SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT/OVERSEAS ENVIRONMENTAL ASSESSMENT

JOINT STRIKE FIGHTER

SYSTEM DEVELOPMENT AND DEMONSTRATION DEVELOPMENTAL TEST PROGRAM

JUNE 2013

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JOINT STRIKE FIGHTER SYSTEM DEVELOPMENT AND DEMONSTRATION DEVELOPMENTAL TEST PROGRAM

JUNE 2013

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ABSTRACT

This Supplemental Environmental Assessment (EA)/Overseas EA (OEA) re-evaluates the potential effects from conducting the Joint Strike Fighter (JSF) Developmental Test (DT) Program, the Proposed Action. Proposed DT activities of the three F-35 aircraft variants will be conducted over a 7- to 8-year period at Department of Defense facilities and ranges uniquely equipped with assets and experienced expertise to support test and evaluation of military strike aircraft weapon systems. The Supplemental EA/OEA re-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 Warfare Center Weapons Division China Lake; Naval Base Ventura County 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 at Joint Base McGuire-Dix-Lakehurst, and Lockheed Martin Aeronautics (LM Aero), Ft. Worth, TX at NAS Forth Worth Joint Reserve Base (JRB), TX; 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 Take-off Vertical Landing (STOVL) variant of the F-35 between NAS Patuxent River and LM Aero. No significant impact or harm to the environmental resources (air quality, noise, biological/natural resources, socioeconomics, and coastal zone resources) analyzed in detail in this Supplemental EA/OEA are expected from implementing the Proposed Action under either alternative.

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FOREWORD

The Joint Strike Fighter (JSF) Program's first Developmental Test (DT) test flight occurred in December of 2008. It was preceded in January 2007 by an approved Environmental Assessment (EA)/Overseas EA (OEA) for the DT Program. A Finding of No Significant Impact and Harm Statement was approved by the Joint Strike Fighter Program Office (JPO) Program Executive Officer (PEO) in January 2007. Since completion of the 2007 EA/OEA, the DT Program has undergone modifications in terms of tempo of operations, duration, and an increase in numbers of aircraft. Additionally, since 2008, improved acoustics data, refined flight profiles, and noise modeling techniques have become available.

In light of these changes, the F-35 Joint Program Office (formerly the JPO) felt it necessary to re-evaluate the 2007 EA/OEA to determine if there had been any substantial changes to the 2007 analytical results. This Supplement, therefore, re-analyzes the potential for environmental impacts at each proposed test location selected by the F-35 Joint Program Office, and approved by the PEO in 2007, for meeting JSF DT Program requirements:

East Coast Primary Test Location

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

West Coast Primary Test Location

- Edwards Air Force Base (AFB), Air Force Flight Test Center (AFFTC), California (CA) to include using the airspace and ranges of:
  - Naval Air Warfare Center Weapons Division (NAWCWD) China Lake, CA
  - Naval Base Ventura County (NBVC) Point Mugu, CA
  - 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 at Joint Base McGuire-Dix-Lakehurst (hereafter referred to as NAES Lakehurst), New Jersey
- Eglin AFB, Air Armament Center (AAC), Florida
- Lockheed Martin Aeronautics (LM Aero), Ft. Worth, TX at NAS Forth Worth Joint Reserve Base (JRB), TX (hereafter referred to as LM Aero)

Given the change in the DT flight profile (number of flights and flight hours), the analysis re-examined the potential affects to the same environmental resources analyzed in the 2007 EA/OEA: air quality, noise, biological/natural, socioeconomics, and coastal zone management. This supplemental analysis focuses predominantly on the air quality and noise at the primary test locations of NAS Patuxent River and Edwards AFB where the greatest change in tempo occurred.

To facilitate the review of this Supplemental EA/OEA, changes between the 2007 EA/OEA and this Supplement are presented with regard to the DT profile. Additional details on the differences and approaches taken are as follows:

- The test years were re-aligned based on the changes to the JSF DT profiles and test operating tempos. Proposed DT activities reflected in the 2007 EA/OEA were slower than planned due to program changes, aircraft design issues, and schedule delays. The tempo to date has been commensurate with the flight tempos analyzed in the 2007 EA/OEA for the first three years of proposed tests. Given the restructuring of the entire JSF DT Program by the F-35 Joint Program

Office and the JSF Integrated Test Force Team, Test Year 1 is now considered 2010 for the purpose of this Supplement vice 2007 and the Program concludes in Test Year 2016 vice 2013.

- Eighteen F-35 aircraft vice the 15 reflected in the 2007 EA/OEA will be used to execute the full complement of the JSF DT Program. Nine aircraft each will be based at Edwards AFB and NAS Patuxent River.
- JSF DT Program tempo of the F-35 (flights and flight hours) increased at Edwards AFB, NAS Patuxent River, NAES Lakehurst, VACAPES OPAREA, NAWCWD China Lake, NBVC Point Mugu; decreased at White Sand Missile Range and Nellis AFB; and remained the same at Eglin AFB and LM Aero.
- Air emissions and noise contour results were updated based on the refined acoustic and emission indices for the F-35, as well as the modeling techniques.
- Projected air emission levels changed as a result of the modified number of flights and flight profiles, emission indices, times in mode (TIM), and other operational considerations. In general, the estimated emissions from the Proposed Action at the test locations are lower than those estimated in the 2007 EA/OEA due to the availability of more mature data and improved modeling techniques, even though the number of flights and total flight hours increased at several of the locations, especially at primary DT locations of Edwards AFB and NAS Patuxent River. The following factors were considered as part of the updated analyses and additional information is presented in the air quality sections for each test location and Appendix E of this Supplemental EA/OEA.
    - *All Test Locations*
        - Updated engine cycle and particulate matter (PM) data used in the air emissions model resulted in lower emission indices for gaseous emissions and a significant reduction in the PM emissions.
        - New flight profiles were used based on the “Karnes 2” dataset. “Karnes 2” profiles are considered more representative of how the F-35 is flown and are predicated on simulator data such as airspeed, altitude and engine power settings.
        - Emissions from sources, such as ground support equipment and aircraft refueling were scaled based on the current DT operational tempo versus the number of operations reflected in the 2007 EA/OEA.
        - Updated analysis used a sulfur content of 0.049% for JP-5 vice the content of 0.020% used in the previous analysis.
    - *Edwards AFB*
        - Estimating emissions from engine in-frame testing and the test cell operations was revised to incorporate the more mature F135 Maintenance Built-In Test (MBIT) (post engine maintenance runs) frequencies provided by Pratt & Whitney.
        - Twelve engine tests per year were analyzed in the 2007 EA/OEA. For this Supplement, the number of tests conducted both in-frame and in a test cell were based on MBIT requirements, which takes into account total engine flight hours rather than a static number of tests.
        - The Integrated Power Package (IPP) emission estimates were revised based on updated emissions data for the IPP.

- *NAS Patuxent River*
    - The conventional airspeed calibration range test runs at Outlying Field (OLF) Webster Field were incorporated in to the analysis. Flight times per segment were estimated based on airspeeds and the still valid flight path plot in the Joint Test Plan dated 8 January 2008.
- Noise contours and affected acreage changed as a result of the changes in the number of flights and flight profiles, use of NOISEMAP 4.965 vice 4.872, and use of Base Ops Version 7.357 and 7.32 vice Base Ops Version 7.294. As in the 2007 EA/OEA, noise was modeled for the highest year of F-35 flight activity conducted at Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero. Other considerations follow and additional information is presented in the noise sections for each test location and Appendix F of this Supplemental EA/OEA.
    - *All Test Locations*
        - As with the 2007 EA/OEA, noise modeling updates were conducted for Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero. Potential noise impacts at the other locations were still considered minimal to negligible given most of the flights would be above 3,000 feet above ground level/mean sea level, and no landings or take-offs of the F-35 would occur at these locations (except for the transit flight in and out of Eglin AFB, and in the event of an emergency).
        - The latest set of measured noise data for the F-35 (acoustic test data collected in October 2008 at Edwards AFB on the F-35 CTOL variant designated AA-1) was used in this Supplement. Therefore, contours generated for this Supplement were based on empirical F-35 noise measurements as opposed to data derived from legacy systems. This enabled analysis in greater detail that is F-35 specific.
    - *NAS Patuxent River*
        - The modeling assumptions used in the 2007 EA/OEA remained the same as reflected in Section 6.4.2 and Appendix F of this Supplement.
        - The baseline changed since the 2007 EA/OEA noise analysis which was predicated on the baseline for Alternative III of the *Final Environmental Impact Statement (FEIS), Increased Flight Operations in the Patuxent River Complex, Patuxent River, Maryland (December 1998)*. NAS Patuxent River completed an *Air Installations Compatible Use Zones (AICUZ) Study* in 2009. This Study is indicative of the current aircraft operations and resulting noise environment for the base. Inputs contained in the 2009 AICUZ Study were captured in NOISEMAP to maintain consistency between the baseline contours for NAS Patuxent River and those with the proposed JSF DT Program.
        - Fly-by test activities originally were planned for just the main airfield of NAS Patuxent River. Now, there is the plan to also potentially conduct those flights at OLF Webster Field. The actual flight profile and TIM data are very test event driven during fly-bys, so definitive modeling parameters could not be obtained to allow NOISEMAP to create contours. Given this and the short duration of the proposed fly-by test activities at the OLF, Single Exposure Level values were used instead to verify acoustic levels.

    - *NAES Lakehurst*
        - During the course of updating the analysis, errors were discovered in the noise modeling data parameters used previously with regard to the aircraft flight profiles. Additionally, the labeling of the DNL contours for the 2007 EA/OEA was found to be incorrect. With the use of the updated 2008 noise data set and corrected modeling parameters, the noise contour depicted in Section 7.4.1 of this Supplement represents a corrected baseline for NAES Lakehurst.
    - *LM Aero*
        - The modeling assumptions used in the 2007 EA/OEA remain the same.
        - The analysis was updated using the latest AICUZ data for NAS Fort Worth JRB; specifically the *Wyle Report WR 04-18 Aircraft Study for Naval Air Station Joint Reserve Base Fort Worth, TX, August 2004* which was presented in the March 2008 Joint Land Use Study Report.
- Analysis and conclusions of the biological/natural resource and coastal zone management were verified to ensure there were no major changes or potential significant impacts resulting from the change in the JSF DT flight tempo, the noise contours, and impacted acreage/land use. Slight updates were made to include the regulatory status of species listed in the document. Otherwise, the results of the 2007 EA/OEA are the same as those reflected in this Supplement.
- The socioeconomic analysis was updated with regard to environmental justice demographics, inclusion of children population demographics, and economic characteristics. Besides keeping the United States (U.S.) Census Bureau data of 2000 in this Supplement (as extracted from the 2007 EA/OEA), 2009 Census data from the American Community Survey of 2005-2007 estimated data was used for poverty rates, ethnicity, and children demographics to support the environmental justice and children population analyses. Potential impacts to these populations would be based predominantly on the outcome of the noise analyses. With regard to housing and infrastructure considerations associated with the number of personnel planned to support the JSF DT Program, the F-35 Joint Program Office decided not to re-examine the impacts and conclusions reached in the 2007 EA/OEA, since:
    - Most of the required personnel are already in place now at Edwards AFB and NAS Patuxent River and
    - Results stemming from the Economic Impact Forecast System used to project community impacts showed no exceedance of significance criteria ranges of the model and no significant impacts.

  There would be no changes in the analyses reflected in the 2007 EA/OEA for these areas, and therefore, additional analysis was considered not needed.

The decision to be made under this Supplemental EA/OEA is confirmation that there are no significant impacts and harm to the environment, and the conclusions of this Supplement still support the overall decisions resulting from the 2007 EA/OEA. The PEO of the F-35 Joint Program Office remains as the final decision authority for the Proposed Action.

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) 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 F-35 Join Program is a Department of Defense (DoD) Major Defense Acquisition Program jointly 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 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.

Timeframe

The entire JSF System Development and Demonstration Developmental Test (SDD DT) Program will be conducted over a 7- to 8-year period, both within and outside U.S. territory.

Purpose and Need

The purpose and need of the proposed JSF DT Program remains unchanged and is twofold: (1) to satisfy the DoD's system acquisition development requirements pursuant to DoD Directive (DoDD) 5000.01 and DoD Instruction (DoDI) 5000.02 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 Program is needed for final air system effectiveness verification and to support the decision of whether or not to proceed with JSF Operational Test and production decisions.

Proposed Action

The F-35 Joint Program Office established the JSF Integrated Test Force (ITF) Team for the planning and execution of the proposed JSF DT Program. Eighteen (vice the 15 in the 2007 EA/OEA) instrumented F-35 test aircraft and various support aircraft are proposed for the entire JSF DT Program to generate approximately 25,004 flights (vice the 16,474 flights reflected in the 2007 EA/OEA) in 48,982 flight hours (vice the 32,703 flight hours reflected in the 2007 EA/OEA) to certify the three variants. The maximum level of F-35 specific flights (based on implementation of Alternative Two) are approximately 8,760 (15,706 flight hours) vice the approximately 6,477 F-35 flights (11,903 flight hours) examined in the 2007 EA/OEA. Flight tests are conducted five days per week with most of the flights occurring during the day in compliance with airspace operating procedures. Less than 1% of the total proposed flights would occur at night, later in the test program schedule (i.e., Test Years 3 through 7). Support aircraft are 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 are used as part of proposed JSF DT activities. Stores are internally or externally mounted on the F-35 or support aircraft suspension and release equipment. Some JSF DT activities may require the separation of the store from the aircraft. In addition to stores, the proposed JSF DT activities would 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 JSF Program Office (now the F-35 Joint Program Office) and JSF ITF Team determined the following USN, USAF, and U.S. Army locations are needed (as reflected in the 2007 EA/OEA) 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 (VACAPES) Operating Area(OPAREA) of the Atlantic Warning Area (AWA)

West Coast Primary Test Location

- Edwards Air Force Base (AFB), Air Force Flight Test Center (AFFTC), California (CA) to include using the airspace and ranges of:
  - Naval Air Warfare Center Weapons Division (NAWCWD) China Lake, CA
  - Naval Base Ventura County (NBVC) Point Mugu, CA
  - 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 at Joint Base McGuire-Dix-Lakehurst, New Jersey (hereafter referred to as NAES Lakehurst)
- Eglin AFB, Air Armament Center (AAC), Florida
- Lockheed Martin Aeronautics (LM Aero), Ft. Worth, TX at NAS Forth Worth Joint Reserve Base (JRB), TX (hereafter referred to as LM Aero unless otherwise stated)

Though the proposed West Coast Primary Test Location actually consists of five military facilities/ranges, Edwards AFB, AFFTC, is the only proposed location where the F-35 is based and all flights to the other proposed test locations originate and return to Edwards AFB. Other proposed West Coast Primary Test Locations are used for their airspace and the technical attributes of their ranges. Conducting the proposed JSF DT Program 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 fully 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 were considered reasonable and viable, by the JSF Program Executive Officer (PEO) (now PEO of the F-35 Joint Program Office), as documented in the 2007 Finding of No Significant Impact or Harm Statement. Both Alternatives can still be implemented as described.

Alternative One. The proposed JSF DT Program 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 allows the JPO and JSF ITF 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 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 NBVC 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 Program.

Approximately 56% (vice the 52% in the 2007 EA/OEA) of the proposed JSF DT Program (F-35 flights) would be conducted at the East Coast Primary Test Location of which approximately 46% (vice 42%) of the events would occur at NAS Patuxent River and 10% (vice 10%) within the VACAPES OPAREA. For the West Coast Primary Test Locations, approximately 43% (vice 47% in the 2007 EA/OEA) of the entire proposed JSF DT Program (F-35 flights) would occur in this geographic region of which approximately 35% (vice 32%) of the activities would occur at Edwards AFB and 8% (vice 15%) at the other West Coast locations. The remaining 1% of events for the entire proposed JSF DT Program (F-35 flights) would occur at the Other Ancillary Test Locations. Table ES-1 summarizes the revised flight tempos for the proposed JSF DT Program. The proposed JSF DT Program would be a combination of ground- and flight-based activities. Other than the take-off and landing of the F-35, the proposed JSF DT at Eglin AFB would be ground-based, conducted indoors at the McKinley Climatic Laboratory.

Table ES-1: Summary of the Proposed Action Profile for Alternative One

Proposed Test Location	Current Total F-35 Flights	2007 EA/OEA Total F-35 Flights	Current Total F-35 Flight Hours	2007 EA/OEA Total F-35 Flight Hours
NAS Patuxent River	4,037	2,715	7,267	4,633
VACAPES OPAREA	832	649	1,498	1,298
Edwards AFB	3,033	2,074	5,460	3,941
NACWD China Lake	211	124	401	247
NBVC Point Mugu	383	153	728	304
WSMR	40	41	81	82
NTTR Nellis AFB	120	677	227	1,424
NAES Lakehurst	40	40	40	40
Eglin AFB	2-3	2-3	1 or Less	1 or Less
LM Aero	0	0	0	0

Alternative Two. This alternative comprises the same activities and locations described in Alternative One, but would expand the JSF DT testing occurring at LM Aero. Specifically, 90% of the Short Takeoff Vertical Landing (STOVL) hover operations would be performed at NAS Patuxent River and approximately 10% at LM Aero locations instead of just NAS Patuxent River. 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 events. Overall, this equates to 1% of the test profile reflected in Alternative One for NAS Patuxent River transitioning for conduct at LM Aero, as depictedin Table ES-2. The proposed JSF DT Program profile at all the other locations would be the same as reflected above in Table ES-1.

Some of the proposed Short Take-Off Vertical Landing (STOVL) hover operations performed at NAS Patuxent River would be conducted at LM Aero. Approximately 10% of the airborne STOVL hover operations would be conducted at LM Aero instead of NAS Patuxent River. Only 90% of the proposed STOVL hover tests would be conducted at NAS Patuxent River. Overall, this equates to 1% of the test profile reflected in Alternative One for NAS Patuxent River transitioning for conduct at LM Aero.

Some of the proposed. Only 90% of the proposed STOVL hover tests would be conducted at NAS Patuxent River. Overall, this equates to 1% of the test profile reflected in Alternative One for NAS Patuxent River transitioning for conduct at LM Aero, as depicted in Table ES-2. The proposed JSF DT Program profile at all the other locations would be the same as reflected above in Table ES-1.

Table ES-2: Summary of the Proposed Action Profile for Alternative Two

Proposed Test Location	Current Total F-35 Flights	2007 EA/OEA Total F-35 Flights	Current Total F-35 Flight Hours	2007 EA/OEA Total F-35 Flight Hours
NAS Patuxent River	3,996	2,674	7,196	4,562
LM Aero	41	41	71	71

Other Alternatives. The F-35 Joint Program Office and JSF ITF Team also considered computer modeling and simulation and conducting the proposed JSF DT Program 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 therefore were not analyzed in the 2007 EA/OEA or are analyzed in this Supplemental EA/OEA.

No Action Alternative. Under the No Action Alternative, no new activities associated with the proposed JSF DT Program would occur at any location and the JSF DT Program profile/tempo of Alternative Two in the 2007 EA/OEA would continue. The No Action Alternative, as reflected in this Supplemental 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 test locations. The existing environment of each proposed test location in this Supplemental EA/OEA (Sections 4 through 8) was updated since the 2007 EA/OEA to represent the baseline conditions.

Methodology

Potential environmental impacts from implementing the proposed JSF DT Program were re-analyzed for those resources that could be significantly affected at each proposed test location: air quality, noise, biological/natural, socioeconomic, and Coastal Zone Management (CZM). 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 still expected to be minimal to negligible, and therefore were not analyzed in greater detail in the 2007 EA/OEA and are also not analyzed in this Supplemental 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 Program are still 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 are anticipated under either Proposed Action alternative based on the re-analysis presented in this Supplemental EA/OEA. Implementation of environmental measures as required by each test location, in addition to the F-35 Joint Program Office's and JSF ITF Team's close coordination with test location representatives (e.g., Air Operations, Range Sustainability, Environmental, and Public Affairs offices), further assures continued minimal impact from the proposed JSF DT activities. Table ES-3 summarizes the potential impacts of Alternatives One and Two for the Proposed Action. No specific mitigation measures are required for the proposed JSF DT activities based on the analytical findings presented in this Supplemental EA/OEA.

Table ES-3: 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, NBVC 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 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. 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 from implementing either Proposed Action alternative at Eglin AFB, NAWCWD China Lake, NBVC 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 Research, Development, Test, and Evaluation (RDT&E) programs. Specific noise analysis findings for Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero follows: • Edwards AFB: On-base areas potentially impacted by the 60 Decibel (dB) and greater Community Noise Equivalent Level (CNEL) noise contour (applicable to the State of California) increase by approximately 5,221 acres (approximately 25%), from approximately 21,079 to 26,300 acres. There are no off-base areas impacted by the 65 dB and greater CNEL noise contour. • NAS Patuxent River: On-base areas potentially impacted by the 65 dB and greater Day-Night Average Sound Level (DNL) noise contour increase by about 195 acres, from approximately 5,267 to 5,462 acres (approximately 4%). Off-base areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 53 acres (approximately 10%) from 552 to 605 acres of land outside of NAS Patuxent River's boundary. • NAES Lakehurst: On-base areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 360 acres (approximately 25%), from 1,430 to 1,790 acres. Off-base areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 60 acres (approximately 31%) from 510 to 670 acres. • LM Aero: On-base areas potentially impacted by the 65 dB and greater DNL noise contour would remain constant at approximately 1,720 acres. Off-base areas potentially impacted by the 65 dB and greater DNL noise contour would also remain constant at approximately 14,670 acres. 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 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-3: 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)/Mean Sea Level (MSL), most of those flights will be of short duration and above the 550-foot AGL/MSL 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, NBVC Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA. Specific findings for Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero follows: • Edwards AFB: The proposed JSF DT activity may change the baseline noise impact areas, but the species present in the newly affected area are transient in nature and accustomed to the regularly occurring flight noise associated with on-going actions at Edwards AFB and the ranges/impact areas. Potential significant impacts to biological resources, while possible, are not expected since all weapon releases are 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 are not likely to 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 increases with the proposed JSF DT (from 193 acres to 264 acres in the Manchester Fish and Wildlife Management Area). 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. Therefore, no significant impacts are expected to the environment. • LM Aero: No impacts to biological/natural resources are anticipated as no sensitive receptors are expected to be present within the proposed JSF DT noise impact area. The proposed JSF DT Program 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 the proposed JSF DT Program is not likely to adversely affect listed species.
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, and Eglin AFB have the potential to impact the immediate, surrounding areas. No additional personnel are required to support the Proposed Action at the 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 effect to the coastal zone resources of California, Maryland, Virginia, and Delaware are expected from implementing the Proposed Action at NBVC 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 PEO of the F-35 Joint Program Office has determined the proposed JSF DT activities will be consistent to the maximum extent practicable with the enforceable policies and objectives of the California, Maryland, Virginia, and Delaware CZMP. This is the same conclusion reached in the 2007 EA/OEA. It was determined, in consultation with the USN Regional Environmental Coordinator Southwest, a Negative Coastal Consistency Determination is not needed because most of the JSF DT activities are occurring in air space or at sea outside of the coastal zone. It was also determined for the 1% or less of stores that may be released within the coastal zone, the proposed JSF DT activities are already considered consistent with the existing activity in the Point Mugu Sea Range and those types of activities are covered in the Sea Range EIS. A Negative Coastal Consistency Determination has been completed by the F-35 Joint Program Office for Maryland, Virginia, and Delaware because of a higher flight test tempo occurring within these State's coastal zones. A Negative Coastal Consistency Determination has been completed by the F-35 Joint Program Office for Maryland, Virginia, and Delaware because of a higher flight test tempo occurring within these State's coastal zones.

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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	Afterburner
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
AGL	Above Ground Level
AICUZ	Air Installations Compatible Use Zones
AIM	Air Intercept Missile
AoA	Angle-of-Attack
ALRE	Aircraft Launch and Recovery Equipment
AMRAAM	Advanced Medium Range Air-to-Air Missile
APCD	Air Pollution Control District
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
AVAQMD	Antelope Valley Air Quality Management District
AWA	Atlantic Warning Area
AZ	Arizona
BAC	British Aerospace Corporation
BAMS	Broad Area Maritime Surveillance
BASH	Bird/Aircraft Strike Hazards
BEA	Bureau of Economic Analysis
BDU	Bomb Dummy Unit
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BLU	Bomb Live Unit
BO	Biological Opinion
BRAC	Base Realignment and Closure

ACRONYMS AND ABBREVIATIONS (CONTINUED)

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
CBU	Cluster Bomb Unit
CCD	Coastal Consistency Determination
CCF	Central Coordinating Facility
CDD	Capability Development Document
CEQ	Council on Environmental Quality
CFA	Controlled Firing Area
CFR	Code of Federal Regulation
CH_4	Methane
CLTF	Consolidated Logistics and Training Facility
CMP	Coastal Management Program
CNDDB	California Natural Diversity Data Base
CNEL	Community Noise Equivalent Level
CO_2	Carbon Dioxide
CO_2-e	CO_2 equivalent
CO	Carbon Monoxide
CPD	Coastal Program Division
CTOL	Conventional Take-Off and Landing
CTR	Chesapeake Test Range
CV	Carrier Variant
CVN	Multipurpose Aircraft Carrier (Nuclear Propulsion)
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
E3	Electromagnetic Environmental Effects
EA	Environmental Assessment
EC	Electronic Combat

ACRONYMS AND ABBREVIATIONS (CONTINUED)

ECR	Electronic Combat Range
ECS	Environmental Control System
EDMS	Emissions and Dispersion Modeling System
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIFS	Economic Impact Forecast System
EIS	Environmental Impact Statement
EMALS	Electromagnetic Aircraft Launching System
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESOH	Environmental, Safety, and Occupational Health
ETR	Engine Thrust Request
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
FOUO	For Official Use Only
FQ	Flying Qualities
FRC	Fleet Readiness Center
FSI	Forecast Significance of Impact
FY	Fiscal Year
GBU	Guided Bomb Unit
GEAE	General Electric Aircraft Engines
GOCO	Government Owned, Contractor Operated
GHG	Greenhouse Gas
GPS	Global Positioning System
GSE	Ground Support Equipment
GTV	Guided Test Vehicle
GWP	Global Warming Potentials
HAP	Hazardous Air Pollutant
HAZMAT	Hazardous Materials
HAZWASTE	Hazardous Waste
HC	Hydrocarbons
Hz	Hertz
IF	Infrared
IJTS	Initial Joint Training Site
IFR	Instrument Flight Rules
ITF	Integrated Test Force
IMC	Instrument Meteorological Conditions
INRMP	Integrated Natural Resources Management Plan

ACRONYMS AND ABBREVIATIONS (CONTINUED)

IPCC	Intergovernmental Panel on Climate Change
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
JTP	Joint Test Plan
KCAPCD	Kern County Air Pollution Control District
KCAS	Knots Calibrated Airspeed
km	kilometers
KPP	Key Performance Parameter
kts	knots
LC_{dn}	C-Weighted Average Day-Night Sound Level
LDGP	Low Drag General Purpose
LGTR	Laser Guided Training Round
LGB	Laser Guided Bomb
LHD	Amphibious Assault Ship (Multipurpose)
LM Aero	Lockheed Martin Aeronautics
Lmax	Maximum Noise Level
LRIP	Low Rate Initial Production
LTO	Landing and Take-off
LZ	Landing Zone
M&S	Modeling and Simulation
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
MDAPCD	Mojave Desert Air Pollution Control District
MDAQMD	Mojave Desert Air Quality Management District
MDE	Maryland Department of the Environment
MIL	Military
MILCON	Military Construction
MIL-STD	Military Standard
MK	Mark
mm	millimeter
MMPA	Marine Mammal Protection Act
MOA	Military Operations Area
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

ACRONYMS AND ABBREVIATIONS (CONTINUED)

MT	Metric Ton (a Megagram)
MW	Megawatts
MWAQC	Metropolitan Washington Air Quality Committee
MWNAA	Metropolitan Washington Nonattainment Area
N_2O	Nitrous Oxide
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
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
NAWS	Naval Air Weapons Station
NBVC	Naval Base Ventura County
NC	North Carolina
NCO	Non-Commissioned Officer
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
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NO_X	Nitrogen Oxides
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
ONR	Office of Naval Research
OPAREA	Operating Area
OPNAVINST	Office of the Chief of Naval Operations Instruction
ORD	Operational Requirements Document
OSD	Office of the Secretary of Defense

ACRONYMS AND ABBREVIATIONS (CONTINUED)

OSHA	Occupational Safety and Health Administration
OT	Operational Test
P	Partially
P.L.	Public Law
P&R	Personnel and Readiness
P&W	Pratt & Whitney
PAA	Primary Assigned Aircraft
PAO	Poly Alpha Olefin
Pb	Lead
PEO	Program Executive Officer
PGK	Projectile Guidance Kit
PGU	Projectile Gun Unit
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
ROG	Reactive Organic Gas
ROI	Region of Influence
RONA	Record of Non-Applicability
RTV	Rational Threshold Level
SAIA	Sikes Act
SAV	Submerged Aquatic Vegetation
SBCAPCD	Santa Barbara County Air Pollution Control District
SCB	Southern California Bight
SCIF	Special Compartmental Information Facilities
SDB	Small Diameter Bomb
SDD	System Development and Demonstration
SE	Support Equipment
SECNAVINST	Secretary of the Navy Instruction
SEL	Sound Exposure Level
SFW	Sensor Fuzed Weapon
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SOP	Standard Operating Procedure
SPL	Sound Pressure Level
STOVL	Short Take-off Vertical Landing
STV	Separation Test Vehicles
SUA	Special Use Airspace
T&E	Test and Evaluation
TECOM	Test and Evaluation Command

ACRONYMS AND ABBREVIATIONS (CONTINUED)

TEMP	Test and Evaluation Master Plan
TMD	Tactical Munitions Dispenser
TOC	Total Organic Compounds
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
UAS	Unmanned Aircraft System
UK	United Kingdom
UNESCO	United Nations Special Commission
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USMC	United States Marine Corps
USN	United States Navy
VACAPES	Virginia Capes
VCAPCD	Ventura County Air Pollution Control District
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VOC	Volatile Organic Compound
VTOL	Vertical Take-off and Landing
WCMD	Wind Corrected Munition Dispenser
WSMR	White Sands Missile Range
WSTF	White Sands Test Facility
X	Extirpated
Y	Yes
YPG	Yuma Proving Ground

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1.0 INTRODUCTION

This Supplemental Environmental Assessment (EA)/Overseas EA (OEA) reflects what has changed from the analysis in the 2007 document using yellow highlights. This Supplement 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), or 22 kilometers (km), 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.

As reflected in the Foreward, the F-35 Joint Program Office has prepared this Supplemental EA/OEA to re-analyze the potential environmental effects of performing the Joint Strike Fighter (JSF) Developmental Test (DT) Program during System Development and Demonstration (SDD), the Proposed Action. The tempo of the JSF DT Program has changed since approval of the Finding of No Significant Impact and Harm Statement for the January 2007 EA/OEA, thus warranting the need for this Supplement. The proposed JSF DT Program would be conducted both within and outside the U.S. territory. To comply with CEQ directives, and to reduce paperwork and delay, this Supplemental EA/OEA "tiers" from the January 2007 EA/OEA and other relevant NEPA/EO 12114 documents by incorporating and/or referencing, where appropriate, information and analysis from these documents.

A basic description of the JSF Program and Purpose and Need for the Proposed Action is provided in 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 F-35 Joint Program Office for the Proposed Action. Section 3 discusses the environmental resources that are analyzed in detail vice those determined by the F-35 Joint Program Office 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 the 2007 EA/OEA. Appendices A through G provide supporting details to further the information presented in the main body of this Supplemental 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 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 Take-Off 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 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 Take-Off 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 (C2) functions.

Source: LM Aero.

Figure 1.1-1: F-35A CTOL Variant

Source: LM Aero.

Figure 1.1-2: F-35B Short Take-off Vertical Landing (STOVL) Variant

Source: LM Aero.

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 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) 5000.01 and DoD Instruction (DoDI) 5000.02 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 the 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 Operational Requirements Document (ORD). SDD is the acquisition phase where the 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 F-35 Joint Program Office established an Integrated Test Force (ITF) Team to define and execute the proposed JSF SDD DT Program, which would simultaneously certify the three F-35 variants. The F-35 Joint Program Office '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 Program of the overall SDD T&E Program would be conducted for 7- to 8-years (approximately Calendar Year [CY] 2010 through 2016). The results of the proposed JSF DT Program would be used to verify the effectiveness of the final F-35 Air System.

1.2 PURPOSE AND NEED

The purpose and need of the Proposed Action, JSF SDD DT Program (hereafter referred to as JSF DT Program), remains unchanged and is twofold: (1) to satisfy DoD's system acquisition development requirements pursuant to DoDD 5000.01 and DoDI 5000.02 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 JSF ITF 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 Program 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 Program 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 Program. Data collected during the proposed JSF DT Program are needed to support subsequent major DoD acquisition decisions of whether or not the program should proceed with OT and production decisions.

The purpose of a formal 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 Program 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 Program at dedicated, primary East Coast and West Coast Test Locations is highly preferred by the F-35 Joint Program Office to maximize joint use of DoD assets with less cost incurred to execute proposed JSF DT activities. The selection and use of MRTFBs and other existing DoD assets continues to support the F-35 Joint Program Office 's and JSF ITF 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 F-35 Joint Program Office is the action proponent for this Supplemental EA/OEA and for implementation of the proposed JSF DT Program. The decision is whether or not the overall findings of the 2007 EA/OEA remain unchanged or similar – that there is no significant impact or harm to the environment. The Program Executive Officer (PEO) of the F-35 Joint Program Office is the final decision authority for the Proposed Action.

1 JIST3 2005
2 Ibid

2.0 PROPOSED ACTION AND ALTERNATIVES

Section 2.1 describes the Proposed Action. The requirements and screening process used by the F-35 Joint Program Office and JSF ITF Team to determine the potential alternative test locations for conducting the Proposed Action as reflected in the 2007 EA/OEA are 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. There are no changes to the process and alternatives presented below that were in the 2007 EA/OEA. The only substantial change has been the flight test tempos presented below in Sections 2.1 and 2.4. Some of the test descriptions have been clarified in Table 2.1-1 below.

2.1 PROPOSED ACTION

The proposed JSF DT Program is designed to evaluate the F-35's systems and components, ensuring technical specifications and operating criteria were successfully designed and built into the F-35. The JSF ITF Team structured the proposed JSF DT Program 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 Program at its peak. These personnel consist of engineering, logistics, maintenance, quality assurance, administrative, safety, and F-35 Joint Program Office personnel.

Eighteen (vice 15 in the 2007 EA/OEA) instrumented F-35 test aircraft and various support aircraft would be used to conduct the proposed JSF DT activities. The proposed JSF DT Program would consist of a combination of ground-based and flight test activities spanning approximately 7- to 8-years. In some instances, ground-based tests would include static operation of the installed or uninstalled 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 3 through 7). A typical 90-minute test flight would include at least one take-off 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 of some of the more predominant proposed JSF DT activities. Overall, approximately 8,760 F-35 flights (vice approximately 6,477 in the 2007 EA/OEA) in approximately 15,706 F-35 flight hours (vice approximately 11,903 in the 2007 EA/OEA) would be conducted to certify the three variants with flight altitudes ranging from 500 to 45,000 feet. With support aircraft included, the overall JSF DT Program would be comprised of approximately 25,004 flights (vice the 16,474 flights reflected in the 2007 EA/OEA) and 42,982 flight hours (vice the 32,703 flight hours reflected in the 2007 EA/OEA). Most of the proposed JSF DT activities would be conducted at altitudes above 10,000 feet. The JSF DT Program 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 number of flights and flight hours evaluated in this Supplemental EA/OEA represent planned, realistic approximations. These approximations may increase or decrease, as needed, during the actual proposed JSF DT activities to demonstrate F-35 capabilities and mission performances. Substantial changes to the proposed JSF DT Program would be examined by the F-35 Joint Program Office and JSF ITF 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 Proposed Action arise that are relevant to environmental concerns and conclusions reflected in this Supplemental EA/OEA, the F-35 Joint Program Office will evaluate and prepare any additional supplements 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 Program. Stores would be internally or externally mounted on the F-35 or on the suspension and release equipment. A new 25 millimeter (mm) gun, firing PGU-23 target practice ammunition, would be used during some weapons integration and mission systems test activities. The ammunition would be inert and is comprised of a hollow aluminum/steel body. Most of the weapon related stores (bombs and missiles) would be inert, having a live solid rocket motor and 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 laser designation and targeting system, the Electro-Optical Targeting System, would be used during various proposed JSF DT activities. This system is similar to current systems used by the DoD. In addition to stores, the proposed JSF DT activities 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 Afterburner (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.

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

Proposed Test Activity	Description
STOVL, CTOL, & CV Flying Qualities (FQ), Performance, and Propulsion (continued)	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 take-off, 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. 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, take-off, 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.

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

Proposed Test Activity	Description
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 bay doors closed and open. This would include assessing the clearance needed for carrying and releasing external stores. The F-35's stability would be accessed 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.
Ship Suitability (Land-Based and At-Sea)	Proposed land-based tests would be conducted to determine aircraft compatibility with ship-based take-off, approach, and recovery equipment under various environmental conditions. The performance characteristics of the aircraft would be assessed during taxi, take-off, 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 an F-35 during taxi, take-off, 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. All testing would be in the nominal airfield traffic pattern. At-sea shipboard testing of the F-35 would be conducted with U.S. Navy ships (such as an Aircraft Carrier, Nuclear [CVN] class ship) already operating in the Atlantic Ocean. The proposed shipboard suitability tests would be conducted within the take-off and landing pattern of the ship.
Weapons Separation & Integration	Proposed weapons (stores) separation and 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 combination of stores. Proposed weapon separation and 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.

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

Proposed Test Activity	Description
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.
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, KC-130, 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-35 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 and Jet Blast Deflector (Land-Based Ship Suitability)	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% of the launches result in Afterburner (AB) blowout. Landings and take-offs 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 10 minutes at a time. Aircraft engine parameters and JBD water and surface temperatures would be monitored for adverse trends. These 10-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 (Land-Based Ship Suitability)	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 against both the Mark (MK) 7 arresting gear (shipboard-compatible arresting gear) and the E28 arresting gear (shore-based emergency arresting gear). Landings and take-offs 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

The process used for identifying the proposed test location remains unchanged from the 2007 EA/OEA. No new criteria or test locations were added; test locations are the same as those analyzed in the 2007 EA/OEA. Selection of reasonable and viable test location(s) for the Proposed Action was based on a combination of specific military aircraft test facility and ranges having the capabilities needed to support proposed JSF DT Program 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 considered for the proposed JSF DT activities were those that maximize testing capability and minimize cost. Highest consideration was given to facilities and ranges that possessed the capabilities of MRTFBs; supported the full spectrum of routine aircraft flight-testing; could accommodate 18 test aircraft; and met 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 was also based on F-35 Joint Program Office 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 were considered in selecting the JSF DT Program locations. Each candidate location required existing or approved Military Construction (MILCON) assets to support the proposed JSF DT activities. Neither the F-35 Joint Program Office nor the Joint Service Test Community could 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 Program.

Lastly, proposed test locations were 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 Program. The Department of the Navy (DoN) Environmental Policy Memorandum 99-01, *Requirements for Environmental Considerations in Test Site Selection*, 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 was given priority provided the location/range could support tests without improvements to facilities and the F-35

Joint Program Office was satisfied that the current site NEPA/EO 12114 documentation applies to the proposed JSF DT activity. 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 PROGRAM TEST LOCATION SCREENING

Based on the purpose and need and the facility/range capabilities, the F-35 Joint Program Office and the JSF ITF Team determined there was no change required to the screening performed in support of the 2007 EA/OEA. As such, the information presented in this Supplement remains unchanged from the 2007 EA/OEA. The following 11 USN, USAF, USMC, and U.S. Army locations, as reflected in Table 2.3-1 were screened in the 2007 EA/OEA:

- 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 Warfare Center Weapons Division (NAWCWD) China Lake, CA
- Naval Base Ventura County (NBVC) PointMugu, CA
- Naval Air Engineering Station (NAES) Lakehurst at Joint Base McGuire-Dix-Lakehurst (hereafter referred to as 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) Bogie, North Carolina (NC)
- Nevada Test and Training Range (NTTR) Nellis AFB, Nevada (NV)
- Lockheed Martin Aeronautics (LM Aero), Fort Worth, Texas (TX) at NAS Forth Worth Joint Reserve Base (JRB), TX (hereafter referred to as LM Aero unless otherwise stated)

Other MRTFBs (Aberdeen Test Center, Dugway Proving Ground, Kwajalein 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 F-35 Joint Program Office and the JSF ITF Team. However, these locations were not pursued further in the detailed site screening process for the proposed JSF DT Program 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 activities.

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 activity, (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	NBVC 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 Take-off 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, take-offs, and approaches; representative GSE; and qualified personnel)	Y	P	N	Y	N	P	N	P	Y	N	N
Hover and Vertical Take-off 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	NBVC 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	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	NBVC 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	NBVC 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	NBVC 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	NBVC 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	NBVC 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	NBVC 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 (AoA) 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 Take-off 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	NBVC 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
Hot Refueling Pit Capabilities, Equipment, and Operators	Y	Y	Y	P	P	Y	P	P	P	P	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	NBVC 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											
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
Photogrammetric 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
Shore-to-Air Communications Capabilities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	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	NBVC 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											
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 for the 2007 EA/OEA, the F-35 Joint Program Office and JSF ITF Team recommended the following USN, USAF, and U.S. 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. These were approved by the JSF PEO (now the PEO of the F-35 Joint Program Office) in the Finding of No Significant Impact and Harm to the Environment Statement.

East Coast Primary Test Location

- NAS Patuxent River/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
  - NBVC 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 is the only location where the F-35 would be based and maintained for the proposed JSF DT Program. 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 enables the F-35 Joint Program Office and JSF ITF Team to meet the purpose and need for the proposed JSF DT Program, 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.

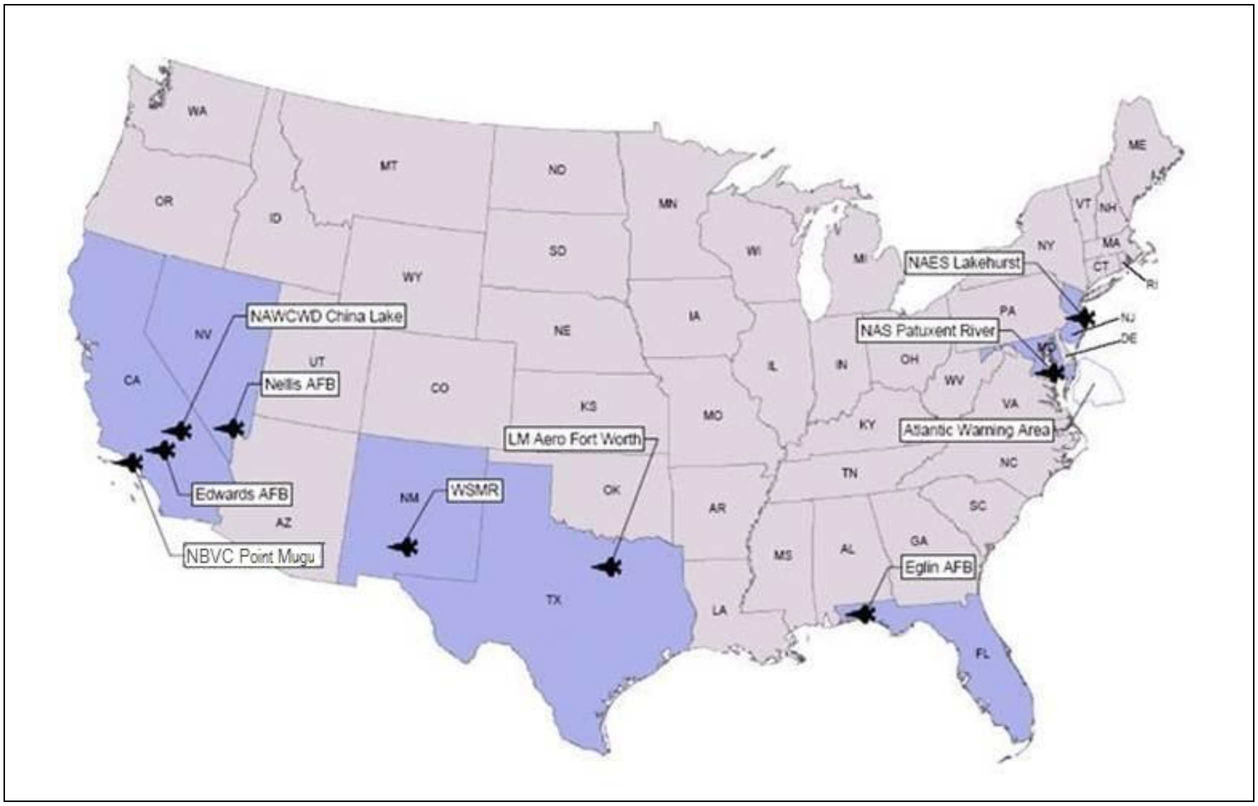


Figure 2.3-1: Proposed JSF DT Program Test Locations

While NAS Patuxent River and Edwards AFB can accommodate most of the proposed JSF DT Program requirements, additional necessary capabilities (such as environmentally-controlled laboratories, shipboard-related test stands, hover pits, etc.) are not present to accomplish the full purpose and need for the proposed JSF DT Program. The additional proposed test locations not only meet the purpose and need of the Proposed Action, but are also the premier USN, USAF, or U.S. Army testing facilities/ranges for the types of tests proposed to occur at each location. In addition, testing the F-35 in a limited combat environment (not representing the range of potential combat and natural environments) does not meet the purpose and need, nor the ORD requirements needed to support major DoD acquisition decisions of whether or not the JSF SDD Program should proceed to OT and subsequent production decisions. 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 Program with East and West Coast Primary Test Locations allows for the F-35 to take-off 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 F-35 Joint Program Office ’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 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;

3 http://www.globalsecurity.org/military/facility/mrtfb.htm 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 Point Mugu Sea Range operated by and off the coast of NBVC 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 (FEIS), Increased Flights and Related Operations in the Patuxent River Complex (PRC), December 1998 • EA JSF Concept Demonstration Phase Flight Test Program, July 2000 • EA for the F/A-18E/F Stores Separation Testing at NAS Patuxent River, January 1997 • EA for the Developmental Testing and Operational Testing for the CH-60S, December 1998 • EA/OEA of the SH-60R/Airborne Low Frequency Sonar (ALFS) Test Program, October 1999 • EA/OEA for Testing the Hellfire Missile with the H-60 Helicopter, May 2005
Edwards AFB	• Programmatic EA for Routine Flight Line Activities, March 1997 • EA for the Concept Demonstration Phase of JSF at Edwards AFB, September 2000 • Final EA for the Renovation and Construction of a Modern Flight Test Complex Edwards AFB, July 2003 • Final EA for the Continued Use of Restricted Area R-2515, April 1998 • EA for Low-Level Flight Testing, Evaluation, and Training at Edwards AFB, May 2005 • EA for Routine and Recurring Unmanned Aerial Vehicle Flight Operations at Edwards AFB, CA, November 2006
NAWCWD China Lake	• FEIS for Proposed Military Operational Increases and Implementation of Associated Comprehensive Land Use and Integrated Natural Resources Management Plans, February 2004
NBVC Point Mugu	• FEIS/Overseas EIS Point Mugu Sea Range, March 2002 • EA for F-22 Low-Level Supersonic Over-Water Testing, January 2000
WSMR	• EA for Flight Testing of the Advanced Medium Range Air-to-Air Missile, White Sands Missile Range • Final WSMR Range-Wide EIS, January 1998 • Final EIS for Developmental and Implementation of Range-Wide Mission and Major Capabilities, November 2009

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

Proposed Test Location	Relevant NEPA/EO 12114 Documents
NTTR Nellis AFB	• Legislative EIS for Renewal of the Nellis Air Force Range Land Withdrawal, March 2007 • Final EIS, F-22 Aircraft Force Development Evaluation and Weapons School Beddown, Nellis AFB, June 1999 • Final Base Realignment and Closure (BRAC) EA for Realignment of Nellis AFB, March 2007
NAES Lakehurst	• EA for the East Coast Basing of the C-17 Aircraft, August 2005 • EA for Relocation and Consolidation of the New Jersey National Guard Army Aviation Support Facility, September 2005 • EA for the Electromagnetic Aircraft Launching System, EMD Phase at NAES Lakehurst, September 2003
Eglin AFB	• Categorical Exclusion (CATEX) as documented in AF 813, for the F-22 Program in the McKinley Climatic Laboratory, March 2002 • EIS for the Proposed Implementation of the 2005 Decision and Related Actions at Eglin AFB, October 2008
LM Aero	• EA for the JSF EMD Facilities Expansion Project, Air Force Plant #4, LM Aero, August 2002 • Memorandum for the Record, Record of CATEX for Joint Strike Fighter System Development and Demonstration at LM Aero and Pratt & Whitney • EA for BRAC 2005 Action at NAS JRB Fort Worth, Texas, November 2006
VACAPES	• EA for the F/A-18 E/F Stores Separation Testing at NAS, Naval Air Warfare Center Aircraft Division, Patuxent River, MD, January 1997 • Virginia Capes Range Complex Final Environmental Statements/Overseas Environmental Impact Statement, March 2009

For the Proposed Action, there are two alternatives considered reasonable and viable for executing the JSF DT activities at the proposed East and West Coast Primary Test Locations and the Other Ancillary Test Locations. The Proposed Action could be implemented as described under either alternative. 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 Program.

2.4 ALTERNATIVE ONE

Alternative One would be to conduct the proposed JSF DT activities 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 take-off from and return to NAS Patuxent River. Alternative One would allow the F-35 Joint Program Office and JSF ITF Team to capitalize on professional capabilities, technical expertise, and specialized test assets while accommodating the proposed number of F-35 aircraft (18 vice the 15 reflected in the 2007 EA/OEA).

DETs would include aircraft, personnel, and/or equipment to support the proposed testing at NAES Lakehurst and Eglin AFB and would be temporary in nature. No DETs would be required from Edwards AFB. The ranges associated with NAWCWD China Lake, WSMR, NTTR Nellis AFB, and NBVC Point Mugu would complement proposed JSF DT activities (especially with regard to mission systems and weapons separation & integration tests) at Edwards AFB. 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 Program.

Table 2.4-1 provides a summary of the updated proposed tests, total flights, and flight hours for Alternative One at each proposed test location. Additional details are provided in subsequent sections of this Supplemental EA/OEA (Sections 4 through 8). Tempos reflected in Table 2.4-1 show the new proposed flight test profiles (reflected as current) and the original planned DT operational tempos in the 2007 EA/OEA. Test operational tempos remained basically the same for WSMR, Eglin AFB, NAES Lakehurst, and LM Aero. Tempos decreased at Nellis AFB, while tempos increased at NAS Patuxent River, VACAPES OPAREA, Edwards AFB, NAWCWD China Lake, and NBVC Point Mugu. Approximately 56% (vice the 52% in the 2007 EA/OEA) of the proposed JSF DT activities (F-35 flights)would be conducted at the East Coast Primary Test Location of which approximately 46% (vice 42%) of the activities would occur at NAS Patuxent River and 10% (vice 10%) in the VACAPES OPAREA. Up to nine F-35s would be used to execute the proposed JSF DT activities at NAS Patuxent River. Up to nine F-35s would be used to execute the proposed JSF DT activities at Edwards AFB. Approximately 43% (vice the 47% in the 2007 EA/OEA) of the entire proposed JSF DT Program (F-35 flights) would occur in the West Coast Primary Test Locations of which approximately 35% (vice 32%) of the events would occur at Edwards AFB and 8% (vice 15%) at the other West Coast locations. The remaining 1% of events for the entire proposed JSF DT activities (F-35 flights) would occur at the Other Ancillary Test Locations.

The proposed JSF DT Program 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 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 as 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 Program 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 CV FQ, Performance, and Propulsion; Loads; Flutter; Land-Based Ship Suitability; Weapons Separation & Integration; STOVL Environment; Mission Systems; and CATB	Current	4,037	6,093	*10,130*	7,267	10,628	*17,895*
	2007 EA/OEA	2,715	3,058	*5,773*	4,633	6,116	*10,749*
VACAPES OPAREA							
CV FQ, Performance, and Propulsion; Loads; Flutter; Weapons Separation & Integration; Mission Systems; and At-Sea Shipboard Suitability	Current	832	2,214	*3,046*	1,498	3,877	*5,375*
	2007 EA/OEA	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	Current	3,033	6,263	*9,296*	5,460	9,409	*14,869*
	2007 EA/OEA	2,074	4,143	*6,217*	3,941	8,610	*12,551*
NAWCWD China Lake							
CTOL FQ; Weapons Separation & Integration; Mission Systems; KC-135 Flights; F-16 Support Flights; and CATB	Current	211	442	*653*	401	790	*1,191*
	2007 EA/OEA	124	266	*390*	247	651	*898*
NBVC Point Mugu							
CTOL FQ, Performance, and Propulsion; Loads; Flutter; Weapons Separation & Integration; Mission Systems; KC-135 Flights; and F-16 Support Flights	Current	383	766	*1,149*	728	1,325	*2,053*
	2007 EA/OEA	153	203	*356*	304	501	*805*

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)							
WSMR							
Mission Systems	Current	40	44	*84*	81	111	*192*
	2007 EA/OEA	41	44	*85*	82	111	*193*
NTTR Nellis AFB							
Mission Systems	Current	120	240	*360*	227	415	*642*
	2007 EA/OEA	677	712	*1,389*	1,354	1,424	*2,778*
Other Ancillary Test Locations							
NAES Lakehurst							
JBD		20 ground-based jet blast deflector test events with the aircraft engine running on deck for 120 hours total (no aircraft flights)					
Barricade Tests		8 ground-based barricade test events (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, Updated Supplemental Data Verification (2007-2009), Edwards Data 2011, and JSF ITF 2011.

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. Planned stores/expendables changed for all proposed locations based on better refined requirements for the proposed JSF DT activities at the proposed locations. Updated quantities and the original planned quantities are shown below. Of the proposed stores/expendables, the use of ammunition for a 25 mm gun system is new to the original plans reflected in the 2007 EA/OEA. The ammunition planned is an inert, hollow steel body. This listing is applicable to both Alternatives One and Two, explained in Section 2.5 of this Supplemental 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 will be used as needed and the type of target used will 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)84 Joint Direct Attack Munition (JDAM) Guided Bomb Unit (GBU-12) Laser Guided Bomb (LGB)	Current	24
	2007 EA/OEA	36
Air Intercept Missile (AIM)-120 Advanced Medium Range Air-to-Air Missile (AMRAAM) GBU-12	Current	20
	2007 EA/OEA	12
GBU-12 LGB GBU-31 JDAMs Bomb Live Unit (BLU)-109 Bomb Bodies GBU-31 JDAMs Joint Stand-Off Weapon (JSOW) AIM 120 AMRRAM	Current	41
	2007 EA/OEA	90
MK82 Fuel Tank GBU-12 LGB GBU-31 JDAMs with BLU-109 Bomb Bodies GBU-32 JDAMs	Current	76
	2007 EA/OEA	42
AIM-120 AMRAAM AIM-9X Sidewinder Laser Guided Training Round (LGTR) GBU-12 LGB GBU-31 JDAMs with BLU-109 Bomb Bodies GBU-31 JDAMs with MK84 Bomb Bodies	Current	62
	2007 EA/OEA	56
Projectile Gun Unit (PGU)-23 Inert 25mm Ammunition	2,500	
VACAPES OPAREA		
Mark (MK)84 Joint Direct Attack Munition (JDAM) Guided Bomb Unit (GBU-12) Laser Guided Bomb (LGB)	Current	24
	2007 EA/OEA	36
Air Intercept Missile (AIM)-120 Advanced Medium Range Air-to-Air Missile (AMRAAM) GBU-12	Current	20
	2007 EA/OEA	12
GBU-12 LGB GBU-31 JDAMs BLU-109 Bomb Bodies GBU-31 JDAMs JSOW AIM 120 AMRRAM	Current	41
	2007 EA/OEA	90
MK82 Fuel Tank GBU-12 LGB GBU-31 JDAMs with BLU-109 Bomb Bodies GBU-32 JDAMs	Current	76
	2007 EA/OEA	42
AIM-120 AMRAAM AIM-9X Sidewinder LGTR GBU-12 LGB GBU-31 JDAMs with BLU-109 Bomb Bodies GBU-31 JDAMs with MK84 Bomb Bodies	Current	62
	2007 EA/OEA	56
PGU-23 Inert 25mm Ammunition	2,500	

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

Stores/Expendables		
Type	**Quantity***	
West Coast Primary Test Locations		
Edwards AFB		
MJU-7	200	
GBU-31 MK83 AIM-120A/B ASRAAM GBU-12 MK84	Current	28
	2007 EA/OEA	75
GBU-31 GBU-39 GBU-105 PGU-23 Inert 25mm Gun Ammunition MK84 GBU-12	Current	1,347
	2007 EA/OEA	470
MK84 GBU-31 GBU-39 Small Diameter Bomb (SDB)	Current	53
	2007 EA/OEA	248
MK84 GBU-31	Current	9
	2007 EA/OEA	298
NAWCWD China Lake		
MQM-107 QF-4 MJU-7	Current	204
	2007 EA/OEA	4
GBU-12-GTV GBU-31 GBU-32 MQM-107 MJU-7	Current	110
	2007 EA/OEA	15
AIM-120 AMRAAM GBU-39 MQM-107 BQM-34A MJU-7	Current	164
	2007 EA/OEA	85
AIM-120C-AMRAAM-AAVI AIM-120B-AMRAAM-AAVI AGM-154 AIM-1207 ASRAAM GBU-12-GTV GBU-12 GBU-32 GBU-39 PGU-23 Inert 25mm Gun Ammunition MQM-107 BQM-34A MJU-7	Current	1,181
	2007 EA/OEA	30

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

<table>
<tr><th colspan="3">Stores/Expendables</th></tr>
<tr><th>Type</th><th colspan="2">Quantity*</th></tr>
<tr><td colspan="3">NBVC Point Mugu</td></tr>
<tr><td rowspan="2">AIM-120C-ASRAAM-AAVI
QF-4
BQM-34A
MQM-107</td><td>Current</td><td>10</td></tr>
<tr><td>2007 EA/OEA</td><td>8</td></tr>
<tr><td rowspan="2">AIM-120C-ASRAAM-AAVI
QF-4
BQM-34A
MQM-107</td><td>Current</td><td>16</td></tr>
<tr><td>2007 EA/OEA</td><td>4</td></tr>
<tr><td rowspan="2">AIM-120C-ASRAAM-AAVI
BQM-34A
MQM-107</td><td>Current</td><td>4</td></tr>
<tr><td>2007 EA/OEA</td><td>11</td></tr>
<tr><td colspan="3">WSMR</td></tr>
<tr><td>Only flares are planned on an as needed basis. No other stores/expendables are planned at this time.</td><td colspan="2">Not Applicable (N/A)</td></tr>
<tr><td colspan="3">NTTR Nellis AFB</td></tr>
<tr><td>No stores/expendables are planned at this time</td><td colspan="2">N/A</td></tr>
<tr><td colspan="3">Other Ancillary Test Locations</td></tr>
<tr><td colspan="3">NAES Lakehurst</td></tr>
<tr><td>No stores/expendables are planned at this time</td><td colspan="2">N/A</td></tr>
<tr><td colspan="3">Eglin AFB</td></tr>
<tr><td>No stores/expendables are planned at this time</td><td colspan="2">N/A</td></tr>
<tr><td colspan="3">LM Aero</td></tr>
<tr><td>No stores/expendables are planned at this time</td><td colspan="2">N/A</td></tr>
</table>

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005) and Updated Supplemental Data Verification (2007-2009).

Note: Proposed stores/expendables reflect approximations for the proposed JSF DT Program.

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
NBVC 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 Program. Some support equipment (such as floodlights, shipboard aircraft handler, portable duct heaters, and compressors) may change out from the above listed equipment in the table depending on test requirements.
***Total for all units*

2.5 ALTERNATIVE TWO - MODIFIED STOVL TESTING

Alternative Two comprises Alternative One and the expansion of testing at LM Aero. This is the preferred alternative implemented by the PEO of the F-35 Joint Program Office as a result of the 2007 EA/OEA. 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 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, 64% at NAS Patuxent River and 33% at LM Aero would be conducted, while the remaining 3% would be conducted at Edwards AFB. 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 test operational tempo at LM Aero did not change from the original planned DT operational tempos in the 2007 EA/OEA. 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 F-35 Joint Program Office and JSF ITF Team's approach to minimizing program risks, such as test schedule delays. Based on history with other aircraft programs, the F-35 Joint Program Office and the JSF ITF Team took prudent measurers to verify that the F-35 STOVL variant was operationally capable before sending the aircraft to NAS Patuxent River. The Proposed JSF DT activities at LM Aero (such as engaging the lift fan of the F-35) confirmed there were no performance mechanical, or technical problems with the aircraft. Proposed tests verified the F-35 STOVL variant was ready to conduct the extensive tests upon arrivals at NAS Patuxent River. Implementing this proposed alternative will help ensure there is 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 CV FQ, Performance, and Propulsion; Loads; Flutter; Land-Based Ship Suitability; Weapons Separation & Integration; STOVL Environment; Mission Systems; and CATB	Current	3,996	6,093	10,089	7,196	10,628	17,824
	2007 EA/OEA	2,674	3,058	5,732	4,562	6,116	10,678
LM Aero							
STOVL FQ, Performance, Propulsion, Environment; and CATB	Current and 2007 EA/OEA	41	242	283	71	721	792

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005), Updated Supplemental Data Verification (2007-2009), Edwards Data 2011, and JSF ITF 2011.

Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT Program; 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 were not analyzed further in the 2007 EA/OEA or in this Supplement.

2.6.1 Computer Modeling and Simulation (M&S) Alternative

Computer M&S technologies can be used to infer aerodynamic and system performance. LM Aero and the F-35 Joint Program Office 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 Program at a single, principal location. However, it became apparent during the site selection process that this was 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 Program. Neither NAS Patuxent River nor Edwards AFB by themselves has the capacity in facilities or workforce personnel to conduct the entire proposed JSF DT Program. 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 18 test aircraft and approximate 1,342 test personnel required for the proposed JSF DT Program. This significant MILCON would expand fiscal requirements beyond what has already been projected for the JSF 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 F-35 Joint Program Office would not meet the T&E milestones that support production and deployment decisions for 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[4]. The DoD acquisition process emphasizes efficient use of DoD resources to effectively support a program and ultimately the operational forces. Neither the F-35 Joint Program Office 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 Program. As such, conducting the proposed JSF DT activities at one primary test location would jeopardize the entire JSF Program and the stated purpose and need for the Proposed Action.

2.7 NO ACTION ALTERNATIVE

Under the No Action Alternative, no new activities associated with the proposed JSF DT Program would occur at any location and the JSF DT Program profile/tempo of Alternative Two in the 2007 EA/OEA would continue. The No Action Alternative, as reflected in this Supplemental 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. The existing environment of each proposed test location in this Supplemental EA/OEA (Sections 4 through 8) was updated since the 2007 EA/OEA to represent the baseline conditions; the No Action Alternative. If the No Action Alternative is selected by the PEO F-35 Joint Program Office, no additional impacts would be anticipated from the baseline. Thus, the No Action Alternative is not examined in further detail in the environmental consequences sections of this Supplemental EA/OEA.

4 JIST3 2005

3.0 ENVIRONMENTAL RESOURCES ANALYZED

Based on the review of relevant NEPA/EO 12114 documents and analysis of other relevant environmental and technical information, as well as the 2007 EA/OEA, the PEO of the F-35 Joint Program Office reasonably concluded the Proposed Action would not 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, which remains unchanged from the 2007 EA/OEA, 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
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 Supplemental EA/OEA. These are the same resources analyzed in the 2007 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 are expected to these resources for the proposed test locations discussed in Section 4. Due to the complexity or extent of the proposed test activities, a more detailed analysis of potential impacts to these environmental resources is provided for the proposed JSF DT activities at Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero (see Sections 5 through 8).

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.[5] 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), the EPA established National Ambient Air Quality Standards (NAAQS) for the criteria pollutants.[6] 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.

5 EPA 2005
6 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.[7] The primary standard has been established to protect public health and the secondary standard is intended to prevent environmental and property damage.[8] The primary NAAQS established under the CAAA-90 are listed in Table 3.1.1-1.

Table 3.1.1-1: NAAQS[9]

Pollutant	Primary Standards	
	Level	**Averaging Time**
Carbon Monoxide (CO)	9 ppm (10 mg/m^3)	8-hour [(1)]
	35 ppm (40 mg/m^3)	1-hour [(1)]
Lead (Pb)	0.15 µg/m^3 [(2)]	Rolling 3-Month Average
	1.5 µg/m^3	Quarterly Average
Nitrogen Dioxide (NO_2)	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)
Particulate Matter (PM_{10})	150 µg/m^3	24-hour [(3)]
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual [(4)] (Arithmetic Mean)
	35 µg/m^3	24-hour [(5)]
Ozone (O_3)	0.075 ppm (2008 std)	8-hour [(6)]
	0.08 ppm (1997 std)	8-hour [(7)]
	0.12 ppm	1-hour [(8)]
Sulfur Dioxide (SO_2)	0.03 ppm	Annual (Arithmetic Mean)
	0.14 ppm	24-hour [(1)]

µg/m3 = micrograms per cubic meter
µg/m3 = micrograms per cubic meter
ppm = parts per million
std = standard
Notes: [(1)] Not to be exceeded more than once per year.
[(2)] Final rule signed October 15, 2008.
[(3)] Not to be exceeded more than once per year on average over 3 years.
[(4)] To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m3.
[(5)] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).
[(6)] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average O_3 concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)
[(7)] (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average O_3 concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard–and the implementation rules for that standard–will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 O_3 standard to the 2008 O_3 standard.
[(8)] (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1.
(b) As of June 15, 2005 EPA has revoked the 1-hour O_3 standard in all areas except the fourteen 8-hour O_3 nonattainment Early Action Compact (EAC) Areas. For one of the 14 EAC areas (Denver, CO), the 1-hour standard was revoked on November 20, 2008. For the other 13 EAC areas, the 1-hour standard was revoked on April 15, 2009.

7 40 CFR Part 50.4 et. Seq.
8 40 CFR Part 50.
9 Ibid.

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 NAAs under the 8-hour O_3 standard are classified into seven levels: marginal, moderate, serious, severe, extreme, unclassified, or Subpart 1[10] 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.[11]

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 that 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, the 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 the 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.[12] General conformity covers all other Federal actions not addressed by transportation conformity.[13] 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 Supplemental EA/OEA focuses only on general conformity.

3.1.3 General Conformity Applicability Analysis and Determination

The General Conformity Rule (40 CFR 51 Subpart W and 40 CFR 93 Subpart B) establishes a process for analyzing its applicability. Potential emissions from a Proposed Action are determined on an annual basis and compared to annual *de minimis* levels for those pollutants (or precursors) for which the area is classified as nonattainment. Those emissions must also not be considered regionally significant; meaning the total direct or indirect emissions of an individual pollutant cannot be greater than 10% of a NAAs emissions of that pollutant. General Conformity is not applicable to attainment areas. The regionally

10 The "Subpart 1" nonattainment designation means that the area is considered nonattainment but is not classified in Subpart 2 (CAA, 42 USC 7502)
11 EPA 2005
12 40 CFR 51, Subpart T
13 40 CFR 51, Subpart W and 40 CFR 93, Subpart B

significant threshold is no longer applicable; however, this information was kept to stay consistent with the 2007 EA/OEA.[14]

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 divides the air conformity process into two distinct areas: applicability and determination. Federal agencies must initially assess if an action is subject to the General Conformity Rule by conducting an applicability analysis. The technical analysis is documented in a Record of Non-Applicability (RONA) if the Proposed Action is exempt from a General Conformity determination; or if the direct and indirect emissions are below the conformity thresholds and are not regionally significant.The process for analyzing and determining conformity is outlined in the following steps:[15]

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.
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 did not result in nonconforming pollutant emissions or emissions exceeding certain threshold *de minimis* amounts. [16] 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 not considered 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

14 The requirement to evaluate the regionally significant threshold was deleted from 40 CFR Parts 51 and 93 - see Revisions to the General Conformity Regulation, Final Rule in the Federal Register Vol. 75, No. 64 dated April 5, 2010.

15 40 CFR Parts 51.853 et. seq.

16 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.

the SIP. At the time the general conformity regulation was promulgated, the $PM_{2.5}$ NAAQS did not exist; therefore, no conformity threshold for $PM_{2.5}$ was established. The EPA has since established 100 tpy as the *de minimis* emission level for directly emitted $PM_{2.5}$ and each of the precursors that form it (SO_2, Nitrogen Oxides [NO_x], Volatile Organic Compounds [VOC], and ammonia). The 100 tpy threshold applies separately to each precursor.

Table 3.1.3-1: Conformity De *Minimis* Thresholds[17]

Nonattainment Area (NAA) Designation	*De minimis* Threshold (tons/year)
O_3, VOCs, NO_x	
Extreme NAAs	10
Severe NAAs	25
Serious NAAs	50
Other O_3 NAAs Outside O_3 Transport Region	100
Marginal and Moderate NAAs Inside an O_3 Transport Region	
VOCs	50
NO_x	100
NO_2 All NAAs	100
CO All NAAs	100
SO_2 All NAAs	100
PM_{10} NAAs	
Serious NAAs	70
Moderate NAAs	100
$PM_{2.5}$ All NAAS	100
Pb All NAAs	25
Maintenance Areas	
O_3 Maintenance Areas (VOCs)	
Inside an O_3transport region	50
Outside an O_3 transport region	100
O_3 Maintenance Areas (NO_x)	100
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 NAAs 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_{2x} emissions.

17 40 CFR 51.853

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.

3.1.5 Climate Change/Greenhouse Gas Emissions

The EPA defines climate change as any distinct change in temperature, rainfall, snow, or wind patterns that last for decades or longer. These changes may result from naturally occurring events including changes in the Sun's energy or in the Earth's orbit, natural processes within the climate system (such as changes to circulation patterns of oceans), or human activities.[18] Human activities such as combustion of fossil fuels and deforestation alter the composition of the atmosphere by increasing the amount of CO_2, which intensifies the Greenhouse Gas (GHG) affect and increases the surface temperature of the Earth. Studies have shown that the amount of CO2 has increased by about 35% during the industrial era. The Intergovernmental Panel on Climate Change (IPCC) scientists believe that most of the warming experienced since the 1950s is from human activities resulting in an increase in GHG emissions.[19]

GHGs are compounds found naturally within the Earth's atmosphere, which trap and convert sunlight into infrared heat. Increased levels of GHGs in the atmosphere have been correlated to a greater overall temperature on Earth (global warming). The most common GHGs emitted from natural processes and human activities include CO_2, methane (CH_4), and nitrous oxide (N_2O). CO_2 is the primary GHG emitted by human activities in the U.S., with the largest source from fossil fuel combustion. The U.S. domestic military aviation section contributes only 16.9 million metric tons (MT) CO_2 equivalent (CO_2-e) or approximately 0.2% of the total CO_2e emissions from all domestic anthropogenic sources (7,129.9 million MT CO_2-e).[20]

No universal standard or regulation has been established to determine the significance of cumulative impacts from GHG emissions. In addition, there is no requirement as part of the General Conformity Rule (40 CFR Parts 51 and 93) or NEPA requirements to consider GHG emissions and impact of the Proposed Action to climate change, however, this may not be the case in the near future. California Senate Bill 97 (Chapter 185, 2007) required the Governor's Office of Planning and Research (OPR) to develop draft guidelines to mitigate GHG emissions or address the effects of GHG emissions. OPR was required to develop and submit proposed guidelines to the Natural Resources Agency on or before July 1, 2009. The Natural Resources Agency was to certify and adopt the guidelines on or before January 1, 2010. As of the writing, OPR has developed a set of guidelines, which include quantifying GHG emissions of proposed projects where possible. It also recommends consideration of several qualitative factors that may be used in the determination of significance and to mitigate the effects of GHG emissions. The guidelines were sent to the Natural Resources Agency and are currently under review.

CEQ released draft guidance on February 18, 2010 for public comment on when and how Federal agencies must consider greenhouse gas emissions and climate change from Proposed Actions. The guidance includes a discussion of how Federal agencies should analyze the potential environmental impacts of greenhouse gas emissions and climate change and sets a threshold of 25,000 metric tons of carbon dioxide. If a Proposed Action exceeds this threshold, a Federal agency would need to conduct a quantitative analysis to further assess the effects of climate change on the Proposed Action. The draft

18 EPA, 2009
19 IPCC, 2007
20 Pew 2009

guidance does not apply to land and resource management actions and does not propose to regulate greenhouse gases. Government agencies must reduce non-tactical GHG by FY 2020 in accordance with EO 13514. The military Services are actively researching, testing, and implementing various initiatives that help to address the aggressive GHG reduction goals established by DoD, as reflected in the following overview.

- DoD – A series of reduction goals are established for Scope 1, 2, and 3 sources of GHG. Scope 1 and 2 sources are any indirect and direct source controlled by DoD (e.g., fuel combustion and consumption of purchased electricity) and Scope 3 sources are those not in DoD's control (e.g., employee commuting and supply chain emissions). The target emission reductions set for Scope 1 and 2 emissions are 34% by FY 2012, which is 6% more than the Government-wide reduction goal of 28%. The target emission reductions set for Scope 3 emissions is 13.5% by FY 2020. In addition, DoD outlined four sub-goals in their *Strategic Sustainability Performance Plan* that will assist in meeting the reduction goals for Scope 1 and 2. These sub-goals include reducing energy use per square foot by 37.5%; reducing petroleum use in non-tactical fleet vehicles by 30%; increasing the use of renewable energy sources for electricity by 20%; and producing, capturing, and using methane from landfill/wastewater treatment plants. For Scope 3 sources, the plan outlined 2 sub-goals: increase telecommuting work force by 30% once a week and reduce business travel by 7%. As of 2010, DoD reduced total GHG emissions from Scope 1, 2 and 3 sources by 3.6%.

- **U.S. Army** – Several initiatives have been implemented over the last couple of years to reduce energy consumption from both stationary and mobile sources of GHG emissions. An energy conservation pilot program, called NetZero, is implemented at eight installations with the goal by 2020 for each installation to consume only as much energy as it generates in a given year. The focus of the NetZero Program is reducing energy use, maximizing energy efficiency, diverting energy for secondary purposes, and recovering energy. The project will result in less energy use, as well as a reduction in GHG emissions. In addition, the Army is transforming its Fleet of non-tactical vehicles to hybrid, and low speed electric vehicles to lower fossil fuel usage. In 2011, the Army deployed 500 hybrid vehicles and over 4,000 low-speed electric vehicles.

- **USN –** Efforts in reducing energy consumption also helps to reduce GHG emissions. Lower energy consumption is being achieved by improving energy efficiency of shore assets and using renewable resources. One initiative, the "Great Green Fleet", involves a carrier strike group that is fueled by alternative sources of energy such as nuclear fuel and advanced biofuels. In addition to reducing its reliance on fossil fuels, this Fleet also employs solid state lighting, gas turbine on-line water wash, shipboard energy dashboards, smart voyage planning decision aids, and stern flaps to reduce energy consumption and increase energy efficiency. On July 2012, the Green Fleet successfully performed at full capacity using advanced biofuels and energy efficient technologies.

At Naval Air Weapons Station China Lake, the USN installed a 270 megawatts (MW) geothermal power plant and five solar photovoltaic arrays on parking garages, roofs, and on the ground which has produced four MW of electricity. The USN is currently installing more arrays with the capability of producing 20 MW of electricity; all of which reduces energy consumption from traditional sources of electricity and associated GHG emissions.

- USAF – Several goals, outlined in the *Air Force Energy Plan*, that the USAF hopes to achieve by 2030 include reducing energy demand at installations, flight operations, and ground operations; increasing the use of renewable and alternative energy; increasing energy awareness; using alternative fuel blends in aircraft that have a life-cycle greenhouse gas footprint equal to or less than petroleum; operating Forward

Operating Bases on renewable energy; and optimizing energy use. These goals will help the USAF achieve energy security and independence, as well as reduce GHG emissions.

Several energy initiatives are underway by the USAF. Different blends of biofuels and jet fuels (hydotreated renewable jet fuel) are being tested in several aircraft with a goal of using 50% alternative fuel blends by 2016. The USAF is looking into ways to produce and/or purchase renewable forms of energy and has several of renewable energy projects under way including geothermal energy at Charleston AFB, a waste to energy plant at Hill AFB, and a wind project at F.E. Warren AFB.

3.1.6 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 that are reactive VOCs, NO_x, NO_2, SO_2, and $PM_{2.5}$. Since Pb is not normally found in refined aircraft fuels, it was 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 were also excluded from the air analysis in this Supplemental EA/OEA. Limited research was 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 were 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 Supplemental EA/OEA.[21]

For purposes of analyzing the potential environmental consequences to the affected environment at each proposed test location, F-35 emissions were 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*.[22] The methodology for determining emissions from all direct and indirect sources is discussed further in Sections 5 through 8 and Appendix E.

Given the impending requirements to consider GHG emissions in NEPA and General Conformity Rule, the impact of proposed GHG emissions to climate change was considered in this Supplemental EA/OEA. GHG emissions were quantified and the levels of emissions are discussed in the context of cumulative impacts compared to the total amount of GHG emissions in 2009 resulting from U.S. activities.

GHG emissions (CO_2, CH_4, and N2O) were calculated by determining the total fuel combusted during the Proposed Action and applying the following emissions factor specific to the fuel (diesel or gasoline) from generally accepted GHG protocols, as reflected in Table 3.1.6-1. The protocols do not include an emission factor for JP-8, therefore the emission factor for Jet A/A-1 was used.

21 O’Brien 2002
22 Ibid

Table 3:1.6-1: Estimated Emission Factors for Combusted Fuel

Fuel	CO_2		CH_4		N_2O	
	Emission Factor	Units	Emission Factor	Units	Emission Factor	Units
Jet A/A-1	9.57	kg/gallon	0.27	g/gallon	0.31	g/gallon
Diesel	10.15	kg/gallon	0.07	g/L	0.02	g/L
Gasoline	8.81	kg/gallon	0.22	g/L	0.32	g/L

kg/gallon = kilograms/gallon; g/gallon = grams/gallon; and g/L = grams/liter

The individual GHG emissions were converted into a CO_2e based on Global Warming Potentials (GWP). The cumulative warming effect over a specified time period of an emission of a mass unit of CO_2 is assigned the value of 1. Effects of emissions of a mass unit of non-CO_2 GHG are estimated as multiples of CO_2. For example, CH_4 has a GWP of 21, which means that 1 kg of CH_4 has the same heat-trapping potential as 21 kg of CO_2 and N_2O has a GWP of 310.[23]

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 (SPL).
- 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 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 5-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).

23 *IPCC (1996)*

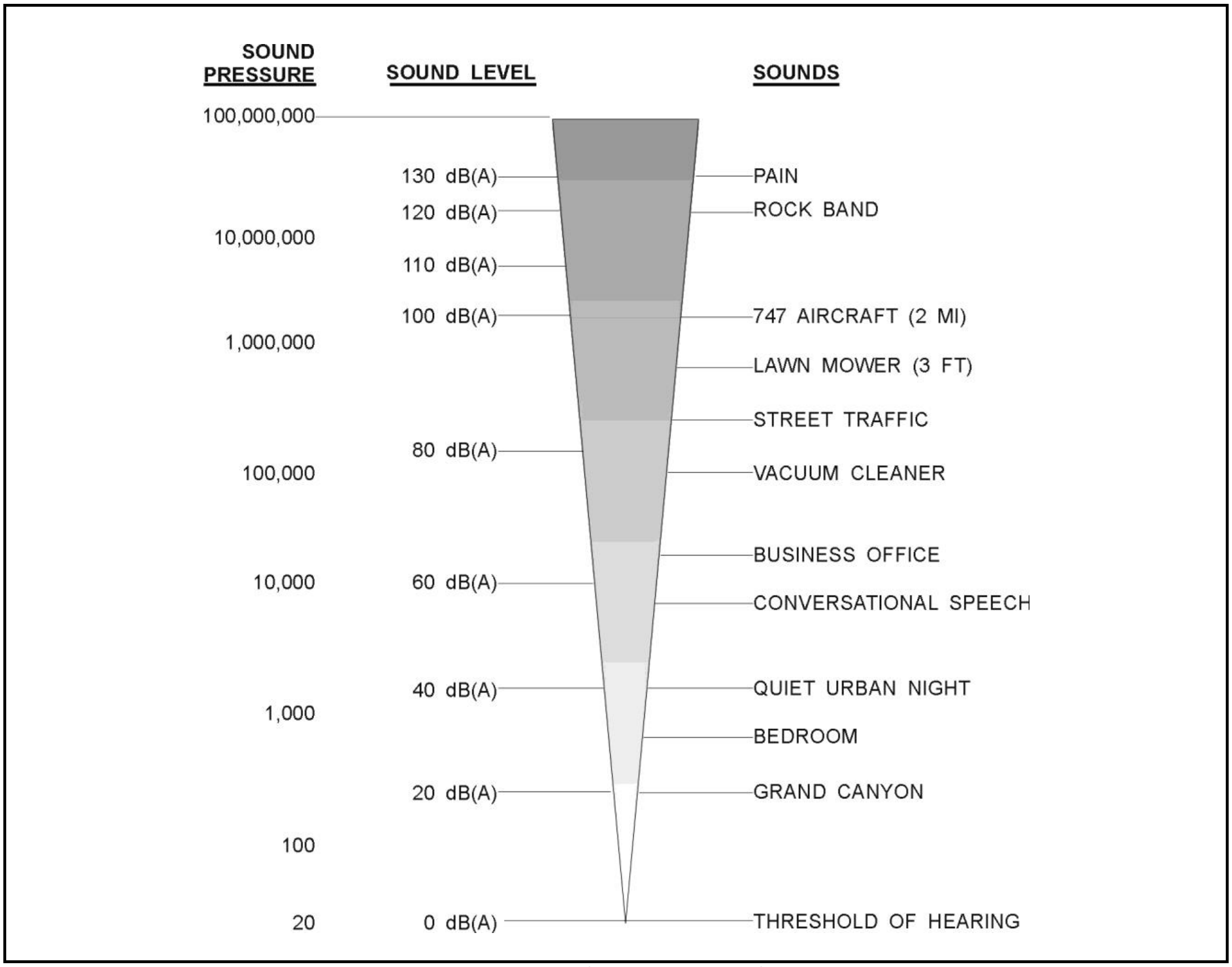
3.2.1 Noise Metrics

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 Program considered 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] 5100.23G Ch-1). 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 every day, a logarithmic measure is applied. For this Supplemental 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 3 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

In addition, the minimum change in sound level that the human ear can detect is about 3 dB. A 10 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 10 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 10 dB penalty is applied to nighttime 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.

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 10 dB lower than during daytime hours.

The inclusion of daytime and nighttime 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.[24]

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.[25] 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 existing environment.

24 U.S. EPA 1978
25 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 (dB)					
	< 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

Source: Federal Aviation Regulations, Part 150, Airport Noise Compatibility Planning, 18 January, 1985.

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

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.

Source: Federal Aviation Regulations, Part 150, Airport Noise Compatibility Planning, 18 January, 1985.

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, 1,0, 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.

(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 Supplemental EA/OEA could potentially impact the noise environment at proposed test locations because of modifications and/or additions to the baseline Fleet, Fleet mix of aircraft, and proposed JSF DT activities. Fleet refers to all the varying types of aircraft (F-16s, F/A-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 were calculated using the USAF approved noise modeling programs: NOISEMAP Version 4.965 vice 4.872, and BaseOps Version 7.32 and 7.357 vice 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 were 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 Program is discussed further in Sections 5 through 8 and Appendix F. Potential noise impacts at Eglin AFB, NAWCWD China Lake, NBVC 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 take-offs 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 proposed test locations.

3.3 BIOLOGICAL/NATURAL RESOURCES[26]

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.

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. 1C, Chapter 24, *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 take-off/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.

26 Manci et. al. 1988; Schmidt-Bremer, Martin Jr. and Timothy LeDoux 2004

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 that 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 emphasized 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, possible 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.[27] 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).[28] 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

27 Manci 1988
28 NPS 1994; AFFTC 2005

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.[29] 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 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 than 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

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29 AFFTC 2005

modifications that may amplify sound, and react differently to noise events.[30] 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 effects from noise.

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.[31] 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 $21,027 for a family of four.[32] The EPA identifies a low-income community as an area with a significantly greater population of low-income families than a statistical reference area.[33] For the purposes of the socioeconomic analysis reflected in this Supplemental 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. 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."*

Minority and children populations and poverty rates reflected in this Supplemental EA/OEA for counties with populations larger than 20,000 people were obtained from the U.S. Census, American Community Survey 2005-2007 3-year estimates.[34] In addition to the 3-year estimates, more localized tract/block areas for poverty rates, ethnicity and children populations (obtained from the U.S. Census 2000) were used to

30 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

31 CEQ 1997

32 Census Bureau 2009

33 EPA 1998

34 More localized 3-year estimates than counties, such as municipalities or places with populations larger than 20,000 people, were not used because the more localized municipalities or places did not completely overlap the socioeconomic study areas and the accuracy of the 3-year estimates decrease the smaller the localized area gets.

support the environmental justice and children demographic analyses for counties with smaller populations (less than 20,000 people).

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

EIFS is a web-based modeling and information system that provides regional economic analyses to planners and analysis. 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.[35]

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.[36]

3.5 COASTAL ZONE MANAGEMENT (CZM)

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 CZMPs in order “to preserve, protect, develop and where possible, to restore or enhance the resources of the nation’s coastal zone.” [37]

The CZMP leaves day-to-day management decisions at the State level in the 34 States and territories with Federally approved CZMPs. Currently, 95,376 national shoreline miles (99.9%) are managed by the Program.[38] The State management plans provide for the protection of natural resources and the husbandry

35 EIFS 2001
36 Ibid
37 http://www.ocrm.nos.noaa.gov/czm/
38 Ibid

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 of each State's Coastal Zone Management (CZM) program and policies.[39] 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 Supplemental EA/OEA to the following States that have Federally-approved CZM Programs: Maryland, Virginia, and Delaware. CZM for California was determined not required since the predominance of the proposed JSF DT Program is occurring in the airspace or at-sea outside the coastal zone. For the 1% of activities that may occur within the coastal zone, they are consistent with already existing activity in the Point Mugu Sea Range, which are covered in the FEIS/Overseas EIS Point Mugu Sea Range.[40]

Maryland's CZM Overview[41]

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[42]

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[43]

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.

39 DoN 1998
40 Comment by NRSW N40 2011
41 http://www.ocrm.nos.noaa.gov/czm/czmmaryland.html
42 http://www.ocrm.nos.noaa.gov/czm/czmvirginia.html
43http://www.ocrm.nos.noaa.gov/czm/czmdelaware.html

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4.0 ASSOCIATED TEST LOCATIONS

Conclusions of the 2007 EA/OEA for these locations are the same as what is reflected in this section. The F-35 Joint Program Office reasonably concluded the proposed JSF DT Program at Eglin AFB, NAWCWD China Lake, NBVC Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA of the AWA would still not pose any foreseeable degradable direct, indirect, or cumulative significant impact or harm to the environment. As such, these proposed test locations remain grouped together in one section to facilitate cohesive analysis. Most of the proposed JSF DT activities at these locations does not involve the landing or take-off 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 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° 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.

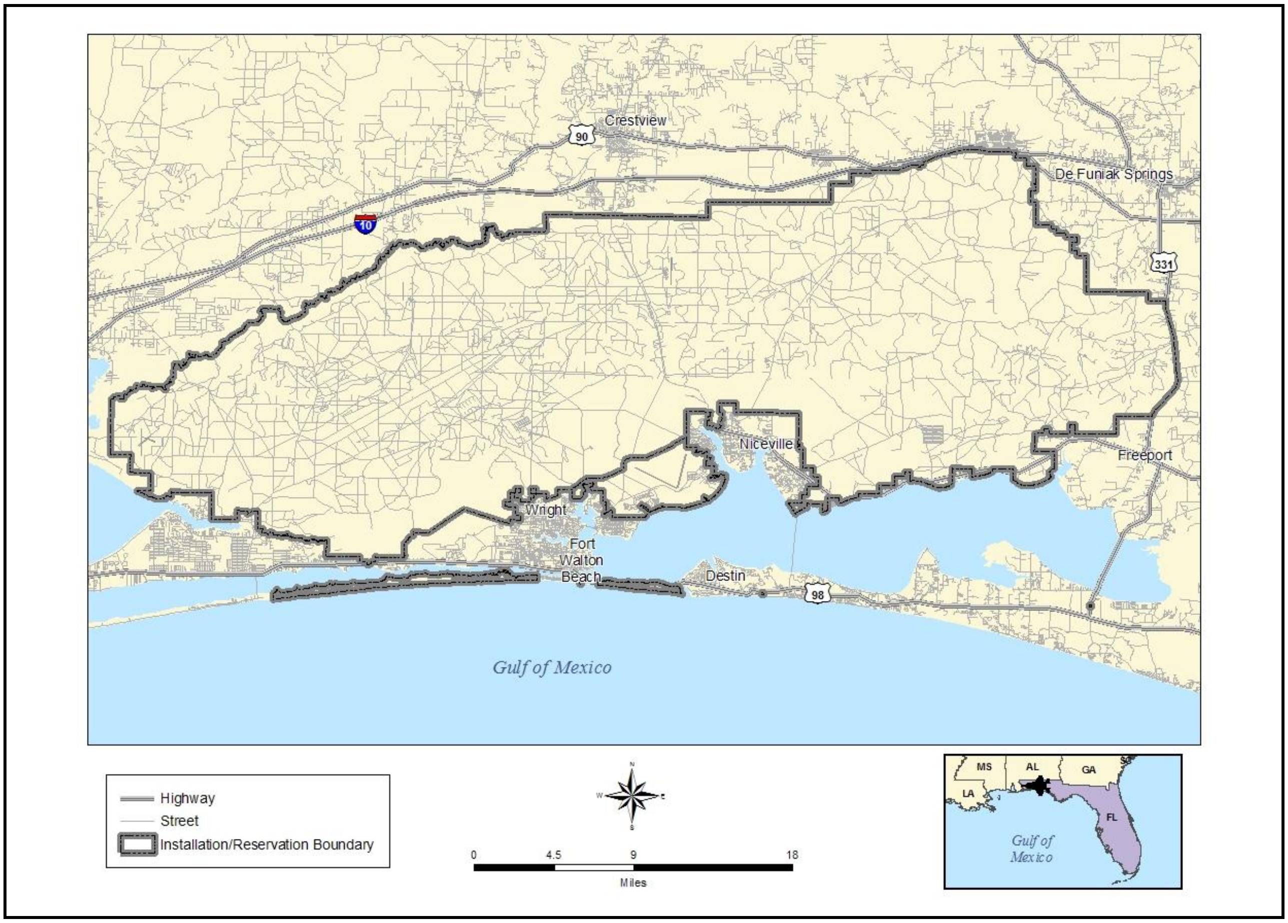


Figure 4.1.1-1: General Map of Eglin AFB

4.1.2 Proposed JSF DT Program at Eglin AFB

The purpose of the proposed JSF DT Program at McKinley Climatic Laboratory, Eglin AFB, is 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 activities 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 2 to 3 transit flight hours of the F-35 to and from Eglin AFB. The proposed JSF DT activities would be approximately 4 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 1-hour in the afterburner (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 Program as necessary to demonstrate F-35 capabilities and mission performances. The F-35 Joint Program Office and JSF ITF 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 Supplemental EA/OEA regarding potential environmental impacts.

The proposed JSF DT program 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.[44]

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.[45]

Florida has adopted the NAAQS except for SO_2, for which the State has adopted a more stringent annual and 24-hour 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.

44 McKinley Climatic Lab 2002
45 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 take-offs 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 activities 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. Section 3.1.5 provides a high level overview of DoD's and the Service's energy activities (e.g., alternative fuels, reduce energy consumption, etc.), which have an added benefit of reducing greenhouse gas emissions.

4.1.4 Noise at Eglin AFB

4.1.4.1 Affected Environment

Based on the 2007 EA/OEA, aircraft operations are conducted within the airspace above and surrounding Eglin AFB, including restricted and warning areas in addition to MOAs. 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.

Since development of the 2007 EA/OEA, Eglin AFB completed the EIS for the BRAC decision for Eglin AFB that included the beddown of the JSF Initial Joint Training Site (IJTS). The Record of Decision for this EIS was the beddown of 59 F-35 Primary Assigned Aircraft (PAA) vice the full complement for the Proposed Action of 107 aircraft for 122 sorties per day. Results of the FEIS showed over flights would cause direct noise impacts over the Valparaiso areas.[46] Due to the potential noise impacts both on- and off-base, the USAF decided to impose temporary operational limitations on JSF flight training activities to both avoid and minimize noise impacts. A Supplemental EIS is underway to assess whether or not the entire complement or some variation of the Proposed Action analyzed in the FEIS can be implemented at Eglin AFB. [47]

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 take-offs 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 and the tempo of IJTS activities for the full complement of 107 PPA as analyzed in the BRAC FEIS, the two to three F-35 transit hours would not change baseline noise levels.[48] In addition, potential noise impacts from the anticipated 60 to 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.

46 U.S. Air Force Eglin BRAC Program 2005
47 U.S. Air Force 2006
48 Eglin Gulf Test and Training Range Final Programmatic Environmental Assessment, 2002, Page 1-1

4.1.5 Biological/Natural Resources at Eglin AFB

4.1.5.1 Affected Environment

Based on the 2007 EA/OEA, 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.

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 11 Federally-listed threatened or endangered species, such as the red-cockaded woodpecker (*Picoides borealis*), piping plover (*Charadrius melodus*), Frosted flatwoods salamander (*Ambystoma cingulatum*), eastern indigo snake (*Drymarchon corais couperi*), etc.

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 activities inside the McKinley Climatic Laboratory. Any potential for impacts would be associated with the short duration landings and take-offs 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 take-offs. 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

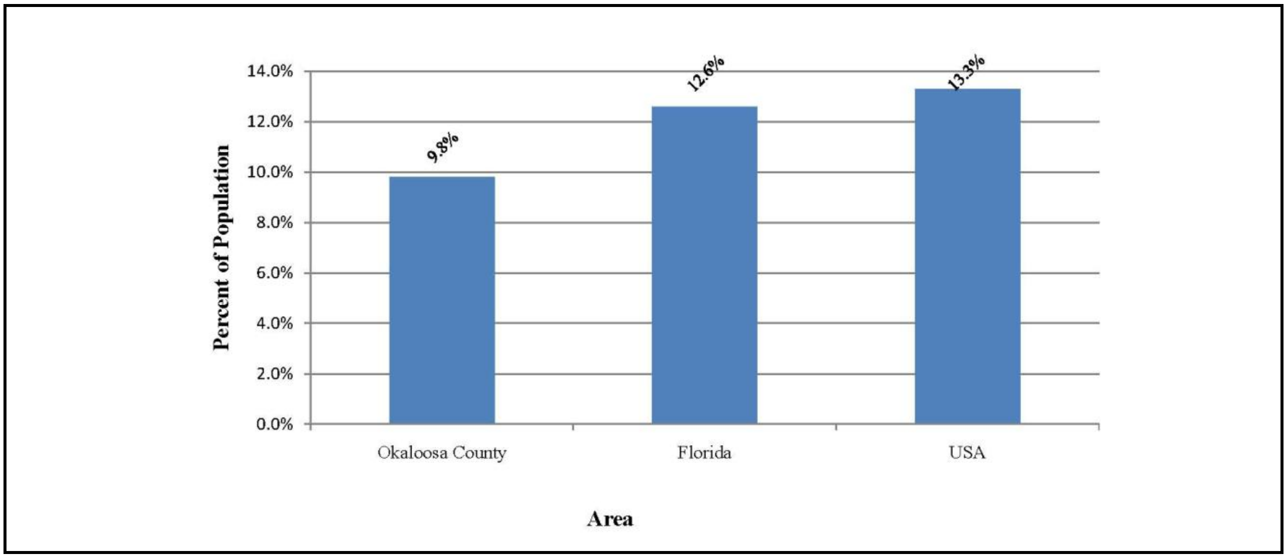
4.1.6.1 Affected Environment

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 sources were used to support the baseline information regarding environmental justice and children demographic considerations, the predominant socioeconomic resource area potentially affected by the proposed JSF DT Program. 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 activities.

Based on the 2005-2007 census data, Okaloosa County has a poverty rate of 9.8%, which is well below the Florida rate of 12.6% and below the set CEQ threshold of 25% for low-income populations. Figure 4.1.6.1-1 summarizes the poverty level of Okaloosa County compared to the State of Florida and the U.S. Okaloosa County is predominantly white (78.8%) and the remaining race distribution is Black or African American (9.4%), Hispanic or Latino (5.4%), Asian (2.9%), two or more races (2.7%), Native Indian or Native Alaskan (0.5%), some other race (0.2%), and Native Hawaiian or Pacific Islander (0.2%).[49]

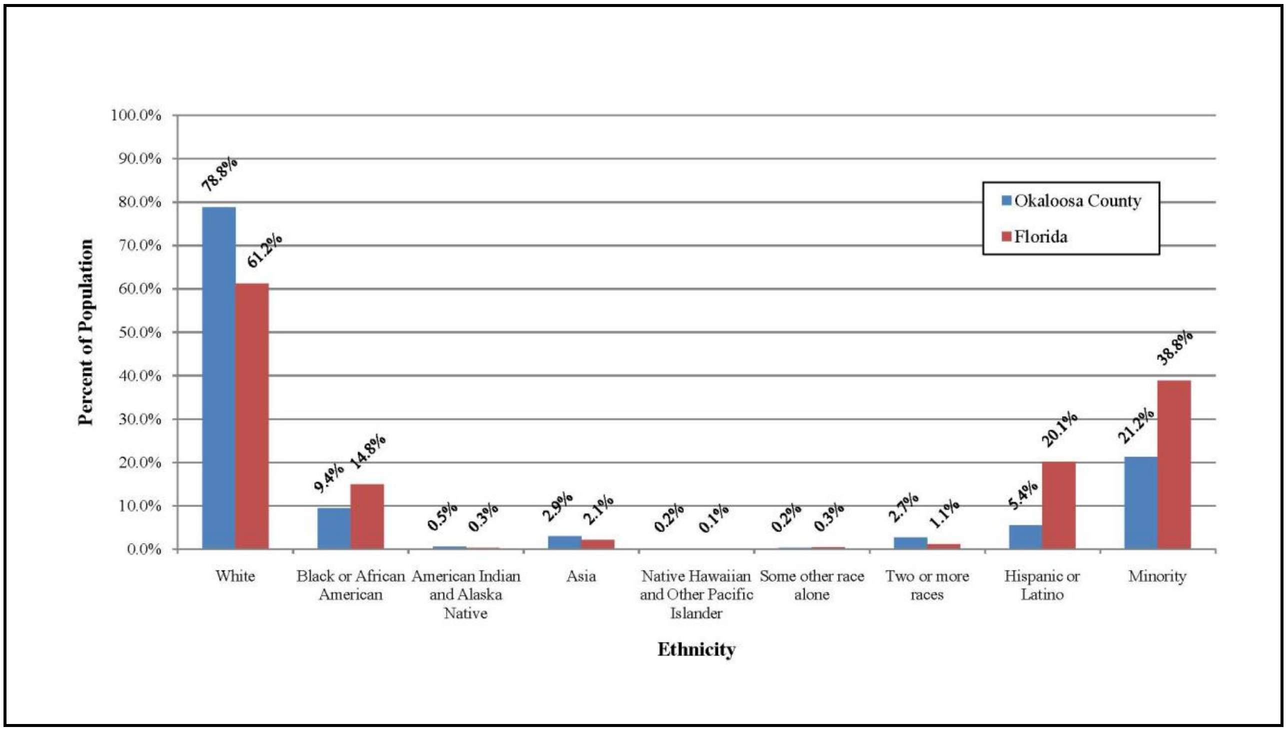
49 Census Bureau 2009

Figure 4.1.6.1-2 summarizes the population ethnicity for Okaloosa County. Okaloosa County's minority population is at 21.2%; well below the CEQ threshold of 50%, and much lower than the statewide average of 38.8%.[50]



Source: U.S. Census Bureau, 2005 – 2007 3-year estimate.

Figure 4.1.6.1-1: Poverty Rates for Eglin AFB Socioeconomic Study Area

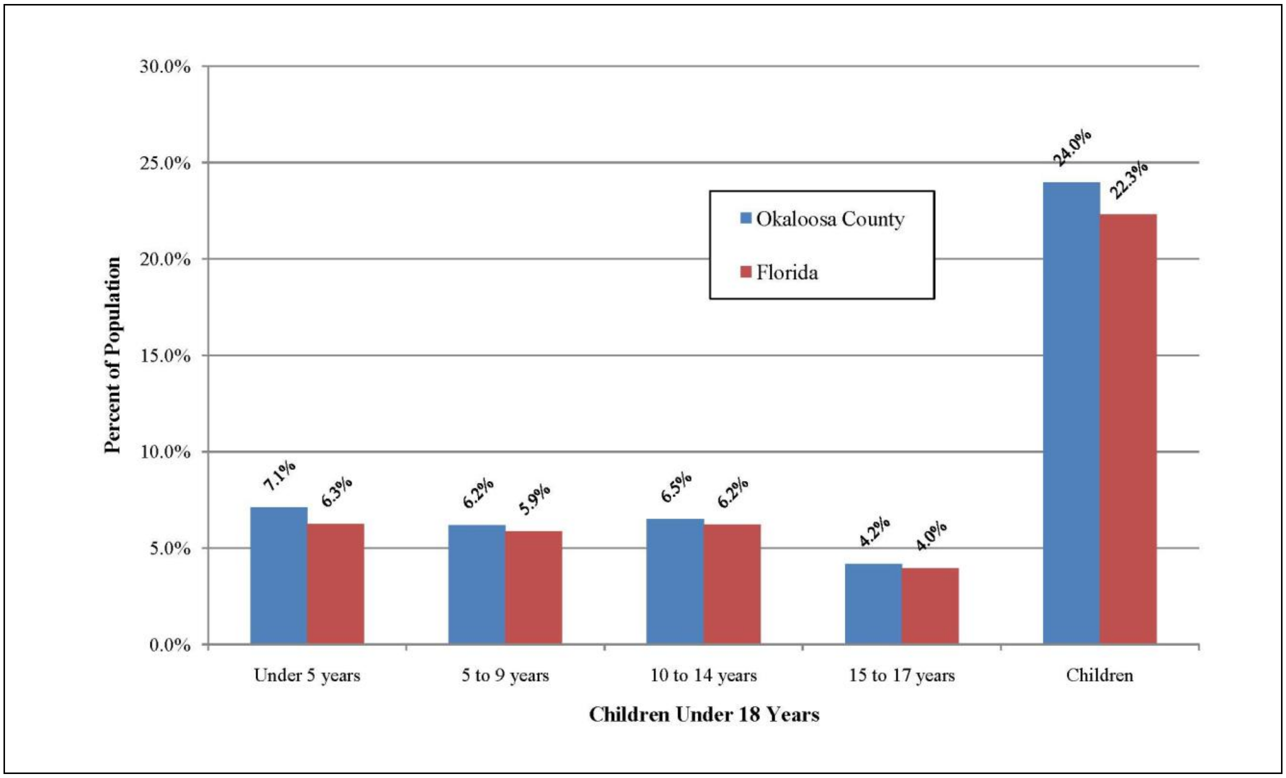


Source: U.S. Census Bureau, 2005-2007 3-year estimate.
Note: In some cases, total do not add up to 100% due to rounding of the Census estimated data.

Figure 4.1.6.1-2: Ethnicity of Eglin AFB Socioeconomic Study Area

50 Ibid

Okaloosa County has a relatively even distribution of children under 5 years of age to 14 years and a slightly smaller population of children 15 to 17 years of age. The largest group of children is under 5 years (7.1%) and the remaining distribution is 10 to 14 year olds (6.5%), 5 to 9 years old (6.2%), and 15 to 17 years old (4.2%). Figure 4.1.6.1-3 summarizes the children demographics for Okaloosa County. Okaloosa County's child population is 24.0%; slightly higher than the statewide average of 22.3%.[51]



U.S. Census Bureau, 2005-2007 3-year estimate.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 4.1.6.1-3: Children Demographics of Eglin AFB, Socioeconomic Study Area

4.1.6.2 Environmental Consequences

Some JSF DT Program personnel would temporarily DET from NAS Patuxent River, to participate in the proposed JSF DT activities 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). Based on the threshold criteria, it does not appear any environmental justice and children populations would be affected from the proposed JSF DT activities. 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 Program is conducted inside the McKinley Climatic laboratory chambers.

51 Census Bureau 2009

4.2 NAWCWD CHINA LAKE

4.2.1 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 Bernadine 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 (EW) 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 EW 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 EW; (2) integrating weapons and avionics on tactical aircraft; (3) operating the USN's western land and Point Mugu Sea Range test and evaluation complex; and (4) developing and applying new technology to ensure battle space dominance.

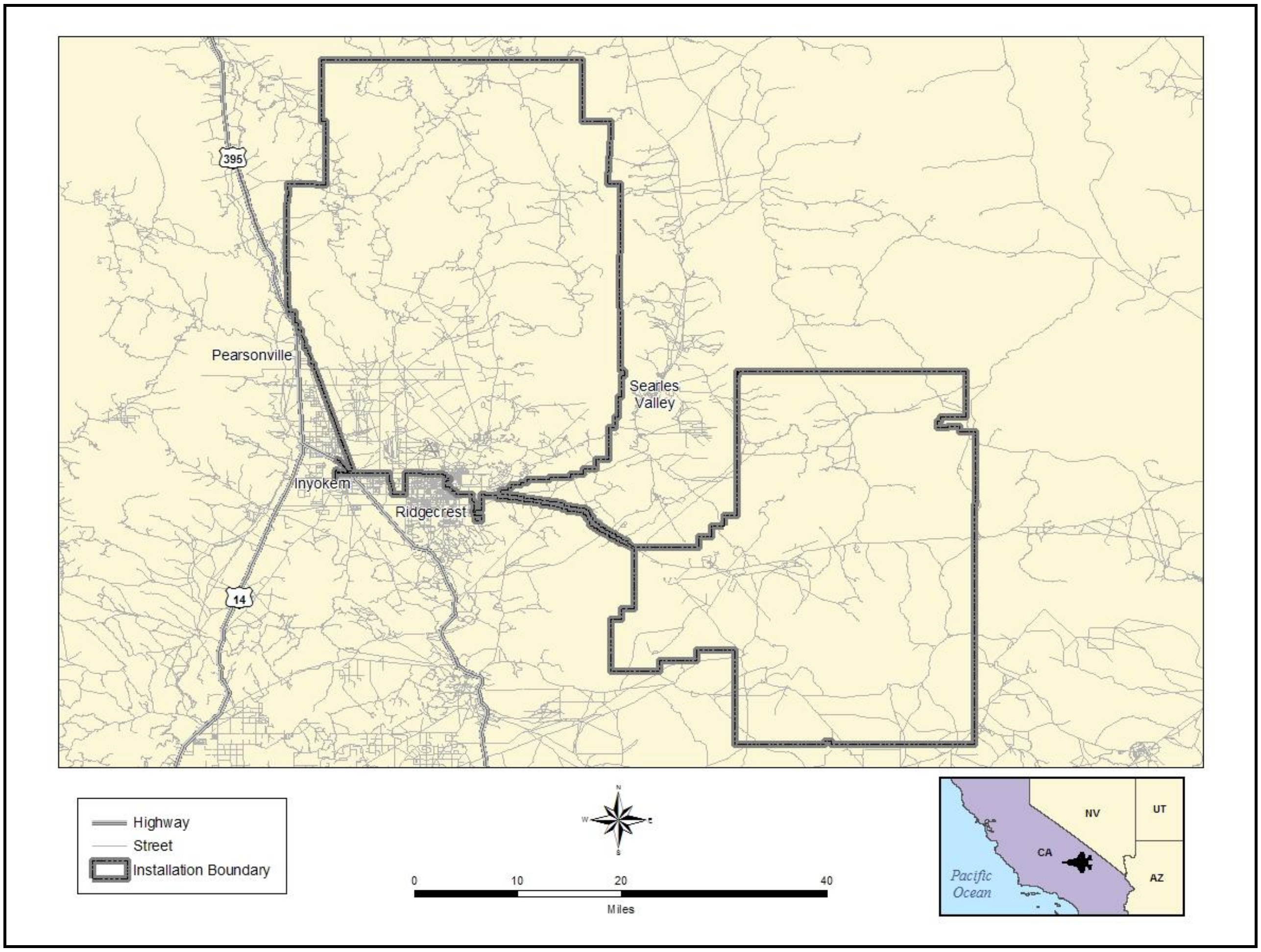


Figure 4.2.1-1: General Map of NAWCWD China Lake

4.2.2 Proposed JSF DT at NAWCWD China Lake

The purpose of the proposed JSF DT Program at NAWCWD China Lake is to conduct mission systems, weapons separation & integration, and CTOL tests over a 7-year period. Planned flight tests would peak in Test Year 5. The overall JSF DT tempo analyzed in the 2007 EA/OEA increased by 263 flights total, as reflected in Table 4.2.2-1.

Table 4.2.2-1: Current and 2007 EA/OEA Overall Test Program

	No. F-35 Flights	F-35 Flight Hours	No. Support Aircraft	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
Current	211	401	442	790	653	1,191
2007 EA/OEA	124	247	266	651	390	898

Table 4.2.2-2 lists the updated proposed flight tests and support aircraft analyzed in this Supplemental EA/OEA, as well as the profile from the 2007 EA/OEA (Table 4.2.2-2). Table 4.2.2-3 lists the current proposed stores/expendables while Table 4.2.2-4 lists those from the 2007 EA/OEA. 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 5% (vice 60% reflected in the 2007 EA/OEA) 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 area 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 airspace areas or use parameters or require any new restrictions

Table 4.2.2-2: Proposed JSF DT Profile at NAWCWD China Lake–Current

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
2-4	CTOL FQ, Weapons Separation & Integration, Mission Systems	Current	46	87	F-16, KC-135	92	159	138	246
		2007 EA/OEA	54	107		135	324	189	431
5	Same as Test Year 2-4	Current	80	152	F-16, KC-135	160	277	240	429
		2007 EA/OEA	47	94		55	132	102	226
6	Same as Test Year 2-4	Current	32	61	F-16, KC-135	64	111	96	172
		2007 EA/OEA	19	38		50	119	69	157
7	Same as Test Year 2-4	Current	53	101	F-16, KC-135	106	183	159	284
		2007 EA/OEA	4	8		6	16	10	24
2-6	CATB	Current	0	0	Modified 737	20	60	20	60
		2007 EA/OEA	0	0		20	60	20	60
	TOTAL	Current	***211***	***401***		***442***	***790***	***653***	***1,191***
		2007 EA/OEA	***124***	***247***		***266***	***651***	***390***	***898***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005) and Updated Edwards/Western Area Supplemental Data Verification (2007-2009).

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 4.2.2-3: Proposed JSF DT Stores/Expendables at NAWCWD China Lake–Current

Test Year	Stores/Expendables	
	Type	**Quantity***
2	MQM-107 (2) QF-4 (2), MJU-7 (200)	204
3	GBU-12-GTV (3) GBU-31 (2) GBU-32 (4) MQM-107 (1) MJU-7 (100)	110
4	AIM-120 (10) GBU-39 (36) MQM-107 (1) BQM-34A (4) MJU-7 (100)	164
5	AIM-120 (16) AGM-154 (2) ASRAAM (10) GBU-12-GTV (3) GBU-31 (4) GBU-32(6) GBU-39 (36) 25mm Gun Ammunition (1,000 rounds) MQM-107 (1) BQM-34A (3) MJU-7 (100)	1,181
6	AIM-9X (20) AGM-154 (2) ASRAAM (10) GBU-12-GTV (3) GBU-31 (2) GBU-39 (14) MJU-7 (100)	151
7	N/A	N/A

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005) and Updated Edwards/Western Area Supplemental Data Verification (2007-2009).

Note: Proposed stores/expendables reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down in quantities as the F-35 variants proceed through the various DT activities and time periods. It is possible usage quantities for stores may slide into the next test year if not used in the planned test year.

***Total for all types*

Table 4.2.2-4: Proposed JSF DT Stores/Expendables at NAWCWD China Lake – 2007 EA/OEA

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 sections below include updates to the regulatory setting.

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 activities. These emissions are included in Table 4.2.3.1-1 to provide a comprehensive summary of California ambient air quality standards (AAQS).

Table 4.2.3.1-1: California AAQS

Criteria Pollutant	Averaging Time	California Standard[a] $\mu g/m^3$ (ppm)
CO[b]	8-hour 1-hour	10,000 (9) 23,000 (20)
Pb[c]	30-day average	1.5
NO_2	1-hour	339 (0.18)
O_3	1-hour 8-hour	180 (0.09) 137 (0.070)
PM_{10}	Annual 24-hour	20 50
$PM_{2.5}$	Annual	12
SO_2	24-hour 1-hour	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 [1- 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.

Inyo and San Bernardino counties are in attainment for the Federal O_3 standards, however, Eastern Kern County is classified as former subpart 1 nonattainment.[52] In addition, portions of NAWS China Lake lie in five different NAAs for Federal PM_{10}, as illustrated in Figure 4.2.3.1-1. Table 4.2.3.1-2 indicates the PM_{10} attainment status.

52 On June 8, 2007, the United States Court of Appeals vacated the Subpart 1 portion of the Phase 1 Rule (Court Order). The Subpart 1 areas in the Greenbook are listed as "Former Subpart 1" until reclassification of the areas is finalized. Kern county was proposed as moderate nonattainment for 8-hr ozone (74 FR 2936, January 16, 2009).

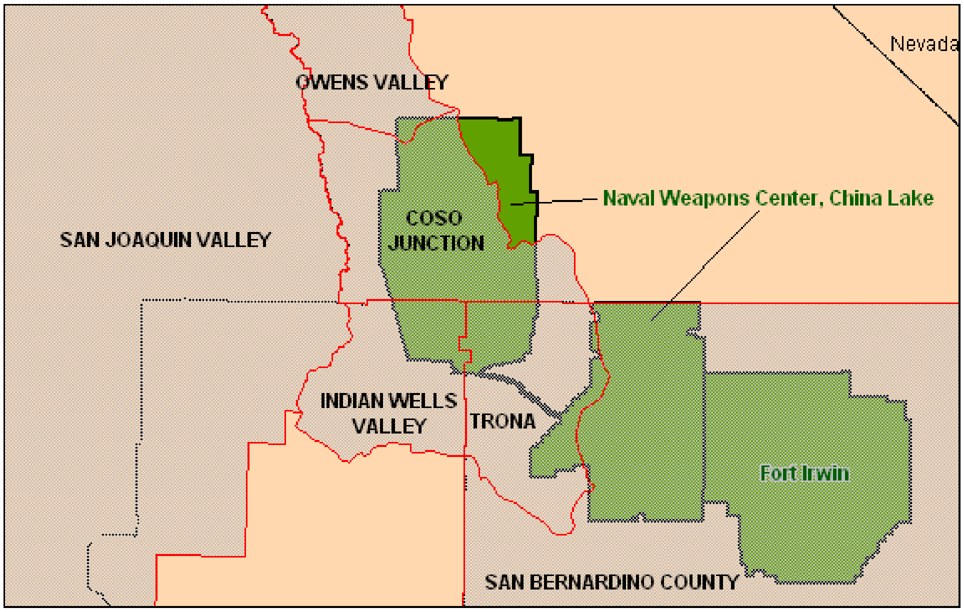


Figure 4.2.3.1-1: NAWS China Lake Federal Nonattainment Areas (NAAs) for PM_{10}

Table 4.2.3.1-2: NAWS China Lake Federal Attainment and Nonattainment Areas (NAAs) 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.
Coso Junction, Trona, Indian Wells Valley, and Mojave Desert NAAs. The Mojave Desert NAAs includes the on-station portions of San Bernardino county outside of the *Trona NAA*.	Moderate Nonattainment [100 tons per year (tpy)]	Most portions of the North Range and all of the South Range.
Owens Valley NAA (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).

Eastern Kern County and San Bernardino Counties are considered moderate nonattainment for the State O_3 standard while the Inyo County portion is unclassified for the State O_3 standard. 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. The entire State is considered in nonattainment for the PM_{10} State standard.

Because portions of NAWS China Lake are in NAAs, *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 NAAs.

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

Pollutant	Nonattainment Status	Area	*de minimis* Level
8-hr O_3	Subpart 1 Nonattainment	Kern County	100 tpy per pollutant precursor (NO_X and VOCs)
PM_{10}	Moderate Nonattainment	Searles Valley NAA Mojave Desert NAA	100 tpy
	Serious Nonattainment	Owens Valley NAA	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. The dominant F-35 air emission sources at NAWS China Lake are relegated solely to range airspace usage. 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.

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

		Forecasted Emission Levels tons/day [Metric Tons (MT)/day]			10% Threshold tons/year (MT/year)		
District	Year	NO_x[1]	VOC[1]	PM_{10}	NO_x	VOC	PM_{10}
Great Basin Unified APCD[2]	2015	N/A	N/A	20.64 (18.73)	N/A	N/A	753.5 (683.6)
Kern County Air Pollution Control District (KCAPCD)[3]	2015	53.55 (48.56)	12.85 (11.66)	N/A	1,711 (1552)	1,019 (924)	N/A
Mojave Desert Air Quality Management District (MDAQMD)[3]	2015	N/A	N/A	128.23 (116.33)	N/A	N/A	10,687 (9,695)

Notes: 1. Tons per day (metric tons per day) during the O_3 season (May through September).

2. 2008 Owens Valley PM^{10} Planning Area Demonstration of Attainment State Implementation Plan, Great Basin Unified Air Pollution, January 28, 2008. Control District

3. CEPAM: 2009 Almanac – Standard Emissions Tool, http://www.arb.ca.gov/app/emsinv/fcemssumcat2009.php, accessed December23, 2009.

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 NAAs with different *de minimis* levels. Therefore, the *de minimis* levels applicable to each area must be analyzed. Only a southwestern portion of the North Range at NAWS China Lake is classified as nonattainment for O_3. The area is currently classified as former subpart 1, however, it was proposed as moderate nonattainment for 8-hour O_3 (74 FR 2936, January 16, 2009). Given that the proposed reclassification is currently under public review, the *de minimis* threshold of 100 tpy for the new classification (moderate) was used in this analysis. 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 NAA.

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 activities at NAWS China Lake, nor does it appear that there would be any significant environmental impacts. It is also expected that the Proposed Action would not have a significant impact on the local air quality with respect to the California AAQS (refer to Table 4.2.3.1-1). Additional details that support Table 4.2.3.2-1 are provided in the Supplemental EA/OEA Administrative Record (AR) maintained by the F-35 Joint Program Office and JSF Environment, Safety, and Occupational Health (ESOH) Lead.

Table 4.2.3.2-1: Estimated Air Emissions for the Proposed JSF DT Program at NAWS China Lake

Test Year	CO tpy (MT/yr)	NOx tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
4	0.56 (0.51)	1.4 (1.2)	0.016 (0.015)	0.14 (0.13)	<0.01 (<0.01)
5	0.56 (0.51)	1.4 (1.2)	0.016 (0.015)	0.14 (0.13)	<0.01 (<0.01)
6	0.58 (0.52)	1.6 (1.5)	0.016 (0.015)	0.16 (0.15)	0.08 (0.07)
7	0.024 (0.022)	0.43 (0.39)	<0.01 (<0.01)	0.028 (0.025)	0.11 (0.10)
Highest Test Year (6)	0.58 (0.52)	1.6 (1.5)	0.016 (0.015)	0.16 (0.15)	0.08 (0.07)

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

GHG emissions (CO_2, CH_4, N_2O) were also estimated for the proposed aircraft operations at NAWS China Lake, based on the total quantity of fuel combusted and applying emissions factor specific to the fuel burned (diesel or gasoline) from generally accepted GHG protocols. The protocols do not include an emission factor for JP-8, therefore the emission factor for Jet A/A-1 was used. The GHG emissions were converted to a CO_2e basis using the GWP of each gas.

The CO_2e generated from the Proposed Action are shown in Table 4.2.3.2-2. Approximately 11,220 MT of CO_2e would be generated by sources and operations comprising the Proposed Action. There is no requirement under the General Conformity Rule to consider GHG emissions, therefore in absence of any regulatory standard, the results of the analysis for NAWS China Lake were compared to the 2009 total U.S. GHG emissions of 6,633.20 million MT CO_2e.[53] The emissions associated with the Proposed Action would result in less than a 0.0002% increase, and as such would not be a significant source of GHG emissions. Section 3.1.5 provides a high level overview of DoD's and the Service's energy activities (e.g., alternative fuels, reduce energy consumption, etc.), which have an added benefit of reducing greenhouse gas emissions.

Table 4.2.3.2-2: Estimated GHG Emissions for the Proposed JSF DT Program at NAWS China Lake

Test Year	CO_2e (MT)
4	2,948
5	4,050
6	2,508
7	1,714
Total	11,220
Highest (Test Year 5)	**4,050**

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

53 EPA 2009

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 Supplemental EA/OEA, the proposed JSF DT Program at NAWCWD China Lake is 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 429 flight hours total for both F-35 and support aircraft. This would be an approximate 2% increase over the 2004 utilization of 17,568 hours reported to the FAA for both the R-2505 and R-2524 ranges.[54] 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, Naval Air Weapons Station China Lake (February 2004)*, which considered subsonic operations would increase by 15% over 5 years. Conclusions from the 2004 FEIS stated: [55]

> *"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 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 activities 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 baseline noise environment; or require changes or restrictions to 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 activities, 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 Program.

54 FAA 2004 Range Utilization Report for Restricted Areas R-2505 and R-2524
55 China Lake EIS 2004

4.2.5 Biological/Natural Resources at NAWCWD China Lake

4.2.5.1 Affected Environment

The *Final Environmental Impact Statement 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 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 DoDD 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 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 species 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
Bald Eagle *(Haliaeetus leucocephalus)*	Delisted	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. http://ecos.fws.gov/tess_public/

Endangered and Threatened Animals of California, January 2011 and Endangered, Threatened, and Rare Plants of California, April 2011, California Fish and Game. http://guides.library.fullerton.edu/endangered/california.htm

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 jaegerianus*) that was listed as an endangered species. This species has been identified approximately 4 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 eremophilu*s), have been identified. The Federally endangered southwestern willow flycatcher *(Empidonax traillii extimu*s) is a known migrant but does not breed on the Station.

Three Federally listed nonresident birds, Least Bell's vireo *(Vireo bellii pusillu*s), southwestern willow flycatcher, and western snowy plover and one State-listed bird, the California brown pelican *(Pelecanus occidentalis californicu*s), occur as migrants with varying degrees of abundance at NAWCWD China Lake.

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 [Gopheru*s*] agassizi*i) 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] regill*a), 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 catesbeiana*) have been found in the Lark Seep channel as an introduced exotic species.

Fishes

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 non-listed species, mosquito fish *(Gambusia affinis*), bullhead catfish *(Ictalurus* sp.), goldfish *(Carassius auratus*), and largemouth bass *(Micropterus salmoides*), 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/MSL. 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. Only 5% of the projected DT activities are expected to occur below 3,000 feet AGL/MSL. No supersonic flights nor landings or take-offs would be conducted at NAWCWD China Lake. Potential impacts to biological resources from the proposed JSF DT Program 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 240 flights (80 for the F-35 and 160 for support aircraft) and 429 flights hours (152 for the F-35 and 277 for support aircraft). The proposed F-35 flights would represent an approximate 3% increase over the projected baseline flight operations at NAWCWD China Lake (4,600 hours). As indicated earlier, support aircraft are part of the baseline Fleet mix. 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 Program would be conducted in established MOAs consistent with established operating procedures. All proposed weapons separation tests would occur on established ranges. Proposed JSF DT Program 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).[56]

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 Program. The potential to startle wildlife would likely be minimal because most of the proposed tests would occur above the 550-foot AGL/MSL 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.

56 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 activities is 2009 with 85 stores proposed for release.

4.2.6 Socioeconomics at NAWCWD China Lake

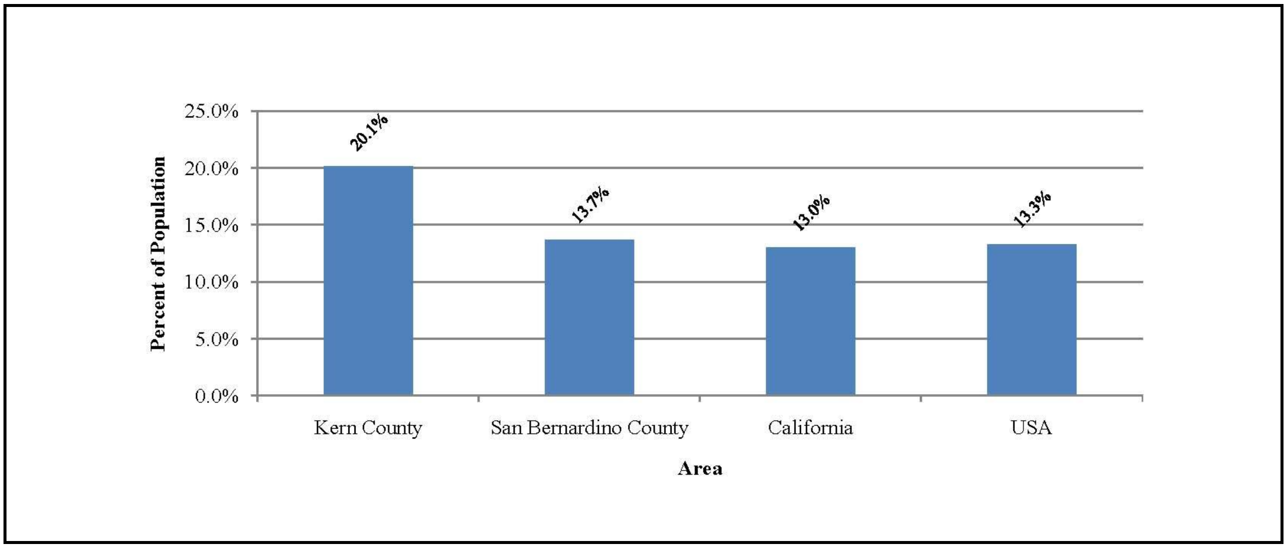
4.2.6.1 Affected Environment

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

U.S. Census American Community Survey 2005-2007 3-year estimate poverty rates for the NAWCWD China Lake area, which only include the counties with a population larger than 20,000 people, are summarized in Figure 4.2.6.1-1. The poverty rate is 20.1% in Kern County and 13.7% in San Bernardino County. The poverty rates in these two counties are below the set CEQ threshold of 25% for low-income populations, but poverty rates in Kern and San Bernardino counties are higher than the California statewide estimates of 13.0%.

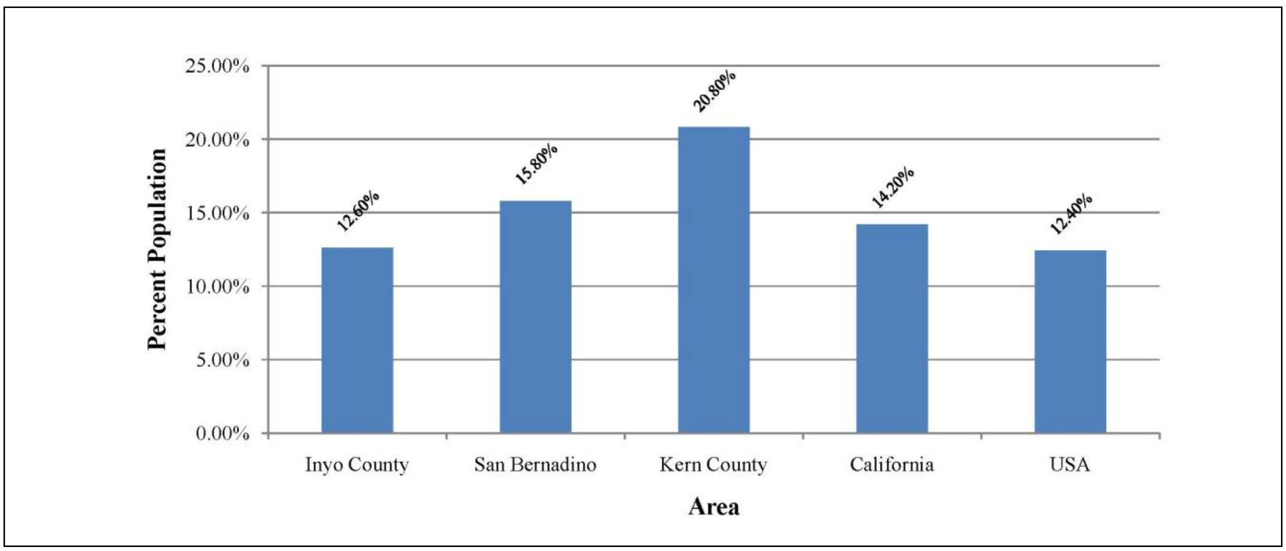
Poverty rates of all three counties in the NAWCWD China Lake area for 2000 census data are summarized in Figure 4.2.6.1-2. The poverty rate is 12.6% in Inyo County, 20.8% in Kern County, and 15.8% in San Bernardino County. The poverty rates in all three counties are below the set CEQ threshold of 25% for low-income populations, but poverty rates in Kern and San Bernardino Counties are higher than the California Statewide estimates of 14.2%.

The U.S. Census American Community Survey poverty rate for San Bernardino County and California Statewide are lower than their previous 2000 poverty rates, but Kern County’s more recent poverty rate is higher than its previous 2000 poverty rate. Based on these trends, it is unclear whether or not Inyo County’s poverty rate changed over the same time period.



Source: U.S. Census Bureau, 2005-2007 3-year estimate.

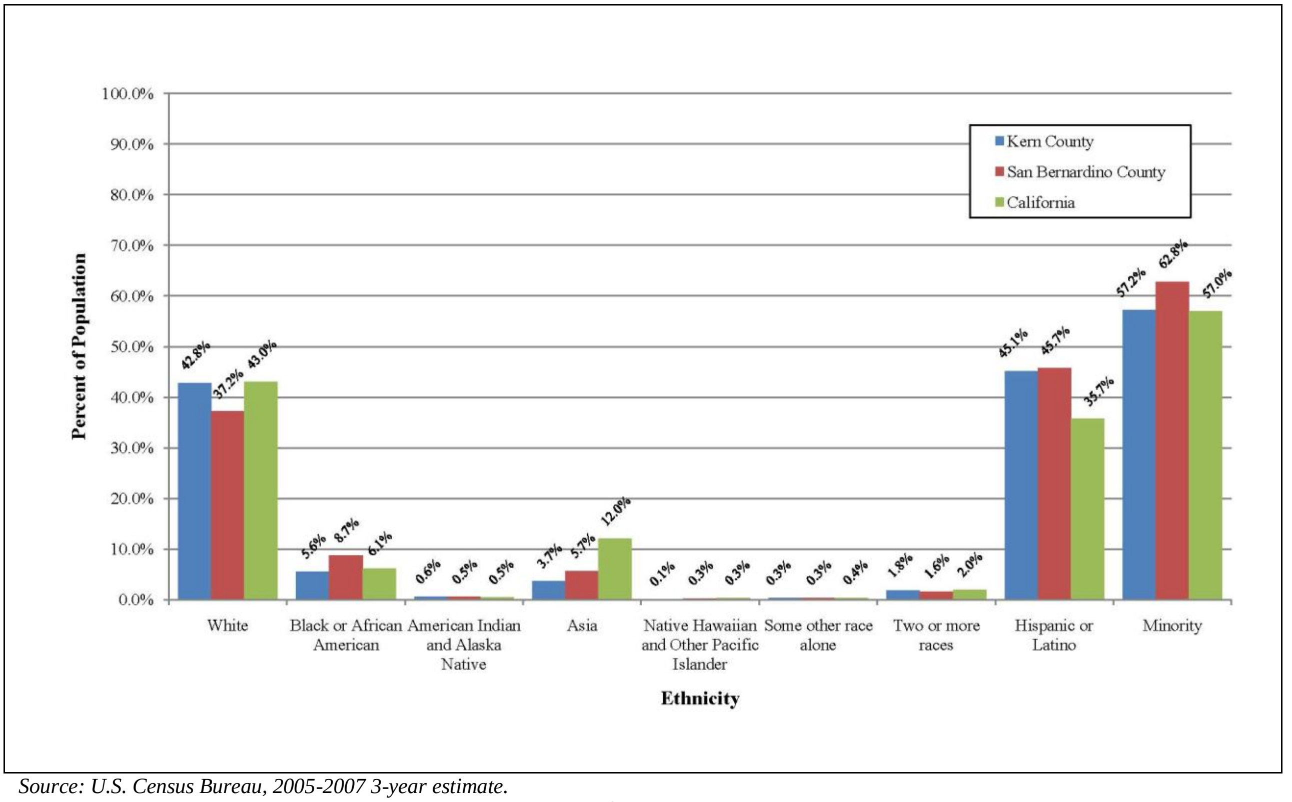
Figure 4.2.6.1-1: Poverty Rates for NAWCWD China Lake Socioeconomic Study Area



Source: U.S. Census Bureau, 2000.

Figure 4.2.6.1-2: Poverty Rates for NAWCWD China Lake Socioeconomic Study Area

U.S. Census American Community Survey 2005-2007 3-year estimate of population ethnicity, which only include the counties with a population larger than 20,000 people, is summarized in Figure 4.2.6.1-3. The two-county area shows a population that is predominantly Hispanic or Latino (45.6%) with a large white representation (38.7%). The remaining race distribution is Black or African American (7.8%), Asian (5.1%), two or more races (1.7%), American Indian or Native Alaskan (0.5%), some other race (0.3%), and Native Hawaiian or Pacific Islander (0.2%). The two-county area is similar to California with high Hispanic or Latino representations. San Bernardino and Kern Counties exceeds the CEQ threshold of 50% minority and is similar to or exceeds statewide estimates of 57.0%.

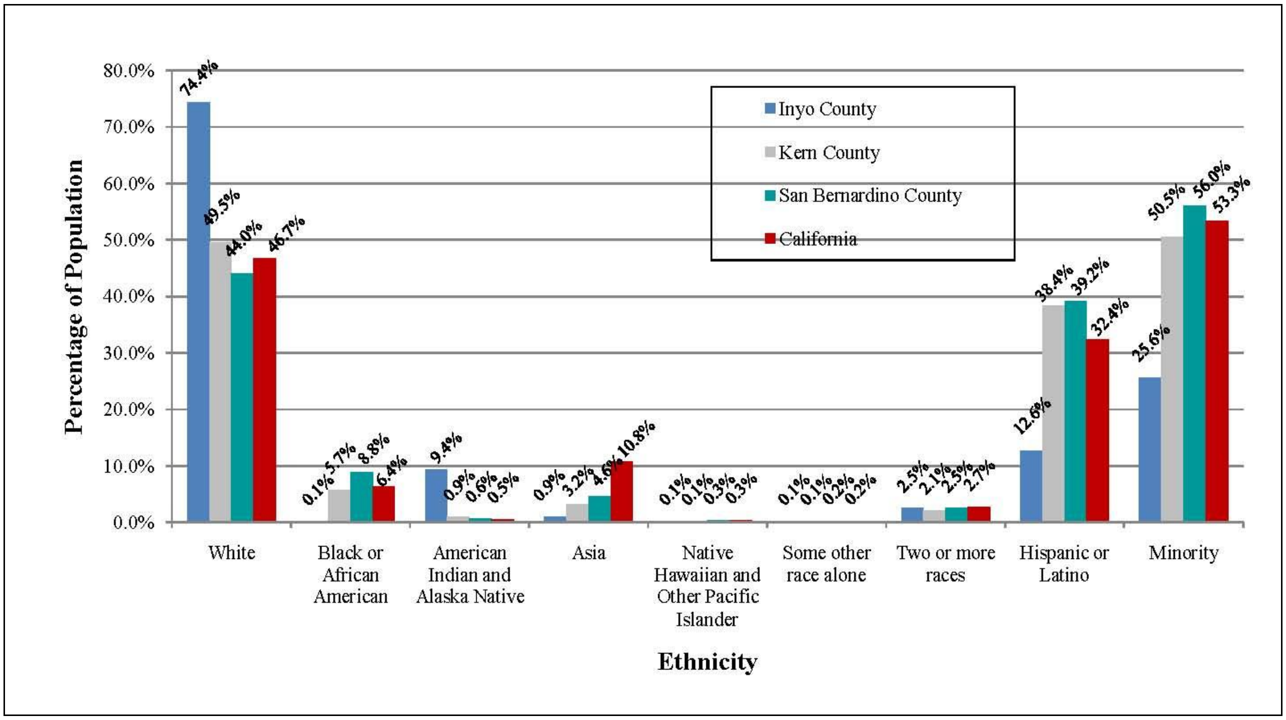


Source: U.S. Census Bureau, 2005-2007 3-year estimate.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 4.2.6.1-3: Ethnicity for NAWCWD China Lake Socioeconomic Study Area

The 2000 population ethnicity for all three counties in the NAWCWS China Lake socioeconomic study area is summarized in Figure 4.2.6.1-4. 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. San Bernardino and Kern Counties exceeds the CEQ threshold of 50% minority and is similar to or exceeds statewide estimates of 53.3%, and is similar to the more recent population ethnicity trend mentioned above.

Over the time period 2000 to 2007, the Hispanic and Latino representation in both Kern and San Bernardino Counties have moved from a minority portion of the population to the majority. Given Inyo County's population ethnicity in 2000, it is likely to still be predominantly white.

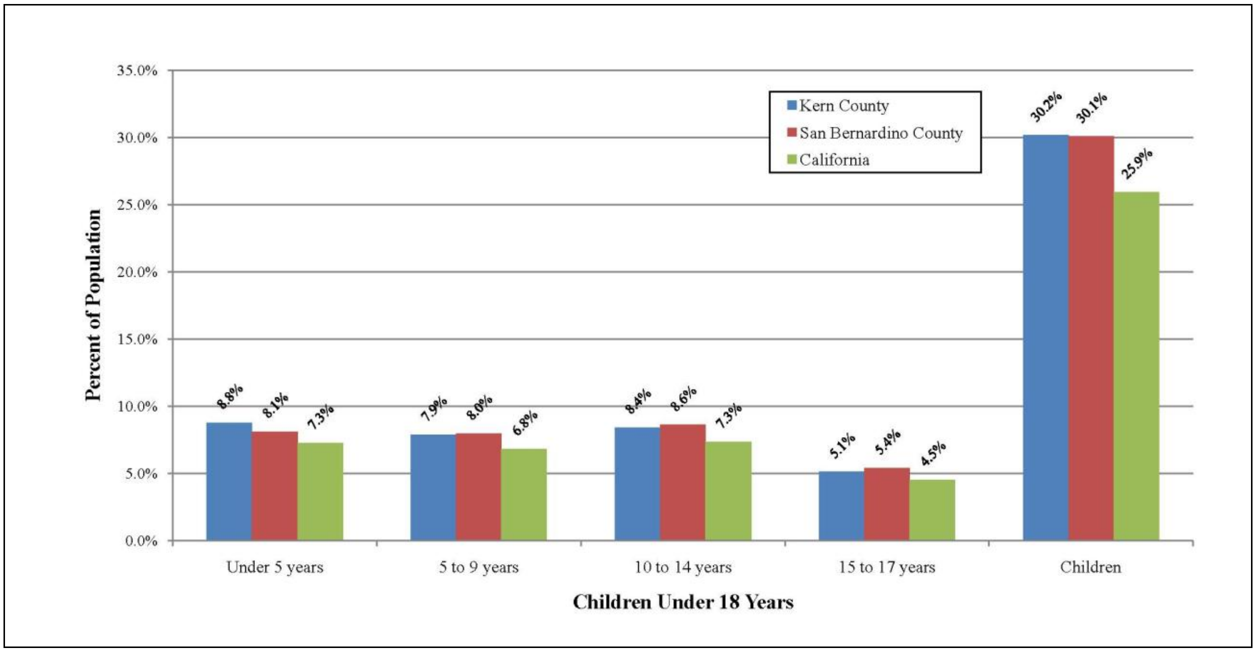


Source: U.S. Census Bureau, 2000.
Note: The percent of the population by ethnicity for the study area will not equal the average of the counties' percent of the population by ethnicity because denominators (county populations) are not common to all.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 4.2.6.1-4: Ethnicity for NAWCWD China Lake Socioeconomic Study Area

U.S. Census American Community Survey 2005-2007 3-year estimate of children populations, which only include the counties with a population larger than 20,000 people, is summarized in Figure 4.2.6.1-5. The two-county area shows a relatively even distribution of children under 5 years of age to 14 years and a small population of children 15 to 17 years of age. The largest group of children are age 10 to 14 years old (8.6%) and the remaining distribution is under 5 years old (8.3%), 5 to 9 years old (7.9%), and 15 to 17 years old (5.3%). Percent of the population under 18 years of age for Kern and San Bernardino counties exceed the statewide estimate of 25.9%.[57]

57 Census Bureau 2009

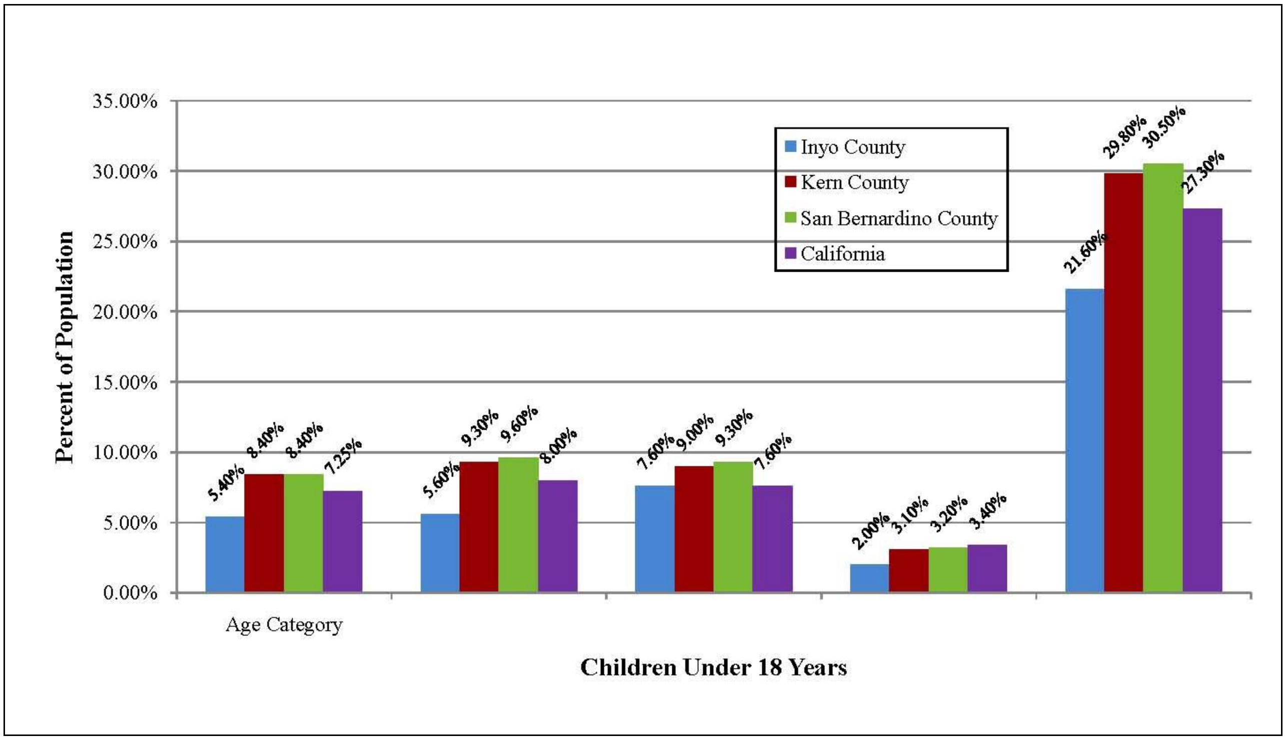


Source: U.S. Census Bureau, 2005-2007 3-year estimate.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 4.2.6.1-5: Children Demographics for NAWCWD China Lake Socioeconomic Study Area

The 2000 children populations for all three counties in the NAWCWD China Lake socioeconomic study area is summarized in Figure 4.2.6.1-6. The three-county area shows a relatively even distribution of children under 5 years of age to 14 years and a small population of children 15 to 17 years of age. The largest group of children is age 5 to 9 years old (9.5%) and the remaining distribution is 10 to 14 years old (9.2%), under 5 years old (8.4%), and 15 to 17 years old (3.2%). Percent of the population under 18 years of age for the three-county area slightly exceed the statewide estimate of 27.3%.[58]

58 Census Bureau 2009



Source: U.S. Census Bureau, 2000.

Figure 4.2.6.1-6: Children Demographics for NAWCWD China Lake Socioeconomic Study Area

4.2.6.2 Environmental Consequences

Based on the threshold criteria, there would be potential environmental justice populations and slightly disproportionately larger child populations present in the socioeconomic area that could be impacted by the proposed JSF DT activities. However, these environmental justice and disproportionately larger child populations would not be significantly affected because no changes to baseline noise levels and land use would be expected. In addition, there would be no landings or take-offs with the F-35 at the Station. As such, the proposed JSF DT activities would not likely result in disproportionately high and adverse effects to low-income populations or children relative to other populations in the area. No potential significant impacts to any sensitive receptors (including hospitals, schools, and daycare facilities) where a disproportionately large groups of children may be present would be expected to occur.

4.3 NBVC POINT MUGU

4.3.1 General Information

NBVC Point Mugu, as depicted in Figure 4.3.1-1, is located approximately 50 miles northwest of Los Angeles, California, in Southern Ventura County. NAWCWD 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 Point Mugu Sea Range parallels the California coastline for about 200 miles and extends seaward for more than 180 miles. The main station consists of 4,490 acres on the Pacific Coast.

NBVC Point Mugu activities 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 NBVC 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 NBVC 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.

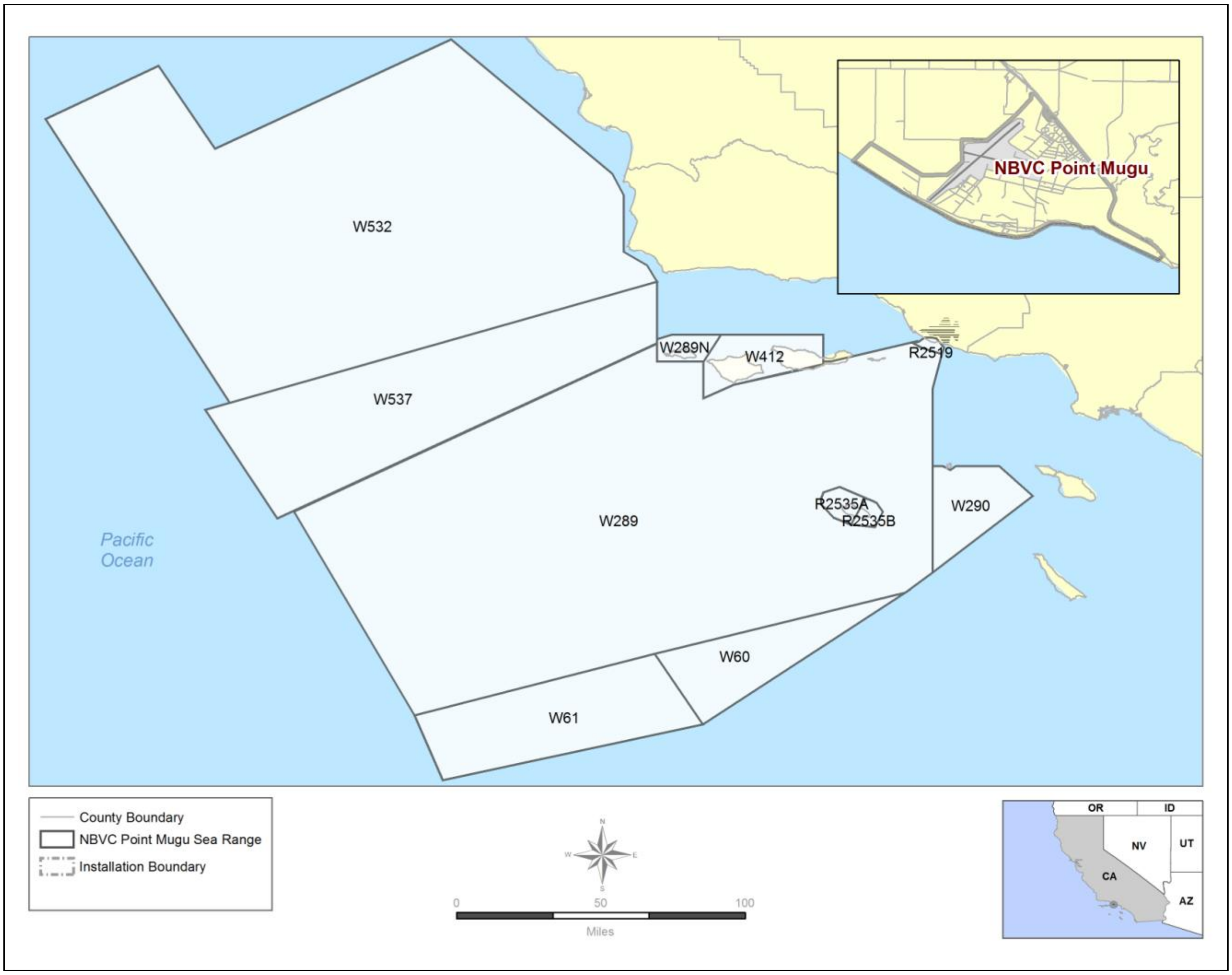


Figure 4.3.1-1: General Map of NBVC Point Mugu

4.3.2 Proposed JSF DT Program at NBVC Point Mugu

The purpose of the proposed JSF DT Program at NBVC Point Mugu is to conduct FQ, mission systems, weapons separation & integration, flutter, and CTOL tests for a 4-year time period. Planned flight tests would peak in Test Year 7. The overall JSF DT tempo analyzed in the 2007 EA/OEA increased by 793 flights total, as reflected in Table 4.3.2-1; F-35 specific flights increased by 230.

Table 4.3.2-1: Current and 2007 EA/OEA Overall Test Program

	No. F-35 Flights	F-35 Flight Hours	No. Support Aircraft	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
Current	383	728	766	1,325	1,149	2,053
2007 EA/OEA	153	304	203	501	356	805

Table 4.3.2-2 lists the updated proposed flight tests and support aircraft analyzed in this Supplemental EA/OEA. Table 4.3.2-3 annotates the test profile analyzed in the 2007 EA/OEA. 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). Tables 4.3.2-4 summarizes the stores/ expendables proposed for use while Table 4.3.2-5 summarizes those from the 2007 EA/OEA.

The F-35s would be based at Edwards AFB with the proposed tests flights beginning and ending there. There would be no take-offs or landings of the F-35 at NBVC Point Mugu except in the event of an aircraft emergency. 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 NBVC Point Mugu. All proposed flight tests would be conducted at altitudes both above and below 3,000 feet in compliance with NBVC Point Mugu airspace use restrictions and air operation procedures. Approximately 5% (vice 46% reflected in the 2007 EA/OEA) of the proposed test activities anticipated within NBVC Point Mugu ranges would be at and below 3,000 feet AGL/MSL, but of short duration in support of performance, mission systems, and weapons separation & integration tests.

Table 4.3.2-2: Proposed JSF DT Flight Profile at NBVC Point Mugu–Current

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	CTOL FQ, CTOL Performance, CTOL Propulsion, Loads, Flutter, Weapons Separation & Integration, Mission Systems	52	99	F-16, KC-135	104	180	156	279
5	CTOL FQ, CTOL Propulsion, Mission Systems	83	158	F-16, KC-135	166	287	249	445
6	CTOL FQ, Loads, Flutter, Weapons Separation & Integration, Mission Systems	40	76	F-16, KC-135	80	138	120	214
7	Mission Systems	208	395	F-16, KC-135	416	720	624	1,115
TOTAL		***383***	***728***		***766***	***1,325***	***1,149***	***2,053***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005) and Updated Edwards/Western Area Supplemental Data Verification (2007-2009).
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 4.3.2-3: Proposed JSF DT Flight Profile at NBVC Point Mugu–2007 EA/OEA

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 4.3.2-4: Proposed JSF DT Stores/Expendables at NBVC Point Mugu–Current

Test Year	Stores/Expendables	
	Type	Quantity*
4	AIM-120C-AAVI (5) QF-4 (3) BQM-34A (1) MQM-107 (1)	10
5	N/A	N/A
6	AIM-120C-AAVI (8) QF-4 (1) BQM-34A (6) MQM-107 (1)	16
7	AIM-120C-AAVI (2) BQM-34A (1) MQM-107 (1)	4

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005) and Updated Edwards/Western Area Supplemental Data Verification (2007-2009).
Note: Proposed stores/expendables reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down in quantities as the F-35 variants proceed through the various DT activities and time periods. It is possible usage quantities for stores may slide into the next test year if not used in the planned test year period. QF-4, BQM-34A, and MQM-107 are drones used routinely during DT activities, which are typically recovered at the conclusion of a test activity.
*****_Total for all types_

Table 4.3.2-5: Proposed JSF DT Stores/Expendables at NBVC Point Mugu–2007 EA/OEA

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 activities, 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 NBVC Point Mugu.

4.3.3 Air Quality at NBVC 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 NBVC Point Mugu. The sections below include updates to the regulatory setting.

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. The current California AAQS applicable to NBVC Point Mugu are provided in Table 4.3.3.1-1. There are no sulfate, hydrogen sulfide, or vinyl chloride emissions from the proposed JSF DT Program. These emissions are included in Table 4.3.3.1-1 to provide a comprehensive summary of California AAQS. The local agency responsible for the administration and enforcement of air quality regulations affecting NBVC Point Mugu is the Ventura County Air Pollution Control District (VCAPCD). Portions of the Point Mugu Sea Range are located in Santa Barbara and Ventura Counties. The portions of the Point Mugu 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 AAQS.

Criteria Pollutant	Averaging Time	California Standard[a] $\mu g/m^3$ (ppm)
CO[b]	8 hour 1 hour	10,000 (9) 23,000 (20)
Pb[c]	30-day average	1.5
NO_2	1 hour	339 (0.18)
O_3	1 hour 8 hours	180 (0.09) 137 (0.070)
PM_{10}	Annual 24 hour	20 50
$PM_{2.5}$	Annual	12
SO_2	24 hour 1 hour	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 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 O_3, 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 serious nonattainment for the Federal 8-hour O_3 standard. It is also designated nonattainment for the State PM_{10}, and $PM_{2.5}$ standards and moderate nonattainment for the State O_3 standard. NBVC San Nicolas Island and Santa Cruz Island are considered to be in attainment/ unclassified for NAAQS. Santa Barbara County is classified as maintenance and no longer subject to the Federal 1-hour O_3 standard and in nonattainment for the State O_3 standard. Santa Barbara is also in nonattainment for the State PM_{10} standard, but is attainment/unclassified for the State $PM_{2.5}$ standard. Santa Barbara is in attainment for all other Federal NAAQS.

Airborne sources of emissions in the Point Mugu 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 Point Mugu Sea Range.

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

		Basin Emissions[1] tons/day (MT/day)		10% of Summer Budget Annualized tons/year (MT/year)	
District	Year	NO_x	VOC[4]	NO_x	VOC
VCAPCD[2]	2012	58.2 (52.8)	49.2 (44.6)	2,124 (1,927)	1,796 (1,628)
SBCAPCD[3]	2010	7.4 (6.8)	20.5 (18.7)	270 (246)	748 (680)

Notes:
1. *Tons per day (metric tons per day) during the O_3 season.*
2. *Ventura County 2007 Air Quality Management Plan, Revision, May 13, 2008. (Tables 4-6 and 4-7).*
3. *Santa Barbara County Air Pollution Control District, 2007 Clean Air Plan, Final, August 2007 (Table 6-3). Sum of Stationary and Area-wide sources.*
4. *Reported as Reactive Organic Gas (ROG), which is not a pollutant that is directly measured. Instead, it is the reactive fraction of the Total Organic Compounds (TOC), therefore, ROG excludes methane and other compounds with inconsequential effects on O_3 photochemical reactivity.*

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

	Emissions, Tons/Year (MT/Year)				
Location	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**
Point Mugu 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)
Point Mugu Sea Range Total	313.10 (284.04)	267.74 (242.89)	24.54 (22.26)	168.49 (152.85)	43.03 (39.04)
NBVC 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)
NAWCWD Total	672.89 (610.45)	170.45 (154.63)	118.09 (107.13)	13.26 (12.03)	123.33 (111.88)
Islands					
NBVC 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 NBVC 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 NBVC Point Mugu is comprised of two local air districts; one of which (Ventura) is in nonattainment for O_3. The *de minimis* level used in this analysis was 50 tpy.

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: NVBC Point Mugu Estimated Air Emissions for the Proposed JSF DT Program

Test Year	CO tpy (MT/yr)	NOx tpy (MT/yr)	VOC tpy (MT/yr)	SO_2 tpy (MT/yr)	PM tpy (MT/yr)
4	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
5	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
6	0.01 (0.01)	0.23 (0.18)	0.0 (0.0)	0.01 (0.01)	0.06 (0.05)
7	0.09 (0.08)	1.68 (1.36)	0.0 (0.0)	0.11 (0.10)	0.45 (0.41)
Highest (Test Year 7)	0.09 (0.08)	1.68 (1.36)	0.0 (0.0)	0.11 (0.10)	0.45 (0.41)

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

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 activities 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 (excluding support aircraft). Additional details supporting Table 4.3.3.2-1 are provided in the Supplemental EA/OEA AR maintained by the F-35 Joint Program Office and JSF ESOH Lead.

GHG emissions (CO_2, CH_4, N_2O) were also estimated for the proposed aircraft operations at NBVC Point Mugu, based on the total quantity of fuel combusted and applying emissions factor specific to the fuel burned (diesel or gasoline) from generally accepted GHG protocols. The protocols do not include an emission factor for JP-8, therefore the emission factor for Jet A/A-1 was used. The GHG emissions were converted to a CO_2e basis using the GWP of each gas.

The CO_2e generated from the Proposed Action are shown in Table 4.3.3.2-2. Approximately 12,353 MT of CO_2e would be generated by sources and operations comprising the Proposed Action. There is no requirement under the General Conformity Rule to consider GHG emissions, therefore in absence of any regulatory standard, the results of the analysis for NBVC Point Mugu were compared to the 2009 total U.S. GHG emissions of 6,630.20 million MT CO_2e.[59] The emissions associated with the Proposed Action would result in less than a 0.0002% increase, and as such would not be a significant source of GHG emissions. Section 3.1.5 provides a high level overview of DoD's and the Service's energy activities (e.g., alternative fuels, reduce energy consumption, etc.), which have an added benefit of reducing greenhouse gas emissions.

59 EPA 2009

Table 4.3.3.2-2: Estimated GHG Emissions for the Proposed JSF DT Program at NBVC Point Mugu

Test Year	CO_2-e (MT)
4	1,679
5	2,680
6	1,290
7	6,704
Total	12,353
Highest (Test Year 7)	6,704

4.3.4 Noise at NBVC Point Mugu

4.3.4.1 Affected Environment

Additional details regarding noise at NBVC 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 Point Mugu Sea Range are transitory and widely dispersed. The Point Mugu Sea Range covers very little land area. Few structures occur within the area encompassed by the range (primarily NBVC 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 Supplemental EA/OEA, the purpose of the proposed JSF DT Program at NBVC 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 NBVC 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 activities would be anticipated in the vicinity of the NBVC Point Mugu airfield, since most of the proposed test activities would be conducted within the Point Mugu Sea Range at 12 NM and greater offshore. Peak activity from the proposed JSF DT activities would be in Test Year 7 with 395 F-35 and 720 support aircraft flight hours anticipated, as reflected in Table 4.3.2-1. This would constitute an approximate 2% increase of F-35 specific flights over the 2004 utilization of 17,748 sorties reported to the FAA for the W-289 warning area. [60] As indicated earlier, support aircraft are already accounted for in the baseline Fleet mix. The support aircraft would be operating regardless in support of program requirements at NBVC Point Mugu and the Point Mugu Sea Range. In addition, only 1% of the proposed test activities would be around the airfield and within 3 NM of the shoreline. Considering the 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

60 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.

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.[61] 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.[62] As such, the proposed JSF DT activities conducted within NBVC 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 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 activities, during a CY within the Point Mugu Sea Range would be established months in advance. It is not anticipated that additional time would be allocated specifically for the proposed JSF DT Program.

4.3.5 Biological/Natural Resources at NBVC Point Mugu

4.3.5.1 Affected Environment

As reflected here based on the 2007 EA/OEA, The *Final Environmental Impact Statement/Overseas Environmental Impact Statement (FEIS/OEIS) Point Mugu Sea Range (March 2002)* provides details on the potential resources within the base 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

NBVC Point Mugu lies within the Southern California Bight (SCB). Several habitat types occur at NBVC 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. NBVC San Nicolas Island contains 12 different vegetative communities, including vernal pools. Over 195 species of birds may exist on or transit through NBVC Point Mugu. The California brown pelican, western gull (*Larus occidentalis*), Brandt's cormorant (*Phalacrocorax penicillatus*), and the black oystercatcher (*Haematopus bachmani*) have all been known to frequent NBVC San Nicolas Island.

One Federally endangered plant species, the salt marsh bird's-beak (*Cordylanthus maritimus*) occurs on NBVC Point Mugu. Three additional State listed species are known to exist on NBVC San Nicolas Island, Trask's milkvetch (*Astragalus traskiae*) [rare], spectacle pod (*Dithyrea maritima*) [threatened], and San Nicolas Island buckwheat (*Eriogonum grande timorum*) [endangered]. One Federally threatened reptile, the island night lizard (*Xantusia riversiana*), is known to occur on NBVC San Nicolas Island.

61 DoN 2002, Chapter 2, Table 2-4
62 DoN 2002, Chapter 4.3, Page 4.3-1

Found on NBVC Point Mugu and NBVC San Nicolas Island, the light-footed clapper rail (*Rallus longirostrus levipes*) and California least tern (*Sterna antillarum browni*) are on the Federally endangered list, the western snowy plover (*Charadius alexandrinus nivosus*) is on the Federally threatened list, and Belding's savannah sparrow (*Passerculus sndwichensis beldingi*) is on the State endangered list.

The island fox is found only on six of California's Channel Islands. Each island hosts a specific subspecies of the fox (*Urocyon littoralis*). All fox populations on the islands have recovered significantly but are still considered Federally endangered species.

4.3.5.1.2 Marine Flora and Fauna

Most of the marine flora in the Point Mugu Sea Range is comprised of phytoplankton. The Point Mugu 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 NBVC Point Mugu and NBVC San Nicolas Island. The black abalone (*Haliotis cracherodii*), which has been seen at NBVC San Nicolas Island, was listed as an endangered species in 2011.

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 known to exist within the Sea Range, NBVC Point Mugu, and NBVC 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 8 species of mysticetes (baleen whales). Of the 34 species of marine mammals, 6 species of whales are as endangered and include the following: sperm whale (*Physeter macrocephalus*), North Atlantic 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 Point Mugu 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 Point Mugu Sea Range. Also Federally-protected is the southern sea otter (*Enhydra lutris nereis*), which infrequently occurs along the coast at NBVC Point Mugu. A translocated, experimental population occurs on NBVC San Nicolas Island.

All four species of sea turtles known to occur at sea within the Point Mugu Sea Range and NBVC San Nicolas Island are Federally-protected. No sea turtle nesting sites have ever been detected on NBVC Point Mugu or NBVC San Nicolas Island. In addition, NMFS issued a final rule in January 2012 to revise and designate approximately 41,914 square miles of designated leatherback sea turtle critical habitat along the West Coast (to include areas within NBVC Point Mugu/Point Mugu Sea Range).

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
North Atlantic right whale–E *(Eubalaena glacialis)*	N	M	M	N
Gray whale *(Eschrichtius robustus)*	Y	Y	Y	N
Bryde's 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
Black abalone–E (*Haliotis cracherodii*)	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 NBVC Point Mugu

As discussed in Section 3.6.1.1 of the Point Mugu Sea Range FEIS (March 2002), three Essential Fish Habitat (EFH) zones have been identified off the West Coast of the U.S.: (1) Coastal Pelagic Species, (2) Groundfish, and (3) Pacific Salmon. Two of the three EFH zones (Coastal Pelagic and Groundfish) occur within the 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 trout (*Oncorhynchus mykiss*) is listed as endangered. The California Evolutionary Significant Unit of the steelhead trout includes the marine waters of the Point Mugu Sea Range. The white abalone (*Haliotis sorenseni*) is a Federally-listed endangered species and may occur in the Point Mugu 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. Only 5% of the projected DT activities are expected to occur below 3,000 feet AGL/MSL. No landings or take-offs with the F-35 would be conducted at NBVC Point Mugu. In addition, the majority of the proposed JSF DT activities (98%) would be conducted within the Point Mugu Sea Range. Potential impacts to biological resources from the proposed JSF DT activities 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 base and within the Point Mugu Sea Range. 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 NBVC Point Mugu and in the Point Mugu 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 (approximately 790 of the total stores released at NAWCWD, see Table 2.4 in the FEIS)at NBVC Point Mugu vice 383 flights/728 flight hours proposed for the F-35. The maximum F-35/support aircraft flight hours would occur in Test Year 7 with 624 flights (208 for the F-35 and 416 for support aircraft) and 1,115 flight hours (395 for the F-35 and 720 for support aircraft). The maximum of 16 stores/expendables would be released in Test Year 6. Proposed JSF DT activities would be conducted in the warning areas and MOA of NBVC Point Mugu and the Point Mugu Sea Range, consistent with established operating procedures. The proposed F-35 flights would represent less than 1% increase over the projected baseline flight operations at NBVC 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 NBVC Point Mugu, 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 Program. 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 Program 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 Point Mugu Sea Range 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 NBVC 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 effect to EFH would be expected to occur. Therefore, a consultation under the MSFCMA is deemed not necessary for the proposed JSF DT Program.[63]

4.3.6 Socioeconomics at NBVC Point Mugu

4.3.6.1 Affected Environment

Based on the 2007 EA/OEA, the socioeconomic area for NBVC Point Mugu in California encompasses Ventura County. A large amount of ocean traffic (both small and large vessels) occurs through the Point Mugu Sea Range. The Point Mugu 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 Point Mugu Sea Range vary from small workboats to major USN combatants, such as aircraft carriers. Operations are conducted in large subdivisions of the total Point Mugu 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 NBVC 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 Point Mugu 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 Point Mugu 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. These numbers were confirmed with NOAA – SWFSC that these numbers are still current, but that publications slated to be released at the end of FY 2011 may have updated numbers. Commercial vessels enter and cross the Point Mugu Sea Range on a routine basis. For safety purposes, large vessel traffic on and through the Point Mugu Sea Range is tracked and controlled by the United States Coast Guard (USCG). The USCG also provides traffic advisories to vessels transiting the Point Mugu Sea Range. In addition, the USN notifies airmen and mariners when testing activities are occurring in the Point Mugu Sea Range for safety precautions to commercial and recreational boaters.

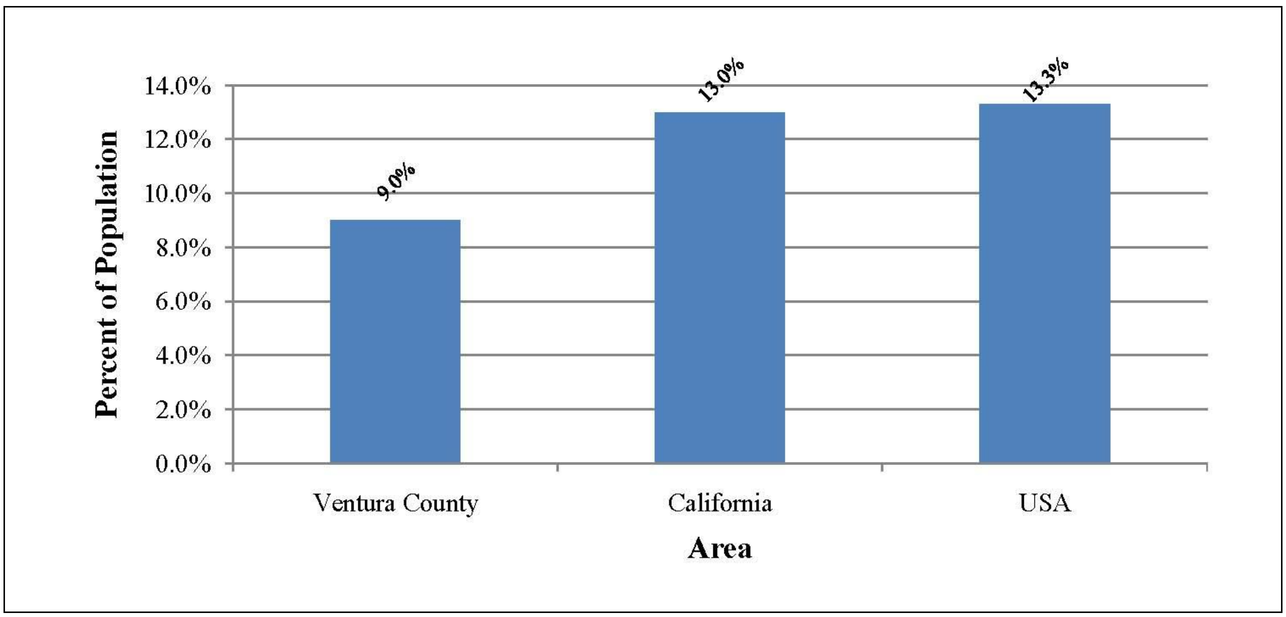
Socioeconomic data for commercial fishing was obtained from the NMFS, Fisheries Statistics Division. Annual monthly landing summaries were used to determine the volume and value of finfish and shellfish

63 NMFS 2005

for specified states. These summaries were used to evaluate economic impacts on the marine fisheries within the Point Mugu Sea Range. The area is accessible to commercial fishing from California coasts. Local members of the California coast rely on commercial fishing as a source of income. Available NMFS statistics show the 2009 commercial harvest of finfish and shellfish from waters off the California coast totaled 168,891 metric tons, for a reported retail value of approximately $150 million.[64] 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 NBVC Point Mugu.

The Point Mugu Sea Range supports year-round recreational fishing. Recreational fishing includes charter and private boats, pier, and shore activities. The 2009 annual review of the California Recreational Fisheries Survey estimated that California recreational anglers took over 4.5 million fishing trips.[65] Other popular Channel Islands recreational activities include diving, boating, bird watching, and marine mammal watching which includes whale watching from March through May.[66] 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 NBVC Point Mugu.

Potential impacts have been considered for environmental justice. Based on the 2005-2007 census estimates, Ventura County in California has a poverty rate of 9.0%, which is much lower than the State poverty rate of 13.0% and well below the set CEQ threshold of 25% for low-income populations. Poverty rates are summarized in Figure 4.3.6.1-1.

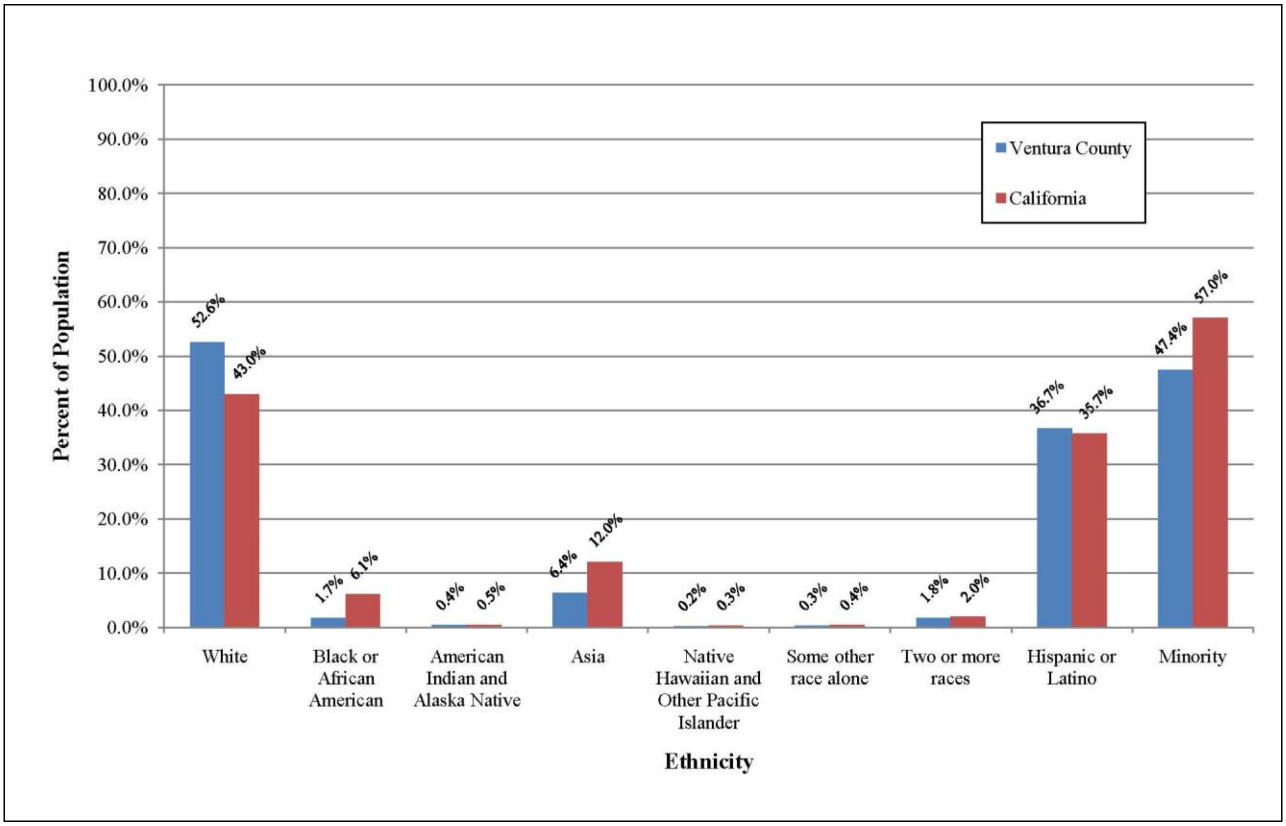


Source: U.S. Census Bureau, 2005-2007 3-year estimates.

Figure 4.3.6.1-1: Poverty Rates for NBVC Point Mugu Socioeconomic Study Area

64 NMFS 2011
65 DFG 2011
66 FEIS 2002

Population ethnicity for Ventura County is summarized in Figure 4.3.6.1-2 based on the 2005-2007 data. Ventura County is predominantly white (52.6%) and the remaining race distribution is Hispanic or Latino (36.7%), Asian (6.4%), two or more races (1.8%), Black or African American (1.7%), American Indian or Native Alaskan (0.4%), some other race (0.3%), and Native Hawaiian or Pacific Islander (0.2%).[67] 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 47.4%, which is slightly below the CEQ threshold of 50% and below the statewide average of 57.0%.

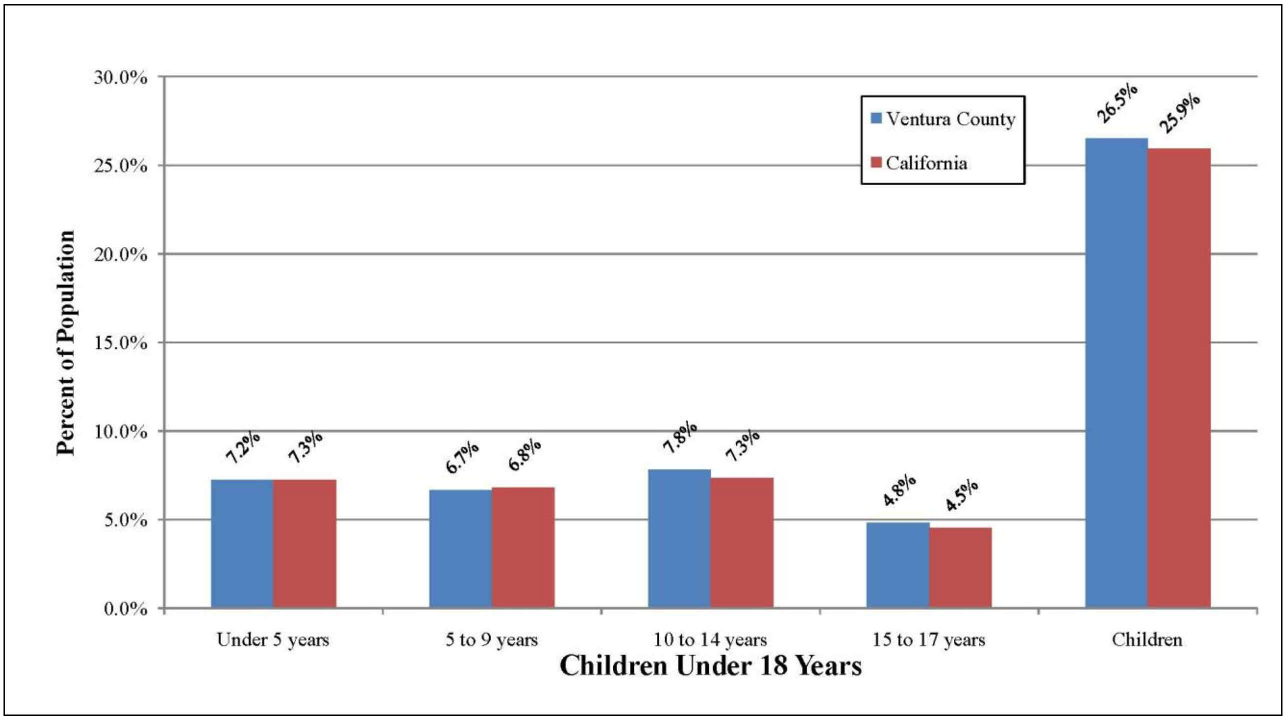


Source: U.S. Census Bureau, 2005-2007 3-year estimate.
Note: In some cases, totals do not add up to 100% due to rounding of the Census estimated data.

Figure 4.3.6.1-2: Ethnicity for NBVC Point Mugu Socioeconomic Study Area

Ventura County has a relatively even distribution of children under the age of 15 and then a slightly smaller population of 15 to 17 years old. The largest group of children is 10 to 14 years old (7.8%) and the remaining distribution is under 5 years (7.2%), 5 to 9 years old (6.7%), and 15 to 17 years old (4.8%). Figure 4.1.6.1-3 summarizes the children demographics for Ventura County. Ventura County's child population is 26.5%; very similar to the statewide average of 25.9%.[68]

67 Census Bureau 2005-2007
68 Census Bureau 2009



Source: U.S. Census Bureau, 2005-2007 3-year estimate.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 4.3.6.1-3: Children Demographics of NBVC Point Mugu, Socioeconomic Study Area

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 and children populations are not expected to be significantly affected from the proposed JSF DT Program.

The proposed JSF DT Program 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 Program. 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 Point Mugu Sea Range would be expected from the Proposed Action.

No take-offs or landings with the F-35 would occur at NBVC Point Mugu. No significant changes to baseline noise levels are expected and most of the proposed JSF DT activities would occur over the ocean. Therefore, the proposed JSF DT Program would not likely cause disproportionate high or adverse human health and environmental affects to the environmental justice and children populations relative to other populations in the area. Proposed JSF DT activities are similar in scope to the tests currently conducted at NBVC Point Mugu, and any predicted impacts are expected to be negligible. Similarly, implementation of the proposed JSF DT Program 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 groups 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 NBVC Point Mugu

4.3.7.1 Affected Environment

The California Coastal Commission maintains jurisdiction over the California coastal zone, which includes areas adjacent to NBVC 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 NBVC Point Mugu is to protect unique wildlife habitats present at Mugu Lagoon. In addition, the California coastal zone includes the Point Mugu Sea Range at NBVC 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 activities (98%) would occur more than 12 NM offshore of California, within the Point Mugu 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 activities 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 activities would only allow for shore crossings (less than 2% of proposed tests) to occur in the coastal zone.

No effect to the coastal zone would be anticipated from conducting the proposed JSF DT activities, 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 Point Mugu 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 PEO of the F-35 Joint Program Office has determined the conclusions reached in the 2007 EA/OEA remain unchanged. The proposed JSF DT activities would be consistent to the maximum extent practicable with the enforceable policies of the California Coastal Act, and no CCD is required in accordance with the CZMA.

4.4 WSMR

4.4.1 General Information

WSMR is an U.S. Army installation with a tri-Service presences (U.S. Army, USAF, and USN located near Las Cruces, New Mexico (as depicted in Figure 4.4.1-1). The City of Las Cruces lies approximately 15 miles southwest of WSMR, Alamogordo lies about 10 miles east, and Albuquerque is approximately 100 miles north. The southern part of WSMR is bisected by US 70, which connects the Cities of Las Cruces and Alamogordo. The Main Post of WSMR is located south of US 70 to the east of the Organ Mountains.

WSMR spans approximately 40 miles from east to west, and 100 miles from north to south, encompassing a land area of nearly 2.2 million acres in south central New Mexico. Fort Bliss, which is comprised of approximately 1.1 million acres, borders the installation to the south and southeast. Holloman AFB, which is comprised of approximately 59,700 acres, is adjacent to WSMR on the east. Collectively, WSMR, Fort Bliss, and Holloman AFB provide nearly 3.4 million acres of neighboring land area to support DoD test and training missions. Associated with the land area, restricted airspace overlies and extends beyond the WSMR land boundary.

WSMR is managed and supported by the U.S. Army's Installation Management Command. The mission of WSMR is to provide the U.S. Army, USAF, USN, DoD, and other customers with high quality services for experimentation, test, research, assessment, development, and training.WSMR encompasses the White Sands Test Center, a MRTFB, and is managed and operated by the U.S. Army for RDT&E of military systems and similar high-technology commercial products. Operation of this national range is in accordance with direction from the Army Test and Evaluation Command, and uses the extensive test resources and infrastructure of this MRTFB to accomplish its RDT&E role. As one of the largest joint test and training ranges in the U.S., WSMR provides unique infrastructure and test facilities including a nuclear survivability test reactor, radar test facilities, a high energy laser systems test facility, and a state-or-the-art range control center. 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. WSMR provides for testing and development of weapons and equipment (both hardware and software) for military use in combat zones and for homeland security.

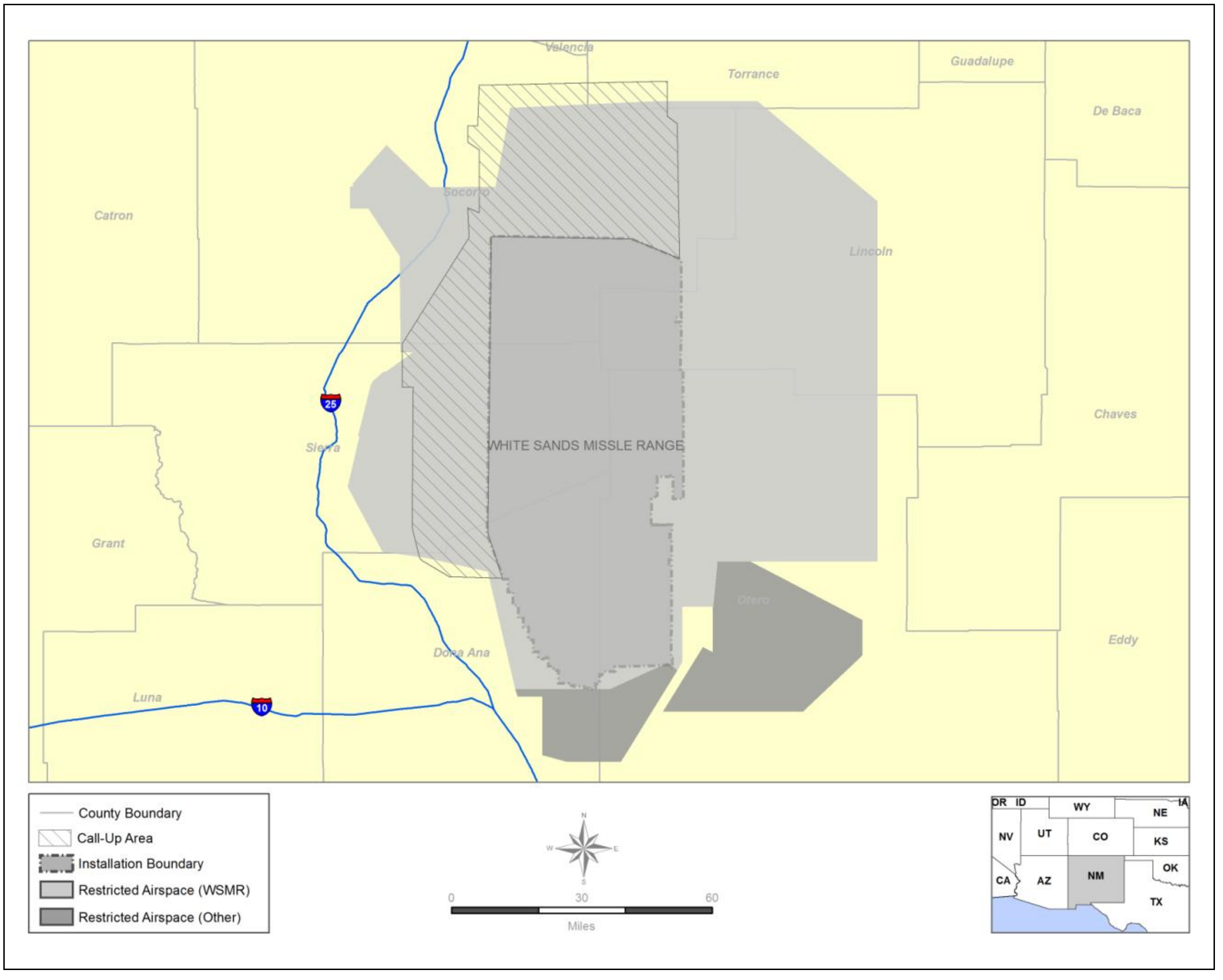


Figure 4.4.1-1: General Map of WSMR

A total of 13 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.

4.4.2 Proposed JSF DT Program at WSMR

The purpose of the proposed JSF DT Program at WSMR is to conduct mission systems and weapons separation & integration tests for a 3-year time period. Planned flight tests would peak in Test Year 5. The proposed JSF DT Program 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 F-35 Joint Program Office and JSF ITF Team would capitalize on the core mission of WSMR and the close proximity of WSMR to Edwards AFB. The overall JSF DT tempo analyzed in the 2007 EA/OEA basically remains the same with a decrease of only 1 F-35 flight total, as reflected in Table 4.4.2-1.

Table 4.4.2-1: Current and 2007 EA/OEA Overall Test Program

	No. F-35 Flights	F-35 Flight Hours	No. Support Aircraft	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
Current	40	81	44	111	84	192
2007 EA/OEA	41	82	44	111	85	193

Table 4.4.2-2 summarizes the updated proposed flight tests and support aircraft. Table 4.4.2-3 annotates the test profile analyzed in the 2007 EA/OEA. Approximately 5% (vice 60% reflected in the 2007 EA/OEA) of the proposed test activities anticipated with WSMR's ranges would be at and below 3,000 feet AGL, but of short duration. 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 take-offs at WSMR except in the event of an aircraft emergency.

Table 4.4.2-2: Proposed JSF DT Flight Profile at WSMR–Current

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	Mission Systems	12	24	F-16, KC-135	17	46	29	70
5	Same as Test Year 4	22	45	F-16, KC-135	27	65	49	110
6	Same as Test Year 4	6	12	N/A	0	0	6	12
TOTAL		***40***	***81***		***44***	***111***	***84***	***192***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2007–2008) and Updated Edwards/Western Area Supplemental Data Verification (2007-2009).

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

Table 4.4.2-3: Proposed JSF DT Flight Profile at WSMR–2007 EA/OEA

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 Program, however, the proposed test profile may fluctuate as the F-35 variants proceed through the various DT activities and time periods.

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. Table 4.4.2-4 summarizes the stores/expendables proposed for use, which remains unchanged from the 2007 EA/OEA. 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 4.4.2-4: Proposed JSF DT Stores/Expendables at WSMR–Current and 2007 EA/OEA

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) and updated Edwards/Western Area Supplemental Data Verification (2007-2009).
Note:1. Proposed stores/expendables reflect realistic approximations for the proposed JSF DT, however, the proposed test profile may fluctuate up or down in quantities as the F-35 variants proceed through the various DT activities and time periods. It is possible usage quantities for stores may slide into the next test year if not used in the planned test year.
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 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-35s 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 5 hours, with 2 hours spent within WSMR's airspace/ranges. Drones (the QF-4) used in 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. The exact type and number of these required expendables is dependent on the requirements for specific test activities. All SOPs in place for the safe use and release of expendables would be adhered to during the proposed JSF DT Program.

4.4.3 Air Quality at WSMR

4.4.3.1 Affected Environment

Air quality at WSMR was analyzed in the *Final Environmental Impact Statement for Development and Implementation of Range-Wide Mission and Major Capabilities* (2009) and *Final White Sands Missile Range Range-Wide Environmental Impact Statement (January 1998)*. Section 3.4.3 of the 2009 FEIS provides a concise description of the baseline 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 Program.

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. The current New Mexico State air quality standards applicable to WSMR 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 1-hour O_3 NAAQS and the area around Anthony, New Mexico in nonattainment for the PM_{10} NAAQS. Neither of these NAAs 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 for the Proposed JSF DT Program

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	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
5	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
6	<0.01 (<0.01)	0.05 (0.45)	<0.01 (<0.01)	<0.01 (<0.01)	0.01 (0.01)
Highest (Test Year 6)	<0.01 (<0.01)	0.05 (0.45)	<0.01 (<0.01)	<0.01 (<0.01)	0.01 (0.01)

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 in the Appendix are assumed to be VOCs.
Note: The highest year represents the year most likely to produce the greatest estimated emissions.

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 Supplemental EA/OEA AR maintained by the F-35 Joint Program Office and JSF ESOH Lead.

GHG emissions (CO_2, CH_4, N_2O) were also estimated for the proposed aircraft operations at WSMR, based on the total quantity of fuel combusted and applying emissions factor specific to the fuel burned (JP-8, diesel, or gasoline) from generally accepted GHG protocols. The protocols do not include an emission factor for JP-8, therefore the emission factor for Jet A/A-1 was used. The GHG emissions were converted to a CO_2e basis using the GWP of each gas.

The CO_2e generated from the Proposed Action are shown in Table 4.4.3.2-2 below. Approximately 1,332 MT of CO_2e would be generated by sources and operations comprising the Proposed Action. There is no requirement under the General Conformity Rule to consider GHG emissions, therefore in absence of any regulatory standard, the results of the analysis for WSMR were compared to the 2009 total U.S. GHG emissions of 6,633.20 million MT CO_2e.[69] The emissions associated with the Proposed Action would result in less than a 0.0001% increase, and as such would not be a significant source of GHG emissions. Section 3.1.5 provides a high level overview of DoD's and the Service's energy activities (e.g., alternative fuels, reduce energy consumption, etc.), which have an added benefit of reducing greenhouse gas emissions.

69 EPA 2009

Table 4.4.3.2-2: Estimated GHG Emissions Estimates for the Proposed JSF DT Program at WSMR

Test Year	CO_2e (MT)
4	407
5	763
6	162
Total	1,332
Highest (Test Year 5)	**763**

4.4.4 Noise at WSMR

4.4.4.1 Affected Environment

Noise at WSMR was analyzed in Sections 3.10 and 4.10 *Final Environmental Impact Statement for Development and Implementation of Range-Wide Mission and Major Capabilities* (2009) and in the *Final White Sands Missile Range Range-Wide Environmental Impact Statement (January 1998)*. The following is a summary of the information contained within these FEISs. 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. Aircraft operations conducted by F-22As stationed at Holloman AFB are a prime contributor to noise on WSMR. Time-averaged subsonic aircraft noise levels are expected to increase by less than 1.5 dB DNL over noise levels experienced just prior to initiation of the F-22A beddown. Based on the 2009 FEIS, these levels would be considered essentially insignificant. The 2009 FEIS also indicated sonic booms under WSMR airspace are expected to increase from five per month (prior to F-22A beddown) to 25 per month once beddown of both F-22A squadrons is complete. This increase was expected to result in a slight increase in the percentage of the population beneath WSMR airspace that is highly annoyed (approximately one percent to four percent. Other significant sources of noise in WSMR’s operational testing areas include missile launches, ordnance explosions, aircraft drone overflights, gun firing, general vehicle traffic, ground maneuvers, and low-altitude military jet traffic. While noise from aircraft operations occurs regularly, other activities are more sporadic, dispersed geographically, transient, and temporary, occurring only during the operation.

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 Program 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 Program 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 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.

Peak activity from the proposed JSF DT Program would be in Test Year 5, as reflected in Table 4.4.2-1, consisting of approximately 49 flights and 110 flight hours for both F-35 and support aircraft. The overall tempo or amount of proposed JSF DT activities over a 3-year period (84 flights and 192 flight hours for both F-35 and support aircraft) would be less than similar related actions analyzed in the 1998 WSMR EIS (approximately a 10 to 15% increase over a 10-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 AMRAAM* (30 flights annually for a 10 to 15-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.[70] Therefore, the proposed JSF DT Program 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 activities. The potential for significant and cumulative noise effects is not anticipated considering schedule limits, the extensive range area over which test activities are conducted, and the limited population within WSMR. Therefore, the proposed JSF DT activities 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 3.7 of the *Final Environmental Impact Statement for Development and Implementation of Range-Wide Mission and Major Capabilities* (2009) and the *Final White Sands Missile Range Range-Wide Environmental Impact Statement (January 1998)* describes the biological resources including threatened and endangered species at WSMR. The following is a brief synopsis. 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 WSMR is provided in this section. 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.

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70 WSMR 1998

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
Artic peregrine falcon *(Falco peregrinus tundrius)*	D	S
Piping plover *(Charadrius melodus circumcinctusp)*	T	T
Mexican spotted owl *(Strix occidentalis lucida)*	T	T
Southwestern willow flycatcher *(Empidonax traillii extimus)*	E	E
Baird's sparrow *(Ammodramus bairdii)*		T
Northern goshawk *(Accipiter gentiles)*		S
Ferruginous hawk *(Buteo regalis)*		S
Mountain plover *(Charadrius montanus)*		S
Loggerhead shrike *(Lanius ludovicianus)*		S
Arizona grasshopper sparrow *(Ammodramus savannarum ammolegus)*		E
Common black-hawk *Buteogallus anthracinus*		T
Varied bunting *(Passerina versicolor)*		T
Neotropic cormorant *(Phalacrocorax brasiliensis)*		T
Bell's vireo *(Vireo bellii)*		T
Gray vireo *(Vireo vicinior)*		T

Source: WSMR EISs 2009 and 1998; and USFWS endangered species status tool http://www.fws.gov/endangered.
Legend: Legend: E=Endangered, T=Threatened; S=Sensitive; D=Delisted.

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

Common Name Scientific Name	Federal Status	State Status
Mammals		
Mexican gray wolf *(Canis lupus baileyi)*		E
New Mexico meadow jumping mouse *(Zapus hudsonius luteus)*		E
Organ Mountain Colorado chipmunk *(Tamias quadrivittatus australis)*		T
Spotted bat *(Euderma maculatum)*		T
White Sands woodrat *(Neotoma micropus leucophaeus)*		E
Hot Springs cotton rat *(Sigmodon fulviventer goldmani)*		S
Arizona black-tailed prairie dog *(Cynomys ludovicianus arizonensis)*		S
White Sands pupfish *(Cyprinodon Tularosa)*		T
Little brown myotis (bat) *(Myotis lucifugus)*		S
Invertebrates		
Woodland snail, Goat Mountain *(Ashmunella harrisi)*		LP
Woodlandsnail, no common name *(Asmunella kochi caballoensis)*		LP
Woodlandsnail, San Andres *(Ashmunella kochi kochi)*		LP
Woodlandsnail, no common name *(Ashmunella kochi sanandresensis)*		LP
Woodlandsnail, Salinas Peak *(Ashmunella salinasensis)*		LP

Source: WSMR EISs 2009 and 1998; and USFWS endangered species status tool http://www.fws.gov/endangered.
Legend: Legend: E=Endangered, T=Threatened; S=Sensitive; LP=Limited Protection

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.

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. Todsen's pennyroyal (*Hedeoma todsonii*) is the only plant species listed as endangered by the USFWS and State endangered by the New Mexico Department of Game & Fish (NMDGF) 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 14 plant species listed as endangered by NMFRCD. Habitat apparently suitable for nine more species listed as endangered by NMFRCD occurs on WSMR. An additional 10 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 12 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.

Mammal Species

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 NMDGF beginning in 1969. Oryx are 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.

Bird Species

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 no nesting habitat is 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 Northern aplomado falcon (*Falco femoralis*) occur or have been observed in the past within WSMR. The peregrine and Northern 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 twenty-one 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 threatened by the NMDGF and as a Federal category 2 candidate by the USFWS. There are four populations of the White Sands pupfish known to occur in Salt Creek, Malpais Spring, Mound Springs, and 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*). The potential for chemical spills from military vehicles could also be a threat to the populations.

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 10 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 mission systems test activities, where short duration and low-angle flights may occur. Only 5% of the projected DT activities are expected to occur below 3,000 feet AGL. No landings or take-offs with the F-35 would be conducted at WSMR. Potential impacts to biological resources from the proposed JSF DT Program 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 WSMR. The initial temporary response to overflight noise from the proposed F-35 tests would not be anticipated to have a negative impact on any species' population at WSMR. The maximum F-35/support aircraft flight hours would occur in Test Year 5 with 49 flights (22 for the F-35 and 45 for support aircraft) and 110 flight hours (45 for the F-35 and 65 for support aircraft). The tempo or amount of proposed tests is significantly less than those analyzed in the 1998 WSMR EIS. The 1998 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 10 to 15-year period (approximately 60 total missiles). Additionally, proposed JSF DT activities 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. No change in land area is anticipated from the proposed JSF DT activities. 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 initial temporary response to overflight noise from the proposed F-35 tests would not be anticipated to have a negative impact on any species' population at WSMR. 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 within the T&E areas of WSMR. In addition, information presented in Appendix G of the Hollomon F22 Draft EA indicated behavioral were rare and limited reactions. The following are excerpts from Appendix G:

- Weisenberger et al. (1996)
  - Heart rates of response captive bighorn sheep (*Ovis canadensis*) and mule deer (*Odocoileus hemionus*) to simulated aircraft noise ranging from 92 to 112 dB increased following the simulated aircraft noise, but returned to normal levels within 60–180 seconds.

    - Behavioral responses were relatively rare, and the animals returned to normal behavior within 253 seconds.
    - Animals exhibited decreased responses to increased exposure, suggesting habituation.
- Krausman et al. (1998)
    - Bighorn sheep in a 790-acre enclosure exposed to actual and frequent F-16 overflights at 395 feet AGL had heart rate increased above preflight level during7 percent of the overflights but returned to normal within 120 seconds.
    - No behavioral response by the bighorn sheep was observed during the overflights.

The F-35 Joint Program Office will also adhere to any mitigative measures or other flights restrictions imposed by WSMR to protect biological resources (i.e., the flight restriction below 2,000 feet AGL over the San Andres Mountatins). As such, no significant impacts to biological/natural resources from noise would be expected over the 3-year test period for the proposed JSF DT Program.

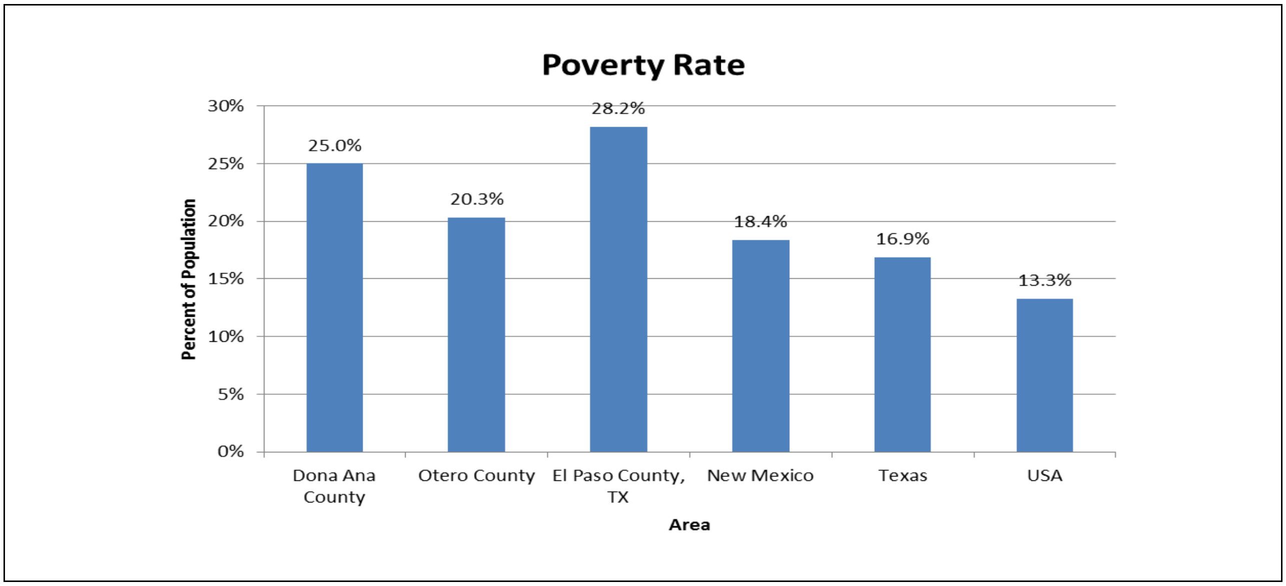
Flares may be used in support of the JSF DT Program, and it should be noted that flare usage is also common in other RDT&E and training activities conducted at WSMR. There is a potential impact to Todsen's pennyroyal from wildland fires started by flares. Potential direct effects from the release of flares include the potential for a flare to strike a plant. Indirect effects include fire resulting from a defective flare igniting vegetation on the ground, or the chemicals from a flare harming a plant. WSMR published a BiologicalAssessment (BA) in June 2009 which describes the potential effects on the endangered Todsen's pennyroyal (*Hedeoma todsenii*) from proposed USAF use of Yonder Air Space R-5107B and Yonder Impact Area (together "Yonder"). WSMR analyzed the effects of the proposed action and determined the proposed action may affect, but is not likely to adversely affect, the Todsen's pennyroyal and is not likely to destroy or adversely modify Todsen's pennyroyal Critical Habitat. As reflected in the analysis, the expected frequency of a flare component to strike an exposed plant depends on the number of flares used and the size and population density of the exposed plant. For example, calculations done for the BA determined that the potential strikes to a human-sized animal with a density of 50 animals per square mile, where 8,000 flares were used annually, was one strike in 200 years. A plant or animal 1/100th the size of human with a density of 500 animals per square mile exposed 100% of the time (i.e., animals not protected by burrows or dense vegetation) would also have an expected strike rate of one in 200 years. And while the JSF DT Program may use flares, it would be incidental to the program as this is not a major component of the proposed DT activities at WSMR (i.e., not every flight of a F-35 would require dispensing of flares). Any flares used will not be concentrated in or near areas where the Todsen's pennyroyal occurs, especially considering their locations and that WSMR excludes activities that have potential to disturb the ground in areas with known Todsen's pennyroyal populations. Approximately 95 % of the proposed JSF DT activities would be well above 3,000 feet AGL, leaving a 2,600 feet buffer in which the flares are very likely to extinguish during release. In the unlikely event that an ignited flare is defective, reaches the ground burning, and ignites on the ground, it is expected based on the BA that a fire would most likely spread towards the north and east (rather than north and west towards the area where pennyroyal occurs) due to prevailing winds from the south and west. Therefore, the chances of flare components or an unexpected fire affecting a pennyroyal plant would be minimal with no significant affects expected from the proposed JSF DT activities. In addition, the JSF DT Program will adhere to all protective measures identified by WSMR.

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 and children population 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 Program.

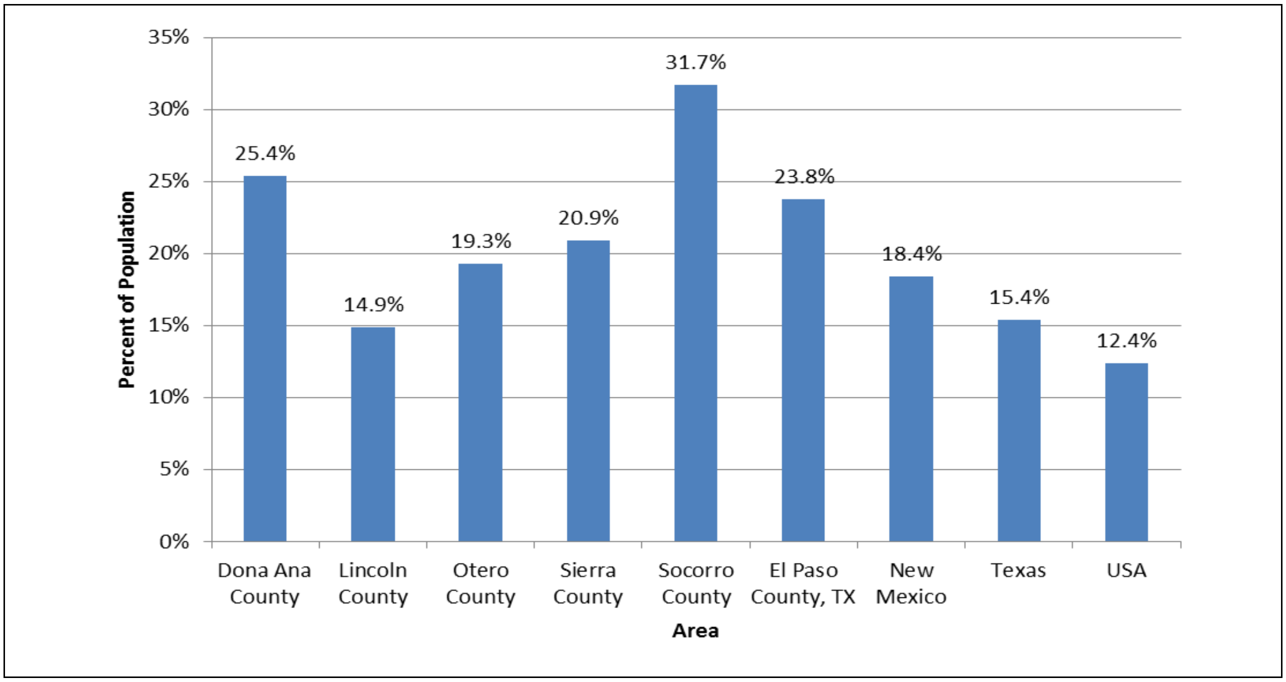
U.S. Census American Community Survey 2005-2007 3-year estimate poverty rates for the WSMR study area, which only include the counties with a population larger than 20,000 people, are summarized in Figure 4.2.6.1-1. Poverty rates in Doña Ana and El Paso Counties equal or exceed the set CEQ threshold of 25% for low-income populations, and no county has a poverty rate below the State poverty rates for New Mexico (18.4%) and Texas (16.9%).



Source: U.S. Census Bureau, 2005-2007 3-year estimate.

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

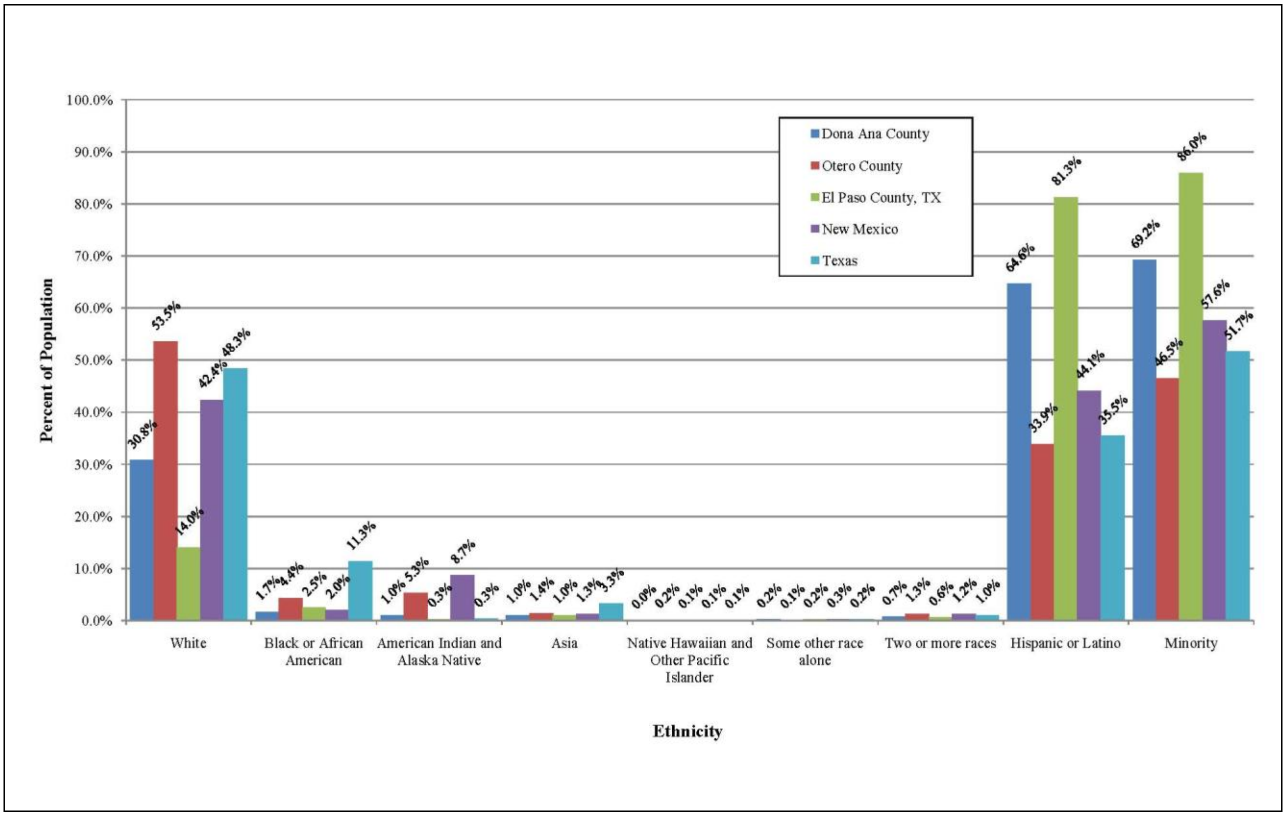
Poverty rates of all counties within the WSMR study area for 2000 are summarized in Figure 4.4.6.1-2. Poverty rates in Doña Ana and Socorro Counties exceed the set CEQ threshold of 25% for low-income populations, and only Lincoln County has a poverty rate below the State poverty rates for New Mexico (18.4%) and Texas (15.4%). Poverty rates for Dona Ana, Otero and El Paso Counties all decreased in 2007 relative to 2000.



Source: U.S. Census Bureau, 2000.

Figure 4.4.6.1-2: Poverty Rates for WSMR Socioeconomic Study Area

U.S. Census American Community Survey 2005-2007 3-year estimate of population ethnicity, which only include the counties with a population larger than 20,000 people, is summarized in Figure 4.2.6.1-3. The three-county area population is predominantly Hispanic or Latino (74.9%). The remaining race distribution is white (19.9%), Black or African American (2.4%), Asian (1.1%), two or more races (0.7%), American Indian or Native Alaskan (0.7%), some other race (0.2%), and Native Hawaiian or Pacific Islander (0.1%). The minority percentage in El Paso County well exceeds the CEQ threshold of 50% and Texas with 51.7%. Doña Ana County exceeds the CEQ threshold and New Mexico with 57.6%.

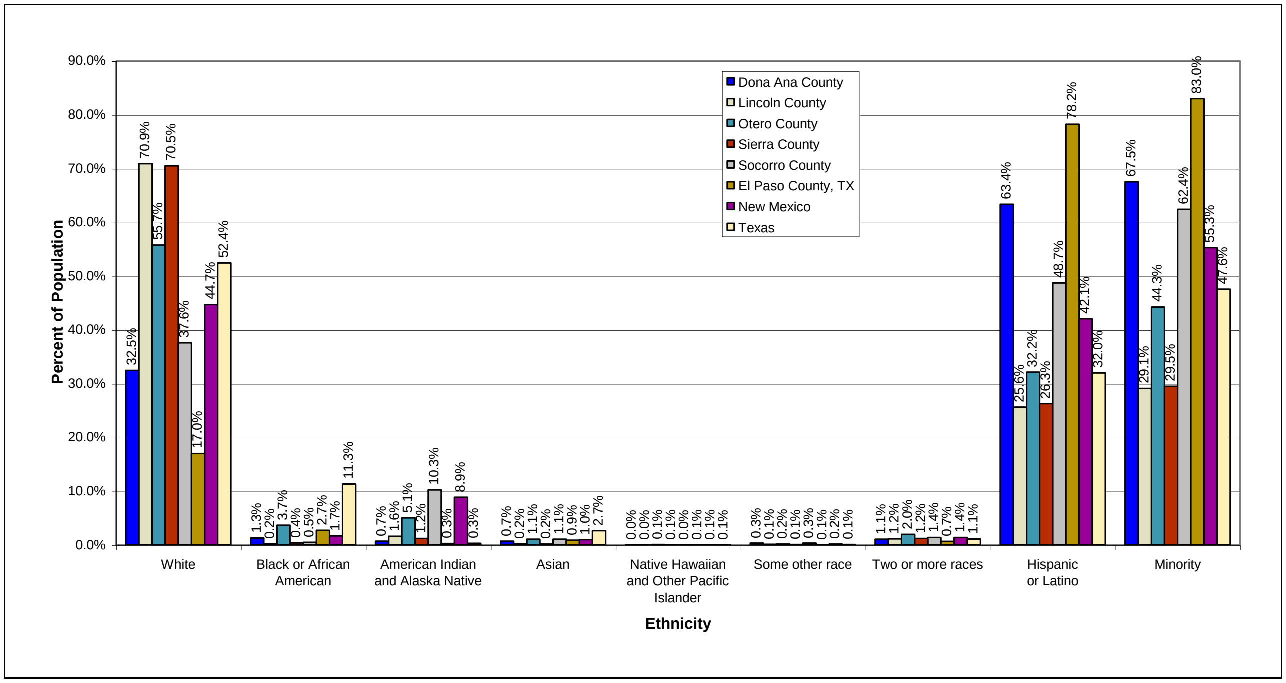


Source: U.S. Census Bureau, 2005-2007 3-year estimate.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 4.4.6.1-3: Ethnicity for WSMR Socioeconomic Study Area

The 2000 population ethnicity for all counties is summarized in Figure 4.4.6.1-4. 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.[71] 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.

71 Census Bureau 2000



Source: U.S. Census Bureau, 2000.

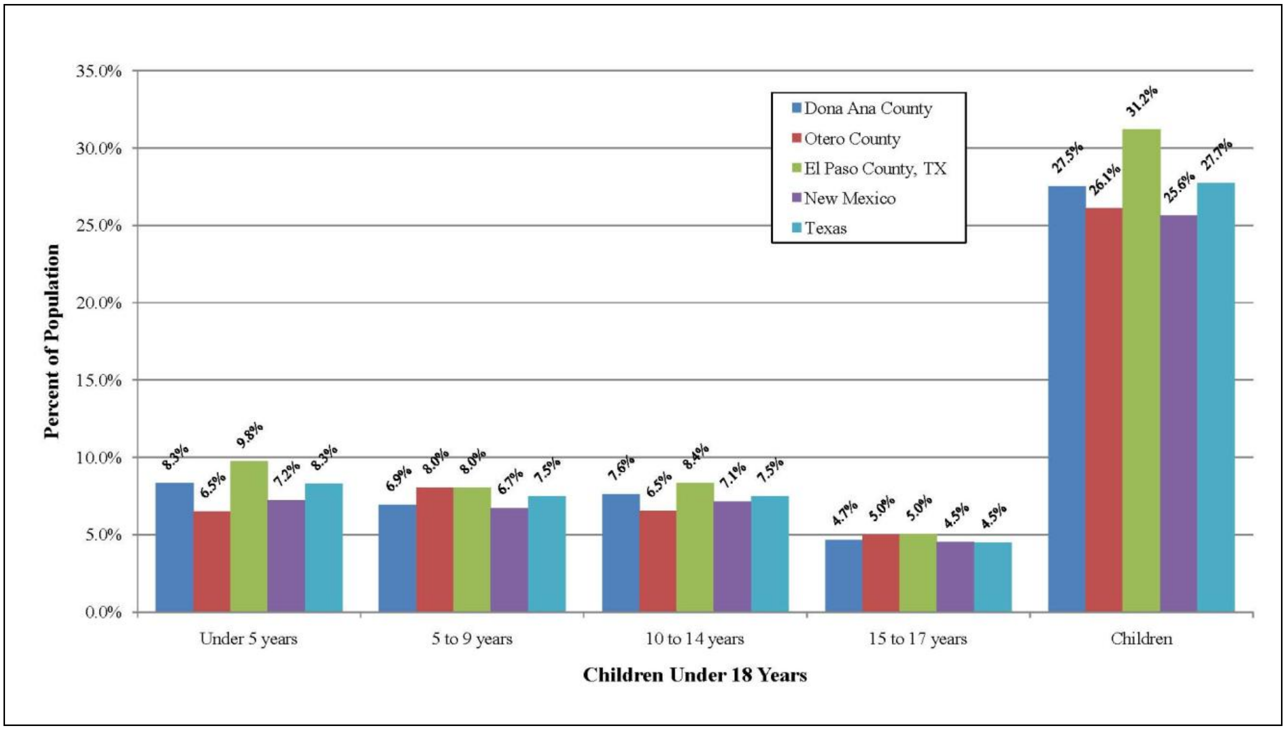
Note: The percent of the population by ethnicity for the study area will not equal the average of the counties' percent of the population by ethnicity because denominator (county populations) are not common to all.

Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 4.4.6.1-4: Ethnicity for WSMR Socioeconomic Study Area

U.S. Census American Community Survey 2005-2007 3-year estimate of children demographics, which only include counties with a population larger than 20,000 people, is summarized in Figure 4.2.6.1-5. The three-county area shows there is a relatively even distribution of children under the age of 15 years with a smaller group of 15 to 17 years old. The largest group of children is under 5 years old (9.3%) and the remaining distribution is 10 to 14 years old (8.1%), 5 to 9 years old (7.8%), and 15 to 17 years old (5.0%). Percent of the population under 18 years of age for Dona Anna and Otero counties exceed the New Mexico statewide estimate of 25.6%, and El Paso County exceeds Texas statewide estimate of 27.7%.[72]

72 Census Bureau 2009

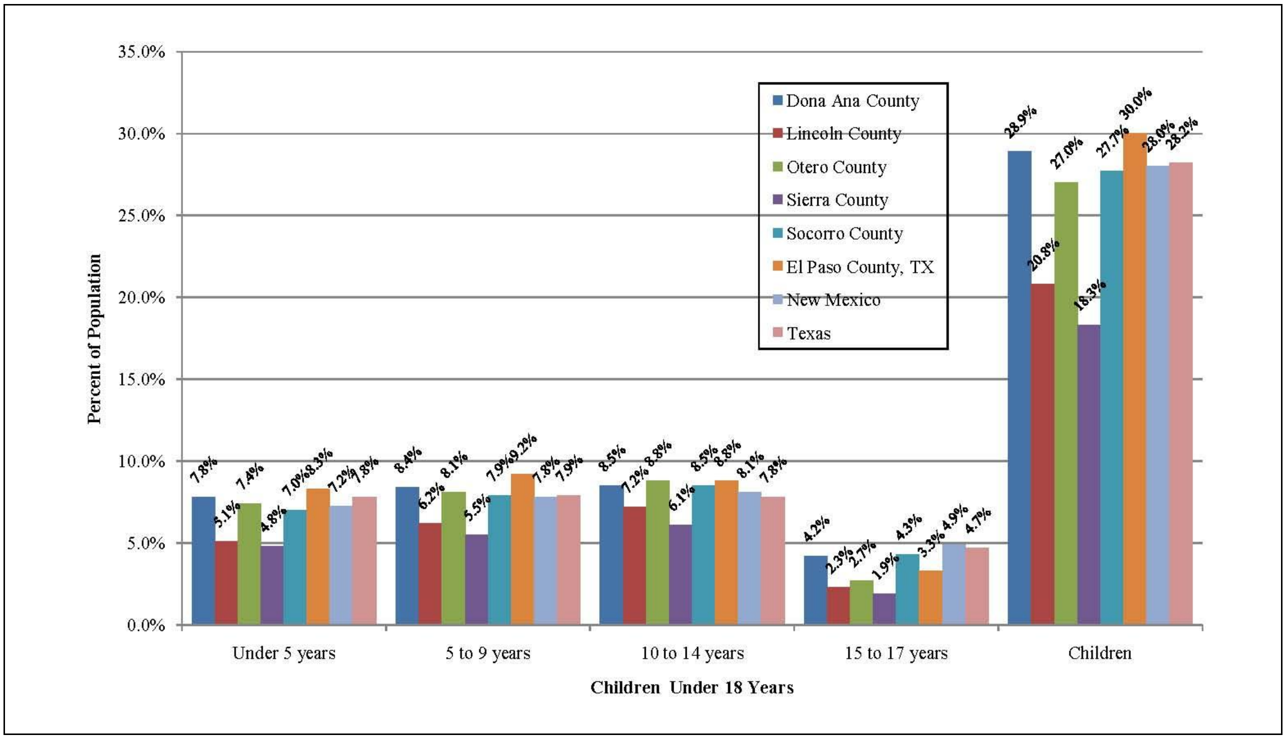


Source: U.S. Census Bureau, 2005-20073-year estimate.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 4.4.6.1-5: Children Demographics of WSMR, Socioeconomic Study Area

The 2000 children populations for all counties in the WSMR study area is summarized in Figure 4.2.6.1-6. The six-county area shows a relatively even distribution of children under 5 years of age to 14 years and a small population of children 15 to 17 years of age. The largest group of children are age 5 to 9 years old (8.8%) and the remaining distribution is 10 to 14 years old (8.7%), under 5 years old (8.3%), and 15 to 17 years old (3.4%). Percent of the population under 18 years of age for Dona Anna County slightly exceeds the New Mexico statewide estimate of 28.0%, and El Paso County exceeds the Texas statewide estimate of 28.2%.[73] In 2000, Otero County did not exceed the statewide estimate, but did in 2007.

73 Census Bureau 2009



Source: U.S. Census Bureau, 2000.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 4.4.6.1-6: Children Demographics of WSMR, Socioeconomic Study Area

4.4.6.2 Environmental Consequences

The proposed JSF DT Program flights would be conducted mostly above 3,000 feet and higher with no take-offs or landings and/or long standing low-altitude flight tests occurring at WSMR. As such, the proposed JSF DT activities would not likely cause disproportionate high or adverse human and environmental affects to the environmental justice and disproportionately larger children 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 Program 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 groups 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 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. NTTR is a USAF training facility located in the southern Nevada desert. It comprises approximately 3.1 million acres and 12,000 square miles of airspace.[74] 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

74 http://www.globalsecurity.org/military/facility/nellis-range.htm 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.

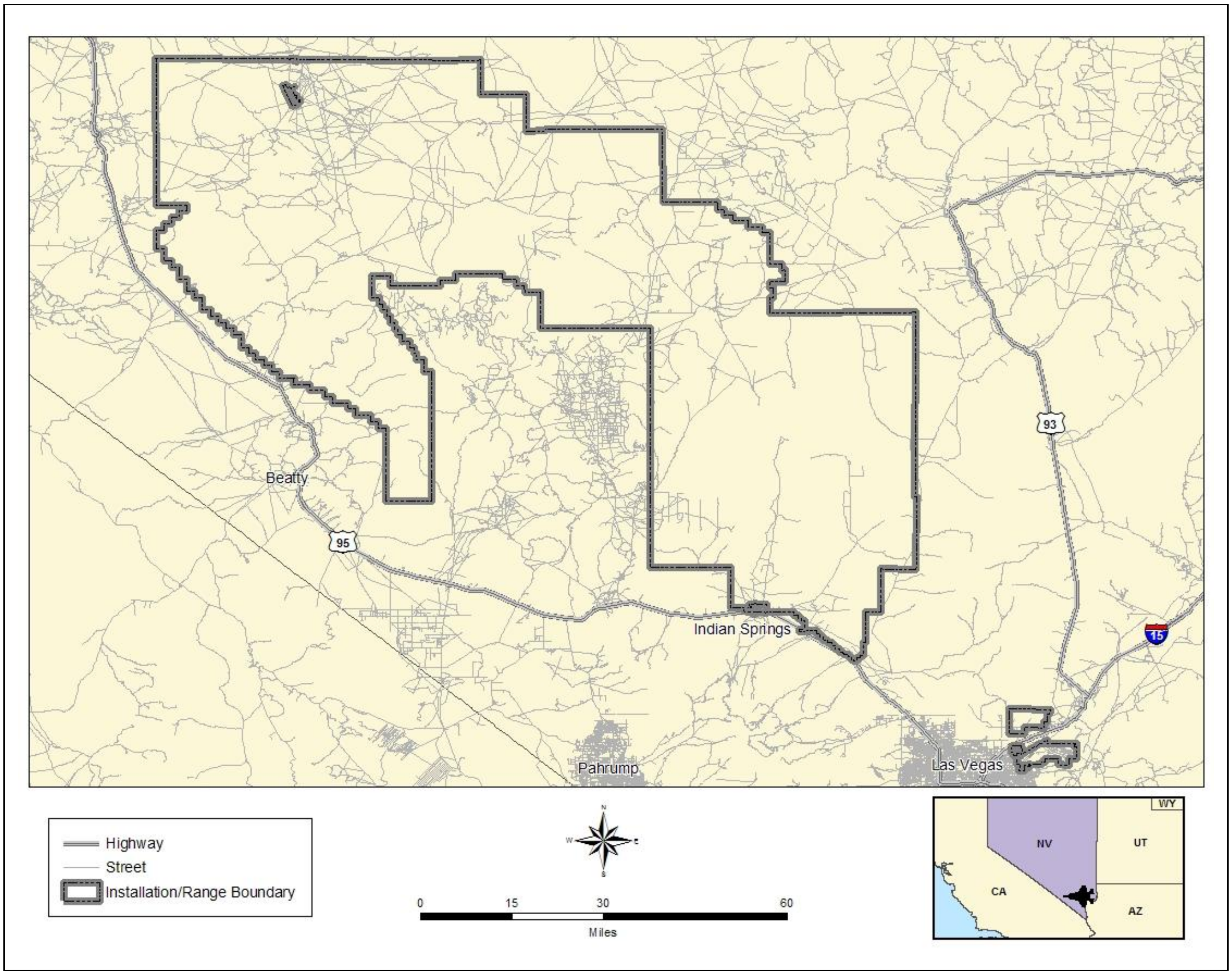


Figure 4.5.1-1: General Map of NTTR Nellis AFB

4.5.2 Proposed JSF DT Program at NTTR Nellis AFB

The purpose of the proposed JSF DT activities at NTTR Nellis AFB would be to conduct mission systems tests for a 4-year time period. Planned flight tests would peak in Test Year 7, 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 Program profile. The overall JSF DT tempo analyzed in the 2007 EA/OEA decreased by 1,029 flights total, as reflected in Table 4.5.2-1. F-35 specific flights decreased by 557.

Table 4.5.2-1: Current and 2007 EA/OEA Overall Test Program

	No. F-35 Flights	F-35 Flight Hours	No. Support Aircraft	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
Current	120	227	240	415	360	642
2007 EA/OEA	677	1,354	712	1,424	1,389	2,778

Table 4.5.2-2 provide an overview of the current proposed JSF DT activities by number of flights and flight hours for both the F-35 and support aircraft. Table 4.5.2-3 annotates the test profile analyzed in the 2007 EA/OEA. Some flights may be conducted with captive carried inert weapons, but there would be no weapon releases.

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 NTTR Nellis AFB. Mission systems tests would be comprised of sensor development, subsystem integration, core processor software integration, off-board integration demonstrations, RF compatibility, EW regression tests, electromagnetic environmental effects (E3) tests, tactical weapons deployment, etc. All of NTTR Nellis AFB would be used for the proposed JSF DT activities 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 30% of the total proposed flights occurring below 3,000 feet. No supersonic flights are planned for the proposed mission systems tests.

Table 4.5.2-2: Proposed JSF DT Flight Profile at NTTR Nellis AFB–Current

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	Mission Systems	19	36	F-16, KC-135	38	66	57	102
5	Same as Test Year 4	27	51	Same as Test Year 4	54	93	81	144
6	Same as Test Year 4	26	49	Same as Test Year 4	52	90	78	139
7	Same as Test Year 4	48	91	Same as Test Year 4	96	166	144	257
TOTAL		***120***	***227***		***240***	***415***	***360***	***642***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2007–2008) and Updated Edwards/Western Area Supplemental Data Verification (2007-2009).

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 4.5.2-3: Proposed JSF DT Flight Profile at NTTR Nellis AFB–2007 EA/OEA

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 NTTR Nellis AFB region has an arid, desert climate, typical of the Mojave Desert in which it lies. There is abundant sunshine year-round with an average of about 300 sunny days per year, with very little rainfall. The average annual temperature for the area is 68.1° Fahrenheit. In the summer, daily high temperatures typically exceed 100° with lows in the 70s. Winters are generally mild and pleasant with average afternoon temperatures near 60.[75] Annual precipitation is approximately 4.5 inches with the maximum average precipitation occurring during February.[76]

Designated State and local agencies have the primary authority and responsibility to implement rules and regulations to control sources of criteria pollutants. The majority of the NTTR is located within two counties, Lincoln and Nye County. The very southern tip of the NTTR falls within Clark County while Nellis AFB is situated in Clark County. The Nevada Division of Environmental Protection, Bureau of Air Quality Planning is responsible for implementing and maintaining an air pollution control program for the entire State of Nevada with the exception of two Counties, Clark and Washoe. The Clark County Department of Air Quality and Environmental Management (DAQEM) has jurisdiction for applying and enforcing air quality regulations in Clark County.

75 http://www.wrh.noaa.gov/vef/climate/pagei.php
76www.weather.com

Table 4.5.3.1-1 summarizes the Federal NAAQS attainment status for NTTR Nellis AFB. Both Lincoln and Nye Counties where NTTR is located, fall within an area that is unclassified for all Federal and State air quality standards. The very southern portion of the NTTR and Nellis AFB fall within Clark County. A portion of Clark county, *Las Vegas Planning Area Hydrographic Area 212* is in nonattainment for CO (severe) and PM_{10} (serious) and is a former subpart 1 NAA for the 8-hour O_3 standard. Clark County is in attainment for all other criteria pollutants.

Table 4.5.3.1-1: NTTR Nellis AFB Attainment Status[77]

Criteria Pollutant	Clark County	Lincoln County	Nye County
CO	Serious Nonattainment	Attainment	Attainment
Pb	Attainment	Attainment	Attainment
NO_2	Attainment	Attainment	Attainment
O_3	Subpart 1[78]Nonattainment	Attainment	Attainment
PM_{10}	Serious Nonattainment	Attainment	Attainment
$PM_{2.5}$	Attainment	Attainment	Attainment
SO_2	Attainment	Attainment	Attainment

In addition to the Federal NAAQS, Nevada has an approved set of AAQS. The current Nevada AAQS applicable to NTTR Nellis AFB are provided in Table 4.5.3.1-2. Even though Nevada has adopted these AAQS, there are no general conformity requirements placed on Federal facilities because of these standards. There are no hydrogen sulfide emissions from the proposed JSF DT. These emissions are included in Table 4.5.3.1-2 to provide a comprehensive summary of Nevada's AAQS.

77 EPA Greenbook http://www.epa.gov/air/oaqps/greenbk/index.html

78 On June 8, 2007, the United States Court of Appeals vacated the Subpart 1 portion of the Phase 1 Rule (Court Order). The Subpart 1 areas in EPA's Greenbook are listed as "Former Subpart 1" until reclassification of the areas is finalized. Las Vegas was proposed as marginal nonattainment for 8-hour O_3 (74 FR 2936, January 16, 2009). Former subpart areas are still designated nonattainment until the proposed rule is finalized and an area is redesignated. EPA is expecting to classify the former subpart 1 areas under subpart 2. These areas would be classified based on the same air quality data used in the initial 2004 designations, and would be classified either marginal or moderate nonattainment.

Table 4.5.3.1-2: Nevada AAQS[79]

Criteria Pollutant	Averaging Time	Nevada Standard $\mu g/m^3$ (ppm)
CO	8 hour	10,500 (9) – at less than 5,000 ft above mean sea level 7,000 (6) – at or greater than 5,000 ft above mean sea level
	1 hour	40,500 (35)
Pb	Quarterly	1.5
NO_2	Annual	100 (0.053)
O_3[a]	1 hour	235 (0.12)
PM_{10}	Annual 24 hour	50 150
SO_2	Annual 24 hour 3 hour	80 (0.030) 365 (0.14) 1,300 (0.5)
Hydrogen Sulfide	1 hour	112 (0.08)

$\mu g/m^3$ = micrograms per cubic meter
ppm = parts per million
Notes: The 1-hour O_3 standard for Lake Tahoe Basin is 195 $\mu g/m^3$ (0.10 ppm).

As specified in the air conformity requirements of 40 CFR 51.853/93.153 (b)(1) and applicable State and county 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 4.5.3.1-3 below depicts the total emissions inventory for Clark County in which Nellis AFB and a small area of NTTR are located, as included in the most recently approved SIP documents. Also included in the table are the regionally significant thresholds (10% of the emissions budget) for the County**.**

Table 4.5.3.1-3: SIP Emissions Budget and 10% Nonattainment Area (NAA) Emissions Budget

		Baseline Emission Levels tons/day (MT/day)				Regionally Significant Threshold tons/year (MT/year)			
Nonattainment Area	Emissions Inventory Year	CO[2]	NO_x[1]	VOC[1]	PM_{10}[3]	CO	NO_x	VOC	PM_{10}
Clark County	2008	NA	179.3 (162.7)	227.7 (206.6)	394.7 (358.1)	NA	6,544.5 (5,937.1)	8311.1 (7,539.703)	14,406.6 (13,069.4)
	2010	617.2 (559.9)	NA	NA	NA	22,527.8 (20,436.9)	NA	NA	NA

Notes: 1. 8-hour O_3 Early progress plan for Clark County, Nevada, June 2008.
2. Carbon Monoxide State Implementation Plan Revisions Las Vegas Valley NAA, Clark County Nevada, June 2005. Table 3-1.2
3. PM_{10} State Implementation Plan Milestone Achievement Report for Clark County, Nevada, June 2007 Table 6-3.

79 CARB 2005

4.5.3.2 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. It was assumed all flight operations would occur in Clark County as a worst case scenario given the nonattainment status of the county for CO, PM_{10}, and O_3. The estimated annual emissions for the Proposed Action (under either alternative) for Test Year 4 through Test Year 7 are shown in Table 4.5.3.2-1.

Table 4.5.3.2-1: Estimated Air Emissions for the Proposed JSF DT Program at NTTR Nellis 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)
4	0.05 (0.05)	0.83 (0.76)	<0.001 (<0.001)	0.06 (0.06)	0.004 (0.003)
5	0.07 (0.07)	1.18 (1.07)	<0.001 (<0.001)	0.09 (0.08)	0.005 (0.005)
6	0.07 (0.06)	1.14 (1.03)	<0.001 (<0.001)	0.09 (0.08)	0.005 (0.005)
7	0.13 (0.12)	2.11 (1.91)	<0.002 (<0.002)	0.16 (0.14)	0.009 (0.009)
Highest (Test Year 7)	0.13 (0.12)	2.11 (1.91)	<0.002 (<0.002)	0.16 (0.14)	0.009 (0.009)

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

Table 4.5.3.2-2 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 are below the applicable *de minimis* thresholds and the annual project related emissions do not make up 10% or more of the NAAs total emissions inventory. It is expected, therefore, that impacts on air quality would not be significant for the proposed action at NTTR.

Table 4.5.3.2-2: Proposed JSF DT Peak Year Emission Comparison

Pollutant	Highest Year Emissions[1] tpy	*de minimis* Threshold tpy	Regionally Significant Threshold tpy
CO	0.13	100	22,527.8
NO_x	2.11	100	6,544.5
VOC	<0.002	100	8311.1
PM_{10}	0.009	70	14,406.6

Note: 1. The highest year represents the year (Test Year 7) with the potential to produce the greatest estimated emissions from the Proposed Action.

GHG emissions (CO_2, CH_4, N_2O) were also estimated for the proposed aircraft operations at NTTR, based on the total quantity of fuel combusted and applying emissions factor specific to the fuel burned (JP-8) from generally accepted GHG protocols. Note the protocols do not include an emission factor for JP-8, therefore the emission factor for Jet A/A-1 was used. The GHG emissions were converted to a CO_2e basis using the GWP of each gas.

The CO_2e generated from the Proposed Action are shown in Table 4.5.3.2-3 below. Approximately 3,845 MT of CO_2e would be generated by sources and operations comprising the Proposed Action. There is no requirement under the General Conformity Rule to consider GHG emissions; therefore in absence of any regulatory standard, the results of the analysis for NTTR were compared to the 2009 total U.S. GHG emissions of 6,633.20 million metric ton (MT) CO_2e.[80] The emissions associated with the Proposed Action would result in a increase of less than a 0.0001% increase, and as such would not be a significant source of GHG emissions. Section 3.1.5 provides a high level overview of DoD's and the Service's energy activities (e.g., alternative fuels, reduce energy consumption, etc.), which have an added benefit of reducing greenhouse gas emissions.

Table 4.5.3.2-3: Estimated GHG Emissions for the Proposed JSF DT Program at NTTR, Nellis AFB

Test Year	CO_2e (MT)
4	610
5	864
6	830
7	1,541
Total	3,845
Highest (Test Year 7)	1,541

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.

Based on the *Final Base Realignment and Closure (BRAC) Environmental Assessment for Realignment of Nellis Air Force Base, Headquarters Air Combat Command and Nellis AFB, NV, March 2007*, annual airfield operations at Nellis AFB varies between 61,000 and 181,000 from 1987 to 1994. More recent data indicated there were approximately 86,000 airfield operations in 2003, as reflected in Table 4.5.4.1-1. Overall, airfield operations translate to approximately 43,000 sorties per year.

Table 4.5.4.1-1: Annual Airfield Operations at Nellis AFB – 2003

Aircraft Based at Nellis AFB	62,474
Transient Aircraft	23,155
Total	**85,629**

Historical use on NTTR ranges from 200,000 to 300,000 sortie-operations annually. The EA reflected current noise levels of 65 DNL to greater than 85 DNL affect approximately 18,098 acres at Nellis AFB, with the highest noise levels on and around the runway and flight-line. Nellis AFB has a program to reduce noise over off-base residential areas. Noise abatement procedures for flights over residential areas

80 EPA 2009

to the south and southwest and North Las Vegas generally include expedited climb to 6,000 feet MSL for fighter aircraft and 2,500 to 3,500 feet MSL for others; 60-degree banked right turn upon departure; a departure to the north before 9:00 a.m.; and practice approaches after 9:00 a.m. on weekends and holidays. Engine run-up locations have been established in areas that minimize noise for those in the surrounding communities, as well as for people on-base.

4.5.4.2 Environmental Consequences

The proposed JSF DT activities 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 Program would occur in Test Year 7, as illustrated in Table 4.5.2-1, with a total of 257 flight hours for both JSF and support aircraft. As reflected in the 2007 EA/OEA, 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, and Reveille N/S MOA). [1] This increase would be considered less than significant resulting in minimal to negligible changes to the baseline noise levels.

The BRAC EA of 2007 for Nellis AFB addressed the supplement of the 57th Adversary Tactics Group complement of aircraft for two existing aggressor squadrons at the base, and the 64th Aggressor Squadron (64ARGS) and the 65th Aggressor Squadron (65 ARS) receiving 5 F16 aircraft and 18 F-15C aircraft, respectively. Beddown was planned for FY 2007, 2010, and 2011. Eleven new facilities for personnel and equipment were required to accommodate the realignment. Approximately 1,400 more sorties would be flown from Nellis AFB. The EA concluded the addition of these aircraft sorties would not change the baseline on noise levels at Nellis AFB considering the 200,000 to 300,000 sorties flown at the base and the BRAC action would only represent a 3% increase over baseline conditions of 43,000 annual sorties. F-35 specific flights of 120 would represent less than 1% of the baseline (i.e., 43,000 sorties). It is also expected the F-35 JSF DT Program would adhered to the same flight procedures for noise abatement as reflected above in Section 4.5.5.1 during the conduct of DT activities. Therefore, the proposed JSF DT activities 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 baseline noise environment, or cause changes or revisions to the 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 five endangered and three threatened species, while an additional 34 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. The golden eagle (*Aquila chrysaetos*) is a year-round resident of NAFR.[81] 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.

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.[82] 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.[83] NAFR implements an aggressive BASH Program.

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 30% of the projected JSF DT activities would be conducted below 3,000 feet AGL but of short duration. 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 take-offs with the F-35 would be conducted at NTTR Nellis AFB. Potential impacts to biological resources from the proposed JSF DT activities 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 activities over a 4-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 Program is projected to peak in Test Year 7 with a planned flight profile of 144 flights (48 for the F-35 and 96 for support aircraft) and 257 flights hours (91 for the F-35 and 166 for support aircraft). Further, the entire 4-year test period (360 total flights/642 flight hours with both F-35 and support aircraft) would represent 1% or less of the sortie operations in the NRC. The proposed JSF DT activities 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 Program. The potential to startle wildlife

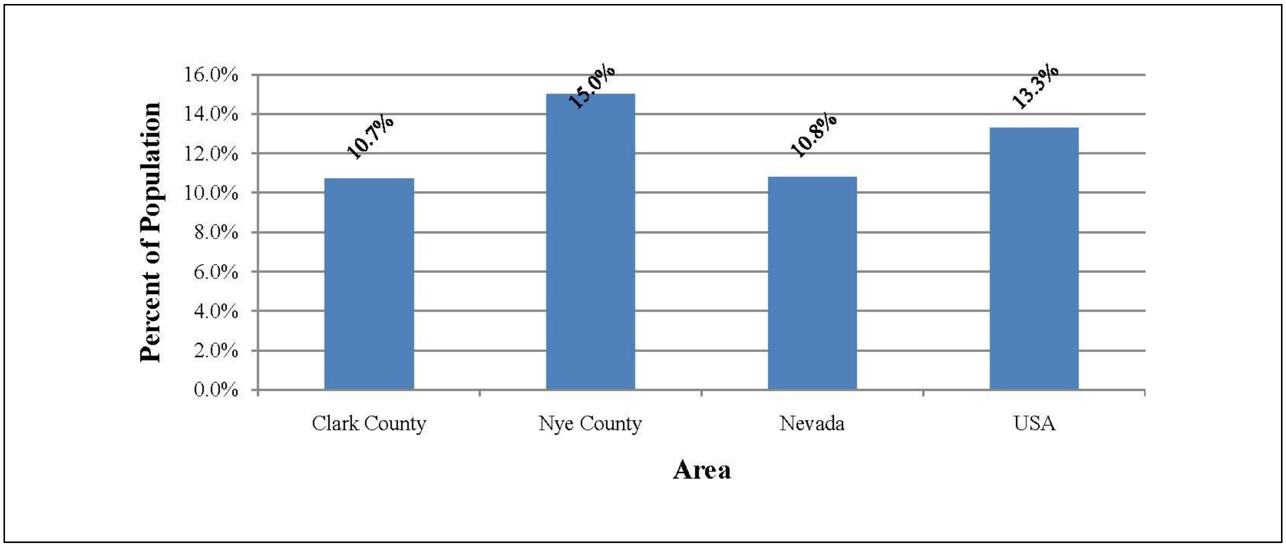
81 U.S. Air Force 2007
82 U.S. Air Force 2011
83 U.S. Air Force 1997

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, especially considering most operations would occur at high altitudes. Similarly, no significant impacts to biological/natural resources would be expected over the 4-year test period for the proposed JSF DT Program.

4.5.6 Socioeconomics at NTTR Nellis AFB

4.5.6.1 Affected Environment

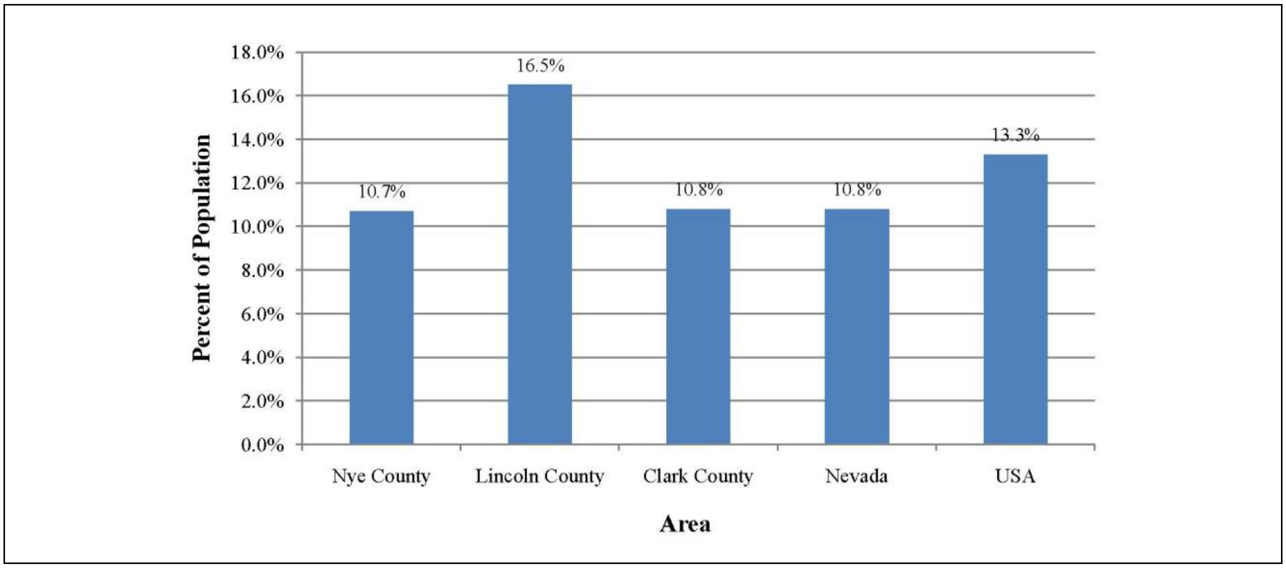
NTTR Nellis AFB encompasses Nye, Lincoln, and Clark counties. U.S. Census American Community Survey 2005-2007 3-year estimate poverty rates for NTTR Nellis AFB study area, which only include the counties with a population larger than 20,000 people, are summarized in Figure 4.2.6.1-1. The poverty rate is 10.7% in Clark County and 15.0% in Nye County. The poverty rate in Nye County exceeds the Nevada poverty rate of 10.8%, but both counties are well below the set CEQ threshold of 25% for low-income populations.



Source: U.S. Census Bureau, 2005-2007 3-year estimate.

Figure 4.5.6.1-1: Poverty Rates for NTTR Nellis AFR Socioeconomic Study Area (2005-2007)

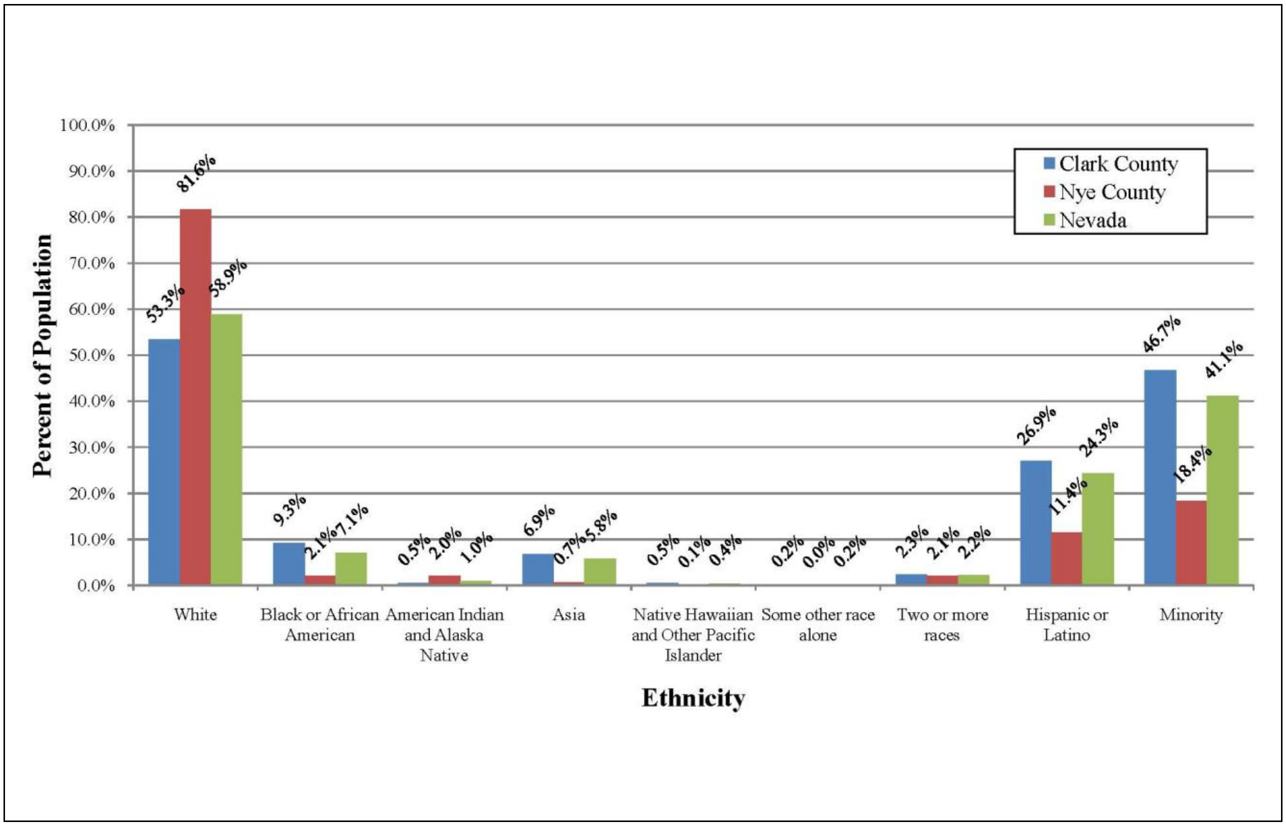
Poverty rates of all counties in NTTR Nellis AFB for 2000 are summarized in Figure 4.5.6.1-2. The poverty rate is 10.7% in Nye County, 16.5% in Lincoln County, and 10.8% in Clark County. The poverty rate in Lincoln and Clark Counties exceed the Nevada poverty rate of 10.5%, but all three counties are well below the set CEQ threshold of 25% for low-income populations.



Source: U.S. Census Bureau, 2000.

Figure 4.5.6.1-2: Poverty Rates for NTTR Nellis AFR Socioeconomic Study Area

U.S. Census American Community Survey 2005-2007 3-year estimate of population ethnicity, which only include the counties with a population larger than 20,000 people, is summarized in Figure 4.5.6.1-3. The two-county area population is predominantly white (54.0%). The remaining race distribution in the two-county area are Hispanic or Latino (26.6%), Black or African American (9.1%), Asian (6.7%), two or more races (2.3%), American Indian or Native Alaskan (0.6%), Native Hawaiian (0.5%), and some other race (0.2%). Both counties are below the CEQ threshold of 50%, but Clark County is slightly above the State minority population of 41.1%.

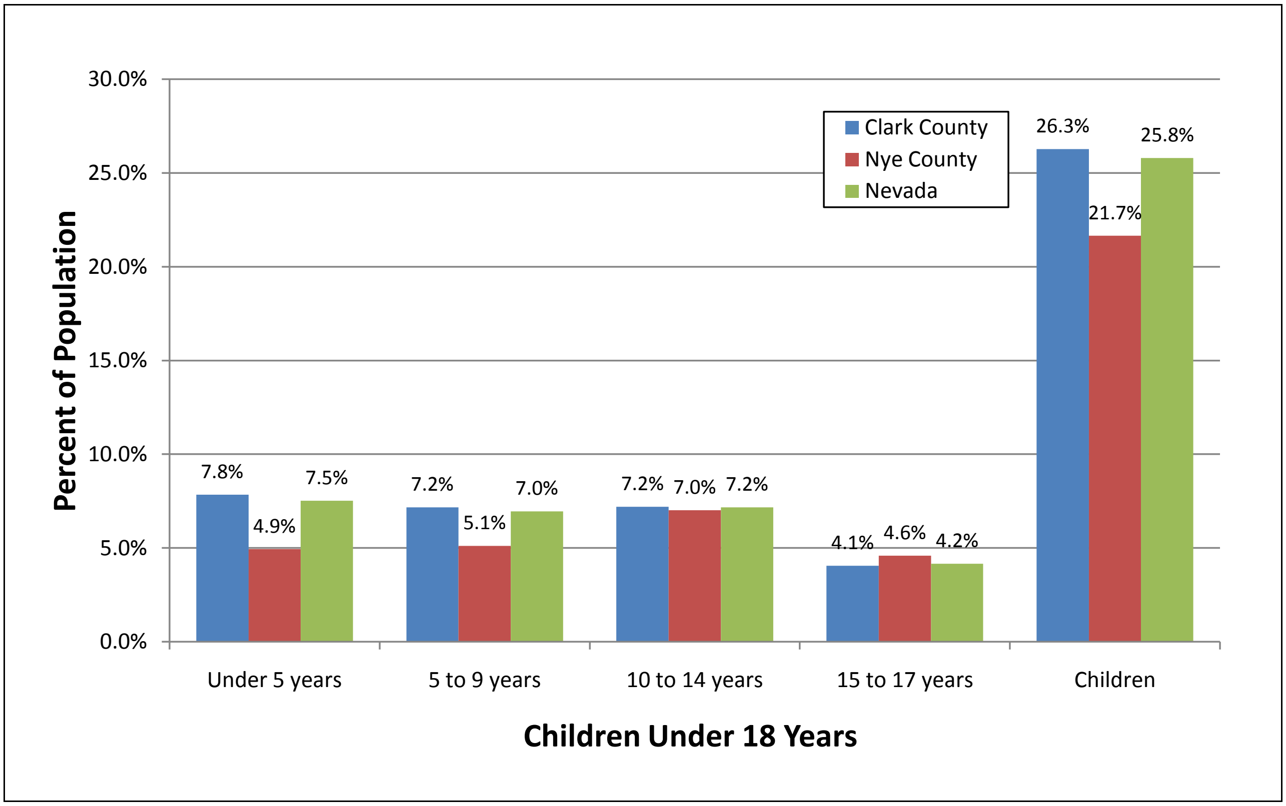


Source: U.S. Census Bureau, 2005-2007 3-year estimate.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 4.5.6.1-3: Ethnicity for NTTR Nellis AFR Socioeconomic Study Area

U.S. Census American Community Survey 2005-2007 3-year estimate of children demographics, which only include counties with a population larger than 20,000 people, is summarized in Figure 4.5.6.1-4. The two-county area shows there is a relatively even distribution of children under the age of 14 and slightly smaller population of children 15 to 17 years of age. The largest group of children is under 5 years (7.8%) and the remaining distribution is 10 to 14 years old (7.2%), 5 to 9 years old (7.1%), and 15 to 17 years old (4.1%). The two-county child population is 26.2%; closely resembling the statewide average of 25.8%.[84]

84 Census Bureau 2009

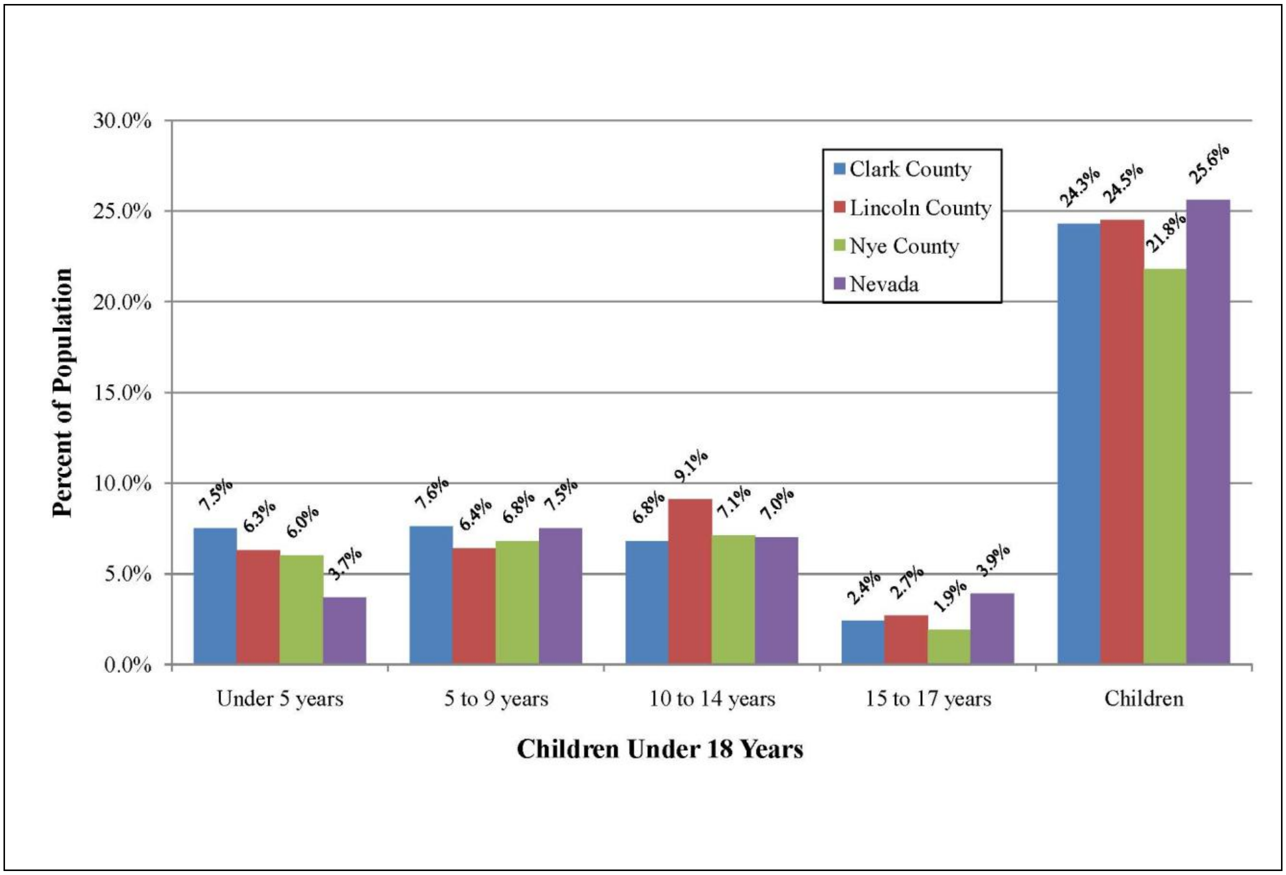


Source: U.S. Census Bureau, 2005-2007 3-year estimate.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 4.5.6.1-4: Children Demographics for NTTR Nellis, Socioeconomic Study Area

The 2000 children populations for all counties in the NTTR Nellis AFR study area is summarized in Figure 4.5.6.1-5. The 3-county area shows a relatively even distribution of children under 5 years of age to 14 years and a smaller population of children 15 to 17 years of age. The largest group of children are age 5 to 9 years old (7.6%) and the remaining distribution is under 5 years old (7.5%), 10 to 14 years old (6.8%), and 15 to 17 years old (2.4%). Percent of the population under 18 years of age for three counties are lower than statewide estimate of 25.6%[85], which is similar to the 2005-2007 estimates.

85 Census Bureau 2009



Source: U.S. Census Bureau, 2000.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 4.5.6.1-5: Children Populations for NTTR Nellis AFR Study Area

4.5.6.2 Environmental Consequences

Socioeconomic impacts would not be anticipated because no new personnel are required to support the proposed JSF DT activities at NTTR Nellis AFB. Environmental justice and children populations are not expected to be significantly affected from the proposed JSF DT activities. The proposed JSF DT Program flights would be conducted predominantly above 3,000 feet and higher, with no take-offs or landings at NTTR Nellis AFB. As such, the proposed JSF DT activities would not likely cause disproportionate high or adverse human health and environmental affects to the environmental justice and children 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 Program 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 group of children may be present would be expected to occur.

4.6 VACAPES OPAREA

4.6.1 General Information

The portion of the VACAPES OPAREA underlying 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, based on the sea floor, range from less than 60 feet (shallow littoral waters) and up to 13,000 feet (deepwater ocean areas).

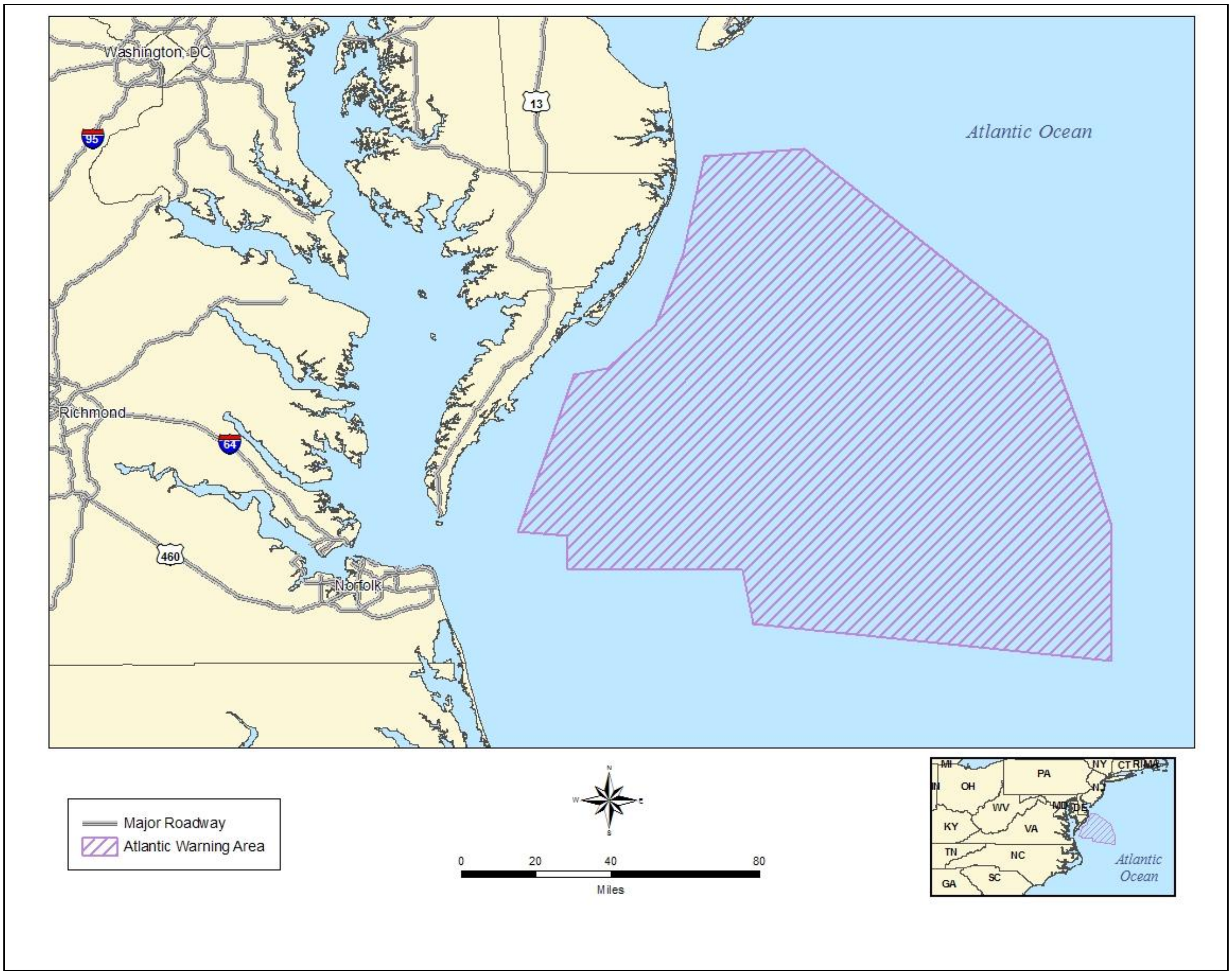


Figure 4.6.1-1: General Map of VACAPES OPAREA

4.6.2 Proposed JSF DT at VACAPES OPAREA

The VACAPES OPAREA has the necessary range and airspace to perform the proposed JSF DT Program. It is used on a regular basis by NAS Patuxent River. The required distances for established safety hazard patterns of missiles can be achieved and maintained during proposed JSF DT activities. The overall JSF DT tempo analyzed in the 2007 EA/OEA increased by 1,411 flight hours total, as reflected in Table 4.6.2-1. F-35 specific flights increased by 183.

Table 4.6.2-1: Current and 2007 EA/OEA Overall Test Program

	No. F-35 Flights	F-35 Flight Hours	No. Support Aircraft Flights	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
Current	832	1,498	2,214	3,877	3,046	5,375
2007 EA/OEA	649	1,298	1,333	2,666	1,982	3,964

Table 4.6.2-2 summarize the current proposed flight tests and support aircraft. Table 4.6.2-3 annotates the test profile analyzed in the 2007 EA/OEA. Additional support aircraft, besides the types reflected below, may include the KC-10, UK VC-10, UK TriStar, and British Aerospace Corporation (BAC) 1-11 depending on aircraft availability and requirements of proposed JSF DT activities. 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 MSL.

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 4.6.2-2: Proposed JSF DT Flight Profile at VACAPES OPAREA–Current

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	STOVL & CV FQ, STOVL & CV Performance, STOVL & CV Propulsion, Loads, Flutter, Mission Systems	5	9	F/A-18 KC-130	18	32	23	41
3	STOVL & CV FQ, STOVL & CV Performance, STOVL & CV Propulsion, Loads, Flutter, Weapons Separation & Integration, Mission Systems	86	155	F/A-18 KC-130 F-15, E3, E2, EP-3E, EA-6, AH-66, V22 NIMROD ASTER EFA	290	516	376	671
4	Same as Test Year 3 and Shipboard Suitability[1]	218	392	Same as Test Year 3	547	974	765	1,366
5	Same as Test Year 3	177	319	Same as Test Year 3	436	776	613	1,095
6	Loads, Flutter, Weapons Separation & Integration, Mission Systems, Shipboard Suitability[1]	204	367	Same as Test Year 3	561	999	765	1,366
7	Weapons Separation & Integration, Mission Systems, Shipboard Suitability	142	256	F/A18 KC130	362	580	504	836
TOTAL		***832***	***1,498***		***2,214***	***3,877***	***3,046***	***5,375***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005) and Updated NAS Patuxent River Supplement Data Verification (2007-2008).

Notes: 1. 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.

2. During Test Year 4, shipboard sorties with the F-35B would be approximately 28 and approximately 47sorties with the F-35C. For Test Year 6, approximately 28 sorties with the F-35B and approximately 93 sorties with the F-35C would occur for shipboard tests.

Table 4.6.2-3: Proposed JSF DT Flight Profile at VACAPES OPAREA–2007 EA/OEA

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	CV FQ, CV Performance, CV Propulsion, Loads, Flutter, Mission Systems	25	50	F/A-18 KC-130	47	94	72	144
3	CV FQ, CV Performance, CV 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 Program, however, the proposed test profile may fluctuate up or down as the F-35 variants proceed through the various DT activities and time periods.

Proposed shipboard tests with the F-35Bs and F-35Cs would be used to gather and verify data to be used in Aircraft Launch Bulletins and Aircraft Recovery Bulletins for the F-35C and Shipboard Operating Bulletins for the F-35B. The proposed F-35B tests would include STOVL operations on an Amphibious Assault Ship (multipurpose) (LHD) at various aircraft weights, loadings, and wind conditions. The proposed testing for the F-35C will include catapult launches and arrested landings, as well as approach flying qualities testing at various aircraft gross weights and configurations to an CVN class ship.

For the proposed shipboard testing, the F-35 would ferry from NAS Patuxent River at or below 10,000 feet MSL to where the ship is located within the VACAPES OPAREA. The F-35 Joint Program Office is capitalizing predominantly on the availability of USN class ships already conducting their scheduled, routine missions in the VACAPES OPAREA. Scheduling of deck time with the ships would be conducted approximately 18 months prior to embarking for proposed JSF DT tests. Proposed flight testing would be conducted within the shipboard take-off and landing pattern of which approximately 40% of the proposed tests would be conducted at night.

Approximately 150 hours of at sea F-35B testing is planned consisting of approximately 56 sorties. Proposed testing would be divided between two DETs aboard an LHD. Two F-35Bs would be used for each 2-week test period currently planned for Test Years 4 and 6. Approximately 40% of the flight test time for the F-35B would in a hover directly near and over the deck of the LHD at an altitude of approximately 150 feet MSL or less. A third 2-week block of testing is planned for Test Year 7 with a UK Carrier Vessel Future. The number of flight hours and F-35B aircraft needed for this test period is yet to be determined. In addition, there are three 2-week DETs scheduled for F-35C testing aboard a CVN. This testing would consist of approximately 140 sorties and 280 flight hours total using two F-35Cs in the first DET in Test Year 4, one aircraft in the second DET planned for Test Year 6, and two aircraft for the third DET also in Test Year 6.

Tables 4.6.2-4 summarize the stores/expendables proposed for use at the VACAPES OPAREA, while Table 4.6.2-5 summarizes those from the 2007 EA/OEA. There is the possibility of using the UK ASRAAM in support of the proposed weapons integration testing in the VACAPES OPAREA from NAS Patuxent River.

Table 4.6.2-4: Proposed JSF DT Stores/Expendables at VACAPES OPAREA–Current

Test Year	Stores/Expendables	
	Type	Quantity*
2	GBU-12 LGB (6) MK 84 JDAM (18)	24
3	GBU-32 JDAMs (10) AIM120 AMRAAM (10)	20
4	GBU-12 LGB (1) GBU-31 JDAMs with BLU-109 Bomb Bodies (3) GBU-31 JDAMs (6) AIM120 AMRAAM (19) JSOW (12)	41
5	GBU-12 LGB (25) GBU-31 JDAMs with BLU-109 Bomb Bodies (3) GBU-32 JDAMs (6) MK82 (30) Fuel Tank (12)	76
6	GBU-12 LGB (6) GBU-31 JDAMs with BLU-109 Bomb Bodies (3) GBU-31 JDAMs with MK84 Bomb Bodies (6) AGM-154C JSOWs (8) AIM-120 AMRAAM (4) AIM-9X Sidewinder (13) LGTR (22)	62

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005) and Updated NAS Patuxent River Supplemental Data (2005-2007).

Note: Proposed stores/expendables reflect realistic approximations for the proposed JSF DT Program, however, the proposed test profile may fluctuate up or down in quantities as the F-35 variants proceed through the various DT activities and time periods. It is possible usage quantities for stores may slide into the next test year if not used in the planned test year.

Total for all types

Table 4.6.2-5: Proposed JSF DT Stores/Expendables at VACAPES OPAREA–2007 EA/OEA

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*

Air-to-air ground stores expended would be inert bomb bodies. Air-to-air missiles would have inert armament sections. 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 would 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 relevant 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. Section 3.1.5 provides a high level overview of DoD's and the Service's energy activities (e.g., alternative fuels, reduce energy consumption, etc.), which have an added benefit of reducing greenhouse gas emissions.

4.6.4 Noise at VACAPES OPAREA

4.6.4.1 Affected Environment

The proposed JSF DT Program would be conducted 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 activities would occur in Test Years 4 and 6 with 765 total flights for both F-35 and support aircraft in each Test Year, as reflected in Table 4.6.2-1. Approximately 218-F-35 flights in Test Year 4 would be conducted while 204 F-35 flights would occur in Test Year 6. Annualized, this operational tempo would constitute less than 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 activities would not be expected to result in any significant increases in noise, or cause changes or revisions to the existing airspace areas and use 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 were analyzed in the *Virginia Capes Range Complex Final Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) (March 2009)*, as well as the *Overseas Environmental Assessment of Testing the Hellfire Missile System's Integration with the H-60 Helicopter (May 2005);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 environment at the VACAPES OPAREA. 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 biological resources, and additional information on threatened and endangered species found within the VACAPES OPAREA, as derived from the above mentioned references and based on the 2007 EA/OEA.

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, 4 species of sea turtles, and numerous marine birds.[86]

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 11 others are listed as strategic stocks under the MMPA.[87] 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.[88] 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, and further information is available in the VACAPES EIS/OEIS, Volume 1, Section 3.6-3.8.

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86 NAVAIR 2005
87 DoN 2001, NAVFAC 2002, and NAVAIR 2005
88 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		M	M	M	M
Family Ziphiidae	**Beaked whales**					
Mesoplodon densirostris	Blainville's beaked whale		M	M	H	M
Ziphius cavirostris	Cuvier's beaked whale		M	M	H	M
Mesoplodon europaeus	Gervais' beaked whale		M	M	H	M
Mesoplodon bidens	Sowerby's beaked whale		A	A	A	A
Mesoplodon mirus	True's beaked whale		M	M	H	M
Hyperoodon ampullatus	Northern bottlenose whale		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.

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	**Dolphins and Porpoises**					
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
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
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		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.

Essential Fish Habitat

Thirty-three species of fish have designated EFH for at least one stage of their life-cycle in the proposed JSF DT Program 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.[89] 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, and Section 3.9 of the VACAPES EIS/OEIS, Volume 1.

4.6.5.2 Environmental Consequences

Potential environmental impacts could occur from the proposed JSF DT Program overflights and weapons separation tests. Because the majority of the proposed JSF DT activities would not be consistently at low-levels over the water of the VACAPES OPAREA, no impacts from noise would be anticipated to marine species. Additionally, the VACAPES Final EIS/OEIS of March 2009 found no significant impact or harm resulting from weapons firing/non-explosive practice munitions use. This is further substantiated in the VACAPES EIS/OEIS of March 2009, which concluded fixed-wing aircraft overflights were not expected to result in chronic stress to animals, or result in injurious or non-injurious effects. 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 76 separations in Test Year 5 with a planned total of 223 during a six-year test period. *The Environmental Assessment (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 VACAPES

89 NAVAIR 2005

OPAREA, similar in type and greater in tempo (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, including marine mammals and 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 for determining the potential impact on marine mammals and sea turtles. Similar conclusions of no effects from weapons firing/non-explosive practice munitions use were reached in the VACAPES Final EIS/OEIS of March 2009. As such, direct impacts to the marine environment are not likely from the proposed JSF DT activities. Mitigation measures reflected in Chapter 5 of the March 2009 EIS/OEIS for the VACAPES would be adhered to during proposed weapons separation and integration tests. These measures, as synopsized and further detailed in Section 5.7 of the VACAPES EIS/OEIS, include but are not limited to:

- Buffer zones for the protection of marine mammals and sea turtles will be established.
- Aircraft (aerial surveillance) will visually survey the target and buffer zone for marine mammals and sea turtles prior to and during test events.
- If surface vessels are involved, on-board ship lookouts will survey for *Sargassum* rafts, and ordnance shall not be targeted to impact within established zones of the known/observed rafts, marine mammals, sea turtles, or coral reefs.
- Events will not begin or will be stopped if marine species are in the buffer zone or vicinity of the proposed weapons firings/releases.

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 activities. Impacts for environmental justice and children are also not expected since 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. Annual 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. Available NMFS statistics show the 2009 commercial harvest of finfish and shellfish from waters off the coasts of Maryland, Delaware, and Virginia totaled 226,606 metric tons for a reported retail value of approximately $236.3 million.[90]

4.6.6.2 Environmental Consequences

Socioeconomic impacts from the proposed JSF DT activities 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.

90 NMFS 2008

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 CZMP includes the inland boundary of the counties bordering the Atlantic Ocean, 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/A-18E/F Stores Separation Testing at NAS Patuxent River (January 1997)*and the *Virginia Capes Range Complex Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) (March 2009)* analyzed the impacts of inert stores separations in the VACAPES OPAREA, similar in type and greater in tempo than the Proposed Action. Potential direct impacts to marine animals were found to be less than significant. The PEO of the F-35 Joint Program Office has determined the conclusions reached in the 2007 EA/OEA remain unchanged as reflected in the Negative CCD for each State in accordance with the CZMA (See Appendix G.1, G.2, and G.3. The proposed JSF DT Program would be consistent to the maximum extent practicable with the enforceable policies of the Delaware, Maryland, and Virginia Coastal Management Programs.

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."[91] 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.

91 40 CFR 1508.7

Activities that are reasonably foreseeable in the future, with the potential to interact with the Proposed Action, were considered in a qualitative assessment. The impact of past actions are reflected in the current baseline environment (the as is condition). On-going or future actions considered, included but are not limited to, BAMS DT at NAWCWD Point Mugu and VACAPES; F-22 Follow-On T&E (FOT&E); F/A-18E/F and EA-18G FOT&E at NAWCWD Point Mugu, NAWCWD China Lake, and VACAPES; the 57th Adversary Tactics Group and 65th Aggressor Squadron at Nellis AFB, etc. Current and future actions at the proposed locations listed below in Table 4.7-1 would not be expected to exceed current flight operation levels or airspace/range capacity based on the scheduling of operations and range asset usage conducted by each proposed location.

The proposed JSF DT Program is considered consistent with similar, on-going activities and operation constraints at Eglin AFB, NAWCWD China Lake, NBVC 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 airspace and range use parameters. The proposed JSF DT activities 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 F-35 Joint Program Office, JSF ITF 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 that potential impacts would be minor to negligible at each of the above proposed test locations, as summarized in Table 4.7-1. The implementation of the proposed JSF DT Program, along with any present and reasonably foreseeable actions, would not adversely impact air quality, noise, biological/natural, socioeconomic, or coastal zone resources at any of the proposed test locations as reflected below in Table 4.7-1.

Table 4.7-1: Associated Test Location Analysis Summary

Proposed Associated Test Location	**Summary of Potential Environmental Impacts**
Eglin AFB	The proposed JSF DT Program 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 NBVC Point Mugu	The proposed JSF DT Program 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 FEIS/OEIS Point Mugu Sea Range for which no significant impact was found. The Proposed Action would represent approximately 2-7% 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 activities 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. Environmental justice/children population impacts are expected to be negligible. No significant impacts or harm to air quality, biological/natural resources, environmental justice/children populations (based on threshold criteria), and coastal zone resources (for NBVC Point Mugu) would be expected from the proposed JSF DT activities.
WSMR	The proposed JSF DT Program 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. The tempo or amount of proposed tests is significantly less than those analyzed in the WSMR EIS and Final EA for the AMRAAM. 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.

Table 4.7-1: Associated Test Location Analysis Summary (Continued)

Proposed Associated Test Location	Summary of Potential Environmental Impacts
WSMR (Continued)	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/ children population impacts are expected to be negligible. No significant impacts to air quality, biological/natural resources, and environmental justice/children populations (based on threshold criteria) would be expected from the proposed JSF DT activities.
NTTR Nellis AFB	The proposed JSF DT activities would have no impacts to air quality, biological/natural resources, or environmental justice/children populations (based on threshold criteria), since proposed flight tests at NTTR Nellis AFB would be conducted at altitudes predominantly above 3,000 feet AGL and higher and no supersonic flight tests are planned. Only 30% of the entire proposed JSF DT Program would be conducted below 3,000 feet and of short duration. 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. 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/children population impacts are expected to be negligible.
VACAPES OPAREA	The proposed JSF DT Program would be consistent with the activities analyzed in the *EA for the F/A-18E/F Stores Separation Testing at NAS Patuxent River (January 1997)* and the *Virginia Capes Range Complex Final Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) (March 2009)*. No significant impacts to air quality and biological/natural resources would be expected. The proposed JSF DT Program 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 activities. There would be no expected impacts from noise or to socioeconomics, including environmental justice/children populations. No significant impacts or harm to air quality, biological/natural resources, environmental justice/children populations (based on threshold criteria), and coastal zone resources are expected from the proposed JSF DT activities.

5.0 EDWARDS AFB

5.1 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.

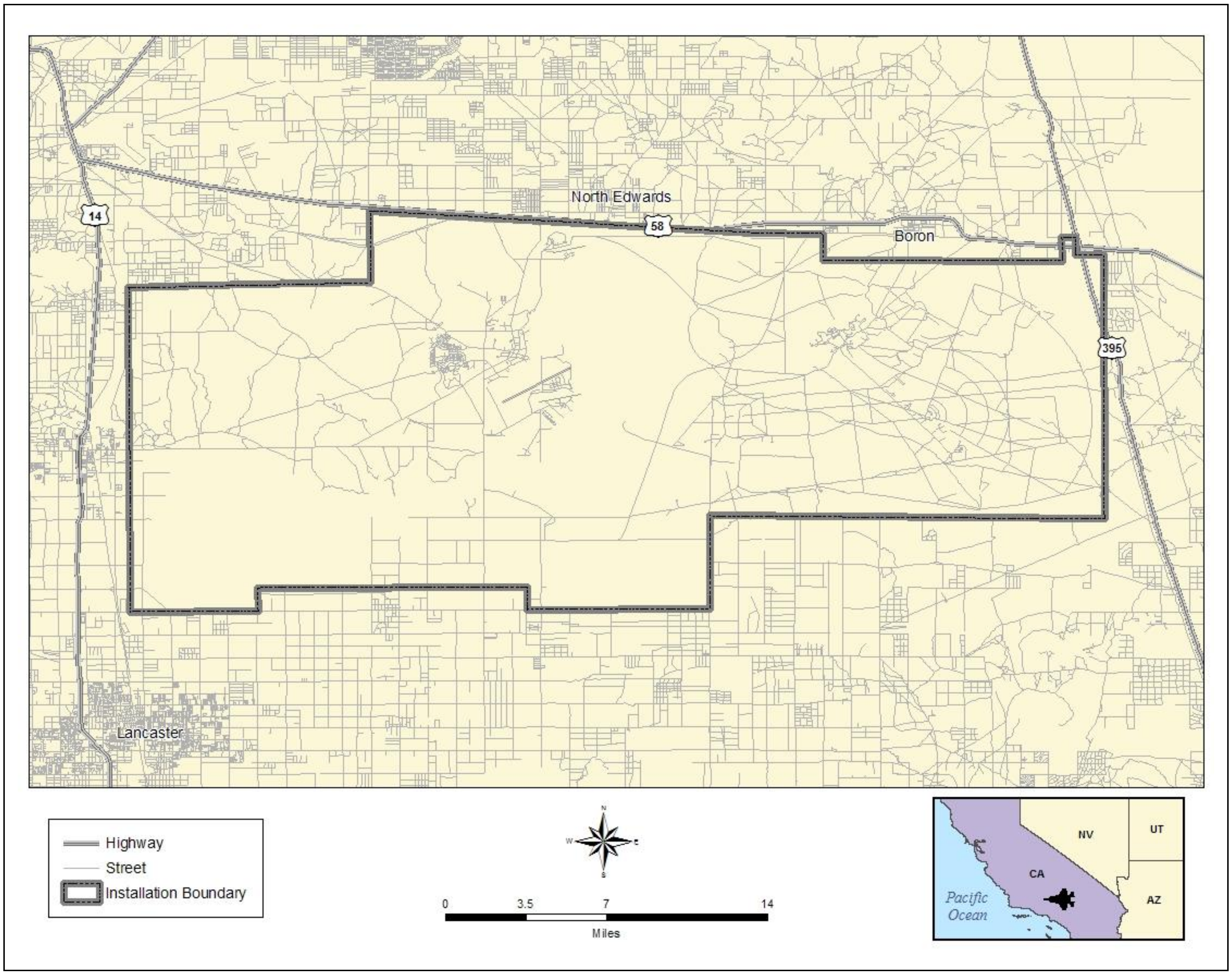


Figure 5.1-1: General Map of Edwards AFB

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 the required test equipment, facilities expressly designed for flight test support, laboratories, and trained personnel necessary to conduct flight test operations.

5.2 PROPOSED JSF DT PROGRAM AT EDWARDS AFB

The AFFTC at Edwards AFB is the primary responsible test organization for implementing the proposed JSF DT Program. Approximately 642 personnel would support the proposed JSF DT activities, of which 408 were new employees. 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.

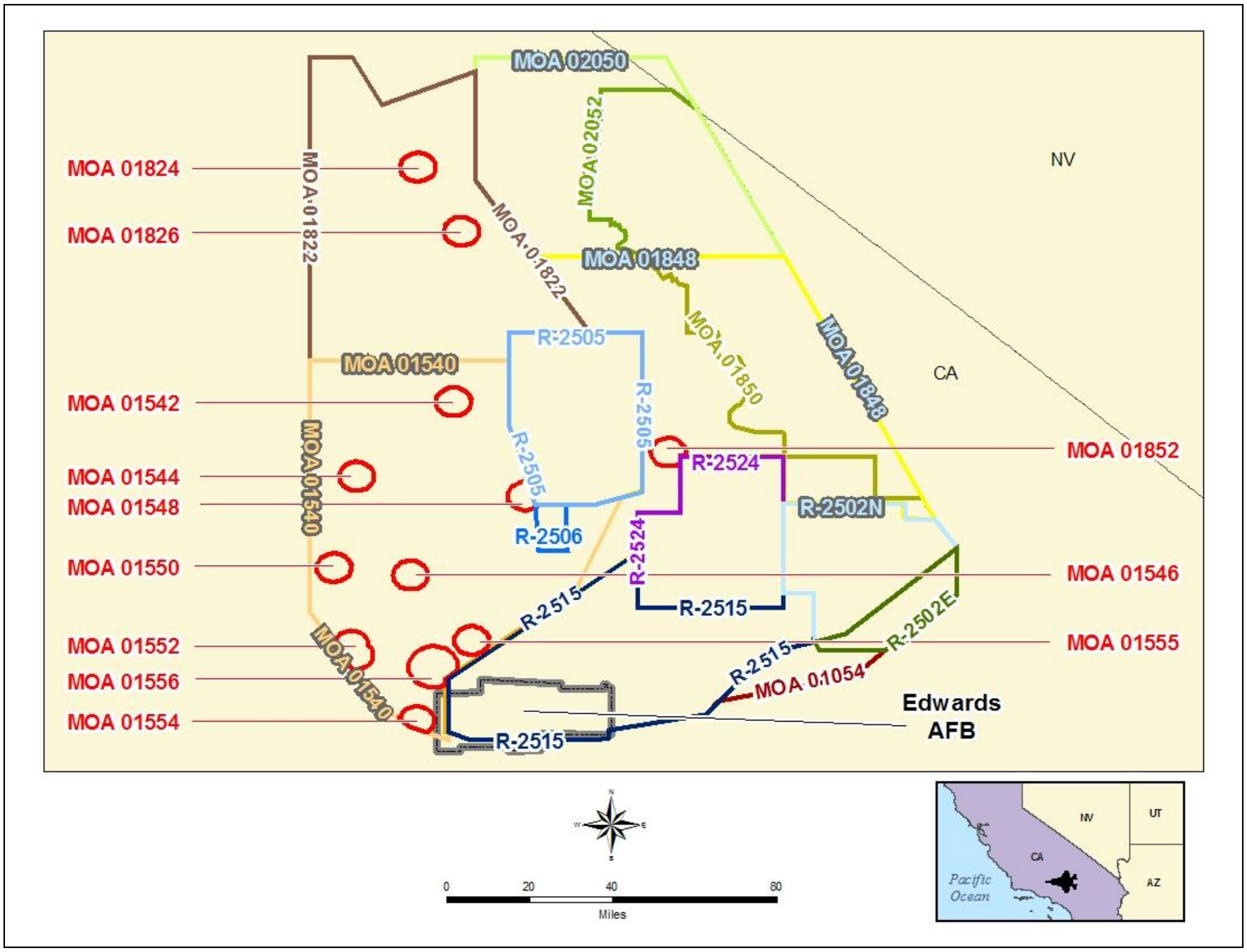


Figure 5.2-1: Representative Edwards AFB Airspace

The JSF DT tempo for the F-35 analyzed in the 2007 EA/OEA increased by 959 flights (1,519 flight hours) total, as reflected in Table 5.2-1. Including support aircraft, the tempo increased by 3,079 flights – from 6,217 flights in the 2007 EA/OEA to 9,296 flights.

Table 5.2-1: Current and 2007 EA/OEA Overall Test Program

	No. F-35 Flights	F-35 Flight Hours	No. Support Aircraft	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
Current	3,033	5,460	6,263	9,409	9,296	14,869
2007 EA/OEA	2,074	3,941	4,143	8,610	6,217	12,551

The proposed JSF DT Program would be conducted over 7 years with the planned flights tests of the F-35 peaking in Test Year 5 (the same as in the 2007 EA/OEA). Table 5.2-2 lists the updated proposed flight tests and support aircraft analyzed in this Supplemental EA/OEA. Additional support aircraft, besides the types reflected below, may include the KC-10, UK VC-10, UK TriStar, Danish F-16, and BAC 1-11 depending on aircraft availability and requirements of proposed JSF DT activities. Table 5.2-3 annotates the test profile analyzed in the 2007 EA/OEA. Table 5.2-4 summarizes the stores/expendables proposed for use, while Table 5.2-5 summarizes those from the 2007 EA/OEA.

Table 5.2-2: Proposed JSF DT Program Flight Profiles Occurring at Edwards AFB–Current

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	CTOL FQ, CTOL Performance, CTOL Propulsion, Loads, Flutter, High AoA	72	130	F-16 KC-135	144	230	216	360
2	Same as Test Year 1 with Weapons Separation & Integration, Mission Systems, and STOVL Environment	435	783	F-16 KC-135 F-15	751	1,127	1,186	1,910
3	Same as Test Year 2	521	938	Same as Test Year 2	976	1,464	1,497	2,402
4	Same as Test Year 2	694	1,249	Same as Test Year 2	1,080	1,620	1,774	2,869
5	Same as Test Year 2	700	1,260	Same as Test Year 2	1,104	1,656	1,804	2,916
6	Same as Test Year 2	462	832	Same as Test Year 2	1,104	1,656	1,566	2,488
7	Same as Test Year 2	149	268	F-16 KC-135	1,104	1,656	1,253	1,924
Total		***3,033***	***5,460***		***6,263***	***9,409***	***9,296***	***14,869***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005), Updated Edwards/Western Area Supplemental Data Verification (2007–2009), Edwards Data 2011, and JSF ITF 2011.

Note: This is reflective of both Alternatives One and Two. Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT Program, 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 5.2-3: Proposed JSF DT Program Flight Profiles Occurring at Edwards AFB–2007 EA/OEA

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 Program, 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 5.2-4: Proposed JSF DT Program Support Equipment, Stores, and Expendables–Current

Test Year	Support Equipment		Stores/Expendables	
	Type	**Quantity***	**Type**	**Quantity***
1	Generators (A/C and Power Carts), PAO Carts, Air Compressors, Aircraft Tow Tractors, Bobtail Tow Tractors, Cargo Loaders/Weapons Loaders/Jammers, Light Carts (Portable Floodlights), Flightline Service Trucks	28	MJU-7	100
2	Same as Test Year 1	Same as Test Year 1	Same as Test Year 1	Same as Test Year 1
3	Same as Test Year 1	Same as Test Year 1	GBU-31 (5) MK83 (5)	10
4	Same as Test Year 1	Same as Test Year 1	AIM-120A/Bs (4) GBU-12 (3) GBU-31 (5) MK84 (6)	18
5	Same as Test Year 1	Same as Test Year 1	GBU-12 (3) GBU-31 (2) GBU-39 (16) CBU-105 (13) MK84 (6) 25mm Gun Ammunition (1,300)	1,347
6	Same as Test Year 1	Same as Test Year 1	GBU-31 (5) GBU-39 (18) MK84 (6) SDB (24)	53
7	Same as Test Year 1	Same as Test Year 1	GBU-31 (3) MK84 (6)	9

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003–2005) and Updated Edwards/Western Area Supplemental Data Verification (2007-2009).

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 in quantities as the F-35 variants proceed through the various DT activities and time periods. It is possible usage quantities for stores may slide into the next test year if not used in the planned test year period. Some support equipment (such as floodlights, shipboard aircraft handler, portable duct heaters, and compressors) may change out from the above listed equipment in the table depending on test requirements.

*****Total for all units and types

Table 5.2-5: Proposed JSF DT Program Support Equipment, Stores, and Expendables–2007 EA/OEA

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 Program, 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*

There is the potential for F-35 engine run-ups within the Hush House and on outdoor engine test stands during the proposed JSF DT at Edwards AFB. Proposed tests conducted in the Hush House, designed specifically for conducting indoor air testing on uninstalled aircraft engines, would be approximately three engine tests/runs per month with a total of 36 engine run-ups per year. 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. A Title V operating permit is also in place for Hush House operations. The proposed F-35 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.[92] Therefore, no further analysis is included in this EA/OEA for proposed F-35 engine tests in the Hush House. For proposed tests on the outdoor engine test stands, approximately 12 tests per year would be expected during the course of the JSF DT Program based on the 2007 EA/OEA; no different data was provided during the 2007 through 2009 data collection period in support of this Supplemental EA/OEA. These engine test activities, along with all other proposed JSF DT activities, were 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 3 to 10 inches with most occurring during the winter months.[93]

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 Quality Management District (AVAQMD)–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 with respect to Edwards AFB.

92 AFFTC 1997
93 USDA Forest Service 2006

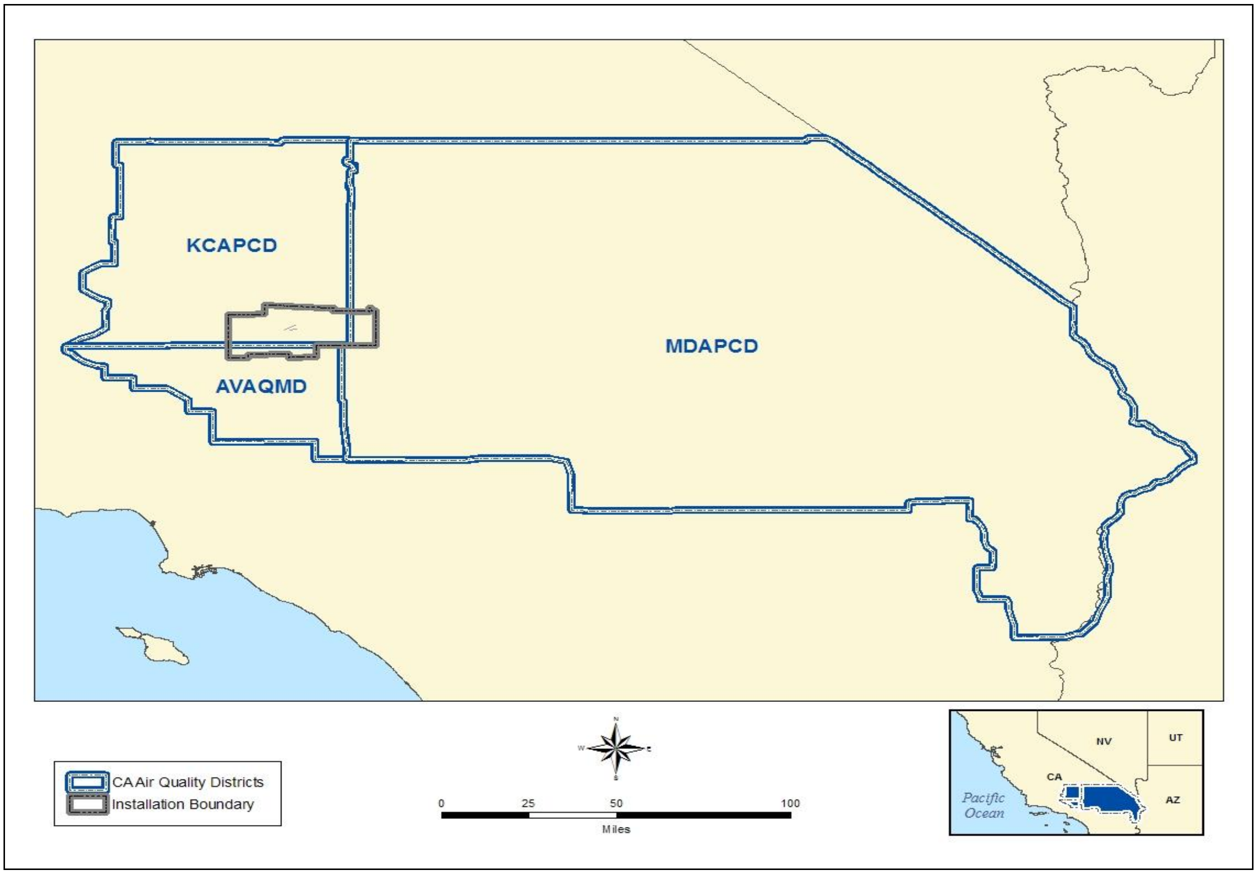


Figure 5.3.1-1: Edwards AFB Air Districts

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 8-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 (NAAs) for O_3 and PM_{10}[94]

Area	O_3 Attainment Status	PM Attainment Status	Edwards AFB Coverage
Eastern Kern County Attainment Area	Subpart 1 nonattainment for the 8-hour	Unclassified	The majority of Edwards AFB lies within Eastern Kern County
San Bernardino County (The Mojave Desert NAA)	Moderate nonattainment for the 8-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 8-hour	Unclassified	The southern portion of the base is in Los Angeles County

In addition to the Federal NAAQS, California has an approved set of AAQS. The current California AAQS applicable to Edwards AFB are provided in Table 5.3.1-2. Eastern Kern County and the MDAQMD portion of San Bernardino County are moderate nonattainment and AVAQMD portion of Los Angeles County is classified as extreme nonattainment of the State O_3 standard. The entire region is in

94 EPA 2005

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 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. There are no sulfate, hydrogen sulfide, or vinyl chloride emissions from the proposed JSF DT.

Table 5.3.1-2: California AAQS[95]

Criteria Pollutant	Averaging Time	California Standard[a] $\mu g/m^3$ (ppm)
CO[b]	8-hour 1-hour	10,000 (9) 23,000 (20)
Pb[c]	30-day average	1.5
NO_2	1-hour	339 (0.18)
O_3	1-hour 8-hour	180 (0.09) 137 (0.070)
PM_{10}	Annual 24-hour	20 50
$PM_{2.5}$	Annual	12
SO_2	24-hour 1-hour	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 [1- 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.

95 CARB 2005

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

		Baseline Emission Levels tons/day (MT/day)			Regionally Significant Threshold tons/year (MT/year)		
District	Emissions Inventory Year	NO_x[a]	VOC[a]	PM_{10}	NO_x	VOC	PM_{10}
AVAQMD[b]	2011	23.2 (21.0)	22.5 (20.4)	N/A	845 (767)	820 (744)	N/A
KCAPCD[c]	2008	47.3 (42.9)	10.8 (9.80)	N/A	1,726 (1,566)	394 (358)	N/A
MDAQMD[d]	2011	129.0 (117.1)	47.51 (43.1)	N/A	4,710 (4,272)	1,734 (1,573)	N/A

Notes: a. Tons per day (metric tons per day) during the O_3 season (April through October).
b. AVAQMD Federal 8-hour O_3 Attainment Plan (Western Mojave Desert Non-attainment Area) May 20, 2008.
c. Air Resources Board Early Progress Plans Demonstrating Progress Toward Attaining the 8-hour National Air Quality Standard for Ozone and Setting Transportation Conformity Budgets for Ventura County, Antelope Valley – Western Mojave Desert, Coachella Valley Eastern Kern County, and Imperial County, January 29 2008.
d. MDAQMD Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area) June 9, 2008.

5.3.2 Emission Estimation Methodology

The emission estimates used to determine General Conformity Rule applicability were calculated for flight operations and GSE identified for the proposed JSF DT activities 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*.[96] 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.[97] For AB operations, emission factors from F119 testing were used except for particulate emissions.[98] PM emission factors for the F-35 engine during non-AB conditions were calculated using the FAA First Order Approximation, Version 3 methodology, which differentiates between volatile, sulfate and soot particles. The volatile particulate emissions were calculated based on the gaseous HC emissions; the sulfate emissions were calculated based on the assumed sulfur content of the fuel of 0.047%; and the soot particles were based on data from the Office of Naval Research (ONR). Engine operating times for all unscheduled post-maintenance & engine replacement re-run requirements was based upon P&W model predictions for mature fleet reliability.

Emissions from engine test cell operations and in-frame engine testing were calculated based on information provided by P&W. The number of uninstalled engine runs was projected to be 12 annually with an average run-time of 180 minutes. P&W also projected an average of one in-frame engine test per month with a run time of approximately one hour. Engine operating times for all unscheduled post-maintenance and engine replacement re-run requirements was based upon P&W model predictions for mature Fleet reliability.

96 O'Brien 2002
97 Graves 2002
98 Wade 2002

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.[99] [100] [101]

Emissions from additional commuter traffic associated with new personnel (approximately 470) 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.[102] The EDMS Program was used to estimate emissions from the additional vehicle traffic.[103] Emissions from refueling operations were calculated using procedures recommended by the EPA in AP-42.[104]

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 F-35 Joint Program Office chose to assess all emissions associated with the Proposed Action as if the emissions would occur only in Kern County. The estimated annual emissions (tpy/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. The highest year annotated in this table represents the year most likely to produce the greatest estimated emissions. The difference in the highest emissions per test year for the various criteria pollutants is a function of the combination of different emission sources (e.g., aircraft, GSE, personal vehicles) and the operation of those sources. Often the difference in the highest year is slight. However, the mix of emission sources will cause emissions to be highest in one year for a given pollutant and in a different year another pollutant.

99 EDMS 2005
100 O'Brien 2002
101 Ambrosino 1999
102 Wilson 2005
103 EDMS 2005
104 EPA 1997

Table 5.3.3-1: Estimated Air Emissions for the Proposed JSF DT Program 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	29.4 (26.7)	6.10 (5.53)	1.76 (1.60)	0.24 (0.21)	0.18 (0.17)
2	124.7 (113.1)	27.3 (24.7)	8.16 (7.40)	1.28 (1.16)	0.91 (0.82)
3	120.8 (109.6)	27.0 (24.5)	7.81 (7.09)	1.43 (1.30)	0.90 (0.82)
4	115.4 (104.6)	26.7 (24.2)	6.53 (5.91)	1.55 (1.41)	0.79 (0.72)
5	110.8 (100.5)	25.4 (23.1)	6.19 (5.61)	1.55 (1.40)	0.77 (0.70)
6	100.5 (91.2)	21.2 (19.2)	5.61 (5.09)	1.14 (1.04)	0.68 (0.61)
7	89.9 (81.6)	16.2 (14.7)	5.10 (4.63)	0.61 (0.55)	0.55 (0.50)
Highest Year[2]	124.7 (113.1) (Test Year 2)	27.3 (24.7) (Test Year 2)	8.16 (7.40) (Test Year 2)	1.55 (1.41) (Test Year 4)	0.91 (0.82) (Test Year 2)

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: This is reflective of both Alternatives One and Two.

1. See Appendix E.1 for additional details.
2. The highest year represents the year most likely to produce the greatest estimated emissions. The difference in the highest emissions per test year for the various criteria pollutants is a function of the combination of different emission sources (e.g., aircraft, GSE, personal vehicles) and the operation of those sources. Often the difference in the highest year is slight, however, the mix of emission sources will cause emissions to be highest in one year for a given pollutant and in a different year another pollutant.
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 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 NAAs total emissions inventory. 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 Program Peak Year Emission Comparison

Pollutant	Highest Year Emissions[1] tpy	*de minimis* Threshold tpy	Regionally Significant Threshold tpy
NO_x	27.3	100	1,726
VOC	8.16	100	394

tpy = tons per year
NO_x = Nitrogen Oxides, VOC = Volatile Organic Compound
Hydrocarbon emissions are assumed to be VOCs.
Note: 1. The highest year represents the year (Test Year 4) with the potential to produce the greatest estimated emissions from the Proposed Action (for both Alternatives One and Two)

GHG emissions (CO_2, CH_4, N_2O) were also estimated for the proposed aircraft operations at Edwards AFB, based on the total quantity of fuel combusted and applying emissions factor specific to the fuel burned (JP-8, diesel, or gasoline) from generally accepted GHG protocols. Note the protocols do not include an emission factor for JP-8, therefore the emission factor for Jet A/A-1 was used. The GHG emissions were converted to a CO_2e basis using the GWP of each gas.

The CO_2e generated from the Proposed Action are shown in Table 5.3.3-3 below. Approximately 62,612 MT of CO_2e would be generated by sources and operations comprising the Proposed Action. There is no requirement under the General Conformity Rule to consider GHG emissions, therefore in absence of any regulatory standard, the results of the analysis for Edwards AFB were compared to the 2009 total U.S. GHG emissions of 6,633.20 million metric ton (MT) CO_2e.[105] The emissions associated with the Proposed Action would result in less than a 0.001% increase, and as such would not be a significant source of GHG emissions. Section 3.1.5 provides a high level overview of DoD's and the Service's energy activities (e.g., alternative fuels, reduce energy consumption, etc.), which have an added benefit of reducing greenhouse gas emissions.

Table 5.3.3-3: Estimated GHG Emissions for the Proposed JSF DT Program at Edwards AFB

Test Year	CO_2e (MT)
1	1,677
2	10,259
3	11,863
4	13,300
5	13,407
6	8,972
7	3,134
Total	62,612
Highest (Test Year 5)	13,407

5.4 NOISE AT EDWARDS AFB

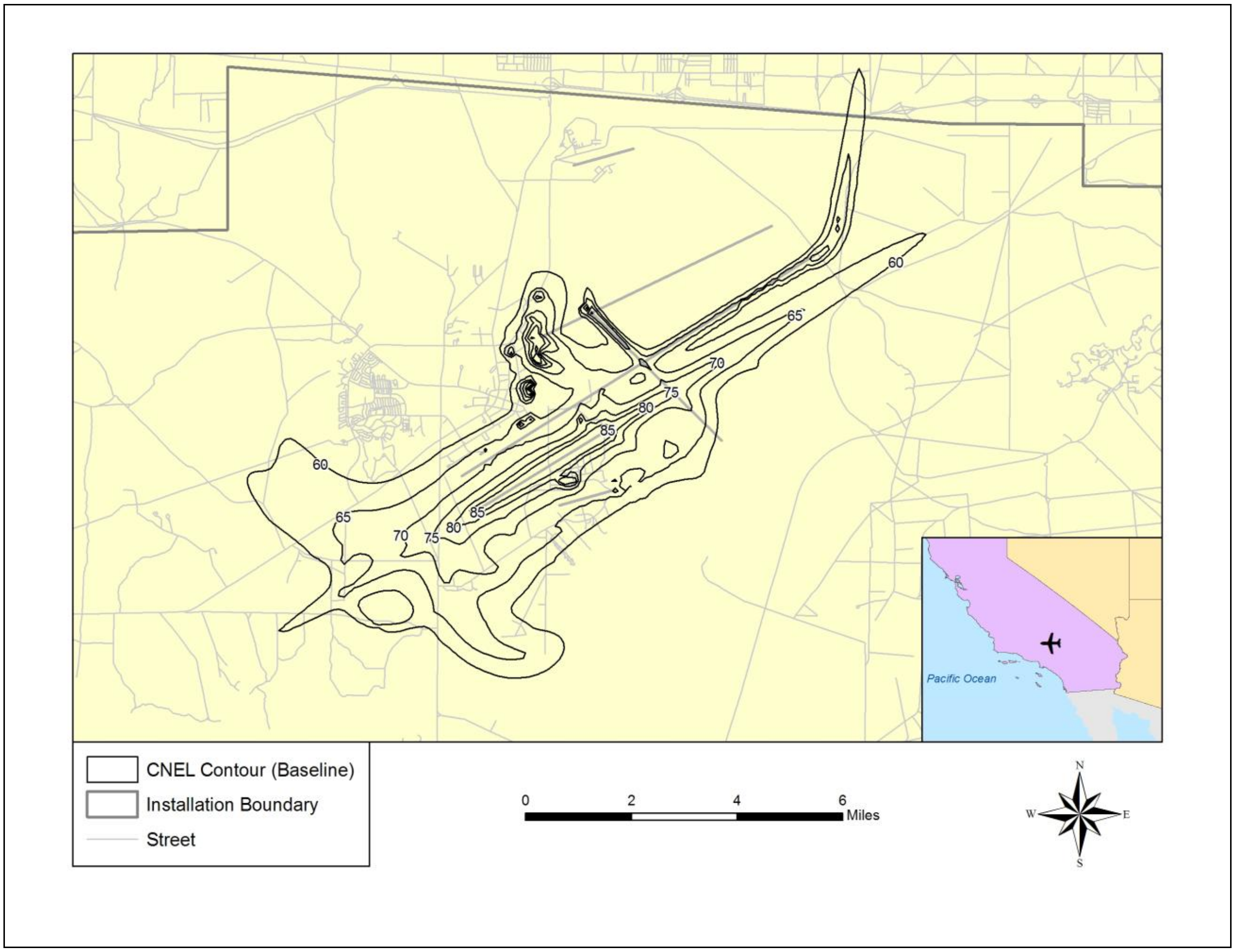
5.4.1 Affected Environment

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 and Appendix F 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.

Baseline CNEL contours were developed based upon the aircraft Fleet mix, number of operations, time of day of operations, and runway and flight track utilization in Edwards AFB's Air Installation Compatible Use Zone (AICUZ) documentation and from previous noise modeling efforts. Appendix F.2 contains additional details on the modeling methodology for Edwards AFB. Baseline CNEL contours (60, 65, 70, 75, 80, and 85 dB) for Edwards AFB are presented in Figure 5.4.1-1.

105 EPA 2009



Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005) and Booz Allen Hamilton (September 2009 – June 2011).

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

Aerial photography was used to determine populations affected by the baseline 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 baseline CNEL noise contours.

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

CNEL Contour Bands	Area Acres On-Base	Area Acres Off-Base
60-65 dB	9,584	130
65–70 dB	6,793	0
70–75 dB	2,568	0
75–80 dB	1,059	0
80–85 dB	572	0
85+ dB	503	0
65 dB and greater (Total)	***21,079***	***130***

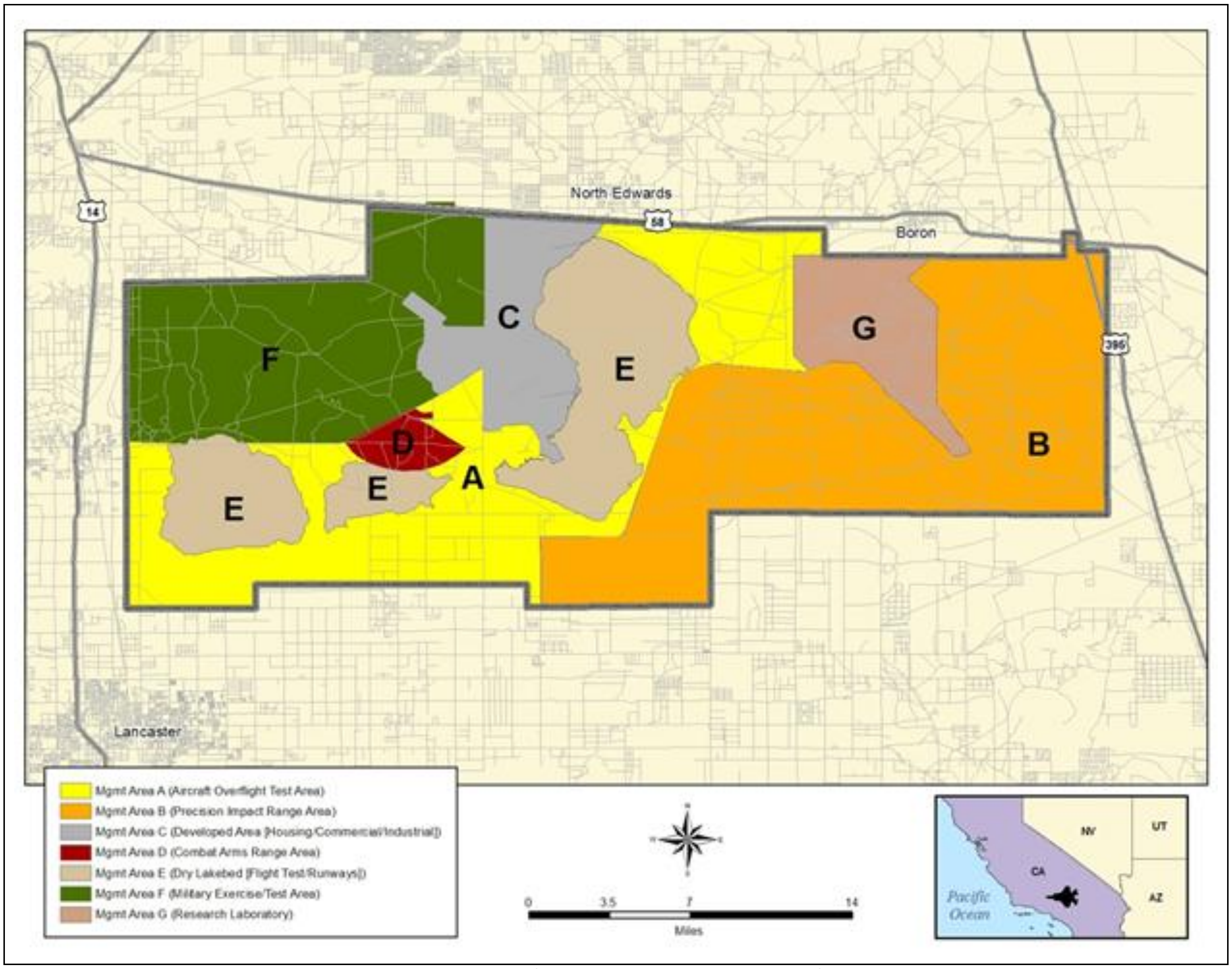
Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005) and Booz Allen Hamilton (September 2009 – June 2011).

As illustrated in Table 5.4.1-2 and Figure 5.4.1-2, land uses affected by the baseline CNEL noise contour consist of engineering, buffer zone, aircraft Operations and Maintenance (O&M), and industrial. There are no identifiable residential housing units or sensitive land uses identified within the baseline CNEL noise contours. Although the baseline contours do extend beyond the base's boundary, no residential or noise-sensitive units are within the contours off-base. All land use off-base within the 60 and 65 CNEL contours is listed as vacant.

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

Land Use Type	Baseline CNEL Contour Bands						
	60 dB	65 dB	70 dB	75 dB	80 dB	85 dB	60+ dB
Administrative	7	<1	1	0	0	0	8
Aircraft Clearances, QDs	625	1,042	410	379	374	357	3,187
Aircraft Operations and Maintenance	117	19	<1	0	0	0	136
Aircraft Pavements	121	239	73	40	41	125	639
Buffer Zone	2,736	2,427	1,255	445	81	7	6,951
Community Commercial	3	0	0	0	0	0	3
Community Service	0	10	0	0	0	0	10
Engineering Test	281	325	163	48	26	14	857
Engineering Test/Aircraft Overflight Test Area	878	229	26	0	0	0	1,133
Industrial	147	208	<1	0	0	0	355
Industrial Combat Arms Range Area	289	0	0	0	0	0	289
Lakebed - Non-Maintained Landing Site	2,694	2,047	469	112	24	0	5,346
Lakebed - Painted Runway	149	246	171	35	26	0	627
Medical	<1	1	0	0	0	0	1
Outdoor Recreation	1,494	0	0	0	0	0	1,494
Outdoor Recreation/Military Exercise/Test Area	43	0	0	0	0	0	43
Total	**9,584**	**6,793**	**2,568**	**1,059**	**572**	**503**	**21,079**

Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005) and Booz Allen Hamilton (September 2009 – June 2011).



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: Land Use at Edwards AFB

5.4.2 Environmental Consequences

Aircraft noise impacts are presented as land areas (acres) and populations exposed to aircraft noise above baseline levels. This section discusses the physical characteristics of noise resulting from the Proposed Action.

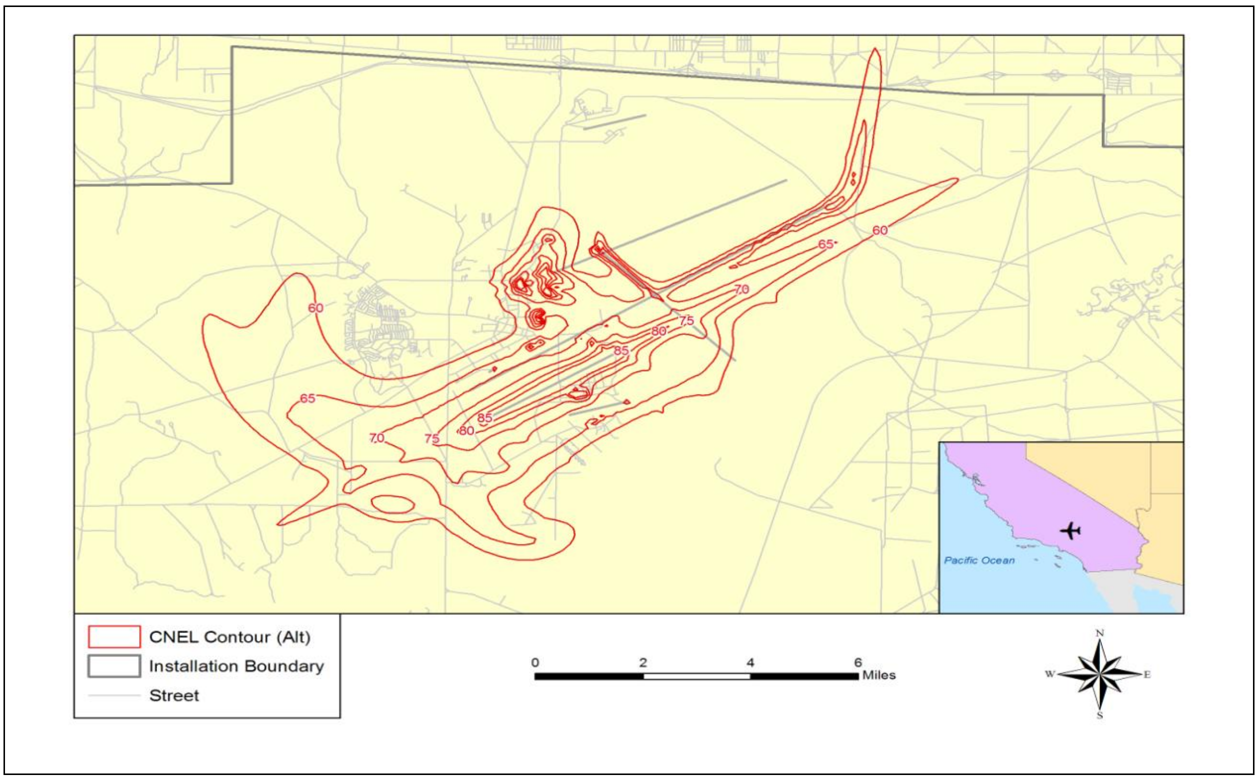
The Proposed Action was modeled for the largest predicted year of proposed JSF DT activity (Test Year 5). The proposed F-35 test activities reflected in Table 5.4.2-1 were added to the aircraft Fleet mix for the baseline noise contours at Edwards AFB. Distinct performance profiles were provided by the Lockheed Martin Flight Simulation Group regarding operational performance characteristics for the F-35. Conversations with the JSF ITF Team Lead and Edwards AFB operational personnel confirmed proposed support aircraft are currently accounted for in the baseline Fleet mix.[106] These aircraft would be logging in the same amount of air time in support of other programs, even if the proposed JSF DT was not to occur. Therefore, proposed support aircraft for the JSF DT program were not included in the noise model profile.

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

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

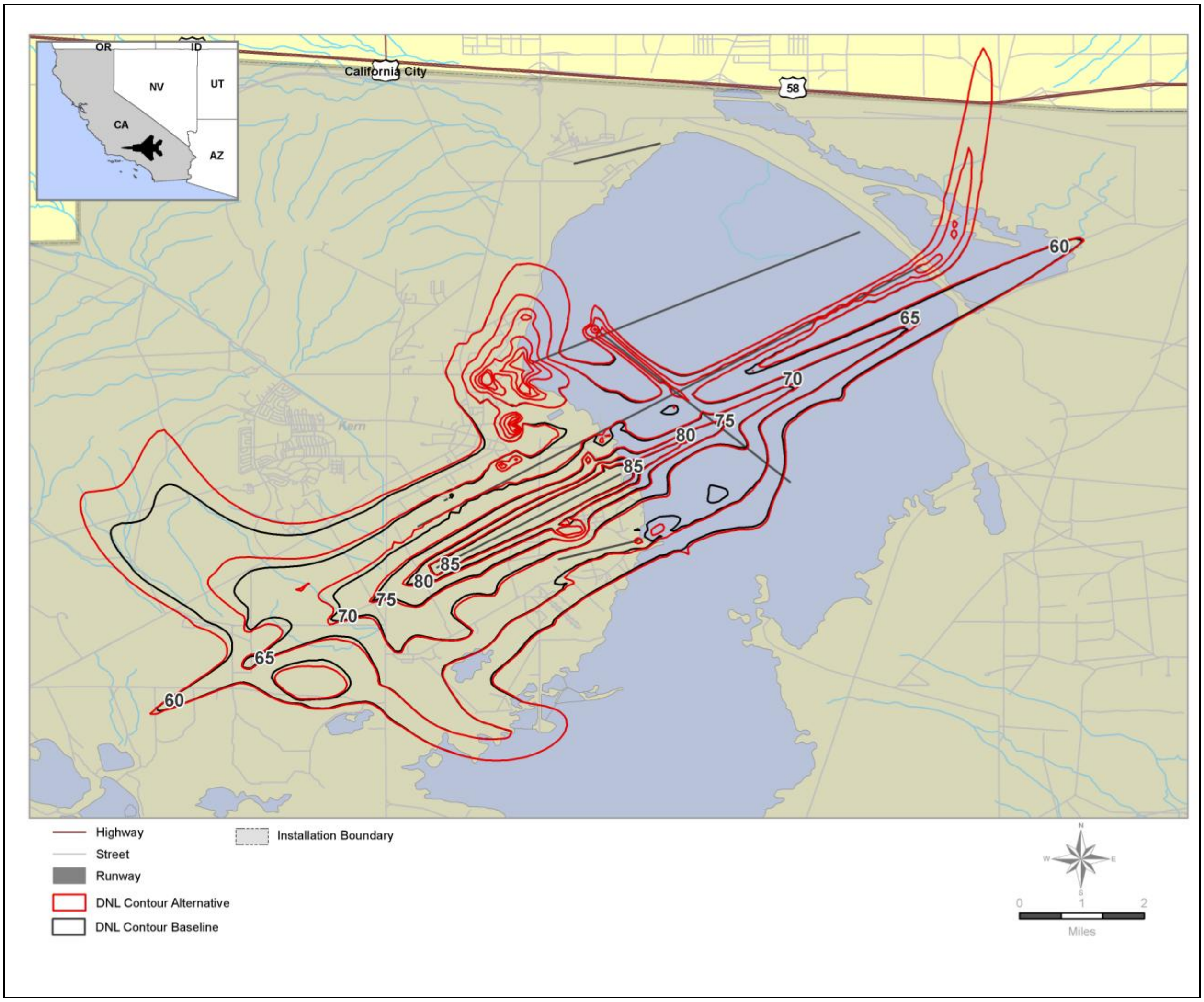
Test Year	Test Activity/Description	No. F-35 Flights	F-35 Flight Hours
5	F-35 Baseline Program (STOVL & CTOL FQ, STOVL & CTOL Performance, STOVL & CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Int., STOVL Environment, Mission Systems, High AoA), F-16 Proficiency Flights, KC-135 Flights	700	1,260

Figure 5.4.2-1 illustrates the resulting noise contours. The 60 and 65 dB CNEL and greater noise contour does extend outside of Edwards AFB's boundaries which is comprised of vacant land, but no further than the baseline contours. Figure 5.4.2-2 illustrates comparison contours showing the baseline CNEL contours overlaid with the JSF DT Program noise contours.



Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005) and Booz Allen Hamilton (September 2009 – June 2011).
Note: This is reflective of both Alternatives One and Two.

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



Source: Edwards AFB NOISEMAP Model Outputs United States Air Force Acoustics Lab (August 2005) and Booz Allen Hamilton (September 2009 – June 2011).
Note: This is reflective of both Alternatives One and Two.

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

Areas on-base impacted by the 60 dB and greater CNEL contour would increase by approximately 5,221 acres (approximately 25%). Table 5.4.2-2 outlines a comparison of the JSF DT Program CNEL contours contrasted to the baseline CNEL noise contours at Edwards AFB. Similar to the baseline, land uses exposed to noise from the Proposed Action at Edwards AFB would be comprised of engineering, buffer zone, aircraft O&M, and industrial. Residential housing unit locations at Edwards AFB were identified using aerial photographs. No residential housing units were identified within the Proposed Action 60 dB and greater CNEL noise contour. Therefore, no populations or land uses are expected to be impacted by the Proposed Action.

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

CNEL Contour Bands	Area Acres On-Base		Area Acres Off-Base		Acreage Change	
	Baseline	Proposed JSF DT Program	Baseline	Proposed JSF DT Program	On-Base	Off-Base
60–65 dB	9,584	12,600	130	130	3,016	0
65–70 dB	6,793	7,820	0	0	1,027	0
70–75 dB	2,568	3,300	0	0	732	0
75–80 dB	1,059	1,270	0	0	211	0
80–85 dB	572	670	0	0	98	0
85> dB	503	640	0	0	137	0
60 dB and greater (Total)	***21,079***	**26,300**	***130***	***130***	***5,221***	***0***

Source: Edwards AFB NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005) and Booz Allen Hamilton (September 2009 – June 2011).
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 baselines.

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

Land Use Type	Baseline CNEL Contour Bands						
	60 dB	65 dB	70 dB	75 dB	80 dB	85 dB	60+ dB
Administrative	7	<1	1	0	0	0	8
Aircraft Clearances, QDs	625	1,042	410	379	374	357	3,187
Aircraft Operations and Maintenance	117	19	<1	0	0	0	136
Aircraft Pavements	121	239	73	40	41	125	639
Buffer Zone	2,736	2,427	1,255	445	81	7	6,951
Community Commercial	3	0	0	0	0	0	3
Community Service	0	10	0	0	0	0	10
Engineering Test	281	325	163	48	26	14	857
Engineering Test/Aircraft Overflight Test Area	878	229	26	0	0	0	1,133
Industrial	147	208	<1	0	0	0	355
Industrial Combat Arms Range Area	289	0	0	0	0	0	289
Lakebed - Non-Maintained Landing Site	2,694	2,047	469	112	24	0	5,346
Lakebed - Painted Runway	149	246	171	35	26	0	627
Medical	<1	1	0	0	0	0	1
Outdoor Recreation	1,494	0	0	0	0	0	1,494
Outdoor Recreation/Military Exercise/Test Area	43	0	0	0	0	0	43

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

Land Use Type	With Proposed JSF DT Program CNEL Contour Bands						
	60 dB	65 dB	70 dB	75 dB	80 dB	85 dB	60+ dB
Administrative	23	0	1	0	0	0	24
Aircraft Clearances, QDs	583	1,082	486	378	360	450	3,339
Aircraft Operations and Maintenance	82	53	0	0	0	0	135
Aircraft Pavements	77	231	103	47	44	137	639
Buffer Zone	3,011	2,562	1,450	507	149	14	7,693
Community Commercial	3	0	0	0	0	0	3
Community Service	0	10	0	0	0	0	10
Engineering Test	141	10	266	98	33	29	577
Engineering Test/Aircraft Overflight Test Area	923	320	28	0	0	0	1,271
Industrial	231	228	8	6	1	0	474
Industrial Combat Arms Range Area	444	232	0	0	0	0	676
Lakebed - Non-Maintained Landing Site	2,610	2,248	539	140	28	8	5,573
Lakebed - Painted Runway	146	290	172	38	27	0	673
Medical	0	1	0	0	0	0	1
Outdoor Recreation	2,441	179	0	0	0	0	2,620
Outdoor Recreation/ Military Exercise/Test Area	484	0	0	0	0	0	484
Land Use Type	**Change**						
	60 dB	**65 dB**	**70 dB**	**75 dB**	**80 dB**	**85 dB**	**60+ dB**
Administrative	16	0	0	0	0	0	16
Aircraft Clearances, QDs	-42	40	76	-1	-14	93	152
Aircraft Operations and Maintenance	-35	34	0	0	0	0	-1
Aircraft Pavements	-44	-8	30	7	3	12	0
Buffer Zone	275	135	195	62	68	7	742
Community Commercial	0	0	0	0	0	0	0
Community Service	0	0	0	0	0	0	0
Engineering Test	-140	-315	103	50	7	15	-280
Engineering Test/Aircraft Overflight Test Area	45	91	2	0	0	0	138
Industrial	84	20	8	6	1	0	119
Industrial Combat Arms Range Area	155	232	0	0	0	0	387
Lakebed - Non-Maintained Landing Site	-84	201	70	28	4	8	227
Lakebed - Painted Runway	-3	44	1	3	1	0	46
Medical	0	0	0	0	0	0	0
Outdoor Recreation	947	179	0	0	0	0	1,126
Outdoor Recreation/ Military Exercise/Test Area	441	0	0	0	0	0	441

Source: NOISEMAP Model Outputs, United States Air Force Acoustics Lab (August 2005) and Booz Allen Hamilton (September 2009 – June 2011).

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 environment. There would be slight changes in the noise environment anticipated as a result of the Proposed Action. However, none occur in either the 60 dB or 65 dB and greater CNEL noise contours. 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 Supplemental EA/OEA.

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

Name	Type	Baseline 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 (March 2006) and Booz Allen Hamilton (September 2009 – June 2011).
Note: This is reflective of both Alternatives One and Two.

Table 5.4.2-5: Non-Residential Noise Sensitive Receptors (Distance from Edwards AFB)

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 (March 2006) and Booz Allen Hamilton (September 2009 – June 2011).
Note: This is reflective of both Alternatives One and Two.

No significant noise impacts would be expected over non-residential noise-sensitive receptors. There would be no discernable residential or incompatible land uses located within either the baseline 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 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.[107] Two plant communities, mesquite woodlands and Transmontane alkali marsh, are considered sensitive 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.

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 section. 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.

107 COE 1997

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*)	D	D
California least tern *(Sterna antillarum browni)*	E	E
Peregrine falcon *(Falco peregrinus anatum)*		D
Swainson's hawk *(Buteo swainsoni)*		T
Western snowy plover *(Charadrius alexandrinus nivosus)*	T[108]	
Mammals		
Mohave ground squirrel *(Spermophilus mohavensis)*		T
Reptiles		
Desert tortoise (*Gopherus agassizii*)	T	T
Fish		
Mohave tui chub (*Gila bicolor mohavensis)*	E	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.
http://ecos.fws.gov/tess_public/
Legend: E=Endangered, T=Threatened, C=Candidate

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 Federally-endangered plant, the Lane Mountain milk-vetch (*Astragalus jaegerianus*), can be found in the R-2515 area.

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

<u>*Mammal Species*</u>

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*).[109] 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.

<u>*Bird Species*</u>

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).*[110] 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 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.[111]

<u>*Other Animal Species of Concern*</u>

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 were 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.[112] Common reptiles include lizards and snakes. For a list of reptiles and amphibians 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.)*[113]

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 endangered 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 Bernadine County, of which one habitat under R-2515 is the Desert Research Station, northwest of Barstow.[114]

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109 AFFTC 2000
110 Ibid
111 AFFTC 1998
112 AFFTC 1997
113AFFTC 2000
114 AFFTC 1998

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 occurring 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; 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. Only 5% of the projected DT activities are expected to occur below 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:

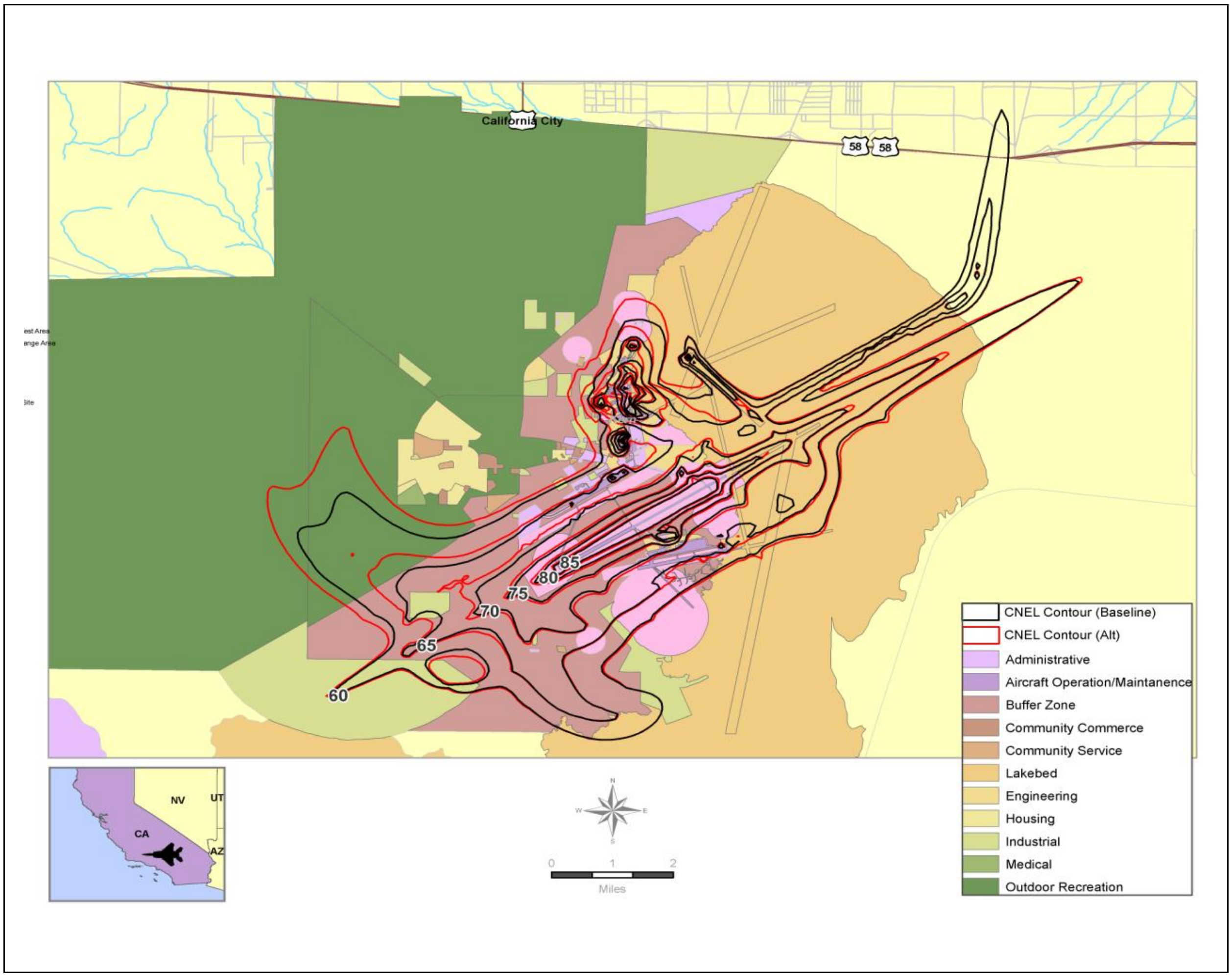
- During STOVL and CTOL FQ, some performance and propulsion tests flights would occur at 2,500 feet; low-angle FQ tests would come within 1,000 feet AGL at the bottom of the dive; some supersonic flights would occur; 5% of the total proposed single performance test activities/runs (not total flights/flight 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.
- 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 activities 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 of that EA and associated analysis included low level flights of the F-35, F/A-18, F-22, and 41 other aircraft that are already flying or proposed to fly the low level routes associated with Edwards AFB. Based on the analysis in the EA for low-level flight testing, 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 Supplemental EA/OEA, the change in land area impacted (as designated by 65 dB or higher contours) is not anticipated to be greater than 14% (Note: 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 Program contours over land use at Edwards AFB. New areas impacted by the proposed JSF DT activities 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 Program 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.



Source: Edwards AFB NOISEMAP Model Outputs United States Air Force Acoustics Lab (August 2005) and Booz Allen Hamilton (September 2009 – June 2011).

Figure 5.5.2-1: Noise Contour with Land Use Map

Additionally, the proposed JSF DT activities 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 take-offs, and some weapons integration and mission systems tests. No potential primary impacts (direct physical impacts) are 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 are not anticipated, as most species present on Edwards AFB have already adapted to living with aircraft noise.

The proposed JSF DT activities 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 are expected. Noise studies on desert tortoise have shown very little behavioral or physiological effects from loud noises that simulated jet overflights and sonic booms.[115] The desert tortoise sparsely populates Edwards AFB at an estimated density of fewer than 20 tortoises per 1 square mile on approximately 80% of the base.[116] 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 Program weapons separation tests. During the proposed JSF DT Program, compliance with all terms and conditions of SOPs and any relevant Biological Opinion (BO) requirements would be enforced, which would further minimize any potential affects to desert tortoises. Thus, the proposed JSF DT Program would not be expected to have any significant effect on biological/natural resources, including no effect 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 was 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).*

115 AFFTC Armed Munitions Environmental Assessment, Draft
116 Ibid

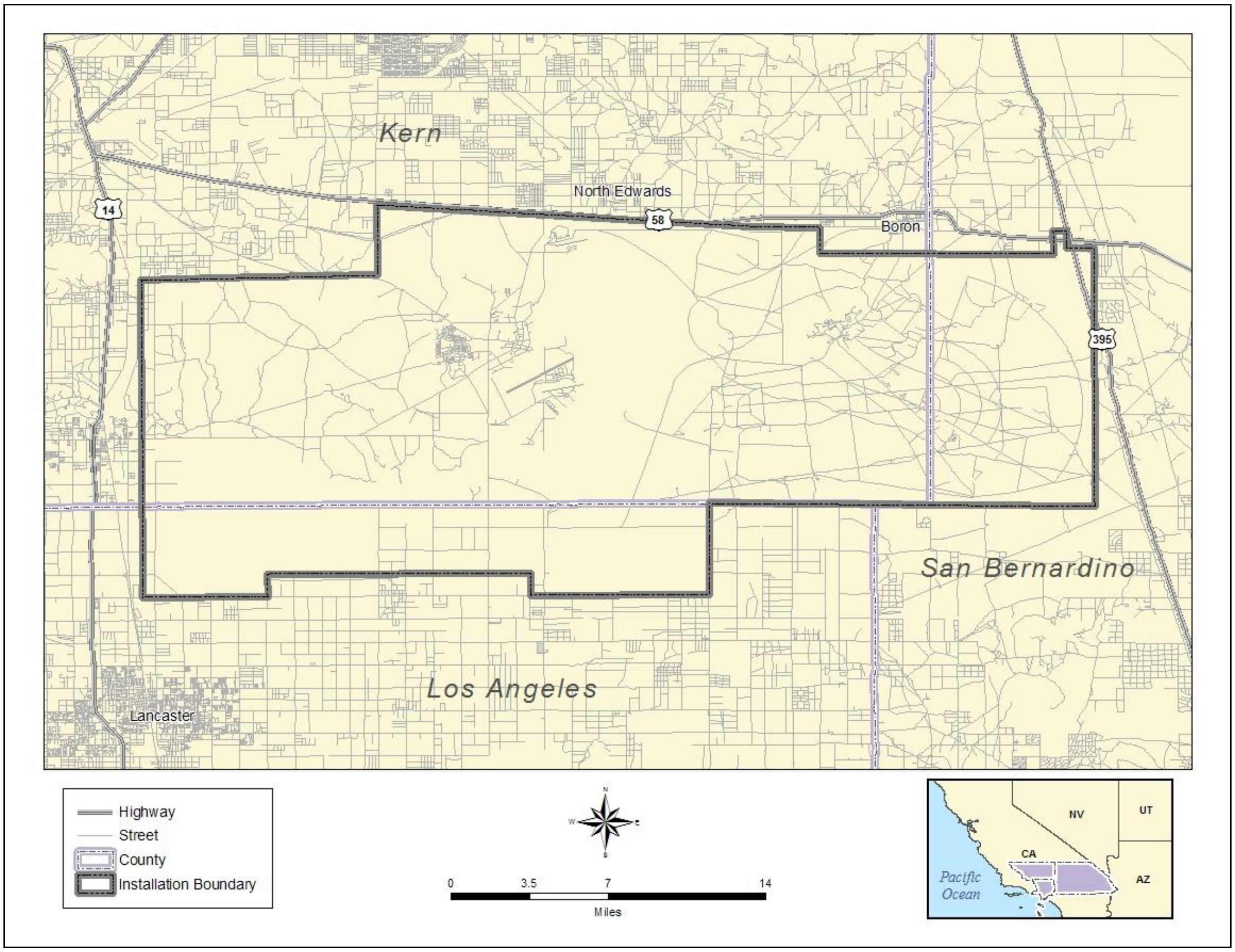


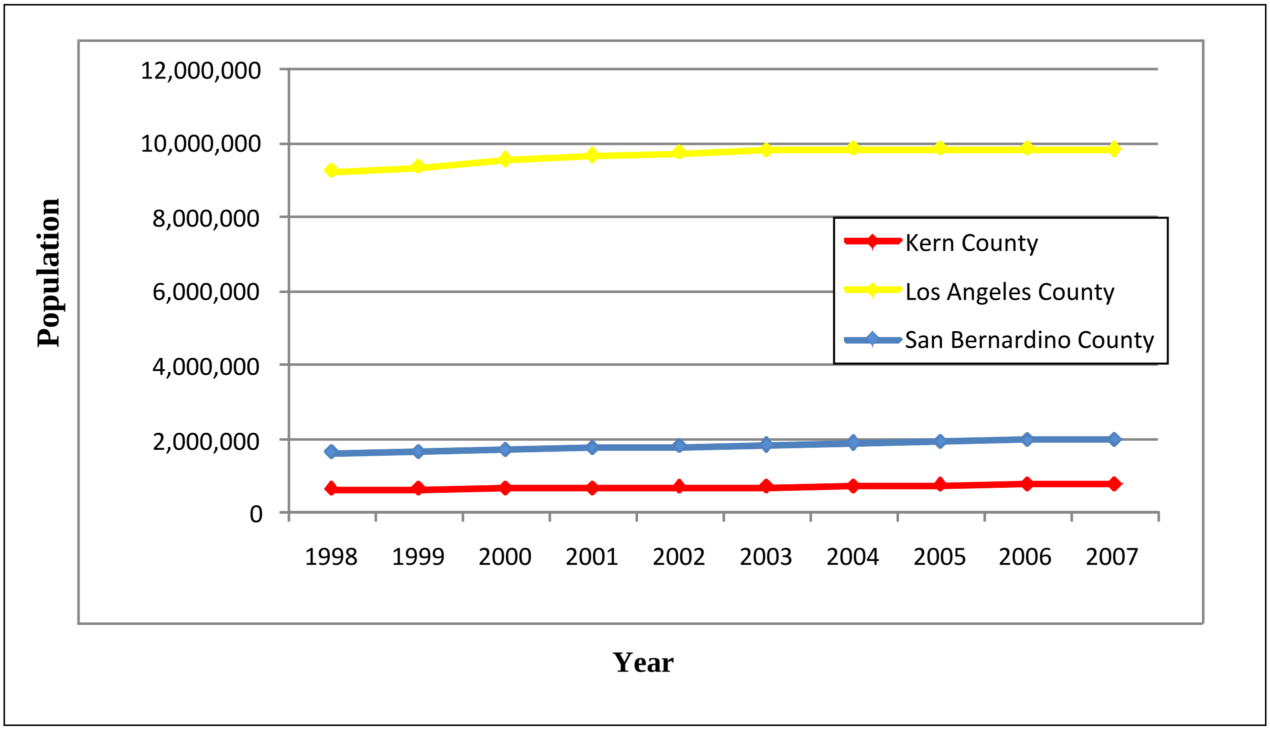
Figure 5.6.1-1: Edwards AFB Socioeconomic Study Area

5.6.1.1 Demographics

Total population within the three-county Edwards AFB socioeconomic area in 2007 was estimated to be 12,597,257. This includes 9,807,870, in Los Angeles County, 787,179 in Kern County, and 2,002,208 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 1998 and 2007 by 9.6%, with a 6.3% increase in Los Angeles County, 24.6% increase in Kern County, and 22.4% increase in San Bernardino County.[117] The median age of the population in 2007 was estimated to be 34.1 in Los Angeles County, 29.9 in Kern County, and 30.2 in San Bernardino County; all are slightly lower than the State median age of 34.5.[118]

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.[119] The Base also supports approximately 5,101 dependents.

117 Census Bureau 2009b
118 Census Bureau 2009
119 AFFTC 2004



Source:U.S. Census Bureau, 2009b.

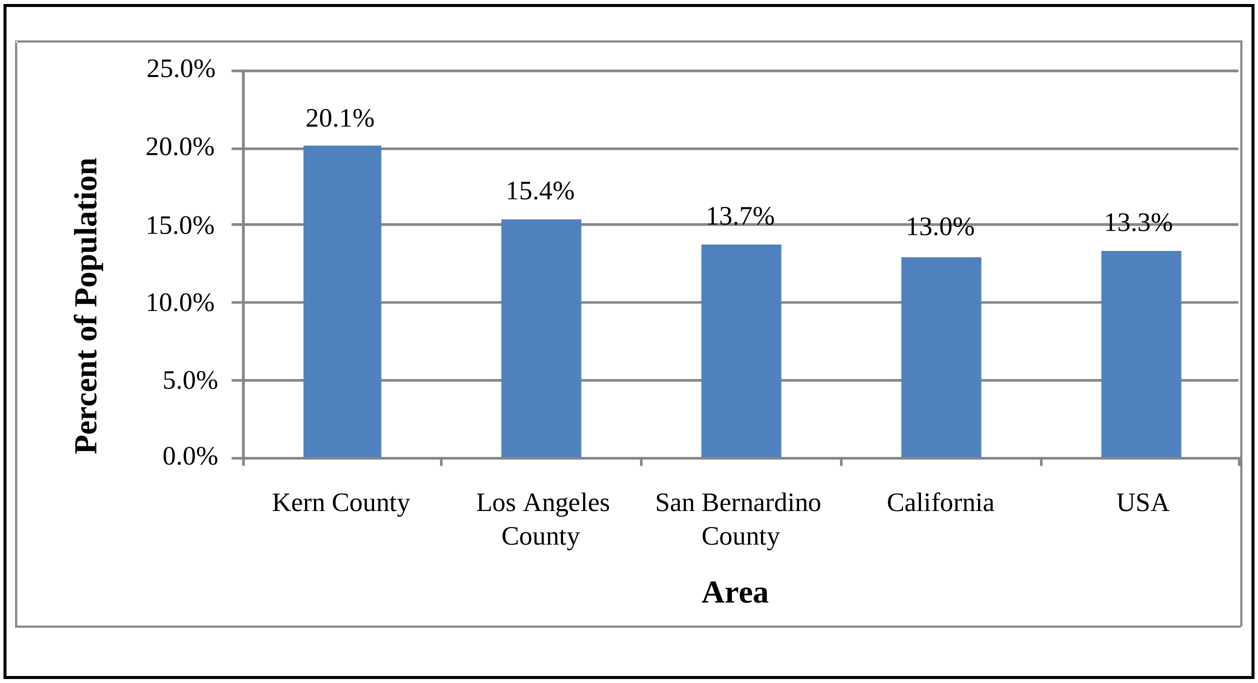
Figure 5.6.1.1-1: Population Trends for Edwards AFB Socioeconomic Study Area (1999–2007)

5.6.1.2 Environmental Justice and Children Demographics

American Community Survey 2005-2007 3-year estimate data for the three-county Edwards AFB socioeconomic study area for poverty rates, ethnicity, and children demographics was used to support both the environmental justice and children populations analyses.

Figure 5.6.1.2-1 illustrates the poverty rates in the socioeconomic study area.[120] Kern County has the highest percent of the population below the poverty level at 20.1%. There are 15.4% of the population below poverty rates in Los Angeles County and 13.7% below poverty rates in San Bernardino County. The poverty rates in all three counties are below the set CEQ threshold of 25% for low-income populations, but are higher than the California statewide estimate of 13.0%.

120 Census Bureau 2009

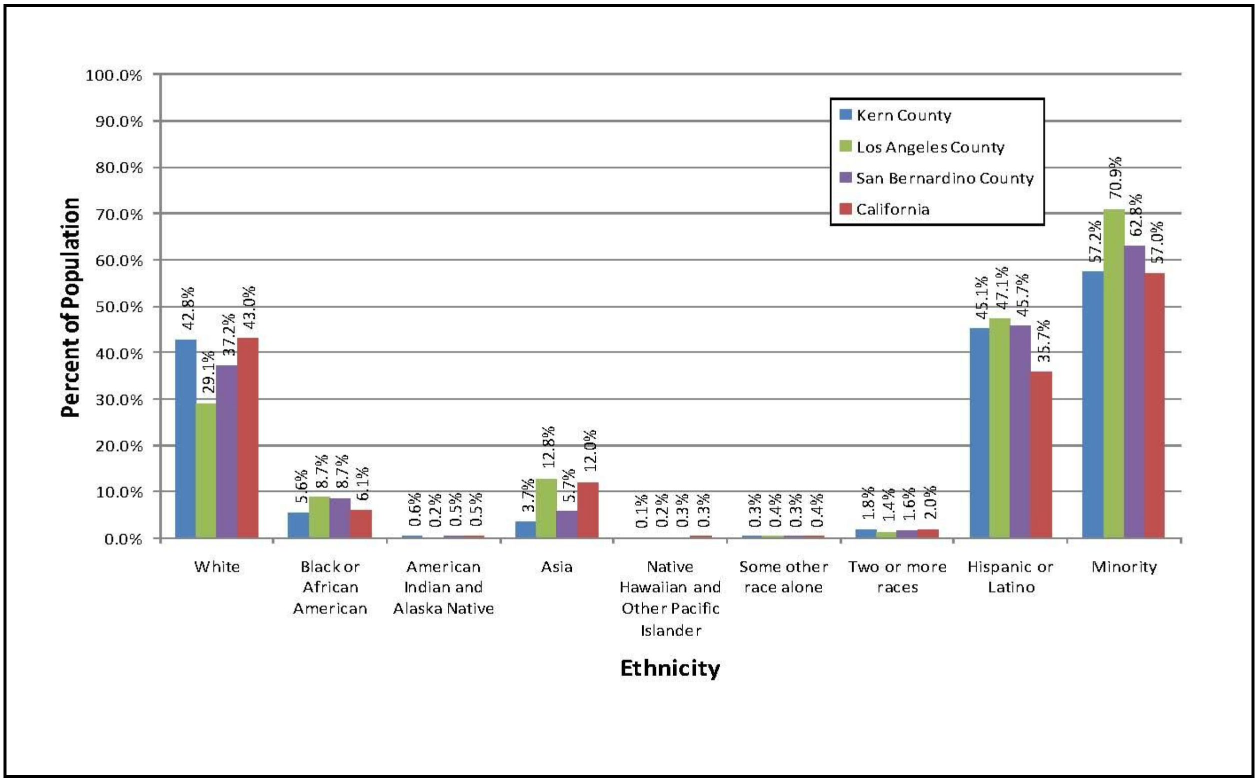


Source: U.S. Census Bureau 2009.

Figure 5.6.1.2-1: Poverty Rates for Edwards AFB Socioeconomic Study Area (2005-2007)

Population ethnicity in the Edwards AFB study area is summarized in Figure 5.6.1.2-2. The Edwards AFB socioeconomic study area is comprised of predominantly Hispanic or Latino (46.8%) populations. The remaining population distribution in the three-county area is White (31.2%), Asian (11.1%), Black or African American (8.5%), two or more races (1.5%), some other race (0.4%), American Indian or Native Alaskan (0.3%), and Native Hawaiian or other Pacific Islander (0.2%).[121] The three-county area is similar to California with high Hispanic or Latino representations. Kern, Los Angeles, and San Bernardino counties exceeds the CEQ threshold of 50% minority and is similar to or exceeds statewide estimates of 57.0%.

121 Census Bureau 2009

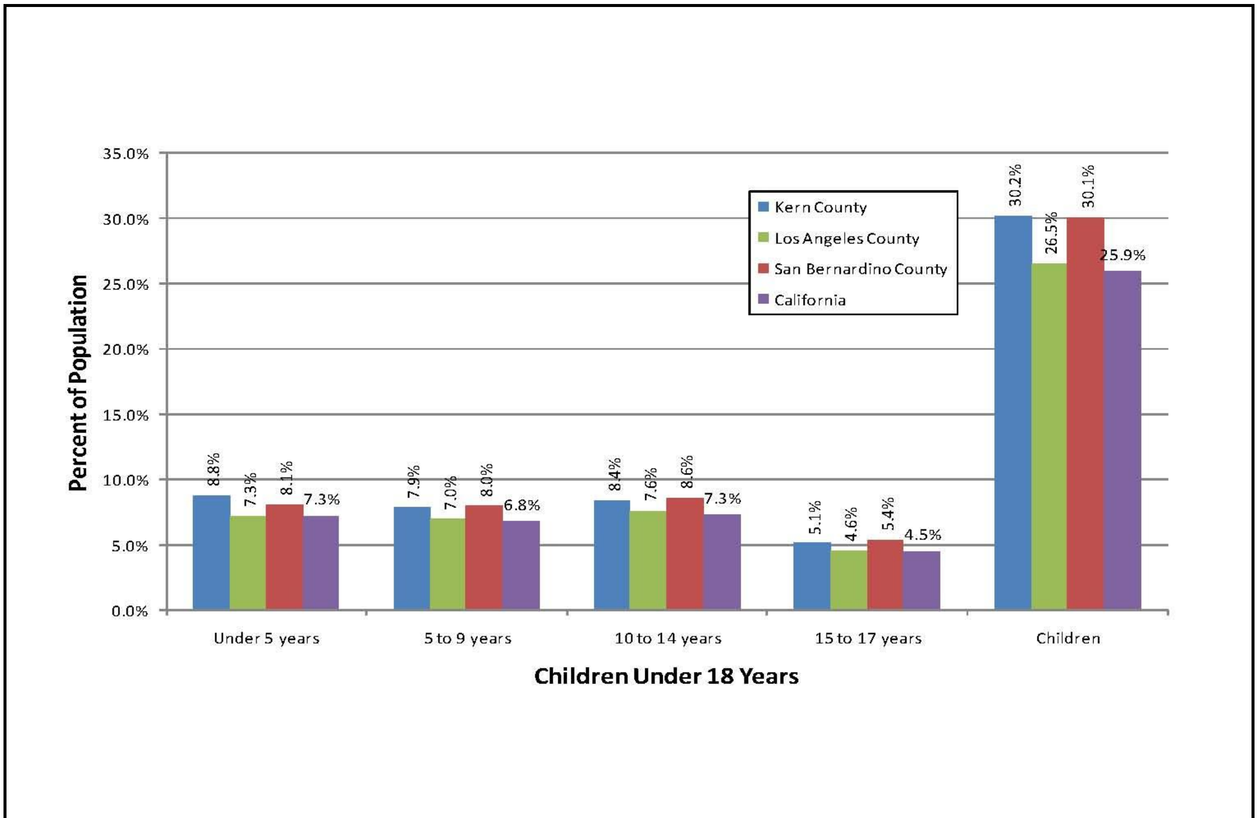


Source: U.S. Census Bureau, 2009.

Figure 5.6.1.2-2: Ethnicity for the Edwards AFB Socioeconomic Study Area (2005-2007)

Children populations for the Edwards AFB socioeconomic study area are summarized in Figure 5.6.1.2-3. The three-county area shows a relatively even distribution of children less than 5 years of age to 14 years and a slightly smaller population of children 15 to 17 years of age. The largest group of children is 10 to 14 years old (7.8%) and the remaining distribution is children under 5 years (7.5%), 5 to 9 years old (7.2%), and 15 to 17 years old (4.8%). The children populations for both Kern and San Bernardino Counties are larger than the California statewide average of 22.3%.[122] Los Angeles County has a smaller population of children then the statewide average.

122 Census Bureau 2009



Source: U.S. Census Bureau, 2009.

Figure 5.6.1.2-3: Children Demographics for the Edwards AFB Socioeconomic Study Area (2005-2007)

In addition to the three-county Edwards AFB socioeconomic study area of 2005-2009, more localized year 2000 U.S. Census tract/block areas for poverty rates, ethnicity, and children demographics presented in the 2007 EA/OEA were included to support both the environmental justice and children population analyses, as illustrated in Figure 5.6.1.2-4.[123] 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 Supplemental EA/OEA.

123 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.

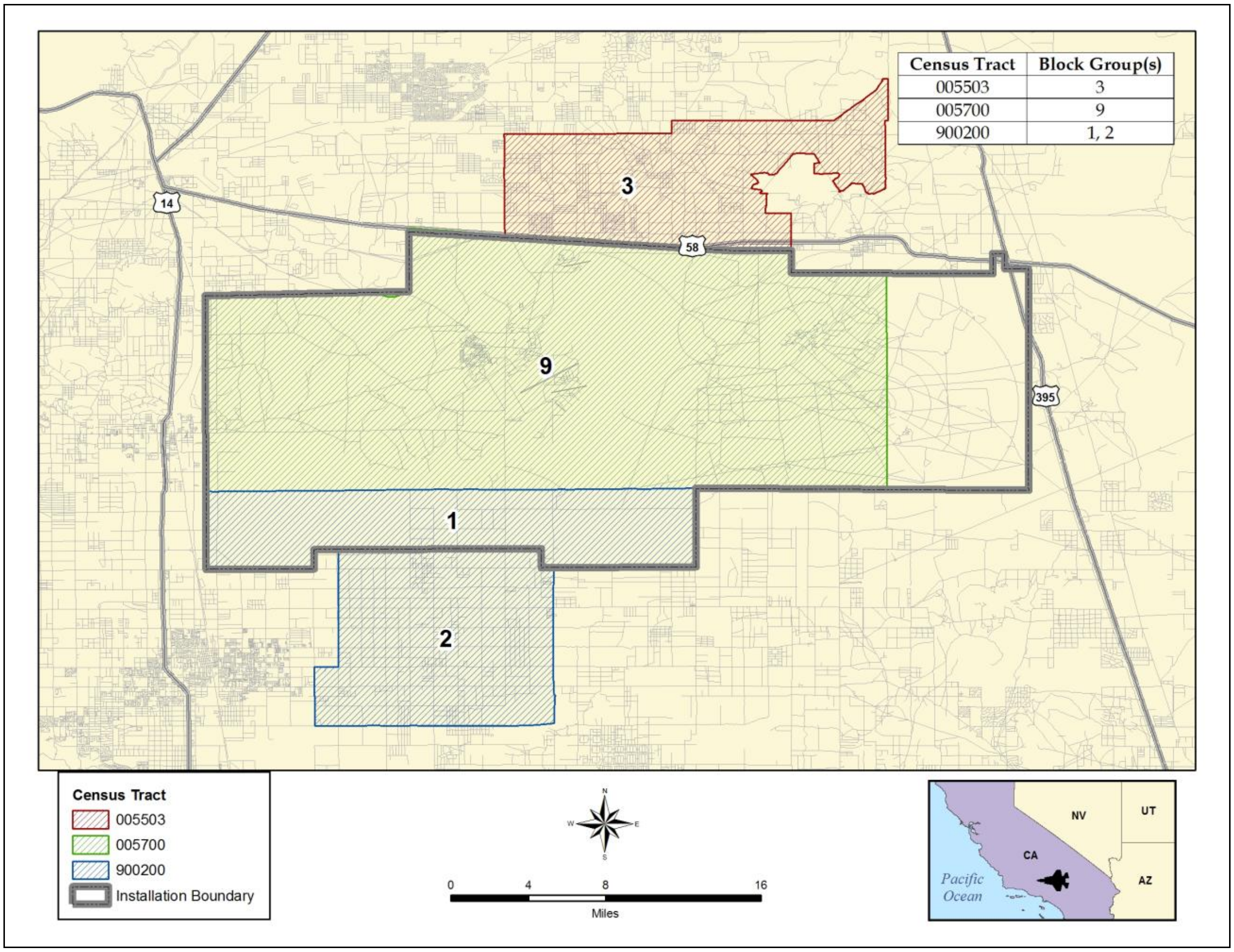


Figure 5.6.1.2-4: Environmental Justice Block Groups in Census Tracts for the Edwards AFB Socioeconomic Study Area

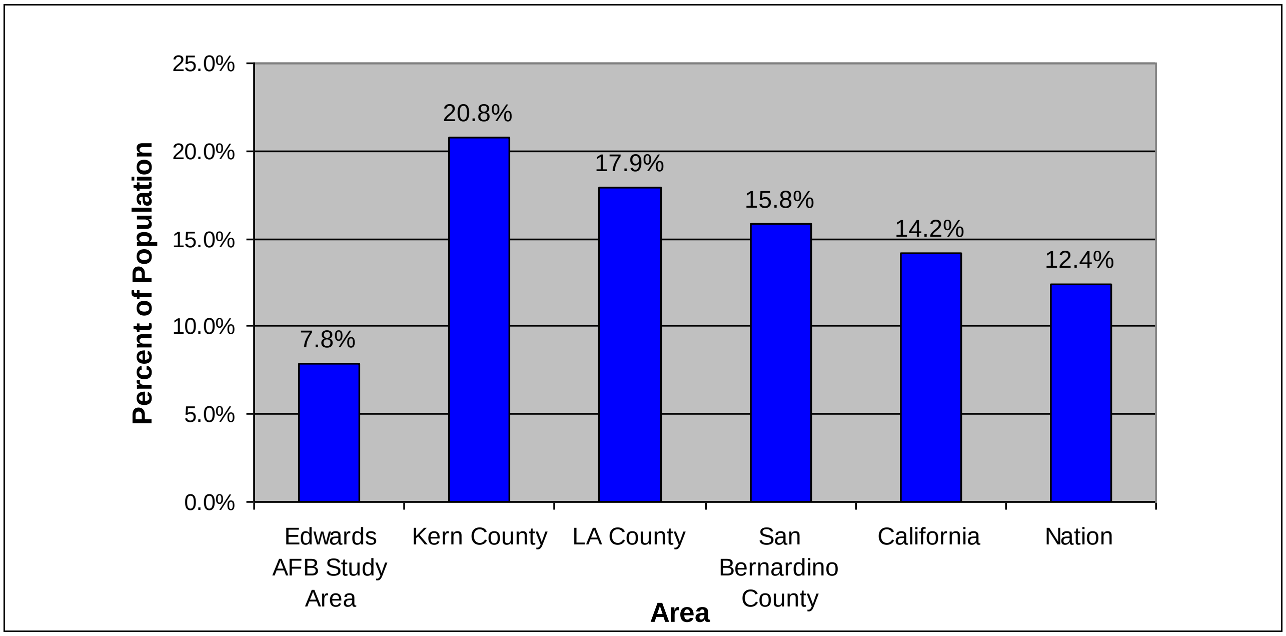
Poverty rates by the block groups for census tracts in the vicinity of Edwards AFB are summarized in Table 5.6.1.2-1.

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

County	Census Tract #	Block Group #	Total Block Group Population (1999)	Persons Living in Poverty (1999)	Total Average Poverty Rate
Kern	005503	3	1,343	187	13.92%
Kern	005700	9	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;.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 5.6.1.2-5 in the 2007 EA/OEA, 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 U.S. 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.

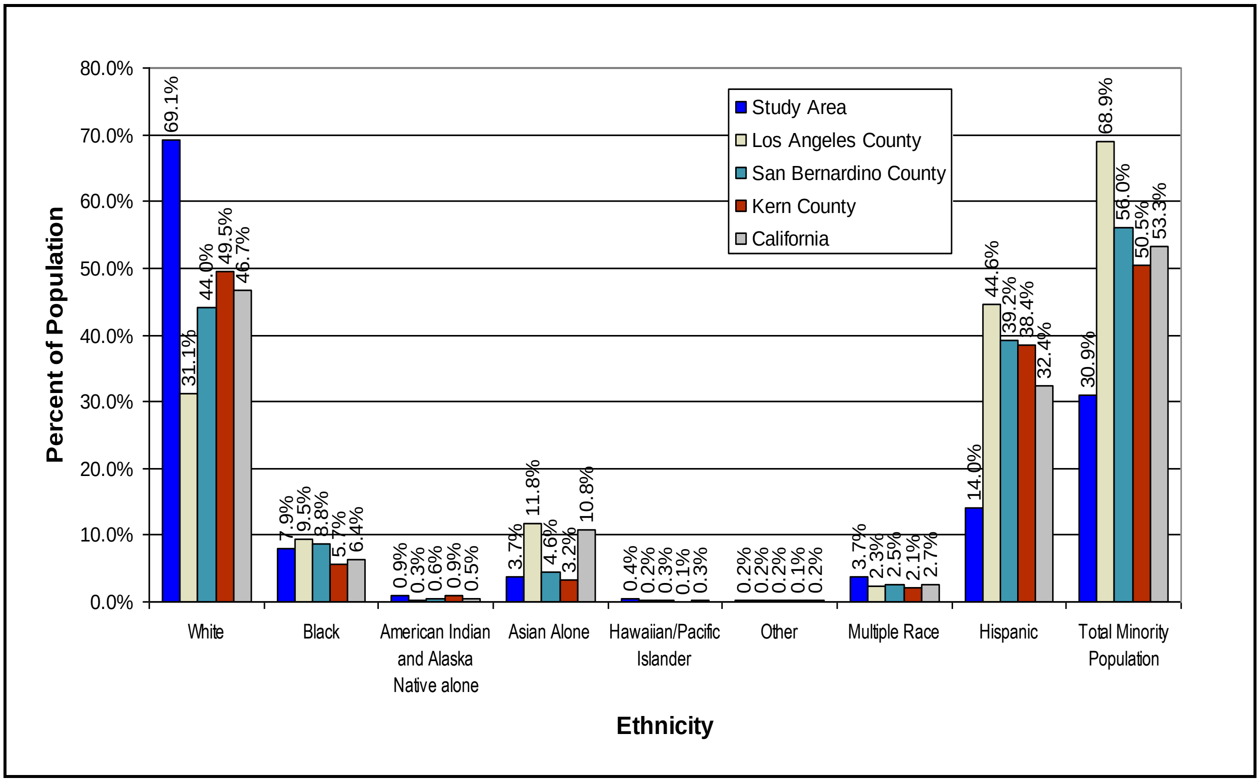


Source: U.S. Census Bureau 2000.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 5.6.1.2-5: Poverty Rates for Edwards AFB Socioeconomic Study Area

Population ethnicity in the Edwards AFB study area is summarized in Figure 5.6.1.2-6 as reflected in the 2007 EA/OEA. 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.



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.

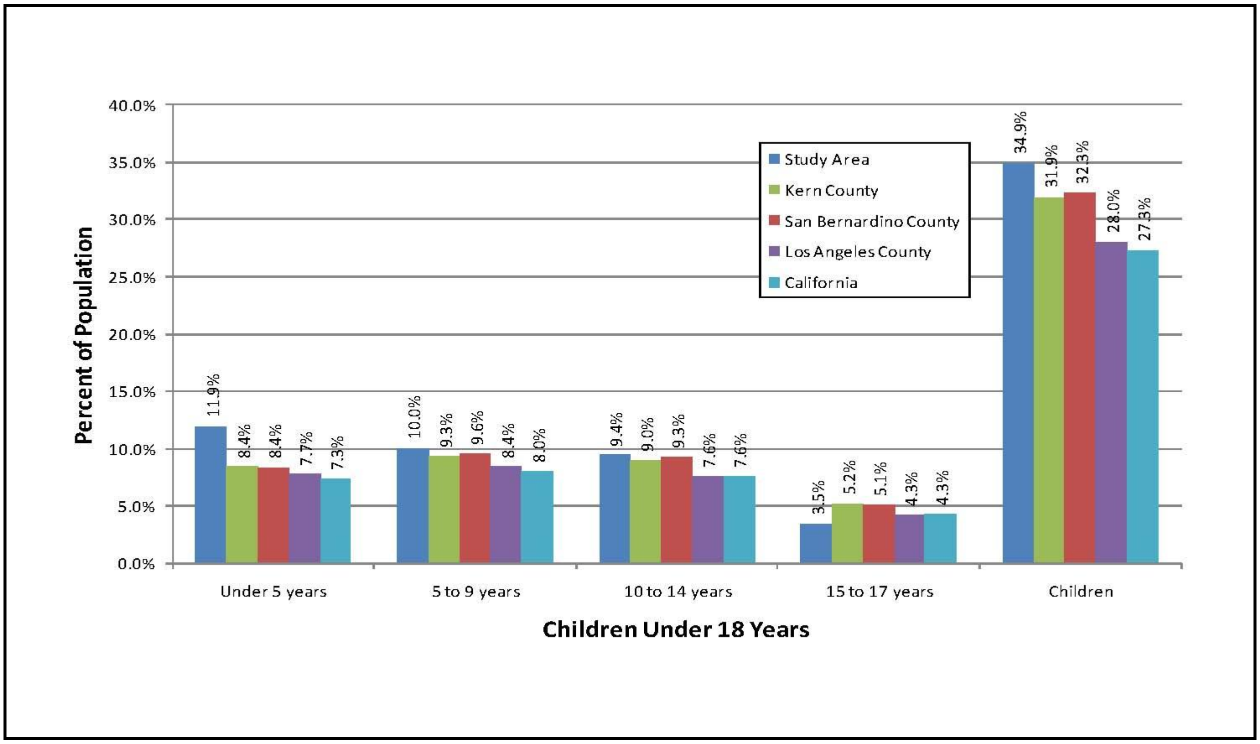
Figure 5.6.1.2-6: Ethnicity for the Edwards AFB Socioeconomic Study Area

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.

Children populations in the Edwards AFB children demographic study area for 2000 are summarized in Figure 5.6.1.2-7. The study area has a gradually decreasing distribution of children less than 5 years of age to 14 years then a smaller population of children 15 to 17 years of age. The largest group of children is under 5 years (11.9%) and the remaining distribution is children 5 to 9 years old (10.0%), 10 to 14 years old (9.4%) and 15 to 17 years old (3.5%).



Source: U.S. Census Bureau, 2000.

Figure 5.6.1.2-7: Children Demographics for the Edwards AFB Socioeconomic Study Area

Total population of children for the study area block groups of the census tracts (34.9%) is higher than surrounding counties and the State of California (27.3%). Children populations by block groups are summarized in Table 5.6.1.2-3. U.S. census tract 005700, block group 9 has a higher total population of children to the surrounding counties and State of California. The other block groups have a total population of children similar to the surrounding counties and statewide.

Table 5.6.1.2-3: Children Demographics by Block Group for the Children Population Census Tracts/Blocks Area within Edwards AFB Socioeconomic Study Area (2000)

County	Census Tract #	Block Group #	Under 5 Years	5 to 9 Years	10 to 14 Years	15 to 17 Years	Children
Kern	005503	3	5.9%	6.0%	9.9%	5.1%	26.8%
Kern	005700	9	14.4%	11.0%	9.1%	2.8%	37.2%
Los Angeles	900200	1	N/A	N/A	N/A	N/A	**N/A**
Los Angeles	900200	2	6.0%	9.3%	10.6%	5.1%	31.1%

Source: Census 2000, Summary File 1 - Detailed Table P12.

5.6.1.3 Economic Characteristics

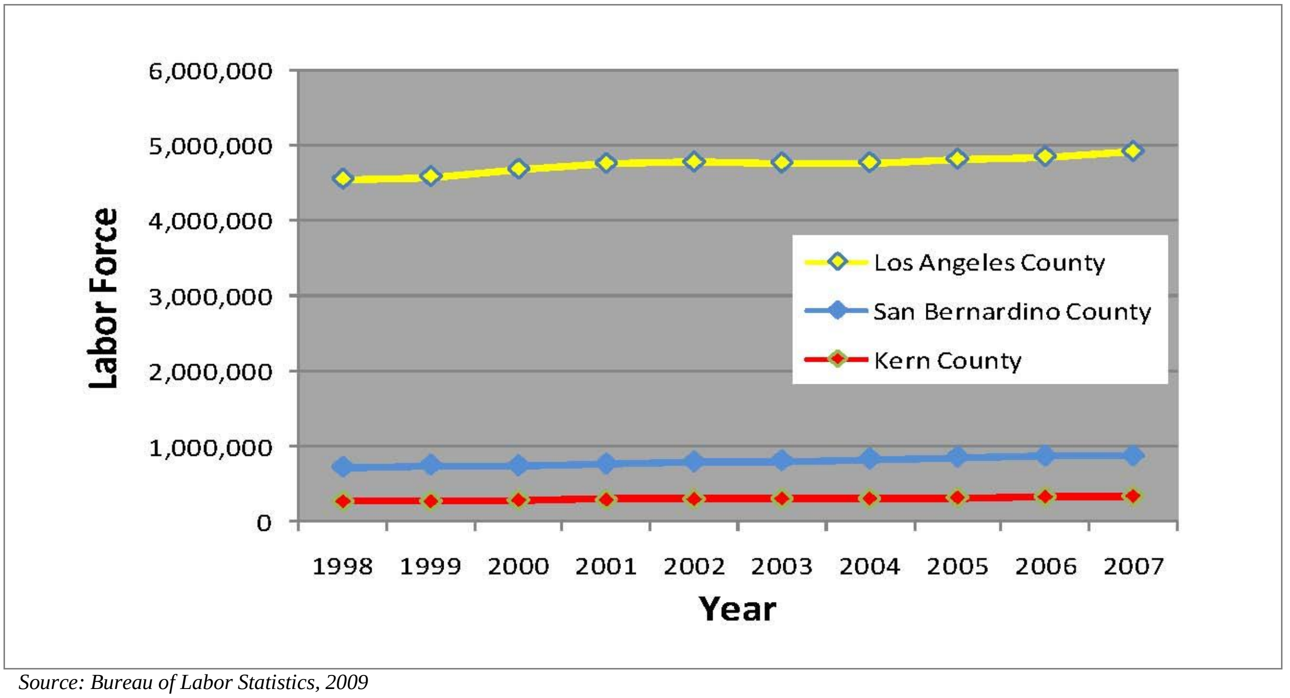
Median Household Income

The median household income in Kern County ($44,620) is slightly lower than San Bernardino ($54,093) and Los Angeles ($52,628) counties, as well as below the median household income estimated for California ($58,361).[124]

Employment Trends

Employment information was obtained from the BLS, as summarized in Figure 5.6.1.3-1. There were over 6.1 million workers in the three-county area labor force in 2007, consisting of 348,792 workers in Kern County, 4,912,605 workers in Los Angeles County, and 871,231 workers in San Bernardino County. The three-county area represents 33.9% of the California labor force.

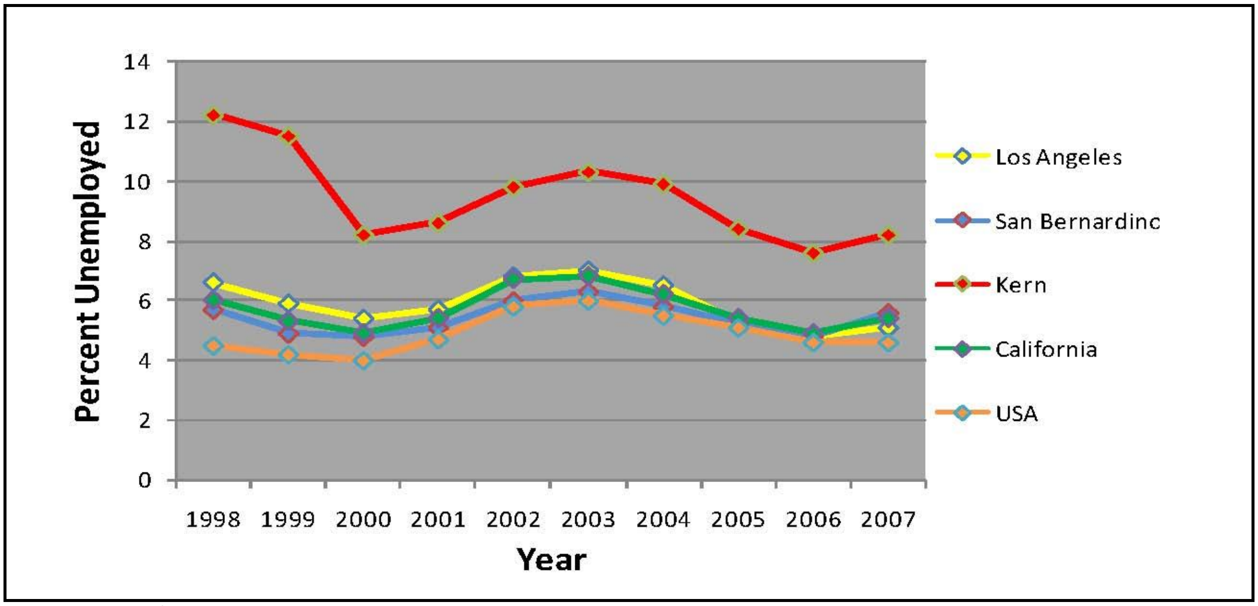
Unemployment rates for the Edwards AFB area, California, and the U.S. from 1998 through 2007 are summarized in Figure 5.6.1.3-2. Kern County has consistently reported higher levels of unemployment than the other areas. Los Angeles and San Bernardino counties show unemployment levels similar to California, but consistently higher than the U.S. unemployment rate of approximately 4.9% during this time period.



Source: Bureau of Labor Statistics, 2009

Figure 5.6.1.3-1: Labor Force Trends for Edwards AFB Socioeconomic Study Area (1998–2007)

124 Census Bureau 2009

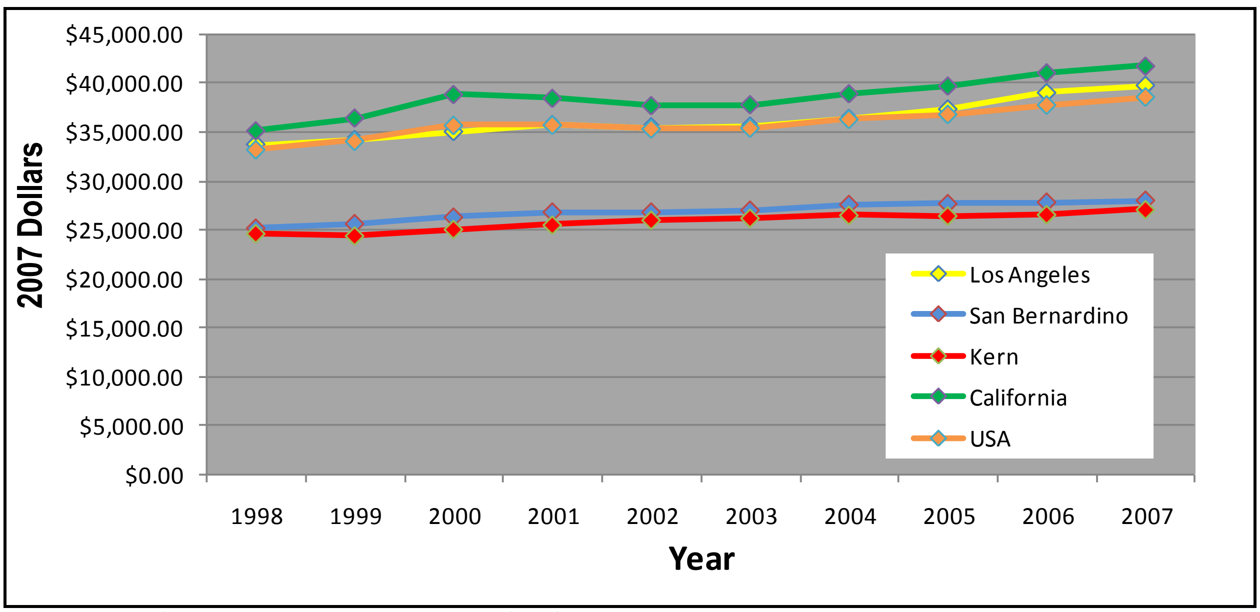


Source: Bureau of Labor Statistics, 2009.

Figure 5.6.1.3-2: Unemployment Trends for Edwards AFB Socioeconomic Study Area (1998–2007)

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

Information was obtained from the BEA for per capita income as summarized in Figure 5.6.1.3-3, which was adjusted for inflation (year 2007 dollars). 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.

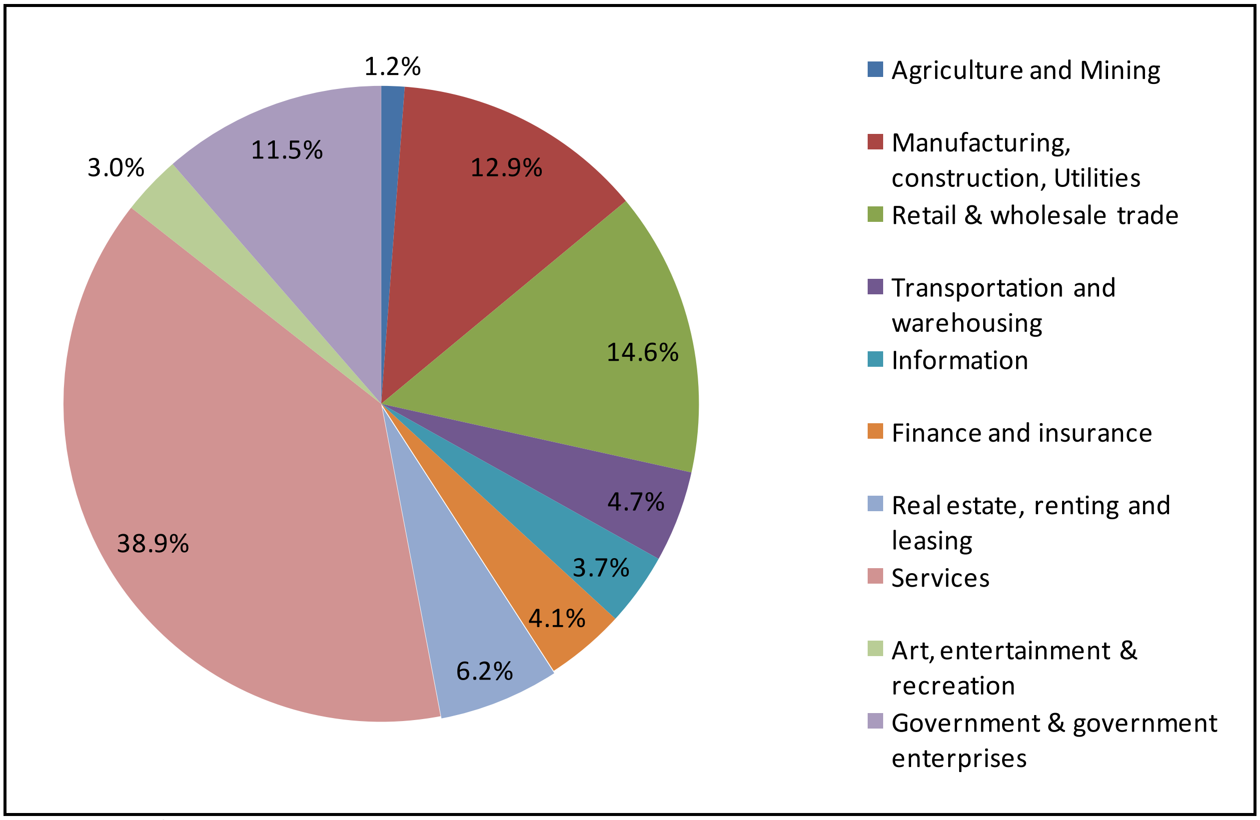


Source: Bureau of Economic Analysis, 2009 and adjusted for inflation (real 2007).

Figure 5.6.1.3-3: Per Capita Income Trends for Edwards AFB Socioeconomic Study Area (1998–2007)

Employment by Industry

Information was obtained from the BEA regarding employment by industry in the Edwards AFB socioeconomic study area for 2007. There were approximately 7.1 million total jobs in the Edwards AFB area in 2007, which included approximately 368,276 jobs in Kern County, approximately 5,846,145 jobs in Los Angeles County, and approximately 892,443 in San Bernardino County (See Figure 5.6.1.3-4 for the distribution among industries and services in the three-county area). Services (38.9%) comprised the largest percentage of jobs in the three-county Edwards AFB socioeconomic study area. In the three-county area, the three largest service industries are health care and social services (8.7%), professional and technical services (7.4%), and administrative and waste services (7.0%).



Source: Bureau of Economic Analysis, 2009.

Figure 5.6.1.3-4: Employment by Industry for Edwards AFB Socioeconomic Study Area (2007)

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 were 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 3.1 persons.[125] In the three-county area, 93.4% of the 4,286,494 housing units were occupied in 2007 with homeowners inhabiting 49.0% of these units (283,070 houses where vacant). All three counties have low homeowner vacancy rates with 1.2% in Los Angeles County, 1.8% in Kern County, and 2.5% in San Bernardino County. Rental vacancy rates for the three-county area are somewhat higher with 3.6% in Los Angeles County, 6.2% in Kern County, and 5.5% in San Bernardino County.[126]

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 an 188-space mobile home park for enlisted personnel, 390 family housing units, 674 bachelor quarters, and 9 Senior Non-Commissioned Officers (NCO) quarters.[127] 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 was at 3.4% (approximately 119 vacancies) based on the 2007 EA/OEA. 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

<u>Transportation</u>

Primary access to Edwards AFB from the adjacent roadways is by way of three gates, each in operation 24 hours a day, 7 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.

<u>Schools</u>

Based on the 2007 EA/OEA, 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 6-weeks to 4-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 5 to 12 years. The Teen Center services children of the ages 13 to 18 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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125 Census Bureau 2009
126 Ibid
127 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 required approximately 642 employees to manage and execute the proposed JSF DT activities. Of these 642 employees, approximately 234 (approximately 212 civilians and 22 military) were already employed at Edwards AFB and transitioned from other programs to support the proposed JSF DT activities. The remaining 408 required employees (approximately 377 civilian and 31 military) were new to Edwards AFB. This additional increase in population equates to less than a 0.07% increase to the 2007 labor force in the Edwards AFB socioeconomic study area. The small increase in the labor force is not expected to cause significant impacts.

As reflected in the 2007 EA/OEA, 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 was used to assess potential impacts and their significance on four elements of a local economy: business volume, employment, personal income, and population.[128] Projected changes that fall outside of these accepted boundaries (referred to as established significance criteria ranges) are considered significant. The analysis from the 2007 EA/OEA showed no exceedance of significance criteria ranges. Because there were no significant impacts, it was decided by the F-35 Joint Program Office not to conduct another analysis with the EIFS model. Potential impacts would be expected to be similar. For completeness, the 2007 EA/OEA analysis is presented in the following paragraphs.

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 was based on discussions with the JSF ITF 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.[129]

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 Program 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 Supplemental EA/OEA. Local population would be expected to increase by approximately 265

128 Bragdon, Katherine and Webster, Ron 2001
129 Gunther, W. 1992

persons based on the EIFS model, which would be a very small percentage of the population in the Edwards AFB socioeconomic study area as stated in Section 5.6.1.1. The low local population increase relative to the local employment increase created at Edwards AFB suggested that most new jobs would be filled by individuals already living in the area. Business volume and personal income would be expected to increase by 0.02% and 0.01%, respectively. 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.

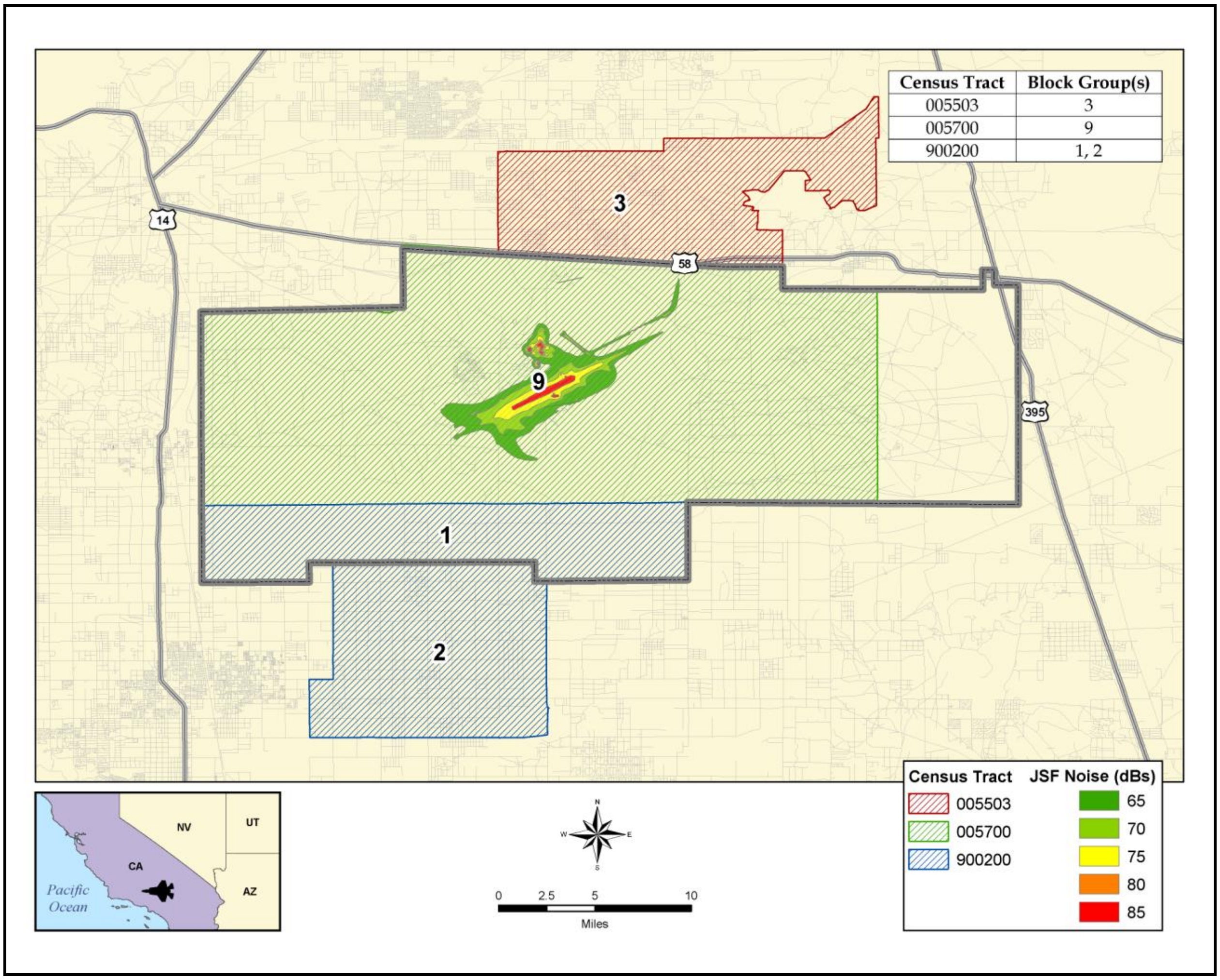
Table 5.6.2-2: Forecasted Output from the EIFS Model for Proposed JSF DT at Edwards AFB

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 Supplemental 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. Figure 5.6.2-1 further illustrates all noise contours, ranging from 60 to 85 dB CNEL, would be confined within the base’s boundary. A small portion of noise contours of 60 dB CNEL extends off the base’s boundary into U.S. census tract 005503, block group 3. All land use off-base within the 60 and 65 dB CNEL contours is listed as vacant (discussed in Section 5.4 of this Supplemental EA/OEA). Additionally, based on the threshold criteria, it does not appear any environmental justice populations would be present within U.S. census tract 005503, block group 3. Therefore, the proposed JSF DT activities would not result in disproportionately high and 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 activities at Edwards AFB would not result in any disproportionately high and adverse health or safety risks to children populations. Noise and air quality analyses have shown that no potentially significant impacts to any potentially disproportionately large populations of children or sensitive receptors (including hospitals, schools, and daycare facilities) where a disproportionately large populations of children may be present would be expected to occur.



Source: Edwards AFB NOISEMAP Model Outputs United States Air Force Acoustics Lab (August 2005) and Booz Allen Hamilton (September 2009 – June 2011).

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.[130]

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

130 40 CFR 1508.7

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 baseline environment (the as is condition).

Table 5.7-1: On-Going and/or Future Actions at Edwards AFB[131]

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
F-15	On-Going - FY 2010
RQ-4, TROUT, X-45, YAL-1A	On-Going - FY 2010
Navy Unmanned Combat Air System CV	On-Going - FY 2011
BAMS Unmanned Aircraft System (UAS)	FY 2012-2013

Typically, when a flight test program is completed a new flight test program begins. The number of personnel, vehicles, and aircraft needed is proportional to the number of flights for the new program. Table 5.7-2 shows the approximate total sorties and flight hours projected for Edwards AFB for FY 2010 and 2011. Average annual flight hours at Edwards AFB were projected to decrease over the next 5 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[132]

FY	Total Hours All Aircraft
2010	13,578
2011	8,728

Flight operations were expected to decrease by 30% from FY 2008 through FY 2011. Proposed JSF DT Program flight hours based on the above table, would range from less than 1% (44 flight hours) to 19 % (1,657 flight hours). 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 remain fairly constant; approximately 10,500 flight operations are conducted per year at Edwards AFB.[133] Test Year 5 represents the highest level of JSF DT activity (700 flights), which is approximately 8% of the annual Edwards AFB flight operations. No significant deviations in flight lines or airspace use are anticipated, thus providing minimal potential for cumulative impacts. As such, no cumulative impacts would be expected to the noise environmental at Edwards AFB.

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 Supplemental EA/OEA concluded JSF DT Program emissions would be predominantly transitory, site-specific, and not cumulatively significant. The additional landings and take-offs would account for less than 10% of the reasonably foreseeable landings and take-offs at the base. The air quality impacts from these flights are small enough to be considered insignificant.

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131 Based on AFFTC Edwards input of copy of 412 OG Fly FCST – G Kellog, April 2005
132 Based on AFFTC Edwards input of copy of 412 OG Fly FCST – G Kellog, April 2005, and Table 5.2-1
133 95th Air Base Wing, Edwards AFB.

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 Program 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 Program would not produce any significant impacts to biological/ natural resources. The proposed JSF DT Program does result in changes from the baseline noise contours at Edwards AFB. This change, coupled with current 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 in place on the altitude and direction of the flights including supersonic operations for safety and protection of the environment. 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 Program would not produce any significant impacts to socioeconomic resources. The arrival of personnel supporting the proposed JSF DT Program, 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 Program 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 Program and other testing activities conclude. No regional cumulative socioeconomic impacts would be anticipated to include environmental justice or disproportionately large populations of children.

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6.0 NAS PATUXENT RIVER

6.1 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.

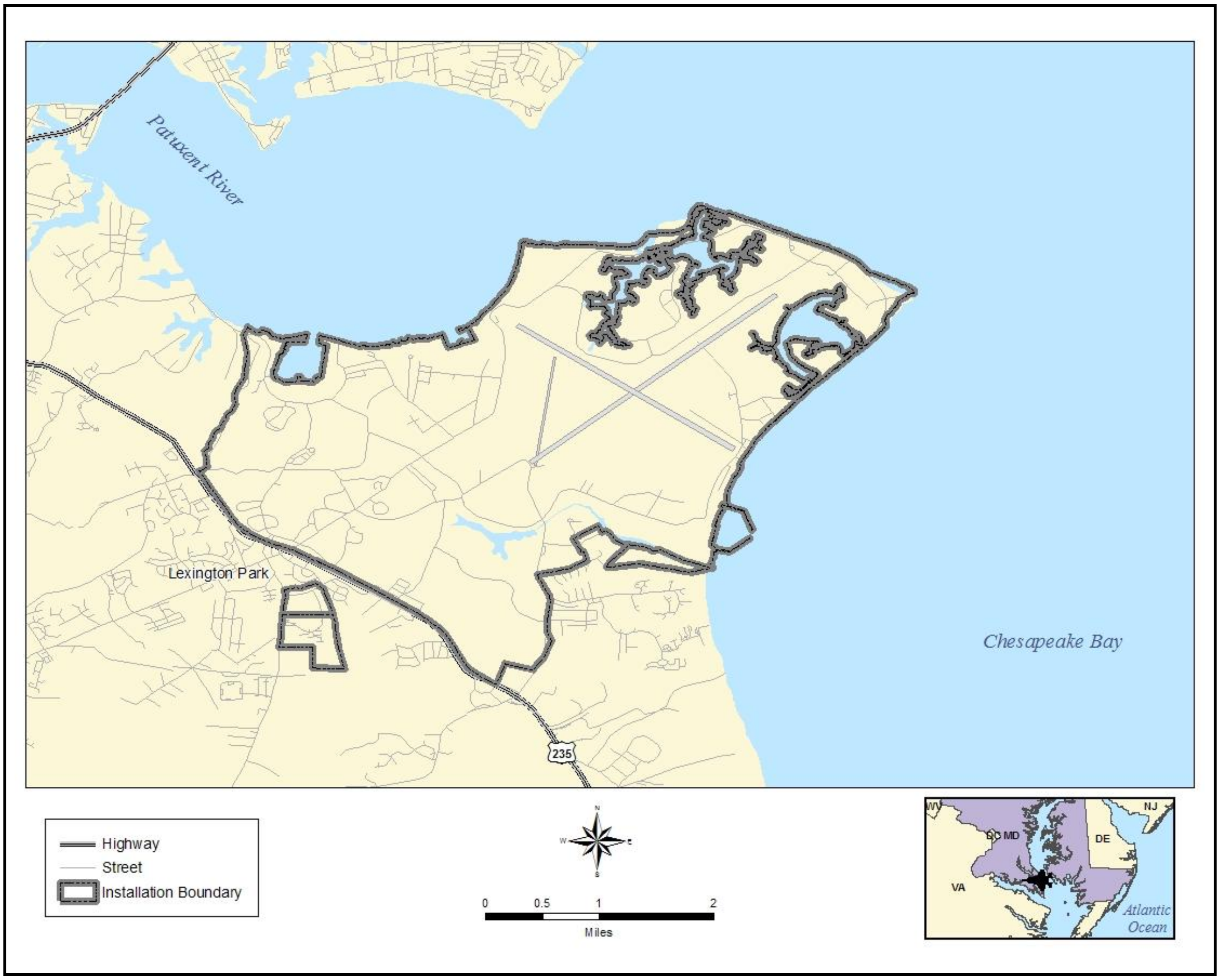

Figure 6.1-1: General Map of NAS Patuxent River

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 the required test equipment, facilities expressly designed for flight-test support, laboratories, and trained personnel necessary to conduct flight-test operations for the proposed JSF DT.

6.2 PROPOSED JSF DT PROGRAM AT NAS PATUXENT RIVER

Naval Air Warfare Center Aircraft Division (NAWCAD), a tenant command at NAS Patuxent River, is the primary responsible test organization for implementing the proposed JSF DT Program. Approximately 700 personnel would support the proposed DT activities, of which 260 were already employed at NAS Patuxent River. The remaining 440 personnel were new employees. The proposed JSF DT activities 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 illustrates the representative restricted and warning areas of NAS Patuxent River.

Alternative One is to conduct the proposed JSF DT Program 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 F-35 Joint Program Office and JSF ITF Team to capitalize on professional capabilities, technical expertise, and specialized test assets while accommodating the full proposed number of F-35s (nine). Proposed flights occurring in the VACAPES OPAREA of the AWA would take-off from and return to NAS Patuxent River.

Under Alternative Two, STOVL hover operations would be performed at both NAS Patuxent River and LM Aero. Approximately 90% of the total STOVL operations planned would be conducted at NAS Patuxent River while the remaining 10% would occur at LM Aero. For the ground-based STOVL operations, 64% would be conducted at NAS Patuxent River and 33% at LM Aero, while the remaining 3% would be conducted at Edwards AFB.

For the proposed at-sea shipboard testing, the F-35 would transit from NAS Patuxent River at or below 10,000 feet MSL to where the ship is located within the VACAPES OPAREA. The F-35 Joint Program Office is capitalizing predominantly on the availability of appropriate types of USN aviation capable ships already conducting their scheduled, routine missions in the VACAPES OPAREA. Scheduling of deck time with the ships would be conducted approximately 18 months prior to embarking on the proposed at-sea shipboard JSF DT activities. The majority of flight testing would be conducted within the shipboard launch and recovery pattern. Approximately 40% of the proposed tests would be conducted at night. Approximately 150 hours of the total F-35B testing is planned consisting of approximately 56 sorties with two LHD class ships. Two F-35B aircraft would be used for each 2-week DET planned for Test Years 4 and 6. There would also be three 2-week DETs scheduled for F-35C testing aboard a CVN consisting of approximately 140 sorties and 280 flight hours total. Two F-35Cs would be used in the first DET in Test Year 4, one aircraft in the second DET planned for Test Year 6, and two aircraft for the third DET also in Test Year 6. A 2-week block of testing is planned for Test Year 7 with a UK Carrier Vessel Future. The number of flight hours and F-35B aircraft needed for this test period is yet to be determined.

As part of the Proposed Action, tower fly-bys with the F-35B aircraft may also be conducted in the AIMES Range in R4005 West and Southwest at Outlying Landing Field (OLF) Webster Field, to the Southeast of NAS Patuxent River (in addition to those planned at the main airfield of NAS Patuxent River). OLF Webster Field is routinely used for a variety of military testing and training activities with helicopters, gliders, unmanned air systems, and fixed-wing aircraft. F/A-18s have previously conducted fly-bys at OLF Webster Field similar to what is proposed for the JSF DT Program. Approaches for the proposed fly-bys are made to two targets in the water located southwest of OLF Webster Field with runs made south to north with an immediate climb out after passing the last target. Approximately 47 flights

(40 for data gathering and 7 for validation) of the total planned mission systems tests would be devoted to the proposed tower fly-bys. Approximately 70% of the proposed fly-bys (whether at NAS Patuxent River or OLF Webster Field) would be conducted in Test Year 3 with the remainder in Test Year 4.

The maximum JSF DT Program tempo for the F-35 analyzed in the 2007 EA/OEA (Alternative One) increased by 1,322 flights (2,634 flight hours) total, as reflected in Table 6.2-1. Including support aircraft, the tempo increased by 4,357 flights - from 5,773 flights in the 2007 EA/OEA to 10,130 flights.

Table 6.2-1: Current and 2007 EA/OEA Overall Test Program

	No. F-35 Flights	F-35 Flight Hours	No. Support Aircraft	Support Aircraft Flight Hours	Total No. Flights	Total Flight Hours
Alternative One						
Current	4,037	7,267	6,093	10,628	10,130	17,895
2007 EA/OEA	2,715	4,633	3,058	6,116	5,773	10,749
Alternative Two						
Current	3,996	7,196	6,093	10,628	10,089	17,824
2007 EA/OEA	2,674	4,562	3,058	6,116	5,732	10,678

The proposed JSF DT Program would be conducted over 7 years with the planned flight tests of the F-35 peaking in Test Year 4 for Alternatives One and Two. Table 6.2-2 lists the updated proposed flight tests and support aircraft analyzed in this Supplemental EA/OEA for Alternative One. Additional support aircraft, besides the types reflected below, may include the KC-10, UK VC-10, UK TriStar, and BAC 1-11 depending on aircraft availability and requirements of proposed JSF DT activities. Foreign aircraft, such as the Irish Omega KDC-10 tanker, have previously flown at NAS Patuxent River. Table 6.2-3 annotates the test profile analyzed in the 2007 EA/OEA. Table 6.2-4 lists the updated proposed flight profile for Alternative Two, while Table 6.2-5 reflects the profile from the 2007 EA/OEA. Table 6.2-6 summarizes the stores/expendables proposed for use, while Table 6.2-7 summarizes those from the 2007 EA/OEA. There is the possibility of using the UK ASRAAM in support of the proposed weapons integration testing in the VACAPES OPAREA from NAS Patuxent River.

Table 6.2-2: Proposed JSF DT Flight Profile at NAS Patuxent River - Alternative One–Current

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	STOVL & CTOL FQ, STOVL & CTOL Performance, STOVL & CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	182	327	F/A18, KC130	364	619	546	946
2	Same as Test Year 1	409	737	F/A18, KC130	818	1,391	1,227	2,128
3	STOVL & CTOL FQ, STOVL & CTOL Performance, CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems, Tower Fly-Bys	358	645	F/A-18, KC-130, F-15, E3, E2, EP-3E, EA-6, AH-66, V22, NIMROD, ASTER, & EFA	659	1,138	1,017	1,783
4	Same as Test Year 3 and At-Sea Shipboard Suitability	909	1,636	Same as Test Year 3	1,244	2,185	2,153	3,821
5	STOVL & CTOL FQ, CTOL Performance, CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems, Tower Fly-Bys	737	1,327	Same as Test Year 3	991	1,737	1,728	3,064
6	STOVL FQ, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, Mission Systems, At-Sea Shipboard Suitability	850	1,530	Same as Test Year 3	1,276	2,233	2,126	3,763
7	Land Based Ship Suitability, Weapons Separation & Integration, Mission Systems, At-Sea Shipboard Suitability	592	1,065	F/A-18 KC-130	741	1,325	1,333	2,390
Total		***4,037***	***7,267***		***6,093***	***10,628***	***10,130***	***17,895***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005), Updated NAS Patuxent River Supplemental Data Verification (2007-2008), and JSF ITF 2011.
Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT Program, 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 Flight Profile at NAS Patuxent River–Alternative One–2007 EA/OEA

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	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, AH-66, V22, NIMROD, ASTER, & EFA	746	1,492	1,513	2,799
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 Program, 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 6.2-4: Proposed JSF DT Flight Profile at NAS Patuxent River - Alternative Two–Current

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	STOVL & CV FQ, STOVL & CV Performance, STOVL & CV Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	182	327	F/A18, KC130	364	619	546	946
2	Same as Test Year 2	409	737	F/A18, KC130	818	1,391	1,227	2,128
3	STOVL & CV FQ, STOVL & CV Performance, CTOL Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	342	617	F/A-18, KC-130, F-15, E3, E2, EP-3E, EA-6, AH-66, V22, NIMROD, ASTER, & EFA	659	1,138	1,001	1,755
4	Same as Test Year 3 and At-Sea Shipboard Suitability	894	1,611	Same as Test Year 3	1,244	2,185	2,138	3,796
5	STOVL & CV FQ, CV Performance, CV Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	732	1,318	Same as Test Year 3	991	1,737	1,723	3,055
6	STOVL FQ, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, Mission Systems, and At-Sea Shipboard Suitability	845	1,521	Same as Test Year 3	1,276	2,233	2,121	3,754
7	Land Based Ship Suitability, Weapons Separation & Integration, Mission Systems, and At-Sea Shipboard Suitability	592	1,065	F/A-18 KC-130	741	1,325	1,333	2,390
Total		***3,996***	***7,196***		***6,093***	***10,628***	***10,089***	***17,824***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005), Updated NAS Patuxent River Supplemental Data Verification (2007-2008), and JSF ITF 2011.

Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT Program, 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 6.2-5: Proposed JSF DT Flight Profile at NAS Patuxent River - Alternative Two– 2007 EA/OEA

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 & CV FQ, STOVL & CV Performance, STOVL & CV Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	178	305	F/A18, KC130	177	354	355	649
3	STOVL & CV FQ, STOVL & CV Performance, CV 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 & CV FQ, CV Performance, CV 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 Program, 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 6.2-6: Proposed JSF DT Support Equipment, Stores, and Expendables at NAS Patuxent River - Alternatives One and Two–Current

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	GBU-12 LGB (6) MK 84 JDAM (18)	24
3	Same as Test Year 2	Same as Test Year 2	GBU-32 JDAMs (10) AIM120 AMRAAM (10)	20
4	Same as Test Year 2	Same as Test Year 2	GBU-12 LGB (1) GBU-31 JDAMs with BLU-109 Bomb Bodies (3) GBU-31 JDAMs (6) AIM120 AMRAAM (19) JSOW (12)	41
5	Same as Test Year 2 without ECS Cooling Cart	37	GBU-12 LGB (25) GBU-31 JDAMs with BLU-109 Bomb Bodies (3) GBU-32 JDAMs (6) MK82 (30) Fuel Tank (12)	76
6	Same as Test Year 2	Same as Test Year 2	GBU-12 LGB (6) GBU-31 JDAMs with BLU-109 Bomb Bodies (3) GBU-31 JDAMs with MK84 Bomb Bodies (6) AGM-154C JSOWs (8) AIM-120 AMRAAM (4) AIM-9X Sidewinder (13) LGTR (22)	62
7	Same as Test Year 2	Same as Test Year 2	N/A	N/A

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005) and Updated NAS Patuxent River Supplemental Data Verification (2007-2008).

Note: Proposed support equipment and stores/expendables reflect realistic approximations for the proposed JSF DT Program, however, the proposed test profile may fluctuate up or down in quantities as the F-35 variants proceed through the various DT events and time periods. It is possible usage quantities may slide into the next test year if not used in the planned test year. Some support equipment (such as floodlights, shipboard aircraft handler, portable duct heaters, and compressors) may change out from the above listed equipment in the table depending on test requirements.

*****Total for all units and types*

Table 6.2-7: Proposed JSF DT Support Equipment, Stores, and Expendables at NAS Patuxent River - Alternatives One and Two–2007 EA/OEA

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*

All air-to-air ground stores expended will be inert bomb bodies. All air-to-air missiles will have inert armament sections. All SOPs in place for the safe use and release of stores/expendables would be adhered to during the proposed JSF DT activities.

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 15 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.[134]

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 Federal NAAQS solely apply. NAS Patuxent River and OLF Webster Field are 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 8-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 8-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[135]

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. This committee 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. Recommendations in the MWAQC's Plan are forwarded to the three State environmental agencies for consideration in their air quality attainment planning. In turn, each State submits a SIP revision to the EPA for review and approval. The MWNAA published a plan in May 2007 for attaining the 8-hour O_3 NAAQS. Table 6.3.1-2 below depicts the total NO_x and VOC emissions budget for the region from the existing plan, as well as the $PM_{2.5}$ mobile source budget established by the Maryland Department of the Environment to comply with the CAAA-1990 and with EPA requirements for the Baltimore region as stated in the EPA's 2005 designation of the Baltimore region, and EPA's Clean Air Fine Particle Implementation Rule. Table 6.3.1-2 also includes the regionally significant thresholds based on the emission budgets.

134 Ibid
135 EPA 2005

Table 6.3.1-2: Emissions Budget and 10% Nonattainment Area (NAA) Emissions Budget for the MWNAA

	Baseline Emission Levels tons/day (MT/day)			Regionally Significant Threshold[a] tons/year (MT/year)		
Nonattainment Area (NAA)	NO_x[b]	VOC[b]	$PM_{2.5}$[c]	NO_x	VOC	$PM_{2.5}$
MWAQC	493.2 (447.4)	358.8 (325.5)	1.9 (1.7)	6,806 (6,174)	4,952 (4,492)	68.7 (62.3)

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 – 138 days).
c. $PM_{2.5}$ emission levels for baseline year 2009. Assuming 365 days per year.

The CTR, where the proposed JSF DT Program 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 for all the NAAQS.[136] Sussex County, Delaware is included in the Philadelphia-Wilmington-Atlantic City moderate NAA for the 8-hour O_3 NAAQS, but is in attainment for all other criteria pollutant standards.[137] In addition to the NAAQS, Delaware has also established primary and secondary standards for suspended particulates, HCs, and hydrogen sulfide. The standards for PM_{10} and $PM_{2.5}$ are more stringent than the standard for suspended particulates (75 $\mu g/m^3$ over 24 hours and 260 $\mu g/m^3$ not to be exceeded more than once per year); therefore, the suspended particulate standards was not included in this analysis. 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.

136 EPA 2005
137 Ibid

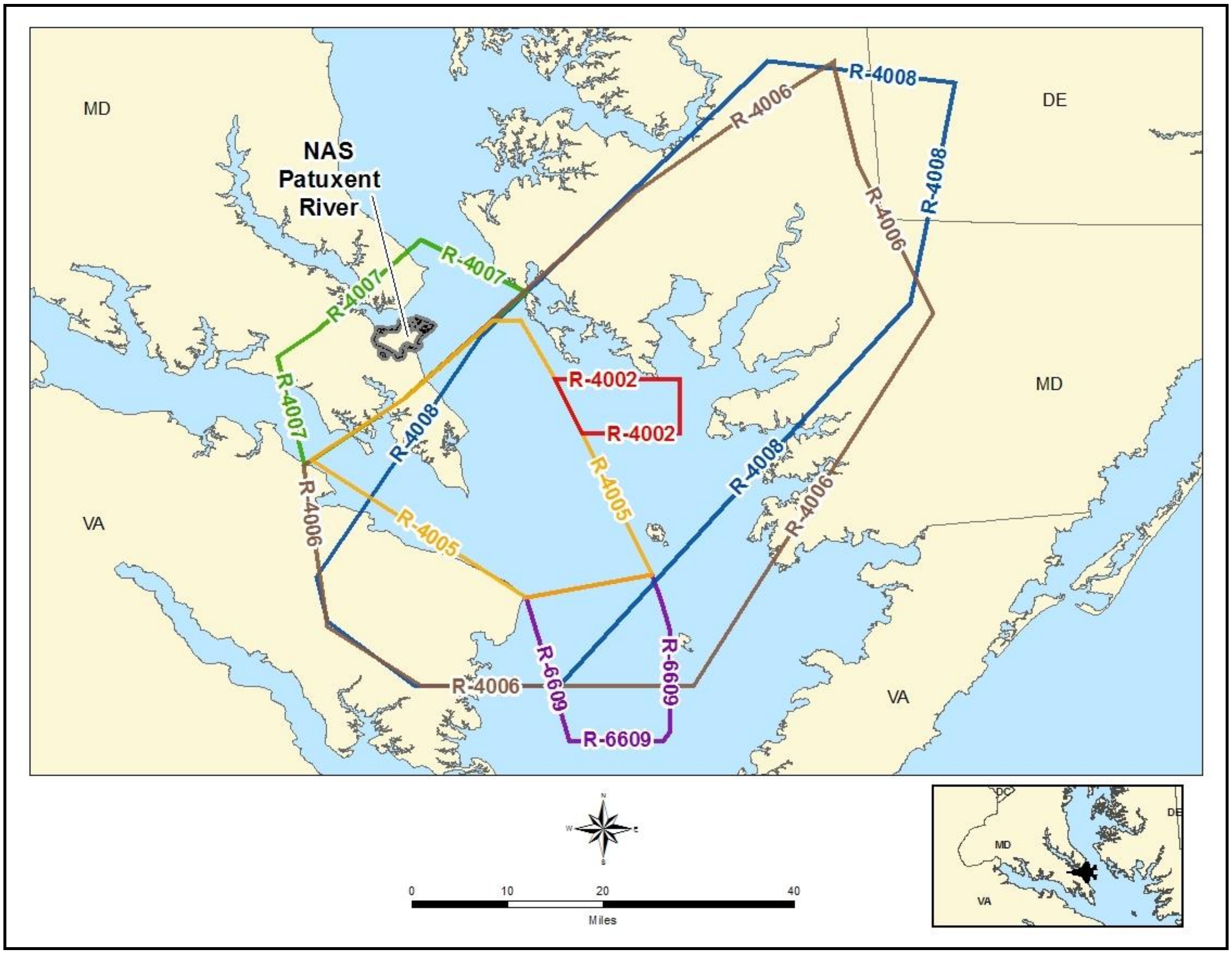

Figure 6.3.1-1: NAS Patuxent River CTR

6.3.2 Emission Estimation Methodology

The emission estimates used to determine General Conformity Rule applicability were calculated for flight operations and GSE identified for the proposed JSF DT Program at NAS Patuxent River; emissions from test flights at OLF Webster Field were also included in the emission estimates. 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 *Air Force Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations*.[138] For F-35 operations, emissions were calculated using emission indices for various throttle settings while the aircraft is operating below 3,000 feet AGL. The flight profiles from the noise analysis were used to develop the emission estimates. Fuel flow rates and emissions for idling, unsticks, engine run-up, and refueling modes on the ground were taken from the standard F-35B landing and take-off (LTO) cycle.

138 O'Brien 2002

The F-35 engine emission factors, provided by P&W, were used for gaseous emissions at non-AB conditions. PM emission factors for the F-35 engine during non-AB conditions were calculated using the FAA First Order Approximation, Version 3, Methodology, which differentiates between volatile, sulfate, and soot particles. The volatile particulate emissions were calculated based on the gaseous HC emissions; the sulfate emissions were calculated based on the assumed sulfur content of the fuel of 0.049%; and the soot particles based on data from ONR.

While there may be a need to conduct engine tests, the extent and details of these proposed test activities and operational profiles (e.g. engine operating times, power settings) are not well defined 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 environmental compliance. Potential emissions resulting from proposed JSF DT activities will be assessed by the F-35 Joint Program Office , JSF ITF 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 calculated by scaling the emission estimates from the 2007 EA/OEA based on the number of JSF operations identified for this Supplemental EA/OEA. 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 were based on the fuel use or the hours of operation.[139] [140] Most emission factors for NAS Patuxent River GSE were derived from emission measurements conducted by the USN; and when no emission measurements were available for the specific equipment in the Proposed Action, other data sources were used.[141] [142]

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.[143] The EDMS Program was used to estimate personal vehicle emissions.[144] In addition, emissions from refueling operations were included in this analysis, using the procedures recommended by the EPA in AP-42 to calculate the emissions.[145]

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. The General Conformity Rule 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 base 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 activities below 3,000 feet AGL would occur in these neighboring counties, the F-35 Joint Program Office decided to analyze the impacts as if all the emissions associated with proposed JSF DT activities at NAS Patuxent River would occur 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. The highest year annotated in this table represents the

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139 EDMS 2005
140 O'Brien 2002
141 Ibid
142 EDMS 2005
143 Hales 2005b; Hales 2005c
144 EDMS 2005
145 EPA 1997

year most likely to produce the greatest estimated emissions. The difference in the highest emissions per test year for the various criteria pollutants is a function of the combination of different emission sources (e.g., aircraft, GSE, personal vehicles) and the operation of those sources. Often the difference in the highest year is slight. However, the mix of emission sources will cause emissions to be highest in one year for a given pollutant and in a different year another pollutant.

Table 6.3.3-1: Estimated Emissions for the Proposed JSF DT Program 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					
1	57.0 (51.8)	19.5 (17.7)	6.8 (6.2)	1.1 (1.0)	0.8 (0.7)
2	113.5 (103.0)	32.5 (29.5)	11.2 (10.2)	1.8 (1.6)	1.1 (1.0)
3	107.3 (97.4)	29.9 (27.1)	10.6 (9.6)	1.6 (1.5)	1.1 (1.0)
4	89.9 (81.5)	46.2 (41.9)	9.5 (8.6)	3.1 (2.8)	1.3 (1.2)
5	83.8 (76.1)	41.5 (37.6)	9.0 (8.1)	2.7 (2.5)	1.2 (1.1)
6	82.3 (74.7)	44.4 (40.3)	8.8 (7.9)	3.0 (2.8)	1.5 (1.4)
7	75.3 (68.3)	34.2 (31.2)	7.9 (7.2)	2.3 (2.1)	1.2 (1.1)
Highest Year[1]	113.5 (103.0) (Test Year 2)	46.2 (41.9) (Test Year 4)	11.2 (10.2) (Test Year 2)	3.1 (2.8) (Test Year 4)	1.5 (1.4) (Test Year 6)
Alternative Two					
1	57.0 (51.6)	19.1 (17.3)	6.8 (6.17)	1.1 (1.0)	0.8 (0.7)
2	113.2 (102.7)	31.6 (28.7)	11.2 (10.2)	1.7 (1.5)	1.3 (0.9)
3	107.1 (97.2)	29.1 (26.4)	10.6 (9.6)	1.6 (1.4)	1.1 (1.0)
4	89.3 (81.1)	45.2 (41.0)	9.5 (8.6)	3.0 (2.7)	1.3 (1.2)
5	83.2 (75.5)	39.1 (35.5)	8.8 (8.0)	2.5 (2.3)	1.2 (1.1)
6	81.6 (74.0)	41.8 (37.9)	8.6 (7.8)	2.8 (2.6)	1.4 (1.3)
7	74.9 (67.9)	33.2 (30.1)	7.8 (7.1)	2.2 (2.0)	1.1 (1.0)
Highest Year[1]	113.2 (102.7) (Test Year 2)	45.2 (41.0) (Test Year 4)	11.2 (10.2) (Test Year 2)	3.0 (2.7) (Test Year 4)	1.4 (1.3) (Test Year 6)

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: 1.See Appendix E.2 for additional details. Hydrocarbon emissions in the appendix are assumed to be VOCs.
2. The highest year represents the year with the potential to produce the greatest emissions. The difference in the highest emissions per test year for the various criteria pollutants is a function of the combination of different emission sources (e.g., aircraft, GSE, personal vehicles) and the operation of those sources. Often the difference in the highest year is slight, however, the mix of emission sources will cause emissions to be highest in one year for a given pollutant and in a different year another pollutant.
3. Test Years 2 and 3 include emissions from flight tests that will occur at OLF Webster Field.

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 NAAs total emissions budget. It is reasonable, therefore, to assume no significant air quality impacts would occur from the proposed JSF DT activities for either alternative at NAS Patuxent River.

Table 6.3.3-2: Proposed JSF DT Program Peak Year Comparison

Pollutant	Highest Year Emissions[1] tpy	*de minimis* Threshold tpy	Regionally Significant Threshold tpy
Alternative One			
NO_x	46.2	100	6,806
VOC	11.2	50	4,952
PM	1.5	100	68.7
Alternative Two			
NO_x	45.2	100	6,806
VOC	11.2	50	4,952
PM	1.4	100	68.7

tpy = tons per year
NO_x = Nitrogen Oxides, VOC = Volatile Organic Compound, PM = Particulate Matter
Hydrocarbon emissions are assumed to be VOCs.
Note: 1. The highest year (Test Years 3 or 4) represents the year with the potential to produce the greatest estimated emissions from the Proposed Action.

GHG emissions (CO_2, CH_4, N_2O) were also estimated for the proposed aircraft operations at NAS Patuxent River and OLF Webster Field based on the total quantity of fuel combusted and applying emissions factor specific to the fuel burned (diesel or gasoline) from generally accepted GHG protocols. These protocols do not include an emission factor for JP-8, therefore the emission factor for Jet A/A-1 was used. The GHG emissions were converted to a CO_2e basis using the GWP of each gas.

The CO_2e generated from the Proposed Action for Alternatives One and Two are shown in Table 6.3.3-3. Approximately 16,058 MT of CO_2e and 14,900 MT of CO_2e would be generated by sources and operations comprising the Proposed Action. There is no requirement under the General Conformity Rule regulations to consider GHG emissions. However, comparing the results of the analysis for NAS Patuxent River to the 2009 total U.S. GHG emissions of 6,633.20 million MT CO_2e show that both Alternatives of the Proposed Action would contribute less than a 0.002% increase of the total 2007 U.S. GHG emissions. Section 3.1.5 provides a high level overview of DoD’s and the Service’s energy activities (e.g., alternative fuels, reduce energy consumption, etc.), which have an added benefit of reducing greenhouse gas emissions.

Table 6.3.3-3: Proposed JSF DT Program GHG Emissions at NAS Patuxent River

Test Year	Alternative One CO_2e (MT)	Alternative Two CO_2e (MT)
1	6,168	5,689
2	14,349	13,233
3	6,346	5,884
4	16,058	14,900
5	13,030	12,090
6	15,024	13,940
7	10,450	9,696
Total	81,425	75,432
Highest (Test Year 4)	16,058	14,900

Note: Test Years 2 and 3 include GHG emissions generated from flight tests conducted at OLF Webster Field.

6.4 NOISE AT NAS PATUXENT RIVER

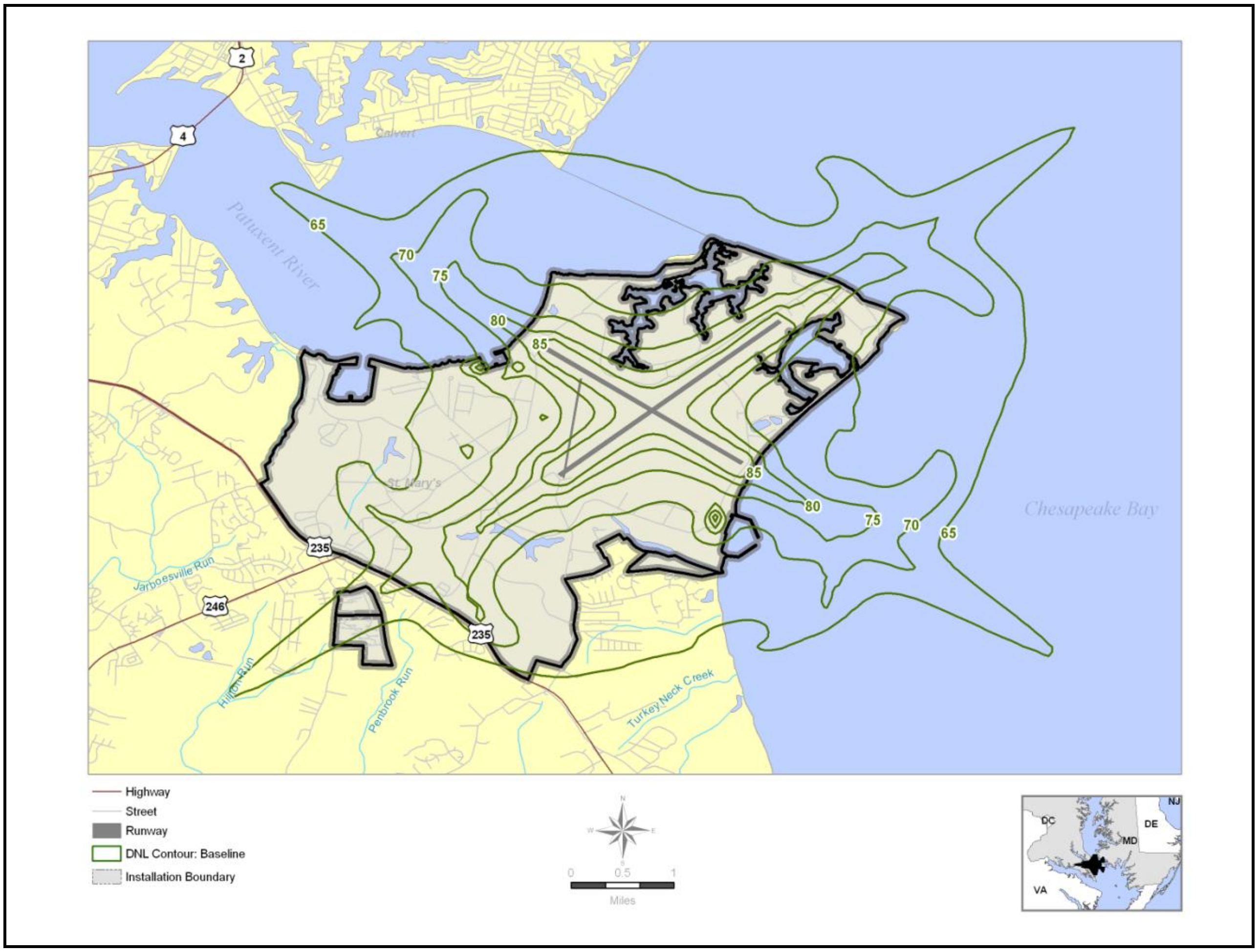
6.4.1 Affected Environment

For the purposes of this evaluation, aircraft noise impacts are presented as land areas (acres) and populations exposed to aircraft noise above baseline levels. Contour lines representing average annual noise baselines for aircraft operations were 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 Program 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. Noise at NAS Patuxent River is produced by a variety of sources including aircraft flight, ground test and operation, vehicle operation, maintenance, and construction activities. The effect of these activities produces the ambient condition (baseline 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, 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.

Baseline DNL contours were 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 Program used the *2009 Air Installation Compatible Use Zone (AICUZ) Study)* as the baseline for noise contours. The baseline for the 2007 EA/OEA was the *Final Environmental Impact Statement (FEIS), Increased Flight and Related Operations in the Patuxent River Complex, Patuxent River, Maryland (December 1998).* In this Supplemental EA/OEA, the baseline in the 2009 AICUZ Study better reflects the current noise environment at NAS Patuxent River. Contours were produced using NOISEMAP from the inputs contained in the 2009 AICUZ Study to maintain consistency between contours produced with and without the proposed JSF DT Program. Appendix F.3 contains additional details on the noise modeling and analysis conducted for NAS Patuxent River.

Figure 6.4.1-1 illustrates the 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 baseline DNL noise contours.



Source: 2009 AICUZ for NAS Patuxent River and Booz Allen Hamilton (August 2010 – June 2011).

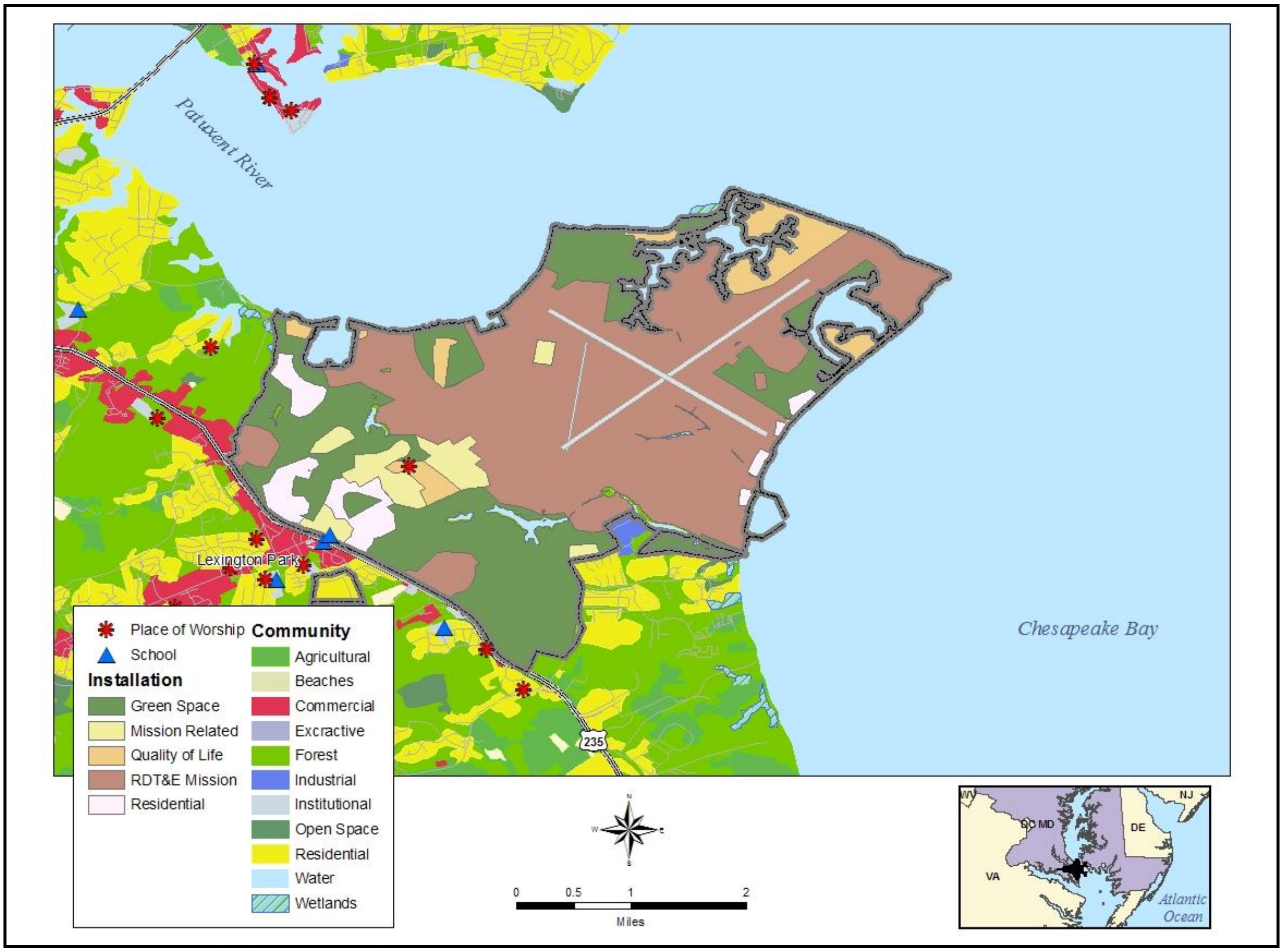
Figure 6.4.1-1: Baseline DNL Noise Contours for NAS Patuxent River

Table 6.4.1-1: Acres within the Baseline DNL Contours at NAS Patuxent River

DNL Contour Bands	Area Acres On-Base	Area Acres Off-Base
65–70 dB	1,709	506
70–75 dB	1,556	37
75–80 dB	847	8
80–85 dB	541	1
85+ dB	614	0
65 dB and greater (Total)	5,267	552

Source: 2009 AICUZ for NAS Patuxent River and Booz Allen Hamilton (August 2010 – June 2011).

Aerial photographs were used to determine the presence of incompatible land uses and populations affected by the baseline DNL noise contours. Land use data was obtained from St. Mary's and Calvert County based on their 2003 census data to provide increased accuracy in the determination of land uses affected by the baseline noise contours. Figure 6.4.1-2 illustrates the land uses within the vicinity of NAS Patuxent River.



Source: St. Mary's and Calvert County Planning Departments 2003.

Figure 6.4.1-2: Land Use Around NAS Patuxent River

NAS Patuxent River's baseline noise contour affects areas in St. Mary's County directly adjacent to base 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-base that are within the baseline noise contours, of which approximately 3,069 acres are of the RDT&E mission, 144 acres of residential development, 219 acres of mission-related, 379 acres of quality of life (such as parks, recreation areas, golf courses, etc.), and 1,456 acres of green space (undeveloped and open) lands. The total 65 dB and greater DNL noise contours off-base property encompass approximately 26 acres of commercial, 60 acres of industrial, and approximately 419 acres of residential lands. The remaining off-base areas (approximately 48 acres) are primarily institutional and agricultural lands.

Table 6.4.1-2: NAS Patuxent River Baseline Affected Land Uses (Acres)

Land Use Type	DNL Contour Bands					
	65 dB	70 dB	75 dB	80 dB	85 dB	65+ dB
On-Base						
Green Space	745	459	206	42	3	1,456
Mission Related	160	47	13	0	0	219
Quality of Life	153	181	43	2	0	379
RDT&E Mission	572	826	573	488	610	3,069
Residential	79	43	12	9	1	144
Off-Base						
Agricultural	9	0	0	0	0	9
Commercial	25	1	0	0	0	26
Industrial	32	24	4	0	0	60
Institutional	34	0	4	1	0	39
Low Density Residential	15	0	0	0	0	15
Medium Density Residential	324	1	0	0	0	325
High Density Residential	68	11	0	0	0	79

Source: 2009 AICUZ for NAS Patuxent River and Booz Allen Hamilton (August 2010 – June 2011).

Table 6.4.1-3 presents the populations affected by the baseline noise contour. A count of residential housing units was conducted to determine the population exposure to the baseline noise contour at NAS Patuxent River. Residential housing units affected by the 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.[146]

[146] *Census Bureau 2000. St. Mary's County Maryland.*

Table 6.4.1-3: Populations within the Baseline DNL Contours at NAS Patuxent River

DNL Contour Bands	Estimated Housing		Estimated Population	
	On-Base	Off-Base	On-Base	Off-Base
65–70 dB	245	1,080	980	2,940
70–75 dB	45	10	180	30
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***	***1,240***	***2,970***

Source: 2009 AICUZ for NAS Patuxent River and Booz Allen Hamilton (August 2010 – June 2011).
Notes: Housing and population rounded to nearest tenth
Assumes U.S. Census 2000, 2.72 persons as average housing density off-base
Assumes U.S. Census 2000, 3.8 persons as average housing density on-base

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 baseline levels. This section discusses the physical characteristics of noise from the Proposed Action. Contour lines representing average annual noise conditions for aircraft operations were generated for 65, 70, 75, 80, and 85 dB DNL.

The major modeling input variables for the analysis were the number of aircraft operations, specifically the addition of F-35 DT activities to the baseline NAS Patuxent River Fleet mix. All other NOISEMAP input variables (such as runway utilization, time of day, and stage length) were consistent with the baselines. Further information regarding the noise modeling, analysis, and rationales follows and is provided in Appendix F.3. 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.

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 & CV FQ, STOVL & CV Performance, CV Propulsion, Loads, Flutter, Land Based Ship Suitability, Weapons Separation & Integration, STOVL Environment, Mission Systems	909	1,636	Same as Baseline	1,244	2,185	2,153	3,821

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005), Updated NAS Patuxent River Supplemental Data Verification (2007-2008), and JSF ITF 2011.
Note: Proposed flights and flight hours reflect realistic approximations for the proposed JSF DT Program, 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 JSF DT activities reflected in Table 6.4.2-1 were added to the Fleet mix within the baseline noise contours at NAS Patuxent River. Conversations with JSF IFT Team and NAS Patuxent River operational personnel confirmed proposed support aircraft are currently accounted for in the baseline Fleet mix.[147] 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 were not added to the overall noise model profile.

As discussed in Section 6.4.1, proposed F-35 DT activity levels and Fleet mix conditions at NAS Patuxent River were based on the 2009 AICUZ Study for NAS Patuxent River. The 2009 AICUZ Study represents the maximum operational levels anticipated at NAS Patuxent River. Additional modeling assumptions were also made regarding performance profiles and AB use for the F-35, as follows:

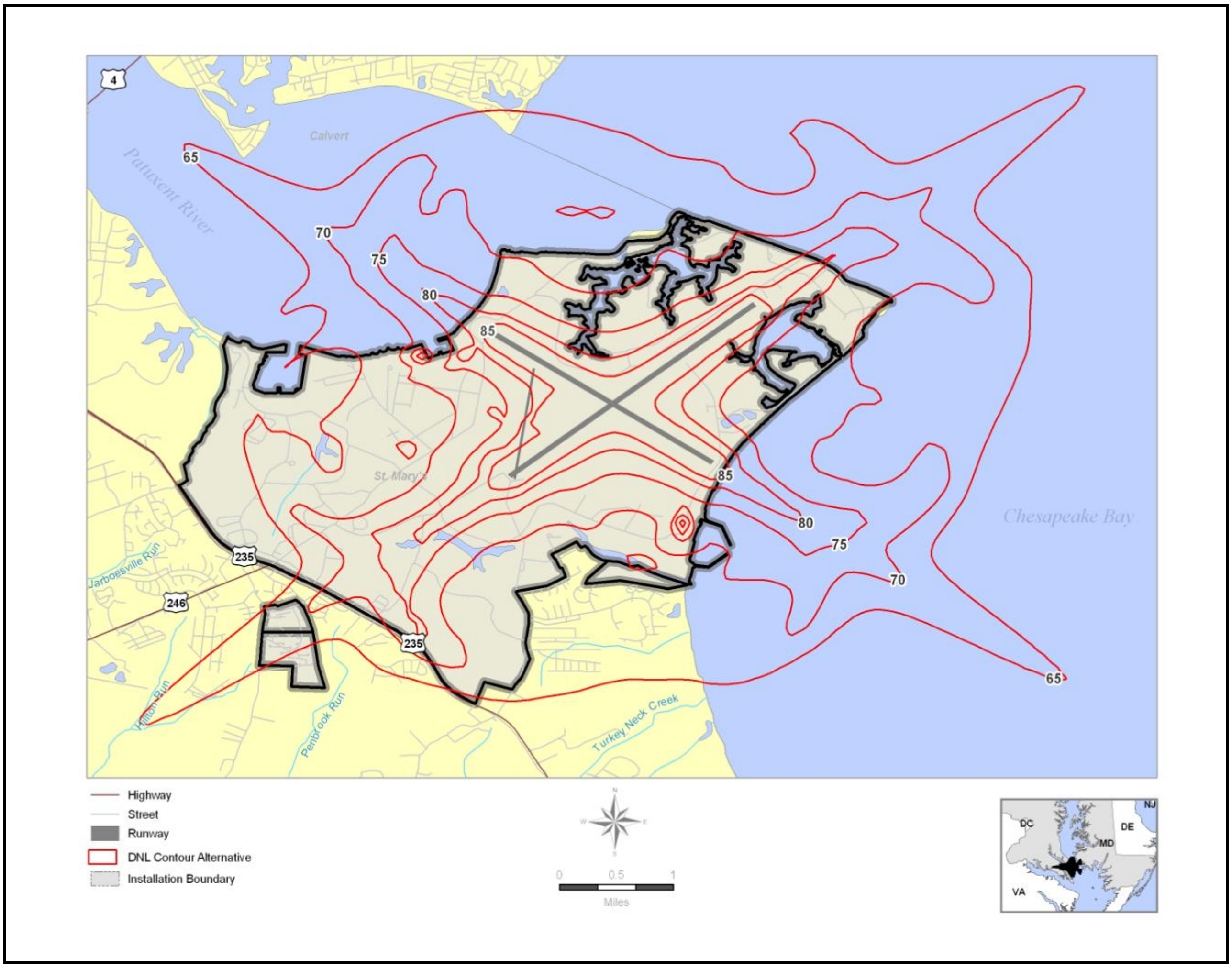
- Legacy Aircraft Substituted with F-35 Aircraft–An equal number of legacy aircraft were removed and substituted with F-35 aircraft in the model, so as not to exceed the total number of operations modeled in the AICUZ Study. The Fleet mix contained approximately 25.5 daily operations of similar legacy aircraft. Approximately 909 annual, proposed F-35 DT operations (~2.4 daily) were added to the baseline Fleet mix. This addition was performed, to reflect the anticipated Fleet mix during the proposed JSF DT Program, based on discussions with NAS Patuxent River air operations personnel, the JSF IFT Team, and Naval Air Systems Command (NAVAIR) Ranges Sustainability Office representatives.[148]

- Proposed F-35 STOVL DT Activities–The same flight tracks as those currently used by similar legacy aircraft in the baseline would be used by the F-35. All proposed F-35 STOVL 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 was assumed once aircraft rotation is achieved (forward flight), then STOVL departures would merge with existing flight tracks. NOISEMAP does not have the ability to model STOVL operations, therefore adjustments were required to best simulate such an activity. Proposed F-35 STOVL DT activities operations were modeled as very slow (~10 knots [kts]) with steep (150 feet AGL going 4 feet down track) departures and arrivals.

- F-35 Flight Profiles and AB Departures[149]–A predominant component of aviation noise exposure is climb and descent rates from 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 IFT 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.[150]

Figure 6.4.2-1 illustrates noise contours at NAS Patuxent River with the Proposed Action (both alternatives).

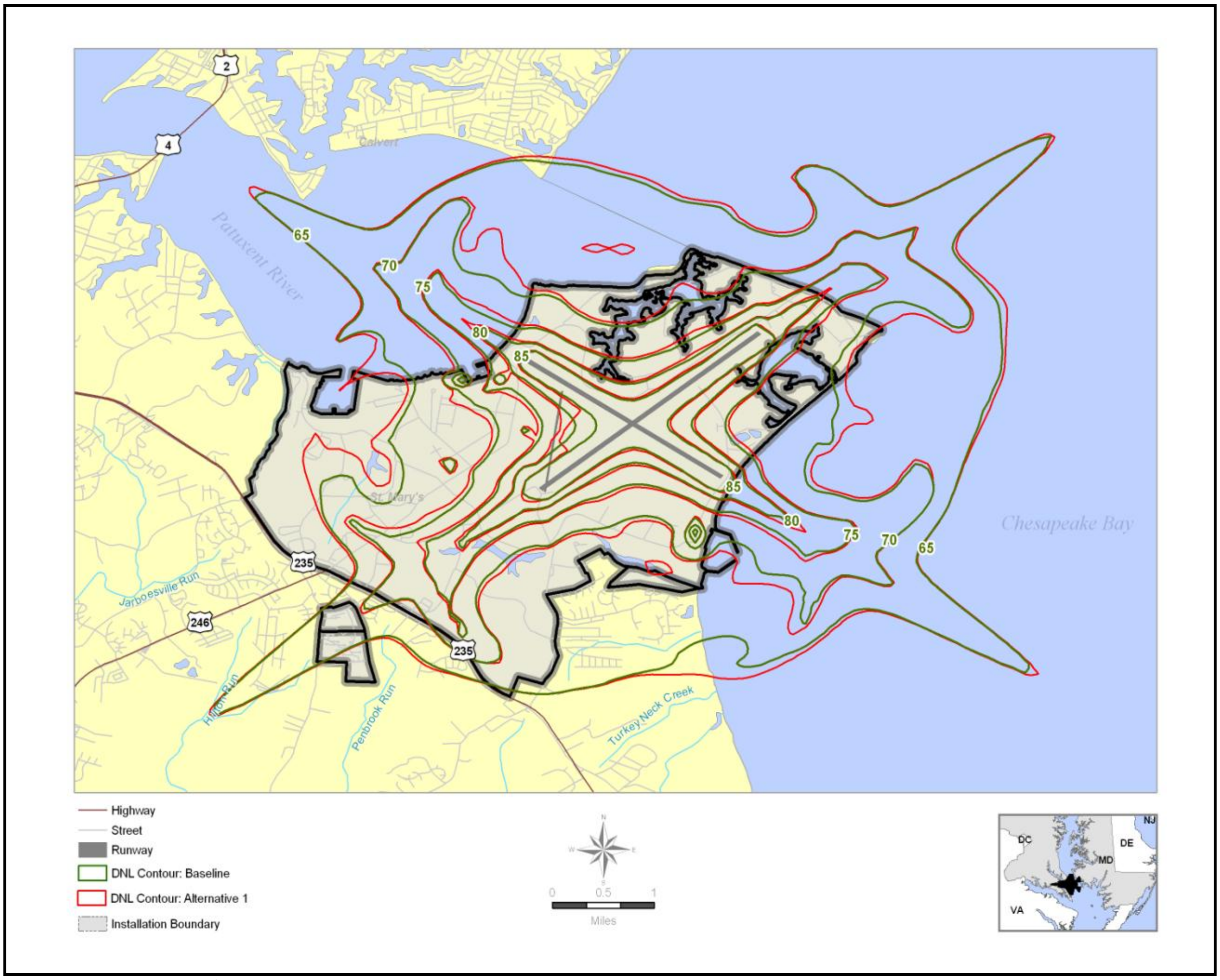
147 Briggs 2005, Maack 2004 and 2005, Nantz 2005, and Wiseman 2005
148 Briggs 2005, Maack, Andrew 2004–2005, Nantz 2005 and 2007-2008, Gallant 2005, and Willis 2005
149 AB is an increased engine thrust mode beyond typical thrust settings used by higher performance aircraft (predominantly fighter and trainer aircraft) in short durations to achieve higher speeds.
150 Briggs 2005, Maack, Andrew 2004–2005, Nantz 2005 and 2007-2008, and Wiseman 2005



Source: 2009 AICUZ for NAS Patuxent River and Booz Allen Hamilton (August 2010 – June 2011).

Figure 6.4.2-1: DNL Noise Contours with the Proposed JSF DT Program at NAS Patuxent River

Table 6.4.2-2 summarizes the total acres within the JSF DT Program noise contour (the 65 dB DNL and greater noise contour) with respect to the baseline. There would be a slight increase of 195 acres from approximately 5,267 to 5,462 (approximately 4%) of base property within the 65 dB and greater DNL noise contours. The total of 65 dB and greater DNL noise contours would encompass approximately 605 acres of land outside of NAS Patuxent River's boundary; an increase of 10% or approximately 53 acres over the baseline. Similar to the 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: 2009 AICUZ for NAS Patuxent River, MD, and Booz Allen Hamilton (August 2010 – June 2011).

Figure 6.4.2-2: Proposed JSF DT Program DNL Noise Contour Comparison at NAS Patuxent River

Table 6.4.2-2: Acres within the Baseline and Proposed JSF DT Program DNL Contours at NAS Patuxent River

DNL Contour Bands	Baseline Area Acres		JSF DT Program Acres		Acreage Change	
	On-Base	Off-Base	On-Base	Off-Base	On-Base	Off-Base
65–70 dB	1,709	506	1,690	542	-19	36
70–75 dB	1,556	37	1,626	54	70	17
75–80 dB	847	8	874	7	27	-1
80–85 dB	541	1	564	2	23	1
85> dB	614	0	708	0	94	0
65 dB and greater (Total)	**5,267**	**552**	**5,462**	**605**	**195**	**53**

Source: 2009 AICUZ for NAS Patuxent River and Booz Allen Hamilton (August 2010 – June 2011).
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 base boundary that are potentially affected by the Proposed Action, as well as reflecting the changes anticipated when compared to the baseline. Acres of residential development lands on-base would increase by 25 acres (18%) from 144 to 170. Acres of RDT&E mission lands would increase by approximately 39 acres (approximately 1.0%) from 3,069 to 3,108 acres.

Table 6.4.2-3: Land Uses (Acres) Potentially Affected by the Proposed JSF DT Program within NAS Patuxent River's Base Boundary

Land Use Type	Baseline DNL Contour Bands					
	65dB	70dB	75dB	80dB	85dB	65+dB
Green Space	745	459	206	42	3	1,455
Mission Related	160	47	13	0	0	220
Quality of Life	153	181	43	2	0	379
RDT&E Mission	572	826	573	488	610	3,069
Residential	79	43	12	9	1	144
Land Use Type	**With Proposed JSF DT DNL Contour Bands**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Green Space	801	480	220	56	4	1,561
Mission Related	161	63	20	0	0	244
Quality of Life	137	182	57	3	0	379
RDT&E Mission	500	849	561	496	702	3,108
Residential	91	52	16	9	2	170
Land Use Type	**Change**					
	65dB	**70dB**	**75dB**	**80dB**	**85dB**	**65+dB**
Green Space	56	21	14	14	1	106
Mission Related	1	16	7	0	0	24
Quality of Life	-16	1	14	1	0	0
RDT&E Mission	-72	23	-12	8	92	39
Residential	12	9	4	0	1	26

Source: 2009 AICUZ for NAS Patuxent River, MD, and Booz Allen Hamilton (August 2010 – June 2011).
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 base boundary that would be potentially affected by the Proposed Action, as well as reflecting the changes anticipated when compared to the baseline. Acres of residential lands would increase by 6 acres (2%) from 419 to 425 acres, while acres of industrial lands would decrease by 28 acres (47%) from 60 to 32 acres.

Table 6.4.2-4: Land Uses (Acres) Potentially Affected by Proposed JSF DT Program Outside of NAS Patuxent River's Base Boundary

Land Use Type	Baseline DNL Contour Bands					
	65 dB	70 dB	75 dB	80 dB	85 dB	65+ dB
Agricultural	9	0	0	0	0	9
Commercial	25	1	0	0	0	26
Industrial	32	24	4	0	0	60
Institutional	34	0	4	1	0	39
Low Density Residential	15	0	0	0	0	15
Medium Density Residential	324	1	0	0	0	325
High Density Residential	68	11	0	0	0	79
Land Use Type	**JSF DT Program DNL Contour Bands**					
	65 dB	**70 dB**	**75 dB**	**80 dB**	**85 dB**	**65+ dB**
Agricultural	28	0	0	0	0	28
Commercial	26	1	0	0	0	27
Industrial	32	0	0	0	0	32
Institutional	29	29	5	1	0	64
Low Density Residential	19	0	0	0	0	19
Medium Density Residential	325	1	0	0	0	326
High Density Residential	66	14	0	0	0	80
Land Use Type	**Change**					
	65 dB	**70 dB**	**75 dB**	**80 dB**	**85 dB**	**65+ dB**
Agricultural	19	0	0	0	0	19
Commercial	1	0	0	0	0	1
Industrial	0	-24	-4	0	0	-28
Institutional	-5	29	1	0	0	25
Low Density Residential	4	0	0	0	0	4
Medium Density Residential	1	0	0	0	0	1
High Density Residential	-2	3	0	0	0	1

Source: 2009 AICUZ for NAS Patuxent River, MD, and Booz Allen Hamilton (August 2010 – June 2011.
Note: This is reflective of both Alternatives One and Two.

Table 6.4.2-5 presents the populations potentially affected by the baseline and proposed JSF DT Program 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.[151]

Potential housing and population impacts are expected to increase slightly outside of NAS Patuxent River's boundary as a result of the Proposed Action. Potential impacts to housing and population resources, respectively, would increase by 12 households (1%) from 1,090 to 1,102 households; and 28 persons (1%) from 2,970 to 2,998 persons. On-base housing and population changes would be similarly low under the Proposed Action.

151 Census Bureau 2000. St. Mary's County Maryland

Table 6.4.2-5: Housing and Populations Potentially Affected by Proposed JSF DT Program at NAS Patuxent River

DNL Contour Bands	Estimated Housing Baseline		Estimated Housing Proposed JSF DT	
	On-Base	Off-Base	On-Base	Off-Base
65–70 dB	245	1,080	980	2,940
70–75 dB	45	10	180	30
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***	***1,240***	***2,970***
DNL Contour Bands	**Estimated Population Baseline**		**Estimated Population Proposed JSF DT**	
	On-Base	**Off-Base**	**On-Base**	**Off-Base**
65–70 dB	270	1,090	1,080	2,965
70–75 dB	55	12	220	33
75–80 dB	12	0	48	0
80–85 dB	10	0	40	0
85+ dB	1	0	4	0
65 dB and greater (Total)	***348***	***1,102***	***1,392***	***2,998***

Source: 2009 AICUZ for NAS Patuxent River and Booz Allen Hamilton (August 2010 – June 2011).
Notes: Housing and population rounded to nearest tenth.
Assumes 2000 census, 2.72 persons as average housing density off-Base.
Assumes 2000 census, 3.8 persons as average housing density on-Base.
This is reflective of both Alternatives One and Two.

The 65 DNL contour does extend out over the water areas surrounding NAS Patuxent River compared to the baseline noise contour bringing in an additional seven residential units located in Solomons Island, Calvert County, which were accounted for in the above housing and population analysis. The noise modeling erred on the conservative side, which means the proposed noise contours are likely to be slightly larger than what they would be in actuality. Residential units in the Solomons Island area already experience noise in the vicinity of 64.5 dB. The typical noise increase at these points would be less than a 1 dB change to the baseline averaged over a day, and at no specific point increases by 1.5 dB or more. It normally requires an approximate 3 dB change in noise before an average person can detect a change in noise levels. No significant noise affects in the Solomons Island area would be expected by the change in the 65 DNL contour. In addition, while there are residential units along the Patuxent River shoreline from NAS Patuxent River to the Thomas Johnson Bridge (Maryland Route 4), the 65 DNL contour does not extend to the land in this area, and points along the shoreline do not display any noise increases of 1.5 dB or higher. Considering this and the above analysis, no significant noise affects would be expected from the Proposed Action.

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 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 baseline or Proposed Action 65 dB DNL noise contour. Therefore, no significant noise impacts would be anticipated for the proposed JSF DT Program (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
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

Table 6.4.2-6: NAS Patuxent River Comparison Non-Residential Noise Sensitive Receptors (Continued)

Name	Type	Existing (dB)	With Proposed JSF DT (dB)	Change (dB)
Joy Chapel Cemetery	Cemetery	43.6	43	-0.6
Lexington Park Elementary	School	59.3	60.3	1
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
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
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
Zion Church	Place of Worship	49	49	0

Source: 2009 AICUZ for NAS Patuxent River, MD and Booz Allen Hamilton (August 2010 – June 2011).

As part of the Proposed Action, fly-bys with the F-35B aircraft may also be conducted in the AIMES Range in R4005 West and Southwest at OLF Webster Field in addition to those planned at the main airfield of NAS Patuxent River. Approximately 47 flights are planned with approximately 70% of these fly-by tests conducted in Test Year 3 and the remainder in Test Year 4. Fly-bys are conducted occasionally with jet aircraft (such as the F/A-18E/F) at OLF Webster Field. OLF Webster Field is a mix of forest, open field, wetlands, open waters, agriculture areas, wildlife areas, and low-density residential.[152] The specific time-in-mode data for the F-35B aircraft performing these fly-bys is dependent upon specific test requirements; approaches are made to two targets in the water located southwest of OLF Webster Field with runs made south to north with an immediate climb out after passing the last

152 DoN 1998

target. Since specific details of the flight profiles and time in mode data are test event specific and not available until the time of the proposed tests, DNL values could not be generated for OLF Webster Field operations. Instead, SEL values were generated for the F/A-18E/F aircraft, which have performed fly-bys at OLF Webster Field, and compared to the SEL values of the F-35 aircraft as annotated in Table 6.4.2-7. The proposed tests would be conducted predominantly over the water, and would not be expected to cause a noticeable change in the noise environment in the vicinity of OLF Webster Field. SOPs for such flights require the aircraft to maintain an altitude at or above 1,500 feet AGL over St. George's Island for noise abatement purposes; to the maximum extent practicable aircraft are required to avoid over-flying St. George's Island.[153] In addition, the proposed tower fly-bys, if they were conducted at OLF Webster Field, are a nominal number of flights conducted over a very short duration within the course of a test year. It would be expected that these limited test activities would not result in a significant change to the aircraft operational profiles and analysis results presented for Alternative 3 in the *FEIS for the Increase Flight and Related Operations at Patuxent River Complex, Patuxent River, Maryland (December 1998)*. No significant impacts from noise would be expected from these proposed tests at OLF Webster Field.

Table 6.4.2-7: SEL Values

Height (in feet)	Distance from Source (in feet)	SEL	
		F/A-18E/F	JSF
500	500	114.5	112.4
	1,000	110.5	108.4
1,000	500	111.1	109.0
	1,000	108.8	106.8

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 biological resources at NAS Patuxent River and the CTR. All 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 (SAV). 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. OLF Webster Field consists of habitat types similar to those 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

153 F-35B Air Data, January 2008.

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 section. 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	
Eastern Small-footed Bat *Myotis subulatusleibii*		I
Birds		
Bald Eagle *Haliaeetus leucocephalus*	D	T
Piping Plover[154] *Charadrius melodus*	T	E
Black Skimmer *Rynchops niger*		E
Northern Goshawk *Accipiter gentillis*		E
Swainson's Warbler *Limnothlypis swainsonii*		E
Royal Tern *Sterna maxima*		E
Gull-billed Tern *Sterna nilotica*		E
Short-eared Owl *Asio flammeus*		E
Olive-sided Flycatcher *Contopus borealis*		E
Alder Flycatcher *Empidonax alnorum*		I
Sedge Wren *Cistothorus platensis*		E

Source: http://ecos.fws.gov/tess_public/, *http://www.fws.gov/, http://www.dnr.state.md.us/index.asp, https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_hq_pp/navfac_environmental/mra, http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/home*
Legend: D = Delisted, E=Endangered, T=Threatened, C=Candidate, I=In Need of Conservation, X= Extirpated, N=Rare, but not Listed

154 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)		
Loggerhead Shrike *Lanius ludovicianus*	T	E
Nashville Warbler *Vermivora ruficapilla*		I
Blackburnian Warbler *Dendroica fusca*		T
Mourning Warbler *Oporornis philadelphia*		E
Upland sandpiper *Bartramia longicauda*		E
Henslow's Sparrow *Ammodramus henslowii*		T
Lark Sparrow *Chondestes grammacus*		X
American Bittern *Botaurus lentiginosus*		I
Least Bittern *Ixobrychus exilis*		I
Common Moorhen/Gallinule *Gallinula chloropus*		I
American peregrine falcon Falco peregrinus anatum		I
Roseate tern *Sterna d. dougalli*	E	X
Least Tern *Sterna antillarum*	E	T
Reptiles and Amphibians		
Leatherback Sea Turtle *Dermchelys coriacea*	E	E
Kemp's Ridley Sea Turtle *Lepidochelys kempii*	E	E
Loggerhead Sea Turtle[155] *Caretta caretta*	E	E
Eastern Spiny Softshell *Apalone s. spinifera*		I
Eastern Narrowmouth Toad *Gastrophryne carolinensis*		E
Eastern Tiger Salamander *Ambystoma tigrinum*	E	E

Source: http://ecos.fws.gov/tess_public/, *http://www.fws.gov/, http://www.dnr.state.md.us/index.asp, https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_hq_pp/navfac_environmental/mra, http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/home*
Legend: D = Delisted, E=Endangered, T=Threatened, C=Candidate, I=In Need of Conservation, X= Extirpated, N=Rare, but not Listed

155 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**
Fish		
Shortnose Sturgeon *Acipenser brevirostrum*	E	E
Ironcolor shiner *Notropis chalybaeus*		E
Flier Centrarchus macropterus		T
Glassy Darter *Etheostoma vitreum*		T
Swamp Darter *Etheostoma fusiforme*		I
Mud Sunfish *Acantharchus pomotis*		I
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
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

Source: http://ecos.fws.gov/tess_public/, *http://www.fws.gov/, http://www.dnr.state.md.us/index.asp, https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_hq_pp/navfac_environmental/mra, http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/home,*
Legend: D = Delisted, 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)		
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 *Saccharum contortum*		N
Pumpkin Ash *Fraxinus profunda*		N
Downy Milk Pea *Galactia volubilis*		N
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
Purple Passionflower *Passiflora incarnata*		N
Seaside Knotweed *Polygonum glaucum*		E
Shumard's Oak *Quercus shumardii*		T
Grass-like Beakrush *Rhynchospora globularis*		E

Source: http://ecos.fws.gov/tess_public/, *http://www.fws.gov/, http://www.dnr.state.md.us/index.asp, https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_hq_pp/navfac_environmental/mra, http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/home*
Legend: D = Delisted, 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)		
Clustered Beakrush *Rhynchospora glomerata*		N
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.
http://ecos.fws.gov/tess_public/
Legend: E=Endangered, T=Threatened, C=Candidate, I=In Need of Conservation, X= Extirpated, N=Rare, but not Listed

Plant species

Although there are no Federally-listed threatened or endangered plant species known to occur at NAS Patuxent River, eight species are listed as threatened by the State of Maryland: wild false indigo (*Baptisia australis*), seaside knotweed (*Polygonum glaucum Nutt*), grass-like beakrush (*Rhynchospora globularis*), swamp-oats (*Sphenopholis pensylvanica*), tobaccoweed (*Elephantopus tomentosus*), sandplain flax (*Linum intercursum*), and creeping cucumber (*Melothria pendula*). Clasping-leaved St. Johns-wort (*Hypericum gymnathum*) is listed on the State of Maryland's Watch List.

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 13 species of SAV commonly found in the Chesapeake Bay or nearby rivers.[156]

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 base are managed to maintain bird species diversity, and to minimize BASH to aircraft.

Ospreys have been observed nesting at NAS Patuxent River and within the CTR. The State-listed threatened least tern (*Sterna antillarum*) (inland populations are Federally-listed), a colony nesting bird which nests from late spring through the summer, has used the base in the past (the last known natural nesting colony on the western shore of the Chesapeake Bay). No least terns have been observed nesting on NAS Patuxent River for several years.

156 USEPA 1995

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 NWR 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. 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*), delisted under the ESA in 1999, is still protected under the MBTA. It 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 that starts in late March and runs until June.[157]

Mammal Species

Mammal species are numerous at NAS Patuxent River. Approximately 30 species of mammals are known to exist at NAS Patuxent River, of which 23 are considered common mammal species. The Eastern small-footed bat is a State–listed species known to be present in the area. 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.

Other Species of Concern

Two species of rare beetle are known to exist within the vicinity of the base. The northeastern beach tiger beetle (*Cicindela d. dorsalis*), a Federally-listed threatened species, occurs at 10 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 base. These beetles are believed to have originated from a location across the Patuxent River; the habitat at 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 10 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 base . 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.[158]

157 USFWS 2004
158 DoN 1998

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 base, 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 presented 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.

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 feed in the Chesapeake Bay 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 that 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 (threatened)	June to September
Atlantic leather back	*Dermochelys coriacea*	ESA (endangered)	June to August
Kemp's Ridley	*Lepidochelys kempii*	ESA (endangered)	May to October
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 NMFS listed the Atlantic sturgeon as a Federally endangedered species for the Chesapeake Bay distinct population segment in February 2012. 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 the District of Columbia, in Nanjemoy Creek in Charles County, and McIntosh Run in St. Mary's County.[159]

6.5.1.3 Essential Fish Habitat

As mentioned in Section 3.3 of this document, the 1996 amendments to the MSFCMA[160] 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.[161] EFH has been designated for 19 species in the Chesapeake Bay, as listed in Table 6.5.1.3-1.

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, Larvae, Juveniles, Adult
Spanish mackerel (*Scomberomorus maculatus*)	Eggs, Larvae, Juveniles, Adult
Cobia (*Rachycentron canadum*)	Eggs, Larvae, Juveniles, Adult
Red drum (*Sciaenop occelatus*)	Eggs, Larvae, Juveniles, Adult
Clear-nosed skate (*Raja eglanteria)*	Eggs, Juveniles, Adult
Little skate (*Leucoraja erinacea)*	Eggs, Juveniles, Adult
Winter skate (*Leucoraja ocellata)*	Eggs, Juveniles, Adult
Atlantic sharpnose shark *(Rhizoprionodon terraenovae)*	Adult
Dusky shark (*Carcharhinus obscurus)*	Neonate, Juveniles
Sand tiger shark *(Carcharias Taurus)*	Neonate
Sandbar shark *(Carcharhinus plumbeus)*	Neonate, Juveniles, Adult

Sources: NOAA Website http://www.nero.noaa.gov/hcd/va1.html, 2009 DON Marine Resources Assessment for the Chesapeake Bay. https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_hq_pp/navfac_environmental/mra

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 CV 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/MSL. 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:

159 DoN 1998
160 16 USC 1801 et seq.
161 MSA Section 301 (b)(2)

- During STOVL and CV 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/MSL 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/MSL. Tower fly-bys with the F-35B may also be conducted at OLF Webster Field in addition to the main airfield of NAS Patuxent River. Proposed tests would be conducted predominantly over the water in the AIMES Range Southwest at OLF Webster Field at altitudes ranging from 500 to 1,000 feet AGL/MSL. Approximately 47 flights would be conducted as part of the overall proposed mission systems tests over a 2-year period, which would be of very short duration and typically over a 1-week period.

- 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.

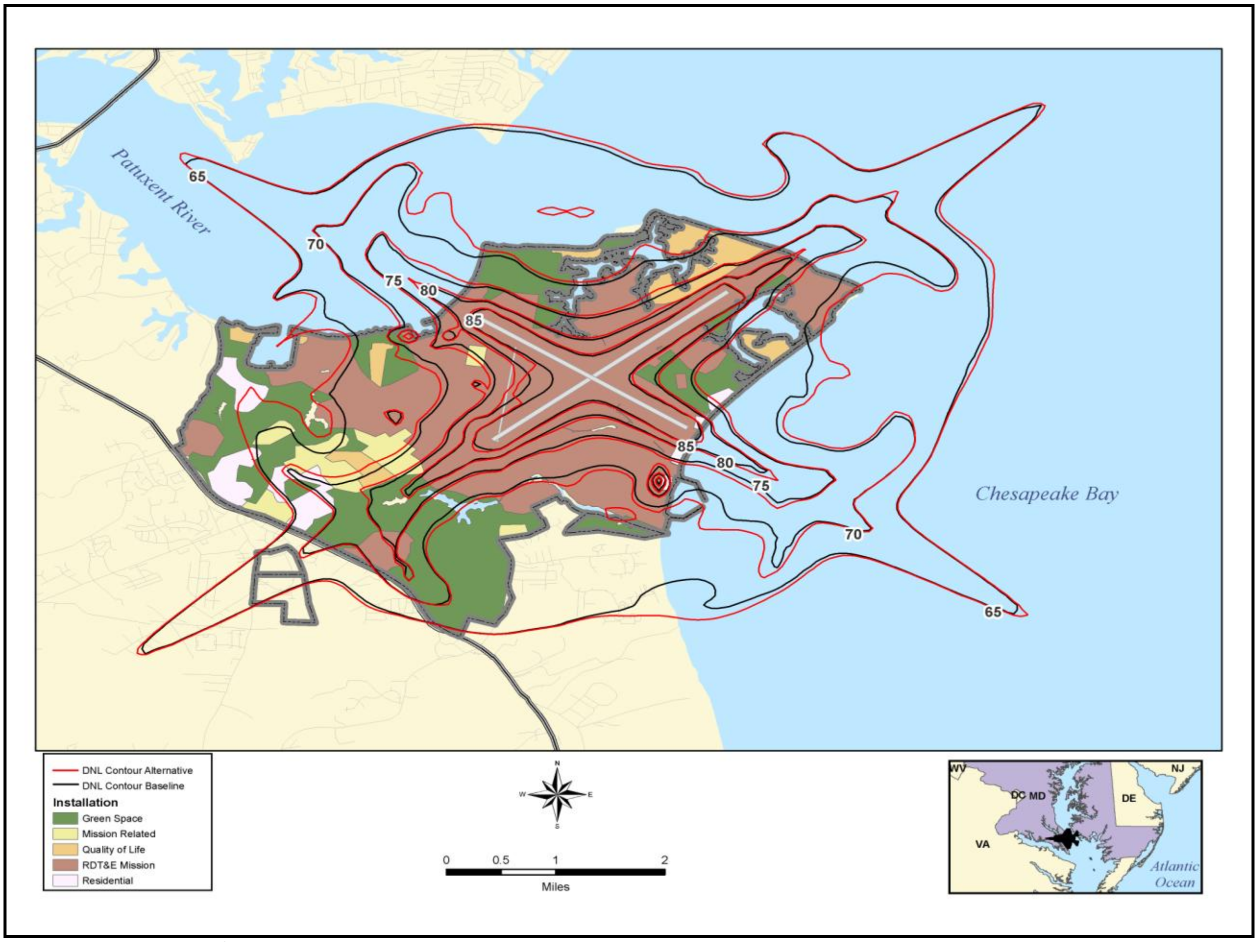
- During CATB tests of aircraft electronics, less than 1–2% of the total flights/flight hours would occur below 3,000 feet.

Potential impacts to biological resources on NAS Patuxent River, the CTR, and OLF Webster Field from the proposed JSF DT activities would be limited to potential noise-induced effects and impacts from weapons separation tests. The proposed JSF DT activities would use the same flight paths analyzed in the 2009 AICUZ Study for NAS Patuxent River and in the NAS Patuxent River FEIS for Webster Field. The proposed STOVL flight tests would occur predominantly on and over the airfield. The number of proposed JSF DT activities would be significantly less than the average number of flight hours conducted annually at NAS Patuxent River. In 2009, approximately 16,614 flight hours occurred vice the maximum F-35 flight hours - approximately 1,636 expected to occur in Test Year 4. The proposed JSF DT activities in the highest test year would represent only 10% of the annual flight hours in 2009. Similarly, the proposed JSF DT activities in Test Year 4 would represent about 7% of the 24,000 flight hours analyzed in the FEIS.[162]

Because the type and tempo of proposed JSF DT activities would be similar to the baseline conditions at NAS Patuxent River and the CTR, the associated noise contours discussed in Section 6.4 of this Supplemental EA/OEA would not be significantly different. (see Figure 6.5.2-1 below). The undeveloped/green space land area potentially affected by a 65 dB DNL or higher for the proposed JSF DT activities would not be significantly higher than the baseline. 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 to non-existent. Any potential noise impacts to biological resources are not anticipated to exceed those already analyzed in the FEIS and the 2007 EA/OEA for the JSF DT Program. For tower fly-bys, whether at NAS Patuxent River or OLF Webster Field, local bird advisory reports will be reviewed prior to flights. The proposed fly-by flights will be flown when the BASH condition is moderate to low. Pre-flight passes with the support aircraft and/or F-35 will be conducted prior to the actual proposed test

162 NAVAIR February 2010

activities to determine and alleviate bird activity levels. An "abort call" will be provided if NAS Patuxent River or the AIMES Range Tower at OLF Webster Field determines bird activity to be hazardous.[163] 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, the CTR, and OLF Webster Field. Therefore, no significant effects to biological/natural resources would be anticipated from the proposed JSF DT activities.



Source: 2009 AICUZ for NAS Patuxent River, MD, and NAS Patuxent River NOISEMAP Model Outputs, Booz Allen Hamilton (August 2010 – June 2011).

Figure 6.5.2-1: Noise Contour with Land Use Map

Additionally, the proposed JSF DT Program 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 Bay water or sediments. All of these possibilities were considered previously in the FEIS.

The maximum stores/expendables expected to be dropped in Test Year 5 is 76 stores/expendables per year (versus 2,516 stores and expendable per year in the FEIS, or less than 3%) for a planned total of 223 stores/expendables during a 7-year test period.[164] In addition, the *EA for the F/A-18E/F Stores Separation*

163 F-35B Air Data, January 2008
164DoN 1998, Table 4-9.1 in the FEIS

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 Program 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 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 10 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 activities. 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*.[165]

Since the Proposed Action would be similar and less in tempo 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 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 Program.[166] Therefore, no significant effect on biological/natural resources would be expected including no effect on Federally- and Stated-listed endangered or threatened species.

165DoN 1998, Section 4.13.1, Water and Sediment Quality of the Patuxent River Complex FEIS
166 NMFS 1999

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 was 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).*

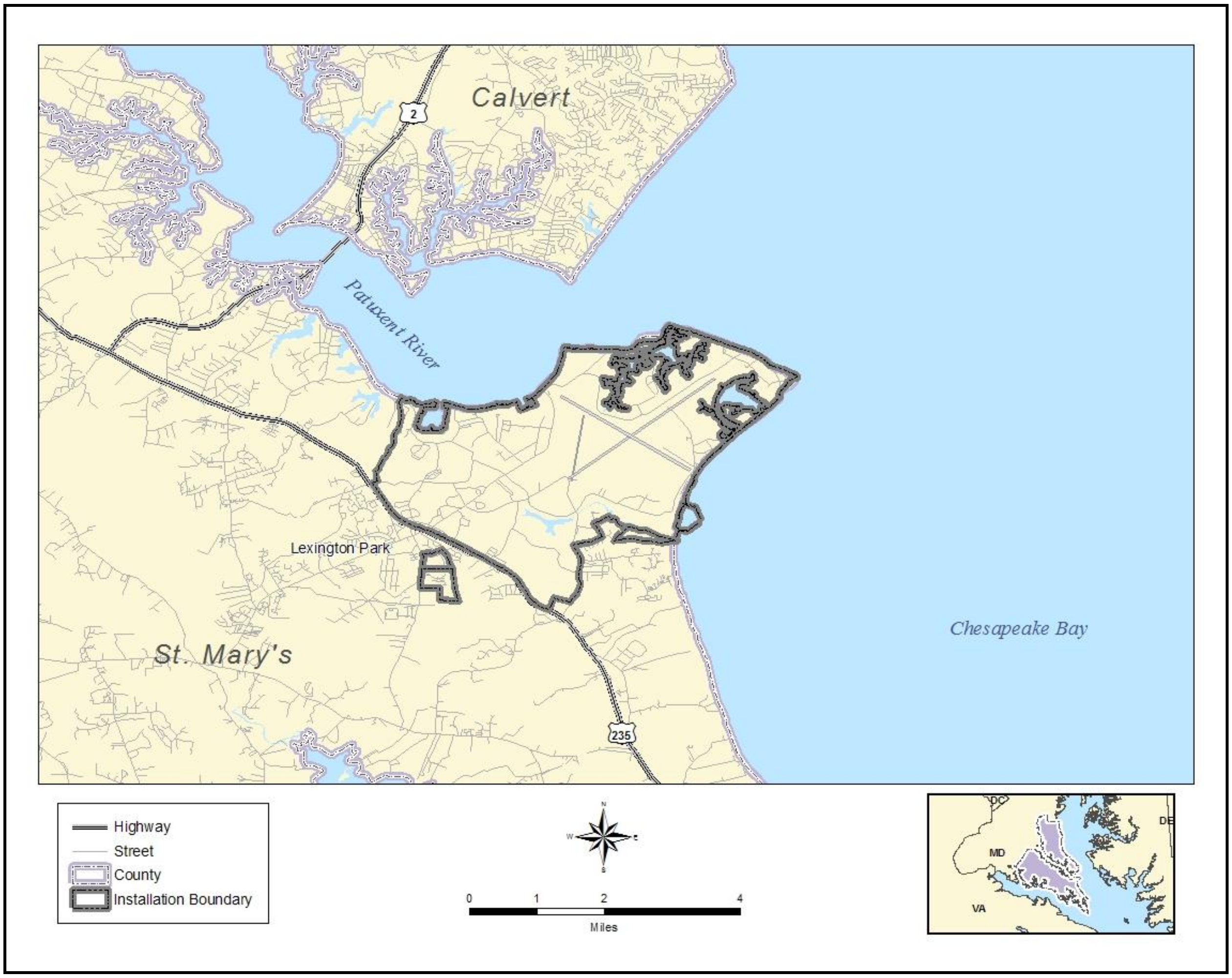
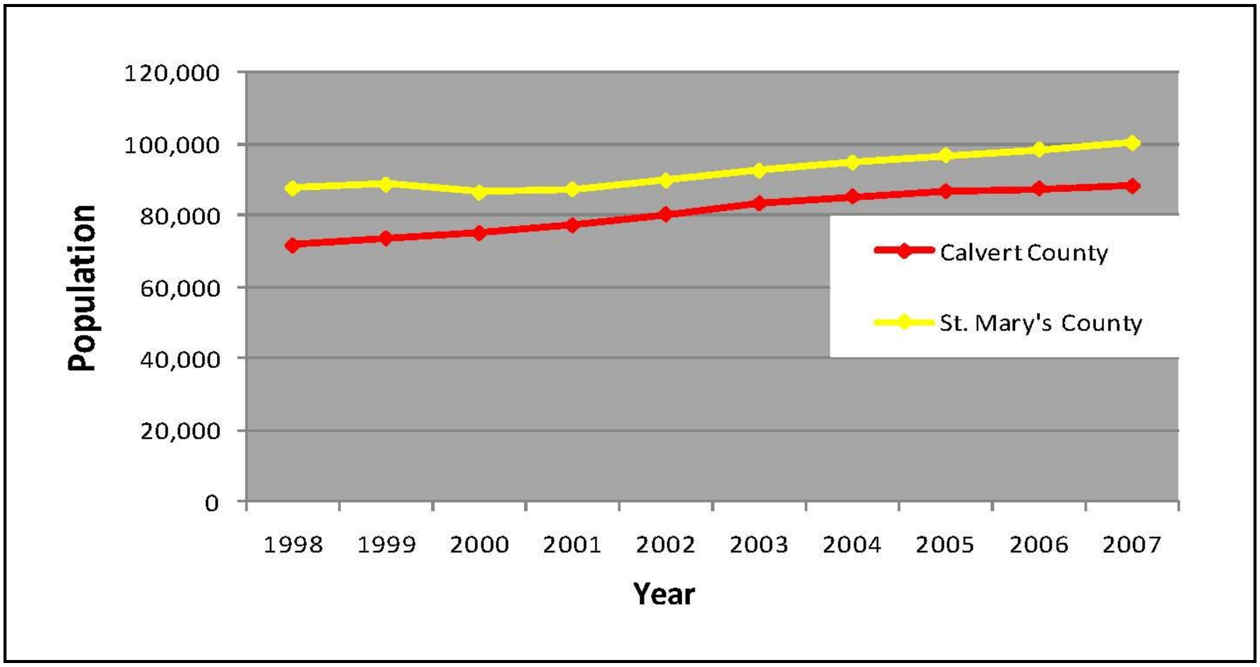


Figure 6.6.1-1: NAS Patuxent River Socioeconomic Study Area

6.6.1.1 Demographics

The population trend for St. Mary's and Calvert Counties between 1998 and 2007 is summarized in Figure 6.6.1.1-1. Total population in St. Mary's County in 2007 was estimated to be 100,262 and comprised 1.8% of the population of Maryland. Total population in Calvert County in 2007 was estimated to be 88,145 and comprised 1.6% of the population of Maryland. The population in St. Mary's County increased by 14.4% from 87,645 in 1998 to 100,262 in 2007, while population in Calvert County increased by 22.8% from 71,757 in 1998 to 88,145 in 2007. [167] The median age of the population in 2007 was estimated to be 34.3 in St. Mary's County and 37.1 in Calvert County, both slightly lower than the State median age of 37.2.[168]



Source:U.S. Census Bureau, 2009b.

Figure 6.6.1.1-1: Population Trends for NAS Patuxent River Socioeconomic Study Area

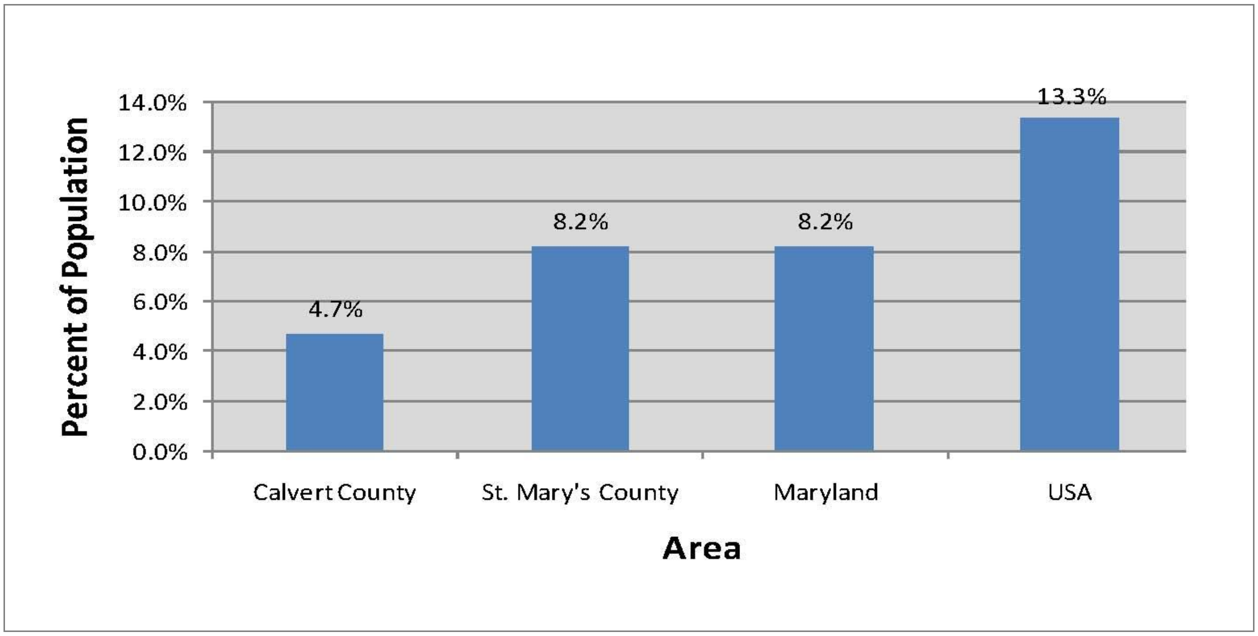
Approximately 19,800 personnel comprise the base population at NAS Patuxent River based on data provided in 2004 by the Public Affairs Office, NAS Patuxent River. Of the total population, 9,000 are contractors, 7,800 are government civilian, and 3,000 are military personnel.[169] The base also supports approximately 9,000 dependents and retirees, and 300,000 visitors annually.[170]

6.6.1.2 Environmental Justice

American Community Survey 2005-2007 3-year estimate data for the two county NAS Patuxent River socioeconomic study area for poverty rates, ethnicity, and children demographics was used to support both the environmental justice and children population analyses.

167 Census Bureau 2009b
168 Census Bureau 2009
169 Romer 2004
170 Ibid

Figure 6.6.1.2-1 illustrates the poverty rates in the socioeconomic study area.[171] There are 4.7% of the population below poverty rates in Calvert County and 8.2% below poverty rates in St. Mary's County. The poverty rates in the two counties are below the set CEQ threshold of 25% for low-income populations, and the same rate or lower than the Maryland statewide estimate of 8.2% and the U.S. estimate of 13.3%.

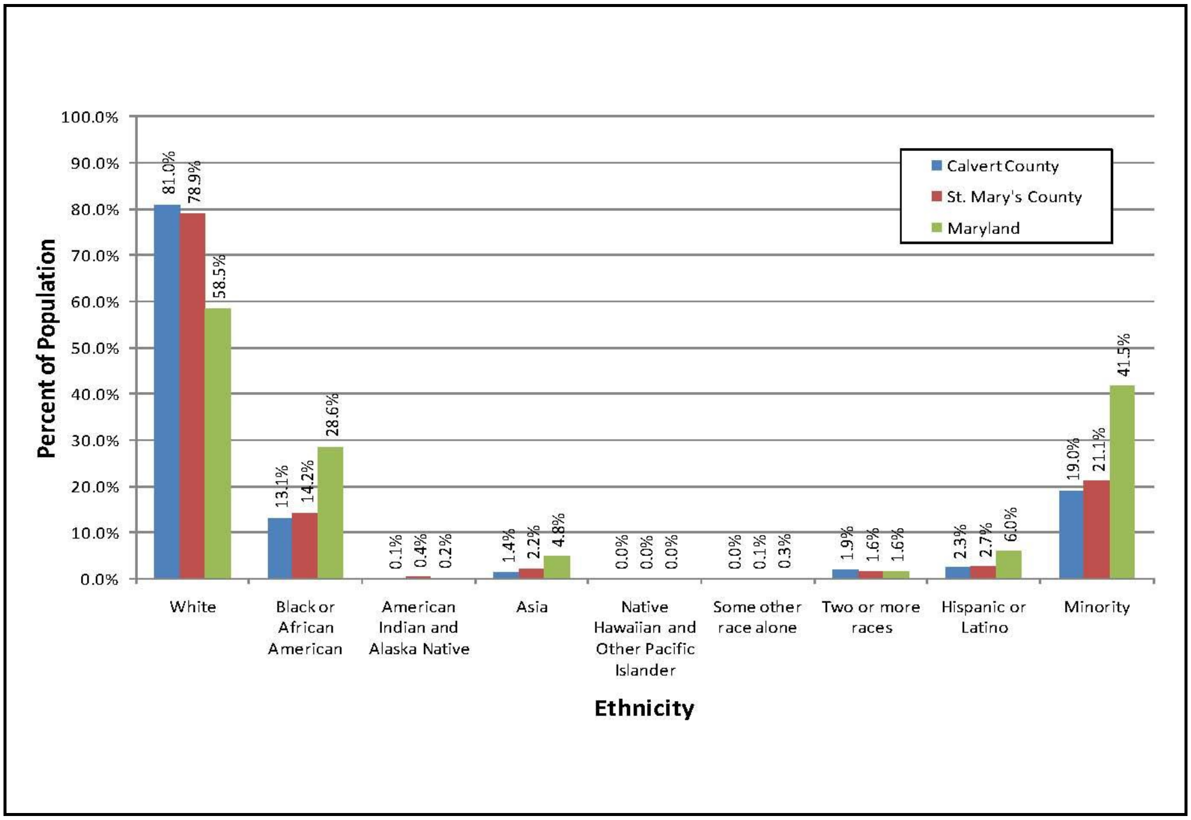


Source: U.S. Census Bureau 2005-2007 3-year estimate.

Figure 6.6.1.2-1: Poverty Rates for NAS Patuxent River Socioeconomic Study Area

Population ethnicity for the NAS Patuxent socioeconomic study area is summarized in Figure 6.6.1.2-2 based on 2005-2007 data from the American Community Survey. The NAS Patuxent River socioeconomic study area is comprised of predominantly White (79.9%) populations. Black or African American (13.7%) populations have the second largest representation in the NAS Patuxent River area, followed by Hispanic or Latino (2.5%), Asian (1.8%), two or more races (1.7%), American Indian or Native Alaskan (0.3%), Native Hawaiian or other Pacific Islander (0.0%), and some other race (0.0%).[172] The ethnic representation 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 (20.1%) is well below the CEQ threshold of 50% minority, which is used to identify environmental justice populations.

171 Census Bureau 2009
172 Census Bureau 2009

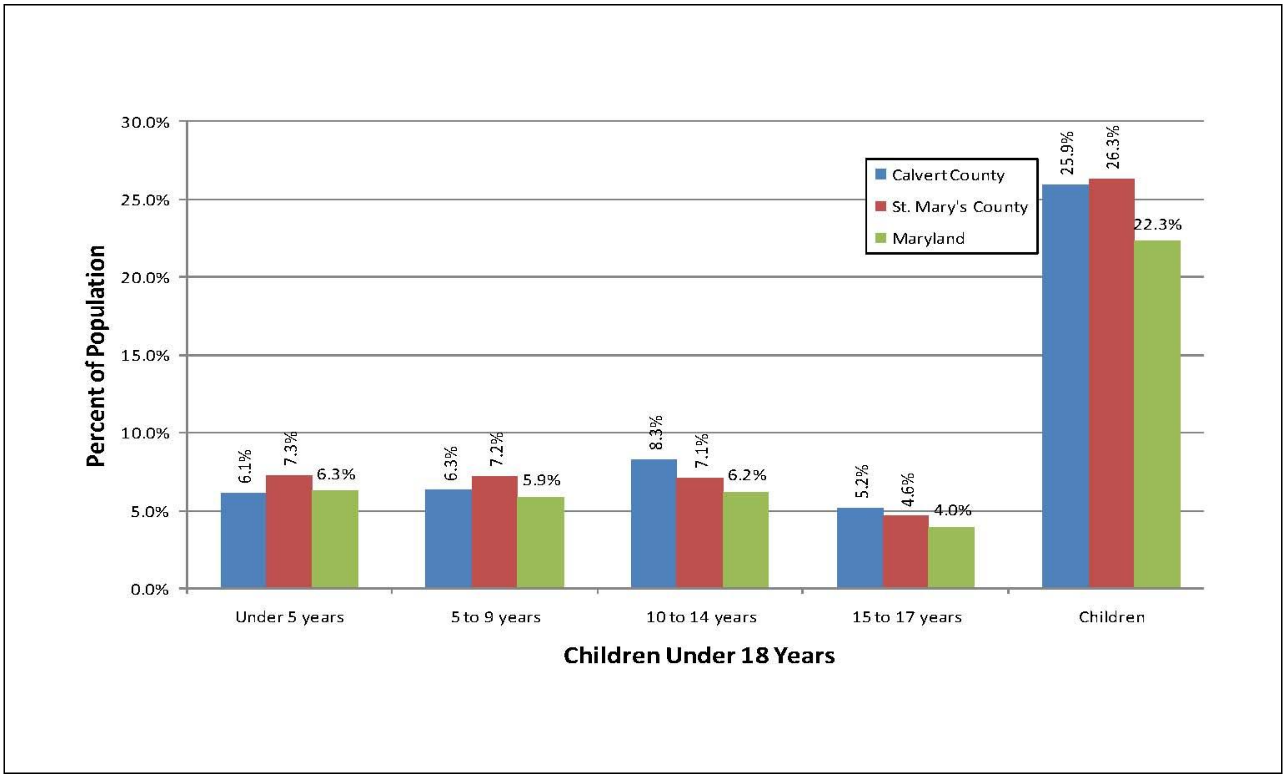


Source: U.S. Census Bureau, 2005-2007 3-year estimate.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 6.6.1.2-2: Ethnicity for NAS Patuxent River Socioeconomic Study Area

Children populations for the NAS Patuxent River socioeconomic study area are summarized in Figure 6.6.1.2-3. The two-county area shows a relatively even distribution of children less than 5 years of age to 14 years and a slightly smaller population of children 15 to 17 years of age. The largest group of children is 10 to 14 years old (7.7%) and the remaining distribution is children under 5 years (6.8%), 5 to 9 years old (6.8%), and 15 to 17 years old (4.9%). The children populations for both Calvert and St. Mary’s Counties are slightly larger than the Maryland statewide average of 22.3%.[173]

173 Census Bureau 2009



Source: U.S. Census Bureau, 2005-2007 3-year estimate.

Figure 6.6.1.2-3: Children Demographics for NAS Patuxent River Socioeconomic Study Area

In addition to the two county study area, more localized year 2000 U.S. Census tracts/blocks for poverty rates, ethnicity, and children demographics, as illustrated in Figure 6.6.1.2-4, were used to support both the environmental justice and children population analyses.

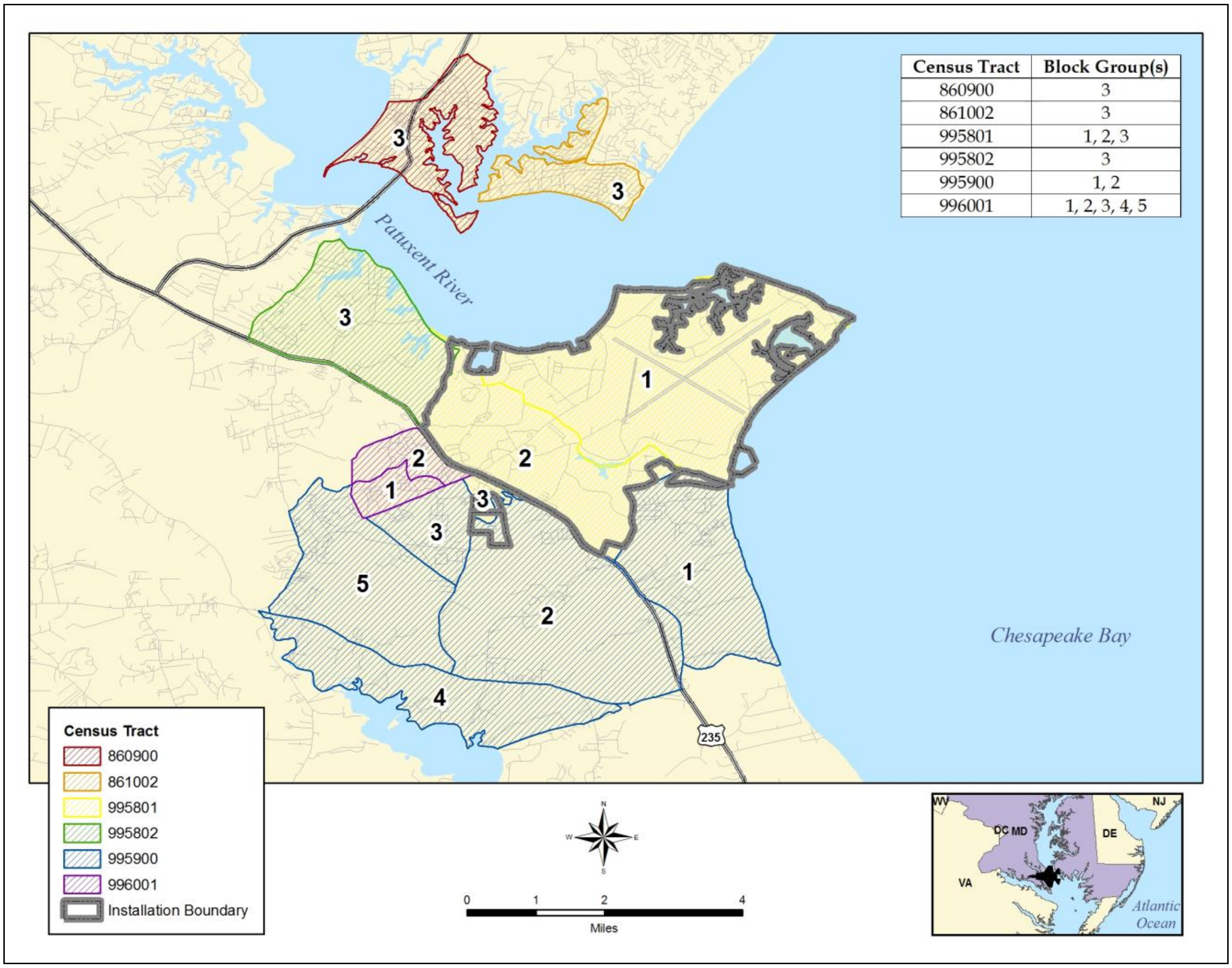


Figure 6.6.1.2-4: Environmental Justice Block Groups for Census Tracts in the NAS Patuxent River Socioeconomic Study Area

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 (as reflected in the 2007 EA/OEA). 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.[174] The 84-acre area is expected to be converted to compatible land uses and open/public space, and required the relocation of approximately 100 families to other compatible areas.

174 DC Military.com

Table 6.6.1.2-1: Poverty Rates by Block Groups in Census Tracts for NAS Patuxent River Socioeconomic Study Area

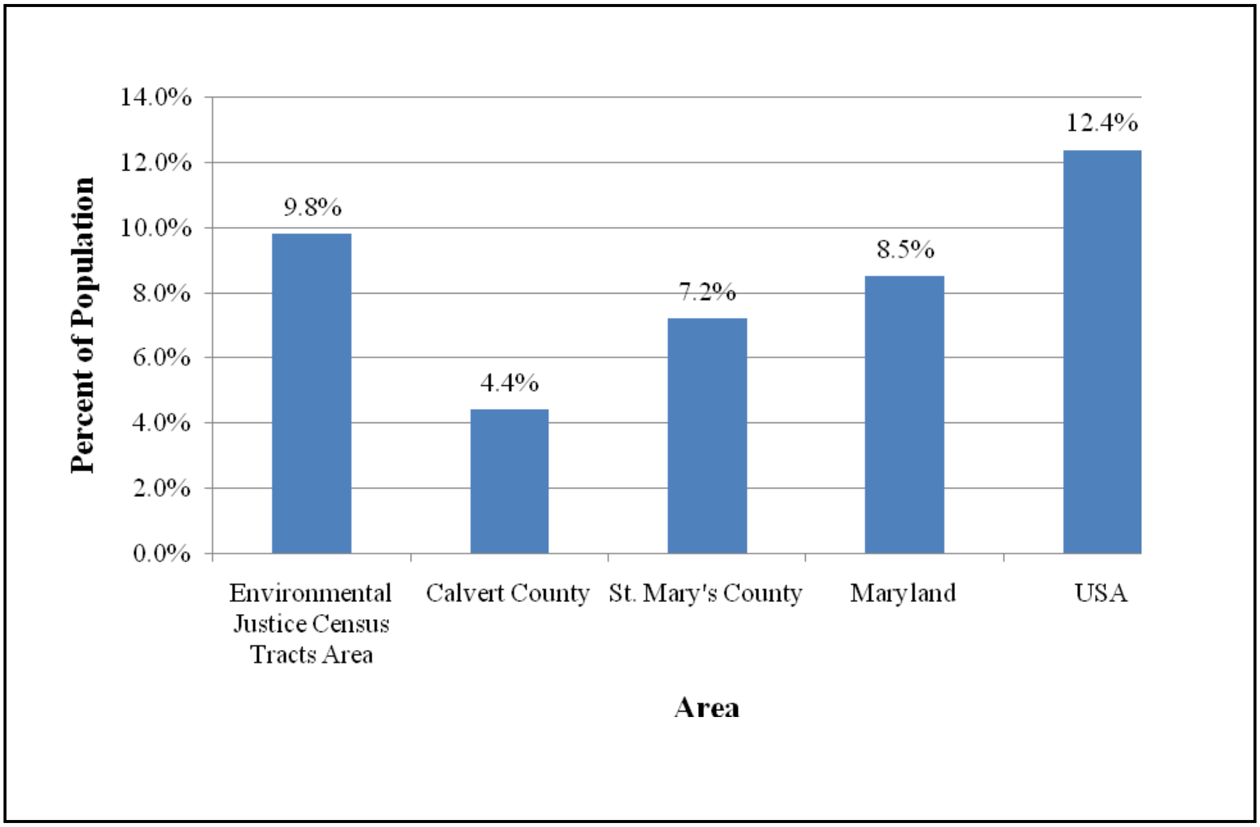
County	Census Tract #	Block Group #	Total Block Group Population (1999)	Persons Living in Poverty (1999)	Average Poverty Rate
Calvert	860900	3	1,035	43	4.15%
Calvert	861002	3	1,705	77	4.52%
St. Mary's	995801	1	58	0	0.00%
St. Mary's	995801	2	2,239	31	1.38%
St. Mary's	995801	3	441	167	37.87%
St. Mary's	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	1,927	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 6.6.1.2-5 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. [175] 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%.[176] 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 Supplemental EA/OEA.

175 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.

176 Census Bureau 2000

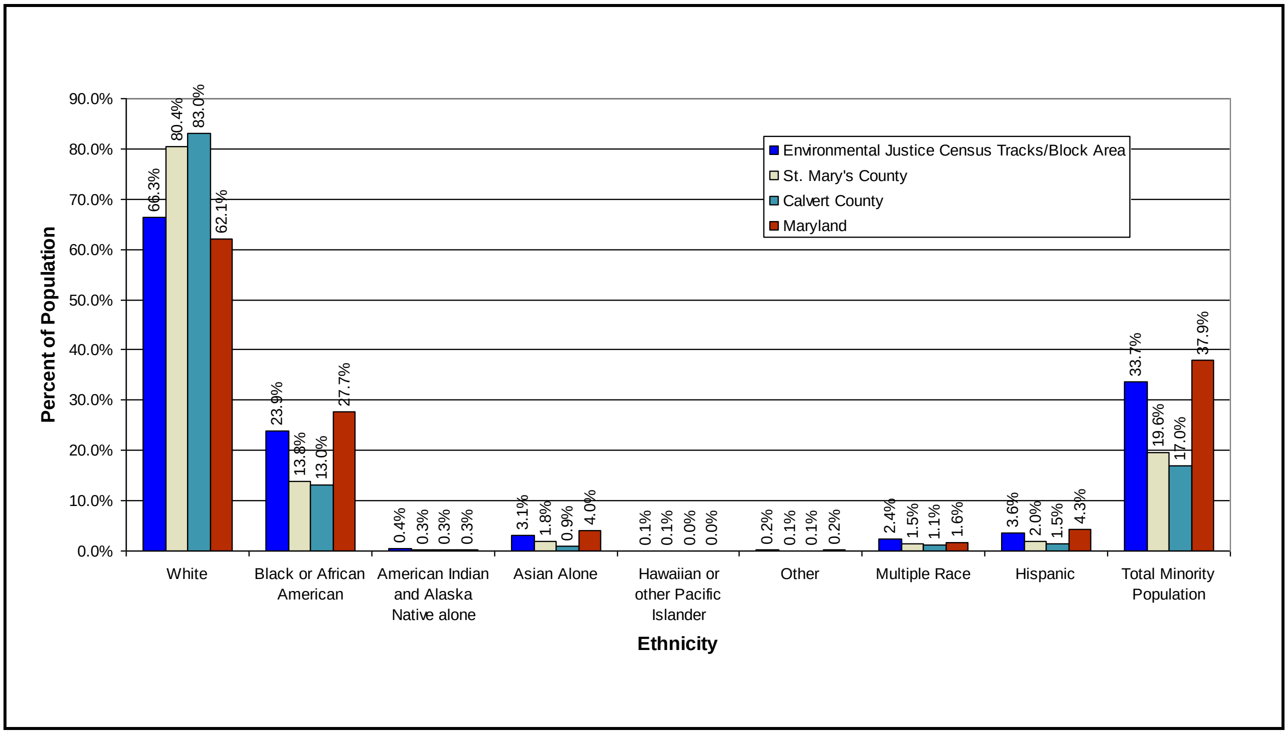


Source: U.S. Census Bureau 2000.

Figure 6.6.1.2-5: Poverty Rates for NAS Patuxent River Socioeconomic Study Area

Population ethnicity for the NAS Patuxent socioeconomic study area is summarized in Figure 6.6.1.2-6 based on the 2007 EA/OEA. 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 representation 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 6.6.1.2-6: Ethnicity for NAS Patuxent River Socioeconomic Study Area

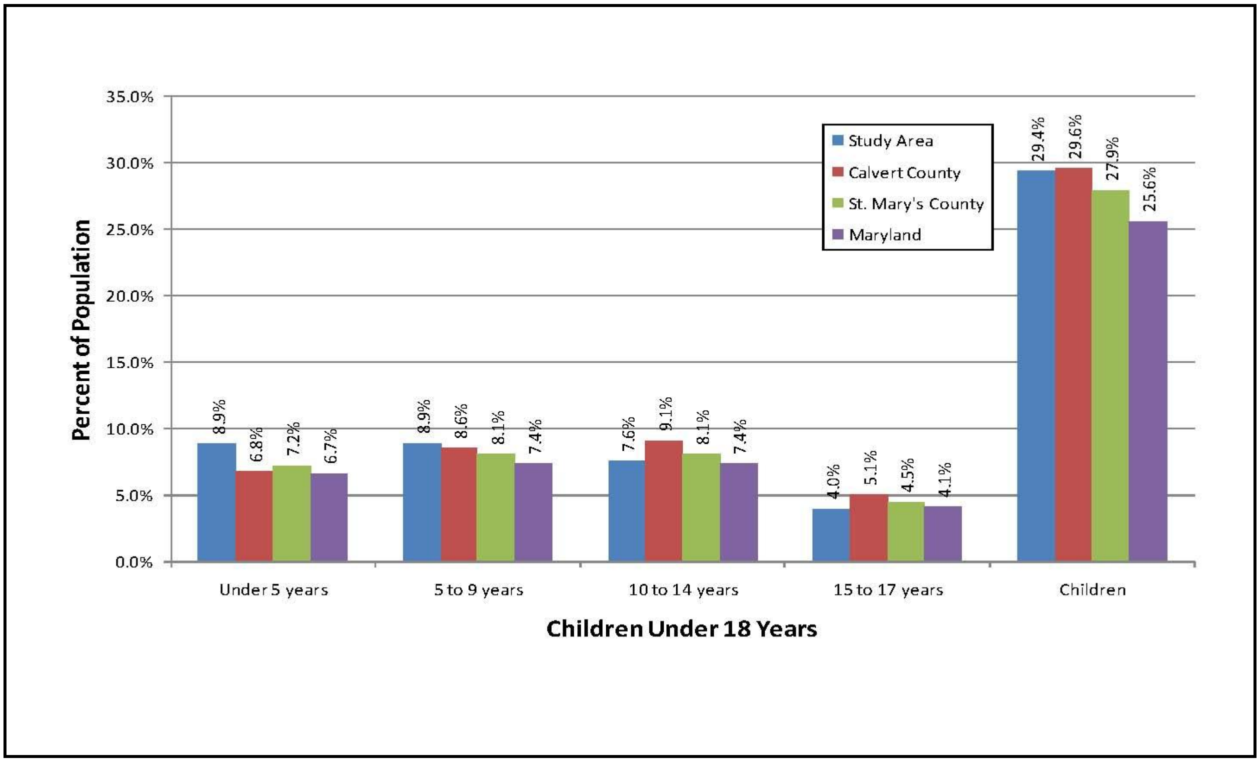
Table 6.6.1.2-2: Ethnicity by Block Groups in Census Tracts for NAS Patuxent River Socioeconomic Study Area

Census Tract #	Block Group #	White	Black or African American	American Indian and Alaska Native Alone	Asian Alone	Hawaiian or other Pacific Islander	Other 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.

Children populations in the NAS Patuxent River children demographic study area are summarized in Figure 6.6.1.2-7 based on 2000 census data. The study area has a similar distribution of children less than 5 years of age to 14 years and a smaller population of children 15 to 17 years of age. The largest group of children are 5 to 9 years old (8.9%) and the remaining distribution is children under 5 years (8.9%), 10 to 14 years old (7.6%), and 15 to 17 years old (4.0%).

Total population of children for the study area block groups of the census tracts (29.4%) is similar to the surrounding counties, but higher than the State of Maryland (25.6%). Children populations by block groups are summarized in Table 6.6.1.2-3. Some block groups in the census tracts have a larger total population of children than others, notably block group 1 census tract 995801, block group 2 of census tract 996001, block group 2 of census tract 995801, and block group 2 of census tract 995900. These five block groups have higher total populations of children than the surrounding counties and State of Maryland. The other eight block groups have a total population of children similar to or lower than the surrounding counties and statewide.



Source: U.S. Census Bureau, 2000.

Figure 6.6.1.2-7: Children Demographics for the NAS Patuxent River Socioeconomic Study Area

Table 6.6.1.2-3: Children Demographics by Block Group for the Children Population Census Tracts/Blocks Area within NAS Patuxent River Socioeconomic Study Area

County	Census Tract #	Block Group #	Under 5 Years	5 to 9 Years	10 to 14 Years	15 to 17 Years	Children
Calvert	860900	3	3.6%	5.2%	4.4%	2.6%	15.8%
Calvert	861002	3	6.1%	7.8%	8.1%	4.4%	26.4%
St. Mary's	995801	1	**8.0%**	**12.0%**	**13.3%**	**4.0%**	**37.3%**
St. Mary's	995801	2	**10.8%**	**11.7%**	**8.0%**	**2.1%**	**32.6%**
St. Mary's	995801	3	11.4%	8.1%	5.3%	4.2%	28.9%
St. Mary's	995802	3	6.9%	8.6%	8.7%	5.7%	29.8%
St. Mary's	995900	1	7.9%	7.1%	5.3%	3.3%	23.6%
St. Mary's	995900	2	**11.9%**	**10.3%**	**8.2%**	**4.1%**	**34.4%**
St. Mary's	995900	3	8.0%	7.5%	7.9%	4.2%	27.6%
St. Mary's	995900	4	7.5%	4.5%	6.2%	4.1%	22.2%
St. Mary's	995900	5	**10.1%**	**9.7%**	**7.8%**	**4.7%**	**32.2%**
St. Mary's	996001	1	8.9%	7.7%	7.0%	4.1%	27.7%
St. Mary's	996001	2	**9.7%**	**11.6%**	**9.7%**	**5.4%**	**36.4%**

Source: Census 2000, Summary File 1 - Detailed Table P12.

6.6.1.3 Economic Characteristics

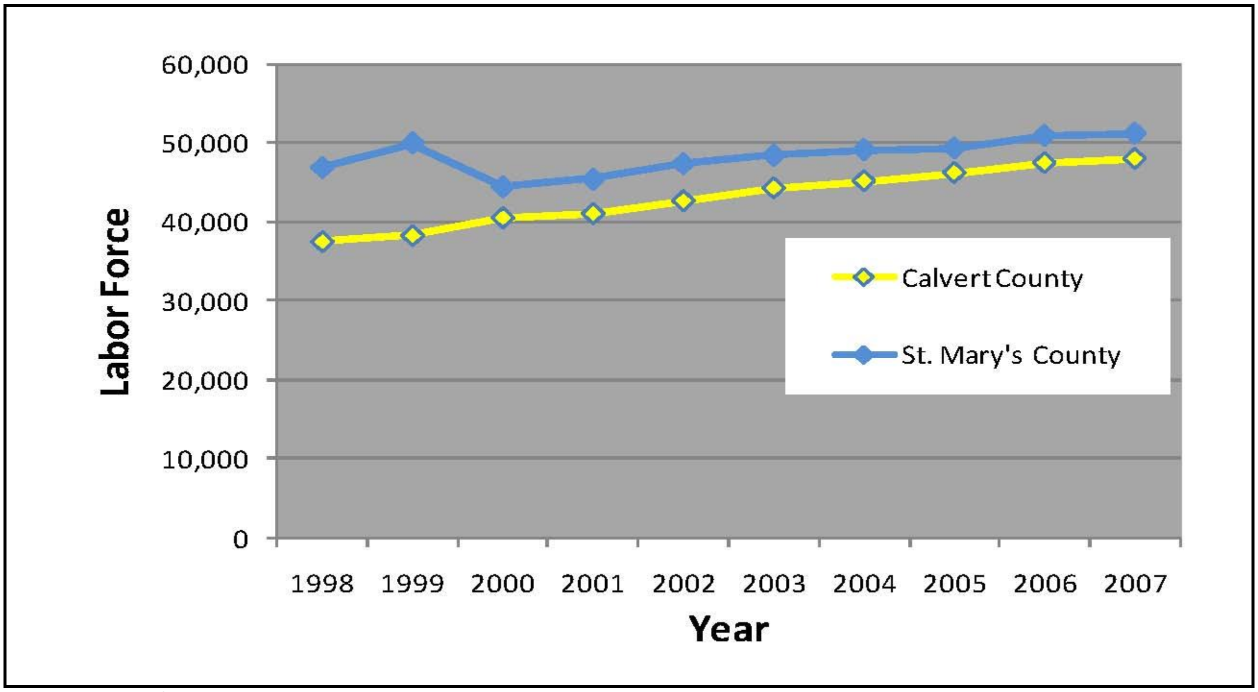
Median Household Income

The median household incomes for Calvert and St. Mary's counties were $88,989 and $71,559, respectively, in 2007, which are both higher than the median household income estimated for Maryland ($66,873).[177]

Employment Trends

Employment information was obtained for the BLS from the time period 1998 through 2007 as summarized in Figure 6.6.1.3-1. There were 51,104 and 47,892 workers, respectively, in the St. Mary's and Calvert counties labor force in 2007. This represents 1.7% and 1.6%, respectively, of the Maryland labor force.

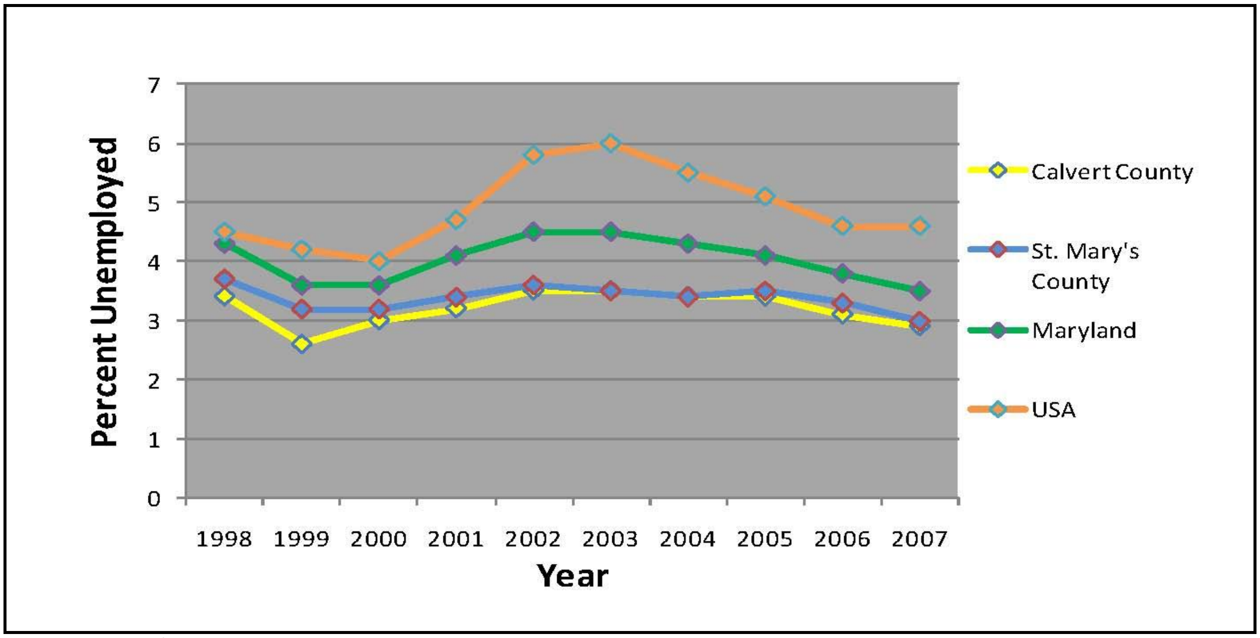
177 Census Bureau 2009



Source: Bureau of Labor Statistics 2003.

Figure 6.6.1.3-1: Labor Force Trends for NAS Patuxent River Socioeconomic Study Area

Trends in unemployment for St. Mary's County, Calvert County, State of Maryland, and the U.S. from 1998 through 2007 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 State unemployment estimates during this time period.

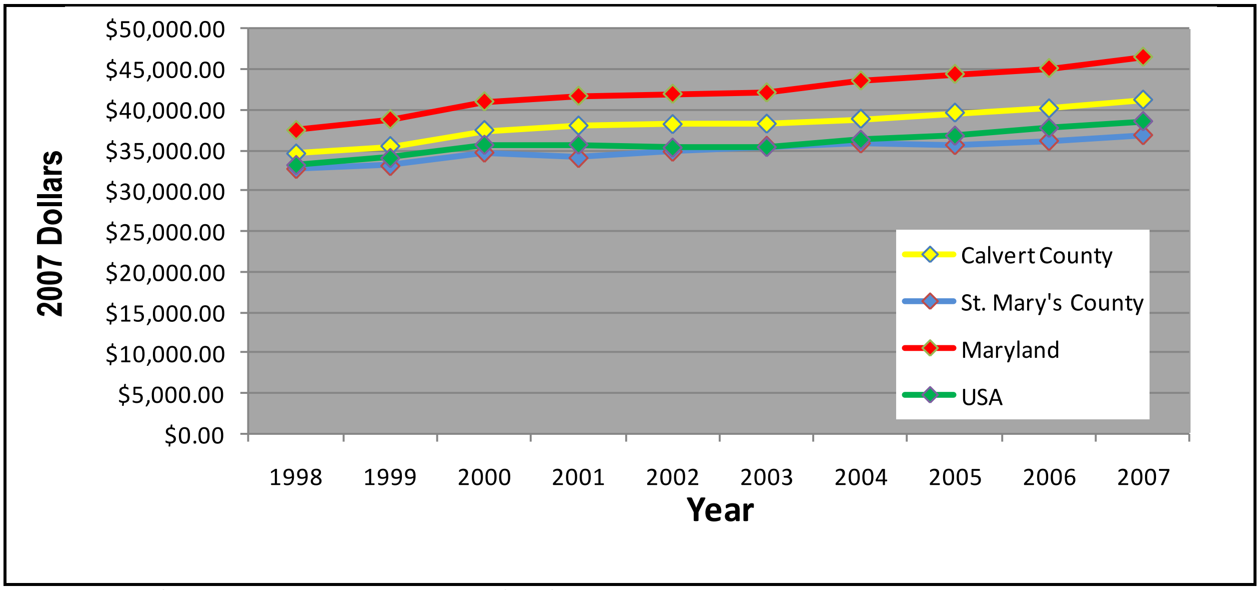


Source: Bureau of Labor Statistics 2009.

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 (year 2007 dollars) 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.

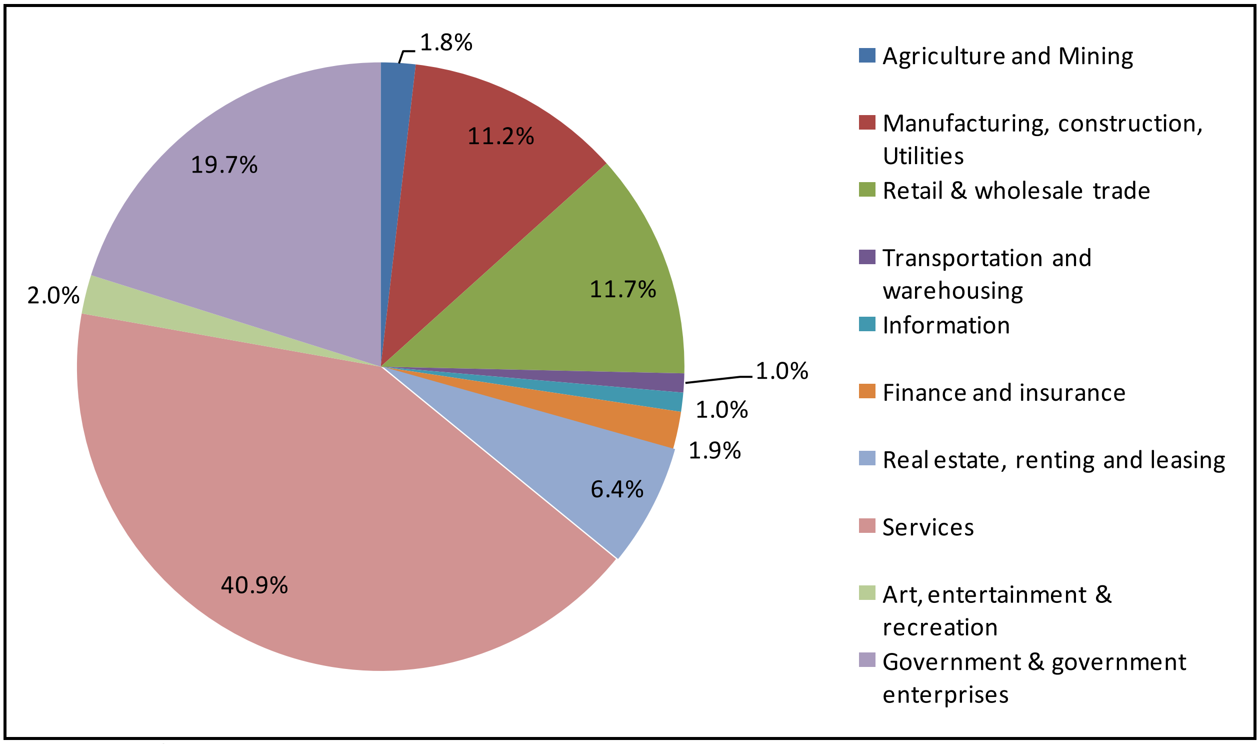


Source: Bureau of Economic Analysis 2009 and adjusted for inflation (2007).

Figure 6.6.1.3-3: Per Capita Income Trends for NAS Patuxent River Socioeconomic Study Area

Employment by Industry

Information was obtained from the BEA regarding employment by industry for the NAS Patuxent socioeconomic study area for 2007. There were approximately 95,743 total jobs in St. Mary's and Calvert Counties in 2007, which were distributed among industries shown in Figure 6.6.1.3-4. Services comprised the largest percentage of private jobs (40.9%). The three largest service industry employers include professional and technical services (12.1%), health care and social assistance (9.3%), and accommodation and food services (6.5%).



Source: Bureau of Economic Analysis 2009.

Figure 6.6.1.3-4: Employment by Industry for NAS Patuxent River Socioeconomic Study Area

Base Economic Contribution

Military operations at the NAS Patuxent River provide an important economic stimulus for much of southern Maryland.[178] First, the base provides over 9,900 high paying direct jobs[179] in the area with an average wage estimated to be $54,747, which is $22,549 above a southern Maryland resident's average earning.[180] Second, NAS Patuxent River 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.[181]

6.6.1.4 Housing

The average household size in the NAS Patuxent River socioeconomic study area is estimated to be 2.8 persons.[182] In the two-county area, 91.0% of the 72,102 housing units were occupied in 2007 with homeowners inhabiting 71.1% of these units (6,461 houses where vacant). Both counties have low homeowner vacancy rates with 1.1% in St. Mary's County and 1.3% in Calvert County. Rental vacancy rates for the two-county area are somewhat higher with 7.9% in St. Mary's County and 2.5% in Calvert County. [183]

178 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

179 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)

180 Jacob France Institute et. al 2002

181 Ibid

182 Census Bureau 2009

183 Ibid

Based on the 2007 EA/OEA, approximately 98% of the NAS Patuxent River population lives off-base, primarily in St. Mary's County. There are 777 family housing units on the base for military personnel. This includes 650 townhomes, 100 four-plex apartments, and 27 single family homes. Approximately 500 military personnel live on the base with an associated 1,300 dependents (as of June 2004). The vacancy rate for base housing was 13% (1,800 out of a total 2,069) in 2005.[184]

Based on the 2007 EA/OEA, St. Mary's County conducted a Housing Needs Assessment Study 2003, 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 5 years to meet the 2003 and future years housing needs. The study also prescribed the county try to maintain an apartment rental vacancy rate between 4% and 6% to allow for some household mobility.[185] From 2000 to 2004, St. Mary's County had on average issued building permits for 1,005 new dwelling units. Since the 2003 Housing Needs Assessment Study, the county has had substantial single family housing development.[186] From October 2004 to October 2005, the apartment rental vacancy rate averaged 4.5%.[187] 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.[188]

6.6.1.5 Infrastructure

<u>Transportation</u>

Section 3.4 of the *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.

<u>Schools</u>

Section 6.6.1.4 of this Supplemental EA/OEA states that the majority of base personnel live off-base primarily in St. Mary's County. However, a large percent of the base civilian personnel (12%) reside in Calvert County. Logically then, the majority of school aged children from base personnel families attend schools in St. Mary's or Calvert counties. Based on the 2007 EA/OEA, 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.[189] St Mary's County planned to build two new elementary schools and one new high school in the next 5 years.[190] Calvert County was planning to build one new elementary school and replace an outdated middle school over the next 5 years.[191] Both counties anticipated 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.[192]

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184 Christman 2004–2005
185 National Leaders in Real Estate Research 2003
186 Savich 2005
187 Phillips, C. 2005
188 Calvert County Comprehensive Plan 2004
189 Bowling 2005
190 Hayden 2005
191 Leah 2005
192 Hayden 2005 and Leah 2005

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 manage and execute the proposed JSF DT Program. Of these 700 employees, approximately 260 (225 civilian and 35 military) were already employed at NAS Patuxent River and transitioned from other programs to the proposed JSF DT Program. The remaining approximate 440 required employees (405 civilian and 35 military) were new to NAS Patuxent River. [193] This additional increase in population would equate to less than 1% of St Mary's and Calvert County's 2007 labor force. The small increase in the labor force is not expected to cause significant impacts.

As reflected in the 2007 EA/OEA, 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 base activities by evaluating the significance of impacts on four elements of a local economy: business volume, employment, personal income, and population.[194] Projected changes that fall outside of these accepted boundaries (referred to as established significance criteria ranges) are considered significant. The analysis from the 2007 EA/OEA showed no exceedance of significance criteria ranges. Because there were no significant impacts, it was decided by the F-35 Joint Program Office not to conduct another analysis with the EIFS model. Potential impacts would be the same as in the 2007 EA/OEA, which is presented in the following paragraphs.

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 was based on discussions with the JSF ITF 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.[195]

Table 6.6.2-1: Proposed JSF DT Program 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.

193 Maack 2004
194 Bragdon, Katherine and Webster, Ron 2001
195 Gunther, W. 1992

Table 6.6.2-2: Forecasted Output from the EIFS Model for Proposed JSF DT Program 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 added 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 Program activities. Even with the improvements to Maryland Highway 235 over the last few years, there is no reserve capacity, especially during peak evening commuting hours.[196] Since the traffic corridor for the NAS Patuxent River is at capacity, increases in employment in the region may add to 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 Supplemental EA/OEA states the majority of personnel live off-base, primarily throughout St. Mary's County. However, another large percent of the base 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 base 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.

196 Phillips, Greg 2005

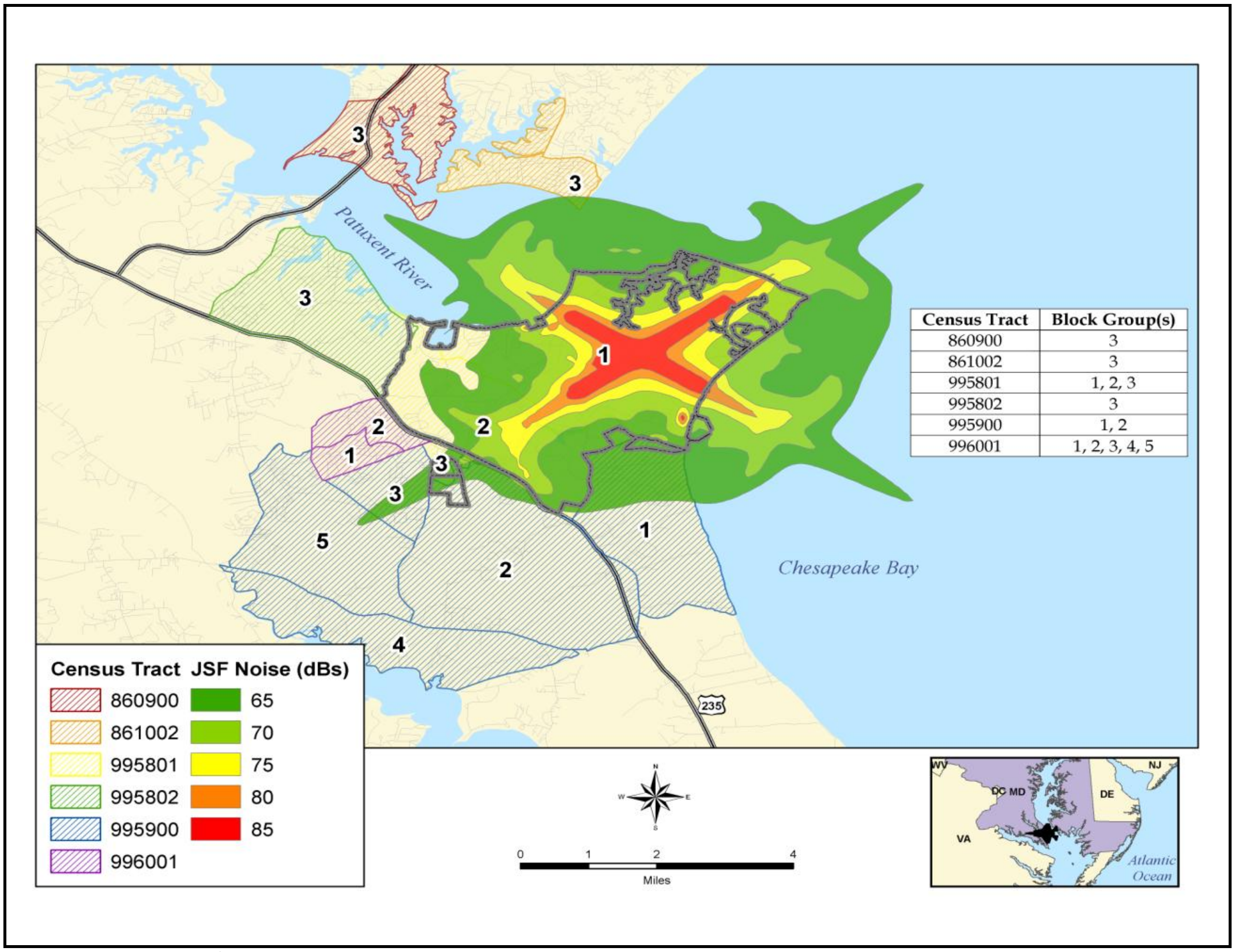
Based on the 2007 EA/OEA, public school capacity levels in both counties have been able to meet increases in school aged children from increased population growth over the past decade by using existing empty school space, refurbishing, and/or building new public schools. St Mary's increase in public school capacities from population growth over the decade have been largely attributed to personnel increases at NAS Patuxent River.[197] Both counties had 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 Supplemental EA/OEA). Both counties anticipated 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.[198] 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-base and the on-base housing is expected to support approximately 268 additional personnel, as discussed in Section 6.6.1.4. Based on the 2007 EA/OEA, St. Mary's County anticipated 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.[199] Also, St. Mary's County 5-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.[200] The continued housing development in St. Mary's County and the availability of on-base housing should have allowed 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 was 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 are not 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 Program 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 and depicted in Figure 6.6.2-1 of this Supplemental EA/OEA, minimal noise contour changes would be anticipated outside the base boundaries; no individual residential unit within the 65 DNL contour would experience a noise increase of 1.5 dB or greater, and no individual residential unit within the 60 dB DNL would experience a noise increase of 3 dB or greater. 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 activities at NAS Patuxent River would cause no disproportionately adverse health or safety risks to children. Noise and air quality analyses have shown that no potentially significant impacts to any potentially disproportionately large populations of children or sensitive receptors (including hospitals, schools, and daycare facilities) where disproportionately large populations of children may be present would be expected to occur.

197 Bowling 2005
198 Hayden 2005 and Leah 2005
199 Savich 2005
200 National Leaders in Real Estate Research 2003



Source: 2009 AICUZ for NAS Patuxent River, MD, and NAS Patuxent River NOISEMAP Model Outputs, Booz Allen Hamilton August 2010 – June 2011.

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 CZMP 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 Supplemental 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 and OLF Webster Field include noise induced effects and stores separation tests potentially hitting marine animals and/or affects to EFH.

6.7.2 Environmental Consequences

No effect to the coastal zone near NAS Patuxent, including OLF Webster Field, would be anticipated from conducting the proposed JSF DT activities. Analyses from *The EA for the F/A-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 activities would be minimal or nonexistent. Noise generated from the Proposed Action would be similar to current test activities conducted routinely in the CTR and at OLF Webster Field. 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 OLF Webster Field. The proposed JSF DT activities would be consistent with the type and tempo of aircraft overflights and stores separation activities 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 Program 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 PEO of the F-35 Joint Program Office has determined that the proposed JSF DT Program would be consistent to the maximum extent practicable with the enforceable policies and objectives of the Maryland, Virginia, and Delaware CZMP. And the conclusions reached in the 2007 EA/OEA remains unchanged as reflected in the 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."[201]

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 was used so that all projects could 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).[202]

201 40 CFR 1508.7
202 Ranges Sustainability Office, NAS Patuxent River, February 2006, comments provided in Review of February 2006 Draft JSF DT EA/OEA

Table 6.8-1: On-Going and/or Future Actions at NAS Patuxent River/CTR

Aircraft	Testing Period
E-2D AHE	CY 2009-2010
MH-60R	CY 2006-2012
P-8A Multi-mission Maritime Aircraft	CY 2009-2012
Fire Scout Vertical Take-Off And Landing Tactical Unmanned Aerial Vehicle	CY 2006-2017
BAMS UAS	FY 2012-2014
Navy Unmanned Combat Air System CV	FY 2012-2014
V-22	On-Going Action
H-1 Upgrades	On-Going Action
MH-60S	On-Going Action
F/A-18	On-Going Action
EA-18G	On-Going Action

Source: NAVAIR and NAS Patuxent River Representatives/Data 2005 and 2009.

Average annual flight hours at NAS Patuxent River have historically been approximately 20% below the maximum analyzed annual flight hours of 24,000.[203] Between the year 2000 and 2005, annual flight hours have decreased from 19,455 hours per year to 17,803 hours per year.[204] During 2009, annual flight operations were 16,614 flight hours of which the proposed JSF DT activities for the highest Test Year (1,636 flight hours in Test Year 3 under Alternative One) would represent only 10% of these annual flight hours.[205] 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. 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 used in the 2009 AICUZ study. Since 2005, flight hours have fluctuated but never exceeded the maximum flight hours of 24,400 in the FEIS for NAS Patuxent:[206]

- 2005 = 17,803 flight hours
- 2006 = 18,520 flight hours
- 2007 = 17,889 flight hours
- 2008 = 17,195 flight hours
- 2009 = 16,614 flight hours

As such, there is minimal potential for cumulative impacts.

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 Supplemental EA/OEA concluded proposed JSF DT Program emissions would be predominantly transitory and not cumulatively significant. 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 F-35 Joint Program Office would comply with approved air

203 DON 1998
204 Ranges Sustainability Office, NAS Patuxent River, February 2006, comments provided in Review of February 2006 Draft JSF DT EA/OEA
205 NAVAIR February 2009
206 Ibid

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 was 2006 through 2008, therefore reducing the potential for cumulative noise impacts at NAS Patuxent River.

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 6.8-1. No significant cumulative effects would be expected from the Proposed Action 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 analyzed in 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 Program 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 Program, along with other future reasonably foreseeable actions, would have the potential to cumulatively impact the immediate area surrounding the base. The nature of the proposed JSF DT program 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 populations would also occur as the proposed JSF DT Program 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 or disproportionately large populations of children.

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7.0 NAES LAKEHURST

7.1 GENERAL INFORMATION

NAES Lakehurst, as depicted in Figure 7.1-1, is the largest USN 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.[207]

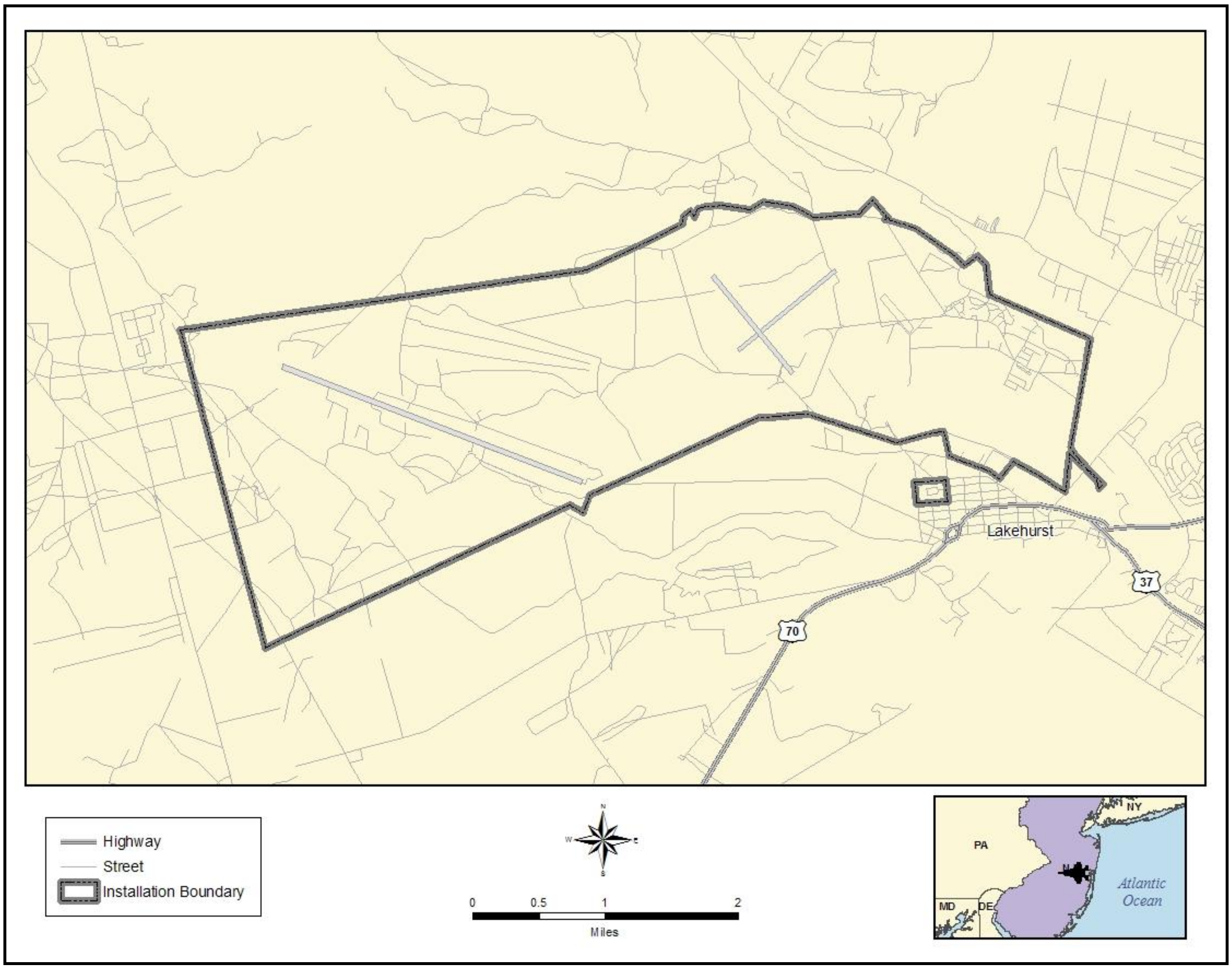

Figure 7.1-1: General Map of NAES Lakehurst

207 NAVAIR 2003

7.2 PROPOSED JSF DT PROGRAM 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. The overall JSF DT tempo analyzed in the 2007 EA/OEA increased by 10 events total, as reflected in Table 7.2-1.

Table 7.2-1: Current and 2007 EA/OEA Overall Test Program

	No. F-35 Flights	F-35 Flight Hours	Number of Events	Number of Hours on Deck w/Engine Operating	Total No. Flights	Total Flight Hours
Current	40	40	448	200	40	40
2007 EA/OEA	40	40	438	200	40	40

Table 7.2-2 lists the updated proposed flight tests and events analyzed in this Supplemental EA/OEA. Table 7.2-3 annotates the test profile analyzed in the 2007 EA/OEA. Table 7.2-4 summarizes the support equipment proposed for use, which remains unchanged from the 2007 EA/OEA. Figure 7.2-1 illustrates the representative airspace of the NAES Lakehurst area. For the various proposed JSF DT activities over the 3-year period, personnel from NAS Patuxent River would DET to NAES Lakehurst. These DETs would be for a 2 to 4-week period at any time during the test year. Approximately 75 personnel would be involved in each DET. 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 take-offs 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 7.2-2: Proposed JSF DT Program Flight Profile at NAES Lakehurst–Current

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	330	122	N/A	N/A	N/A	31	31
4	Barricade Tests	0	0	8	0	N/A	N/A	N/A	0	0
5	F136 JBD Testing, F136 Steam Ingestion	9	9	110	78	N/A	N/A	N/A	9	9
Total		***40***	***40***	***448***	***200***	***N/A***	***N/A***	***N/A***	***40***	***40***

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005) and Updated Lakehurst Supplemental Data Verification (2007-2008).

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 7.2-3: Proposed JSF DT Flight Profile Program at NAES Lakehurst–2007 EA/OEA

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	0	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***	***N/A***	***N/A***	***N/A***	***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 7.2-4: Proposed JSF DT Program Support Equipment at NAES Lakehurst–Current and 2007 EA/OEA

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) and Updated Lakehurst Supplemental Data Verification (2007-2008).
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 period. Some support equipment (such as floodlights, shipboard aircraft handler, portable duct heaters, and compressors) may change out from the above listed equipment in the table depending on test requirements.
Total for all units

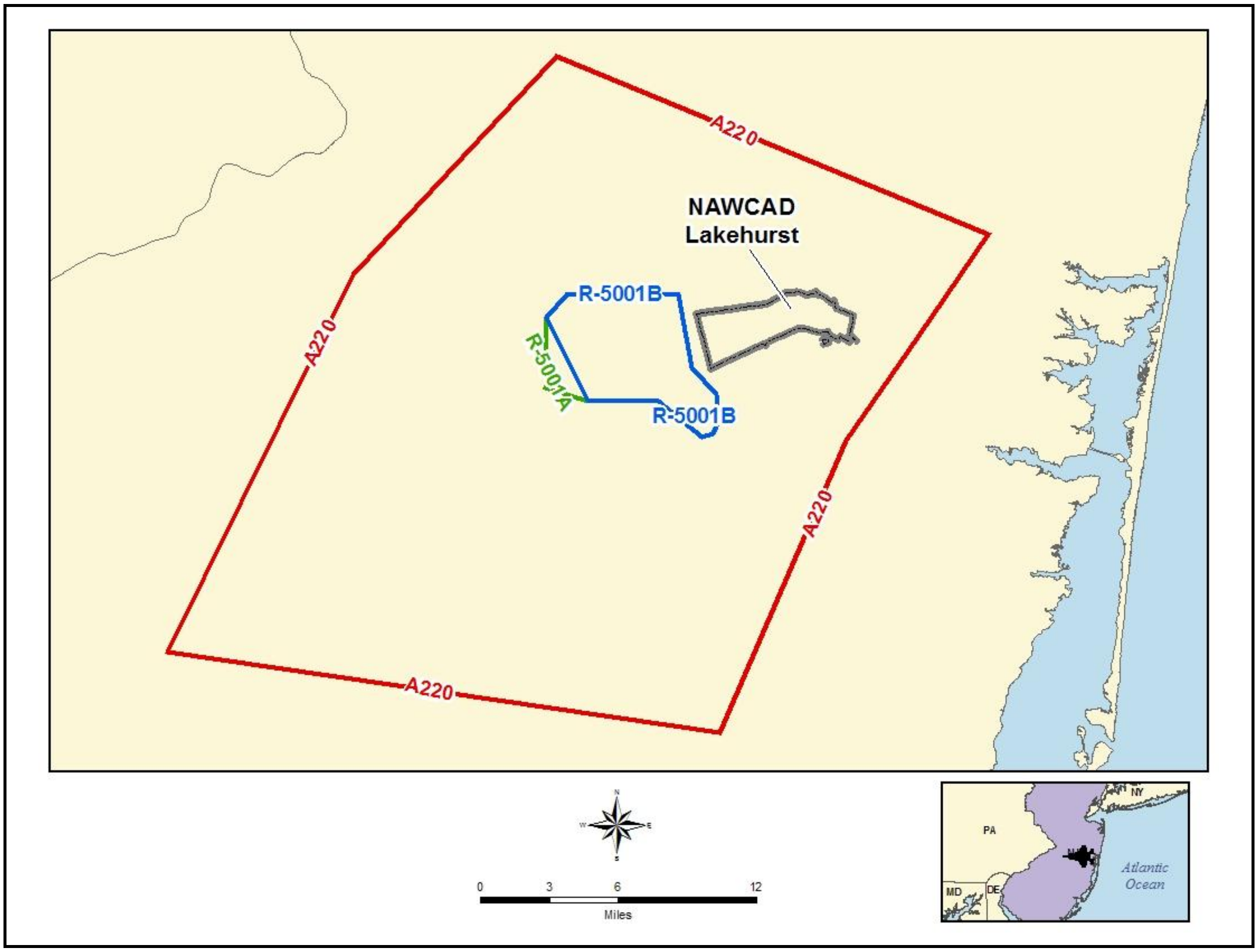

Figure 7.2-1: Representative NAES Lakehurst Airspace

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.[208]

New Jersey has been designated as nonattainment for the 8-hour O_3 NAAQS. Analysis by the State of New Jersey of the meteorology in the region determined over 90% of the nonattainment periods occurred when winds come from the west.[209] Portions of the State (excluding Ocean County) are designated as nonattainment for the annual $PM_{2.5}$ and the SO_2 NAAQS. In addition, portions of New Jersey are maintenance areas for CO. The State is in attainment with the 1997 24-hour $PM_{2.5}$ NAAQS, but is not in attainment with the 2006 24-hour $PM_{2.5}$ NAAQS. Ocean County is located in the Philadelphia-Wilmington-Atlantic City moderate NAA for the 8-hour O_3 NAAQS.[210] 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 AAQS, which must be considered as part of this analysis. As specified in the air conformity

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208 NAVAIR 2003
209 *McGreevey 2003*
210 *Ibid*

requirements of 40 CFR 51.853/93.153 (b)(1), the *de minimis* level for an area classified as moderate nonattainment for the 8-hour O_3 standard in an O_3 transport region is 100 tpy for NO_x and 50 tpy for VOCs.

Table 7.3.1-1 provides the CY2011 annual emissions for operations at NAES Lakehurst including annual stationary, on-road, non-road, aircraft, and test program emissions. These emissions were derived from annual reports, or as predicted and calculated by their respective program NEPA analysis or NO_x and VOC modeling conducted to support the 2006 SIP budget. The SIP budget for NO_x and VOCs are 793 tpy and 129 tpy respectively.

Table 7.3.1-1. Lakehurst SIP Budget Conformity[211]

Source	NO_x (tpy)	VOC (tpy)
Stationary Sources (Title V), 2010	13.57	3.67
C-17 Landing Zone Operations CY 11 and Beyond (Full Operational Capability)	622.48	13.50
Proposed LEMV Emissions – Recurring (Alt 2, Max)	5.73	6.59
NJ Army National Guard Aviation Support Facility	14.41	7.78
Electromagnetic Aircraft Launching System	7.23	6.75
Other Aircraft and Jet Track Emissions	10.64	12.55
NJ Army National Guard Consolidated Logistics and Training Facility[1]	4.78	4.48
Proposed Army Communications-Electronic Research, Development and Engineering Center (CERDEC) FAF Emissions – Recurring[2]	1.43	0.08
Proposed CERDEC FAF Construction Emissions (Fall 2012-Fall 2013)[2]	7.07	1.43
Lakehurst Area Source Emissions	12.09	12.08
Mobile Emissions	1.99	0.85
Non-Road Emissions	33.71	9.40
Annual Emissions	**735.13**	**79.16**
Naval Aircraft Testing at the Test Runway (Maximum – Highest Year of JSF Testing)[1]	8.09	0.54
Total	**747.55**	**79.86**
Lakehurst SIP Budget	**793**	**129**

Notes: VOC is not a criteria pollutant, however, it is an ozone precursor and therefore a controlled pollutant.
(1) Aircraft testing does not occur all years.
(2) The CERDEC FAF emissions would be greatest during the construction phase. Recurring operational emissions would be much less (1.43 tpy NO_x and 0.08 tpy of VOCs). Both values are included to be conservative.

Ten percent of the total emissions budget for the transportation planning areas that encompass McGuire AFB and NAES Lakehurst (i.e., North Jersey Transportation Planning Authority – Ocean County and Delaware Valley Regional Planning Commission), including the emission budgets for McGuire AFB and NAES Lakehurst in the most recently approved State SIP are shown in Table 7.3.1-2.

[211] NAES, 2006.

Table 7.3.1-2: Total 8-Hour Ozone (O_3) Conformity Budgets Applicable to NAES Lakehurst[212]

	Baseline Emissions Levels tons/day (MT/day)		Regionally Significant Threshold tons/year (MT/year)	
Year	NO_x	VOC	NO_x	VOC
2008	260.6 (236.4)	136.5 (123.8)	3,070 (2,785)	1,350 (1,224)
2009	245.3 (222.5)	126.8 (115.0)	3,003 (2,724)	1,268 (1,151)

Note: The Regionally Significant Threshold was calculated as 10 percent of the sum of the VOC and NOx budgets for the North Jersey Transportation Planning Authority – Ocean County, the Delaware Valley Regional Planning Commission, and the budgets for McGuire AFB and NAES Lakehurst.

7.3.2 Emission Estimation Methodology

The emission estimates used to determine General Conformity Rule applicability were calculated for flight operations, aircraft maintenance, aircraft test cells, and GSE identified for the proposed JSF DT Program 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.*[213] 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.[214] The PM emission factors for AB operations from AFIERA were assumed to be the same as for the F100-PW-100 engine.[215] Emission factors for the F100-PW-100 engine were used because it is manufactured by P&W (who is also producing the F-135 engine), is roughly the same size as the engine used in the F-35, and emissions data were readily available. PM emission factors for the F-35 engine during non-AB conditions were calculated using the FAA First Order Approximation, Version 3, methodology, which differentiates between volatile, sulfate, and soot particles. The volatile particulate emissions were calculated based on the gaseous HC emissions; the sulfate emissions were calculated based on the assumed sulfur content of the fuel of 0.049%; and the soot particles were based on engine emission measurements.

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 were based on the fuel use or the hours of operation.[216 217 218]

212 NJDEP 2007
213 O'Brien 2002
214 Wade 2002
215 O'Brien 2002
216 EDMS 2005
217 Ambrosino 1999
218 O'Brien 2002

Emissions from additional commuter traffic associated with additional new personnel (approximately 75 per DET) at 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 4 weeks a year at an average commuting speed of 35 mph.[219 220] The EDMS Program was used to estimate emissions from the additional vehicle traffic.[221] Emissions from refueling operations were calculated using the procedures recommended by the EPA in AP-42. [222]

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. The highest year annotated in this table represents the year most likely to produce the greatest estimated emissions. The difference in the highest emissions per test year for the various criteria pollutants is a function of the combination of different emission sources (e.g., aircraft, GSE, personal vehicles) and the operation of those sources. Often the difference in the highest year is slight. However, the mix of emission sources will cause emissions to be highest in one year for a given pollutant and in a different year another pollutant.

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	7.92 (7.18)	8.09 (7.34)	0.54 (0.49)	0.68 (0.62)	0.45 (0.41)
4	0.58 (0.53)	0.24 (0.22)	0.05 (0.05)	0.01 (<0.01)	0.06 (0.05)
5	6.75 (6.12)	5.73 (5.2)	0.32 (0.29)	0.52 (0.47)	0.38 (0.34)
Highest (Test Year 3)[2]	7.92 (7.18)	8.09 (7.34)	0.54 (0.49)	0.68 (0.62)	0.45 (0.41)

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: This is reflective of both Alternatives One and Two.
1. See Appendix E.3 for additional details.
2. The highest year represents the year with the potential to produce the most emissions. The difference in the highest emissions per test year for the various criteria pollutants is a function of the combination of different emission sources (e.g., aircraft, GSE, personal vehicles) and the operation of those sources. Often the difference in the highest year is slight, however, the mix of emission sources will cause emissions to be highest in one year for a given pollutant and in a different year another pollutant..

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, as well as to the NAES Lakehurst SIP budget. The comparison shows the Proposed Action would not require a formal conformity determination because 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. The JSF Program, when added to the other current and planned emission sources at NAES Lakehurst, would fall well within the current NAES Lakehurst SIP budget, and would therefore be in compliance with the State emission budgets. It is expected, therefore, any impacts on air quality would not be significant for either Proposed Action Alternative.

219 Previte 2005
220 Hales 2005b
221 EDMS 2005
222 EPA 1997

Table 7.3.3-2: Proposed Action JSF DT Program Peak Year Comparison

Pollutant	Test Year 3 Emissions[1] tpy	*de minimis* Threshold tpy	NAES Lakehurst SIP Budget tpy	Regionally Significant Threshold tpy
NO_x	8.09	100	793	3,003
VOC	0.54	50	129	1,268

tpy = tons per year
NO_x = Nitrogen Oxides, VOC = Volatile Organic Compound
Hydrocarbon emissions are assumed to be VOCs.
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).

GHG emissions (CO_2, CH_4, N_2O) were also estimated for the proposed aircraft operations at NAES Lakehurst, based on the total quantity of fuel combusted and applying emissions factor specific to the fuel burned (diesel or gasoline) from generally accepted GHG protocols. The protocols do not include an emission factor for JP-8, therefore the emission factor for Jet A/A-1 was used. The GHG emissions were converted to a CO_2e basis using the GWP of each gas.

The CO_2e generated from the Proposed Action are shown in Table 7.3.3-3. Approximately 3,354 MT of CO_2e would be generated by sources and operations comprising the Proposed Action. There is no requirement under the General Conformity Rule to consider GHG emissions, therefore in absence of any regulatory standard, the results of the analysis for NAES Lakehurst were compared to the 2009 total U.S. GHG emissions of 6,633.20 million MT CO_2e.[223] The emissions associated with the Proposed Action would result in less than a 0.0001% increase, and as such would not be a significant source of GHG emissions. Section 3.1.5 provides a high level overview of DoD's and the Service's energy activities (e.g., alternative fuels, reduce energy consumption, etc.), which have an added benefit of reducing greenhouse gas emissions.

Table 7.3.3-3: Estimated GHG Emissions for the Proposed JSF DT Program at NAES Lakehurst

Test Year	CO_2e (MT)
3	1,939
4	42
5	1,373
Total	3,354
Highest (Test Year 3)	1,939

7.4 NOISE AT NAES LAKEHURST

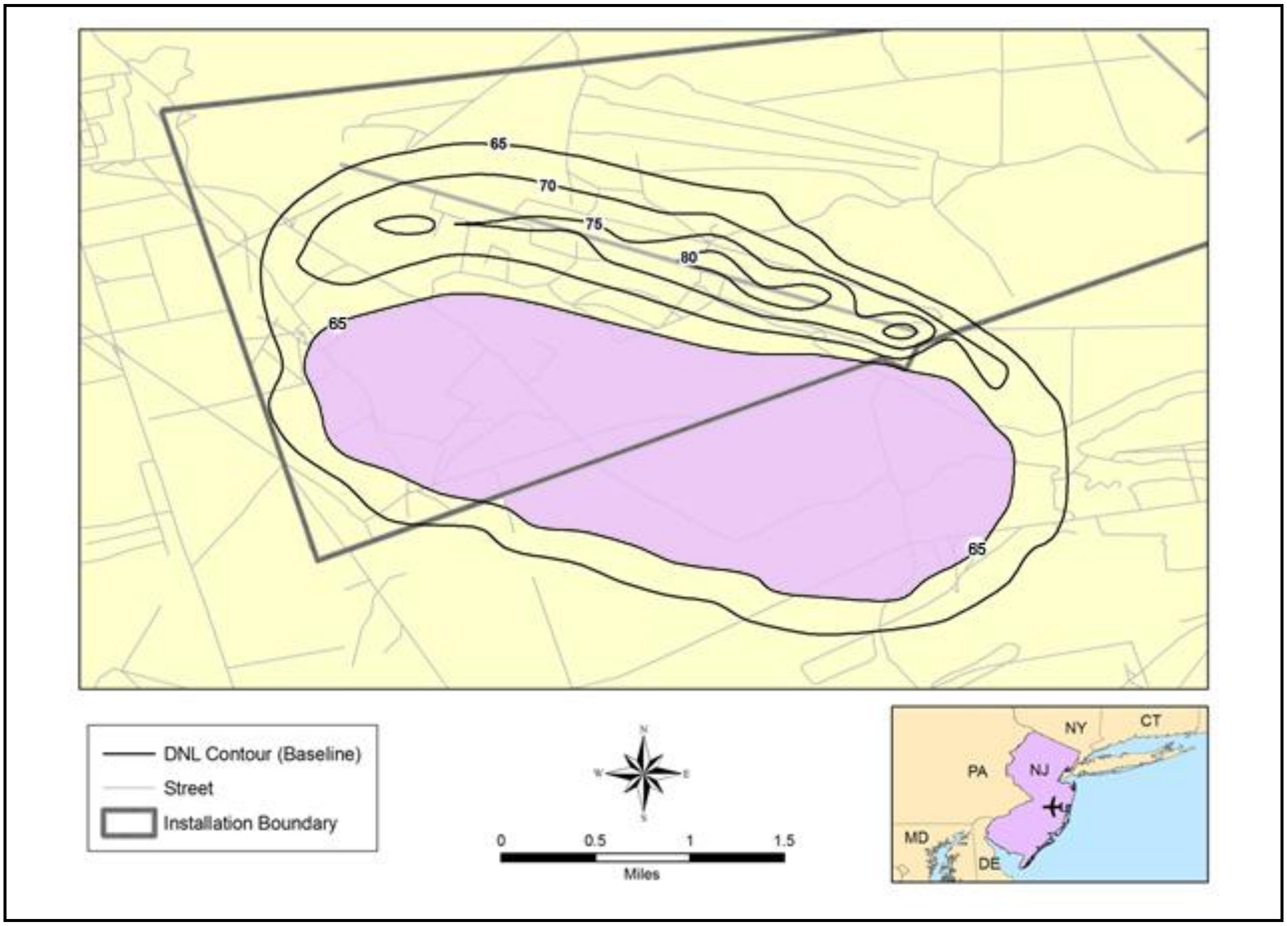
7.4.1 Affected Environment

Baseline DNL contours were developed by using an average annual operational level from a 10-year data sample (1993-2003) of catapult launch and arresting gear operations at NAES Lakehurst.[224] 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 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

223 EPA 2009
224 Previte 2005

baseline noise contours affects areas in Ocean County directly adjacent to and south of the base's property.

The contours presented in this Supplemental EA/OEA are not the same as those in the 2007 EA/OEA. The noise contours presented here are reflective of the actual baselines for NAES Lakehurst, not the ones depicted in the 2007 EA/OEA. During development of this Supplemental EA/OEA, an error was discovered in the noise model with regard to the aircraft flight profiles and in the labeling of the DNL contours. Modeling parameters were corrected in NOISEMAP resulting in the baseline noise contour depicted below in Figure 7.4.1-1. Acreage presented in this analysis is reflective of the immediate area of NAES Lakehurst and their test stands; not the entire base property comprising Joint Based McGuire-Dix-Lakehurst.



Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006) and Booz Allen Hamilton (October 2009 – June 2011).
Note: Noise levels within the shaded area are at or below 65 DNL.

Figure 7.4.1-1: Baseline DNL Noise Contours for NAES Lakehurst

Table 7.4.1-1 presents the number of acres within the noise contours associated with the baseline. There are approximately 1,430 acres of base property and approximately 510 acres of off-base property within the 65 dB and greater DNL noise contours.

Table 7.4.1-1: Acres within the Baseline DNL Contours at NAES Lakehurst

DNL Contour Bands	Area Acres On-Base	Area Acres Off-Base
65–70 dB	730	490
70–75 dB	480	20
75–80 dB	180	0
80–85 dB	40	0
85+ dB	0	0
65 dB and greater (Total)	**1,430**	**510**

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006) and Booz Allen Hamilton (October 2009 – June 2011).

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, aerial photographs were used to determine land uses and populations affected by the baseline NAES Lakehurst DNL noise contours. Figure 7.4.1-2 illustrates the 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 baseline noise contours. Areas within NAES Lakehurst's property boundaries, currently impacted by baseline DNL contours, are comprised of 790 acres of vacant and 640 acres of RDT&E land uses, while areas outside NAES Lakehurst's property boundaries affected by the baseline DNL contours are comprised of forested/vacant land uses.

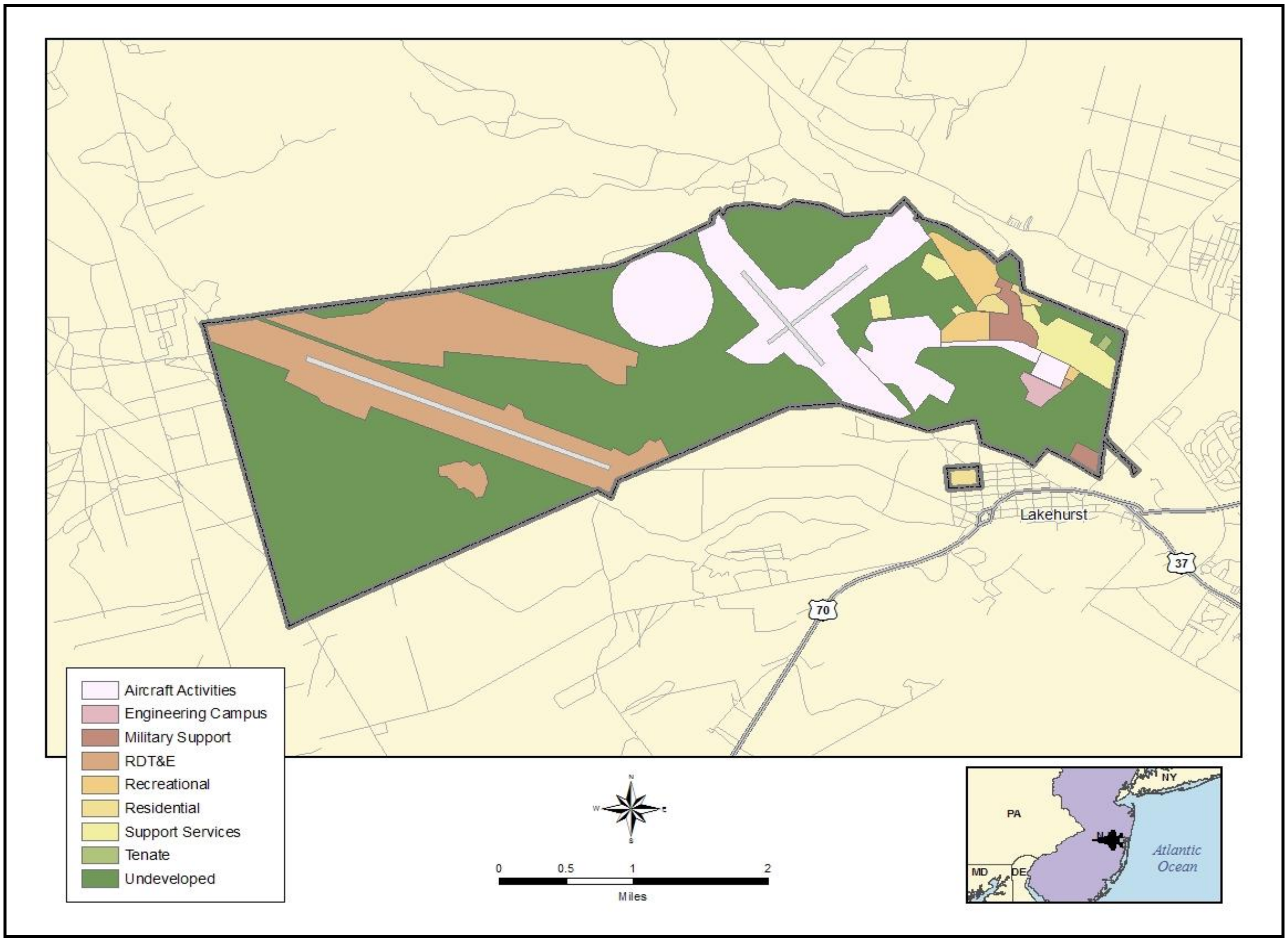


Figure 7.4.1-2: Land Uses Around NAES Lakehurst

Table 7.4.1-2: NAES Lakehurst Baseline Affected Land Uses (Acres)

Land Use Type	DNL Contour Bands					
	65 dB	70 dB	75 dB	80 dB	85 dB	65+ dB
On-Base						
RDT&E Mission	130	290	180	40	0	640
Vacant	600	190	0	0	0	790
Total	**730**	**480**	**180**	**40**	**0**	**1,430**

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006) and Booz Allen Hamilton (October 2009 – June 2011).

Concentrated population centers in the vicinity of NAES Lakehurst are located primarily to the east and southeast of the base property. On NAES Lakehurst, housing is primarily located on the eastern portions of base property, bounded by Lansdowne Road to the west and Moffet Road to the east. There are no residential housing units identified on NAES Lakehurst within the baseline DNL noise contours. Using aerial images, there are 44 discernable residential or incompatible land uses located within the baseline 65 db DNL noise contour.[225]

[225] *Google 2011*

7.4.2 Environmental Consequences

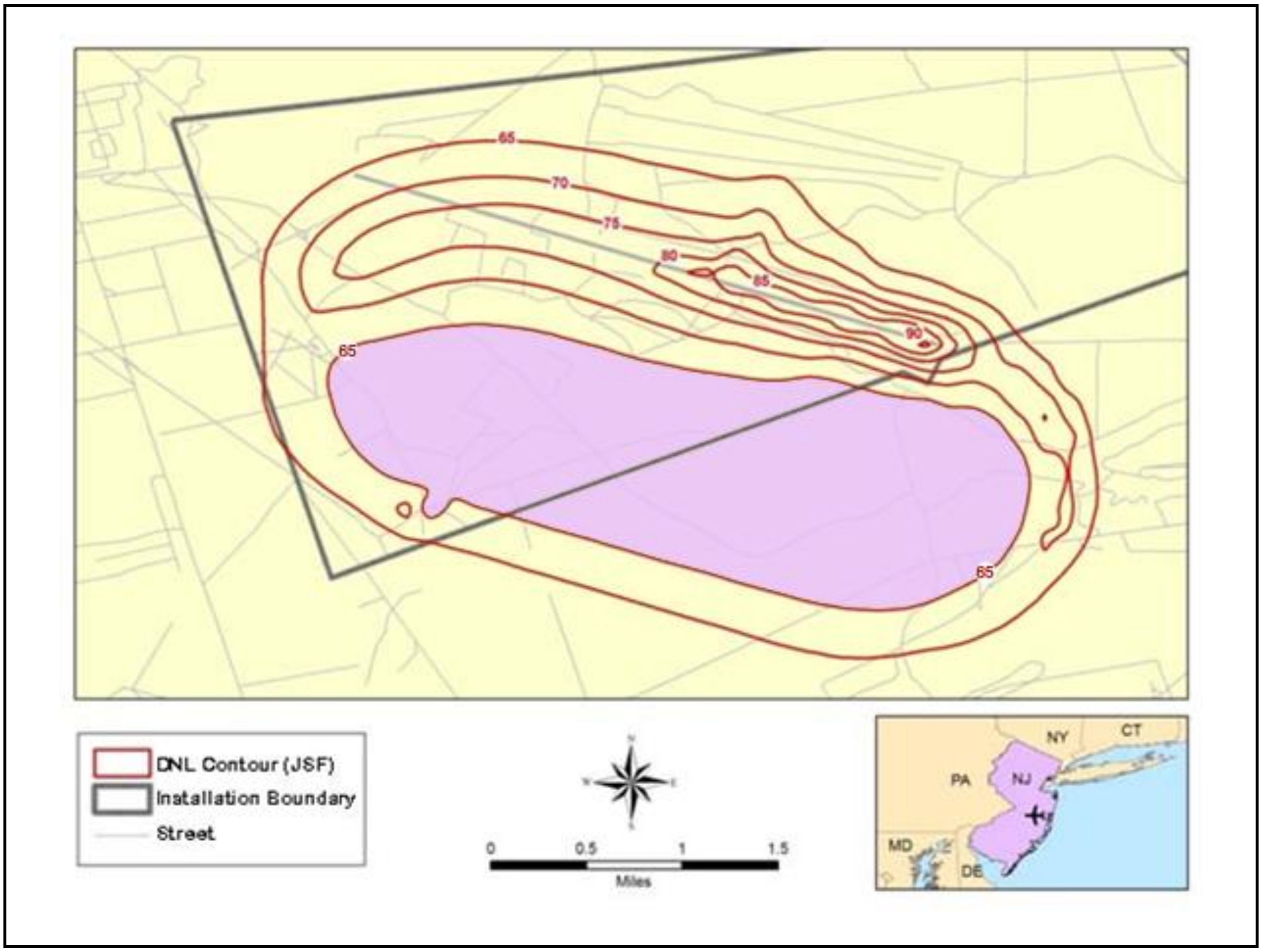
For the purposes of this evaluation, aircraft noise impacts are presented as land uses (acres) and populations exposed to aircraft noise above baseline levels. Contour lines representing average annual noise baselines for aircraft operations are generated for 65, 70, 75, 80, and 85 dB DNL.
The largest predicted year of proposed JSF DT activities at NAES Lakehurst (Test Year 3), as annotated in Table 7.4.2-1, were added to the baseline Fleet mix and modeled in the analysis.

Table 7.4.2-1: Maximum Proposed JSF DT Program 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	330	122	N/A	N/A	N/A	31	31

Source: Compilation of Proposed Test Location JSF Flight Test Matrices (2003-2005) and Updated Lakehurst Supplemental Data Verification (2007-2008).
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.

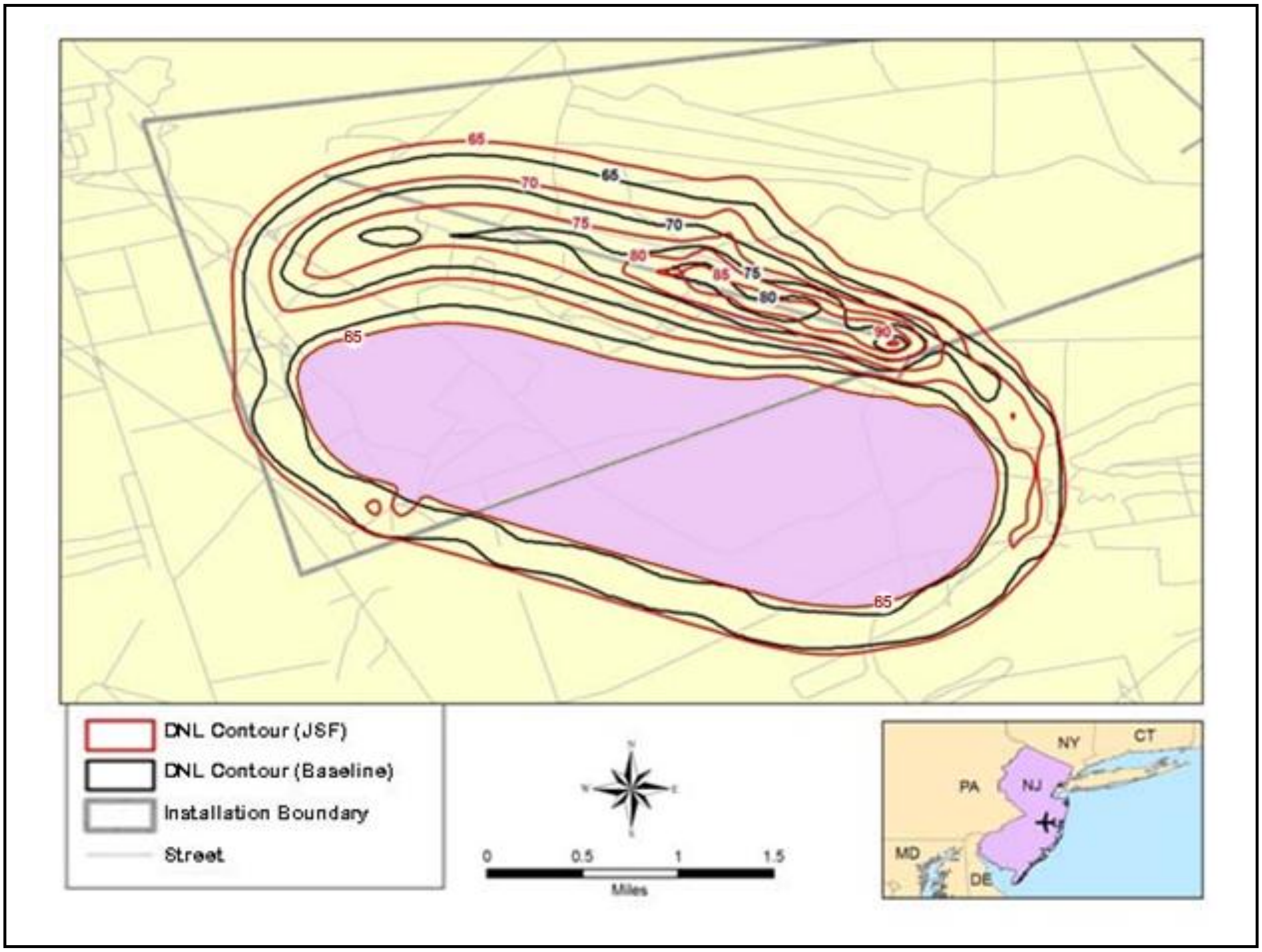
Figure 7.4.2-1 illustrates the noise contours for the Proposed Action, while Figure 7.4.2-2 illustrates the comparison of the Proposed Action DNL contours contrasted to the baseline DNL noise contours at NAES Lakehurst.



Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006) and Booz Allen Hamilton (October 2009 – June 2011)

Note: This is reflective for both Alternatives One and Two. Noise within shaded area are at or below 65 DNL.

Figure 7.4.2-1: DNL Noise Contours with the Proposed JSF DT Program at NAES Lakehurst



Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006) and Booz Allen Hamilton (October 2009 – June 2011).

Note: This is reflective for both Alternatives One and Two. Noise within shaded area are at or below 65 DNL.

Figure 7.4.2-2: Baseline and Proposed JSF DT Program DNL Noise Contours Comparison at NAES Lakehurst

As a result of the Proposed Action, reflected in Table 7.4.2-2, areas on-base potentially impacted by the 65 dB and greater DNL noise contour would increase by approximately 360 acres (approximately 25%) from 1,430 to 1,790 acres. Similarly, off-base areas impacted by the 65 dB and greater DNL noise contour would increase by approximately 160 acres (approximately 31%) from 510 to 670 acres.

Table 7.4.2-2: NAES Lakehurst Comparison Noise Impacts

DNL Contour Bands	Baseline Area Acres		Proposed JSF DT Program Area Acres		Acreage Change	
	On-Base	Off-Base	On-Base	Off-Base	On-Base	Off-Base
65–70 dB	730	490	870	580	140	90
70–75 dB	480	20	460	80	-20	60
75–80 dB	180	0	310	10	130	10
80–85 dB	40	0	90	0	50	0
85> dB	0	0	60	0	60	0
65 dB and greater (Total)	**1,430**	**510**	**1,790**	**670**	**360**	**160**

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006) and Booz Allen Hamilton (October 2009 – June 2011).
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 1,030 acres of vacant and 760 acres of RDT&E land. There would be a slight increase in residential housing units impacted by the Proposed Action DNL noise contour outside NAES Lakehurst's property boundaries. As with the baseline contours for NAES Lakehurst reflected in Section 7.4.1, there are 44 discernable residential housing within the 65 db DNL noise contour. However, no individual residential unit within the 65 DNL contour would experience a noise increase of 1.5 dB or greater, and no individual residential unit within the contour would experience a noise increase of 3 dB or greater. Therefore, it is anticipated that both populations and 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 Program at NAES Lakehurst

Land Use Type	DNL Contour Bands (On-Base)					
	65 dB	70 dB	75 dB	80 dB	85 dB	65+ dB
Baseline DNL Contour Bands						
RDT&E Mission	130	290	180	40	0	**640**
Vacant	600	190	0	0	0	**790**
Total	**730**	**480**	**180**	**40**	**0**	**1,430**
With Proposed JSF DT DNL Contour Bands						
RDT&E Mission	250	140	220	80	70	**760**
Vacant	680	250	80	10	10	**1,030**
Total	**930**	**430**	**240**	**90**	**80**	**1,790**
Change						
RDT&E Mission	120	-150	40	40	70	**120**
Vacant	80	60	80	10	10	**240**
Total	**200**	**-50**	**60**	**50**	**80**	**360**

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006) and Booz Allen Hamilton (October 2009 – June 2011).
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 environment. The non-residential noise sensitive receptors, as listed in Table 7.4.2-4, are all located outside the 65 dB and 60 dB DNL noise contours for NAES Lakehurst and found to be distant enough to warrant no further analysis in this Supplemental 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 to noise-sensitive receptors 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 Baptist Church	Church	1	Riverside Cemetery	Cemetery	11
Community Medical Center	Hospital	11	Saint Gabriel College	School	10
Community Memorial Hospital	Hospital	10	Saint Marys Cemetery	Cemetery	9
Crawford House	Historic	12	Saint Vladimir's Church	Place of Worship	6
DeBow's Church	Place of Worship	10	Spruce Street School	School	10
Emley's Hill Church	Place of Worship	9	Strand Theatre	Historic	11
Evergreen Cemetery	Cemetery	11	Switlik School	School	7
Georgian Court	Historic	10	Sylvia Rosenauer School	School	10
Georgian Court College	School	10	Toms River Cemetery	Cemetery	10
Greenwood Cemetery	Cemetery	11	Toms River North High School	School	11
Hangar No. 1, Lakehurst Naval Air Station	Historic	4	Torrey-Larrabee Store	Historic	5
Health South Rehab Hospital	Hospital	10	West Dover School	School	9
Hope Church	Place of Worship	10	Whitesbog Historic District	Historic	8
Kimball Medical Center	Hospital	10	Woodlawn Cemetery	Cemetery	11
Lakehurst Elementary School	School	4			

Source: NAES Lakehurst NOISEMAP Model Outputs, United States Air Force Acoustics Lab (April 2006) and Booz Allen Hamilton (October 2009 – June 2011).
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) 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 biological resources at NAES Lakehurst. All 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.[226] 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.[227]

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 base 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 section. 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.

226 UNESCO 2003
227 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*	D	E
Barred owl *Strix varia*		T
Bobolink *Dolichonyx oryzivorus*		T
Cooper's hawk *Accipiter cooperii*		T
Dickcissel *Spiza americana*		Regional Priority
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*		T
Northern pine snake *Pituophis m. melanoleucus*		T
Plants		
Knieskern's beaked rush *Rhynchospora knieskernii*	T	E
Two-flowered bladderwort *Utricularia biflora*		E

Source: EA C-17 2005.
NJDEP 2011

Legend: E = Endangered, T = Threatened, EX = Extracted, C2 = Candidate 2 Species, D=Delisted

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.[228] 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 7 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.[229] 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 base.

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.[230] 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 10 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.[231] Reptile species include the Bog turtle (*Clemmys muhlenbergii*) and the Northern pine snake (*Pituophis m. melanoleucus*), as discussed in the next subsection.

228 NJDEP 2003
229 EA C-17 2005
230 Ibid
231 USGS

Other Species of Concern

According to the New Jersey Natural Heritage Network Database, Federally- and State-listed threatened and endangered species are likely to exist 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 the ESA. Additionally, the Bog turtle (a Federally-listed species) hasnot been documented within the grasslands associated with the existing runways, and the habitat immediately surrounding the runways is unlikely to support its habitat.[232]

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.[233] 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).[234] 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 base in recent years.[235]

7.5.2 Environmental Consequences

Proposed JSF DT activities 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.

- 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 activities would be limited to potential noise-induced effects and BASH during landings and take-offs.

232 EA C-17 2005
233 Joyce 2002
234 enature.com 2003
235 EA C-17 2005

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 activities 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 activities at a 65 dB level or higher would increase by 240 acres (30.4%) from the baseline (from 790 acres to 1,030 acres). 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. Species present are already adapted to noise activities at the test stands/airfield or are expected to adapt to the noise. But no permanent behavioral or physiological effects are anticipated from the proposed JSF DT activities. Noise contours extend over open water areas. However, effects on bald eagles are not anticipated since there are no known nest sites, or frequent use of these areas. Portions of the JSF contour overlay the Manchester Fish and Wildlife Management Area to the south of the base. 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 activities at NAES Lakehurst is estimated to affect approximately 31 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 activities noise impact areas are not associated with any known bog turtle habitat and, therefore, would have no expected effect on the species. Noise contours associated with the proposed JSF DT activities would introduce noise over the southwest portion of the base where three known Northern pine snake den sites occur within the proposed 65 dB to 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.

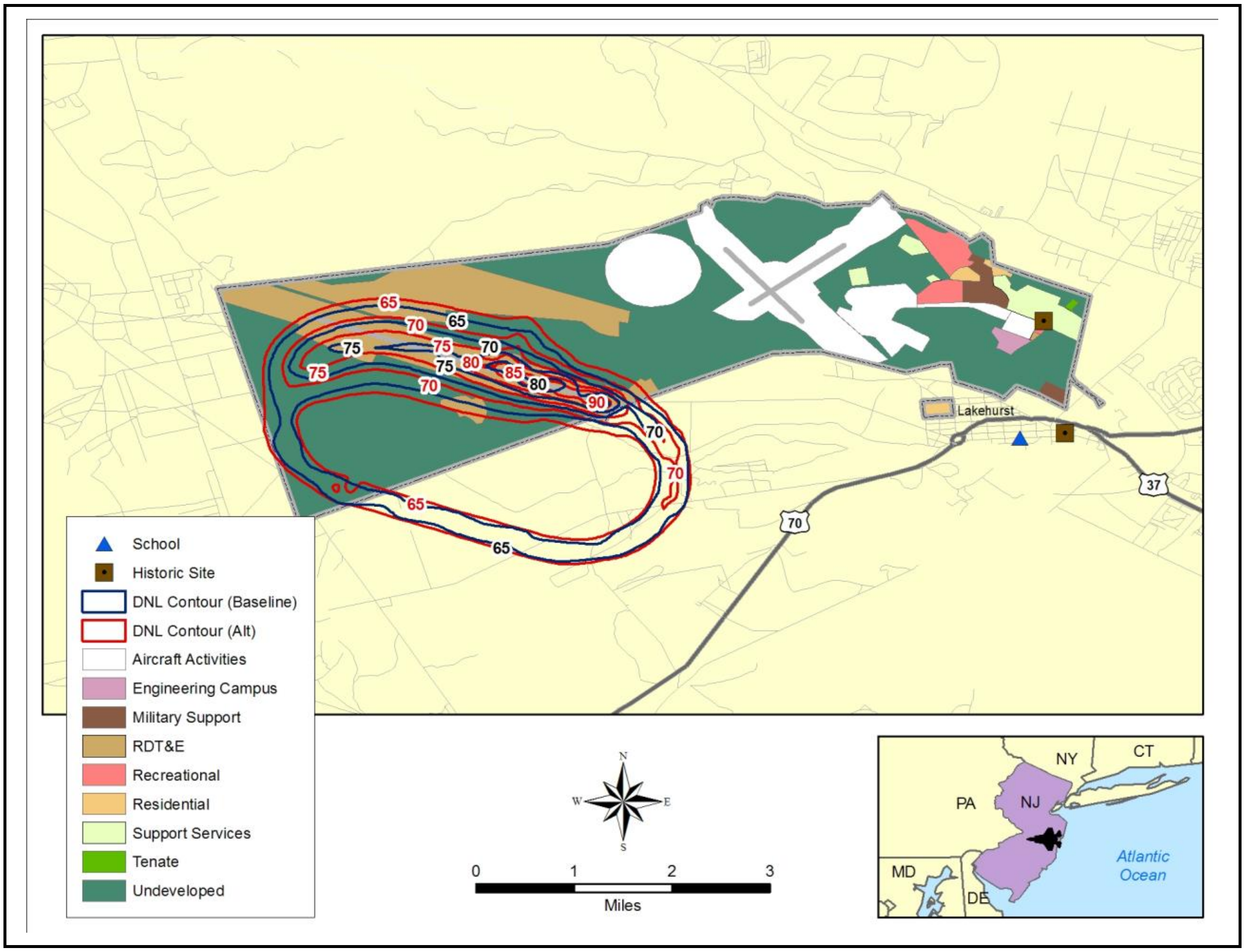


Figure 7.5.2-1: Noise Contour with Land Use Map

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 activities at NAES Lakehurst does not require permanent, dedicated employees stationed at the base. Rather, required JSF DT Program personnel would DET from NAS Patuxent River during the varied 2 to 4 week test activities at NAES Lakehurst. Therefore, this Section of the Supplemental EA/OEA does not address the baseline for demographics, housing, and schools. It focuses only on environmental justice, children demographics, economic, and infrastructure baselines.

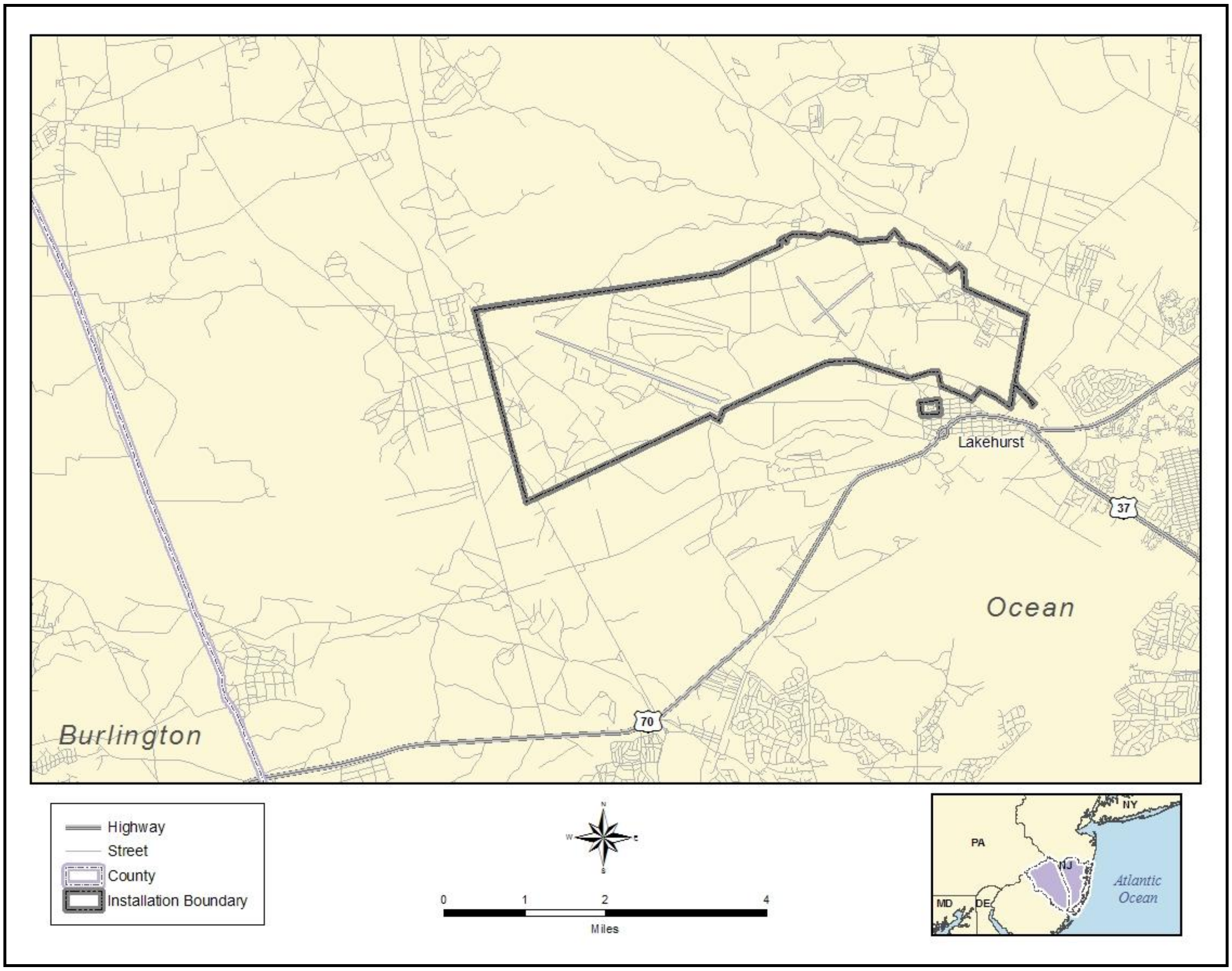
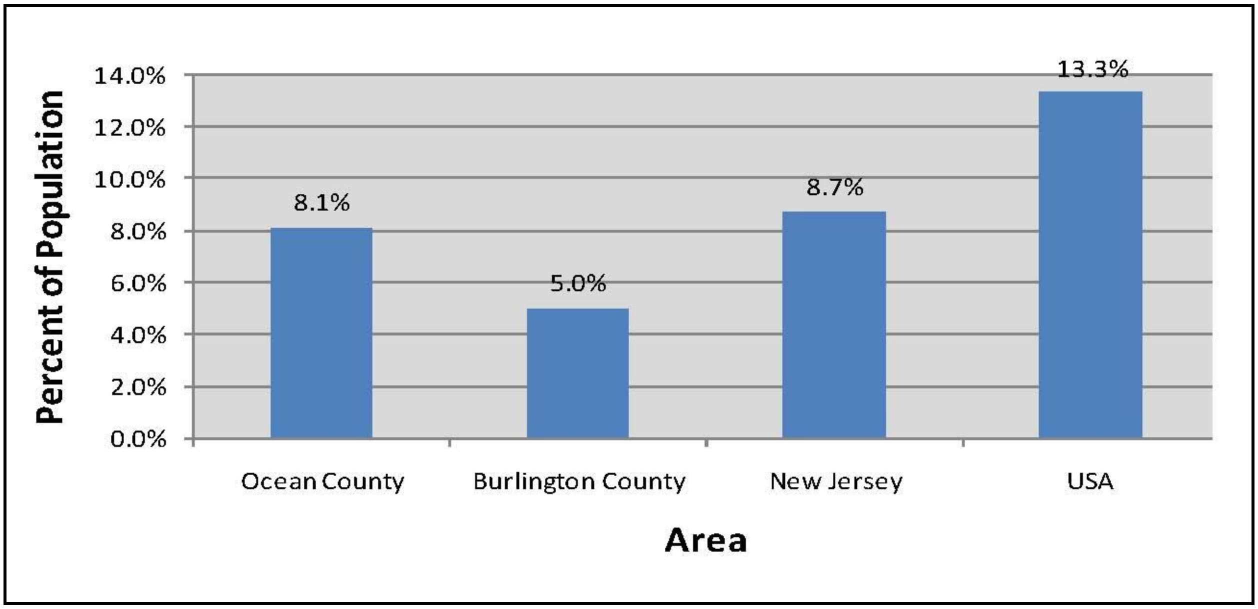


Figure 7.6.1-1: NAES Lakehurst Socioeconomic Study Area

7.6.1.1 Environmental Justice and Children Demographics

The poverty rate in the two counties of the NAES Lakehurst socioeconomic study area are lower (5.0% for Burlington County and 8.1% for Ocean County) than the New Jersey statewide estimate (8.7%) and the U.S. estimate (13.3%), 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.

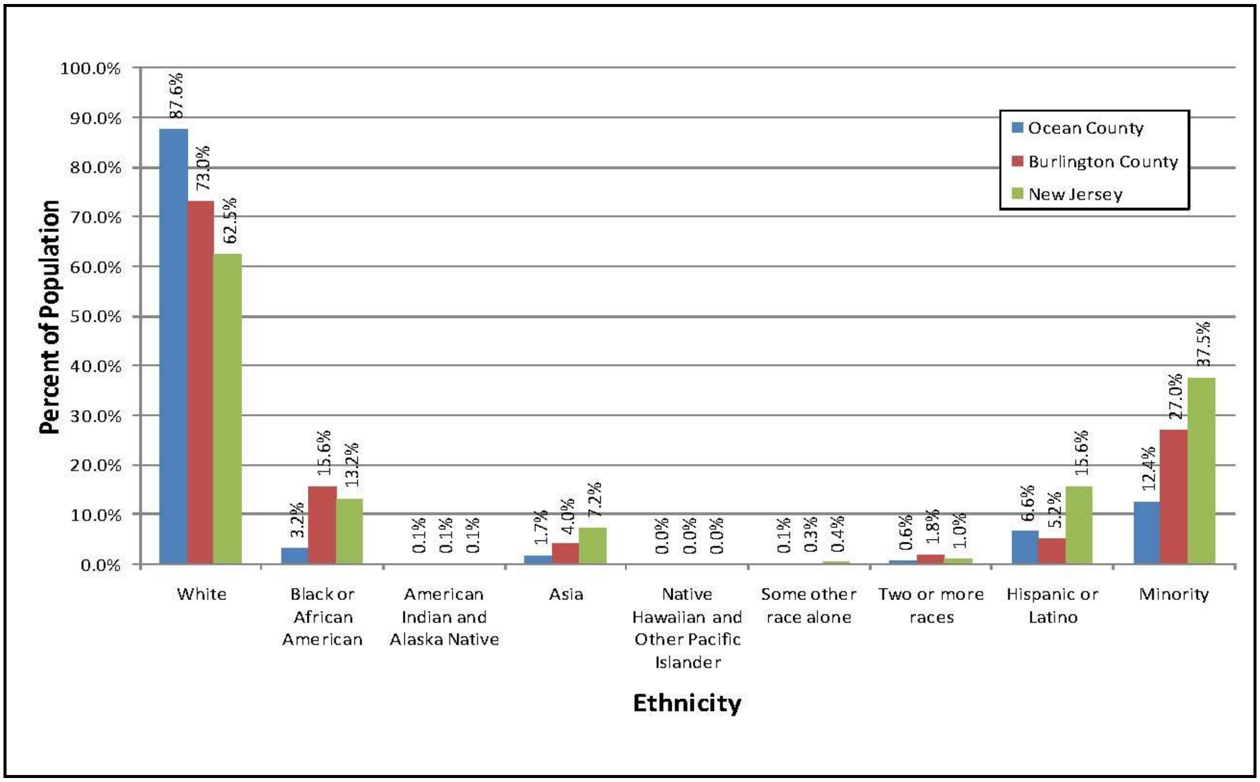


Source: U.S. Census Bureau 2005-2007 3-year estimate.

Figure 7.6.1.1-2: Poverty Rates for NAES Lakehurst Socioeconomic Study Area

Population ethnicity in the NAES Lakehurst area is summarized in Figure 7.6.1.1-3 and is comprised of predominantly White populations (81.1%). The remaining population distribution in the area is Black or African American (8.7%), Hispanic or Latino (6.0%), Asian (2.7%), two or more races (1.2%), some other race (0.2%), and American Indian or Native Alaskan (0.1%). The ethnic representation in the area resembles race distribution for New Jersey. The overall total minority populations in the two-county NAES Lakehurst socioeconomic study area (12.4% for Ocean County and 27.0% for Burlington County) are lower than New Jersey (37.5%).[236] These levels are well below the CEQ threshold of 50% for minority populations, which is used to identify environmental justice populations.

236 Census Bureau 2009

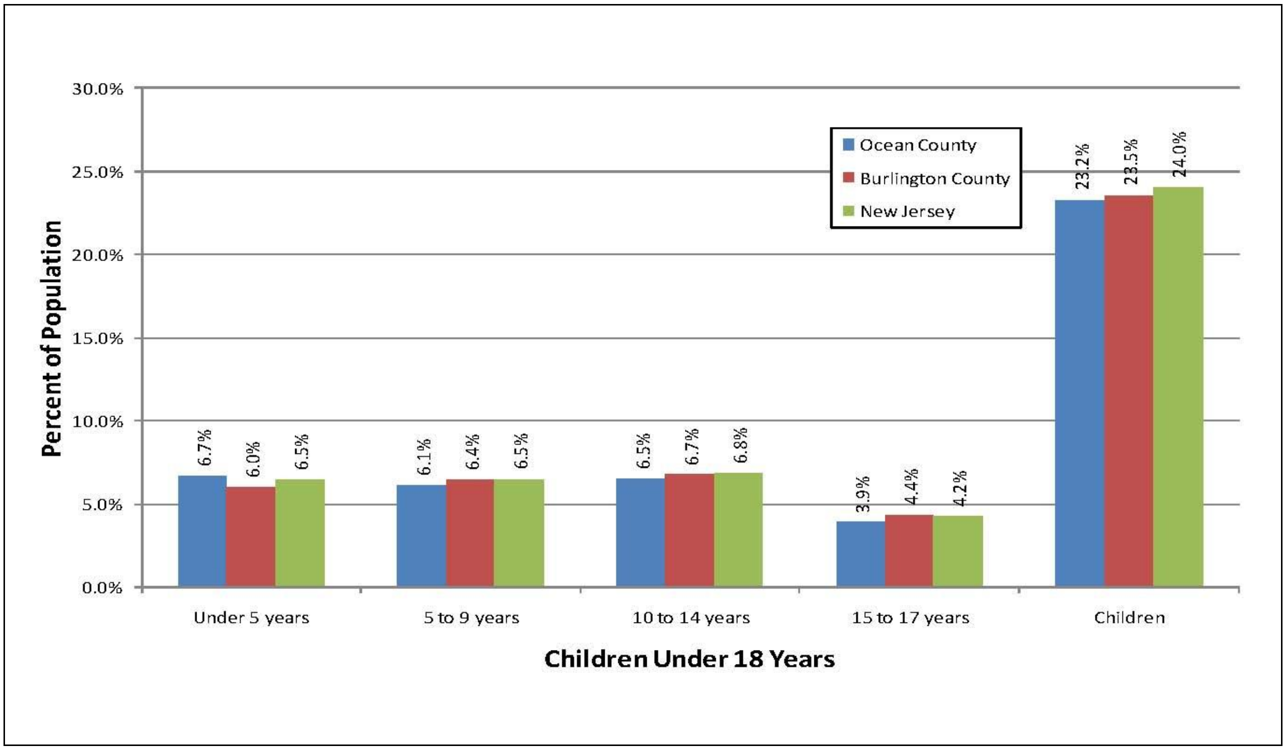


Source: U.S. Census Bureau, 2005-2007 3-year estimate.

Figure 7.6.1.1-3: Ethnicity for NAES Lakehurst Socioeconomic Study Area

Children populations for the NAES Lakehurst socioeconomic study area are summarized in Figure 7.6.1.1-4. The two-county area shows a relatively even distribution of children under 5 years of age to 14 years and a smaller population of children 15 to 17 years of age. The largest group of children is 10 to 14 years old (6.6%) and the remaining distribution is children under 5 years (6.4%), 5 to 9 years old (6.3%), and 15 to 17 years old (4.1%). The two-county child population is similar to the New Jersey statewide average of 24.0%.[237]

237 Census Bureau 2009



Source: U.S. Census Bureau, 2005-2007 3-year estimate.

Figure 7.6.1.1-4: Children Demographics for NAES Lakehurst Socioeconomic Study Area

In addition to the two-county NAES Lakehurst socioeconomic study area, more localized year 2000 U.S. Census tract/block areas poverty rates, ethnicity, and children demographics presented in the 2007 EA/OEA were used to support both the environmental justice and children population analyses, as illustrated in Figure 7.6.1.1-5.

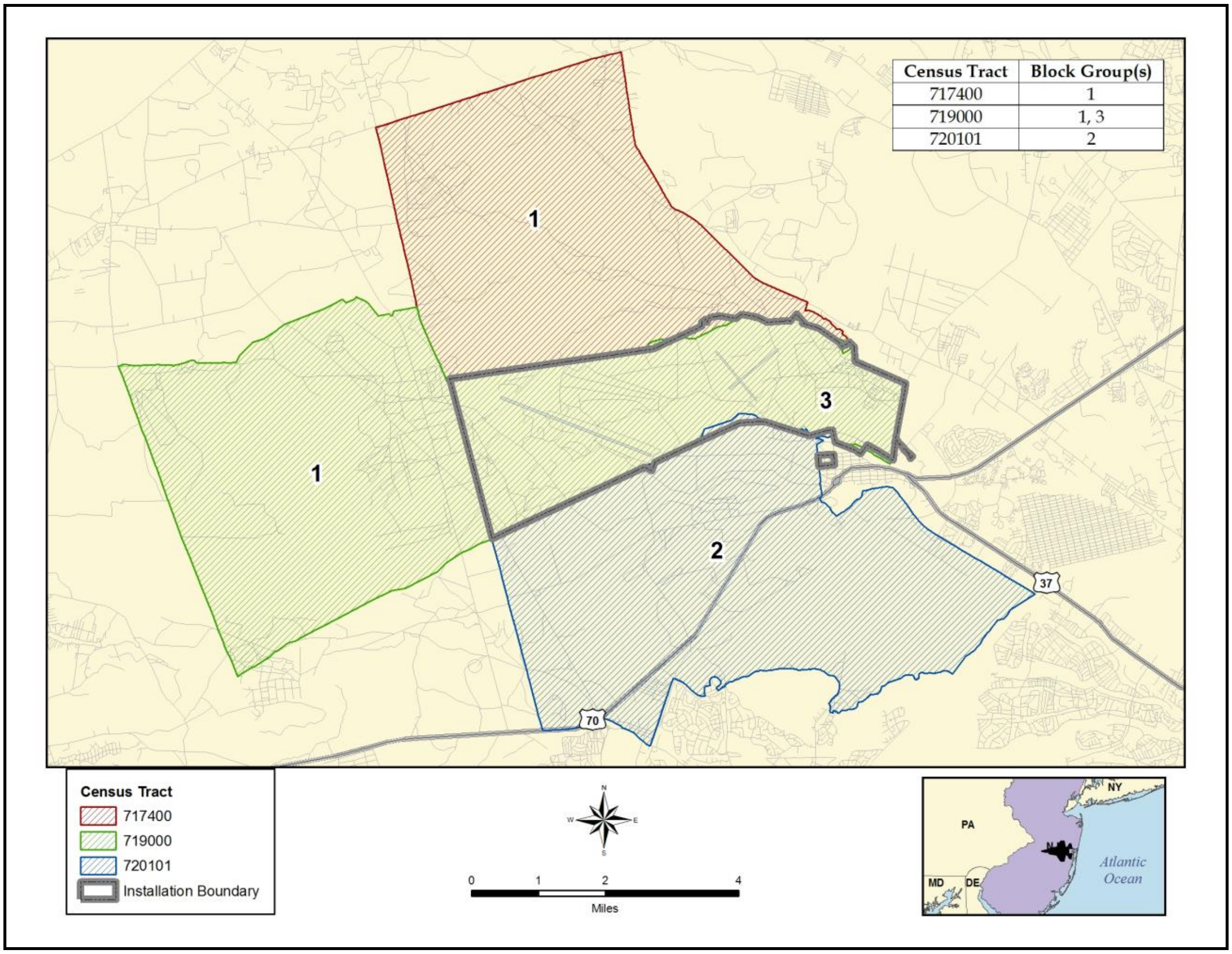


Figure 7.6.1.1-5: Environmental Justice Block Groups in Census Tracts for the NAES Lakehurst Socioeconomic Study Area

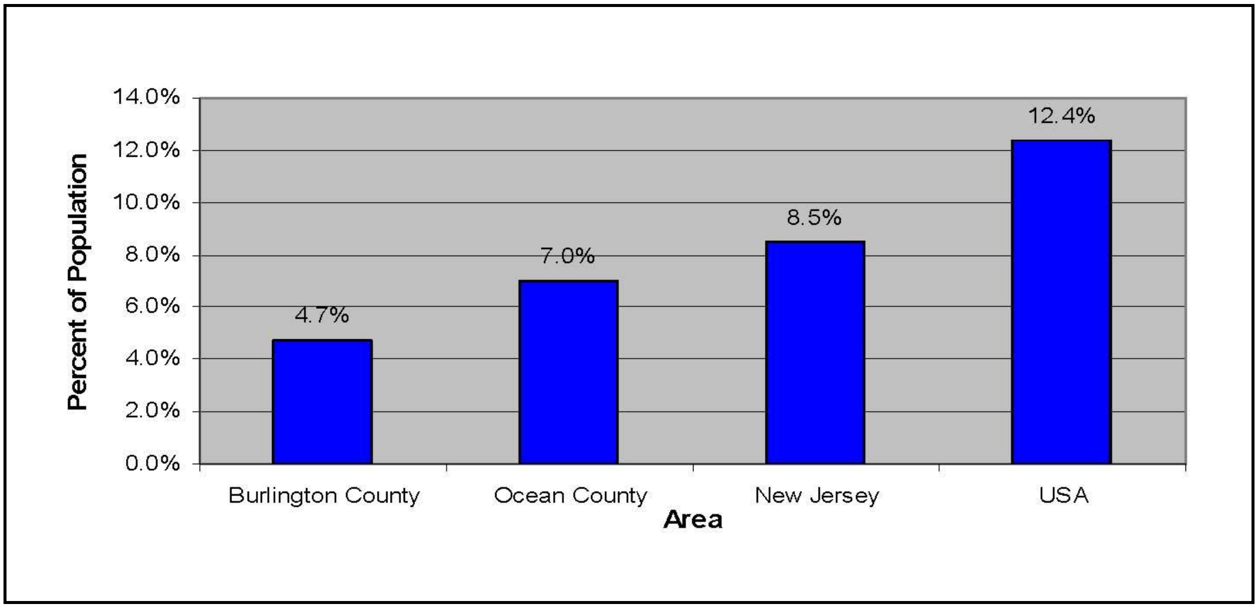
Poverty rates by the block groups in census tracts for the vicinity of NAES Lakehurst fall below the set threshold of 25% (See Section 3.4 of this Supplemental EA/OEA) and are summarized in Table 7.6.1.1-1, based on the 2007 EA/OEA.

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			***2,787***	***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 7.6.1.1-6, based on the 2007 EA/OEA. Poverty rates are well below the set threshold of 25% used to identify environmental justice populations.



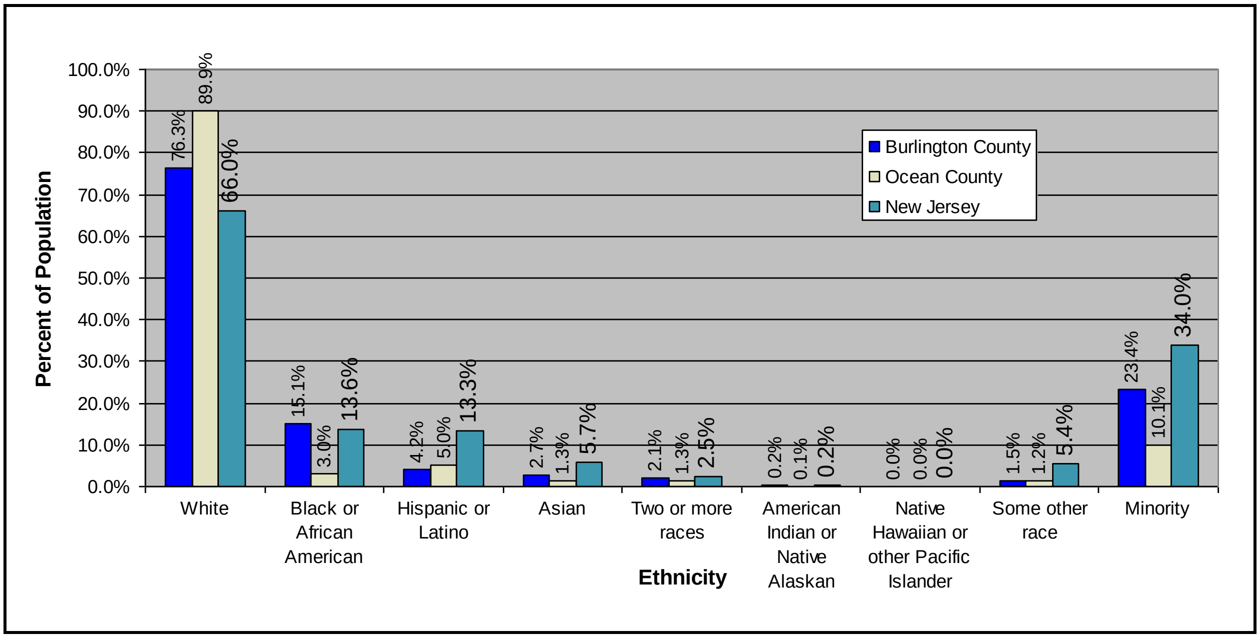
Source: U.S. Census Bureau 2000.

Figure 7.6.1.1-6: Poverty Rates for NAES Lakehurst Socioeconomic Study Area (2000)

Population ethnicity in the NAES Lakehurst area is summarized in Figure 7.6.1.1-7 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%), and Native Hawaiian or other Pacific Islander (0.1%). The ethnic representation in the area resembles race distribution for the greater Burlington and Ocean Counties and New Jersey.

The overall total minority population 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%).[238] 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 based on the 2007 EA/OEA.

238 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.
Note: In some cases, total do not add up to 100% due to rounding of the census estimated data.

Figure 7.6.1.1-7: Ethnicity for NAES Lakehurst Socioeconomic Study Area

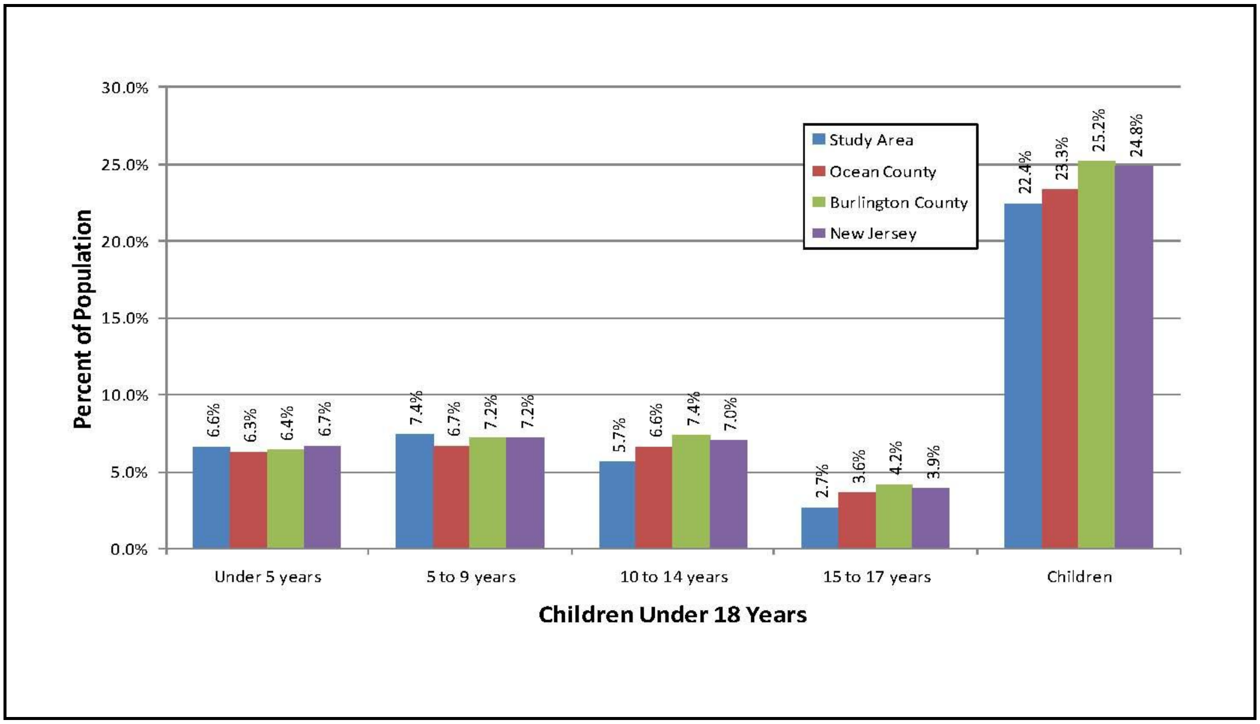
Table 7.6.1.1-2: Ethnicity by Block Groups in Census Tracts for NAES Lakehurst Socioeconomic Study Area

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.

Children populations in the NAES Lakehurst children demographic study area are summarized in Figure 7.6.1.2-8 based on 2000 census data. The study area children populations are similar for children under 5 years of age to 14 years followed by a smaller population of children 15 to 17 years of age. The largest group of children is 5 to 9 years old (7.4%) and the remaining distribution is children under 5 years (6.6%), 10 to 14 years old (5.7%) and 15 to 17 years old (2.7%).

Total population of children for the study area block groups of the census tracts (22.4%) is lower than surrounding counties and the State of New Jersey (24.8%). Children populations by block groups are summarized in Table 5.6.1.2-3. Block group 1 of census tract 717400 has a higher total population of children than the surrounding counties and the State of New Jersey. The other block groups have a total population of children similar to or lower than the surrounding counties and statewide.



Source: U.S. Census Bureau, 2000.

Figure 7.6.1.1-8: Children Demographics for the NAES Lakehurst Socioeconomic Study Area

Table 7.6.1.1-3: Children Demographics by Block Group for the Children Population Census Tracts/Blocks Area within NAES Lakehurst Socioeconomic Study Area

County	Census Tract #	Block Group #	Under 5 Years	5 to 9 Years	10 to 14 Years	15 to 17 Years	Children
Ocean	717400	1	6.4%	10.0%	8.3%	3.3%	27.9%
Ocean	719000	1	N/A	N/A	N/A	N/A	N/A
Ocean	719000	3	10.8%	6.5%	4.9%	2.0%	24.2%
Ocean	720101	2	4.0%	4.8%	2.9%	2.4%	14.1%

Source: Census 2000, Summary File 1 - Detailed Table P12.

7.6.1.2 Economic Characteristics[239]

Based on the 2007 EA/OEA, NAES Lakehurst and its tenants contribute approximately $781.03 million to the economy in and outside New Jersey. Economic contributions were 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 remained in New Jersey. Economic contributions that remained 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.

239 Previte 2004

7.6.1.3 Infrastructure

Transportation[240]

Based on the 2007 EA/OEA, 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.

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.

As reflected in the 2007 EA/OEA, potential socioeconomic impacts for NAES Lakehurst were evaluated using the EIFS model. This input-output model was developed specifically to analyze community impacts of base activities by evaluating the significance on four elements of a local economy: business volume, employment, personal income, and population.[241] Projected changes that fall outside of these accepted boundaries (referred to as established significance criteria ranges) are considered significant. The analysis from the 2007 EA/OEA showed no exceedance of significance criteria ranges. Because there were no significant impacts, the F-35 Joint Program Office decided not to conduct another analysis with the EIFS model. Potential impacts would be the same as in the 2007 EA/OEA, which is presented in the following paragraphs.

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 was based on discussions with the JSF ITF 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.[242]

Table 7.6.2-1: Proposed JSF DT Program 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.

240 Previte 2004
241 Bragdon, Katherine and Webster, Ron 2001
242 Gunther, W., 1992

Table 7.6.2-2: Forecasted Output from the EIFS Model for Proposed JSF DT Program 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 Program 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.

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 activities 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 Supplemental EA/OEA is predominantly comprised of RDT&E mission activities or vacant. Negligible impacts to environmental justice populations would be anticipated from the Proposed Action. Similarly, implementation of the proposed JSF DT at NAES Lakehurst would not result in disproportionately and adverse health or safety risks to children populations. Noise and air quality analysis has shown that no potentially significant impacts to any sensitive receptors (including hospitals, schools, and daycare facilities) where disproportionately large populations of children may be present would be expected to occur.

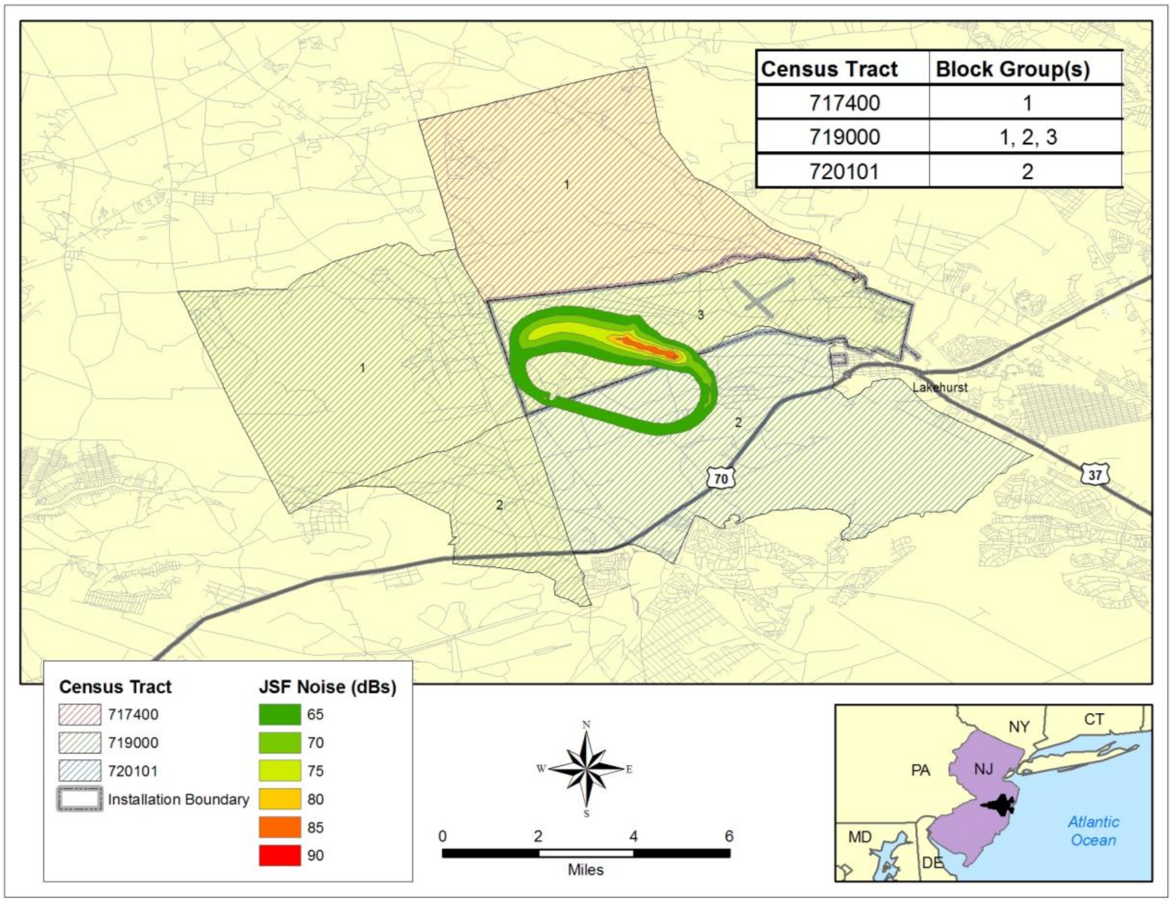


Figure 7.6.2-1: Proposed JSF DT Noise Contour to Census Tracts and Block Groups in the NAES Lakehurst Socioeconomic Study Area

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."[243]

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 was used so that all projects could 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 baseline environment (the as is condition).

243 40 CFR 1508.7

Table 7.7-1: On-Going and/or Future Actions at NAES Lakehurst

Actions	Time Period
C-17 Assault Landing Zone	On-Going
New Jersey Army National Guard Consolidated Logistics and Training Facility (CLTF)	On-Going
Army National Guard Aviation Consolidation	May 2010
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 Supplemental EA/OEA. These actions included 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 was anticipated.[244] No operational changes associated with these BRAC decisions were expected, so no cumulative significant negative impact would be expected.

For the above actions, associated EAs were used in support of determining potential cumulative impacts from the proposed JSF DT activities. 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) was 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 planned to establish habitat for these two birds in other areas of the base to offset the loss of grassland due to the construction of the LZ.[245]

- *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 was to biological habitat, wetlands, and a local traffic route. Minor, short-term impacts from vehicle noise and fugitive dust emissions were anticipated during construction of the CLTF, but no long-term impacts were expected. There were no airspace or aircraft noise issues associated with CLTF.[246]

- *Environmental Assessment for Relocation and Consolidation of the New Jersey Army National Guard (NJARNG) Army Aviation Support Facility (AASF)*–The NJARNG 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 would continue to operate fixed wing aircraft assets, including C-12 and C-23 aircraft, while the AASF #2 facilities at Picatinny Arsenal would be retained by the NJARNG for use as a Field Maintenance Shop to support ground vehicle maintenance operations. The proposed NJARNG consolidation was anticipated to achieve more efficient operation of the rotary wing aircraft, as well as bring supported units closer to their existing New Jersey training

2442005 DoD Recommendations for Defense Base Closure and Realignment Commission, Appendix C; BRAC 2005 Closure and Realignment Impacts by State
245EA C-17 Aircraft 2005
246New Jersey Army National Guard 2005

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.[247]

- *Environmental Assessment for the Electro-Magnetic Aircraft Launching System (EMALS) System Development and Demonstration Phase (SDD) at NAES Lakehurst*–This action involved 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.[248] Construction of this system was completed prior to the proposed JSF DT Program.

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.

Implementation of the proposed JSF DT activities at NAES Lakehurst would result in minimal cumulative impacts to air quality. The qualitative cumulative air quality analysis conducted for this Supplemental EA/OEA concluded proposed JSF DT Program 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 baseline 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 Program 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.

Programs that could result in additional aviation noise in the foreseeable future at NAES Lakehurst included basing of the C-17 aircraft, the relocation and consolidation of the NJARNG AASF, and EMALS SDD. Both the 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.[249] [250] Only the EMALS SDD would occur in the same location as the proposed JSF DT Program. 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.[251]

247 New Jersey Army National Guard 2005
248 NAVAIR 2003
249 New Jersey Army National Guard 2005
250 EA C-17 2005
251 NAVAIR 2003

Development of NAES Lakehurst 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 2009, before the proposed JSF DT Program. 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 Program, in addition to future programs, would not likely result in significant noise impacts in the vicinity of NAES Lakehurst.

Under either alternative, the proposed JSF DT Program would not produce any significant cumulative impacts to biological/natural resources. The East Coast Basing of the C-17 Aircraft EA analyzed the impacts of developing a LZ for the C-17 at NAES Lakehurst. Approximately 8 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 base, no significant impacts to biological/natural resources, including threatened and endangered species, would be anticipated from the C-17 actions. Similarly, construction associated with the EMALS occurred on or adjacent to existing airfield paving. The resulting loss of approximately 4 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 do not occur in the same location of NAES Lakehurst as the proposed JSF DT Program. 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 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 Program would not produce any significant impacts to socioeconomic resources. The temporary arrival of personnel supporting the proposed JSF DT Program, do have the potential to cumulatively impact the immediate area surrounding the base. The nature of the proposed JSF DT activities 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 Program 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 Program and baseline for NAES Lakehurst is not anticipated to significantly impact the surrounding communities. No regional cumulative socioeconomic impacts would be expected from the proposed action alternatives to include environmental justice or disproportionately large populations of children. No significant cumulative effect would be expected from the Proposed Action alternatives.

8.0 LM AERO

8.1 GENERAL INFORMATION

LM Aero is a Government-Owned, Contractor-Operated (GOCO) industrial facility contiguous with NAS 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.[252]

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 PEO of the F-35 Joint Program Office. 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 Ft Worth support a variety of aircraft tests, training, and operations. The STOVL facility, which would be used for the proposed JSF DT Program (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. When needed, the runways at NAS JRB will be used in support of the JSF DT Program.

252 Tarrant County 2004

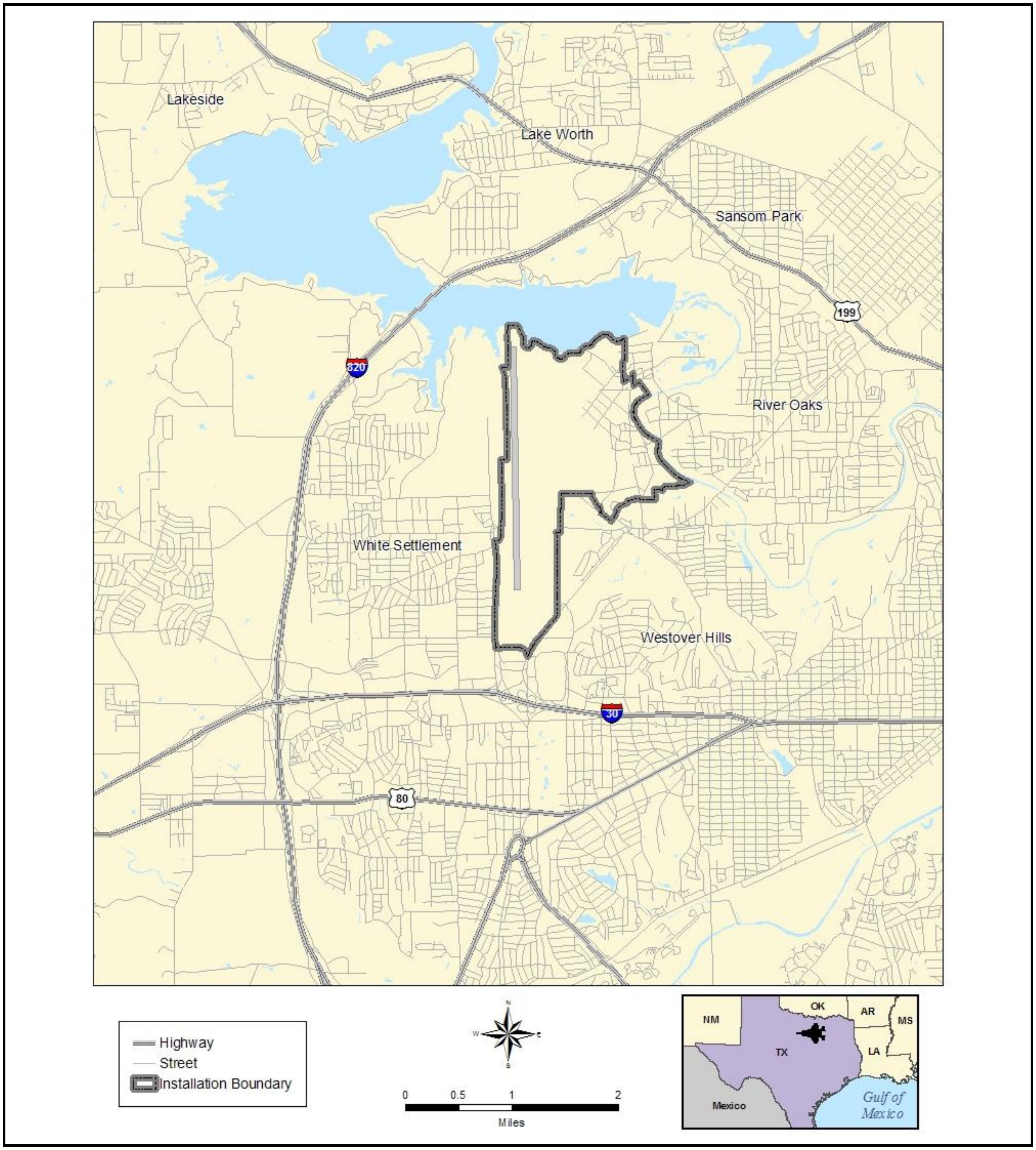


Figure 8.1-1: General Map of LM Aero

8.2 PROPOSED JSF DT PROGRAM AT LM AERO

LM Aero is used for the proposed CATB testing in Alternative One. For Alternative One, the overall proposed JSF DT Program test profile is 242 CATB flights (721 flight hours), as reflected in Table 8.2-1. Alternative Two would include implementing 10% of the overall STOVL tests planned under Alternative One at NAS Patuxent River. Table 8.2-2 reflects the proposed test activities for Alternative Two. Proposed test profiles remain unchanged from the profiles analyzed in the 2007 EA/OEA. Proposed test flights would use the NAS JRB Ft. Worth runway and all flights would be conducted in compliance with SOPs and air operation manuals of NAS JRB Ft. Worth and/or LM Aero flight procedures.

Table 8.2-1: Proposed JSF DT Program 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 Program, 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 Program 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 & Environment	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 Program, 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, which are the same as those in the 2007 EA/OEA. 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 Program 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. Some support equipment (such as floodlights, shipboard aircraft handler, portable duct heaters, and compressors) may change out from the above listed equipment in the table depending on test requirements.
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 8 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.[253]

The Dallas-Fort Worth area is classified as moderate nonattainment for the 8-hour O_3 NAAQS and in attainment for all other NAAQS.[254] Texas has no State-specific AAQS that 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 NAA 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 Rule 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 NAA). Table 8.3.1-1 also includes the regionally significant thresholds for the Dallas-Fort Worth NAA.

253 US Department of Commerce, National Oceanic and Atmospheric Administration, 2006
254 EPA 2005

Table 8.3.1-1: Tarrant County 2007 Attainment SIP Emissions Estimate

	Baseline Emission Levels tons/day (MT/day)		Regionally Significant Threshold[1] tons/year (MT/year)	
Source	**NO_x**	**VOC[255]**	**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 O_3 season running from 1 March to 31 October (245 days).

8.3.2 Emission Estimation Methodology

The emission estimates used to determine General Conformity Rule applicability were calculated for flight operations, aircraft test cell operations, and GSE identified for the proposed JSF DT Program at LM Aero. Emissions from refueling operations were also included as part of the Proposed Action analysis. No new employees would be required at the LM Aero facility to support the proposed JSF DT Program 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.*[256] For F-35 operations, emissions were calculated using emission indices for various throttle settings while the aircraft is operating below 3,000 feet AGL. The flight profiles from the noise analysis were used to develop the emission estimates. Fuel flow rates and emissions for idling, unsticks, engine run-up, and refueling modes on the ground were taken from the standard F-35B LTO cycle.

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 tests that would be conducted on the ground with the engines operating.[257, 258] 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 were based on the fuel usage rates or the hours of operation.[259 260 261]

255 TCEQ 2005
256 O'Brien 2002
257 Laureano 2005a
258 Ibid
259 EDMS, 2005
260 Ambrosino 1999
261 O'Brien 2002

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. The highest year annotated in this table represents the year most likely to produce the greatest estimated emissions. The difference in the highest emissions per test year for the various criteria pollutants is a function of the combination of different emission sources (e.g., aircraft, GSE, personal vehicles) and the operation of those sources. Often the difference in the highest year is slight. However, the mix of emission sources will cause emissions to be highest in one year for a given pollutant and in a different year another pollutant.

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	1.43 (1.30)	5.90 (5.35)	0.49 (0.44)	0.39 (0.36)	0.34 (0.31)
2	3.86 (3.50)	12.37 (11.22)	1.06 (0.96)	0.86 (0.78)	0.71 (0.64)
3	2.82 (2.56)	9.50 (8.62)	0.81 (0.73)	0.65 (0.59)	0.55 (0.50)
4	2.80 (2.54)	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)	9.10 (8.26)	0.76 (0.69)	0.60 (0.54)	0.54 (0.49)
7	0.27 (0.24)	1.30 (1.18)	0.11 (0.10)	0.08 (0.07)	0.08 (0.07)
Highest (Test Year 2)	3.86 (3.50)	12.37 (11.22)	1.06 (0.96)	0.86 (0.78)	0.71 (0.64)
Alternative Two					
1	1.43 (1.30)	5.90 (5.35)	0.49 (0.44)	0.39 (0.36)	0.34 (0.31)
2	4.10 (3.72)	12.74 (11.56)	1.07 (0.97)	0.89 (0.81)	0.71 (0.65)
3	3.03 (2.75)	9.83 (8.91)	0.82 (0.74)	0.68 (0.62)	0.55 (0.50)
4	3.32 (3.02)	10.33 (9.37)	0.82 (0.75)	0.73 (0.66)	0.55 (0.50)
5	2.20 (1.99)	7.41 (6.72)	0.58 (0.53)	0.52 (0.47)	0.39 (0.36)
6	2.43 (2.20)	9.87 (8.96)	0.77 (0.70)	0.67 (0.61)	0.54 (0.49)
7	0.61 (0.55)	1.84 (1.67)	0.12 (0.11)	0.13 (0.12)	0.08 (0.08)
Highest (Test Year 2)	4.10 (3.72)	12.74 (11.56)	1.07 (0.97)	0.896 (0.81)	0.71 (0.65)

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: 1. See Appendix E.4 for additional details.
2. The highest year represents the year with the potential to produce the most emissions. The difference in the highest emissions per test year for the various criteria pollutants is a function of the combination of different emission sources (e.g., aircraft, GSE, personal vehicles) and the operation of those sources. Often the difference in the highest year is slight, however, the mix of emission sources will cause emissions to be highest in one year for a given pollutant and in a different year another pollutant.

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 of the Proposed Action would require a formal conformity determination, because projected emission levels would be below the applicable *de minimis* thresholds. Furthermore, since the annual project-related emissions do not make up 10% or more of the NAAs total emissions budget, the emissions from the implementation of either alternatives are not anticipated to be regionally significant.

Table 8.3.3-2: Proposed JSF DT Program 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	12.74	100	7,862
VOC	1.07	100	16,675

tpy = tons per year
NO_x = Nitrogen Oxides, VOC = Volatile Organic Compound
Hydrocarbon emissions are assumed to be VOCs.
Note: 1. Test Year 2 represents the year with the greatest potential to produce the most emissions from the Proposed Action.

GHG emissions (CO_2, CH_4, N_2O) were also estimated for the proposed aircraft operations at LM Aero, based on the total quantity of fuel combusted and applying emission factors specific to the fuel burned diesel or gasoline) from generally accepted GHG protocols. The protocols do not include an emission factor for JP-8; therefore, the emission factor for Jet A/A-1 was used. The GHG emissions were converted to a CO_2e basis using the GWP of each gas.

The CO_2e generated from the Proposed Action for Alternatives One and Two are shown in Table 8.3.3-3. Approximately 13,578 MT of CO_2e and 14,410 MT of CO_2e would be generated by sources and operations comprising Alternatives One and Two respectively. There is no requirement under the General Conformity Rule to consider GHG emissions. However, comparing the results of the analysis for LM Aero to the 2009 total U.S. GHG emissions of 6,633.20 million MT CO_2e show that both alternatives of the Proposed Action would contribute less than a 0.001% increase of the total 2009 U.S. The Proposed Action, as such, would not be a significant source of GHG emissions. Section 3.1.5 provides a high level overview of DoD's and the Service's energy activities (e.g., alternative fuels, reduce energy consumption, etc.), which have an added benefit of reducing greenhouse gas emissions.

Table 8.3.3-3: Estimated GHG Emissions for the Proposed JSF DT Program at LM Aero

Test Year	Alternative 1 CO_2e (MT)	Alternative 2 CO_2e (MT)
Year 1	299	299
Year 2	4,657	4,661
Year 3	3,464	3,550
Year 4	3,007	3,225
Year 5	1,966	2,143
Year 6	479	683
Year 7	5	148
Total	13,877	14,709
Highest (Test Year 2)	4,657	4,661

8.4 NOISE AT LM AERO

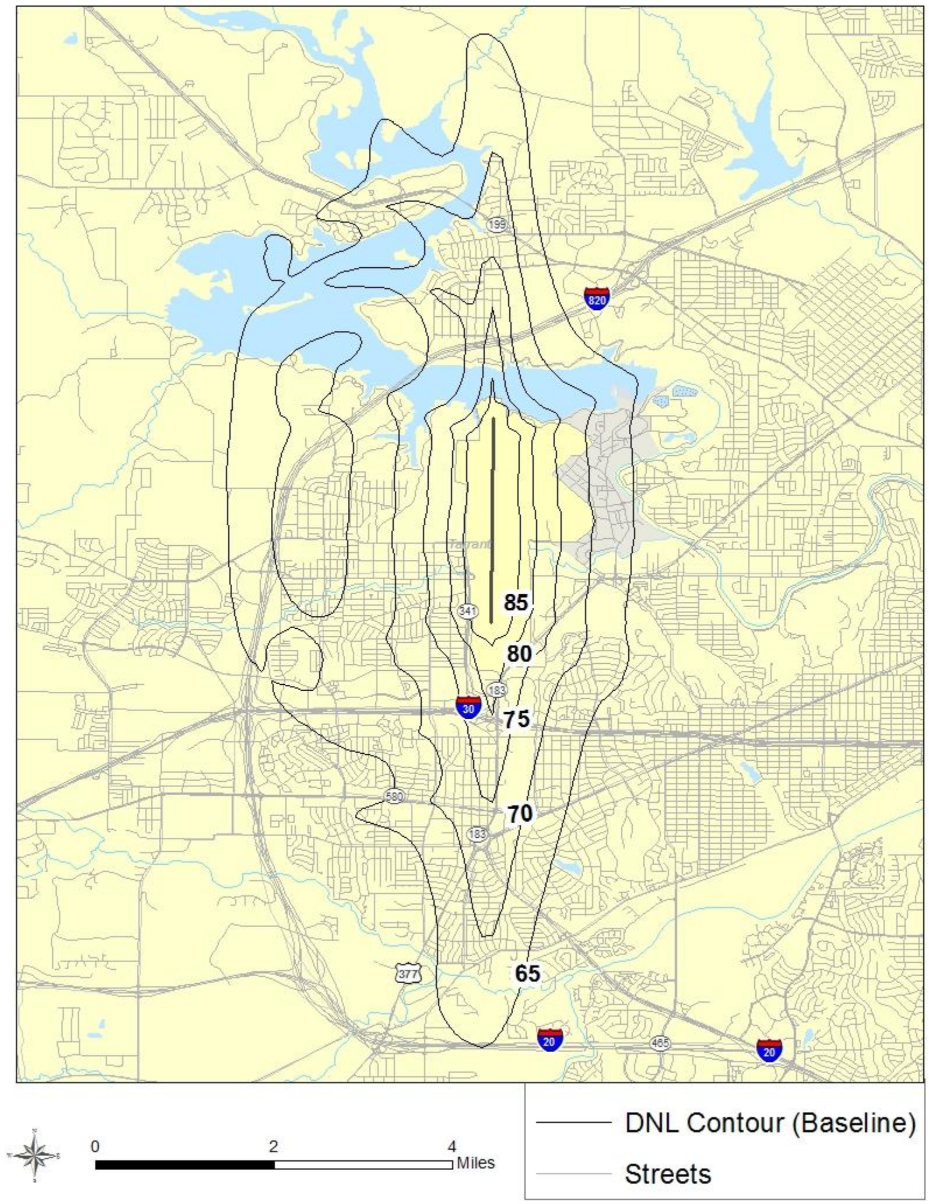
8.4.1 Affected Environment

Additional details regarding noise at LM Aero can be found in the *Wyle Report WR 04-18 Aircraft Study for Naval Air Station Joint Reserve Base Fort Worth, Fort Worth TX, August 2004*, which was presented in the March 2008 Joint Land Use Study Report entitled *Defending the Sound of Freedom*" and 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 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 Ft. Worth 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 75% of total flight operations occurring at NAS JRB Ft. Worth are from F-16 and F-18 aircraft.[262]

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 32,700 flight operations per year.[263] Figure 8.4.1-1 illustrates the 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 baseline DNL noise contours. There are approximately 1,720 acres of base property within the 65 dB and greater DNL noise contours. The total 65 dB and greater DNL noise contours encompass approximately 14,670 acres off-base. Appendix F.5 contains additional details on the noise modeling and analysis conducted for LM Aero.

262 LM Aero 2002
263 Ibid



Source: LM Aero NOISEMAP Model Outputs, Wyle Labs (March 2004) and Booz Allen Hamilton (December 2011)

Figure 8.4.1-1: Baseline DNL Noise Contours for LM Aero

Table 8.4.1-1: Acres within the Baseline DNL Noise Contours at LM Aero

DNL Contour Bands	Area Acres (On-Base)	Area Acres (Off-Base)
65–70 dB	280	9,260
70–75 dB	300	3,310
75–80 dB	230	1,520
80–85 dB	320	390
85+ dB	590	190
65 dB and greater (Total)	***1,720***	***14,670***

Source: LM Aero NOISEMAP Model Outputs, Wyle Labs (March 2004) and Booz Allen Hamilton (December 2011).

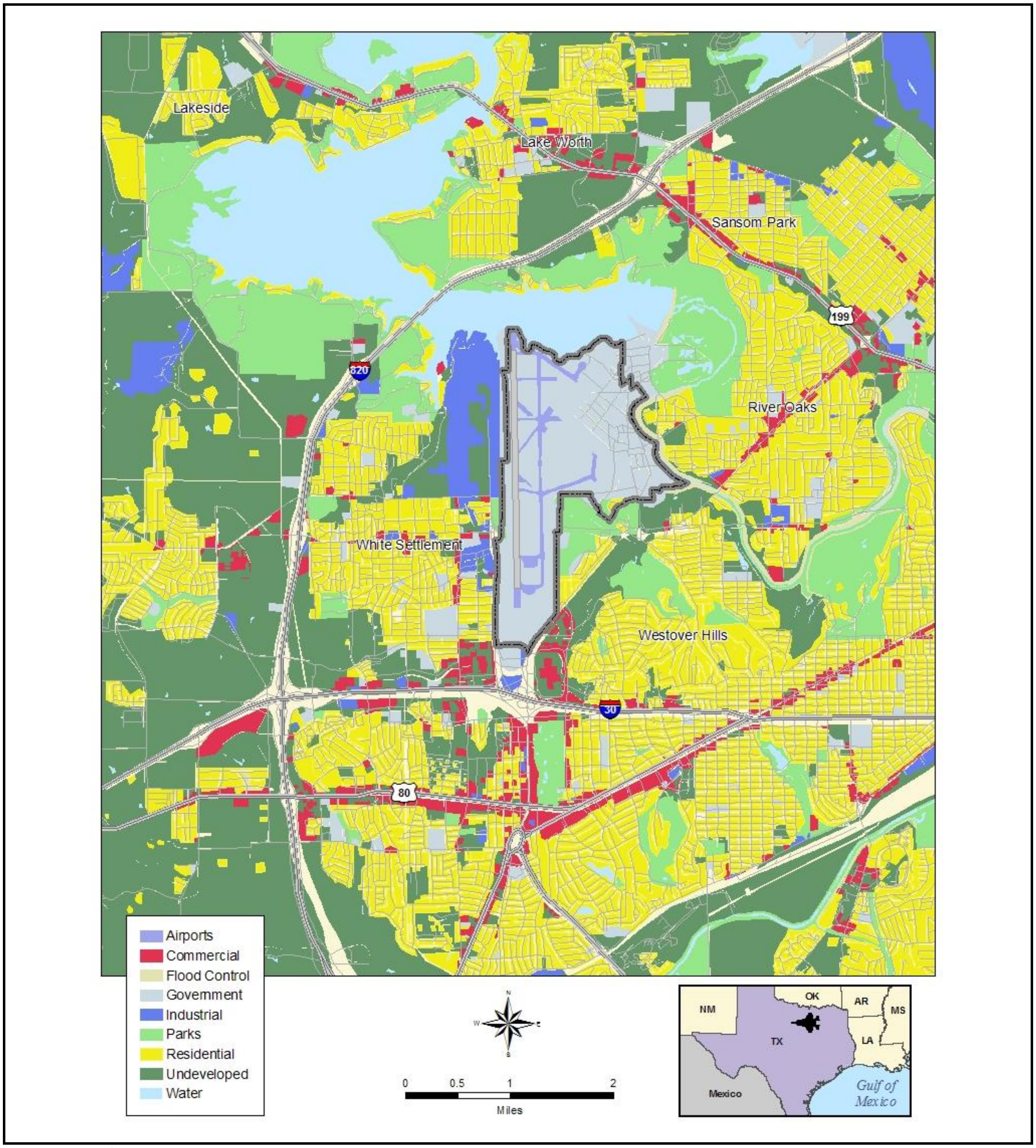
Analysis of aerial photographs was used to determine the presence of incompatible land uses and populations affected by the LM Aero DNL noise contours. Due to LM Aero's proximity to the highly developed areas of Ft. Worth, land use maps were obtained from the city to provide increased accuracy in the determination of land uses affected by the baseline noise contours. Figure 8.4.1-2 illustrates the 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 baseline noise: 3,270 are acres of residential development, 720 acres of commercial development, and 740 acres of industrial development.

Table 8.4.1-2: LM Aero Affected Land Uses (On- and Off- Base)

Land Use Type	DNL Contour Bands					
	65 dB	**70 dB**	**75 dB**	**80 dB**	**85 dB**	**65+ dB**
Commercial	330	280	100	10	<1	720
Government	460	370	270	300	440	1,840
Industrial	210	50	270	130	80	740
Infrastructure	1,470	590	310	70	30	2,470
Parks	1,240	410	120	20	20	1,810
Residential	2,170	810	260	30	<1	3,270
Undeveloped	2,060	520	110	50	~1	2,740
Water	1,570	560	150	70	~5	2,350
Other	20	20	10	30	190	260
65 dB and greater (Total)	**9,530**	**3,610**	**1,600**	**710**	**770**	**16,200**

Source: LM Aero NOISEMAP Model Outputs, Wyle Labs (March 2004) and Booz Allen Hamilton (December 2011).



Source: City of Ft. Worth Planning Department, 2004.

Figure 8.4.1-2: Land Uses Around LM Aero

Table 8.4.1-3 presents the housing and populations affected by the baseline noise contour. A count of residential housing units was conducted to determine the population exposure to the baseline noise contour at LM Aero. Residential housing units affected by the 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.[264]

264 City of Fort Worth Census 2000

Table 8.4.1-3: Housing and Populations within the 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	10	11,628	300	28,534
70–75 dB	22	3,218	84	8516
75–80 dB	43	666	145	1,864
80–85 dB	0	71	0	186
85+ dB	0	0	0	0
65 dB and greater (Total)	***75***	***15,583***	***529***	***39,100***

Source: LM Aero NOISEMAP Model Outputs, Wyle Labs (March 2004) and Booz Allen Hamilton (December 2011).
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 baseline levels. Contour lines representing average annual noise conditions for aircraft operations were generated for 65, 70, 75, 80, and 85 dB DNL.

The Proposed Action was modeled for the largest predicted year of activity (Test Years 2 and 4). The maximum test year at LM Aero for the proposed CATB activities is planned for Test Year 2, while the maximum year for proposed F-35 testing is planned for Test Year 3. Table F.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. This composite was added to the baseline Fleet mix modeled for the proposed JSF DT activities. 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 F.8.4.2-2 is a breakdown of Alternative Two, proposed STOVL hover operations at 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, while the remaining 3% would be conducted at Edwards AFB. Proposed ground-based tests at LM Aero would be comprised of propulsion and performance related STOVL test activities.

Table 8.4.2-1: Maximum Proposed JSF DT Program at LM Aero

Test Year	Test Activity/Description	No. F35 Flights	Support Aircraft Type	No. Support Aircraft Flights	Total No. Flights
2/3	CATB Alternative Two: STOVL FQ, Performance, Propulsion, & Environment	11	CATB Boeing 737, Business Jet	82	93

Note: Represents Composite Test Year 2 CATB test schedule and Test Year 3 F-35 DT at LM Aero.

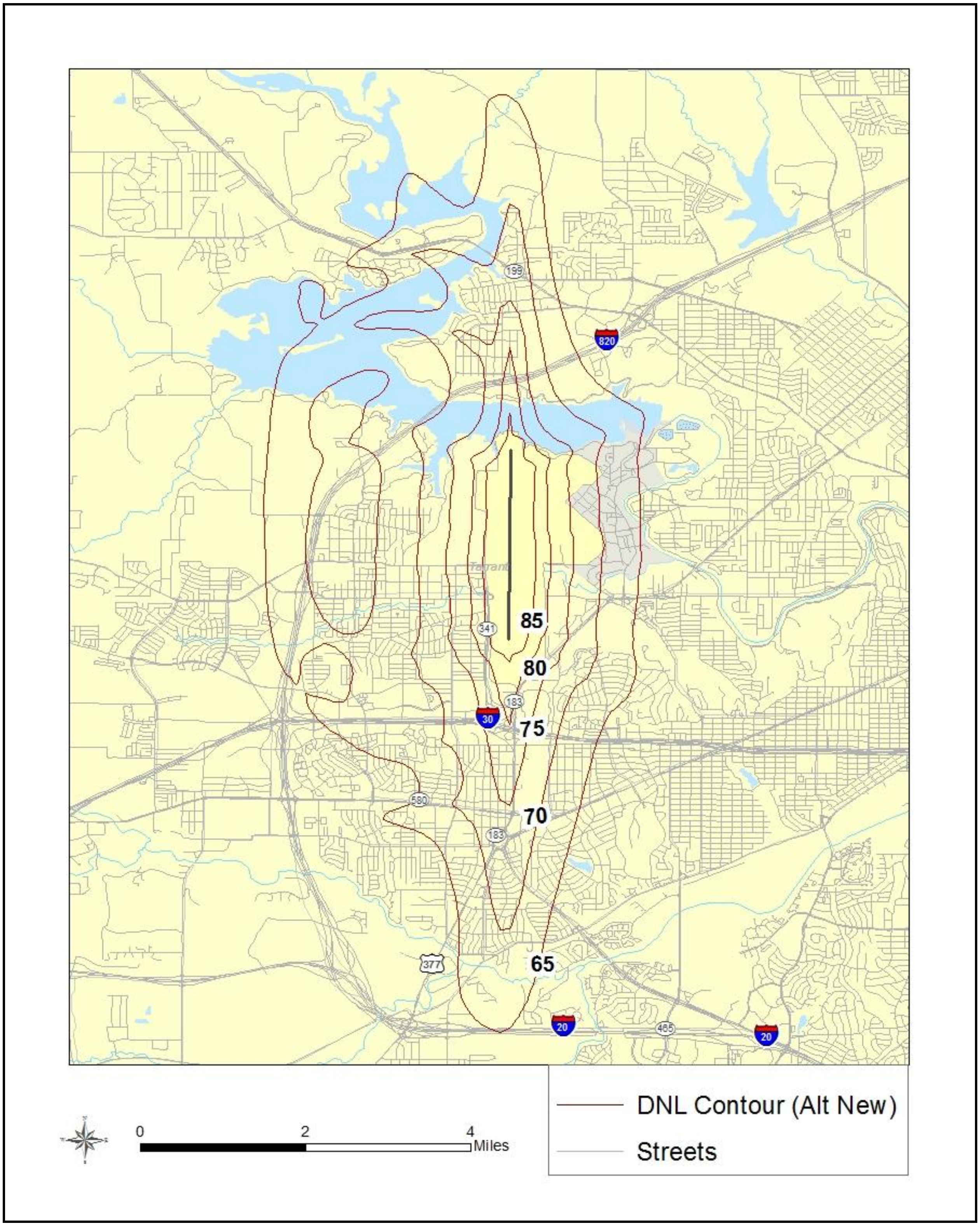
Table 8.4.2-2: Proposed STOVL Test Events at LM Aero

Test Event	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 Two (Proposed Action) moved from NAS Patuxent River.

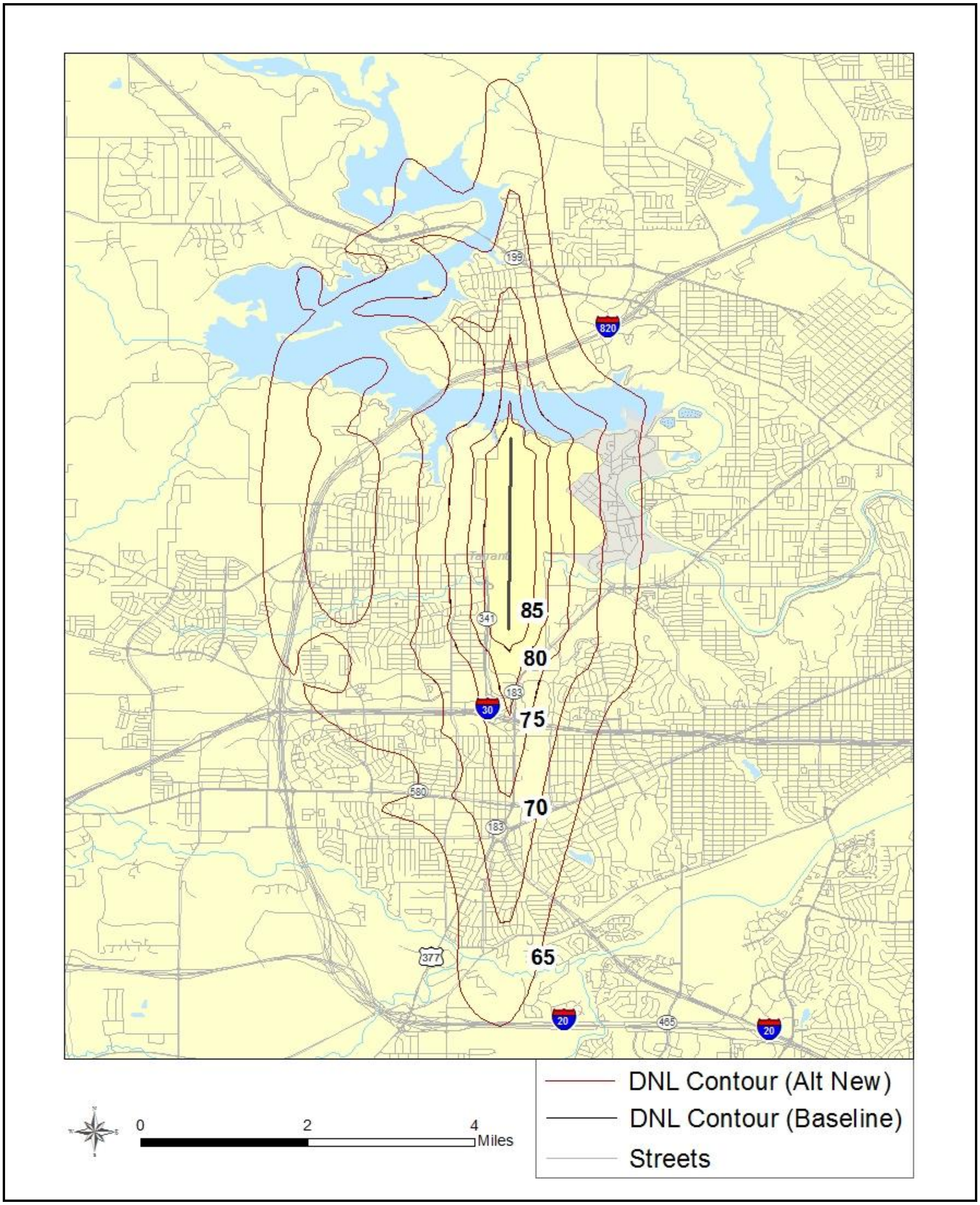
Since NOISEMAP does not have the ability to model VTOL operations, adjustments were required to best simulate such an activity. In the case of LM Aero, VTOL operations were modeled as very slow (~10 kts), with steep departures (150 feet AGL going four feet down track) and arrivals. This was performed 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 baselines.

Figure 8.4.2-1 illustrates the noise contours for the Proposed Action alternatives. The comparison between the baseline 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.



Source: LM Aero NOISEMAP Model Outputs, Wyle Labs (March 2004) and Booz Allen Hamilton (December 2011)
Note: This is reflective of Alternative Two.

Figure 8.4.2-1: DNL Noise Contours with the Proposed JSF DT Program at LM Aero



Source: LM Aero NOISEMAP Model Outputs, Wyle Labs (March 2004) and Booz Allen Hamilton (December 2011).
Note: This is reflective of Alternative Two.

Figure 8.4.2-2: Baseline and Proposed JSF DT Program 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 baseline DNL noise contours at LM Aero. As a result of the Proposed Action, there would be no expected changes to either on- or off-base contours or acreage counts. All acreage counts for the Proposed Action would equal those outlined in Tables 8.4.1-1 and 8.4.1-2.

Table 8.4.2-3: Acres within the Baseline and Proposed JSF DNL Noise Contours at LM Aero

DNL Contour Bands	Area Acres (On-Base)		Area Acres (Off-Base)		Acreage Change	
	Baseline	Proposed JSF DT	Baseline	Proposed JSF DT	On-Base	Off-Base
65–70 dB	280	280	9,260	9,260	0	0
70–75 dB	300	300	3,310	3,310	0	0
75–80 dB	230	230	1,520	1,520	0	0
80–85 dB	320	320	390	390	0	0
85+ dB	590	590	190	190	0	0
65 dB and greater (Total)	***1,720***	***1,720***	***14,670***	***14,670***	***0***	***0***

Source: LM Aero NOISEMAP Model Outputs, Wyle Labs (March 2004) and Booz Allen Hamilton (December 2011).
Note: This is reflective of Alternative Two.

Since there is no perceptible increase to the noise contours based on the Proposed Action, Tables 8.4.1-1 and 8.4.1-2 present the number of acres and acres by land use types that would be within the noise contours associated with Proposed Action. There would be no change to acreage counts under the Proposed Action as reflected in Table 8.2.4-2. Acres of residential development lands would not increase. No noise impacts would be expected since any specific increases over the residential land use would be less than 1.5 dB. Acres of industrial lands would remain unchanged.

As presented in Table 8.4.2-5, there would be no increase in noise to residential areas and populations. Housing and population counts would not change due to the Proposed Action. 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 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 Program at LM Aero

Land Use Type	Baseline DNL Contour Bands					
	65 dB	**70 dB**	**75 dB**	**80 dB**	**85 dB**	**65+ dB**
Commercial	330	280	100	10	<1	720
Government	460	370	270	300	440	1,840
Industrial	210	50	270	130	80	740
Infrastructure	1,470	590	310	70	30	2,470
Parks	1,240	410	120	20	20	1,810
Residential	2,170	810	260	30	<1	3,270
Undeveloped	2,060	520	110	50	~1	2,740
Water	1,570	560	150	70	~5	2,350
Other	20	20	10	30	190	260
65 dB and greater (Total)	**9,530**	**3,610**	**1,600**	**710**	**770**	**16,200**
Land Use Type	**With Proposed JSF DT DNL Contour Bands**					
	65 dB	**70 dB**	**75 dB**	**80 dB**	**85 dB**	**65+ dB**
Commercial	330	280	100	10	<1	720
Government	460	370	270	300	440	1,840
Industrial	210	50	270	130	80	740
Infrastructure	1,470	590	310	70	30	2,470
Parks	1,240	410	120	20	20	1,810
Residential	2,170	810	260	30	<1	3,270
Undeveloped	2,060	520	110	50	~1	2,740
Water	1,570	560	150	70	~5	2,350
Other	20	20	10	30	190	260
65 dB and greater (Total)	**9,530**	**3,610**	**1,600**	**710**	**770**	**16,200**
Land Use Type	**Change**					
	65 dB	**70 dB**	**75 dB**	**80 dB**	**85 dB**	**65+ dB**
Commercial	0	0	0	0	0	0
Government	0	0	0	0	0	0
Industrial	0	0	0	0	0	0
Infrastructure	0	0	0	0	0	10
Parks	0	0	0	0	0	10
Residential	0	0	0	0	0	10
Undeveloped	0	0	0	0	0	10
Water	0	0	0	0	0	-20
Other						
65 dB and greater (Total)	**0**	**0**	**0**	**0**	**0**	**0**

Source: LM Aero NOISEMAP Model Outputs, Wyle Labs (March 2004) and Booz Allen Hamilton (December 2011).

Table 8.4.2-5: Housing and Populations Potentially Affected by the Proposed JSF DT Program at LM Aero

DNL Contour Bands	Estimated Housing Baseline		Estimated Housing Proposed JSF DT	
	On-Base	Off-Base	On-Base	Off-Base
65–70 dB	10	11,628	10	11,628
70–75 dB	22	3,218	22	3,218
75–80 dB	43	666	43	666
80–85 dB	0	71	0	71
85+ dB	0	0	0	0
65 dB and greater (Total)	***75***	***15,583***	***75***	***15,583***
DNL Contour Bands	**Estimated Population Baseline**		**Estimated Population Proposed JSF DT**	
	On-Base	Off-Base	On-Base	Off-Base
65–70 dB	300	28,534	300	28,534
70–75 dB	84	8516	84	8,516
75–80 dB	145	1,864	145	1,864
80–85 dB	0	186	0	186
85+ dB	0	0	0	0
65 dB and greater (Total)	***529***	***39,100***	***529***	***39,100***

Source: LM Aero NOISEMAP Model Outputs, Wyle Labs (March 2004) and Booz Allen Hamilton (December 2011).
Notes: Housing and population rounded to nearest tenth
Assumes U.S. Census 2000, 2.67 persons as average housing density.
This is reflective of Alternative Two.

Table 8.4.2-6 reflects the results of assessing potential impacts to noise sensitive receptors (e.g., residences, schools, hospitals) in the vicinity of LM Aero, based on the analysis in the 2007 JSF EA. 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 environment. The data in the 2007 JSF EA was used because the data points in the Wyle Report of 2004 for NAS JRB Fort Worth were numeric with no descriptive information.

Given there is little to no change between the baseline and Proposed Action noise contours and no changes in acres or housing and populations potentially affected, the conclusions of the 2007 JSF EA remain the same. There would be no increase of 1.5 dB or higher at any of the non-residential noise sensitive receptors identified below in Table 8.4.2-6. Therefore, no significant noise impacts would be anticipated from conduct of the Proposed Action at LM Aero.

Table 8.4.2-6: LM Aero Comparison Non-Residential Noise Sensitive Receptors

Name	Type	Baseline (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	65.6	0.0
Carlson School	School	39.7	39.8	0.1
Castlebury School	School	49.7	49.7	0.0
Central School	School	72.5	72.5	0.0
Chapin School	School	52.9	53.0	0.1
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	41.7	0.1
Crestwood School	School	39.2	39.3	0.1
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	47.4	0.4
Fort Worth Zoo	Park	38.6	38.7	0.1
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	46.6	0.3
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	77.5	0.0
J W Turner Elementary School	School	46.4	46.4	0.0
Kimbell Art Museum	Museum	39.3	39.3	0.0
Kindred Hosp-Fort Worth SW	Hospital	49.8	49.8	0.0
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	45.2	0.0
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	41.2	0.1
Monnig Junior High School	School	62.6	62.7	0.1
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	39.3	0.0

Table 8.4.2-6: LM Aero Comparison Non-Residential Noise Sensitive Receptors (Continued)

Name	Type	Baseline (dB)	With Proposed JSF DT (dB)	Change (dB)
Oakwood Cemetery	Cemetery	33.4	33.5	0.1
Osteopathic Med Ctr of Texas	Hospital	40.7	40.7	0.0
Phillips School	School	63.3	63.4	0.1
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	47.7	0.2
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	38.7	0.1
Thomas Place School	School	45.2	45.3	0.1
Trinity Church	Place of Worship	44.6	44.6	0.0
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	47.8	0.3
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

Based on the 2007 EA/OEA, 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.[265] The 602-acre site is bordered by Lake Worth to the north and northwest, the community of White 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. It should be noted that the EA for Implementation of the Base Realignment and Closure (BRAC) 2005 Action at Naval Air Station, Joint Reserve Base, Fort Worth, Texas, stated no listed rare or biologically important vegetation species and threatened or endangered species were found on the base during 2004 field surveys.

265 Texas Department of Health 1998

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 tundrius*); bald eagle *(Haliaeetus leucocephalus*); whooping crane *(Grus americana*); interior least tern *(Sterna antillarum athalassos*); Texas horned lizard *(Phrynosoma cornutum*); and timber/canebrake rattlesnake *(Crotalus horridus*).[266] 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*)	D	
Bald eagle (*Haliaeetus leucocephalus*)	D	T
Whooping crane (*Grus americana*)	E	E
Interior least tern (*Sterna antillarum athalassos*)	E	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, a Federally recovered (delisted) species, 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 and feeds on fish caught or stolen from smaller birds, such as ospreys.[267] 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 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 are 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

266 USAF 2002; Texas Parks and Wildlife 1999
267 enature.com 2004; Texas Parks and Wildlife 1999

hibernation. Habitat that may support the timber/canebrake rattlesnake occurs on LM Aero, though no known denning sites or recorded sightings 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 occurring 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 effects 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 activities 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 Supplemental EA/OEA, the Proposed Action would be anticipated to result in negligible noise impacts. The base areas impacted by the 65 dB and greater DNL noise contours would remain constant (1,720 acres). Similarly, off-base areas impacted by the 65 dB and greater DNL noise contour would remain constant (14,670 acres) (see Figure 8.4.2-2 and Tables 8.4.2-3 and 8.4.2-4). Land use associated with these impact areas consists of residential use. There would be a very slight increase in land use acreage for parks, infrastructure , and undeveloped areas, while acreage associated with water would decrease slightly. 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 activities and are not discussed further. However, the potential for environmental justice and children demographic impacts are discussed in this section.

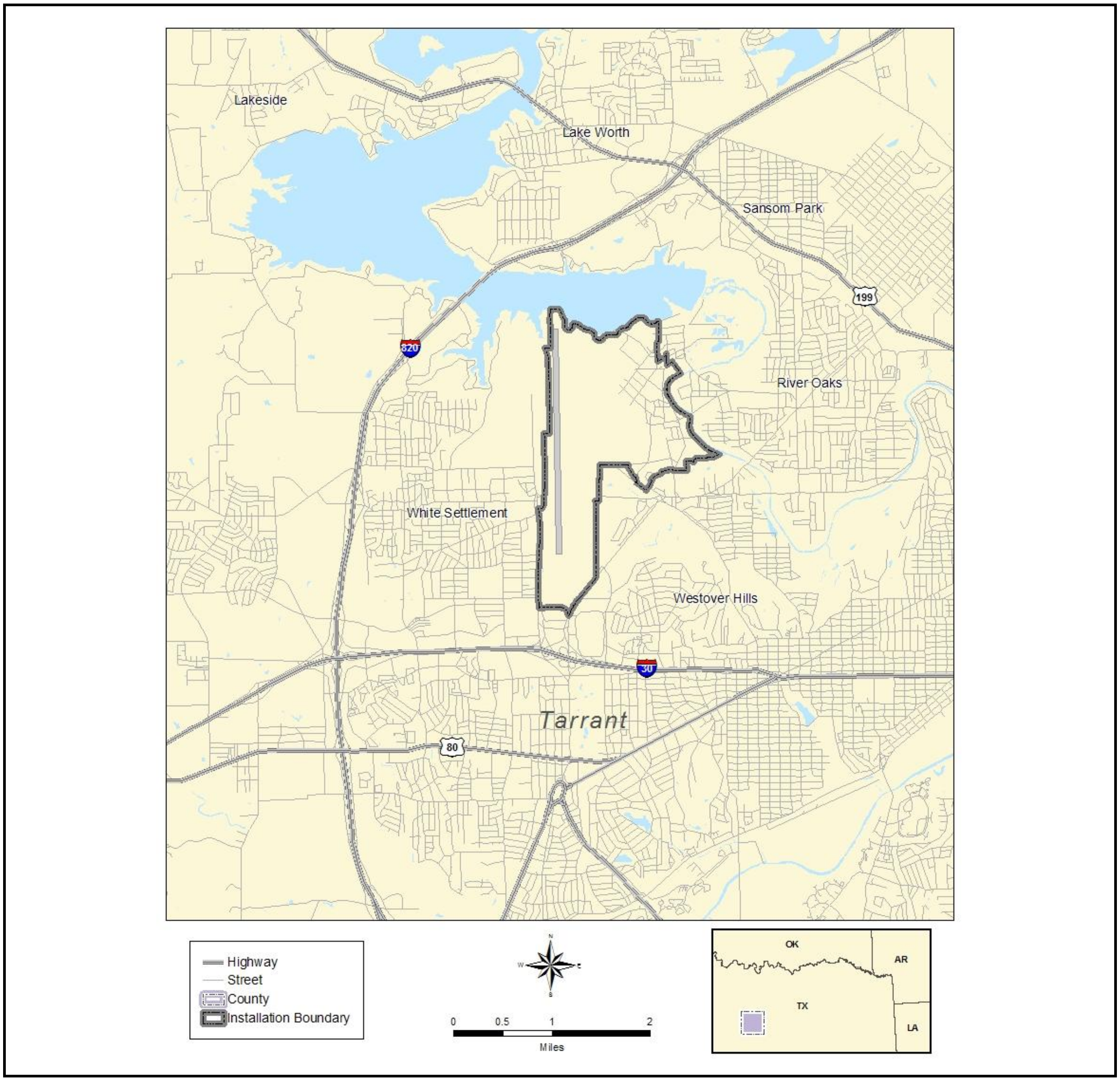


Figure 8.6.1-1: LM Aero Socioeconomic Study Area

8.6.1.1 Environmental Justice and Children Demographics

The poverty rate in Tarrant County of 13.1% is lower than the Texas statewide estimate (16.9%) and the U.S. estimate (13.3%), as illustrated in Figure 8.6.1.1-1, based on 2005-2007 census data.[268] Tarrant County's poverty rate is well below the set threshold of 25% used to identify environmental justice populations.

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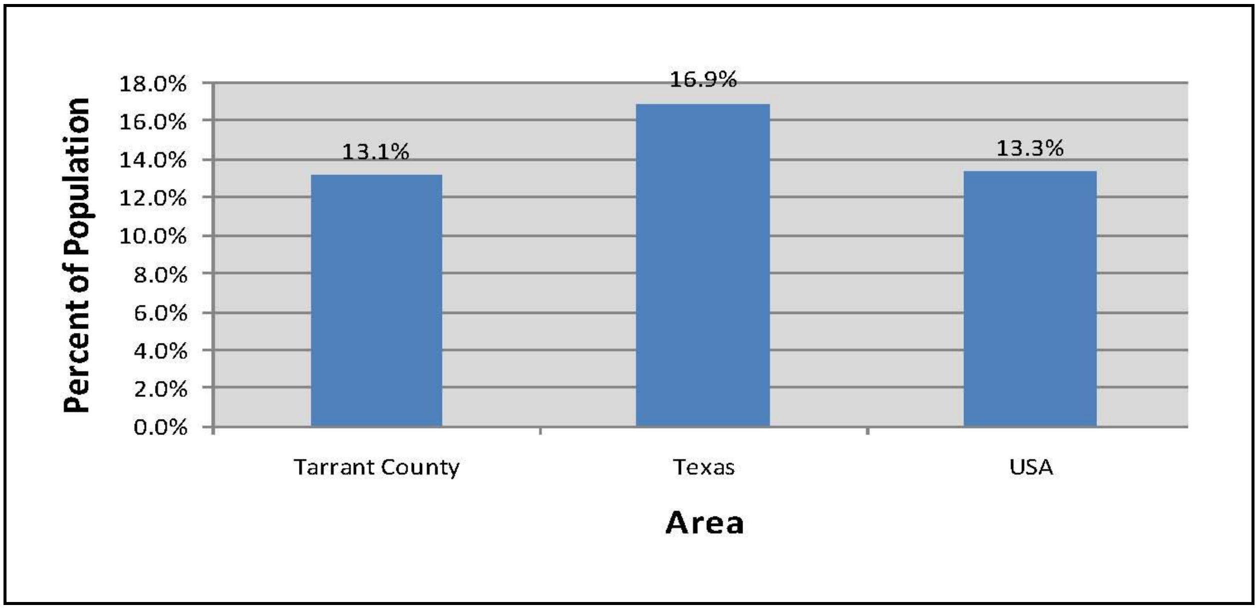
268 Census Bureau 2009

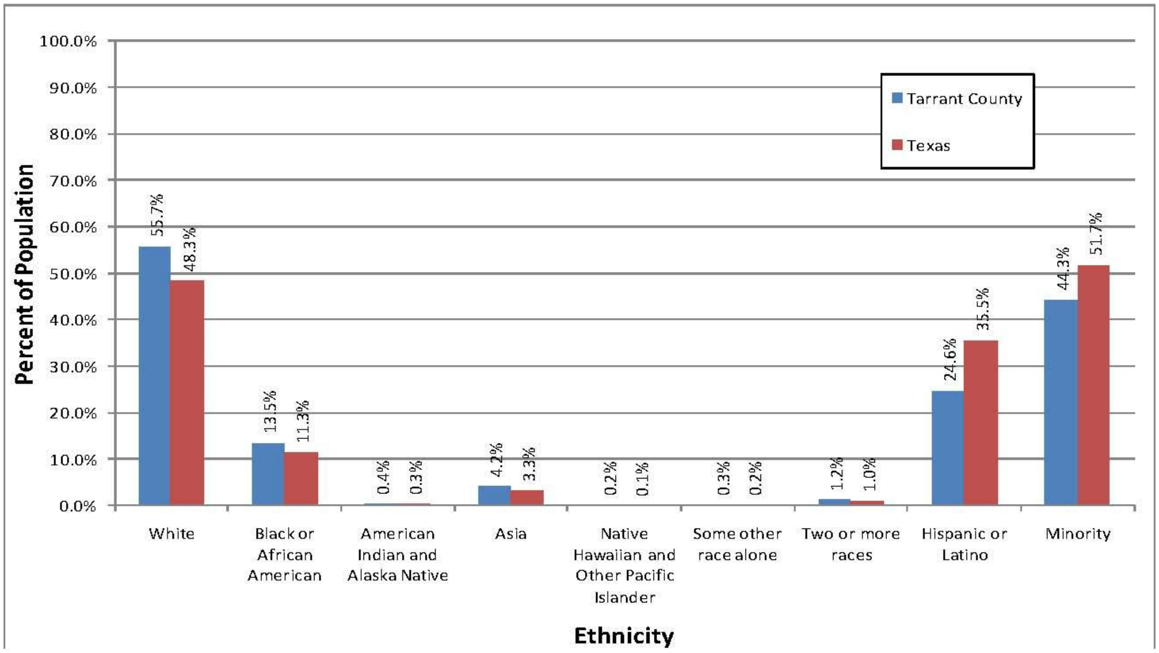


Source: U.S. Census Bureau 2005-2007 3-year estimate.

Figure 8.6.1.1-2: Poverty Rates for LM Aero Area Socioeconomic Study Area

Population ethnicity for the LM Aero area is summarized in Figure 8.6.1.1-3 and is comprised of a predominantly white population (55.7%). The remaining population distribution includes Hispanic or Latino (35.5%), Black or African American (11.3%), Asian (3.3%), two or more races (1.0%), American Indian or Native Alaskan (0.3%), Native Hawaiian or other Pacific Islander (0.1%), and some other race (0.1%).[269] The ethnic representations in the area resemble the ethnicity distribution for Texas. Total minority population in Tarrant County (44.3%) is lower than in Texas statewide (51.7%), and is below the CEQ threshold of 50% for minority populations, which is used to identify environmental justice populations.

269 Census Bureau 2009



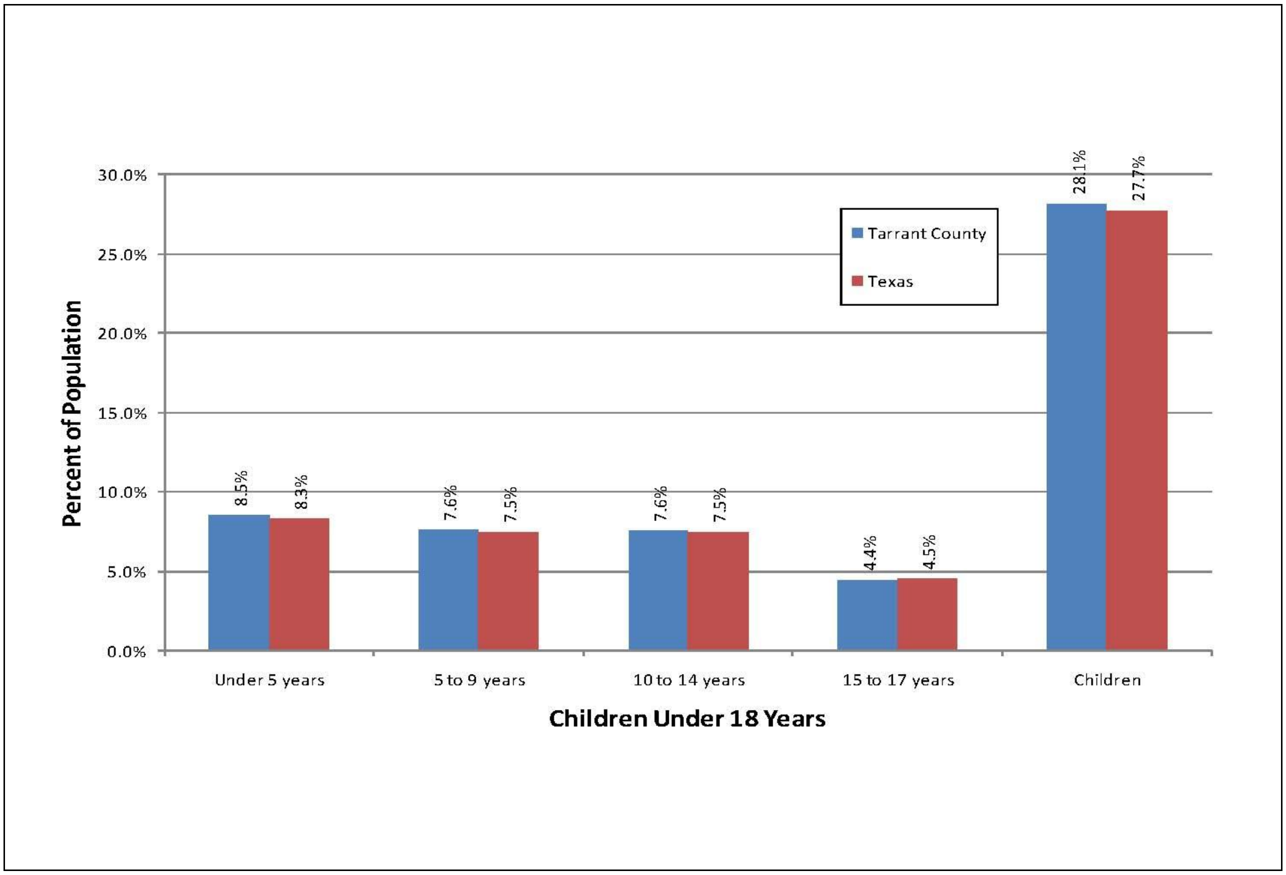
Source: U.S. Census Bureau, 2005-2007 3-year estimate.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 8.6.1.1-3: Ethnicity for LM Aero Socioeconomic Study Area

Tarrant County has a relatively even distribution of children under 5 years of age to 14 years and a slightly smaller population of children 15 to 17 years of age as summarized in Figure 8.6.1.1-4. The largest group of children under 5 years (8.5%) and the remaining distribution is 10 to 14 years old (7.6%), 5 to 9 years old (7.6%), and 15 to 17 years old (4.4%). Tarrant County's child population is nearly identical to the Texas statewide average of 27.7%.[270]

In addition to the Tarrant County LM Aero socioeconomic study area, more localized year 2000 U.S. census tract/block areas for poverty rates, ethnicity, and children demographics was used to support both the environmental justice and children population analyses, as illustrated in Figure 8.6.1.1-5.

270 Census Bureau 2009



U.S. Census Bureau, 2005-2007 3-year estimate.
Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 8.6.1.1-4: Children Demographics of LM Aero Socioeconomic Study Area

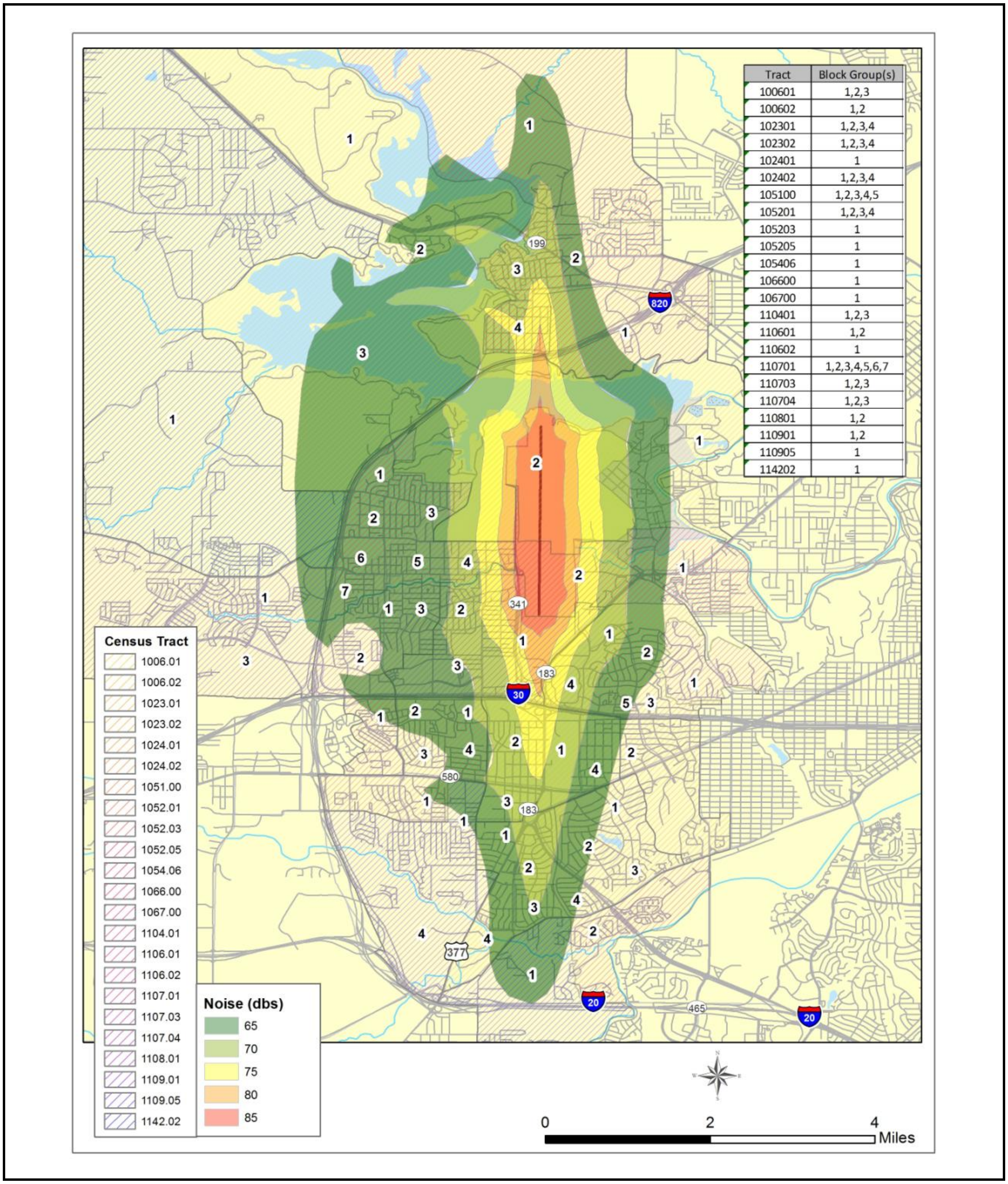


Figure 8.6.1.1-5: Census Tracts for the LM Aero Socioeconomic Study Area

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

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%

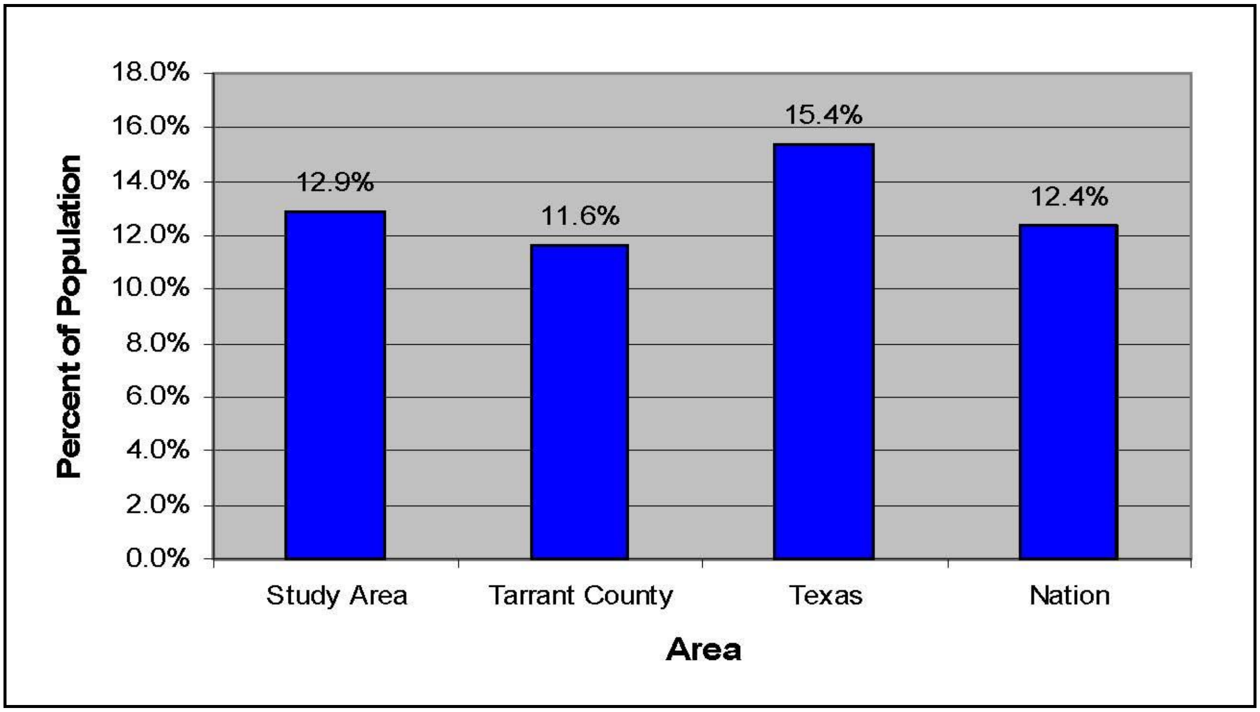
Table 8.6.1.1-1: Poverty Rates by Block Groups in Census Tracts for LM Aero Socioeconomic Study Area (Continued)

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 as reflected in the 2007 EA/OEA, is 12.9% higher than the surrounding Tarrant County rate of 10.6% and U.S. rate of 12.4%. But, the rate is lower than the Statewide estimates for Texas (15.4%), as summarized in Figure 8.6.1.1-6.[271] 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 Supplemental EA/OEA.

271 Census Bureau 2000



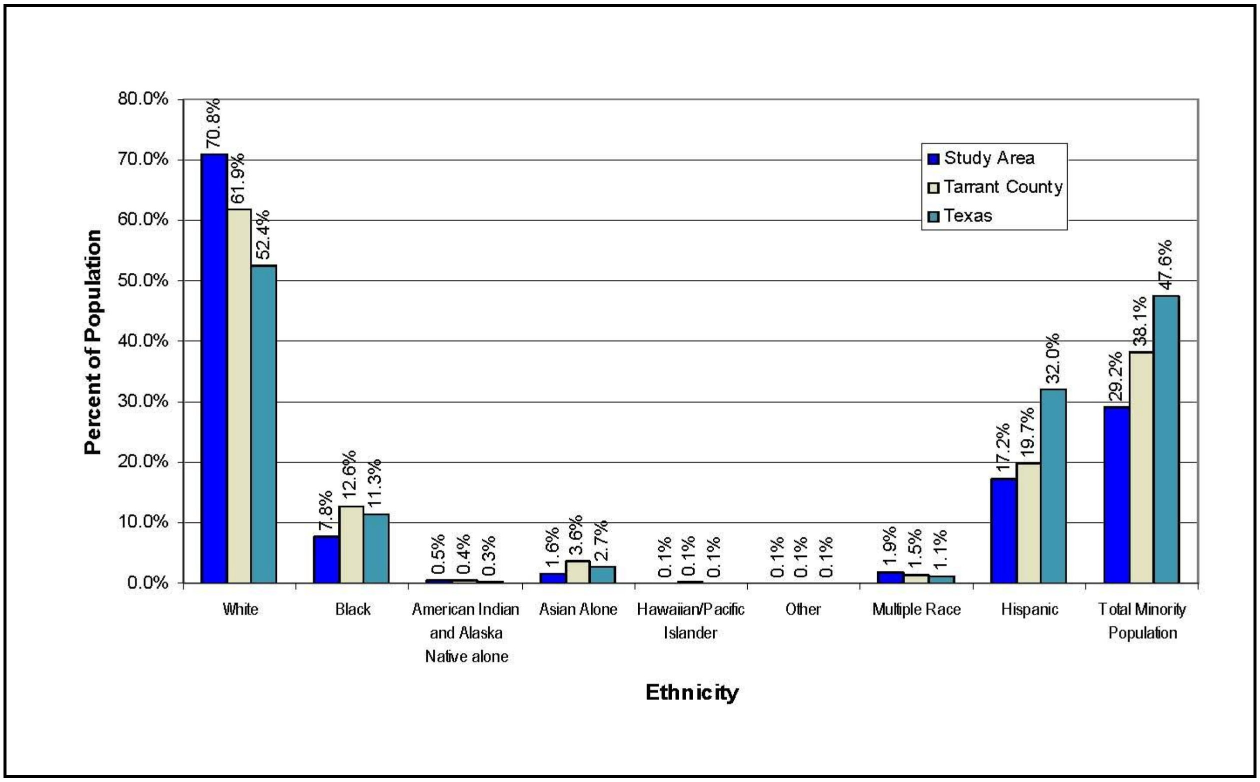
Source: U.S. Census Bureau 2000.

Figure 8.6.1.1-6: Poverty Rates for LM Aero Area Socioeconomic Study Area

Population ethnicity for the LM Aero area based on the 2007 EA/OEA is summarized in Figure 8.6.1.1-7 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.[272]

Total minority populations (29.2%) in the LM Aero area is lower than Tarrant County (38.1%) and Texas (47.6%),[273] 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 based on the 2007 EA/OEA. 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 (53.2%), block group 5 of census tract 105100 (50.5%), block 1 of census tract 1052.01 (61.5%), and block group 1 of census tract 105205 (52.5%).

272 Census Bureau 2000
273 Ibid



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.

Note: In some cases, totals do not add up to 100% due to rounding of the census estimated data.

Figure 8.6.1.1-7: Ethnicity for LM Aero Socioeconomic Study Area

Table 8.6.1.1-2: Ethnicity by Census Tracts/Blocks for LM Aero 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
100601	1	87.8%	0.9%	1.7%	0.4%	0.0%	0.0%	0.5%	8.6%	12.1%
100601	2	90.3%	0.0%	1.8%	0.6%	0.0%	0.0%	3.0%	4.2%	9.6%
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%	28%
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%**	**53.2%**
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%	28.8%
102302	2	67.8%	3.2%	0.7%	1.0%	0.1%	0.0%	1.6%	25.5%	32.1%
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%	26.6%
102401	2	86.6%	3.7%	0.8%	0.7%	0.0%	0.0%	0.7%	7.6%	13.5%
102401	3	50.1%	15.2%	0.3%	1.6%	0.0%	0.0%	1.1%	31.8%	50%
102402	1	90.8%	0.2%	0.0%	2.2%	0.0%	0.3%	1.0%	5.4%	9.1%
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%	13.7%
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%	3.1%
105100	3	72.5%	8.9%	0.1%	7.1%	0.0%	0.1%	0.9%	10.5%	27.6%
105100	4	60.5%	10.2%	0.3%	1.9%	0.0%	0.2%	1.6%	25.2%	39.4%

Table 8.6.1.1-2: Ethnicity by Census Tracts/Blocks for LM Aero Socioeconomic Study Area (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%**	**61.7%**
105201	**2**	**46.7%**	**16.1%**	**0.2%**	**2.0%**	**0.0%**	**0.0%**	**0.8%**	**34.1%**	**53.2%**
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%**	**61.5%**
1052.03	1	81.4%	5.8%	0.1%	0.6%	0.4%	0.0%	1.0%	10.8%	18.7%
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%	48.9%
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%**	**52.5%**
1052.05	2	62.7%	18.3%	0.5%	1.1%	0.0%	0.1%	2.3%	14.9%	37.2%
106600	1	64.3%	6.7%	0.6%	1.3%	0.2%	0.0%	3.0%	24.0%	35.8%
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%	24.3%
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%	29%
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%	23.8%
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%	20.9%

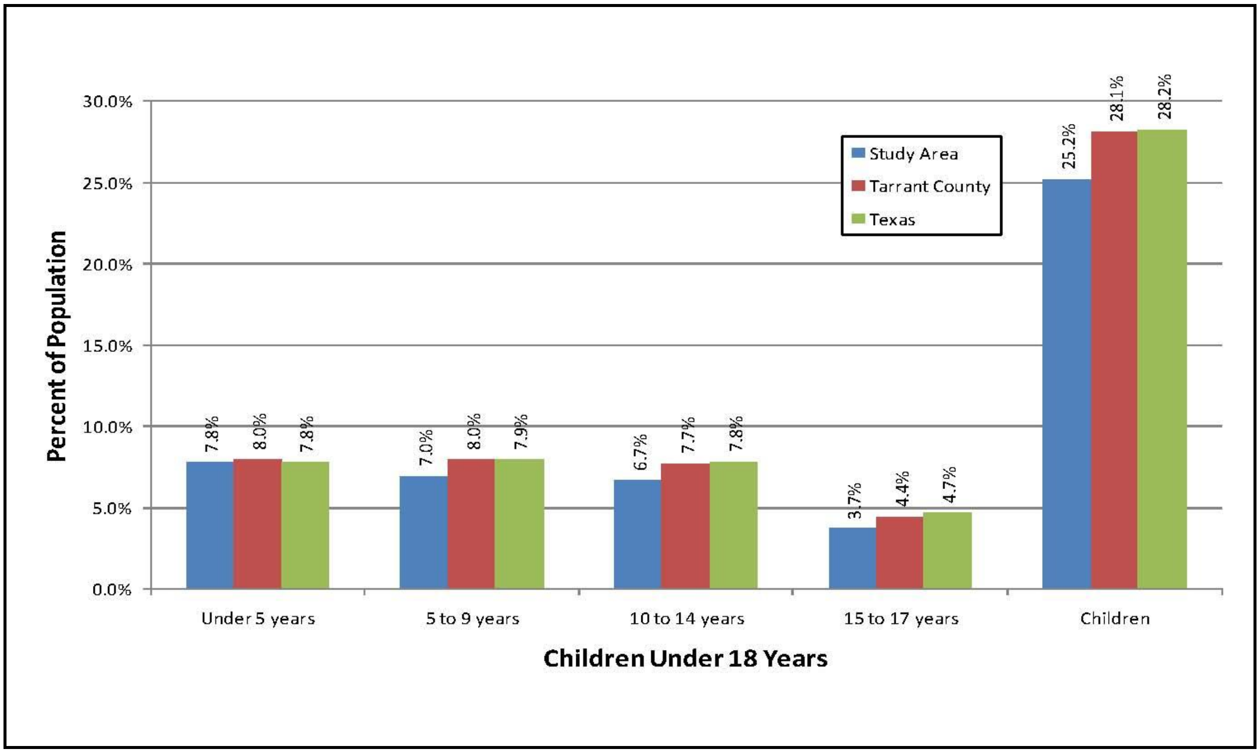
Table 8.6.1.1-2: Ethnicity by Census Tracts/Blocks for LM Aero Socioeconomic Study Area (Continued)

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%	18.1%
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%	25.4%
1108.04	1	82.1%	3.2%	0.1%	2.4%	0.1%	0.0%	1.0%	11.0%	17.8%
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%	11.2%
1142.02	1	82.6%	2.8%	0.6%	1.7%	0.0%	0.0%	1.8%	10.4%	17.3%

Source: Census Bureau 2000.

Children populations in the LM Aero children demographic study area are summarized in Figure 8.6.1.2-8 based on 2000 census data. The study area children populations are similar for children under 5 years of age to 14 years followed by a smaller population of children 15 to 17 years of age. The largest group of children is under 5 years (7.8%) and the remaining distribution is children 5 to 9 years old (7.0%), 10 to 14 years old (6.7%) and 15 to 17 years old (3.7%).

Total population of children for the study area block groups of the census tracts (25.2%) is lower than Tarrant County and the State of Texas (28.2%). Children populations by block groups are summarized in Table 5.6.1.2-3. Some block groups in the census tracts have a larger total population of children than others, notably block group 2 census tract 110601, block group 3 of census tract 110801, block group 1 of census tract 105205, block group 3 of census tract 102302, block group 4 of census tract 102301, and block group 1 of census tract 110801. These six block groups have higher total populations of children than the surrounding counties and State of Texas. The other 56 block groups have a total population of children similar to or lower than Tarrant County and statewide.



Source: U.S. Census Bureau, 2000.

Figure 8.6.1.2-8: Children Demographics for the LM Aero Socioeconomic Study Area

Table 8.6.1.2-3: Children Demographics by Block Group for the Children Population Census Tracts/Blocks Area within LM Aero Socioeconomic Study Area

County	Census Tract #	Block Group #	Under 5 Years	5 to 9 Years	10 to 14 Years	15 to 17 Years	Children
Tarrant	100601	1	7.3%	7.1%	7.5%	4.3%	26.1%
Tarrant	100601	2	6.1%	5.9%	5.1%	2.0%	19.0%
Tarrant	100601	3	3.5%	3.5%	4.4%	2.6%	13.9%
Tarrant	100602	1	2.6%	2.0%	2.1%	1.2%	7.9%
Tarrant	100602	2	3.6%	5.2%	3.6%	2.2%	14.6%
Tarrant	100602	3	5.3%	5.9%	9.3%	4.5%	25.0%
Tarrant	102201	2	5.4%	7.1%	7.3%	5.0%	24.9%
Tarrant	102201	3	6.0%	6.6%	5.4%	2.5%	20.4%
Tarrant	102301	1	8.1%	8.7%	6.9%	3.0%	26.6%
Tarrant	102301	2	9.9%	5.5%	6.1%	4.2%	25.7%
Tarrant	102301	3	8.3%	7.5%	6.4%	3.7%	25.9%
Tarrant	**102301**	**4**	**10.3%**	**8.1%**	**7.7%**	**3.9%**	**30.1%**
Tarrant	102302	1	7.5%	7.2%	8.5%	3.9%	27.2%
Tarrant	102302	2	9.5%	8.1%	8.1%	4.2%	29.9%
Tarrant	**102302**	**3**	**11.3%**	**9.3%**	**7.9%**	**3.6%**	**32.2%**
Tarrant	102302	4	8.8%	7.1%	6.3%	3.3%	25.4%
Tarrant	102401	2	7.6%	5.5%	5.1%	2.0%	20.1%
Tarrant	102401	3	11.5%	8.3%	5.9%	3.7%	29.5%
Tarrant	102402	1	6.0%	6.4%	8.1%	3.3%	23.9%
Tarrant	102402	2	5.5%	4.5%	6.1%	3.8%	20.0%
Tarrant	102402	3	5.9%	4.9%	5.7%	3.3%	19.9%
Tarrant	102402	4	3.3%	6.6%	6.4%	3.6%	19.9%
Tarrant	105100	1	5.3%	6.1%	6.3%	3.6%	21.3%
Tarrant	105100	2	6.5%	8.0%	6.7%	2.7%	23.9%
Tarrant	105100	3	5.9%	4.1%	4.5%	2.1%	16.7%
Tarrant	105100	4	7.0%	4.8%	5.6%	1.8%	19.3%
Tarrant	105100	5	8.7%	4.9%	5.0%	2.4%	21.1%
Tarrant	105201	1	11.6%	7.6%	4.1%	2.8%	26.1%
Tarrant	105201	2	10.2%	7.5%	6.1%	2.8%	26.6%
Tarrant	105201	3	4.2%	5.0%	5.6%	3.8%	18.5%
Tarrant	105201	4	10.4%	8.1%	6.2%	4.0%	28.7%
Tarrant	105203	1	5.7%	7.4%	6.0%	3.9%	23.0%
Tarrant	105203	2	5.8%	4.4%	4.9%	2.5%	17.6%
Tarrant	105204	1	9.7%	5.5%	5.1%	2.0%	22.4%
Tarrant	105204	2	10.9%	6.2%	3.8%	3.0%	24.0%

Table 8.6.1.2-3: Children Demographics by Block Group for the Children Population Census Tracts/Blocks Area within LM Aero Socioeconomic Study Area (Continued)

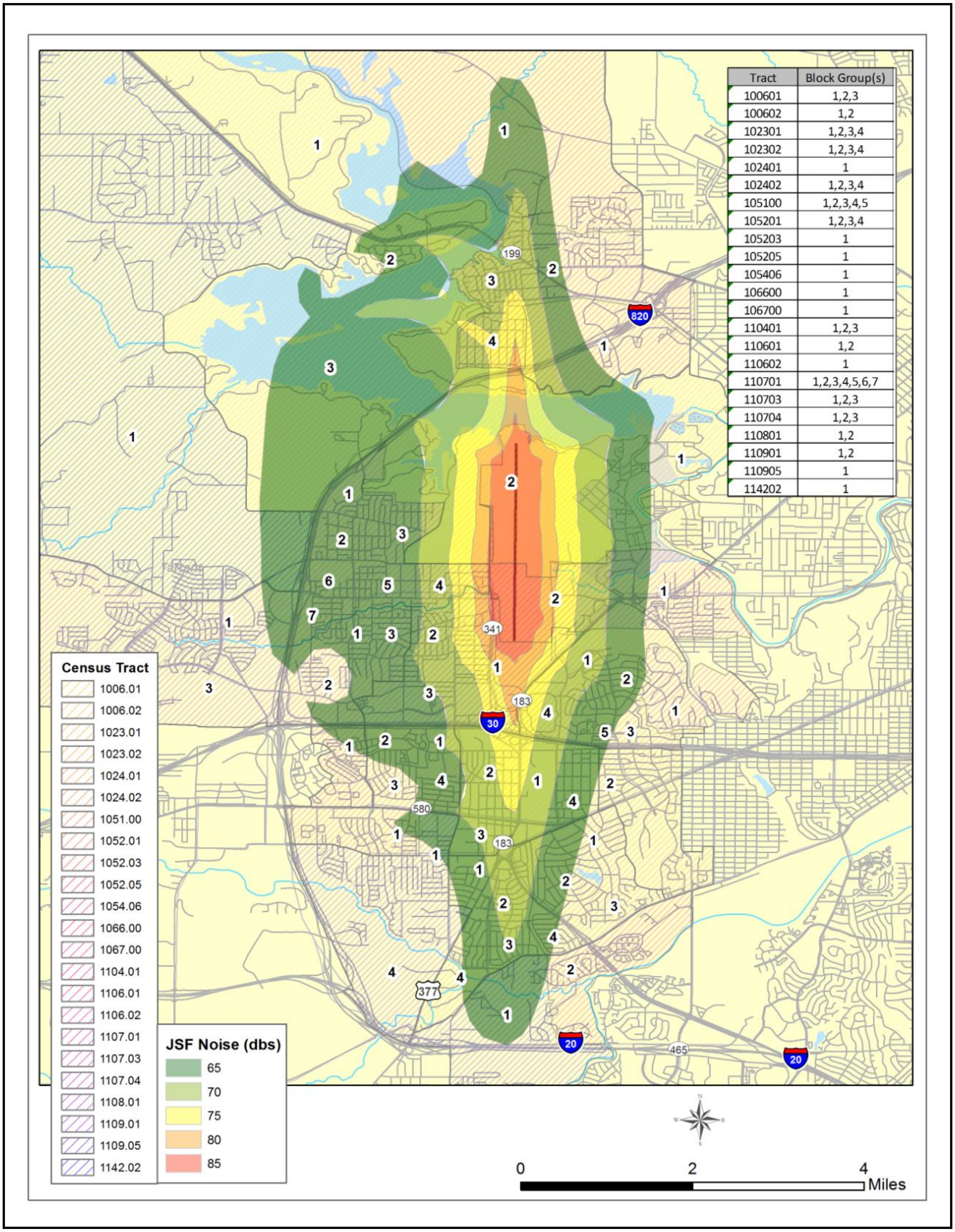
County	Census Tract #	Block Group #	Under 5 Years	5 to 9 Years	10 to 14 Years	15 to 17 Years	Children
Tarrant	**105205**	**1**	**13.3%**	**9.9%**	**7.8%**	**3.5%**	**34.5%**
Tarrant	105205	2	8.0%	6.2%	4.6%	2.8%	21.5%
Tarrant	106600	1	9.7%	6.3%	5.0%	2.9%	23.8%
Tarrant	106700	1	9.9%	8.0%	7.9%	3.6%	29.4%
Tarrant	110401	1	5.5%	4.6%	6.7%	4.7%	21.4%
Tarrant	110401	2	6.8%	6.3%	9.4%	4.7%	27.1%
Tarrant	110401	3	3.4%	6.5%	7.3%	5.4%	22.6%
Tarrant	110401	4	7.0%	7.9%	8.5%	5.1%	28.6%
Tarrant	110601	1	7.3%	8.9%	7.6%	3.2%	26.9%
Tarrant	**110601**	**2**	**11.4%**	**17.6%**	**11.0%**	**3.1%**	**43.1%**
Tarrant	110601	3	5.6%	7.1%	6.9%	4.1%	23.7%
Tarrant	110602	1	5.3%	7.8%	7.0%	4.0%	24.0%
Tarrant	110701	2	6.5%	6.5%	8.4%	5.7%	27.2%
Tarrant	110701	4	8.1%	8.9%	6.8%	5.0%	28.9%
Tarrant	110703	1	8.7%	8.7%	8.3%	3.3%	29.0%
Tarrant	110703	2	11.1%	7.5%	6.5%	3.7%	28.8%
Tarrant	110703	3	7.2%	7.5%	7.0%	5.6%	27.2%
Tarrant	110704	2	7.6%	7.7%	7.5%	5.1%	27.9%
Tarrant	110704	3	7.2%	6.4%	5.9%	4.0%	23.5%
Tarrant	**110801**	**1**	**7.0%**	**8.3%**	**9.1%**	**5.6%**	**30.0%**
Tarrant	**110801**	**3**	**9.9%**	**9.4%**	**10.5%**	**5.5%**	**35.4%**
Tarrant	1108.04	1	6.6%	7.5%	7.4%	3.8%	25.3%
Tarrant	1109.01	1	7.2%	5.4%	7.5%	3.1%	23.3%
Tarrant	1109.01	2	4.3%	4.0%	6.0%	2.2%	16.5%
Tarrant	1109.01	3	3.3%	5.9%	6.8%	3.5%	19.5%
Tarrant	1109.01	4	3.5%	5.1%	6.2%	3.8%	18.6%
Tarrant	1142.02	1	7.3%	7.8%	8.7%	5.4%	29.3%

Source: Census 2000, Summary File 1 - Detailed Table P12.

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 activities 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 Supplemental 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 activities at LM Aero would not result in any disproportionately and 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.



Source: U.S. Census Bureau 2000.

Figure 8.6.2-1: Proposed JSF DT Program 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."[274]

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 addresses the same resources.

Based on the 2007 EA/OEA, annual aircraft activity (current flight operation levels) at NAS JRB Ft. Worth is projected to increase slightly, 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. The proposed CATB and F-35 flights would comprise less than 0.1% of the total annual activity anticipated for LM Aero and NAS JRB Ft. Worth. 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 Fort Worth[275]

CY	Forecasted Traffic	Notes
2008	70,000	Addition of the Fleet Logistics Support Squadron Four Six (VR-46) and Marine Fighter Attack Squadron (VMFA-142)
2009	70,000	No additional information provided
2010	70,000	No additional information provided
2011	70,000	No additional information provided

Table 8.7-2 annotates the FY 2010 aircraft operations at NAS JRB Fort Worth, of which F-16 operations have the highest tempo of the other aircraft annotated in the below table. Proposed CATB Boeing 737 specific flights under Alternative One would be 242 flights vice the total B737 operations of 835. Proposed F-35 specific flights under Alternative Two would still remain less than 1% of the operations conducted at NAS JRB Fort Worth. The entire JSF DT Program tempo based on Alternative Two (283 flights and 792 flight hours) would comprise approximately 1% of the 21,475 operations conducted in FY 2010.

274 40 CFR 1508.7
275 Based on NAS JBR Ft. Worth Input – LCDR D. Gomez, 21 October 2005

Table 8.7-2: Aircraft Operational Tempos at NAS JRB Fort Worth – FY 2010

F-16	F-18	C-130	C-9	B-737	C-12	Helo	*Total*
1st Quarter							
3,217	60	877	238	198	253	8	***4,851***
2nd Quarter							
2,427	625	1,384	220	222	391	23	***5,292***
3rd Quarter							
3,325	299	1,252	341	192	423	17	***5,849***
4th Quarter							
2,824	543	967	288	223	547	91	***5,483***
Total							
11,793	**1,527**	**4,480**	**1,087**	**835**	**1,614**	**139**	***21,475***

Source: JSF Environmental Planning, Flight Ops Data Request, October 2010.

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 Supplemental EA/OEA concluded proposed JSF DT Program emissions would predominately be transitory, site-specific, and not cumulatively significant. The additional landings and take-offs would account for less than 0.1% of the reasonably foreseeable landings and take-offs 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 activities would comply with approved air quality planning documents/permits at LM Aero 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, and the *EA for Implementation of Base Realignment and Closure (BRAC) 2005 Action at Naval Air Station, Joint Reserve Base, Fort Worth, Texas* of November 2006. The EA for expansion of JSF-SDD facilities 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.[276] Considering this and the results of the noise analysis presented in Section 8.4.2 of this Supplemental EA/OEA, no cumulative noise impacts would be expected for either alternative.

The BRAC EA evaluated the potential environmental impacts from 13 projects for relocating facilities, functions, and personnel. Of the 13 projects, there were five new facilities and additions/renovations to 8 other facilities. The relocated functions included the 8th Marine Corps District; Fleet Logistics Support Squadron Four-Six (VR-46) and Marine Fighter Attack Squadron (VMFA-142) including C9s, F/A-18s, and C-12 (of which the USN anticipated a 33% increase in F/A-18 operations and approximately 125 flights per year of C-9s); Depot Aircraft Components, Aircraft Engines, Fabrication and Manufacturing, and Support Aircraft from NAS Atlanta; and F-16s from Virginia Air National Guard (of which AF anticipated a 50% increase in F-16 operations). The EA concluded no significant change to aircraft noise

276 LM Aero 2002

generated at NAS JRB Ft. Worth with the addition of aircraft and increased engine testing resulting from the BRAC action.

Based on the noise analysis, the proposed JSF DT activities are not expected to significantly impact biological/natural resources, surrounding communities, or environmental justice and children populations under either alternative. Additionally, no regional cumulative socioeconomic impacts would be anticipated. The proposed JSF DT activities change the baseline noise impact areas slightly off-base, but land use remains essentially the same as the 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 and children populations would be expected from the Proposed Action.

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 an action (e.g., extinction of a rare or threatened species).

Similar to the conclusions of the 2007 EA/OEA, 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 Program is provided in Table 9-1.

The F-35 Joint Program Office and JSF ITF 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 F-35 Joint Program Office and JSF ITF Team will ensure adherence to the flight profiles and assumptions used in the noise modeling analysis of this Supplemental 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 F-35 Joint Program Office and JSF ITF 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 F-35 Joint Program Office and JSF ITF Team. The F-35 Joint Program Office and JSF Team will also adhere to the applicable mitigation measures reflected in Sections 5.7 of the VACAPES Range Complex EIS/OEIS of March 2009 for all test activities conducted in the VACAPES OPAREA.

Throughout the conduct of the proposed JSF DT Program, the F-35 Joint Program Office and JSF ITF 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 F-35 Joint Program Office and JSF ITF Team will coordinate with Edwards AFB environmental representatives to identify if any terms and conditions of the Biological Opinion would be applicable to the proposed JSF DT activities to ensure compliance. The F-35 Joint Program Office and JSF ITF 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 Supplemental 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, NBVC 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 are below the applicable *de minimis* thresholds, and the annual project-related emissions do not make up 10% or more of the NAAs 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 O_3 precursors, as specified in the SIP 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 AICUZ programs. Minimal to negligible impacts from noise is expected from implementing either Proposed Action alternative at Eglin AFB, NAWCWD China Lake, NBVC 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 60 dB and greater CNEL noise contour (applicable to the State of California) increase by approximately 5,220 acres (approximately 25%), from approximately 21,080 to 26,300 acres. There are no off-base areas impacted by the 65 dB and greater CNEL noise contour. • NAS Patuxent River: On-base areas potentially impacted by the 65 dB and greater DNL noise contour increase by about 195 acres, from approximately 5,267 to 5,462 acres (less than 4%). Off-base areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 53 acres (approximately 10%) from 552 to 605 acres of land outside of NAS Patuxent River's boundary. • NAES Lakehurst: On-base areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 360 acres (approximately 25%), from 1,430 to 1,790 acres. Off-base areas potentially impacted by the 65 dB and greater DNL noise contour increase by approximately 60 acres (approximately 3%) from 510 to 670 acres. • LM Aero: On-base areas potentially impacted by the 65 dB and greater DNL noise contour would remain constant at approximately 1,720 acres. Similarly, off-base areas potentially impacted by the 65 dB and greater DNL noise contour would not be expected to change - 14,670 acres. 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 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 AGL/MSL, most of those flights will be of short duration and above the 550-foot AGL/MSL 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, NBVC Point Mugu, WSMR, NTTR Nellis AFB, and VACAPES OPAREA. Specific findings for Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero 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 and the ranges/impact areas. Potential impacts to biological resources, while possible, would not 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 CTR would not likely to 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 193 acres to 264 acres in the Manchester Fish and Wildlife Management Area). 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. 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 Program 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 the proposed JSF DT Program is not likely to adversely affect listed species.
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 the 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 effect to the coastal zone resources of California, Maryland, Virginia, and Delaware are expected from implementing the Proposed Action at NBVC 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 PEO of the F-35 Joint Program Office has determined the proposed JSF DT activities will be consistent to the maximum extent practicable with the enforceable policies and objectives of the California, Maryland, Virginia, and Delaware CZMP. This is the same conclusion reached in the 2007 EA/OEA. It was determined, in consultation with the USN Regional Environmental Coordinator Southwest, a Negative Coastal Consistency Determination is not needed because most of the JSF DT activities are occurring in air space or at sea outside of the coastal zone. It was also determined for the 1% or less of stores that may be released within the coastal zone, the proposed JSF DT activities are already considered consistent with the existing activity in the Point Mugu Sea Range and those types of activities are covered in the Sea Range EIS. A Negative Coastal Consistency Determination has been completed by the F-35 Joint Program Office for Maryland, Virginia, and Delaware because of a higher flight test tempo occurring within these State's coastal zones. A Negative Coastal Consistency Determination has been completed by the F-35 Joint Program Office for Maryland, Virginia, and Delaware because of a higher flight test tempo occurring within these State's coastal zones.

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11.0 LIST OF CONTRIBUTORS AND REVIEWERS

This Supplemental EA/OEA was prepared by the F-35 Joint Program Office , with contractual assistance from Booz Allen Hamilton and Science Applications International Corporation. Jean Hawkins, F-35 Joint Program Office ESOH Lead, provided project management and oversight for this Supplemental EA/OEA. This Supplemental EA/OEA was 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
Booz Allen Hamilton		
Lori Hales	Project and Environmental Management	BS Biology, Grove City College MS Occupational Safety & Health Engineering, West Virginia University
Vincent Bonifera, Jr.	Air	AS Science, Wesley College BS Chemical Engineering, West Virginia University MS Chemical Engineering, West Virginia University MS Technical Management, Johns Hopkins University
Chris Osburn	Noise	BS Environmental Science, Virginia Tech Minors also in Biology and Chemistry
Jennifer Scarborough	Natural/Biological Resources	BS Wildlife Management and Forestry, Virginia Polytechnic Institute and State University
Eric Hurley	Socioeconomics	BA Economics, University of Colorado MS Economics, University of Oregon
Adam Turbett	Noise	BS Environmental Studies, Bucknell University
Amy Lovelady	Geographic Information System	BA Geography, Edinboro University of Pennsylvania
Cheryl Mertins	Document Configuration Manager	AS Business, Troy University BS Social Science Education, Business, Troy University
Science Applications International Corporation		
Flint Webb, PE	Air	BS Mechanical Engineering, Rensselaer Polytechnic Institute (RPI) Graduate Engineering Coursework at Hartford Graduate Center (RPI), University of Colorado (Boulder), and Massachusetts Institute of Technology (MIT)
Elis Vllasi	Air	BS Civil Engineering, Michigan Technological University MS Environmental Engineering, The University of Tennessee MA Political Science, The University of Tennessee

Table 11-2 identifies those who contributed to the development of this Supplemental EA/OEA by providing updated proposed JSD DT Program profile information, specific data relevant to each proposed test locations, and other related data pertinent to the assessment.

Table 11-2: Contributors

Name	Title	Organization	Location
JSF ESOH Working Group			
Jean Hawkins	JSF ESOH Lead	Performance and Specialty Engineering	NAS Jacksonville, FL
Integrated Test Force			
Paul Robinson	JSF Engineering	JSF	Edwards AFB, CA
Otto E. Zahn	Health & Environmental Engineer	773 TS/ENFH	Edwards AFB, CA
Andrew Maack	JSF DT Project Lead	JSF ITF Team	NAS Patuxent River, MD
Michael Summers	F35 Stores Certification	JSF ITF Team	NAS Patuxent River, MD
Tom Briggs	JSF Air Vehicle Support	JSF ITF Team	NAS Patuxent River, MD
Bob Nantz	JSF DT Engineer	JSF ITF Team	NAS Patuxent River, MD
JSF Vibroacoustics Team			
Rich McKinley	JSF Vibroacoustics Lead	Air Force Research Laboratory/Battlespace Acoustics Branch (AFRL/HECB)	Wright Patterson AFB, OH
Bob McKinley	Noise Modeling	AFTL/HECB	Wright Patterson AFB, OH
Proposed Test Locations			
Scott Fetter	JSF ESH Lead	LM Aero	Fort Worth, TX
Bob Previte	Environmental Engineer	Environmental Department	NAES Lakehurst, New Jersey
Keith Dyas	Environmental Coordinator	Environmental Department	Edwards AFB, CA
Chris Jarboe	Environmental Manager	NAVAIR Ranges Sustainability Office	NAWCAD Patuxent River, MD

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: Edwards AFB, NAS Patuxent River, NAES Lakehurst, and LM Aero. Of the agencies and organizations receiving a copy of the Draft EA/OEA, the Virginia Department of Environmental Quality, Pinelands Commission of the State of New Jersey, and Maryland Office of Planning provided written responses or inquiries, as reflected in the below table.

Table 11-3: Agency and Public Organization Coordination on Draft JSF EA/OEA-June/July 2006

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 F-35 Joint Program Office 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
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

Table 11-3: Agency and Public Organization Coordination on Draft JSF EA/OEA-June/July 2006 (Continued)

Agency/Organization (Continued)
LM Aero **No Responses Received**
Texas Commission on Environmental Quality, Austin Headquarters, Austin, TX
Texas Commission on Environmental Quality, Regional Office Dallas/Fort 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-June/July 2006

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	Community 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
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, Fort 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	