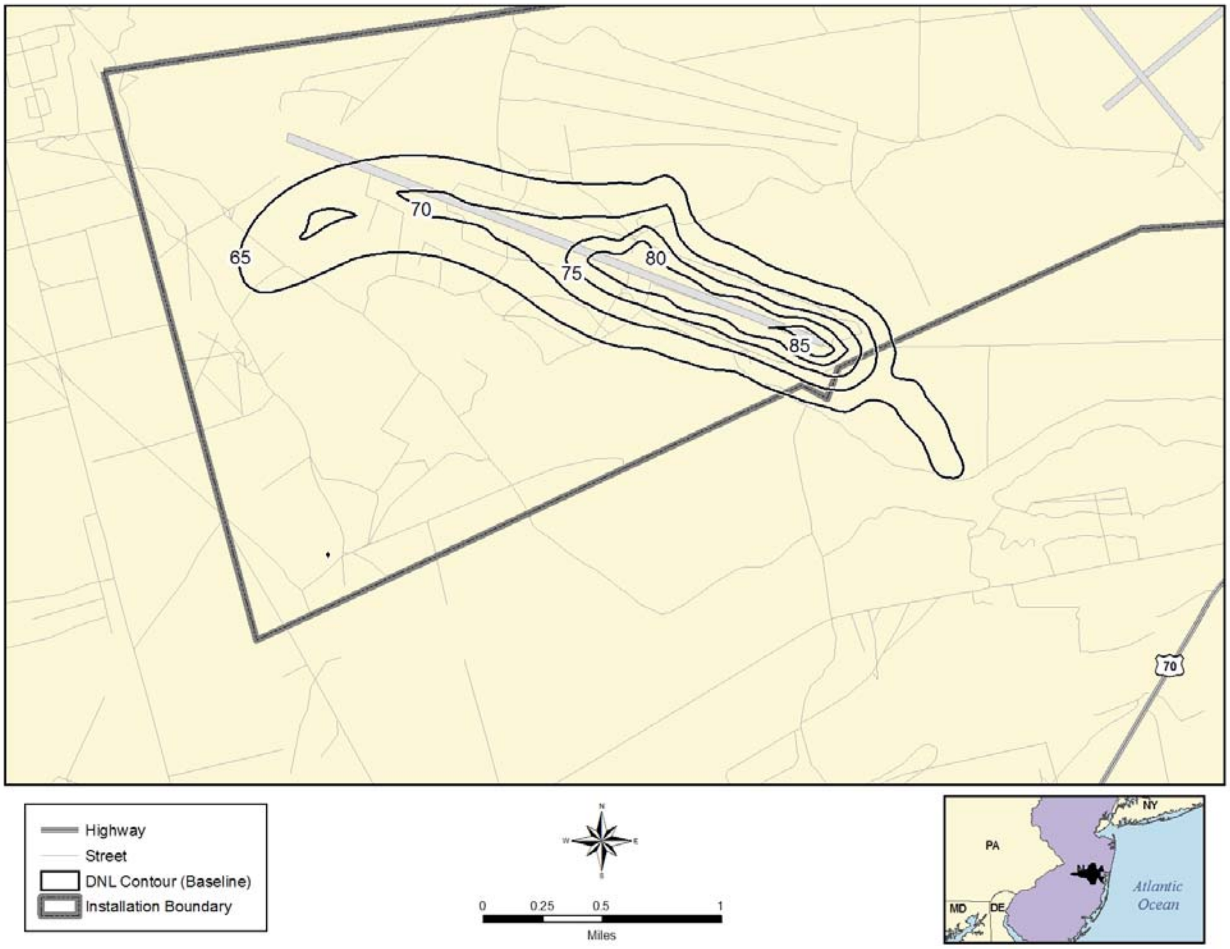

Figure F.4-3: Baseline Noise Contours at NAES Lakehurst

Table F.4-2: NAES Lakehurst Existing Baseline Noise Impacts

DNL Contour Bands	Area Acres (On-Installation)	Area Acres (Off-Installation)
65-70 dB	476	65
70-75 dB	182	9
75-80 dB	87	2
80-85 dB	82	0
85+ dB	8	0
65 dB and greater (Total)	***835***	***76***

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).

As illustrated in Figure F.4-4, NAES Lakehurst's existing baseline noise affects areas in Ocean County directly adjacent to the installation property to the south. Table F.4-3 presents the number of land use acres within the existing baseline noise contours. Areas on NAES Lakehurst currently impacted by existing 65+ dB DNL contours are comprised of 307 acres of vacant and 528 acres of RDT&E land uses, while areas outside NAES Lakehurst's installation property affected are comprised of agricultural/vacant land uses.

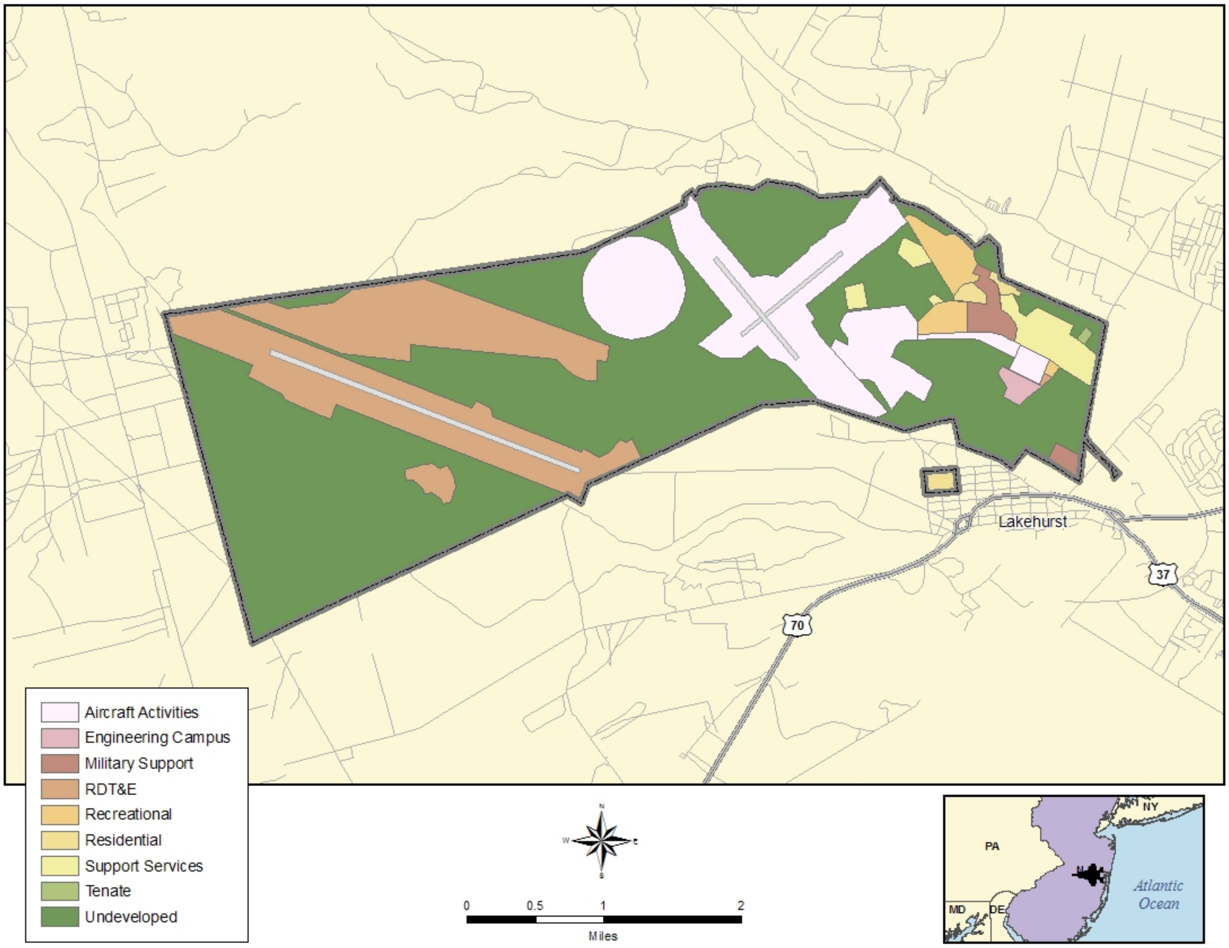

Figure F.4-4: NAES Lakehurst Land Use

Table F.4-3: NAES Lakehurst Existing Baseline Affected Land Uses (Acres)

Land Use Type	DNL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
On-Installation						
RDT&E Mission	194	156	87	82	8	**527**
Vacant	281	26	0	0	0	**307**
Total	***475***	***182***	***87***	***82***	***8***	***834***

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).

F.4.2 Analysis

The major modeling input variables for this analysis are the number of aircraft operations, specifically the addition of the proposed F-35 operations to the existing NAES Lakehurst Fleet mix. It is important to note, through discussions with NAES Lakehurst personnel, the frequency of aircraft catapult launches and arresting gear operations used to develop the existing baseline noise contours are not anticipated to increase as a result of proposed F-35 testing at NAES Lakehurst.[2] The frequency of aircraft launches and arresting gear operations are extremely variable from year to year. Therefore, to be conservative in the analysis of the JSF DT noise environment, proposed F-35 testing operations have been added to existing

[2] *Previte 2005*

operational levels leaving the total number of operations modeled for the proposed JSF DT condition greater than the number of operations modeled in the existing baseline condition. All other NOISEMAP input variables (such as runway utilization and time of day) are constant and consistent with existing baselines. The number and type of aircraft operations for this analysis are presented in Table F.4-4. There are no planned support aircraft flight hours for proposed F-35 tests at NAES Lakehurst.

Table F.4-4: F-35 Aircraft Fleet Mix and Operations by Day/Night Operations

Aircraft	Day Ops	Night Ops
F/A-18E/F	0.68	0.0
F-35	0.89	0.0
Sum	***1.57***	***0.0***

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).

F.4.2.1 F-35 Operational Levels, Runway Use, and Fleet Mix

The proposed F-35 operations would use the same closed pattern flight track (see Figure F.4-2) as currently used by F/A-18E/F aircraft in the baseline condition. In addition, runway and flight track utilization would also be the same as presented in the existing baseline.

Table F.4-5 illustrates the number and types of tests to be performed in the identified highest proposed JSF DT planned for NAES Lakehurst, Test Year 3.

Table F.4-5: Maximum Year of Proposed JSF DT at NAES Lakehurst

Test Year	Test Activity/Description	No. F35 Operations	F35 Flight Hours	Support Aircraft Type	No. Support Aircraft Flights	Support Aircraft Fight Hours	Total No. Operations	Total Flight Hours
3	F35 Baseline Program Catapult Takeoff	130	N/A	None	0	0	130	N/A
	MK 7 Roll-Ins/Arresting Gear Tests*	100	N/A	None	0	0	100	N/A
	E28 Arresting Gear Roll-Ins*	80	N/A	None	0	0	80	N/A
	JBD Testing*	15	N/A	None	0	0	15	N/A
	Total	***325***	-	-	-	-	***325***	-

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005).
*Notes: *Tests would be performed on ground.*
This is reflective of both Alternatives One and Two.

Furthermore, MK 7 Roll-Ins, E28 Arresting Gear Roll-Ins, and Jet Blast Deflection (JBD) tests outlined in Table F.4-5 would be primarily performed on the ground. Approximately eighteen or 10% of the MK 7 Roll-Ins and E28 tests were determined to require flight time.[3] These proposed F-35 operations would use the same closed pattern flight track as currently used by F/A-18E/F, as illustrated in Figure F.4-2. NOISEMAP does not have the capacity to model arrested or aircraft carrier landing operations. Therefore to simulate aircraft speeds and arresting distances, aircraft have been artificially stopped during departure operations in the model, effectively mimicking both MK 7 and E28 Arresting Gear Roll-In operations. JBD tests have been modeled as a ground engine run-up.

[3] *JSF Flight Test Matrices 2003–2005*

F.4.2.2 F-35 NAES Lakehurst Noise Contours

For the purposes of this evaluation, aircraft noise impacts are presented as land areas and populations exposed to aircraft noise above the existing baselines. This section discusses the physical characteristics of noise resulting from the Proposed Action. Contour lines representing average annual noise conditions for aircraft operations are generated for 65, 70, 75, 80, and 85 dB DNL. This section presents a general quantification of the area exposed to noise expressed in acres and population.

Figure F.4-5 illustrates the noise contours for the Proposed Action. Figure F.4-6 illustrates comparison contours showing the baseline DNL contours overlaid with the Proposed Action noise contours. The 65 dB DNL and greater contour for the Proposed Action would not leave the boundaries of NAES Lakehurst. Table F.4-6 outlines a comparison of the Proposed Action DNL contours contrasted to the baseline DNL noise contours at NAES Lakehurst.

Table F.4-6: Acres within the Existing Baseline and Proposed JSF DT DNL Contours at NAES Lakehurst

DNL Contour Bands	Existing Area Acres		Proposed JSF DT Area Acres		Change Area Acres			
	On-Installation	Off-Installation	On-Installation	Off-Installation	On-Installation		Off-Installation	
65-70 dB	476	65	781	204	305	64%	139	214%
70-75 dB	182	9	528	16	346	190%	7	78%
75-80 dB	87	2	239	6	152	175%	4	200%
80-85 dB	82	0	104	0	22	26%	0	0%
85+ dB	8	0	72	0	64	800%	0	0%
65 dB and greater (Total)	835	76	1,724	226	889	106%	150	197%

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).

Note: This is reflective of both Alternatives One and Two.

As a result of the Proposed Action, on-installation areas potentially impacted by the 65 dB and greater DNL noise contour would increase by approximately 889 acres (approximately 106%) from 835 to 1,724 acres. Similarly, off-installation areas impacted by the 65 dB and greater DNL noise contour would increase by approximately 150 acres (approximately 197%) from 76 to 226 acres.

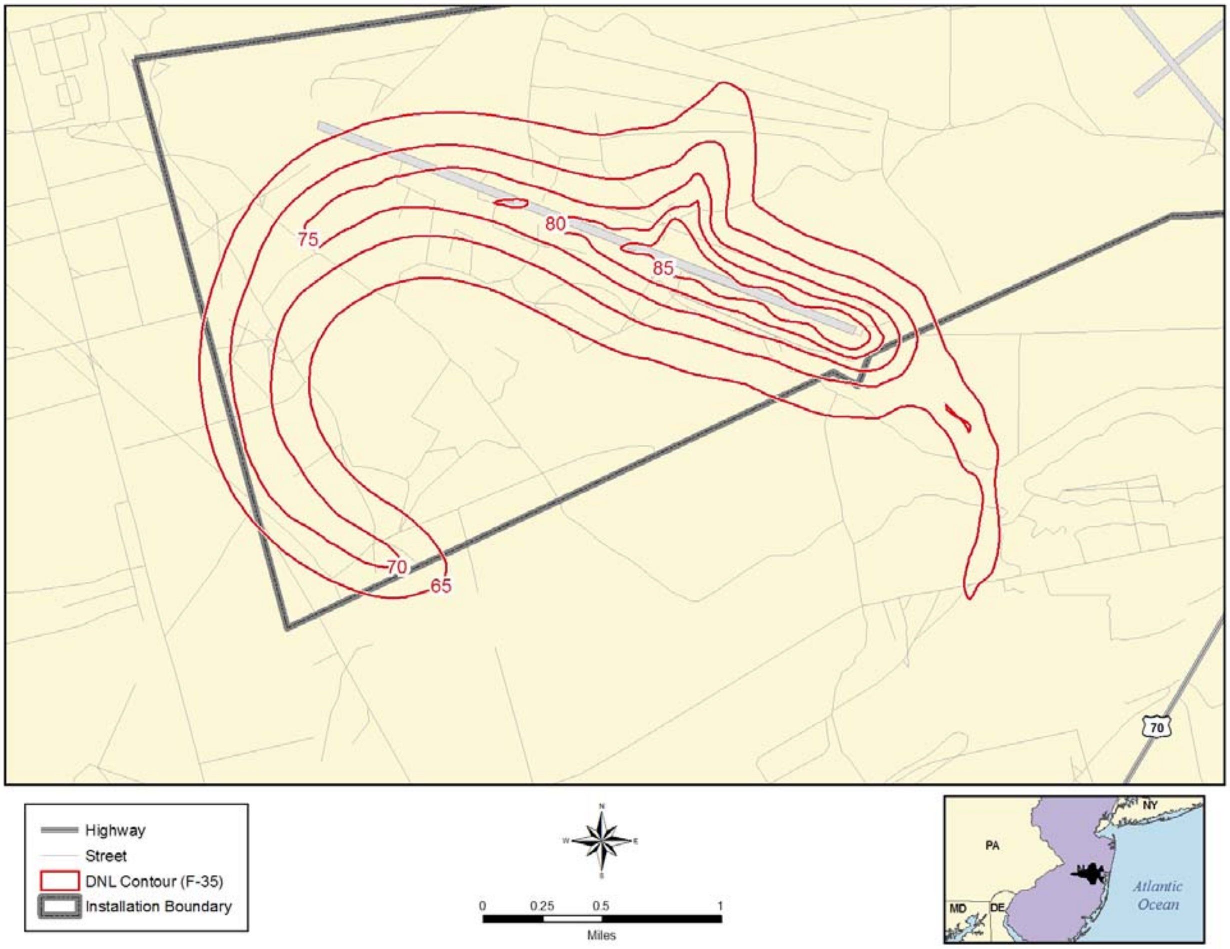

Figure F.4-5: DNL Noise Contours with F-35 Operations for NAES Lakehurst

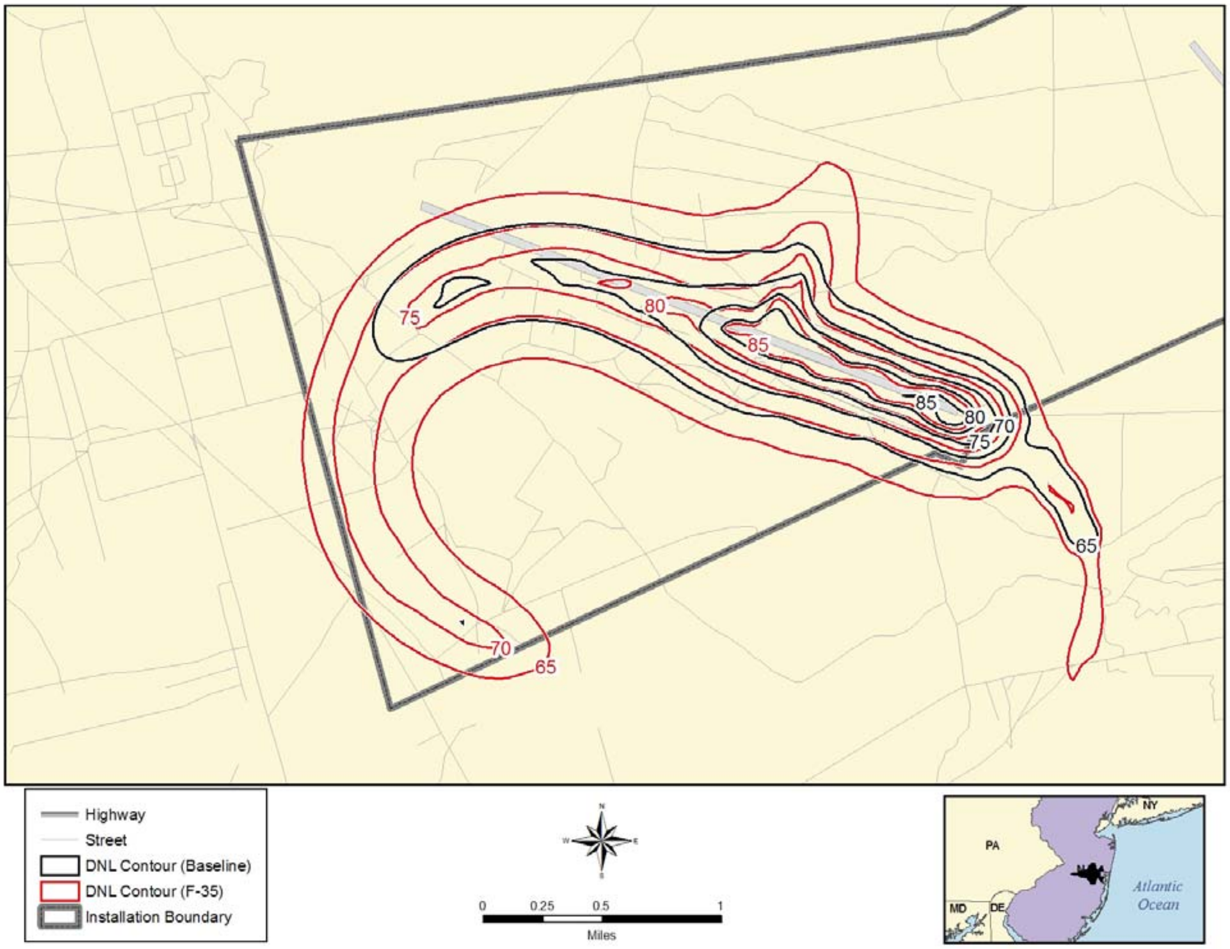

Figure F.4-6: DNL Comparison Contours with F-35 Vs. Baseline Operations for NAES Lakehurst

Identification of land use and residential housing units at NAES Lakehurst were performed through the use of aerial photography. As presented in Figure F.4-4 and Table F.4-7, land uses that would be potentially exposed to noise as a result of the Proposed Action at NAES Lakehurst are comprised of 1,073 acres of vacant and 650 acres of RDT&E land. There would be no residential housing units impacted by the Proposed Action DNL noise contour outside NAES Lakehurst's property boundaries. Therefore, it is anticipated that both populations or incompatible land uses would not be impacted as a result of the Proposed Action.

Table F.4-7: Land Uses (Acres) Potentially Affected by the Proposed JSF DT at NAES Lakehurst

Land Use Type	DNL Contour Bands (On-Installation)					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Existing Baseline						
RDT&E Mission	194	156	87	82	8	**527**
Vacant	281	26	0	0	0	**307**
Total	**475**	**182**	**87**	**82**	**8**	**834**
Land Use Type	**With Proposed JSF DT DNL Contour Bands**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
RDT&E Mission	132	143	203	100	72	**650**
Vacant	649	384	36	4	0	**1,073**
Total	**781**	**527**	**239**	**104**	**72**	**1,723**
Land Use Type	**Change**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
RDT&E Mission	-62	-13	116	18	64	**123**
Vacant	368	358	36	4	0	**766**
Total	**306**	**345**	**152**	**22**	**64**	**889**

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006).

In accordance with FICON guidance, further analysis was performed to identify areas where 1.5 dB increases occur within the 65 dB DNL and greater noise contour and 3.0 dB increases occur within to 60 DNL noise contour. Incompatible land uses, residential units, and noise sensitive receptors were specifically searched for when performing this analysis. Presented previously, Figure F.4-4 illustrates land uses on NAES Lakehurst, while Figures F.4-7 and F.4-8 illustrate 1.5 dB and 3.0 dB increase contours. Only areas in which the respective dB increase contour overlaps the corresponding DNL contour band were analyzed. Similar to the existing baseline, land uses that would be exposed to noise as a result of the Proposed Action are vacant and RDT&E. None of the non-residential noise-sensitive receptors identified in Table F.4-8 would be located in either the existing baseline or Proposed Action 65 or 60 dB DNL noise contours. Table F.4-8 reflects noise sensitive receptors and their distance from the NAES Lakehurst, and no further analysis is considered necessary based on how far these locations are from the installation. As previously stated, there would be no discernable residential or incompatible land uses located within the Proposed Action 65 dB DNL noise contour. Therefore, no significant impacts would be anticipated.

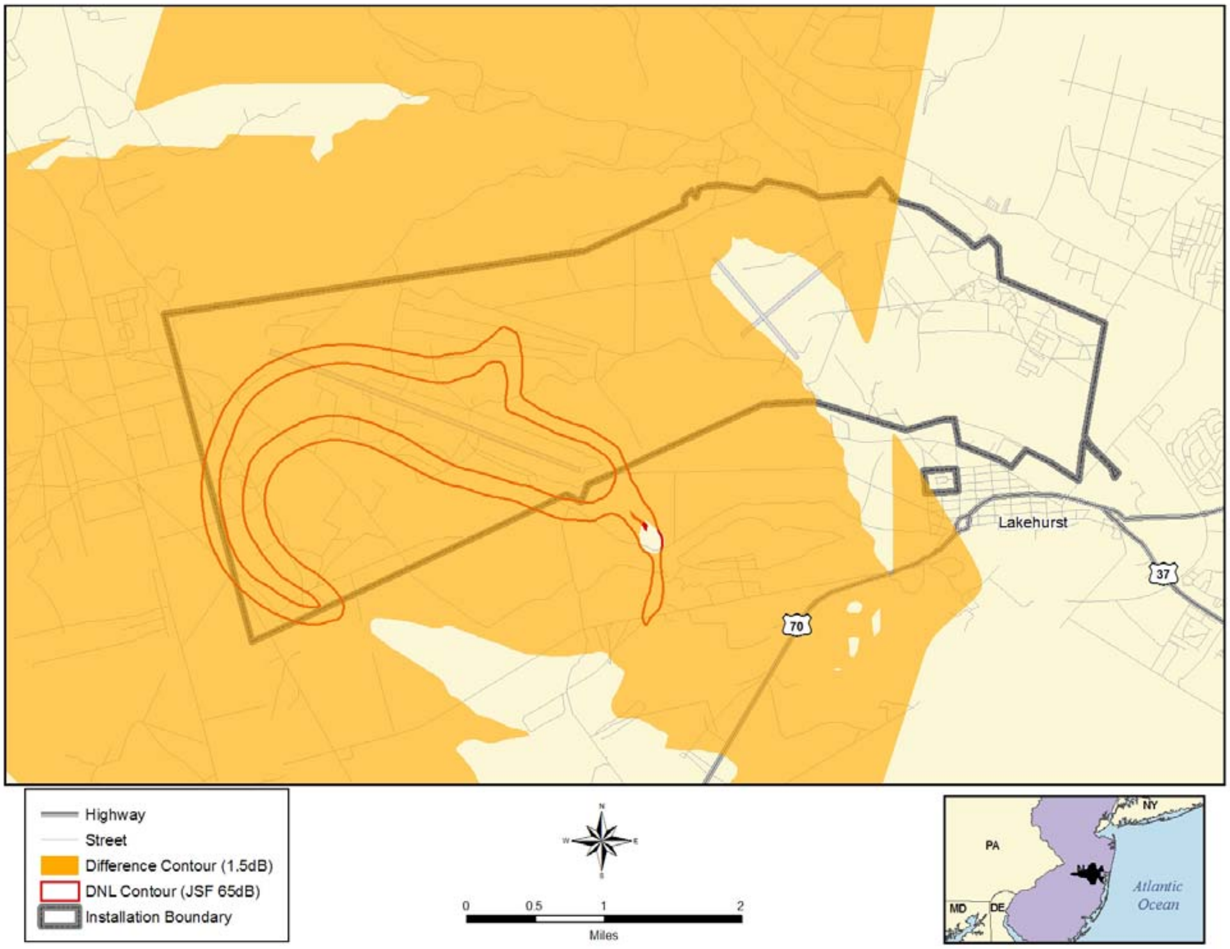

Figure F.4-7: 1.5 dB Increases within the 65 dB DNL Contour

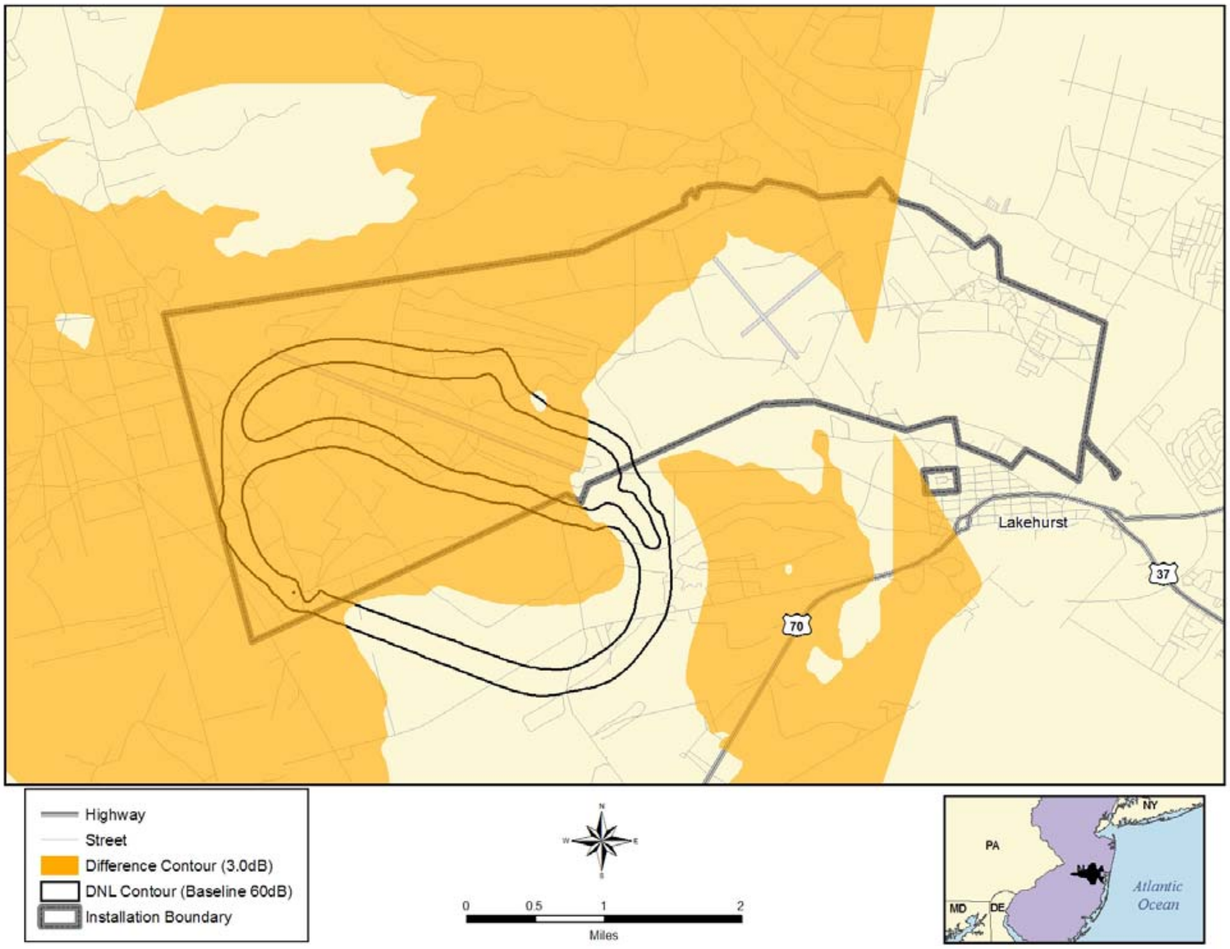

Figure F.4-8: 3.0 dB Increases within the 60 DNL Contour

Table F.4-8: NAES Lakehurst Non-Residential Noise Sensitive Receptors

Name	Type	Distance (Miles)	Name	Type	Distance (Miles)
B'Nai Israel Memorial Park	Park	10	Manchester Township High	School	5
Beth Medrash Govoha	School	11	North Dover School	School	11
Bethel Church	Historic	9	Oak Street School	School	10
Cassville Crossroads Historic District	Historic	6	Ocean County Jail	Historic	12
Clifton Avenue School	School	11	Rava Farms School	School	6
Community Medical Center	Hospital	11	Riverside Cemetery	Cemetery	11
Community Memorial Hospital	Hospital	10	Saint Gabriel College	School	10
Crawford House	Historic	12	Saint Marys Cemetery	Cemetery	9
DeBow's Church	Place of Worship	10	Saint Vladimir's Church	Place of Worship	6
Emley's Hill Church	Place of Worship	9	Spruce Street School	School	10
Evergreen Cemetery	Cemetery	11	Strand Theatre	Historic	11
Georgian Court	Historic	10	Switlik School	School	7
Georgian Court College	School	10	Sylvia Rosenauer School	School	10
Greenwood Cemetery	Cemetery	11	Toms River Cemetery	Cemetery	10
Hangar No. 1, Lakehurst Naval Air Station	Historic	4	Toms River North High School	School	11
Health South Rehab Hospital	Hospital	10	Torrey-Larrabee Store	Historic	5
Hope Church	Place of Worship	10	West Dover School	School	9
Kimball Medical Center	Hospital	10	Whitesbog Historic District	Historic	8
Lakehurst Elementary School	School	4	Woodlawn Cemetery	Cemetery	11
Manchester School	School	5			

Source: NAES Lakehurst NoiseMap Model Outputs, United States Air Force Acoustics Lab (April 2006).
Note: This is reflective for both Alternatives One and Two.

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F.5 LM AERO NOISE ENVIRONMENT

The purpose of this section is to document the analysis of the noise environment at the LM Aero (See Figure F.5-1). The following subsections describe the operational levels, Fleet mix, runway and flight track utilization used in the development of the LM Aero existing baseline.

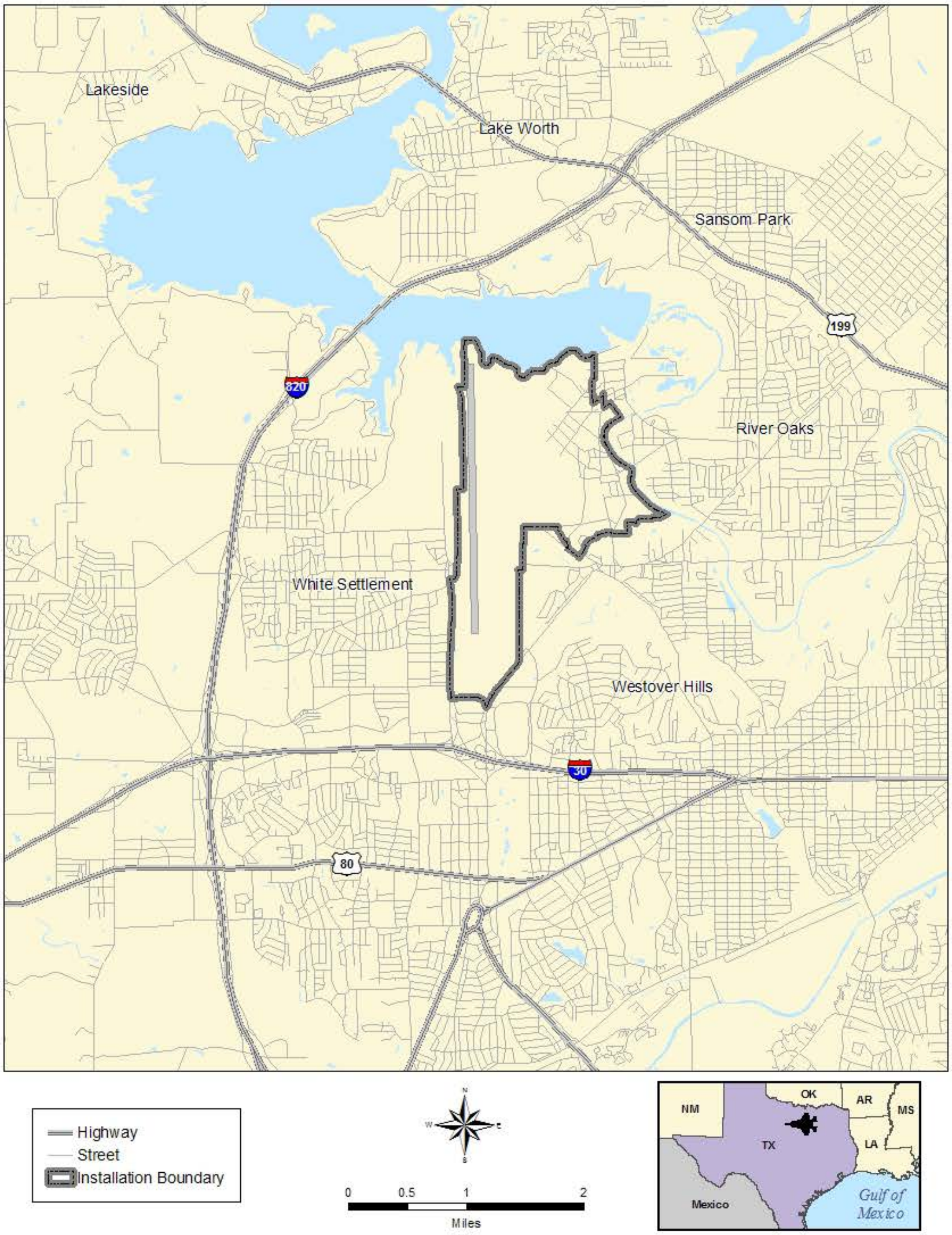

Figure F.5-1: LM Aero Location Map

F.5.1 LM Aero Existing Baseline

The existing baseline for LM Aero has been developed from the 1999 Fort Worth Naval Air Station (FWNAS), Air Force and Lockheed Busy-Day Operations NOISEMAP model for Carswell Field (formerly Carswell AFB).

F.5.1.1 Baseline Operational Levels, Runway Use, and Fleet Mix

Table F.5-1 illustrates the average daily arrival, departure, and closed pattern runway use currently existing at LM Aero. Runway use is expressed as a percentage and is illustrated to present the commonly used runway preference. The existing baseline Fleet mix and average daily operations for each modeled aircraft are presented in Table F.5-2. Table F.5-3 illustrates the average day time flight track utilization by aircraft (note there were no night time operations at the LM Aero).

Table F.5-1: Baseline Runway Use at LM Aero

Arrivals BT			
	Day	**Night**	**Total**
Runway 17:	65.01%	0.00%	65.01%
Runway 35:	34.99%	0.00%	34.99%
Total	***100.00%***	***0.00%***	***100.00%***
Departures			
	Day	**Night**	**Total**
Runway 17:	64.92%	0.00%	64.92%
Runway 35:	35.08%	0.00%	35.08%
Total	***100.00%***	***0.00%***	***100.00%***
Closed Patterns			
	Day	**Night**	**Total**
Runway 17:	64.65%	0.00%	64.65%
Runway 35:	35.35%	0.00%	35.35%
Total	***100.00%***	***0.00%***	***100.00%***

Source: 1999 Fort Worth Naval Air Station (FWNAS), Air Force and Lockheed Busy-Day Operations NOISEMAP model for Carswell Field.

Table F.5-2: Baseline Aircraft Daily Fleet Mix and Operations by Day/Night Operations

Aircraft	Day	Night
C-12	3.62	0.00
C-130 H&N&P	8.2	0.00
C-9A	13.57	0.00
F-14A	0.99	0.00
F-16C	38.1	0.00
F/A-18A/B/C	28.68	0.00
T-37B	2.52	0.00
T-38A	1.44	0.00
Total	***97.12***	***0.00***

Source: 1999 Fort Worth Naval Air Station (FWNAS), Air Force and Lockheed Busy-Day Operations NOISEMAP model for Carswell Field.

Established paths for aircraft arriving to and departing from LM Aero are presented in Figures F.5-2 through F.5-4. The flight tracks depicted have been developed from the 1999 Busy-Day operations study. No modifications to flight tracks or track utilization have been made beyond what was presented in the 1999 study.

Table F.5-3: LM Aero Baseline Daytime Flight Track Utilization

Track	Aircraft								Total
	C-12	C-130H&N&P	C-9A	F-14A	F-16C	F-18A/C	T-37B	T-38A	
17A1						0.28			**0.28**
17A2	0.1	0.18	0.2	0.14	0.3	1.24	0.36	0.2	**2.72**
17A3		0.53							**0.53**
17A4	0.57		2.38		0.21				**3.16**
17A5	0.06		0.26		0.21				**0.53**
17A6					0.14	1.51			**1.65**
17A7					3.69	0.76			**4.45**
17A8						2.52			**2.52**
17A9					3.55				**3.55**
17D1	0.3	0.49	1.16	0.07	0.15	2.8	0.18	0.1	**5.25**
17D2	0.3	0.09	1.16	0.07	0.15	0.59	0.18	0.1	**2.64**
17D3	0.22	0.89	0.81	0.07	0.15	0.44	0.18	0.1	**2.86**
17D4	0.05	0.89	0.1	0.07	0.15	0.94	0.18	0.1	**2.48**
17D5	0.17		0.71		9.46	3.73			**14.07**
17D6					0.46				**0.46**
17D7					0.44				**0.44**
17D8					0.04				**0.04**
17F1	0.1		0.44		0.14				**0.68**
17G1	0.1		0.44		0.14				**0.68**
17O1						0.25			**0.25**
17O2	0.19		0.79		0.11				**1.09**
17O3		0.18				0.07			**0.25**
17O4					1.29				**1.29**
17O5					0.01	0.5			**0.51**
17O6	0.02		0.09		1.18	0.25			**1.54**
17O7						0.63			**0.63**
17O8		0.33							**0.33**
17S1					0.09				**0.09**
17T1	0.05	0.59	0.1	0.07	2.36	1.64	0.18	0.1	**5.09**
35A1						0.15			**0.15**
35A2	0.06	0.63	0.1	0.08	0.16	0.26	0.2	0.12	**1.61**
35A3		0.28							**0.28**
35A4	0.28		1.28		0.12				**1.68**
35A5	0.03		0.14		0.12				**0.29**
35A6					0.08				**0.08**
35A7					0.08				**0.08**
35A8					1.91				**1.91**
35A9					1.91				**1.91**
35D1	0.08	0.59	0.24	0.04	2.63	1.29	0.1	0.06	**5.03**
35D2	0.03	0.05	0.05	0.04	0.08	0.32	0.1	0.06	**0.73**
35D3	0.03	0.59	0.05	0.04	0.08	0.13	0.1	0.06	**1.08**
35D4	0.03	0.05	0.05	0.04	0.08	0.51	0.1	0.06	**0.92**
35D5	0.43				2.55	2.34			**5.32**
35D6			1.71		0.25				**1.96**
35D7					0.24				**0.24**
35D8					0.02				**0.02**
35F1	0.06		0.24		0.07				**0.37**
35G1	0.06		0.24		0.07				**0.37**
35O2					0.64				**0.64**
35O3		0.17				0.34			**0.51**
35O4					0.64				**0.64**
35O5						0.41			**0.41**
35O6	0.11	0.09	0.48		0.13				**0.81**
35O7						0.18			**0.18**
35S1					0.09				**0.09**
35T1	0.03	0.32	0.05	0.04	1.27	0.88	0.1	0.06	**2.75**
5A10						1.29			**1.29**
5A11						1.29			**1.29**
5A12						0.2			**0.2**
5A13						0.2			**0.2**
5A14	0.03	0.05	0.05	0.04	0.08	0.13	0.1	0.06	**0.54**
5A15	0.03	0.05	0.05	0.04	0.08	0.13	0.1	0.06	**0.54**
7A10		0.49							**0.49**
7A11		0.49							**0.49**
7A12	0.05	0.09	0.1	0.07	0.15	0.24	0.18	0.1	**0.98**
7A13	0.05	0.09	0.1	0.07	0.15	0.24	0.18	0.1	**0.98**
Total	**3.62**	**8.2**	**13.57**	**0.99**	**38.1**	**28.68**	**2.52**	**1.44**	**97.12**

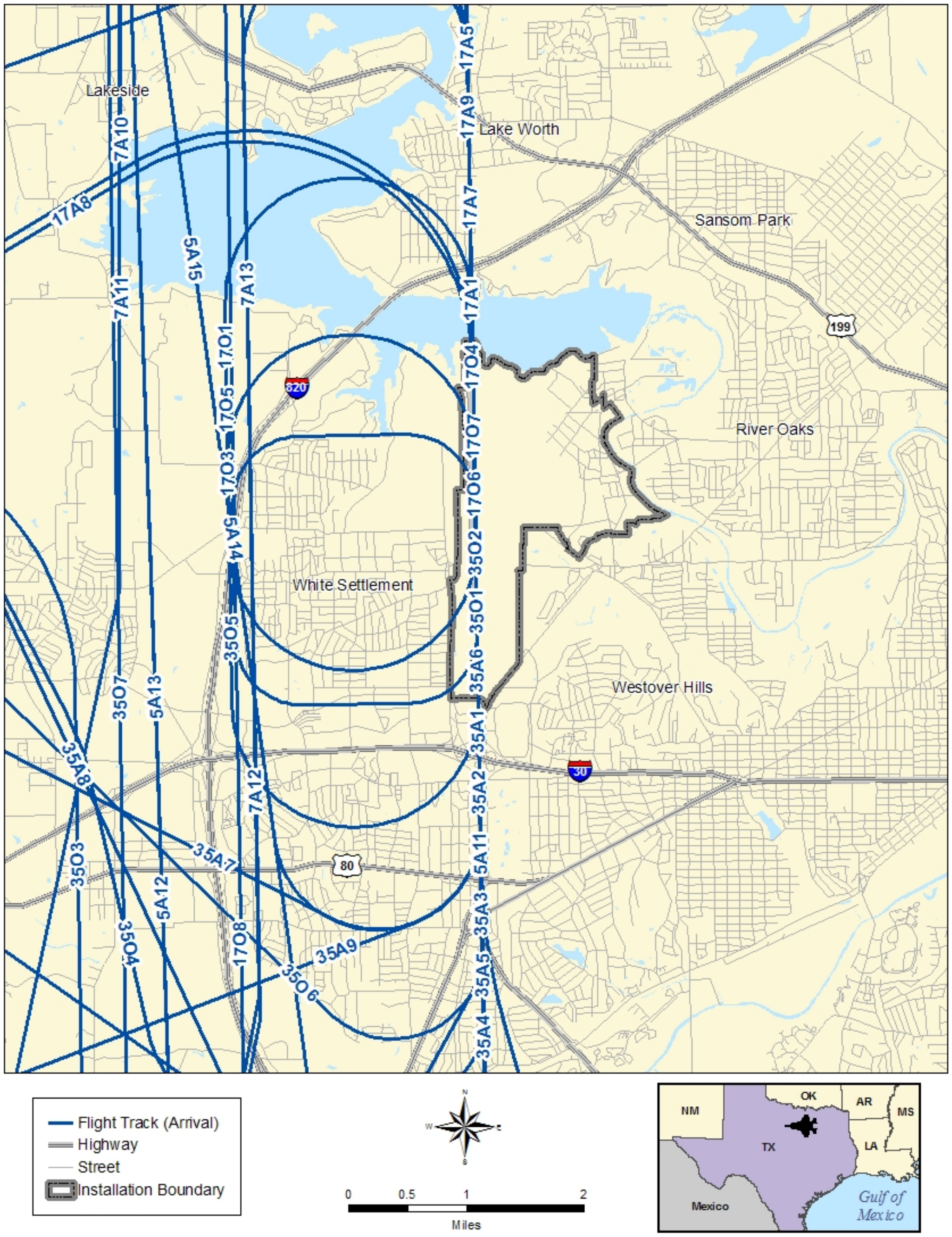

Figure F.5-2: Baseline Arrival Flight Tracks

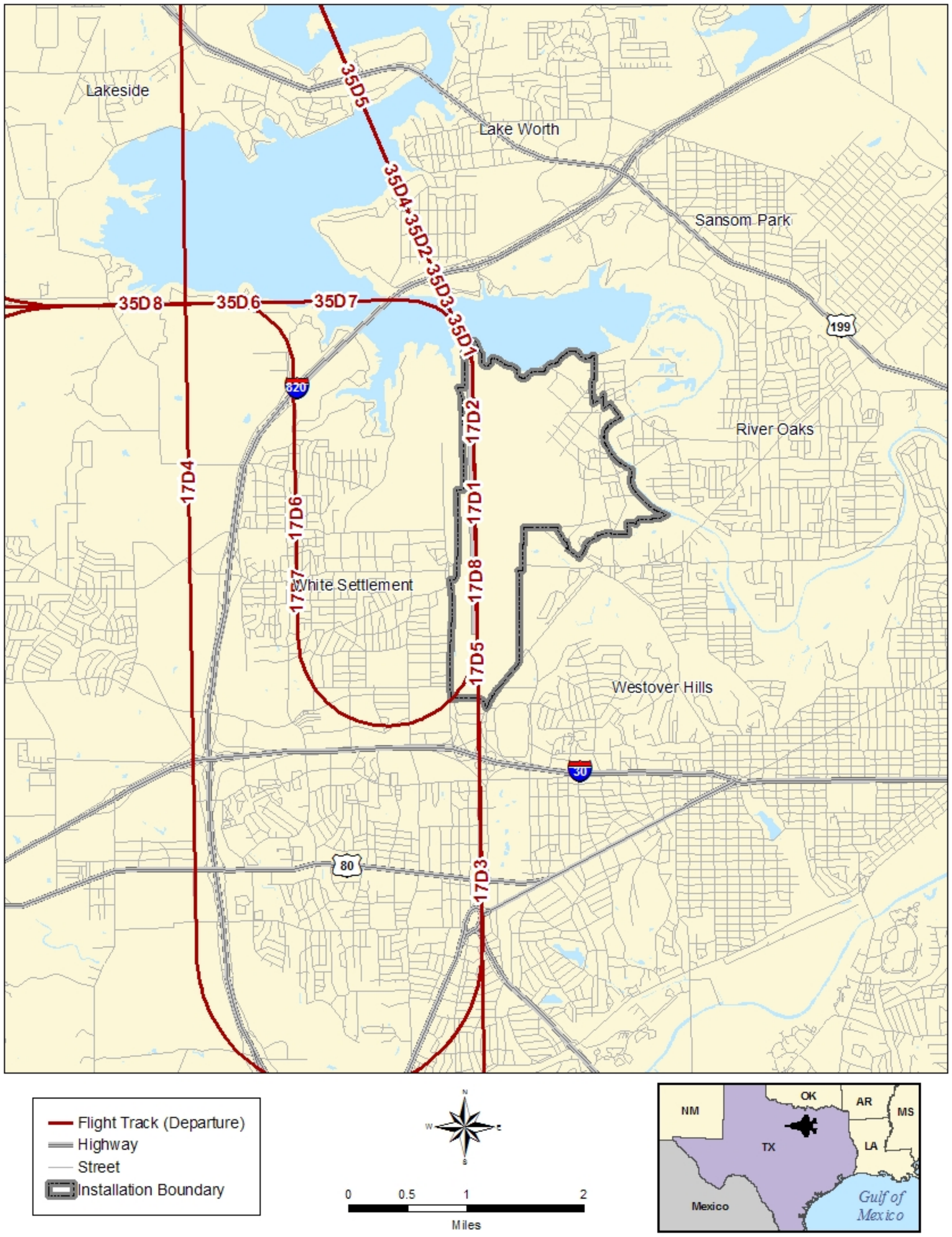

Figure F.5-3: Baseline Departure Flight Tracks

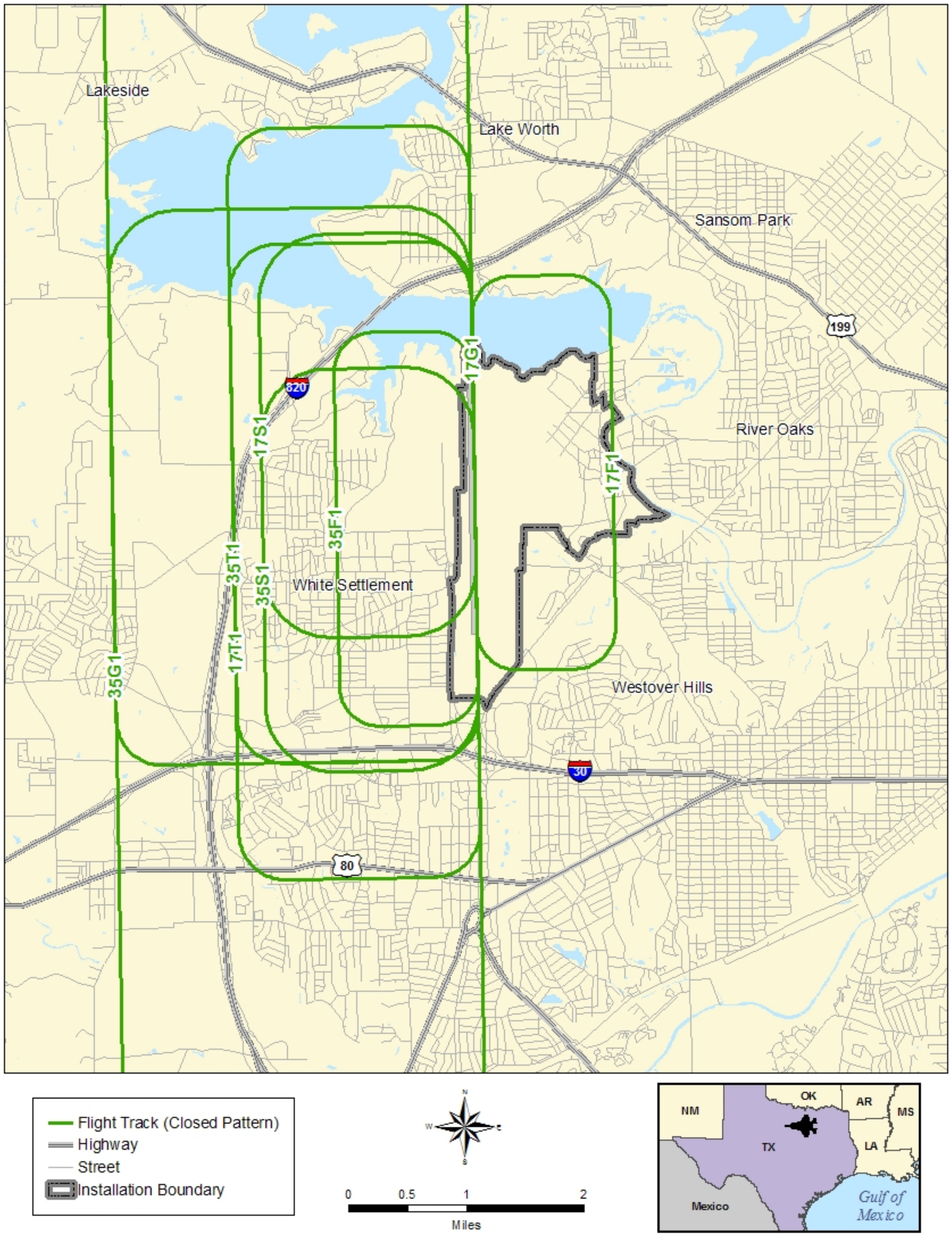

Figure F.5-4: Baseline Closed Pattern Flight Tracks

F.5.1.2 Baseline LM Aero Noise Contours

Existing baseline DNL contours have been developed based upon the aircraft Fleet mix, number of operations, time of day of operations, and runway utilization presented above. Figure F.5-5 illustrates the existing baseline noise contour for operations at LM Aero. Areas affected by the existing DNL contours (65, 70, 75, 80, and 85 dB) for LM Aero are presented in Table F.5-4. As presented, there are 1,566 acres of base property and 9,649 acres off-base within the 65 dB and greater DNL noise contours. As presented in Table F.5-5 and reflected in Figure F.5-6, 2,323 acres are of residential development, 621 acres of commercial development, and 585 acres of industrial development.

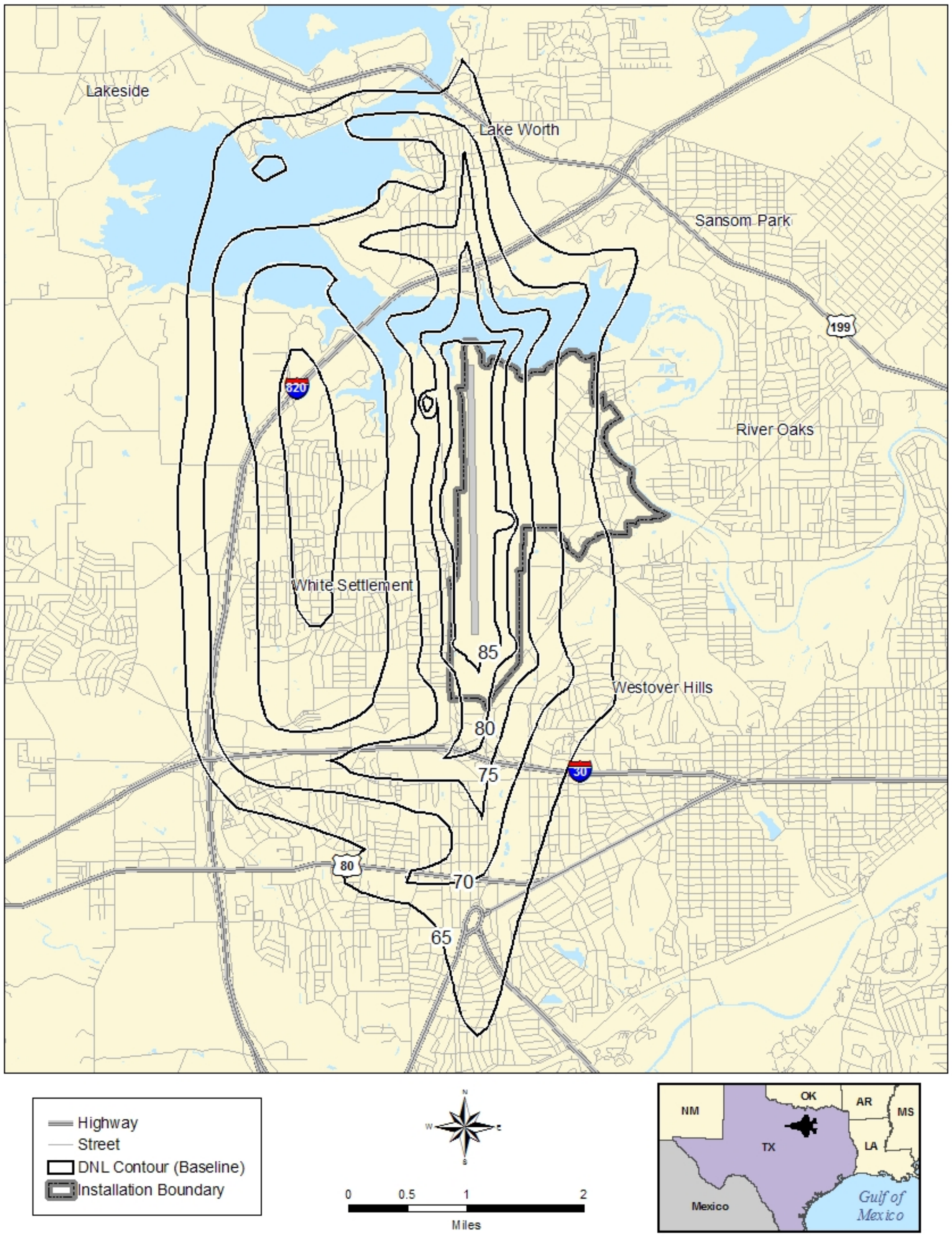

Figure F.5-5: Baseline Noise Contours at LM Aero

Table F.5-4: LM Aero Existing Baseline Noise Impacts

DNL Contour Bands	Area Acres (On-Base)	Area Acres (Off-Base)
65-70 dB	340	4,938
70-75 dB	211	3,254
75-80 dB	238	1,030
80-85 dB	269	286
85+ dB	508	141
65 dB and greater (Total)	***1,566***	***9,649***

Source: LM Aero/NAS JRB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

Table F.5-5: LM Aero Existing Baseline Affected Land Uses

Land Use Type	DNL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Commercial	251	287	79	4	0	621
Industrial	29	200	178	120	58	585
Residential	1,483	622	202	16	0	2,323

Source: LM Aero NOISEMAP Model Outputs, United States Air Force Acoustics Lab (November 2005).

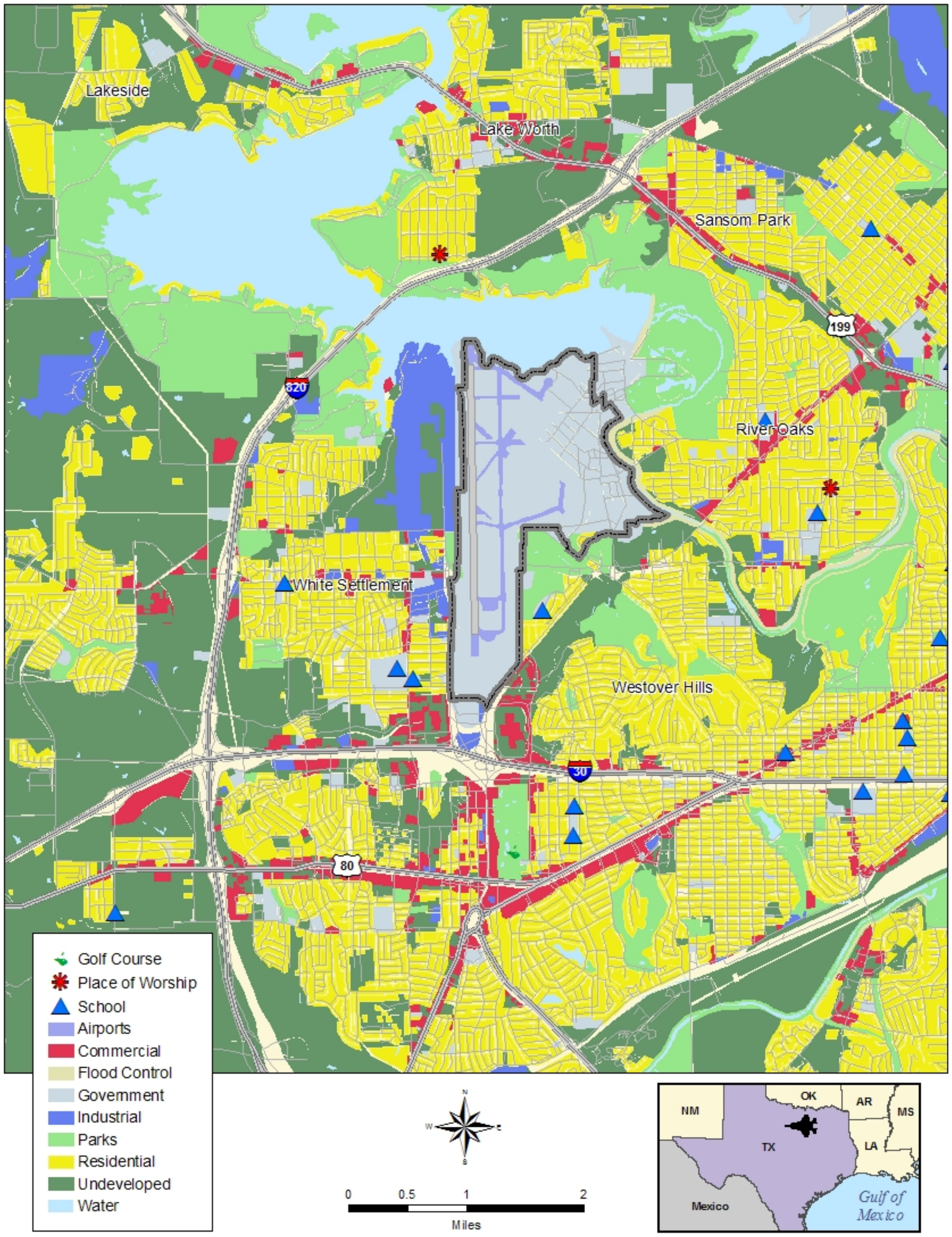

Figure F.5-6: LM Aero Land Use

F.5.2 Analysis

The major modeling input variables for this analysis are the number of aircraft operations, specifically the addition of the proposed F-35 operations to the existing LM Aero Fleet mix. The number and type of aircraft operations for this analysis are presented in Table F.5-6.

Table F.5-6: F-35 Aircraft Daily Fleet Mix and Operations by Day/Night Operations

Aircraft	Day	Night
C-12	3.62	0.00
C-130H&N&P	8.2	0.00
C-9A	13.57	0.00
F-14A	0.99	0.00
F-16C	38.1	0.00
F/A-18A/B/C	28.68	0.00
T-37B	2.52	0.00
T-38A	1.44	0.00
F-35	0.19	0.00
C-40	0.40	0.00
Total	***97.19***	***0.00***

Source: LM Aero/NAS JRB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (March 2006).

The Proposed Action has been modeled for the largest predicted year of activity (Test Years 2 and 4). The maximum testing year at LM Aero for proposed Cooperative Avionics Test Bed (CATB) testing is planned for Test Year 2, while the maximum year for proposed F-35 testing is planned for Test Year 4. Table F.5-7 reflects the number and types of proposed tests to be conducted at LM Aero as a composite of the two peak test years. This composite has been added to the existing baseline Fleet mix modeled for the proposed JSF DT. This composite profile has been modeled to be overly conservative, so that any resultant noise exposure represented for potential impacts would be greater than any one potential year of activity at LM Aero. Table F.5-8 is a break down of Alternative Two, proposed Short Takeoff Vertical Landing (STOVL) hover operations, which would be moved from NAS Patuxent River to LM Aero. Under this proposed scenario, approximately 90% of airborne STOVL hover operations would occur at NAS Patuxent River and approximately 10% at LM Aero. For ground-based operations, 64% would be conducted at NAS Patuxent River and 33% at LM Aero. Proposed ground-based tests at LM Aero would be comprised of propulsion and performance related STOVL test activities.

Table F.5-7: Proposed JSF DT at LM Aero

Test Year	Test Activity/Description	No. F35 Flights	Support Aircraft Type	No. Support Aircraft Flights	Total No. Flights
2/4	CATB Alternative Two: STOVL FQ, Performance, Propulsion, & Environment	34	CATB Boeing 737, Business Jet	82	116

Note: Represents Composite CATB test schedule and F-35 DT at LM Aero

Table F.5-8: Proposed STOVL Test Events at LM Aero (Test Year 4)

LM Aero	F-35 Operation Type								Total F-35
	Vertical TO	Short TO	Conv. TO	Conv. TG	Short TG	Conv. Landing	Short Landing	Vertical Landing	
STOVL FQ	1	4.5	0.5	0.5	3	1	2.5	2.5	**15.5**
STOVL Performance	1.5	4.5	0	0.5	2	0.5	3	2.5	**14.5**
STOVL Propulsion	0	0	0	0	0	0	0	0	**0**
STOVL Environment	13.2	3.3	0	1.65	3.3	1.65	4.95	9.9	**37.95**
Total F-35	**15.7**	**12.3**	**0.5**	**2.65**	**8.3**	**3.15**	**10.45**	**14.9**	**67.95**

Note: Values Represents Alternative 2 (Proposed Action), moved from NAS Patuxent River.

All proposed F-35 operations would be VTOL. The location of VTOL operations is illustrated in Figure F.5-7. Since NOISEMAP does not have the ability to model VTOL operations, adjustments were required to best simulate such an activity. In the case of LM Aero, VTOL operations have been modeled as very slow departures and arrivals (~10 kts) with steep (150 feet AGL going 4 feet down track). This has been performed to recreate the longer duration of the noise event that would be expected from a VTOL operation, and should be considered relatively representative of a VTOL operation given the drift due to winds and control limits of the aircraft. During F-35 departures, it is assumed once aircraft rotation is achieved (forward flight) that VTOL departures would merge with existing flight tracks. Therefore, there would be no additional aircraft flight tracks beyond those illustrated in the existing baseline.

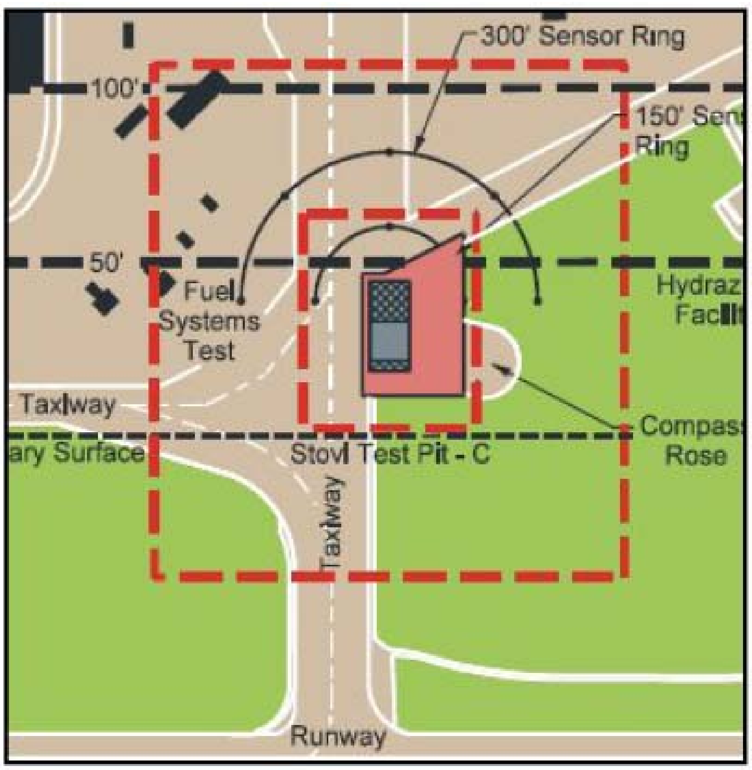

Figure F.5-7: LM Aero VTOL Location

The major modeling input variables for this analysis are the number of aircraft operations, specifically the addition of F-35 and C-40/Boeing 737-300 aircraft operations to the existing Fleet mix. Approximately 0.18 daily (68 annual) proposed F-35 operations and approximately 0.44 daily (or 164 annual) C-40/ Boeing 737-300 aircraft operations have added to the LM Aero baseline Fleet mix. All other NOISEMAP input variables (such as runway utilization and time of day) are constant and consistent with the existing baseline. The Proposed Action runway and flight track utilizations are presented in Tables F.5-9 and F.5.10. There are no planned support aircraft flight hours, other than CATB, for proposed F-35 testing at LM Aero.

Table F.5-9: Proposed JSF DT Condition Runway Use at LM Aero

Arrivals BT			
	Day	**Night**	**Total**
Runway 17:	64.82%	0.00%	64.82%
Runway 35:	34.89%	0.00%	34.89%
Runway STOVLA:	0.29%	0.00%	0.29%
Total	***100.00%***	***0.00%***	***100.00%***
Departures			
	Day	**Night**	**Total**
Runway 17:	64.78%	0.00%	64.78%
Runway 35:	35.00%	0.00%	35.00%
Runway STOVLD:	0.22%	0.00%	0.22%
Total	***100.00%***	***0.00%***	***100.00%***
Closed Patterns			
	Day	**Night**	**Total**
Runway 17:	64.65%	0.00%	64.65%
Runway 35:	35.35%	0.00%	35.35%
Total	***100.00%***	***0.00%***	***100.00%***

Source: LM Aero/NAS JRB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (March 2006).

Table F.5-10: Proposed JSF DT Daytime Flight Track Utilization

Track	Aircraft										Total
	C-12	C-130	C-9A	F-14A	F-16C	F-18A/C	T-37B	T-38A	C-40	F-35	
17A1						0.280					**0.280**
17A2	0.100	0.180	0.200	0.140	0.300	1.240	0.360	0.200	0.006		**2.726**
17A3		0.530									**0.530**
17A4	0.570		2.380		0.210				0.071		**3.231**
17A5	0.060		0.260		0.210				0.008		**0.538**
17A6					0.140	1.510					**1.650**
17A7					3.690	0.760					**4.450**
17A8						2.520					**2.520**
17A9					3.550						**3.550**
17D1	0.300	0.490	1.160	0.070	0.150	2.800	0.180	0.100	0.034		**5.284**
17D2	0.300	0.090	1.160	0.070	0.150	0.590	0.180	0.100	0.034		**2.674**
17D3	0.220	0.890	0.810	0.070	0.150	0.440	0.180	0.100	0.024		**2.884**
17D4	0.050	0.890	0.100	0.070	0.150	0.940	0.180	0.100	0.003		**2.483**
17D5	0.170		0.710		9.460	3.730			0.021		**14.091**
17D6					0.460						**0.460**
17D7					0.440						**0.440**
17D8					0.040						**0.040**
17F1	0.100		0.440		0.140				0.013		**0.693**
17G1	0.100		0.440		0.140				0.013		**0.693**
17O1						0.250					**0.250**
17O2	0.190		0.790		0.110				0.024		**1.114**
17O3		0.180				0.070					**0.250**
17O4					1.290						**1.290**
17O5					0.010	0.500					**0.510**
17O6	0.020		0.090		1.180	0.250			0.003		**1.543**
17O7						0.630					**0.630**
17O8		0.330									**0.330**
17S1					0.090						**0.090**
17T1	0.050	0.590	0.100	0.070	2.360	1.640	0.180	0.100	0.003		**5.093**
35A1						0.150					**0.150**
35A2	0.060	0.630	0.100	0.080	0.160	0.260	0.200	0.120	0.003		**1.613**
35A3		0.280									**0.280**
35A4	0.280		1.280		0.120				0.038		**1.718**
35A5	0.030		0.140		0.120				0.004		**0.294**
35A6					0.080						**0.080**
35A7					0.080						**0.080**
35A8					1.910						**1.910**
35A9					1.910						**1.910**
35D1	0.080	0.590	0.240	0.040	2.630	1.290	0.100	0.060	0.007		**5.037**
35D2	0.030	0.050	0.050	0.040	0.080	0.320	0.100	0.060	0.001		**0.731**
35D3	0.030	0.590	0.050	0.040	0.080	0.130	0.100	0.060	0.001		**1.081**
35D4	0.030	0.050	0.050	0.040	0.080	0.510	0.100	0.060	0.001		**0.921**
35D5	0.430				2.550	2.340					**5.320**
35D6			1.710		0.250				0.051		**2.011**
35D7					0.240						**0.240**
35D8					0.020						**0.020**
35F1	0.060		0.240		0.070				0.007		**0.377**
35G1	0.060		0.240		0.070				0.007		**0.377**
35O2					0.640						**0.640**
35O3		0.170				0.340					**0.510**
35O4					0.640						**0.640**
35O5						0.410					**0.410**
35O6	0.110	0.090	0.480		0.130				0.014		**0.824**
35O7						0.180					**0.180**
35S1					0.090						**0.090**
35T1	0.030	0.320	0.050	0.040	1.270	0.880	0.100	0.060	0.001		**2.751**
5A10						1.290					**1.290**
5A11						1.290					**1.290**
5A12						0.200					**0.200**
5A13						0.200					**0.200**
5A14	0.030	0.050	0.050	0.040	0.080	0.130	0.100	0.060	0.001		**0.541**
5A15	0.030	0.050	0.050	0.040	0.080	0.130	0.100	0.060	0.001		**0.541**
7A10		0.490									**0.490**
7A11		0.490									**0.490**
7A12	0.050	0.090	0.100	0.070	0.150	0.240	0.180	0.100	0.003		**0.983**
7A13	0.050	0.090	0.100	0.070	0.150	0.240	0.180	0.100	0.003		**0.983**
STOVL17A6										0.007	**0.007**
STOVL17A8										0.012	**0.012**
STOVL17D1										0.008	**0.008**
STOVL17D5										0.012	**0.012**
STOVL35D1										0.004	**0.004**
STOVL35D5										0.007	**0.007**
STOVL5A10										0.006	**0.006**
STOVL5A11										0.006	**0.006**
Total	**3.620**	**8.200**	**13.570**	**0.990**	**38.100**	**28.680**	**2.520**	**1.440**	**0.404**	**0.060**	**97.585**

Source: LM Aero/NAS JRB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (March 2006).

F.5.2.1 F-35 Operational Levels, Runway Use, and Fleet Mix

As described above, 68 annual F-35 and 164 annual C-40/Boeing 737-300 aircraft operations are planned for the composite tests at LM Aero. The proposed F-35 operations would use the same flight tracks as those currently used by F/A-18A/B/C aircraft in the existing baseline. Similarly, proposed CATB operations (C-40 or Boeing 737-300 aircraft) have been modeled to follow the existing flight tracks of similar legacy aircraft at LM Aero. In this case, CATB operations have identical runway and track utilization as the C-9A (DC-9-32 aircraft) currently operating at LM Aero. As previously presented in Tables F.5-9 and F.5-10 as the existing baseline, runway and flight track utilization would also be the same. The specific arrival and departure tracks modeled for proposed F-35 operations are illustrated in Figures F.5-8 and F.5-9 and specific arrival, departure, and closed pattern tracks modeled for proposed CATB operations are illustrated in Figures F.5-10, F.5-11, and F.5-12.

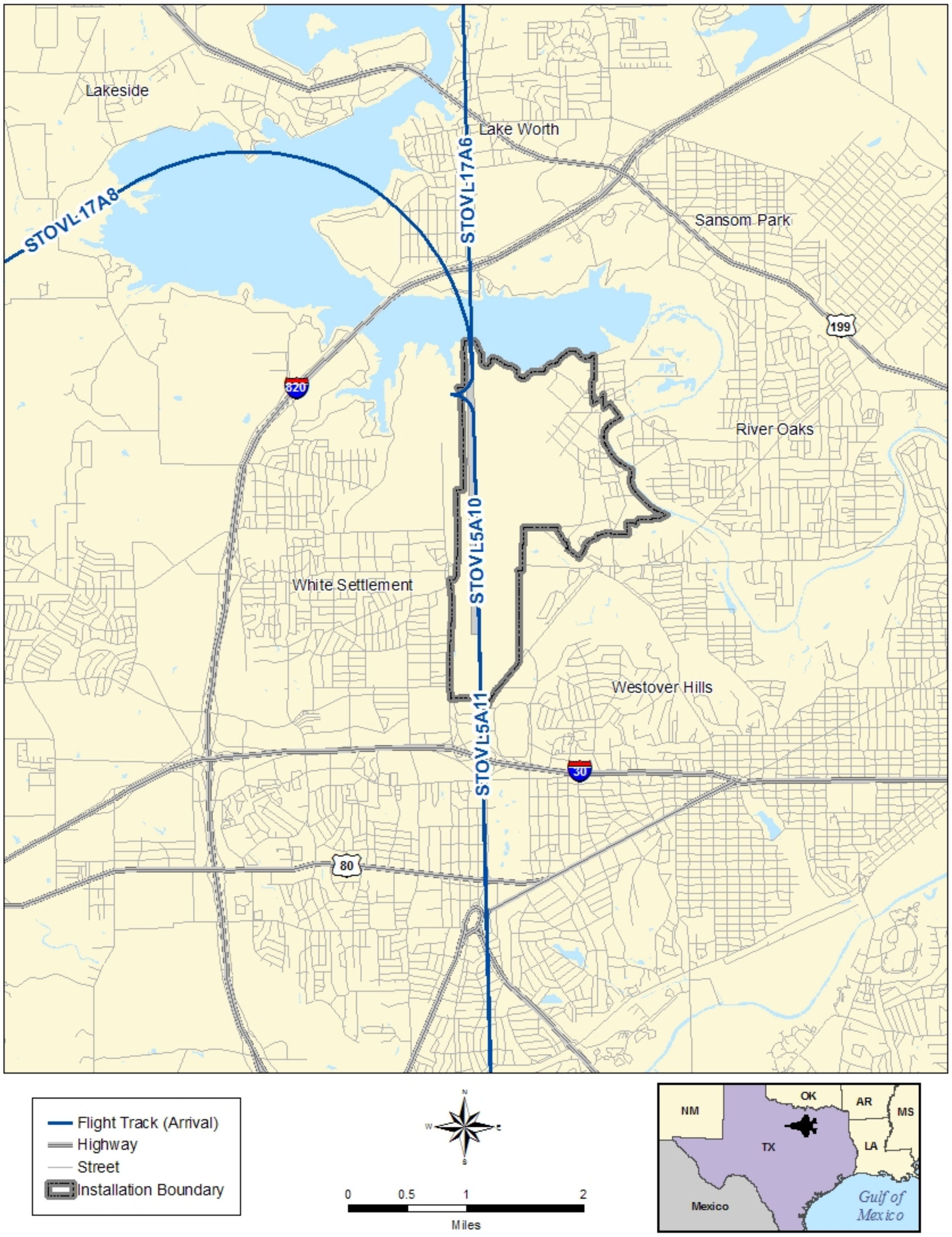

Figure F.5-8: F-35 VTOL Arrival Flight Tracks

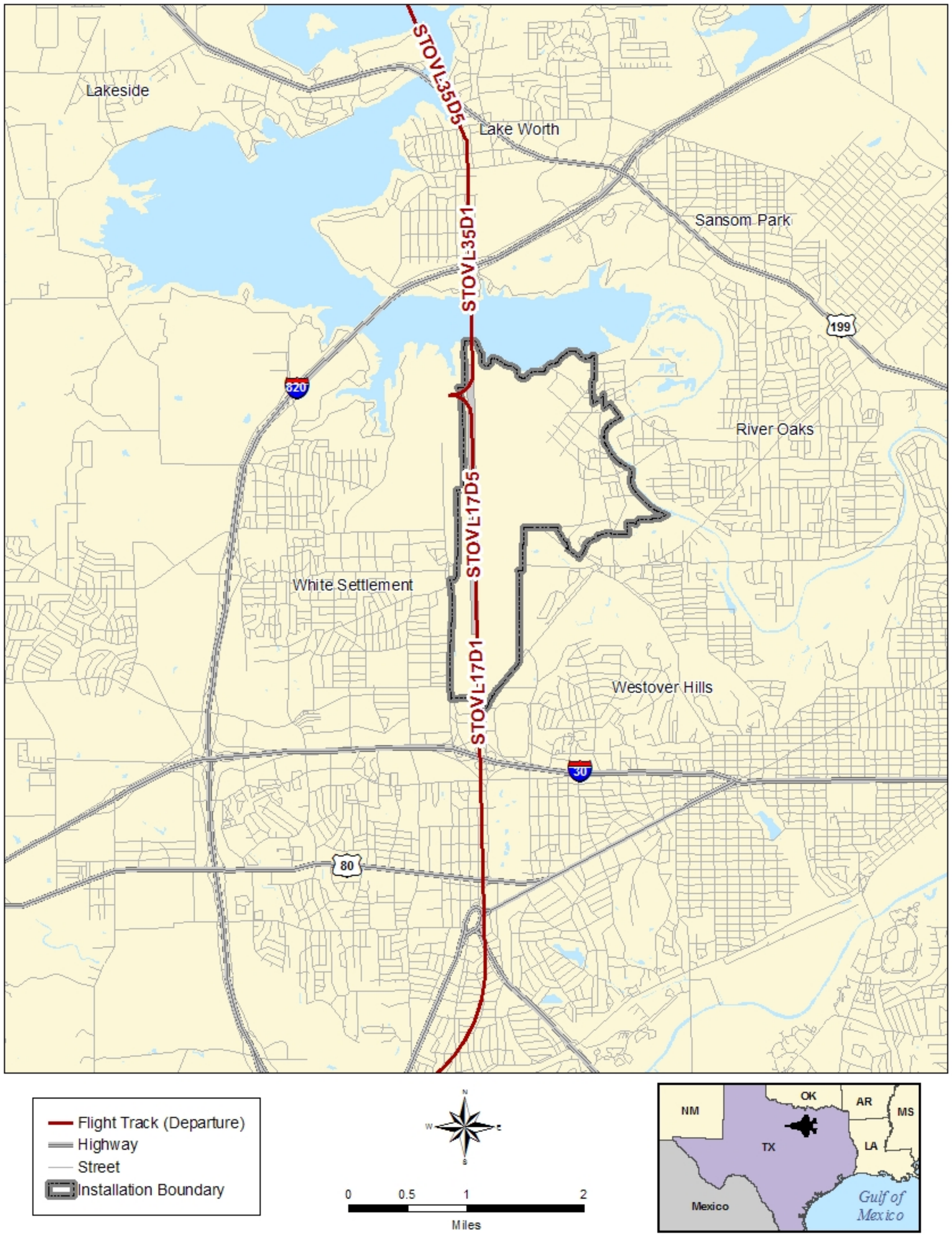

Figure F.5-9: F-35 VTOL Departure Flight Tracks

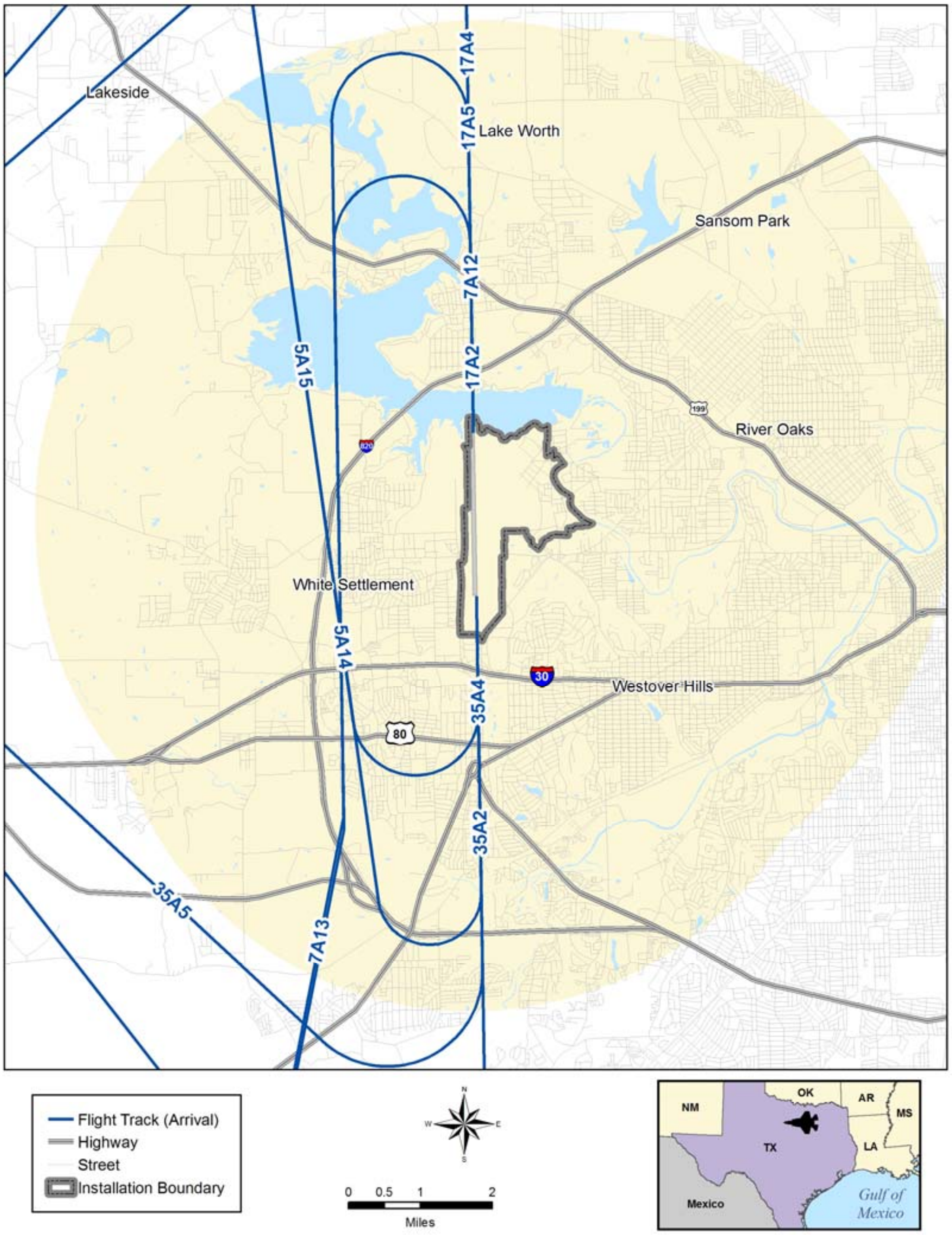

Figure F.5-10: CATB Arrival Flight Tracks

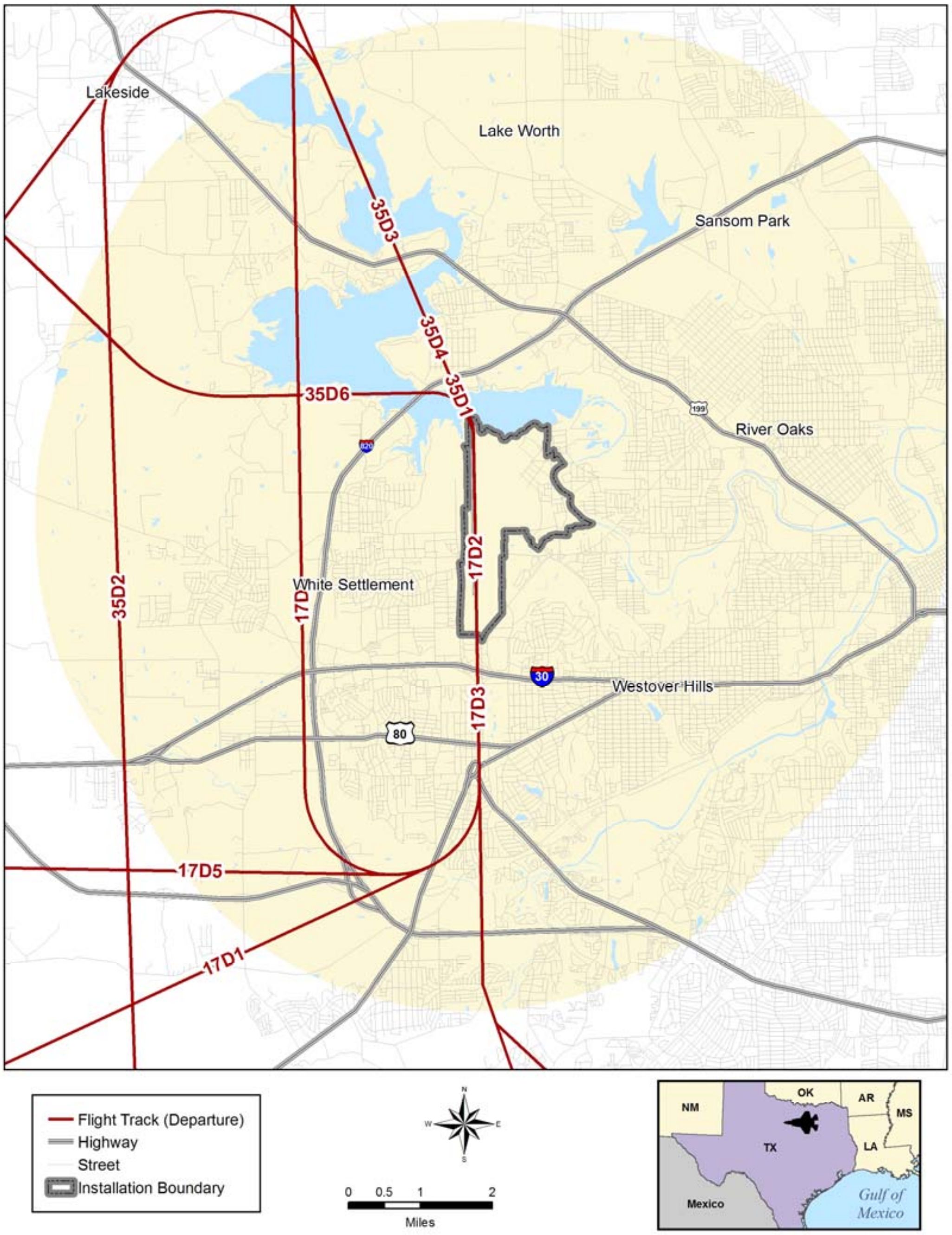

Figure F.5-11: CATB Departure Flight Tracks

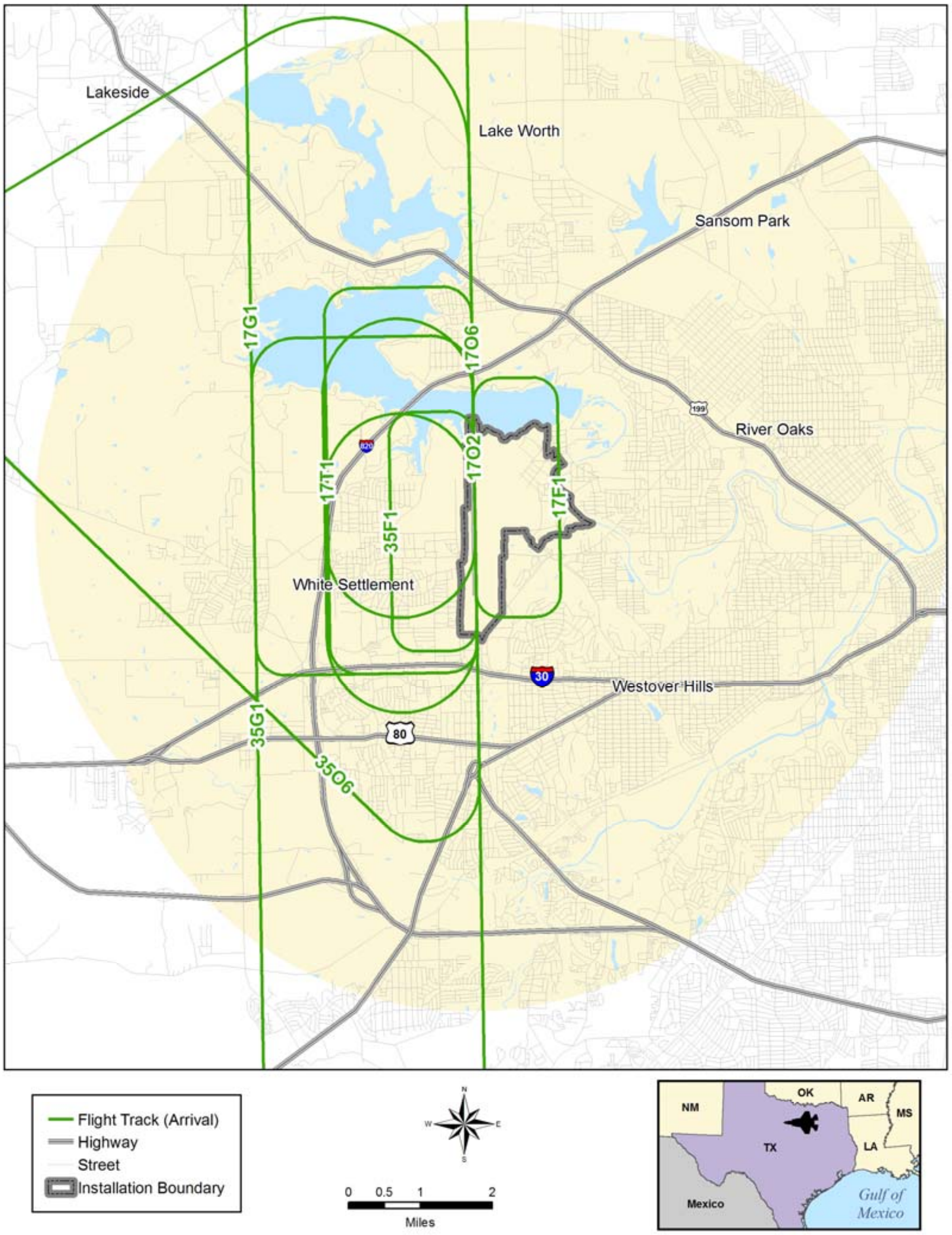

Figure F.5-12: CATB Closed-Pattern Flight Tracks

F.5.2.2 F-35 and CATB LM Aero Noise Contours

For the purposes of this evaluation, aircraft noise impacts are presented as land use areas and populations exposed to aircraft noise above existing baselines. This section discusses the physical characteristics of noise resulting from the Proposed Action. Contour lines representing average annual noise conditions for aircraft operations are generated for 65, 70, 75, 80, and 85 dB DNL.

The Proposed Action has been modeled for the largest predicted year of activity, Test Years 2 and 4 (See Table F.5-7). Figure F.5-13 illustrates the noise contours for the Proposed Action. Figure F.5-14 illustrates comparison contours showing the baseline DNL contours overlaid with the Proposed Action noise contours. As reflected in the figures, the noise contours are virtually the same except for northern areas surrounding LM Aero and areas located directly west of Runway 17/35 on LM Aero property. The 65 DNL noise contour, as a result of the Proposed Action alternatives, would be expected to extend north of Texas Route 199 between Lake Worth and Farm to Market Road (F.M. 1220). Table F.5-11 outlines a comparison of the Proposed Action DNL contours contrasted to the baseline DNL noise contours at LM Aero.

Table F.5-11: LM Aero Comparison Noise Impacts

DNL Contour Bands	Area Acres (On-Base)		Area Acres (Off-Base)		Acreage Change	
	Existing	F-35[1]	Existing	F-35[1]	On-Base	Off-Base
65-70 dB	340	340	4,938	4,963	0	25
70-75 dB	211	212	3,254	3,262	1	8
75-80 dB	238	238	1,030	1,037	0	7
80-85 dB	269	269	286	289	0	3
85+ dB	508	512	141	152	4	11
65 dB and greater (Total)	***1,566***	***1,571***	***9,649***	***9,703***	***5***	***54***

Source: LM Aero/NAS JRB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (March 2006).
Note: This is reflective of both Alternatives One and Two.

As a result of the Proposed Action, on-base areas potentially impacted by the 65 dB and greater DNL noise contour would increase slightly by approximately 5 acres (less than 1%) from approximately 1,566 to 1,571 acres. Similarly, off-base areas potentially impacted by the 65 dB and greater DNL noise contour would increase by approximately 54 acres (less than 1%) from 9,649 to 9,703 acres.

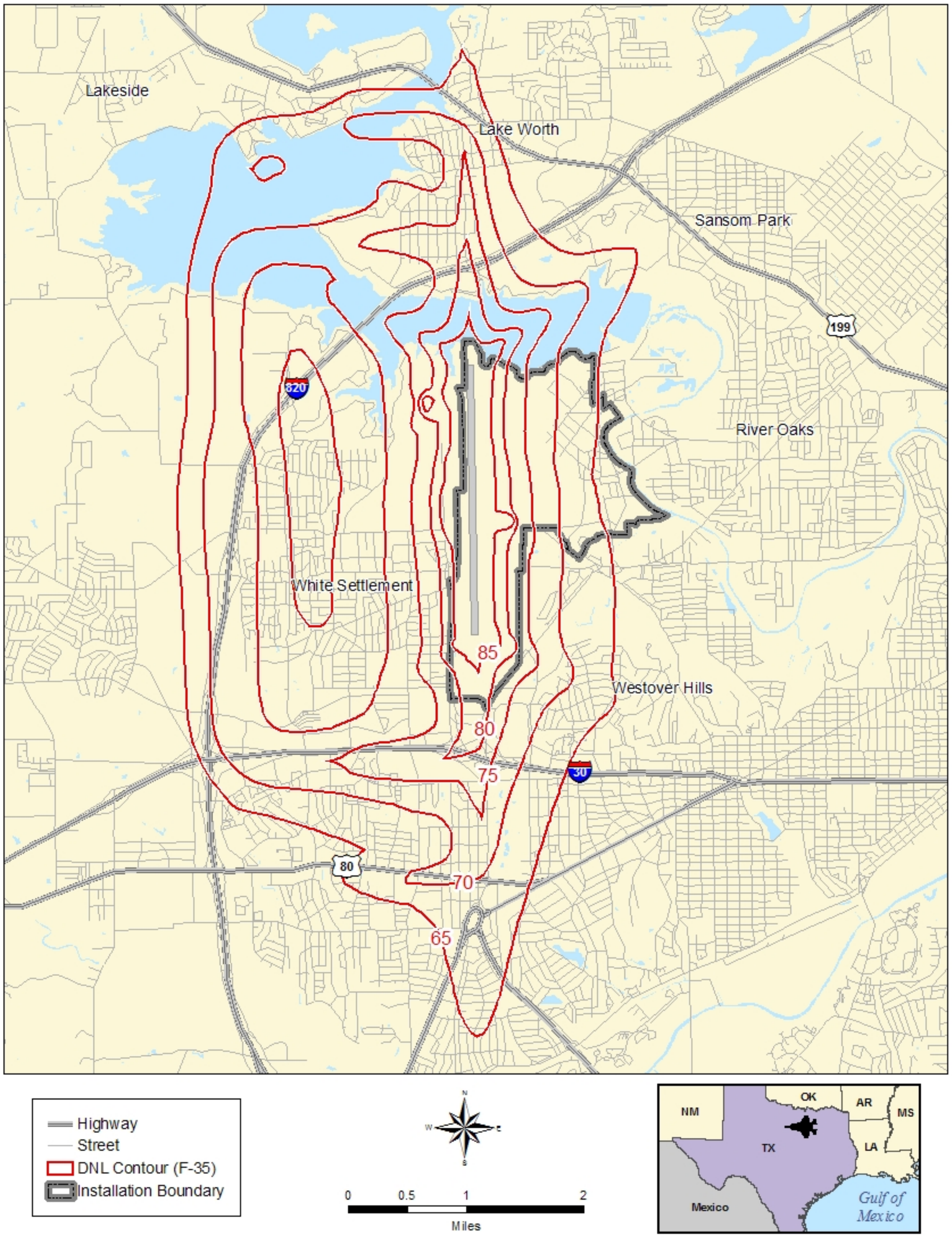

Figure F.5-13: DNL Noise Contours with F-35 Operations for LM Aero

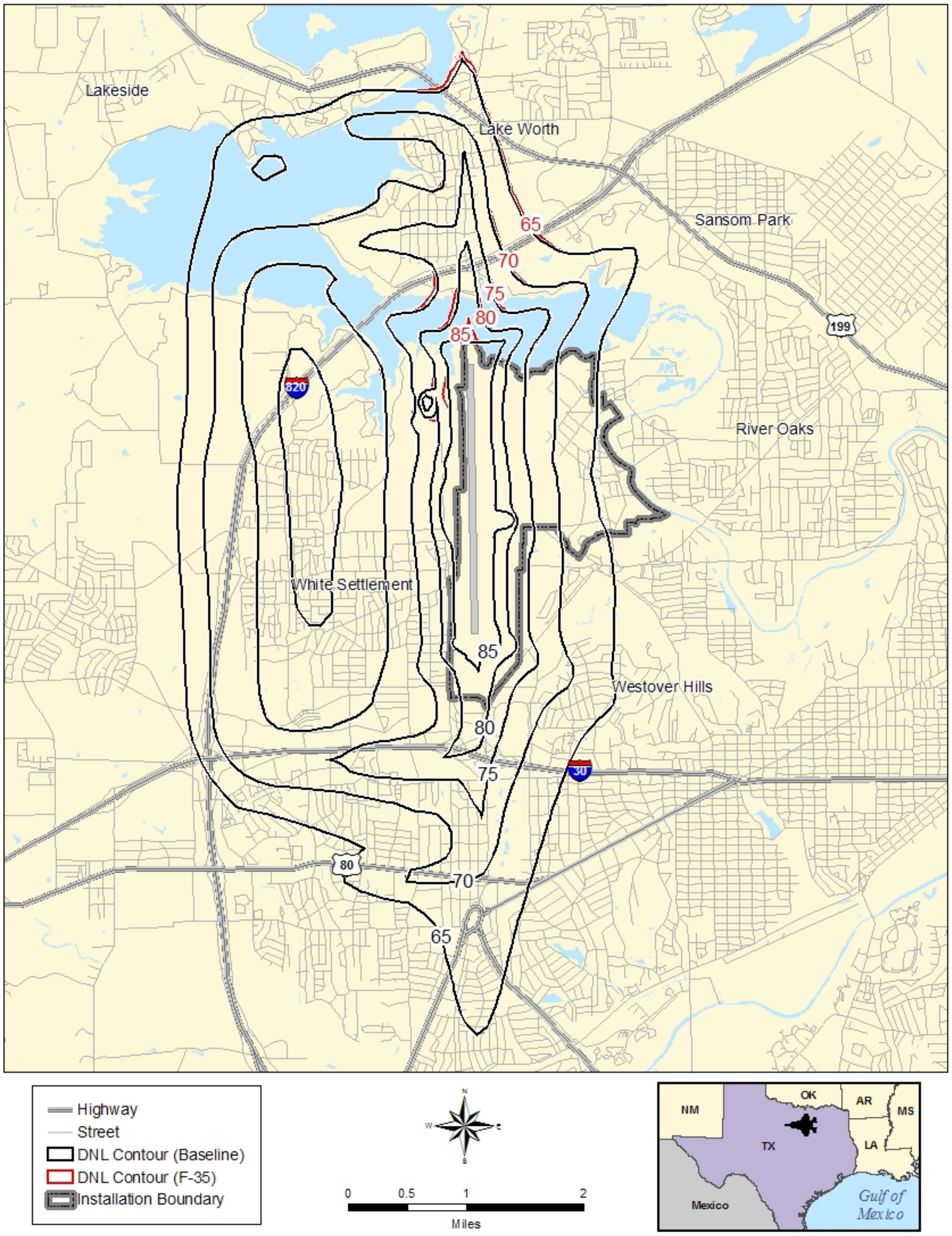

Figure F.5-14: DNL Comparison Contours with F-35 V/s. Baseline Operations for LM Aero

In accordance with FICON guidance, further analysis was performed to identify areas where 1.5 dB increases occur within the 65 dB DNL and greater noise contour and 3.0 dB increases occur within to 60 DNL noise contour. There would be no identified 1.5 or 3.0 dB increases from the Proposed Action. However, there would be slight changes in the noise environment anticipated as a result of the Proposed Action. As illustrated in Table F.5-12, there would be no change in commercial property within the 65 dB and greater DNL noise contours. Acres of residential development lands would increase by 17 acres (or less than 1%) from 2,323 to 2,340 acres. These specific increases over the residential land use would be less than 1.5 dB, so no noise impacts would be anticipated. Acres of industrial lands would remain unchanged.

Table F.5-12: LM Aero Existing and Proposed Action Comparison Land Uses (Acres)

Land Use Type	Existing DNL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Commercial	251	287	79	4	0	621
Industrial	29	200	178	120	58	585
Residential	1,483	622	202	16	0	2,323
Land Use Type	**With Proposed JSF DT DNL Contour Bands**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Commercial	252	288	79	4	0	623
Industrial	29	194	176	118	67	584
Residential	1,493	624	205	18	0	2,340
Land Use Type	**Change**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Commercial	1	1	0	0	0	2
Industrial	0	-6	-2	-2	9	-1
Residential	10	2	3	2	0	17

Source: LM Aero/NAS JRB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (March 2006).
Note: This is reflective of both Alternatives One and Two.

Further analysis was performed to identify specific impacts from vertical F-35 operations from the STOVL Test Pit at LM Aero/NAS JRB. As illustrated in Figures F.5-7 and F.5-15, the STOVL Test Pit is located adjacent to Runway 17/35. This location is along the north edge of the north taxiway leading to the runway and is located just beyond the primary surface for the runway. The STOVL Test Pit may be used simultaneously with normal runway operations through coordination with the airfield control tower at this location; however, all air operations will be controlled by the airfield control tower. [4]

Figure F.5-15 illustrates the anticipated noise impacts in DNL from F-35 vertical operations with the Proposed Action. As illustrated, the 85 DNL contour would bow slightly to the west over the LM Aero/NAS JRB and lease limits as a result of F-35 vertical operations at the Test Pit. Additional influence to the noise environment in this area would be the result of the Engine Test Cell facility located approximately 1,000 feet west of the STOVL Test Pit. Noise from this facility is anticipated to cause a localized, oval shaped area of the 85 DNL contour; and as a result of engine testing operations, there would be noise affects to the west of the STOVL Test Pit.

The nearest residential properties to the STOVL Test Pit are located approximately one mile to the north along the north shore of Lake Worth. These locations would be primarily influenced by the flight paths of aircraft departing LM Aero/NAS JRB to the north, but would not likely be influenced from activities at

[4] *Environmental Assessment for the JSF-SDD Facilities Expansion Project, LM AERO/NAS JRB, August 2002.*

the STOVL Test Pit. Other land use types in the vicinity of the STOVL Test Pit are on-base facilities, especially those associated with Air Force Plant #4. Therefore, no noise impacts would be anticipated from proposed F-35 operations at the STOVL Test Pit.

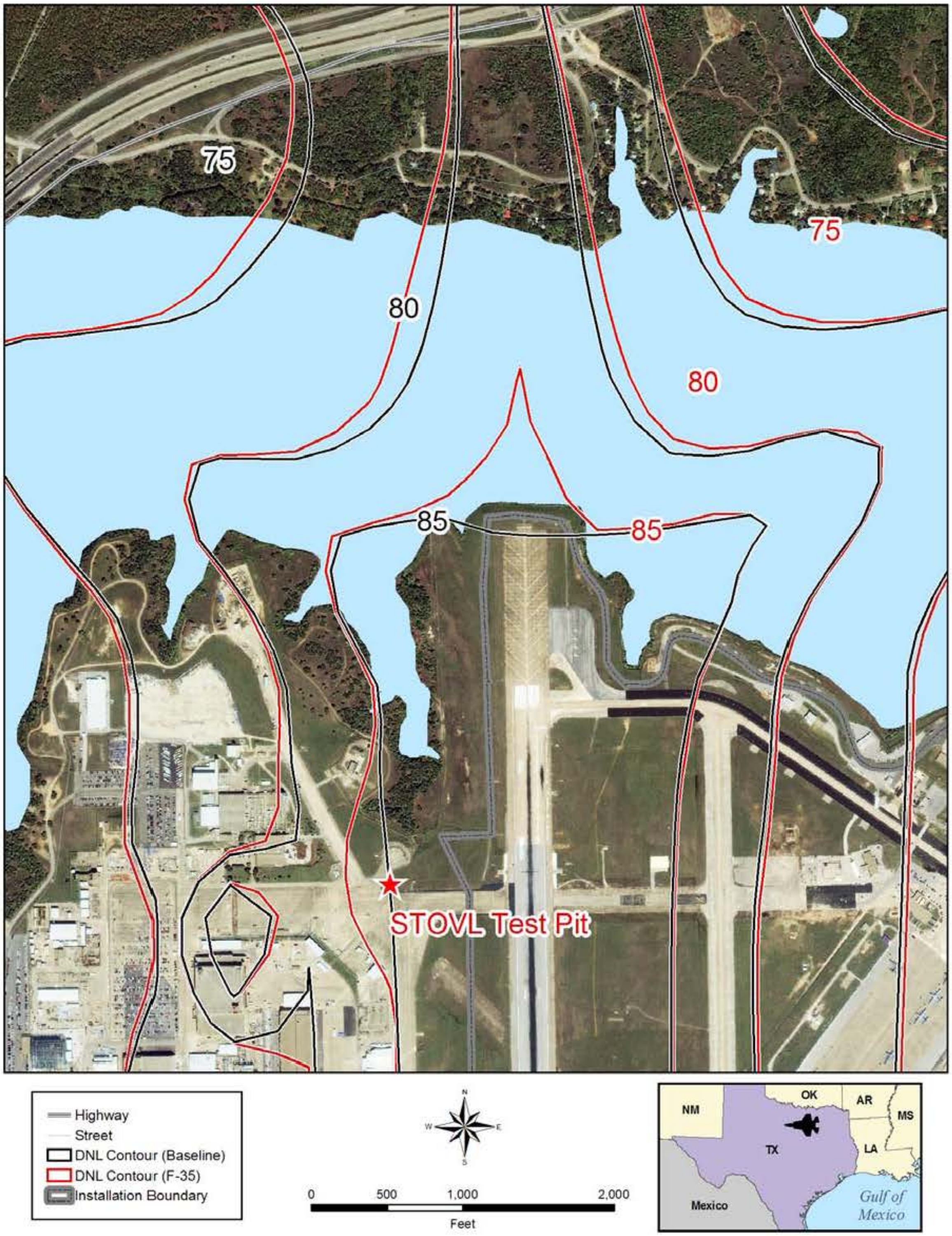

Figure F.5-15: DNL Comparison Contours with F-35 V/s. Baseline Operations for STOVL Test Pit LM Aero

For noise sensitive receptors (e.g., historic sites, schools, hospitals), specific locations were analyzed for 1.5 dB and 3.0 dB increases by obtaining specific latitude and longitude locations and plotting dB deltas for both the existing baseline condition and Proposed Action noise conditions. These locations are identified along with the existing and Proposed Action dB values in Table F.5-13. There would be no anticipated noise-related impacts to these non-residential noise sensitive receptors.

Table F.5-13: LM Aero Comparison Non-Residential Noise Sensitive Receptors

Name	Type	Existing (dB)	With JSF (dB)	Change (dB)
Amon Carter Museum	Museum	40.5	40.6	0.1
Arlington Heights High School	School	47.9	47.9	0.0
Baylor All Saints Medical Center	Hospital	46.4	46.4	0.0
Bluff Springs School	School	44.9	45.1	0.2
Boaz Golf Course	Golf Course	67.7	67.7	0.0
Brewer School	School	71.8	71.8	0.0
Brooklyn Heights School	School	43.5	43.5	0.0
Bryce Building	Historic	50.3	50.3	0.0
Buck Oaks Farm	Historic	65.6	65.7	0.1
Carlson School	School	39.7	39.7	0.0
Castlebury School	School	49.7	49.7	0.0
Central School	School	72.5	72.5	0.0
Chapin School	School	52.9	52.9	0.0
Cherry Lane Hospital	Hospital	73.4	73.4	0.0
Circle Park School	School	35.0	35.0	0.0
Colonial Golf Course	Golf Course	41.6	41.6	0.0
Crestwood School	School	39.2	39.2	0.0
Denver Avenue School	School	34.2	34.2	0.0
Eagle Mountain School	School	46.0	46.0	0.0
Elder Junior High School	School	34.9	35.0	0.1
Elder Middle School	School	35.0	35.0	0.0
Elm Grove Church	Place of Worship	45.4	45.5	0.1
Friendship Church	Place of Worship	47.0	47.5	0.5
Fort Worth Zoo	Park	38.6	38.6	0.0
Fort Worth Museum Of Science	Museum	41.7	41.7	0.0
Greenwood Cemetery	Cemetery	37.9	37.9	0.0
Harris Methodist Fort Worth	Hospital	46.3	46.8	0.5
Harris Methodist Southwest	Hospital	47.5	47.5	0.0
HealthSouth Rehab Hospital	Hospital	44.5	44.5	0.0
Hebrew Cemetery	Cemetery	36.8	36.8	0.0
Highway Chapel	Place of Worship	47.5	47.9	0.4
Indian Oaks Church	Place of Worship	77.5	77.6	0.1
J W Turner Elementary School	School	46.4	46.4	0.0
Kimbell Art Museum	Museum	39.3	39.4	0.1
Kindred Hosp-Fort Worth SW	Hospital	49.8	49.8	0.0

Table F.5-13: LM Aero Comparison Non-Residential Noise Sensitive Receptors (Continued)

Name	Type	Existing (dB)	With JSF (dB)	Change (dB)
Kirkpatrick Junior High School	School	38.3	38.3	0.0
Lake Como Cemetery	Cemetery	52.9	52.9	0.0
Lakeview Church	Place of Worship	45.2	45.3	0.1
Lifecare Hosp of Fort Worth	Hospital	48.1	48.2	0.1
Saint Peters School	School	73.9	73.9	0.0
Sanguinet, Marshall R., House	Historic	49.0	49.0	0.0
Smith-Frazier Cemetery	Cemetery	47.5	47.9	0.4
South Hi-Mount School	School	45.6	45.6	0.0
Stripling Junior High School	School	45.3	45.3	0.0
Technical High School	School	34.8	34.9	0.1
Texas Christian University	School	38.6	38.6	0.0
Thomas Place School	School	45.2	45.3	0.1
Trinity Church	Place of Worship	44.6	44.7	0.1
Turner School	School	46.3	46.3	0.0
Washington Heights Elementary	School	36.9	36.9	0.0
Wesley Chapel	Place of Worship	47.5	47.9	0.4
West Side School	School	65.9	65.9	0.0
West Van Zandt School	School	38.8	38.9	0.1
Westcliff School	School	39.0	39.0	0.0
Westover Manor	Historic	54.9	54.9	0.0
Woolworth, F. W., Building	Historic	40.2	40.2	0.0

Source: LM Aero/NAS JRB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (March 2006).

APPENDIX G
COASTAL CONSISTENCY NEGATIVE DETERMINATION
JOINT STRIKE FIGHTER DEVELOPMENTAL TEST PROGRAM

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G.1 CALIFORNIA COASTAL CONSISTENCY NEGATIVE DETERMINATION

The Proposed Action, Joint Strike Fighter (JSF) Developmental Test (DT), complies to the maximum extent practicable with the goals of the state in protecting the coastal zone; careful consideration has been given to these goals in reviewing the impacts associated with the Proposed Action. Sections of the California Coastal Act of 1976 applicable to the Proposed Action, as determined by the JSF Program Office (JPO), include Article 2 – Public Access (Sections 30210-30214); Article 3 – Recreation (Sections 30220–30224); and Article 4 – Marine Environment (Sections 30230-30237).

G.1.1 Article 1 – General (Sections 30200):

Section 30200

The Proposed Action complies to the maximum extent practicable with the goals of the state in protecting the coastal zone; careful consideration has been given to these goals in reviewing the impacts associated with the Proposed Action.

G.1.2 Article 2 – Public Access (Sections 30210-30214):

Section 30210

Under the Proposed Action, the majority of test activities (98%) would be conducted in waters offshore [greater than 12 Nautical Miles (NM)] from Naval Air Warfare Center, Weapons (NAWCWPNS) Point Mugu outside the California coastal zone. The proposed JSF DT would only occur in the coastal zone (less than 1% of total proposed test activities). To avoid conflicting uses of the area, a Notice to Mariners (NOTMAR) would be issued 48 hours before commencement of proposed tests to give regular boat traffic ample notice prior to testing in the area. The Proposed Action would be consistent with the type and tempo of aircraft overflights and stores separation already occurring at NAWCWPNS Point Mugu. The Proposed Action would not be expected to interfere with recreational access to any public shoreline or result in unnecessary hardships for commercial or recreational fishing operations. Therefore, no interference with public access to coastal resources would be expected from implementing the Proposed Action [additional information is also provided in Section 4 of this Environmental Assessment (EA)/Overseas EA (OEA)].

Section 30211

The Proposed Action would not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

Section 30212

An analysis was not provided for this section because the Proposed Action would not involve the shoreline.

Section 30212.5

An analysis was not provided for this section because the Proposed Action is not a public facility.

Section 30213

An analysis was not provided for this section because the Proposed Action would not provide lower-cost visitor and recreational facilities.

Section 30214

No interference with public access to coastal resources would be expected from implementing the Proposed Action. See response to Section 30210 above.

G.1.3 Article 3 – Recreation (Sections 30220-30224):

Section 30220

Under the Proposed Action, recreational opportunities within the shoreline area are not likely to be affected. Released stores would predominantly break apart upon impact with the water's surface and would settle to the bottom of the ocean. Recreational uses of offshore coastal waters would not likely be affected. The proposed JSF DT would only allow for shore crossings (less than 1% of operations) to occur in the coastal zone. A NOTMAR would be issued 48 hours before commencement of the proposed test to give regular boat traffic ample notice prior to testing in the area. The Proposed Action would be consistent with the type and tempo of aircraft overflights and stores separation already occurring at NAWCWPNS Point Mugu. Potential impacts from aircraft overflights and stores separation activities were concluded to be less than significant (additional information is provided in Sections 4.3.4, 4.3.5, and 4.3.7 of this EA/OEA). The Proposed Action would be consistent, to the maximum extent practicable, with the California coastal zone management program.

Section 30221

No oceanfront land suitable for recreational use is proposed for development under the Proposed Action.

Section 30222

No private land suitable for visitor-serving commercial recreational facilities is proposed for development under the Proposed Action. No private lands would likely be affected under implementation of the Proposed Action; therefore, impacts are not anticipated to private lands suitable for visitor-serving commercial recreational uses.

Section 30222.5

No oceanfront land suitable for coastal-dependent aquaculture is proposed for development under the Proposed Action. Therefore, impacts are not anticipated to oceanfront lands suitable for coastal-dependent aquaculture.

Section 30223

No upland areas necessary to support coastal recreational uses are proposed for development under the Proposed Action. Therefore, impacts are not anticipated to upland areas necessary to support coastal recreational uses.

Section 30224

No oceanfront land suitable for recreational boating use is proposed for development under the Proposed Action. Therefore, impacts are not anticipated to oceanfront lands suitable for recreational boating use.

G.1.4 Article 4 – Marine Environment (Sections 30230-30237):

Section 30230

Although the Proposed Action could potentially affect the marine environment, impacts would not likely be significant and biological productivity of coastal waters would be maintained. Species present in the affected area are believed to be transient in nature and accustomed to the regularly occurring flight noise associated with on-going actions at NAWCWPNS Point Mugu. Impacts to biological resources, while potentially possible, would not be expected and noise generated from the Proposed Action would be similar to current RDT&E activities conducted on the Sea Range. Startle impacts to marine mammals and sea turtles, as well as threatened and endangered shorebird and raptor species, are unlikely because the majority of the flight testing would be at altitudes greater than 500 feet. Released stores would predominantly break apart upon impact with the water's surface and would settle to the bottom of the ocean. Changes to water quality are expected to be minimal to negligible, based on previous environmental analyses. Therefore, the Proposed Action would not be expected to produce any significant impacts to biological resources, including Federally- and state-listed endangered or threatened species, as further described in Sections 4.3.5 and 4.3.7 of this EA/OEA.

Section 30231

The Proposed Action would not be expected to impact the biological productivity and quality of coastal waters. See response to Section 30230 above for a description of potential limitations to biological productivity and coastal water quality.

Section 30232

An analysis was not provided for this section because the Proposed Action would not involve the development or transportation of crude oil, gasoline, petroleum products, or hazardous substances and subsequent protection against spillage.

Section 30233

The Proposed Action would not involve any construction, nor would it generate additional nonpoint source pollution or increased sedimentation. Therefore, physical impacts are not anticipated to tidal or nontidal wetlands or habitat of indigenous animal or plant species.

Section 30234

An analysis was not provided for this section because the Proposed Action would not result in unnecessary hardships for commercial or recreational fishing operations (as described in Sections 4.3.6 and 4.3.7). Released stores would predominantly break apart upon impact with the water's surface and would settle to the bottom of the ocean. No significant changes to water quality are anticipated based on similar, previous environmental analyses. Therefore, impacts to fishing activities or boating harbor space would not be expected to occur.

Section 30234.5

An analysis was not provided for this section because the Proposed Action would not be expected to result in unnecessary hardships for fishing activities, as described in Section 4.3.6 of this EA/OEA.

Section 30235

An analysis was not provided for this section because the Proposed Action would not alter the natural shoreline or shoreline processes.

Section 30236

An analysis was not provided for this section because the Proposed Action would not involve channelization, dams, or other alterations to river and stream systems.

Section 30237

An analysis was not provided for this section because the Proposed Action would not be expected to impact the Bolsa Chica wetlands.

G.2 MARYLAND COASTAL CONSISTENCY NEGATIVE DETERMINATION

The Proposed Action, JSF DT, complies to the maximum extent practicable with the goals of the state in protecting the coastal zone; careful consideration has been given to these goals in reviewing the impacts associated with the Proposed Action. Sections of the Maryland Coastal Zone Management Program as established by executive order and approved in 1978, applicable to this Proposed Action, as determined by the JPO, include Goal 1 (Objectives 1–8):

G.2.1 Goal 1: To Preserve and Protect Coastal Resources

Objective (1)

The Chesapeake Test Range (CTR) of Naval Air Station (NAS) Patuxent River covers approximately 1,800 square miles of airspace over portions of southern Maryland, the eastern shore of the Chesapeake Bay in Maryland, and the northern neck areas of Virginia. Fifty percent (50%) of the CTR is over water. The available working airspace within the Virginia Capes (VACAPES) Operating Area (OPAREA) of the Atlantic Warning Area (AWA) covers over 35,000 square miles and encompasses both the open ocean and open air. The Proposed Action occurring with the CTR is subject to the Clean Air Act (CAA), while those Proposed Action activities occurring in the VACAPES OPAREA are predominately outside of coastal state boundaries and not subject to the regulatory provisions of the CAA, rendering the attainment status irrelevant. However, military operations occurring in the CTR and VACAPES OPAREA are required to conduct analyses to determine impacts to air as a result of their operations and to mitigate them to the maximum extent practicable. Typical sources of emissions associated with the Proposed Action occurring in the CTR and VACAPES OPAREA include aircraft flights and weapons tests. These activities are consistent with those activities already occurring in the CTR and VACAPES OPAREA on a routine basis. A conformity analysis is not applicable for either the CTR or the VACAPES OPAREA. Project-related emissions at NAS Patuxent River would be below the applicable *de minimis* thresholds and do not make up make up 10% or more of the nonattainment area's (Sussex County, Delaware) total emissions budget. Additional information pertaining to the air analysis conducted for the Proposed Action at NAS Patuxent River is provided in Section 6.3 of this EA/OEA. The proposed JSF DT activities in the VACAPES OPAREA would be conducted predominantly outside the Maryland coastal zone boundary at flight altitudes typically above 3,000 feet; therefore, a conformity analysis is not applicable. Drifting of emissions from the VACAPES OPAREA to state boundaries would not likely occur. If the emissions were to disperse over a large area outside the test operating area, they would not result in a change to the Maryland emission status. Air pollutants would be temporary in nature and quickly dissipate in a three-dimensional manner following normal plume dispersion dynamics.

Objective (2)

Although the Proposed Action could potentially affect the marine environment, impacts would not be expected to be significant and biological productivity of coastal waters would be maintained. Species present in the affected area are believed to be transient in nature and accustomed to the regularly occurring flight noise associated with on-going actions in the CTR and VACAPES OPAREA. To avoid conflicting uses of the area, a NOTMAR would be issued 48 hours before commencement of proposed tests to give regular boat traffic ample notice prior to testing in the area. The Proposed Action would be consistent with the type and tempo of aircraft overflights and stores separation already occurring in the CTR and VACAPES OPAREA. Flights altitudes for the Proposed Action are typically at 3,000 feet and above, with occasional flights at lower altitudes (those nominal flights for the total Proposed Action at 500 feet are conducted mostly over land at the airfield of NAS Patuxent River). The Proposed Action would not result in unnecessary hardships for commercial or recreational fishing operations, as described in Sections 4.6.6, 4.6.7 and 6.7.2 of this EA/OEA. Impacts to biological resources, while potentially possible, would not be expected to be significant. Released stores would predominantly break apart upon impact with the water's surface and would settle to the bottom of the ocean. No significant changes to water quality would be expected based on previous analyses. Noise generated from the Proposed Action would be similar to current activities conducted in the CTR and VACAPES OPAREA. Therefore, impacts to biological resources would not be expected to occur as further described in Sections 4.6, 6.4, 6.5, and 6.7 of this EA/OEA.

Objective (3)

The Proposed Action would not involve any construction or coastal development, nor would it generate soil erosion or increased sedimentation. Therefore, physical impacts are not anticipated to soil, land, and vegetation associated with estuarine and marine ecosystems such as wetlands, dunes, and primary islands. No oceanfront land suitable for nursery or feeding areas, wintering and resting areas for migratory birds or recreational use is proposed for development under the Proposed Action. No private lands would likely be affected under implementation of the Proposed Action. Natural resource areas of offshore coastal waters and coastal natural resource areas within the shoreline area would not likely be affected by the Proposed Action.

Objective (4)

The Proposed Action would not involve any construction or coastal development, nor would it generate additional nonpoint source pollution or increased sedimentation. Therefore, physical impacts are not anticipated to tidal or non-tidal wetlands.

Objective (5)

The Proposed Action would not involve any construction or coastal development. Physical impacts are not anticipated to non-tidal wetlands, sensitive habitat areas, and wintering or resting areas for migratory birds. Bird and animal species, as well as other biological resources, in the CTR and VACAPES OPAREA are already accustomed to aircraft noise. Therefore, the Proposed Action would not be expected to produce any significant impacts to biological resources, including habitats for Federally- and state-listed endangered or threatened species or migratory birds (as further described in Sections 4.6, 6.4, 6.5, and 6.7 of this EA/OEA).

Objective (6)

The Proposed Action would not involve any construction or coastal development. Therefore, physical impacts are not anticipated to agricultural or forested areas.

Objective (7)

No waterfront or historic shorefront properties or cultural, historical, or archaeological resources would be expected to be impacted under the Proposed Action.

Objective (8)

The Proposed Action would not be expected to interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation. The Proposed Action would not interfere with public access to coastal resources, such as the state's public beaches. No oceanfront land suitable for recreational use is proposed for development under the Proposed Action. No private lands would be expected to be affected under implementation of the Proposed Action. The Proposed Action is not expected to affect recreational opportunities within the shoreline area or recreational uses of offshore coastal waters. Test activities would not interfere with public access policies to provide the maximum public access possible. All proposed test activities would be conducted in the Chesapeake Bay or open waters within the VACAPES OPAREA, outside of the Maryland coastal zone. To avoid conflicting uses of the area, a NOTMAR would be issued 48 hours before commencement of proposed tests to give regular boat traffic ample notice prior to testing in the area. The Proposed Action would be consistent with the type and tempo of aircraft overflights and stores separation already occurring in the CTR and VACAPES OPAREA. The Proposed Action would not be expected to interfere with recreational access to any public shoreline. Therefore, no interference with public access to coastal resources would be anticipated from implementing the Proposed Action.

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G.3 VIRGINIA COASTAL CONSISTENCY NEGATIVE DETERMINATION

The Proposed Action, JSF DT, complies to the maximum extent practicable with the goals of the state in protecting the coastal zone; careful consideration has been given to these goals in reviewing the impacts associated with the Proposed Action. Sections of the Virginia Coastal Resources Management Program, as authorized by Virginia Executive Order 13 (86) and continued by subsequent executive orders, the most recent being Executive Order 23 (02), applicable to this Proposed Action as determined by the JPO include:

G.3.1 Coastal Resources Management Program Enforceable Policies Fisheries Management

The Proposed Action would not be expected to result in unnecessary hardships for commercial or recreational fishing operations. Released stores would predominantly break apart upon impact with the water's surface and would settle to the bottom of the ocean. No significant changes to water quality are expected based on previous analyses. Although the Proposed Action could potentially affect the marine environment, impacts would not be significant and biological productivity of coastal waters would be maintained. Species present in the affected area are believed to be transient in nature and accustomed to the regularly occurring flight noise associated with on-going actions in the CTR and VACAPES OPAREA. To avoid conflicting uses of the area, a NOTMAR would be issued 48 hours before commencement of the test to give regular boat traffic ample notice prior to testing in the area. The Proposed Action would be consistent with the type and tempo of aircraft overflights and stores separation already occurring in the CTR and VACAPES OPAREA. Flights altitudes for the Proposed Action are typically at 3,000 feet and above, with occasional flights at lower altitudes (those nominal flights for the total Proposed Action at 500 feet are conducted mostly over land at the airfield of NAS Patuxent River). The Proposed Action would not be expected to result in unnecessary hardships for commercial or recreational fishing operations. Impacts to biological resources, while potentially possible, would not be expected to be significant and noise generated from the Proposed Action would be similar to current activities conducted in the CTR and VACAPES OPAREA. Therefore, impacts to biological resources or fishing activities would not likely occur as further described in Sections 4.6, 6.4, 6.5, and 6.7 of this EA/OEA.

Subaqueous Lands Management

An analysis was not provided for this section because the Proposed Action would not involve subaqueous lands.

Wetlands Management

The Proposed Action would not involve any construction or coastal development, nor would it generate additional nonpoint source pollution or increased sedimentation. Therefore, physical impacts are not anticipated to tidal or nontidal wetlands.

Dunes Management

The Proposed Action would not involve any construction or coastal development, nor would it involve dunes or the shoreline. Therefore, physical impacts are not anticipated to dunes or the shoreline.

Non-Point Source Pollution Control

The Proposed Action would not involve any construction or coastal development, nor would it generate soil erosion or increased sedimentation. Therefore, physical impacts are not anticipated to soil, land, and vegetation.

Point Source Pollution Control

An analysis was not provided for this section because the Proposed Action would not involve point source pollution impacts.

Shoreline Sanitation

An analysis was not provided for this section because the Proposed Action would not involve shoreline sanitation impacts.

Air Pollution Control

The CTR of NAS Patuxent River covers approximately 1,800 square miles of airspace over portions of southern Maryland, the eastern shore of the Chesapeake Bay in Maryland, and the northern neck areas of Virginia. Fifty percent of the CTR is over water. The available working airspace within the VACAPES OPAREA covers over 35,000 square miles and encompasses both the open ocean and open air. The Proposed Action occurring with the CTR is subject to the CAA, while those Proposed Action activities occurring in the VACAPES OPAREA are predominantly outside of coastal state boundaries and not subject to the regulatory provisions of the CAA, rendering the attainment status irrelevant. However, military operations occurring in the CTR and VACAPES OPAREA are required to conduct analyses to determine impacts to air as a result of their operations and to mitigate them to the maximum extent practicable. Typical sources of emissions associated with the Proposed Action occurring in the CTR and VACAPES OPAREA include aircraft flights and weapons tests. These activities are consistent with those activities already occurring in the CTR and VACAPES OPAREA on a routine basis. A conformity analysis is not applicable for either the CTR or the VACAPES OPAREA. Project-related emissions at NAS Patuxent River would be below the applicable *de minimis* thresholds and do not make up make up 10% or more of the nonattainment area's (Suffolk County, Delaware) total emissions budget. Additional information pertaining to the air analysis conducted for the Proposed Action at NAS Patuxent River is provided in Section 6.3 of this EA/OEA. The proposed JSF DT activities in the VACAPES OPAREA would be conducted predominantly outside the Virginia coastal zone boundary at flight altitudes typically above 3,000 feet; therefore, a conformity analysis is not applicable. Drifting of emissions from the VACAPES OPAREA to state boundaries would not likely occur. If the emissions were to disperse over a large area outside the test operating area, they would not result in a change to the Virginia emission status. Air pollutants would be temporary in nature and quickly dissipate in a three-dimensional manner following normal plume dispersion dynamics.

Coastal Lands Management

An analysis was not provided for this section because the Proposed Action would not involve the management of coastal lands.

Coastal Natural Resource Areas

The Proposed Action would not involve any construction or coastal development, nor would it generate soil erosion or increased sedimentation. Therefore, physical impacts are not anticipated to soil, land, and vegetation associated with estuarine and marine ecosystems such as wetlands, san dunes, and primary islands. No oceanfront land suitable for recreational use is proposed for development under the Proposed Action. No private lands would be expected to be affected under implementation of the Proposed Action; therefore, impacts to private lands suitable for visitor-serving commercial recreational uses would not occur. Natural resource areas of offshore coastal waters or coastal natural resources within the shoreline area would not likely be affected by the Proposed Action.

Coastal Natural Hazard Areas

The Proposed Action would not involve any construction or coastal development. Physical impacts are not anticipated to flood hazard areas or coastal natural hazard areas.

Waterfront Development Areas

The Proposed Action would not involve any construction or coastal development.

G.3.2 Advisory Policies for Shorefront Access Planning and Protection

Virginia Public Beaches

The Proposed Action would not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation. The Proposed Action would not interfere with public access to coastal resources such as the state's public beaches.

Virginia Outdoors Plan

The Proposed Action would not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation. No oceanfront land suitable for recreational use is proposed for development under the Proposed Action. No private lands would be expected to be affected under implementation of the Proposed Action; therefore, impacts to private lands suitable for visitor-serving commercial recreational uses would not likely occur. The Proposed Action is not expected to affect recreational opportunities within the shoreline area or recreational uses of offshore coastal waters.

Parks, Natural Areas, and Wildlife Management Areas

The Proposed Action would not interfere with the public's right of access to parks, natural areas, and wildlife management areas. See the response in Virginia Outdoors Plan above.

Waterfront Recreational Land Acquisition

The Proposed Action would not interfere with the areas, properties, lands, or any estate or interest therein, of scenic beauty, recreational utility, historical interest, or unusual features.

Waterfront Recreational Facilities

Under the Proposed Action, test activities would not be expected to interfere with public access policies to provide the maximum public access possible. Proposed test activities would be conducted in the Chesapeake Bay of the CTR and open waters within the VACAPES OPAREA, outside of the Virginia coastal zone. To avoid conflicting uses of the area, a NOTMAR would be issued 48 hours before commencement of proposed tests to give regular boat traffic ample notice prior to testing in the area. The Proposed Action would be consistent with the type and tempo of aircraft overflights and stores separation already occurring in the CTR and VACAPES OPAREA. The Proposed Action would not be expected to interfere with recreational access to any public shoreline. Therefore, no interference with public access to coastal resources would be expected to result from the Proposed Action.

Waterfront Historic Properties

No waterfront or historic shorefront properties would be impacted from the Proposed Action.

G.4 DELAWARE COASTAL CONSISTENCY NEGATIVE DETERMINATION

The Proposed Action complies to the maximum extent practicable with the goals of the state in protecting the coastal zone; careful consideration has been given to these goals in reviewing the impacts associated with the Proposed Action. Sections of the Delaware Coastal Management Program as promulgated by the Delaware Coastal Zone Act (7 Del. Code, chapter 70), applicable to this Proposed Action as determined by the JPO include Resources Subject to Management (5.A.1–5.A.5), Other Areas of Interest (5.C.1–5.C.6), and Development Issues (5.D.2–5.D.11):

G.4.1 Resources Subject to Management

5.A.1 Wetlands Management

The Proposed Action would not involve any construction or coastal development, nor would it generate additional nonpoint source pollution or increased sedimentation. Therefore, physical impacts are not anticipated to tidal or non-tidal wetlands.

5.A.2 Beach Management

The Proposed Action would not be expected to interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation. The Proposed Action would not be expected to interfere with public access to coastal resources such as Delaware's public beaches. No oceanfront land suitable for recreational use is proposed for development under the Proposed Action. No private lands would likely be affected under implementation of the Proposed Action. The Proposed Action is not expected to affect recreational opportunities within the shoreline area or recreational uses of offshore coastal waters. Test activities would not interfere with public access policies to provide the maximum public access possible. All proposed test activities would be conducted in the CTR of the Chesapeake Bay or open waters within the VACAPES OPAREA, outside of the Delaware coastal zone. To avoid conflicting uses of the area, a NOTMAR would be issued 48 hours before commencement of proposed tests to give regular boat traffic ample notice prior to testing in the area. The Proposed Action would be consistent with the type and tempo of aircraft overflights and stores separation already occurring in the CTR and VACAPES OPAREA. The Proposed Action would not be expected to interfere with recreational access to any public shoreline. Therefore, no interference with public access to coastal resources would be anticipated from implementing the Proposed Action.

5.A.3 Coastal Waters Management

The Proposed Action would not involve any construction, nor would it generate additional nonpoint source pollution or increased sedimentation. Impacts are not anticipated to water quality and biological productivity. Physical impacts upon soil, land, vegetation or waters associated with wetlands, dunes, primary islands, streams, and marinas would not be expected. Under the Proposed Action, coastal natural resource areas within the shoreline area would not likely be affected.

5.A.4 Subaqueous Lands and Coastal Strip Management

An analysis was not provided for this section because the Proposed Action does not involve subaqueous lands.

5.A.5 CMP Policies for Borrow Pits

An analysis was not provided for this section because the Proposed Action does not involve borrow pits.

5.C.1 Woodlands and Agricultural Lands Policies

The Proposed Action would not involve any construction or coastal development. Therefore, physical impacts are not anticipated to forested woodlands or agricultural lands.

5.C.2 CMP Historic and Cultural Areas Policies

No waterfront or historic shorefront properties or cultural, historical, or archaeological resources are expected to be impacted from the Proposed Action.

5.C.3 CMP Policies for Living Resources

Although the Proposed Action could potentially affect the marine environment, impacts would not be expected to be significant and biological productivity of coastal waters would be maintained. Species present in the affected area are believed to be transient in nature and accustomed to the regularly occurring flight noise associated with on-going actions in the CTR and VACAPES OPAREA. To avoid conflicting uses of the area, a NOTMAR would be issued 48 hours before commencement of the proposed tests to give regular boat traffic ample notice prior to testing in the area. The Proposed Action would be consistent with the type and tempo of aircraft overflights and stores separation already occurring in the CTR and VACAPES OPAREA. Flights altitudes for the Proposed Action are typically at 3,000 feet and above, with occasional flights at lower altitudes (those nominal flights for the total Proposed Action at 500 feet are conducted primarily over land at the airfield of NAS Patuxent River). The Proposed Action would not be expected to result in unnecessary hardships for commercial or recreational fishing operations. Impacts to biological resources, while potentially possible, would not be expected to be significant. Released stores would predominantly break apart upon impact with the water's surface and would settle to the bottom of the ocean. No significant changes to water quality are anticipated based on previous environmental analyses. Noise generated from the Proposed Action would be similar to current activities conducted in the CTR and VACAPES OPAREA. Startle impacts to marine mammals and sea turtles, as well as threatened and endangered shorebird and raptor species, would be unlikely because the majority of the proposed flight testing would be at altitudes greater than 3,000 feet. Therefore, the Proposed Action would not produce any significant impacts to biological resources, including Federally- and state-listed endangered or threatened species and critical habitats, as further described in Sections 4.6, 6.4, 6.5, and 6.7 of this EA/OEA.

5.C.4 CMP Mineral Resource Policy

An analysis was not provided for this policy because the Proposed Action would not involve the extraction or production of minerals.

5.C.5 CMP State Owned Coastal Recreation and Conservation Land Policies

The Proposed Action would not be expected to interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation. The Proposed Action would not interfere with public access to coastal resources such as the state's public beaches. No oceanfront land suitable for recreational use is proposed for development under the Proposed Action. No private lands would likely be affected under implementation of the Proposed Action. The Proposed Action is not expected to affect recreational opportunities within the shoreline area or recreational uses of offshore coastal waters. Test activities would not interfere with public access policies to provide the maximum public access possible. All proposed test activities would be conducted in open waters within the VACAPES OPAREA, outside of the Delaware coastal zone. To avoid conflicting uses of the area, a NOTMAR would be issued

48 hours before commencement of the proposed tests to give regular boat traffic ample notice prior to testing in the area. The Proposed Action would be consistent with the type and tempo of aircraft overflights and stores separation already occurring in the VACAPES OPAREA. The Proposed Action would not be expected to interfere with recreational access to any public shoreline. Therefore, no interference with public access to coastal resources is anticipated from implementing the Proposed Action.

5.C.6 CMP Public Trust Doctrine Policy

An analysis was not provided for this policy because the Proposed Action would not involve properties located between the high and low water marks.

5.D.2 CMP Development Policies

An analysis was not provided for this policy because the Proposed Action would not involve construction or coastal development.

5.D.3 CMP Energy Facilities

An analysis was not provided for this section because the Proposed Action would not involve construction or coastal development of energy facilities and does not result in unnecessary consumption of energy.

5.D.4 CMP Public Investment Policies

An analysis was not provided for this section because the Proposed Action would not involve investments of public funds.

5.D.5 CMP Policies for Recreation and Tourism

An analysis was not provided for this policy because the Proposed Action would not involve construction or coastal development, nor would it involve government promotion of recreation or tourism programs or facilities.

5.D.6 CMP Policies for Natural Defense and Aerospace Facilities

The Proposed Action complies to the maximum extent practicable with the goals of the state in protecting and managing the coastal zone for national defense facilities; careful consideration has been given to the state's coastal policies and goals in reviewing the impacts associated with the Proposed Action.

5.D.7 CMP Policies for Transportation Facilities

An analysis was not provided for this section because the Proposed Action would not involve construction of transportation facilities or infrastructure.

5.D.8 CMP Policies for Air Quality Management

The CTR of NAS Patuxent River covers approximately 1,800 square miles of airspace over portions of southern Maryland, the eastern shore of the Chesapeake Bay in Maryland, and the northern neck areas of Virginia. Fifty percent of the CTR is over water. The available working airspace within the VACAPES OPAREA covers over 35,000 square miles and encompasses both the open ocean and open air. The Proposed Action occurring with the CTR is subject to the CAA, while those Proposed Action activities occurring in the VACAPES OPAREA are predominantly outside of coastal state boundaries and not subject to the regulatory provisions of the CAA, rendering the attainment status irrelevant. However, military operations occurring in the CTR and VACAPES OPAREA are required to conduct analyses to determine impacts to air as a result of their operations and to mitigate them to the maximum extent practicable. Typical sources of emissions associated with the Proposed Action occurring in the CTR and VACAPES OPAREA include aircraft flights and weapons tests. These activities are consistent with those activities already occurring in the CTR and VACAPES OPAREA on a routine basis. A conformity analysis is not applicable for either the CTR or the VACAPES OPAREA. Project-related emissions at NAS Patuxent River would be below the applicable *de minimis* thresholds and do not make up make up 10% or more of the nonattainment area's (Suffolk County, Delaware) total emissions budget. Additional information pertaining to the air analysis conducted for the Proposed Action at NAS Patuxent River is provided in Section 6.3 of this EA/OEA. The proposed JSF DT activities in the VACAPES OPAREA would be conducted mostly outside the Delaware coastal zone boundary; therefore, a conformity analysis is not applicable. Drifting of emissions from the VACAPES OPAREA to state boundaries would not likely occur. If the emissions were to disperse over a large area outside the test operating area, they would not result in a change to the Delaware emission status. Air pollutants would be temporary in nature and quickly dissipate in a three-dimensional manner following normal plume dispersion dynamics.

5.D.9 CMP Policies for Water Supply Management

An analysis was not provided for this section because the Proposed Action would not involve withdrawals from ground or surface waters.

5.D.11 CMP Policies for Waste Disposal

An analysis was not provided for this section because the Proposed Action would not result in the unnecessary generation of solid waste, wastewaters, or sewage.