Supplemental Environmental Assessment

Lighthouse Substation

Cape Canaveral Air Force Station
Florida

October 2007

Report Documentation Page

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Finding of No Significant Impact
Supplemental Environmental Assessment for the Lighthouse Substation

Pursuant to provisions of the National Environmental Policy Act (NEPA), 42 U.S. Code 4321 *et seq.*, implementing Council on Environmental Quality (CEQ) regulations, 40 Code of Federal Regulations (CFR) 1500-1508, and 32 CFR Part 989, *Environmental Impact Analysis Process* (EIAP), the U.S. Air Force conducted an assessment of the potential environmental consequences associated with the National Reconnaissance Office (NRO) proposal to construct a new substation on Cape Canaveral Air Force Station (CCAFS) in Brevard County, Florida.

CCAFS is located north of the city of Cape Canaveral on the east coast of Florida in Brevard County. CCAFS is on the Canaveral Peninsula, a barrier island located approximately 155 miles south of Jacksonville, 210 miles north of Miami, and approximately 60 miles east of Orlando. CCAFS occupies 15,804 acres of the barrier island. The installation is bounded on the north by the John F. Kennedy Space Center (KSC), a National Aeronautic and Space Administration (NASA) installation, on the west by the Banana River, on the south by Port Canaveral, and on the east by the Atlantic Ocean.

An *Environmental Assessment for the New National Reconnaissance Office (NRO) Eastern Processing Facility (EPF)* was completed and a Finding of No Significant Impact (FONSI) was issued on 14 September 2005. The EPF EA analyzed the construction of a new Eastern Processing Facility (EPF) on Cape Canaveral Air Force Station (CCAFS), in Brevard County, Florida. Construction of the proposed facility commenced in the year 2006, with an estimated duration of twenty-four (24) months. The EPF EA addressed the infrastructure components, to include underground power, that were readily available in the vicinity of the site, as part of the design criteria. During the final design phase of the facility, it was determined that the HVAC equipment would require greater loads than anticipated and the existing infrastructure could not supply the required amount of power. It was determined that the NRO could utilize the existing base power grid if a new substation dedicated to the EPF is constructed. The NRO has subsequently decided to propose proceeding with the design of a new substation. A Supplement to the EPF EA has been completed. The Supplemental Environmental Assessment (EA), incorporated as an attachment to this finding, analyzes the potential environmental consequences of constructing and operating the proposed substation.

The NRO is proposing to construct a new substation to provide more reliable electric service to the Eastern Processing Facility (EPF). The growth in the electric load associated with the EPF cannot be supported by the existing transmission system at CCAFS. Additionally, this project will put transmission infrastructure in place for additional facilities in the future, as required. Under the proposed action, the substation would be situated within an approximately 2.5 acre tract located west of Samuel C. Phillips Parkway and directly east of the EPF.

No significant environmental impacts were identified that would require the completion of an Environmental Impact Statement (EIS); however, some less than significant impacts were identified and are summarized below.

The Supplemental EA analyses conclude that there could be direct and indirect impacts to the threatened and endangered species at the proposed site.

Since the majority of the area is not classified as potential scrub-jay habitat and jays do not typically utilize this area, direct impacts on scrub-jays would be negligible. The jays are expected to benefit from the clearing of the right-of-way easement since it will result in a permanent opening within Land Management Unit (LMU) 101.

Eastern indigo snakes would be expected to move out of the area during clearing activities. If any indigo snakes were encountered during gopher tortoise relocation activities, they would be safely moved out of the project area. Additionally, educational posters would be provided on site and the project area would be surveyed and monitored daily to ensure no indigo snakes are present.

Southeastern beach mice could be directly impacted by equipment; however, due to the thickness of the vegetation and the type of soil, it is doubtful that the southeastern beach mouse is present.

Gopher tortoises would be vulnerable to mortality as a result of injuries sustained during activities such as vegetation clearing and grading. Any gopher tortoises present would be relocated safely out of the project area in accordance with the blanket Gopher Tortoise Relocation Permit prior to clearing activities.

Impacts to sea turtles as the result of exterior lighting would be reduced through adherence to the 45 SW exterior lighting policies. All exterior lighting for the substation will be included in the Operational EPF Light Management Plan (LMP), which will be approved by the U.S. Fish and Wildlife Service (USFWS).

In April 2007, the 45 SW Environmental Flight (45 CES/CEVP) reinitiated consultation with USFWS to incorporate the new substation into the existing Eastern Processing Facility (EPF) Biological Opinion, dated August 2005 (reference FWS Log No: 05-1077). USFWS concurred with the USAF that the proposed action would not result in any further "take" of the Florida scrub-jay, the southeastern beach mouse and the eastern indigo snake. Potential adverse impacts to biological resources would be avoided or minimized during construction activities associated with the proposed action through implementation of the terms and conditions of the original Biological Opinion. The construction of the substation or the associated power lines would not affect the five (5) year study to determine the effectiveness of different land management practices as a temporary management tool when prescribed burning has not occurred in scrub-jay habitat (Compartments 97 and 101).

Land disturbance activities have the potential to accelerate erosion. Prior to and during land clearing activities, erosion and sediment control measures would be designed and implemented to retain sediment on site. Any erosion that could cause adverse impacts to water resources would be mitigated by implementing best management practices, as applicable.

Cumulative adverse impacts were identified as having the potential to occur for Biological Resources. Potential environmental impacts of three projects were fully analyzed. Measures were identified during the formal/informal Section 7 consultation process with USFWS that minimized impacts to less than significant for each individual project. Since each of these projects would not have a significant impact to biological resources, individually, the cumulative impacts are not expected to be significant.

Based on my review of the facts and analyses contained in the attached Supplemental Environmental Assessment, conducted in accordance with the provisions of NEPA, the Council on Environmental Quality regulations, and 32 CFR 989, I conclude that the proposed action will not have significant environmental impacts, either by itself or cumulatively with other ongoing projects at Cape Canaveral Air Force Station. Accordingly, an Environmental Impact Statement (EIS) is not required. The signing of this Finding of No Significant Impact (FONSI) completes the environmental impact analysis process.

Carlos R. Cruz-González

CARLOS R. CRUZ-GONZALEZ
Colonel, USAF
Acting Director, Installations and Logistics

26 Feb 08

Date

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ACRONYMS AND ABBREVIATIONS

45 SW	45th Space Wing
45 SWI	45th Space Wing Instruction
45 CES	45th Civil Engineer Squadron
45 CES/CEV	45th Environmental Flight
BPA	Bonneville Power Administration
CEQ	Council on Environmental Quality
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
EPF	Eastern Processing Facility
ESA	Endangered Species Act
FAC	Florida Administrative Code
FDEP	Florida Department Protection Department
FONSI	Finding of No Significant Impact
ft	Feet
ft^2	Square Feet
FWCC	Florida Fish and Wildlife Conservation Commission
IRP	Installation Restoration Program
NAS	National Academy of Sciences
NEPA	National Environmental Policy Act
NIEHS	U.S. National Institute of Environmental Health Sciences
NRO	National Reconnaissance Office
OPlan	Operations Plan
OSL	Office of Space Launch
SARA	Superfund Amendments and Reauthorization Act
SJRWMD	St. Johns River Water Management District
U.S.	United States
USFWS	U.S. Department of the Interior, Fish and Wildlife Service

1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

The National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulations requires a lead agency to prepare an Environmental Assessment (EA) to evaluate the potential impacts of a Federal action on the surrounding environment. The United States (U.S.) Air Force is the lead agency for NEPA compliance on this proposed project. CEQ regulations require that an EA provide evidence and analysis to determine whether a Proposed Action might have significant effects that would require preparation of an Environmental Impact Statement (EIS). If the analysis determines that the environmental effects will not be significant, a Finding of No Significant Impact (FONSI) will be prepared.

An *Environmental Assessment for the New National Reconnaissance Office (NRO) Eastern Processing Facility (EPF)* was completed and a Finding of No Significant Impact (FONSI) was issued on 14 September 2005. The EPF EA analyzed the construction of a new Eastern Processing Facility (EPF) on Cape Canaveral Air Force Station (CCAFS), in Brevard County, Florida. Construction of the proposed facility commenced in the year 2006, with an estimated duration of twenty-four (24) months. Operations within the facility are expected to start some time in the year 2008.

Initial conversations with the 45th SW Civil Engineering Squadron (CES) indicated that the EPF could receive redundant 13.2kv feeds from the Cape North and South substation existing feeders; therefore, at the time of the issuance of the EPF EA, the NRO anticipated receiving power from existing infrastructure components. Consequently, the EPF EA addressed the infrastructure components, to include underground power, that were readily available in the vicinity of the site, as part of the design criteria. During the final design phase of the facility, it was determined that the HVAC equipment would require greater loads than anticipated and the existing infrastructure could not supply the required amount of power. The 45th CES has determined that the NRO could utilize the existing base power grid if a new substation dedicated to the EPF is constructed. The NRO has subsequently decided to propose proceeding with the design of a new substation.

This Supplemental EA has been prepared in accordance with the NEPA of 1969, as amended [42 U.S. Code (USC) 4321 et seq.]; as implemented by CEQ Regulations [40 Code of Regulations (CFR) Parts 1500-1508]; and U.S. Air Force Instruction (AFI) 32-7061, *Environmental Impact Analysis Process*, as amended by the interim change dated 12 March 2003, which adopted 32 CFR Part 989. Accordingly, this Supplemental EA analyzes the potential environmental consequences of constructing and operating the proposed substation. The environmental resources analyzed in this document reflect the unique features and the environmental setting of CCAFS and the surrounding region of influence (ROI).

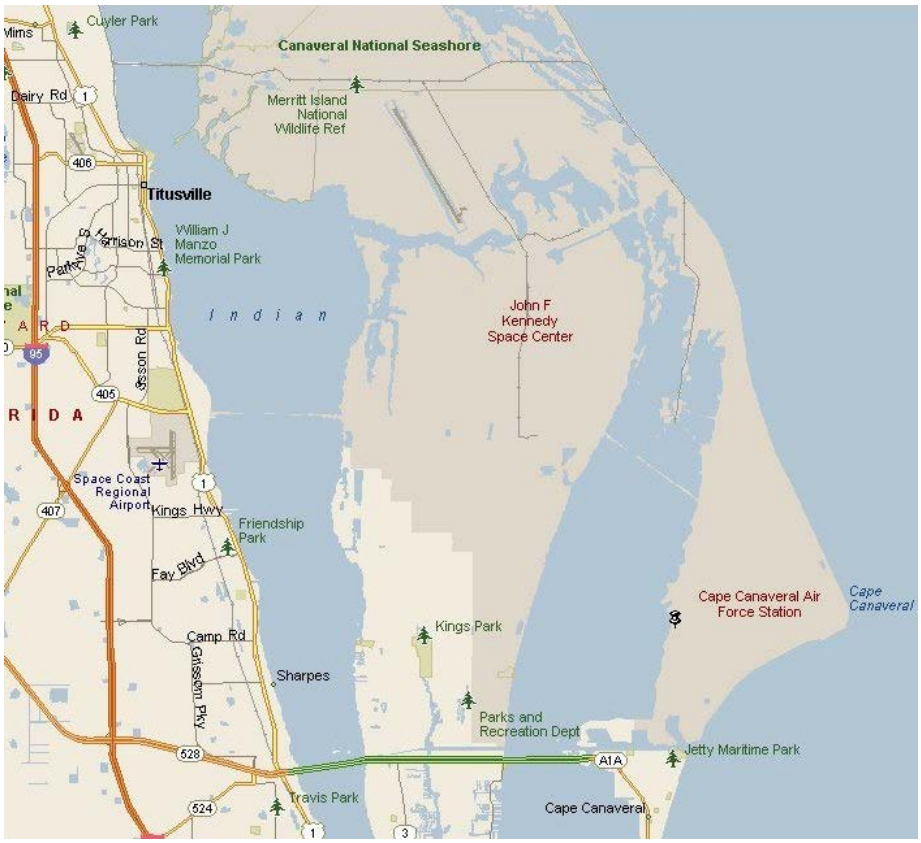
CCAFS provides space launch capability and support for the DoD and commercial launch customers. The EPF will support processing of satellites that use multiple launch vehicles and will provide operational flexibility by allowing the various programs to support their launch complex activities simultaneously. The substation is intended to provide more reliable electric service.

1.2 Project Location

CCAFS is located north of the city of Cape Canaveral on the east coast of Florida in Brevard County. CCAFS is on the Canaveral Peninsula, a barrier island located approximately 155 miles south of Jacksonville, 210 miles north of Miami, and approximately 60 miles east of Orlando. CCAFS occupies 15,804 acres of the barrier island. The installation is bounded on the north by the John F. Kennedy Space Center (KSC), a National Aeronautic and Space Administration (NASA) installation, on the west by the Banana River, on the south by Port Canaveral, and on the

east by the Atlantic Ocean. The nearest civilian community to CCAFS is the City of Cape Canaveral located south of Port Canaveral. Figure 1.1 shows CCAFS and the surrounding areas.

Figure 1.1 Area Map of Cape Canaveral Air Force Station



1.3 Purpose and Need of the Proposed Action

The proposed substation is intended to provide more reliable electric service to the Eastern Processing Facility (EPF). The growth in the electric load associated with the EPF cannot be supported by the existing transmission system at CCAFS. Additionally, this project will put transmission infrastructure in place for additional facilities in the future, as required.

1.4 Scope of the Supplemental Environmental Assessment

This Supplemental EA evaluates the potential impacts associated with the construction and operation of the substation, to include the associated transmission and distribution lines, and the measures developed to avoid, minimize, or offset adverse impacts as identified in this document. It is intended as an addendum to the EPF EA. Evaluation of impacts from the construction and operation of the EPF are discussed in the EPF EA and, consequently, are not further evaluated in this Supplemental EA.

This Supplemental EA considered eleven environmental resources to provide a context for understanding the potential effects of the proposed action and a basis for assessing the significance of potential impacts. Federal and state environmental statutes, which set specific guidelines, regulations, and standards, regulate most resource areas (see Section 1.5). These standards provide benchmarks for determining the significance of the impacts. The resource areas considered in this analysis include:

- Air Quality
- Biological Resources – vegetation and wildlife
- Cultural Resources
- Earth Resources – topography, geology and soils
- Environmental Justice
- Hazardous Materials and Waste Management
- Land Use
- Noise
- Socioeconomics
- Traffic and Transportation
- Utilities
- Water Resources – surface waters, groundwater, hydrology and water quality.

Chapter 2 of this Supplemental EA describes the proponent's proposed action and the no-action alternative. Additionally, environmental conditions that were eliminated from detailed analysis are outlined in Chapter 2. Chapter 3 provides an overview of the existing environmental conditions by resource area. Chapter 4 analyzes the consequences of implementing the proposed action and no-action alternative by applicable resource area. Only resources with the potential to be adversely affected are analyzed in detail in Chapter 3 and 4. In addition, Chapter 4 discusses potential cumulative impacts associated with implementation of the proposed action when considered in conjunction with other past, present and future projects.

1.5 Relevant Federal and State Regulations, Statutes and Permits

The representative federal and state regulations, statutes and permits that may be applicable for the proposed project were addressed in the Eastern Processing Facility (EPF) Environmental Assessment (EA), to include:

- Clean Air Act (CAA) of 1970
- Clean Air Act Amendments of 1990
- Clean Water Act (CWA) of 1977 as amended
- Archaeological Resources Protection Act (ARPA) of 1979, Supplemental Regulations of 1984
- National Historic Preservation Act (NHPA) of 1966 as amended
- Endangered Species Act (ESA) of 1973
- Migratory Bird Treaty Act of 1918 as amended
- Resource Conservation and Recovery Act (RCRA) of 1976
- Chapter 62-730.180, Florida Administrative Code

This list of regulations in the EPF EA is still valid and has not changed; therefore, they will not be re-addressed in this Supplement.

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2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter describes the site and construction requirements for the proposed substation and the alternatives that were considered during the preparation of this environmental assessment. Additionally, this chapter identifies the environmental conditions eliminated from detailed analysis in this Supplement. These conditions were addressed in the Eastern Processing Facility (EPF) Environmental Assessment (EA), are still valid and have not changed.

2.1 Site Requirements

To meet the site requirements of the substation, the following criteria must be considered:

- Utilities – Proximity to existing Florida Power & Light (FPL) Transmission Lines
- Lines of sight – Air Force instrumentation; Kennedy Space Center instrumentation; miscellaneous instrumentation systems
- Electromagnetic interference
- Air approach corridors – Vertical and horizontal clearances
- Transportation accessibility – Repair and maintenance of substation and transmission lines

2.2 Proposed Action

2.2.1 Description of Facility

As noted in Chapter 1, the proposed action is to construct a new substation to provide electrical power to the Eastern Processing Facility (EPF). This unmanned facility will be used for transformation, regulation and distribution of electricity. To reduce the potential of transmission line losses and to minimize the length of the new electrical line, the substation should be located in the general area of the EPF and near the Florida Power and Light's (FPL) main transmission line that runs adjacent to the Banana River. Under the proposed action, the substation would be situated within an approximately 2.5 acre tract located west of Samuel C. Phillips Parkway and directly east of the EPF. The substation site, approximately 170 by 300 feet, would require permanent clearing of undisturbed land, to include approximately 1.1 acres of scrub-jay habitat and 1.4 acres of Banana River maritime hammock. Construction of the substation and the associated transmission and distribution lines will take approximately six (6) to nine (9) months. The site would meet all of the requirements and criteria described in Sections 1.4 and 2.1 for the substation and site. Figure 2.1 and Figure 2.2 are maps of the project location, Figure 2.3 provides the proposed project layout, and Figure 2.4 shows the proposed action site plan.

Figure 2.1 Proposed Project Map

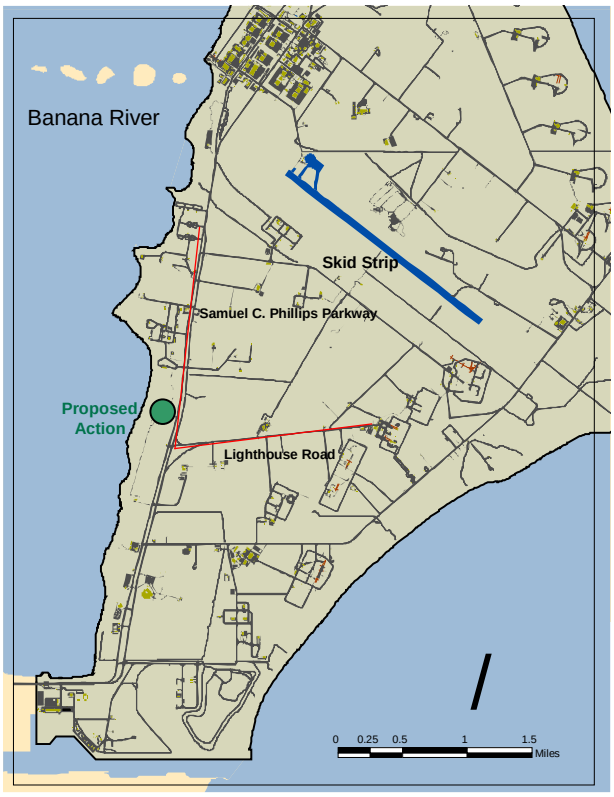


Figure 2.2 Proposed Project Location

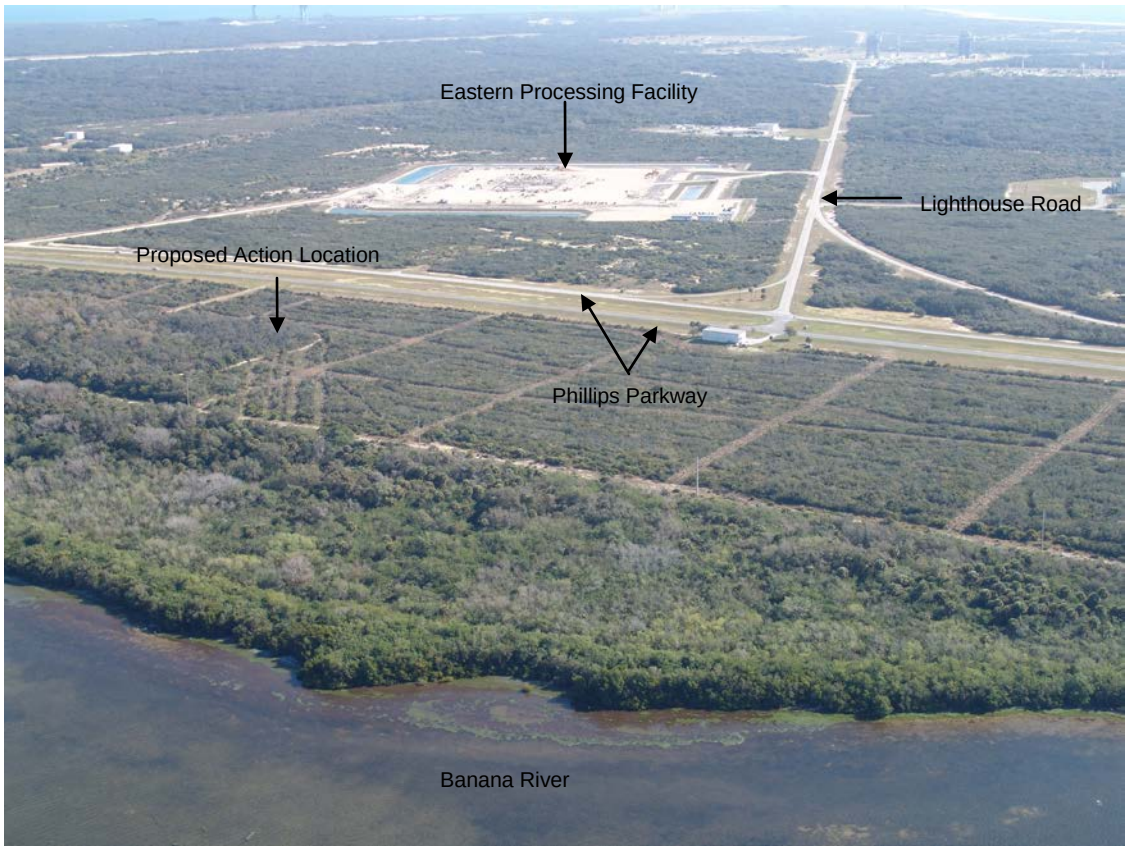


Figure 2.3 Proposed Project Layout

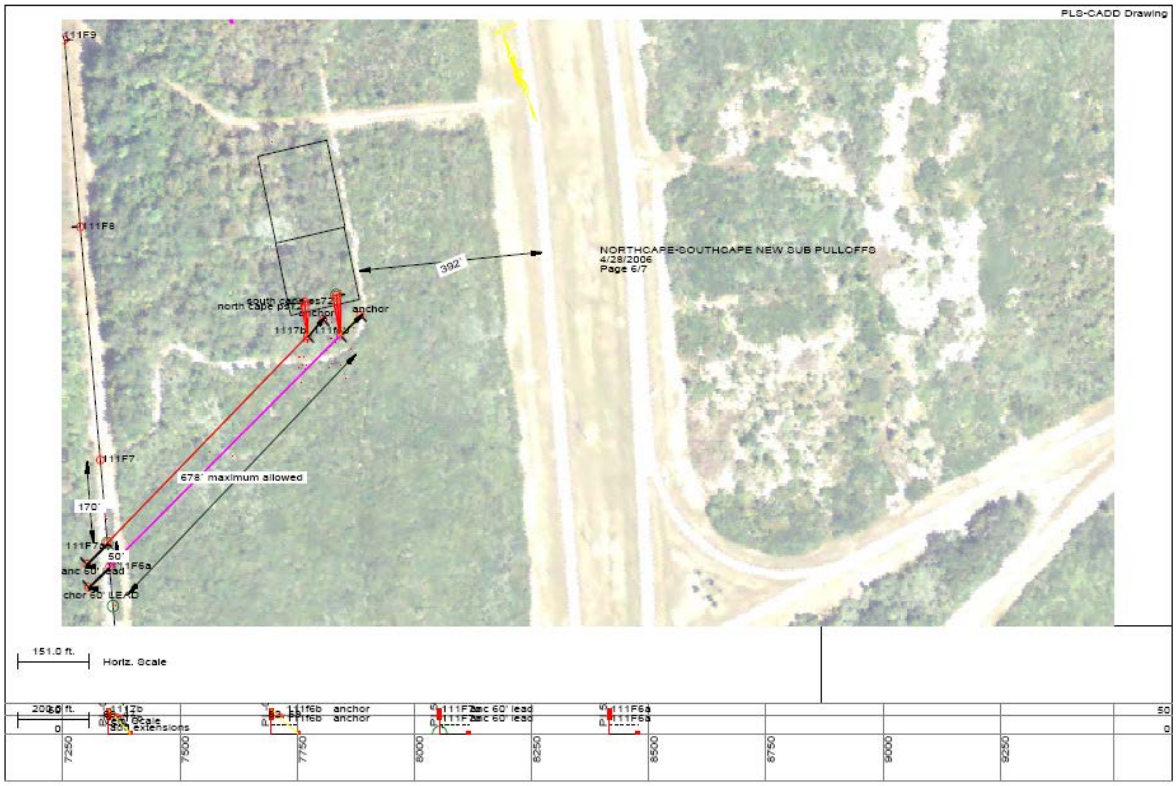
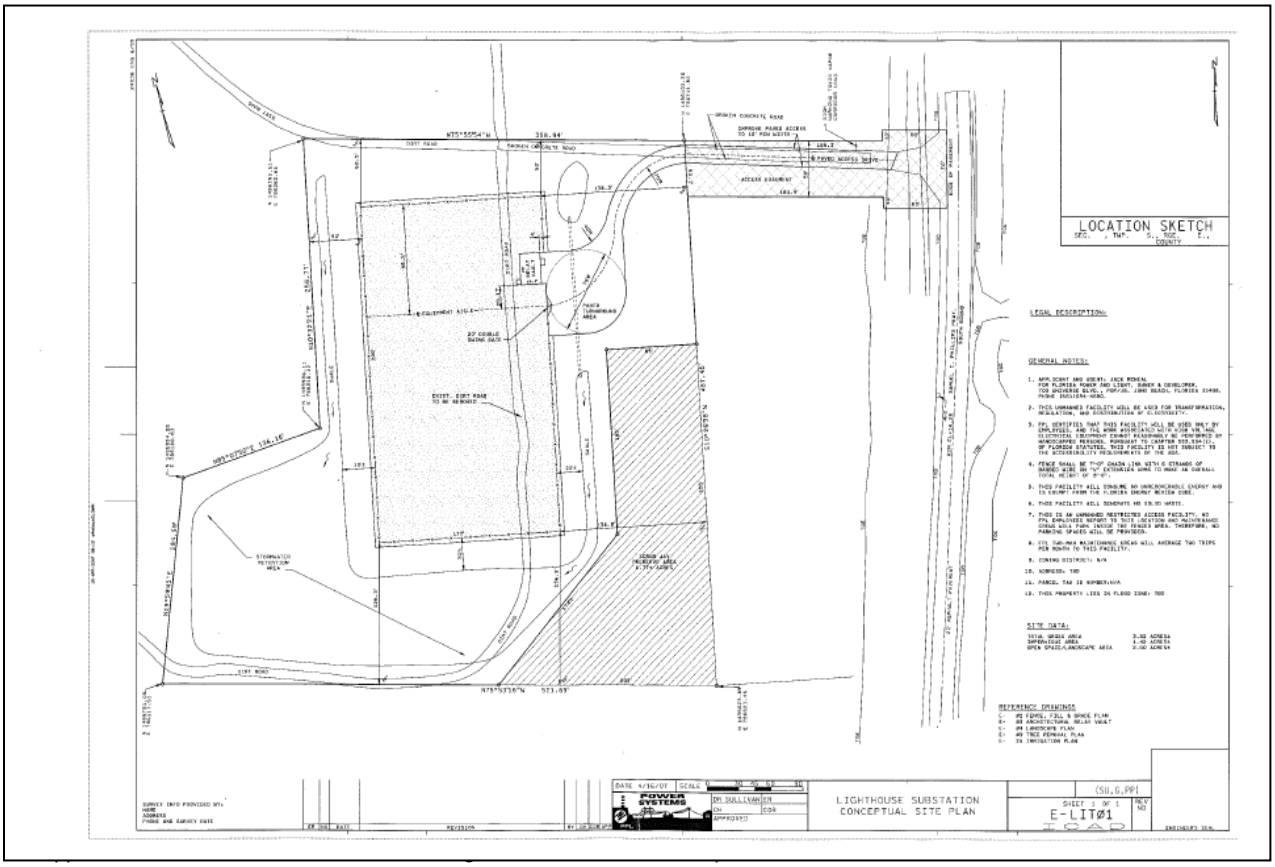


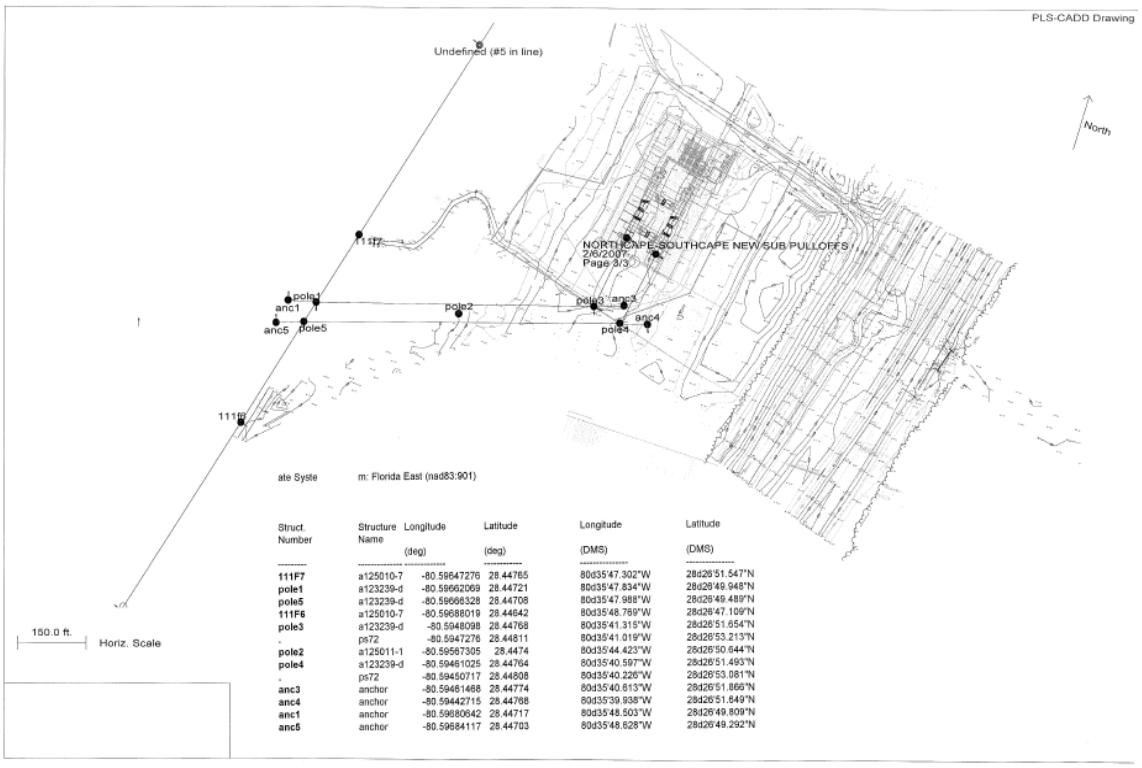
Figure 2.4 Proposed Action Site Plan



2.2.1.1 Transmission Lines and Poles

The electric power transmission system will consist of a 115 kV pole line that will connect to the existing Cape Loop. The overhead power lines will extend from the existing western FPL high voltage line to the substation, via two (2) lines, for a distance of approximately 678 feet (1.9 acres impacted). Two (2) concrete poles with two (2) anchors will be installed in the existing Cape Loop, and two (2) concrete poles with anchors will be installed adjacent to the substation. One (1) intermediate pole will also be installed. Figure 2.4 is a map of the pole locations. From the new poles, the overhead lines will connect to the 115 kV switches located inside the south end of the proposed substation. Pole foundations would be excavated by means of a truck-mounted auger. Depending on the soil conditions, water and driller's mud may have to be utilized. The actual setting depths are to be determined, but typically range from twelve (12) to seventeen (17) feet deep. Soil resulting from the excavations for the pole foundations would be relatively small in quantity and would be utilized to back-fill the holes. Overhead transmission lines are not insulated, so design of these lines requires minimum clearances to be observed to maintain safety. Pole height will be approximately sixty-five (65) feet.

Figure 2.6 Pole Locations



ate Syste m: Florida East (nad83:901)

Struct. Number	Structure Name	Longitude (deg)	Latitude (deg)	Longitude (DMS)	Latitude (DMS)
111F7	a125010-7	-80.59647276	28.44765	80d35'47.302"W	28d26'51.547"N
pole1	a123239-d	-80.59662069	28.44721	80d35'47.834"W	28d26'49.948"N
pole5	a123239-d	-80.59666328	28.44708	80d35'47.988"W	28d26'49.489"N
111F6	a125010-7	-80.59688019	28.44642	80d35'48.769"W	28d26'47.109"N
pole3	a123239-d	-80.5948098	28.44768	80d35'41.315"W	28d26'51.654"N
.	ps72	-80.5947276	28.44811	80d35'41.019"W	28d26'53.213"N
pole2	a125011-1	-80.59567305	28.4474	80d35'44.423"W	28d26'50.644"N
pole4	a123239-d	-80.59461025	28.44764	80d35'40.597"W	28d26'51.493"N
.	ps72	-80.59450717	28.44808	80d35'40.226"W	28d26'53.081"N
anc3	anchor	-80.59461468	28.44774	80d35'40.613"W	28d26'51.866"N
anc4	anchor	-80.59442715	28.44768	80d35'39.938"W	28d26'51.649"N
anc1	anchor	-80.59680642	28.44717	80d35'48.503"W	28d26'49.809"N
anc5	anchor	-80.59684117	28.44703	80d35'48.628"W	28d26'49.292"N

2.2.1.2 Substation Site and Equipment

For power to be useful at a facility, it comes off the transmission grid and is stepped-down to the distribution grid. This occurs at a power substation. Under the proposed action, the substation site, approximately 170 by 300 feet, would be located west of Phillips Parkway and east of an existing Florida Power and Light (FPL) corridor. The orientation of the substation structures on the site will be coordinated with the direction of the incoming and outgoing lines with all distances between adjacent structures and clearances properly dimensioned. The site will be built up to a final elevation of fourteen (14) feet with fill material, consisting of compacted limestone and sand, with a layer of number five (5) crushed rock or granite. Within this area, there will be multiple pilings and concrete slabs for equipment. A seven (7) foot chain link fence with six (6) strands of barbed wire on "v" extension arms would enclose the site. Approximately forty (40) feet around the substation site will be properly sloped for stormwater management, which will include stormwater retention ponds.

A concrete block building with relay equipment and battery bank will be constructed on the site. The following equipment would also be installed:

Number	Equipment Description
4	High Voltage Breakers – SF6 Gas Filled
5	Low Voltage Breakers – Vacuum
2	115kV – 13kV Transformers – Mineral Oil Filled
9	Regulators – Mineral Oil Filled
4	Station Service Transformers – Mineral Oil Filled
-	Associated Relays and Controls

This facility is an unmanned restricted access facility. No FPL employees are required to report to this location, and maintenance crews will park inside the fenced area; therefore, no parking spaces will be required.

2.2.1.3 Distribution Lines

Utilities use lower-voltage distribution lines to bring power from substations to the actual facility. Distribution lines operate at voltages below 50 kV. These levels are further reduced to 120/240 V once the power reaches its destination. The distribution lines associated with the proposed action will be installed underground, which provides potential benefits through:

- Beautification: Overhead wires can be considered unsightly
- Reliability Enhancements: Placing wires underground offers more protection from trees, wind and other damage during storms; however, power outrages may still occur if feeder cables or substations are damaged
- Elimination of Road Hazards: Elimination of road hazards/auto accident risks
- Reduction of Environmental Impacts: Reduction or elimination of tree trimming and vegetation removal

The electrical distribution system will consist of two (2) 13.2 kV underground supply circuits that will be routed through an underground conduit and manhole system to supply electricity to each of the buildings within the EPF complex.

A two (2) manhole system will be installed the entire length of the duct bank to allow the two (2) primary conductors separate manholes. A duct bank from the proposed substation will run along the existing access road to Phillips Parkway and then under Phillips Parkway. A manhole will be installed on the east side of Phillips Parkway. From that east side manhole, the duct bank will continue to the south end of the EPF west stormwater retention pond. This would require temporary clearing of undisturbed land, to include approximately 500 to 550 feet of scrub jay habitat. Vegetation would be allowed to grow back once the duct bank has been installed. The manhole near the south end of the retention pond will allow a sweep north to another manhole outside the west fence near the utility annex. All of the 13.2 kV distribution lines outside of the substation will be located underground until they reach the 13.2 kV pad mounted switches inside the fence at the EPF site. Then the lines will be re-routed underground. The 13.2 kV circuits will be connected to distribution transformers located at each building in the complex to convert the 13.2 kV supply voltage to the appropriate building utilization voltage (D. Barker, personal communication, Oct 2006). Spare conduits will be installed in the duct banks to support potential future expansion requirements.

2.2.1.4 Right-of-Way/Easements

The right-of-way is a strip of land that allows the utility to build, operate, and maintain its transmission lines. Subsequently, this enables the utility to keep the right-of-way clear of trees, structures, and fire hazards that could potentially compromise the reliability of the line and the safety of employees and the public. FPL will maintain the right of way. The area will not be a

paved surface. Management of vegetation within the cleared right of way would consist of an integrated management approach designed to encourage growth of the low growing plant species and discourage the growth of tall growing plant species. The majority of the lines will be over managed oak scrub (A. Chambers, personal communication, Oct. 2006). Due to the type of vegetation, right of way maintenance is expected to be minimal. FP&L has indicated that the width of the utility easement would be no greater than 110 feet, resulting in the removal of approximately 1.9 acres of treated scrub habitat.

2.2.1.5 Grounding

Good substation grounding is very important for effective relaying and insulation of equipment; but the safety of the personnel is the governing criterion in the design of substation grounding. Grounding generally consists of a bare wire grid, laid in the ground, with all equipment grounding points, support structures, fences, shielding wires and poles, and so forth, securely connected to it. Good overhead shielding is also essential for outdoor substations to eliminate the possibility of lightning directly striking the equipment. Shielding is provided by overhead ground wires stretched across the substation or tall-grounded poles.

2.2.1.6 Access Roads

Permanent access roads would be needed to allow vehicle access to the substation and other points along the right-of-way. FPL requires a seventy-five (75) feet turning radius on all roads leading to the station. The existing broken concrete access road, which runs east off of Phillips Highway, will be improved and expanded to sixteen (16) to twenty (20) feet wide to be able to accommodate large construction equipment and maintenance vehicles. This access road, which will meet Load Bearing Ratio (LBR) requirements, will ultimately connect Phillips Parkway to the gate of the substation.

2.2.2. Environmental Permitting

The following environmental permits would be required:

- Stormwater
  - National Pollutant Discharge Elimination System (NPDES) Construction Permit
  - Environmental Resource Permit (ERP)

2.3 Secondary Alternative

Under this alternative, the NRO would utilize the existing CCAFS system. Florida Power and Light (FPL) provides power and transmission systems at CCAFS and KSC. The USAF owns the distribution system. Currently at CCAFS, there are three (3) switching stations and four (4) substations, including the Delta substation. The Delta substation, which was constructed and funded by Boeing, connects directly to the transmission system and is not part of the local distribution system. The three (3) USAF substations have a capacity of fifty-five (55) megawatts (MW), and they are capable of providing 1,320 MWH/day. There are approximately 170 additional substations on CCAFS, which convert distribution voltage to user voltages (45 SW, 2002).

The increasing electrical load due to the construction/operation of the EPF could not be supported by the existing CCAFS system; therefore, system outrages, especially at times of high electricity use, could occur. This alternative was eliminated from analysis in this process because it was determined that the EPF HVAC equipment would require greater loads than anticipated, and the existing infrastructure could not supply the required amount of power.

2.4 No-Action Alternative

Under the no-action alternative, the substation would not be constructed. Thus, no ground or habitat disturbances would result. Under this alternative, there would not be adequate power to support operations at the EPF. No adverse environmental impacts would result from the implementation of the no-action alternative.

2.5 Issues Eliminated From Detailed Analysis

The following potential environmental consequences associated with the proposed project were addressed in the Eastern Processing Facility (EPF) Environmental Assessment (EA). The environmental analyses of the aforementioned consequences are still valid and have not changed; therefore, they will not be re-addressed in this Supplemental Environmental Assessment (EA).

- Air Quality
- Earth Resources
- Environmental Justice
- Land Use
- Recreation
- Traffic and Transportation
- Utilities
- Water Resources – Groundwater, Surface Water and Water Quality

Other environmental conditions were eliminated from detailed analysis due to the lack of significant impacts, to include:

- Aesthetics
- Cultural Resources
- Hazardous Materials and Waste Management (IRP)
- Socioeconomics

A Region of Influence (ROI) is the geographical area within which a federal action, program or activity may cause changes to the natural of manmade environment. The ROIs are described under each of the aforementioned resources, as applicable.

2.5.1 Aesthetics

The ROI for aesthetics at CCAFS includes the general visual environment surrounding CCAFS and areas of CCAFS visible from off-station areas. The barrier island on which CCAFS is located characterizes the visual environment in the vicinity. The Indian and Banana Rivers separate the barrier island from the mainland. The topography of the island is generally flat, with elevations ranging from sea level to approximately twenty (20) feet above sea level. The landscape is dominated by Florida coastal strand, coastal scrub, and coastal dune vegetation. The most visually significant aspect of the natural environment is the gentle coastline and flat island terrain. The area has a low visual sensitivity because the flatness of the area limits any prominent vistas. CCAFS is relatively undeveloped.

The most significant man-made features are the launch complexes and various support facilities. These developed areas are surrounded by disturbed grasses, oak hammocks, and scrub vegetation. Most of CCAFS outside of the developed areas is covered with native vegetation. Since public access to CCAFS is prohibited, viewpoints are primarily limited to marine traffic on the east and west, distant off-site beaches, and small communities to the south. Marine traffic is limited and public observation of the coastline is limited. From the south, launch complexes can be viewed from various beach areas and small communities including Port Canaveral and the cities of Cape Canaveral and Cocoa Beach.

The primary visual impact associated with the substation and associated transmission lines are from the substation equipment and the pole structures, which will be installed at various intervals. The wires result in much less of a visual impact. Distribution lines will be installed underground. Due to restricted public access onto CCAFS and the proposed location of the substation, the proposed action is not expected to adversely affect aesthetics.

2.5.2 Cultural Resources

Cultural resources include prehistoric and historic sites, structures, districts, artifacts, or any other physical evidence that human activity considered important to a culture, subculture or community for scientific, traditional, religious, or any other reasons. Numerous laws and regulations require that possible effects to cultural resources be considered during the planning and execution of federal undertakings.

For the purposes of this analysis, the term ROI is synonymous with the "area of potential effect" as defined under cultural resources legislation. In general, the ROI for cultural resources encompasses all areas requiring ground disturbance.

A Phase I cultural resources survey was completed at the proposed substation site in May 2006 (New South Associates 2006). There are twenty-three (23) previously recorded sites within a one-mile radius of the proposed substation site. Of these sites, twelve (12) have been identified as prehistoric, six (6) as historic, four (4) as containing both historic and prehistoric components, and one (1) was unspecified. One (1) recognized site (8BR85) occurs within the vicinity of the proposed site.

The archaeological survey encompassed approximately three (3) acres, in addition to several outlying points where FP&L will be placing new poles and/or anchors. All thirty-three (33) shovel tests within the three (3) acre site were negative for cultural material; however, one (1) early twentieth century clear glass bottle was encountered at the surface. No additional material was present in the vicinity. One location in the extreme northwestern corner of the proposed substation site was not surveyed due to its proximity to 8BR85. This area appears to be within the boundaries of 8BR85 (New South Associates, 2006).

Various locations southwest of the proposed substation site specified by FP&L for pole and guy wire placement were also surveyed. All five (5) shovel tests were negative for cultural remains.

Site 8BR85, known as the Burn Site or Burnhams Grove, lies directly adjacent and northwest of the proposed substation site. This multi-component site includes an earthen mound with prehistoric burials, historic settler's graves, and a variety of prehistoric and historic artifacts related to habitation in the area. The historic component includes two small historic cemeteries, refuse dumps, ruins of a firebox, remnant fruit trees, and ornamental plantings. Because of the nature of the remains known to be present, 8BR85 has been determined eligible for the National Register of Historic Places under all four eligibility criteria (A, B, C, and D). Additionally, because it is known to contain human remains the site possesses traditional cultural value to Native Americans, it has been recommended for avoidance, including any impacts associated with further archaeological investigation. The boundaries of this existing site were delineated so as to intentionally avoid the known limits of 8BR85.

All shovel tests dug in the proposed project area were negative for cultural remains. Additionally, no evidence of 8BR85 or any other archaeological sites or structures were found during the investigation. Initially, the substation was sited west of the proposed location; however, as a result of the Phase I survey and to avoid potential site disturbance, the substation location was moved slightly to the east. The proposed relocation of the substation allowed the US Air Force to remain in compliance with the Native American Graves Protection and Repatriation Act (NAGPRA) and the Archaeological Resource Protection Act (ARPA). Additionally, a section of untreated scrub habitat is left in place to protect the cultural resources in the area.

In November 2006, an intensive cultural resource assessment survey was completed for the powerline corridor (New South Associates, 2006a). The new corridor is directly adjacent to the proposed NRO substation parcel previously surveyed and is approximately 205-meter long by 30-meter wide. All seven (7) shovel tests within the corridor were negative for cultural material. All testing was negative and no further work is recommended.

The proposed action will have no adverse effect on any significant cultural resources listed or eligible for listing in the National Register of Historic Places.

2.5.3. Hazardous Materials and Waste Management

2.5.3.1. Installation Restoration Program

The Installation Restoration Program (IRP) is an Air Force program that identifies, characterizes, and remediates past environmental contamination on Air Force installations. The program has established a process to evaluate past disposal sites, control the migration of contaminates, and control potential hazards to human health and the environment. In general, the ROI encompasses all areas requiring ground disturbance, to include the groundwater below, and immediate surrounding areas.

There is no known soil or groundwater contamination or monitoring wells in the proposed action site (T. Fiorillo, personal communication, Sept 2006).

2.5.4. Socioeconomics

In the 1950s, several agencies began launching rockets from Cape Canaveral. At its peak during the Apollo era in 1968, the space industry employed nearly thirty (30) percent of Brevard County's workforce. While the Brevard economy has diversified, the space program still accounts for roughly eight (8) percent of local employment.

CCAFS has no military or private housing. The nearest military housing is located at Patrick Air Force Base (PAFB) where 1,500 military family housing units support 3,500 military personnel and their dependents. Incorporated cities within Brevard County include Cape Canaveral, Titusville, Cocoa, Melbourne, West Melbourne, Palm Bay, Cocoa Beach, Indialantic, Indian Harbor Beach, Malabar, Satellite Beach and Rockledge.

The issue whether high voltage transmission lines adversely affect property value has been a controversial topic for many years. The following discussion of property value impacts was prepared by Thomas A. Jaconetty and was published in May/June 2001 edition of the *Assessment Journal*. It has been reproduced herein below in whole:

> *An early analysis of 791 residences in seventeen Hartford, Connecticut, subdivisions in the late 1960s found that "sale prices did not vary perceptibly with closeness to a tower line right-of-way" (Kinnard 1967). A mid-1980s study of Wisconsin rural property also indicated virtually no adverse impact (Solom 1985). Similarly, a 1986-91 review of forty-six parcels in Michigan concluded, "[A] strong relationship between sales prices of recreational acreage and private disclosure of a power transmission line cannot be clearly established." Either value is "not being influenced or [it is not] readily measurable" (Rigdon 1991). One contemporaneous commentator said, "[It does not appear that the public recognizes a substantial detriment to value due to proximity of power lines" (Beasley 1991).4*
>
> *However, there have been several other noteworthy studies. One estimated a valuation loss of only 2-3 percent for properties in very close proximity to such lines (Colwell and Foley 1979; Colwell 1990). Another suggested a loss of about 10 percent (DeLaney and Timmons 1992). So did a 1993 review of 100 Houston residential properties that abutted a power line corridor, which found that there was a measurable loss of value relative to non-abutting peer properties (Bolton and Sick 1999; Bolton 1994). A late 1994 California matched-sales analysis showed that vacant lot values were adversely affected by 18-53.8 percent (Bolton and Sick 1999, 336).*
>
> *An extensive evaluation of 12,907 residential real estate transactions in Vancouver, British Columbia, from 1985 through 1991 established "an undeniable drop in value ... [of] 6.3 percent ... due to proximity and visual impact" (Bolton and Sick 1999, 334, citing Hamilton and Schwann). Research in Portland, Oregon, published in 1996, indicated a 0-*

> *10 percent reduction in value for single family residential property, but greater negative effects on intensively managed agricultural property and on rural vacation home developments (Bolton and Sick 1999, 334-35). In 1997, the Lower Colorado River Authority commissioned a study to evaluate the influence of transmission lines in and around Georgetown, Texas. More than 100 real estate transactions, covering eight different residential subdivisions and vacant parcels, were considered. On balance, it concluded that "an electric transmission line easement has less than a 10% impact on price" (Bolton and Sick 1999, 336).*
>
> *Considering all of the market evidence, a value loss of less than 10 percent may be a reasonable expectation for residential properties. The negative impact is possibly greater for other types of properties.*

Mitigation for socioeconomic effects is typically identified when a proposed action would directly or indirectly result in substantial changes in the availability of employment, housing or services. Since the magnitude of the project is small, it is anticipated that already employed personnel working in the local or nearby areas would accomplish all work. The proposed action would occur within the boundary of CCAFS. Since there is no residential property located on CCAFS, the high voltage lines will not impact any residential property value. No adverse impacts are anticipated.

3.0 AFFECTED ENVIRONMENT

This chapter describes the environmental setting where the proposed action is planned. The environmental resources analyzed in this chapter include:

- Biological Resources
- Hazardous Materials and Waste Management
- Noise
- Water Resources - Stormwater
- Post Construction Conditions – Electromagnetic Fields and Radio and Television Interference

3.1 Biological Resources

The biological resources examined include vegetation, wildlife, threatened and endangered species, and species of special concern. The ROI for vegetation covers the land directly affected by construction activities associated with the proposed action and extends fifty (50) feet beyond the construction disturbance limit to account for potential effects on vegetation within the vicinity of the project area. The ROI for threatened and endangered species and species of special concern covers the entire Air Force Station due to the potential cumulative impacts associated with other projects.

The Cape has been divided into 132 Land Management Units (LMU) to enable better management of the land. Natural resource management units on CCAFS are the same units identified on the Burn Compartments Map, Figure 3.1. Since a vast majority of CCAFS is within the same basic ecosystem, resource management units based on habitat types would be too large to effectively manage; therefore, to facilitate overall unit management, the 133 prescribed burning compartments have been adopted as resource management units (45 SW, 2001). The proposed substation is located in the north central portion of CCAFS LMU 101.

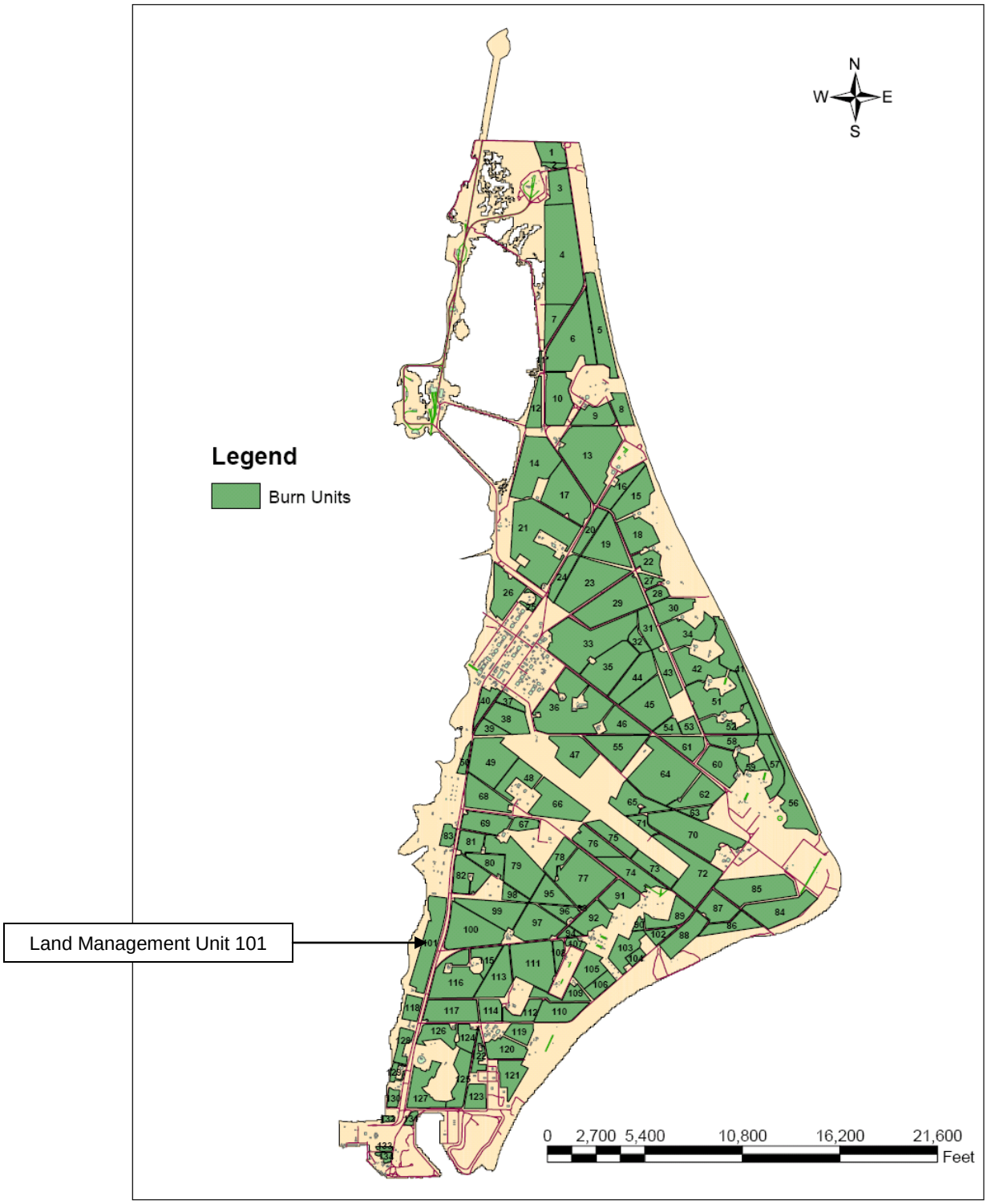
3.1.1. Vegetation

The proposed substation site consists of Banana River maritime hammock and both treated and untreated oak scrub (A. Chambers, personal communication, July 2007). Descriptions of these vegetation types were discussed in the EPF EA; therefore, this information will not be repeated in this Supplement.

Oak scrub is fire-maintained on CCAFS through prescribed burn management The CCAFS Integrated Natural Resources Management Plan includes the burn plan to manage oak scrub. The majority of the area where the substation is being proposed is not part of the scrub restoration program due to the type of vegetation that is present. Additionally, this area serves as a buffer to an archaeological site, as described in Section 2.5.2. LMU 101 was cut and burned in 1995, and an additional eighty (80) acres were burned again in 2000. Vegetation height is optimal for scrub-jay use; however, the vegetation is fairly thick (A. Chambers, personal communication, April 2007).

Figure 3.1

CCAFS Burn Compartment Map



3.1.2 Wildlife

Typical wildlife species that would be expected to occur within the scrub oak habitat are similar at the EPF site and the proposed substation site. Such species include the Virginia opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), Eastern spotted skunk (*Spilogale putorius*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), Southeastern pocket gopher (*Geomys pinetis*), Eastern cottontail rabbit (*Sylvilagus floridanus*), brown anole (*Anolis sagrei*) and Southern black racer (*Coluber constrictor*). Additionally, numerous species of birds protected by the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 USC 703-712), occur on or near the proposed action site, to include the mourning dove (*Zenaida macroura*), house wren (*Troglodytes aedon*), loggerhead shrike (*Lanius ludovicianus*), brown thrasher (*Toxostoma rufum*) and Eastern towhee (*Pipilo erythrophthalmus*).

3.1.3 Threatened and Endangered Species and Species of Special Concern

Three (3) federally listed, the eastern indigo snake, Florida scrub-jay and southeastern beach mouse, and one (1) state listed species, the gopher tortoise, have the potential to occur within the proposed action site. Descriptions of these various threatened and endangered species and species of special concern are provided in the EPF EA; therefore, this information will not be repeated in this Supplement.

3.1.3.1 Eastern Indigo Snake

Due to the type of habitat, the Eastern indigo snakes (*Drymarchon corais couperi*) could possibly inhabit this area.

3.1.3.2 Florida Scrub-Jay

The nearest group of Florida scrub-jays (*Aphelocoma coerulescens*) is approximately 600 feet to the north in LMU 101, per 2007 census data. The second nearest group is located approximately 0.6 miles to the south, which is located on the extreme southern edge of LMU 101. According to the Florida Natural Areas Inventory, the substation site is on the periphery of these two (2) groups' territories. The groups may occasionally fly into the area, but do not utilize the area regularly (A. Chambers, personal communication, April 2007).

3.1.3.3 Southeastern Beach Mouse

Due to the thickness of the vegetation and the type of soil, it is doubtful that the southeastern beach mouse (*Peromyscus polionotus niveiventris*) is present. Recent surveys of the area did not result in any observations of small mammal burrows (A. Chambers, personal communication, April 2007).

3.1.3.4 Gopher Tortoise

Due to the type of habitat, there is a potential for gopher tortoises (*Gopherus polyphemus*) to be located at the proposed action site.

3.2 Hazardous Materials and Waste Management

In this section, hazardous material management and hazardous waste management are discussed.

3.2.1 Hazardous Material Management

Hazardous materials are those substances defined as hazardous by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Toxic Substances Control Act (TSCA), and the Hazardous Materials Transportation Act (HMTA). In general, this includes substances that, because of their quantity, concentration, or physical, chemical or infectious characteristics, may present substantial danger to public health or welfare or the to environment when released.

Numerous types of hazardous materials are used to support the various mission and general maintenance operations at CCAFS. These materials range from common building paints to

industrial solvents and hazardous fuels. Management of hazardous materials, excluding hazardous fuels, is the responsibility of each individual or organization.

Under Spill Prevention, Control and Countermeasures (SPCC) regulations (40 CFR 112,7(c)), secondary containment is a requirement for all bulk storage facilities, large or small, manned or unmanned, and for facilities that use oil-filled equipment. The containment must at least provide for the capacity of the largest single container with sufficient freeboard for precipitation (generally designed at 110% capacity). The CCAFS Spill Prevention, Control and Countermeasures (SPCC) Plan is contained in the 45 SW *Full Spectrum Threat Response* (FSTR) Plan Volume II, Attachment 4. This Plan defines oil spill prevention and containment procedures at CCAFS. The 45th Space Wing Environmental Flight (45 CES/CEVC) is responsible for the overall implementation of these plans. Facility operators and managers of regulated storage systems must have the proper training, equipment, containment facilities, and other resources necessary to implement the spill prevention measures described within the plan.

Spills of hazardous materials are covered under the 45 SW *Full Spectrum Threat Response* (FSTR) Plan 10-2, Volume II, *Hazardous Material (HAZMAT) Emergency Planning and Response*, which establish roles and responsibilities, outlines regulatory guidelines, directs specific activities of personnel responding to an incident and assists in planning the prevention of accidental releases (45 SW, 2005a).

3.2.2 Hazardous Waste Management

Hazardous waste is generated on CCAFS. The collection, management, transportation, and disposition of the hazardous waste are defined and regulated by the Resource Conservation and Recovery Act (RCRA), Federal Hazardous and Solid Waste Amendments of 1984, as amended, and other applicable state and federal regulations. Used oil is specifically regulated under Chapter 62-710, Florida Administrative Code, *Used Oil Management*. OPlan 19-14, *Waste Petroleum Products and Hazardous Waste Management Plan*, establishes the specific processes and requirements for the management of hazardous waste and used oil on CCAFS.

3.3 Noise

Noise is usually defined as unwanted sound. The characteristics of sound include parameters such as amplitude, frequency and duration. The decibel (dB) scale, a logarithmic rating system that accounts for large differences in audible sound intensities, is typically used to describe sound. This scale accounts for the human perception of a doubling of loudness as an increase of 10 A-weighted decibels (dBA). For example, a 70-dBA sound level sounds twice as loud as a 60-dBA sound level. Levels (L levels) have been developed to account for fluctuating sound levels. L_{eq} is the average A-weighted noise level measured over a given period of time. A-weighting is a standard filter used in acoustics that approximates human hearing and in some cases is the most appropriate weighting filter when investigating the impacts of noise on wildlife and humans. For example, a L_{eq1H} of 45.3 dB is what would be measured if a sound measurement device was placed in a sound field of 45.3 dB for one hour. However, this is not what happens during real sound measurements. When a L_{eq1H} level of 45.3 dB is measured, the sound level has fluctuated above and below 45.3 dB, but the average during the hour is 45.3 dB, hence, A-weighted. L_{eq} measurements can also be specified for other time periods, such as 8 or 24-hour periods. Table 3.1 lists examples of A-weighted noise levels for various common sources.

Table 3.1 Comparative A-weighted Sound Levels

Noise Level (dBA)	Common Noise Levels	
	Indoor	Outdoor
100-110	Rock band inside New York subway	Jet flyover at 304 meters
90-100	Food blender at one meter	Gas lawnmower at 1 meter
80-90	Garbage disposal at one meter	Diesel truck at 15 meters
70-80	Shouting at one meter	Gas lawnmower at 30 meters
60-70	Normal speech at one meter	Commercial area heavy traffic at 100 meters
50-60	Large business office	
40-50	Small theater (background)	Quiet urban nighttime
30-40	Library (background)	Quiet suburban nighttime
20-30	Bedroom at night	Quiet rural nighttime
10-20	Broadcast and recording studio (background)	
0-10	Threshold of hearing	

Source: Final EA New NRO EPF, 2005.

Various other factors affect potential noise impacts, to include: distance from the source, frequency of the sound, absorbency of the ground, the presence of obstructions, and the duration of the sound.

3.4 Water Resources

Water resources include groundwater and surface water and their physical, chemical, and biological characteristics; however, since there are no adverse impacts associated with groundwater and surface water, this section only addresses stormwater. There are no wetlands within the proposed action site (A. Chambers, personal communication, Oct. 2006).

3.4.1 Stormwater Management

Generally, St. Johns River Water Management District (SJRWMD) issues the Environmental Resource Permit (ERP), which includes stormwater and wetlands management, in coordination with the Florida Department of Environmental Protection (FDEP) and the U.S. Army Corps of Engineers. However, SJRWMD and FDEP have entered into an operating agreement titled *Operating Agreement Concerning Regulation under Part IV, Chapter 373, F.S., and Aquaculture General Permits under Section 403.814, F.S., Between St. Johns River Water Management District and Department of Environmental Protection*, regarding their respective authority pertinent to permitting, compliance and enforcement. Under this agreement, FDEP is responsible for reviewing and issuing the ERP for projects involving power plants and electrical distribution and transmission lines.

FDEP is responsible for management of the National Pollution Discharge Elimination System (NPDES) permit process and wastewater discharges. The operator of a regulated construction site must obtain a NPDES stormwater permit and implement appropriate pollution prevention techniques to minimize erosion and sedimentation and properly manage stormwater. The permit required under FDEP's NPDES program is separate from the Environmental Resource Permit. The NPDES stormwater program for construction activity regulates projects disturbing one acre or more. The program regulates storm water discharges to surface water of the State or into municipal separate storm sewer systems. Additionally, this permit requires the preparation of a Stormwater Pollution Prevention Plan (SWPPP).

The CCAFS watershed consists primarily of undeveloped scrub and forest vegetation with a flat topography. The installation also includes cleared grounds of turf grasses and herbaceous weeds, storage yards, a landfill, a skid strip, roadways and parking, and numerous administrative processing and launch facilities. These latter areas produce the vast majority of stormwater runoff and have the potential to contribute significantly to non-point pollution in surrounding surface waters. The potential for stormwater non-point source pollution at CCAFS is minimized

by storage of runoff in retention ponds and swales and best management practices to reduce exposure of potential contaminates to stormwater.

3.5 Post Construction Conditions

3.5.1 Electromagnetic Fields

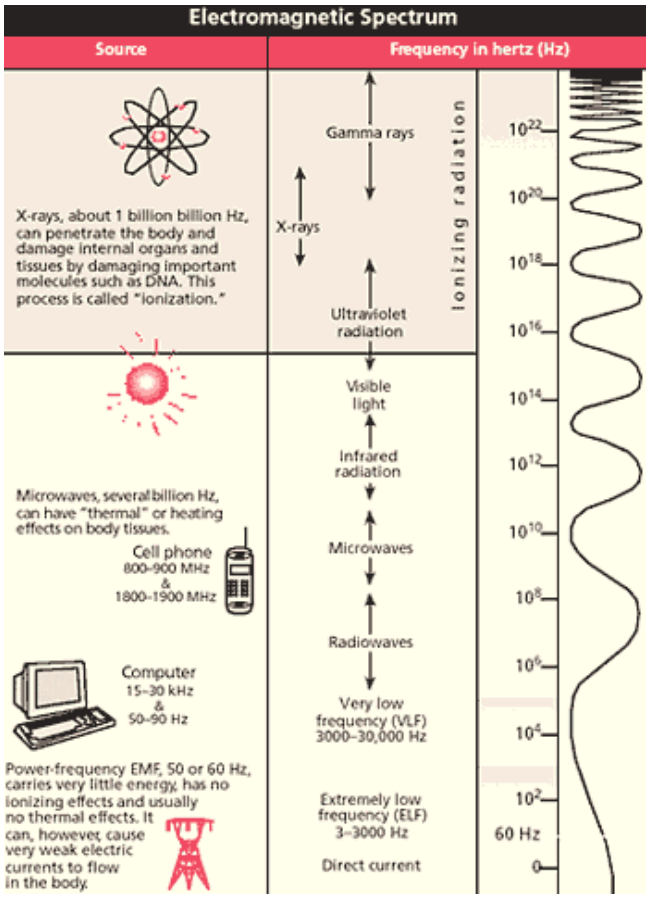
Electromagnetic Fields (EMF) refers to electric and magnetic fields, which are invisible lines of force that surround any electrical device, such as a power line, electrical wiring, or an operating appliance. EMF also occurs both naturally and as a result of human activity. Naturally occurring EMFs include those related to weather and the earth's magnetic field. Televisions, microwaves, copiers, computers, automobile engines, cellular phones and all other devices that use man-made energy to operate produce electromagnetic fields.

Electric fields exist whenever a positive or negative electrical charge is present. Any electrical wire that is charged will produce an associated electric field, and the field will exist even when there is no current flowing. The strength of the electric field is measured in volts per meter (V/m). The strength of the voltage and the electric field are directly related. Electric fields are strongest close to a charge or charged conductor, and their strength rapidly diminishes with increased distance. Conductors, such as metal, shield electric fields very effectively. Other materials can provide some shielding capability. For example, the electric fields from power lines outside a building are reduced by the walls and surrounding trees. The electric fields of buried powered lines are hardly detectable at the surface.

Magnetic fields are a result of the motion of electric charges. In contrast to electric fields, a magnetic field is only produced once a device is switched on and current flows. The strength of the magnetic field is measured in amperes per meter (A/m). At low frequencies, such as power line frequencies, magnetic flux units are more commonly used; therefore, the magnetic field is generally expressed in mG (milliGauss). The strength of the magnetic field becomes greater as the current increases. However, both electric and magnetic fields weaken with increasing distance from the source.

Electric and magnetic fields are characterized by frequency and wavelength. The frequency is measured by the number of cycles per second. One cycle per second equals one Hertz (Hz). Wavelength is the distance that a wave travels in one cycle of oscillation or the distance between a peak on the wave and the next peak of the same polarity. The distance between one wave and the next is shorter as the frequency increases. This results in a greater amount of energy in the field. For example, microwave frequency fields, with wavelengths of several inches, have enough energy to cause heating in conducting material. Still higher frequencies, such as X-rays, cause ionization, the breaking down of molecular bonds, which damage genetic material. In comparison, power frequency fields have wavelengths of more than 3100 miles (5000 km) and consequently have very low energy levels that do not cause heating or ionization. As described above, natural and human-generated EMFs encompass a broad frequency spectrum. Electric power is in the extremely low frequency range that includes frequencies below 3000Hz. In the United States, the electric power system operates at 60 Hz. Figure 3.2 illustrates the electromagnetic spectrum.

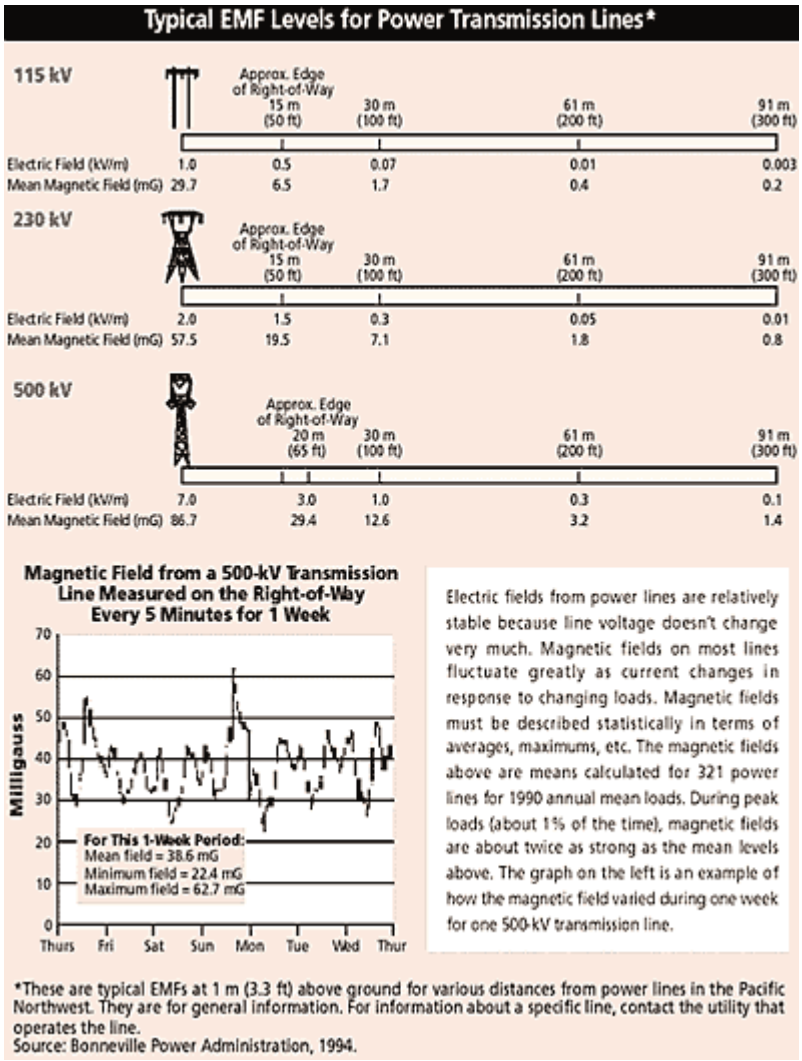
Figure 3.2 Electromagnetic Spectrum



Power transmission lines bring power from a generating station to an electrical substation. The power distribution lines bring power from the substation to the building. Transmission and distribution lines can be either located overhead or underground. Overhead lines produce both electric fields and magnetic fields. Underground lines do not produce electric fields above ground; however, they may produce magnetic fields above ground.

Typical EMF levels for transmission lines are shown on Figure 3.3. At a distance of 300 feet and at times of average electricity demand, the magnetic fields from many lines can be similar to typical background levels found in most homes. The distance at which the magnetic field from the line becomes indistinguishable from typical background levels is dependent on the type of line. In general, the strongest EMFs around the outside of a substation are from the power lines entering and leaving the station. The EMF strength from the substation equipment, such as transformers, reactors and capacitors, decreases rapidly with increasing distance. EMF produced by the substation equipment is typically indistinguishable from background levels beyond the substation fence or wall.

Figure 3.3 Typical EMF Levels for Power Transmission Lines



Typical voltage for power distribution lines range from 4 to 24 kilovolts (kV) in the United States. Electric field levels directly beneath overhead distribution lines can vary greatly from a few volts per meter to 100 or 200 volts per meter. Magnetic fields directly beneath overhead distribution lines typically range from 10 to 20 mG for main feeders and less than 10 mG for laterals. These levels are also applicable directly above underground lines. However, peak EMF levels can vary considerably depending on the amount of current carried by the line. For example, peak magnetic field levels have been measured as high as 70 mG directly below overhead distribution lines and as high as 40 mG above underground lines (National Institute of Environmental Health Services, 2002).

Currently in the United States, there are no federal standards limiting occupational or residential exposure to 60-Hz EMF in the United States. However, at least six states have set standards for transmission line electric fields, and two states have also set standards for magnetic fields, as shown in Figure 3.4.

Figure 3.4 State Transmission Line Standards and Guidelines

State Transmission Line Standards and Guidelines				
	Electric Field		Magnetic Field	
State	**On R.O.W.***	**Edge R.O.W.**	**On R.O.W.**	**Edge R.O.W.**
Florida	8 kV/m[a] 10 kV/m[b]	2 kV/m	-	150 mG[a] (max. load) 200 mG[b] (max. load) 250 mG[c] (max. load)
Minnesota	8 kV/m	-	-	-
Montana	7 kV/m	1 kV/m[e]	-	-
New Jersey	-	3 kV/m	-	-
New York	11.8 kV/m 11.0 kV/m[f] 7.0 kV/m[d]	1.6 kV/m	-	200 mG (max. load)
Oregon	9 kV/m	-	-	-

*R.O.W. = right-of-way (or in the Florida standard, certain additional areas adjoining the right-of-way).
kV/m = kilovolt per meter. One kilovolt = 1,000 volts.
[a] For lines of 69-230 kV.
[b] For 500 kV lines.
[c] For 500 kV lines on certain existing R.O.W.
[d] Maximum for highway crossings.
[e] May be waived by the landowner.
[f] Maximum for private road crossings.

Florida has established state transmission line standards and guidelines for electric fields in regards to the right-of-way and has set standards for electric and magnetic fields for designated areas adjoining the right-of-way. The maximum fields permitted by Florida are the maximum fields that existing lines produce at maximum load-carrying conditions.

There have been numerous studies completed regarding the possible health affects of EMFs. In 1992, the U.S. Congress authorized the Electric and Magnetic Fields Research and Public Information Dissemination Program, EMF-RAPID Program, in the Energy Policy Act. The Congress instructed the National Institute of Environmental Health Sciences (NIEHS), National Institutes of Health and the U.S. Department of Energy (DOE) to develop and implement a program of research and analysis aimed at providing scientific evidence to clarify the potential for health risks from exposure to extremely low frequency electric and magnetic fields (ELF-EMF). In response to the legislation in the Energy Policy Act, the U.S. Department of Energy requested the National Academy of Sciences (NAS) to review the literature on the possible health risks of residential exposure to power-frequency EMF. In 1996, the National Research Council Committee of the National Academy of Sciences (NAS) released its report and concluded there was not any consistent evidence that linked exposures to residential EMF with cancer, adverse neurobehavioral effects, or reproductive and developmental impacts. The 1999 National Institute of Environmental Health Sciences (NIEHS) report, *NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields*, also concluded that evidence linking EMF exposure with cancer was weak and could not be confirmed. EMF studies still continue and the issue remains a controversial topic in the scientific community and other public forums.

3.5.2 Radio and Television Interference

Radio and television interference associated with transmission lines is generally due to either corona or “spark gap” discharges. When the electric field at the surface of a conductor reaches a critical surface voltage gradient, the air immediately surrounding the conductor will break down and an electrical discharge, know as corona, will be initiated from the conductor into the

surrounding air. The intensity of the corona increases with the voltage of the line and is dependent on the conductor diameter, conductor surface roughness condition and ambient weather conditions, such as rain, fog or dust. Radio reception in the AM broadcast band is most often affected by corona-generated interference. FM radio reception is rarely affected. Television interference caused by corona discharges occurs during bad weather and is generally only a concern for conventional receivers within about 600 feet of the transmission line. Cable and satellite television receivers are not affected.

"Spark gap" results from the electrical breakdown of air between closely spaced parts on a transmission line. If the connection that usually bonds two parts electrically is broken, then a voltage can develop across an air gap. If the voltage is sufficient to cause a spark across the gap, then radio interference and television interference would result. Spark gap discharges are a more common source of radio and television interference. Gap discharge interference is easy to detect and can be corrected by re-establishing the electrical bond or replacing the damaged equipment..

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter presents the results of the analysis of potential environmental consequences associated with the proposed project activities. Each section within this chapter discusses a separate resource area and describes the potential impacts resulting from implementation of the proposed action and no-action alternative. Measures to offset impacts are described, where applicable.

Potential environmental consequences outlined in the chapter include:

- Biological Resources
- Hazardous Materials and Waste Management
- Noise
- Water Resources - Stormwater
- Post Construction Conditions - Electromagnetic Fields and Radio/Television Interference
- Cumulative Effects

4.1 Biological Resources

A Biological Opinion (BO) was issued from the US Fish and Wildlife Service (USFWS) for the Eastern Processing Facility (EPF) in August 2005 (reference FWS Log No: 05-1077), Appendix A. After the aforementioned BO was issued, it was determined that a new electrical substation was required to be constructed to provide sufficient power to the EPF. Additionally, as a result of the EPF BO issued by USFWS on 01 August 2005, the NRO is funding and conducting a five-year scrub management technique study in Compartments 97 and 101 to determine the effectiveness of mechanical clearing and burning techniques in relation to the management of scrub on CCAFS (USFWS, 2005). Only three (3) acres of the 107-acre study site will be impacted by construction of the substation.

In April 2007, the 45 SW Environmental Flight (45 CES/CEVP) reinitiated consultation with USFWS to incorporate the new substation into the existing BO, Appendix B. Section 7 consultation with USFWS was completed in June 2007. USFWS concurred with the USAF that the proposed action does not result in any further “take” of the Florida scrub-jay, the southeastern beach mouse and the eastern indigo snake. Potential adverse impacts to biological resources would be avoided or minimized during construction activities associated with the proposed action through implementation of the project constraints, monitoring measures, and the terms and conditions of the original Biological Opinion issued on 01 August 2005, Appendix A. It was also determined that the construction of the substation or the associated power lines would not affect the NRO study in Compartments 97 and 101.

4.1.1. Vegetation

Construction of the proposed substation will result in the loss of approximately 1.4 acres of Banana River maritime hammock and 1.1 acres of treated scrub located in LMU 101.

The right-of-way easement under the transmission lines will result in the removal of approximately 1.9 acres of treated scrub vegetation. There is some limitation on the types of vegetation that can grow immediately adjacent and under the power lines. LMU 101 was cut and burned in 1995, and an additional eighty (80) acres were burned again in 2000. Vegetation height is optimal for scrub-jay use; however, the vegetation is fairly thick (A. Chambers, personal communication, April 2007).

Short-term adverse impacts to soils may result, but long-tem impacts would not be significant. Standard construction practices and adherence to permit requirements would minimize adverse impacts to geology and soils.

Under the no-action alternative, construction activities associated with the proposed action would not occur. Thus, no impacts to vegetation would result.

4.1.2. Wildlife

Construction activities associated with the proposed action would occur over six (6) to nine (9) months, which could potentially include the breeding season of many wildlife species, including birds. If the construction occurs during breeding season for avian species, it has the potential to disrupt breeding activities including courtship, incubation and brooding. These impacts would be considered short-term and would not be considered of a magnitude to result in adverse impacts to populations within the vicinity of the project area. Avian surveys immediately preceding the initiation of construction activities would identify the presence of any nests. Monitoring during construction would identify any potential disturbance so measures could be implemented to avoid adverse effects. Impacts to wildlife are expected to be insignificant.

4.1.3 Threatened and Endangered Species and Species of Special Concern

Three federally listed, the eastern indigo snake, Florida scrub-jay and southeastern beach mouse, and one state listed species, the gopher tortoise, have the potential to occur within the proposed action site. Project related impacts to these species are listed in Table 4.1. Construction activities, such as disturbance, excavation, crushing and burial, have a potential to result in the take of some special status wildlife species.

Table 4.1 Potential impacts to special status wildlife that occur or potential to occur within the proposed action site

Common Name *Scientific Name*	Status[1]		Potential Impacts
	FWC	USFWS	
Eastern Indigo Snake *Drymarchon corais couperi*	T	T	Crushing by equipment. Loss of habitat. Disruption due to noise.
Florida Scrub-Jay *Aphelocoma coerulescens*	T	T	Loss of breeding habitat. Disruption due to noise.
Southeastern Beach Mouse *Peromyscus polionotus niveiventris*	T	T	Crushing by equipment. Disruption due to noise.
Gopher Tortoise *Gopherus polyphemus*	SSC	-	Crushing by equipment. Loss of habitat. Disruption due to noise.

1 FWC – Florida Fish and Wildlife Conservation Commission USFWS – U.S. Fish and Wildlife Service
T – Threatened SSC – Species of Special Concern

Project specific measures to reduce adverse impacts to special status wildlife species and compensation for habitat losses are presented below. A Formal Section 7 Consultation has been completed with USFWS for construction of the substation at the proposed action site. Potential adverse impacts to biological resources would be avoided or minimized during construction activities associated with the proposed action through implementation of the project constraints and monitoring measures.

4.1.3.1. Eastern Indigo Snake

Eastern indigo snakes would be vulnerable to mortality as a result of injuries sustained during activities such as vegetation clearing and grading. Individuals also have the potential to be crushed by vehicles. Incidental take in the form of mortality to eastern indigo snakes would be avoided through pre-construction surveys and relocation of any individuals present within the boundaries of the work area. Monitoring during vegetation clearing and grading activities would provide the opportunity to relocate individuals found within the construction site to adjacent suitable habitat.

Other than the loss of 4.4 acres of habitat, no other adverse impacts to indigo snakes are expected. Construction management and applicable site personnel will receive a copy of the 45 SW Indigo Snake Protection/Education Plan. Additionally, educational signs informing personnel of the snake's appearance, its protected status and who to contact if one is spotted in the area will be posted at the construction site. If any indigo snakes are encountered during site clearing activities, the snake will be allowed to safely leave the area on their own. If any indigo snakes are encountered during gopher tortoise relocation activities, if required, will be safely moved out of the project area.

Under the no-action alternative, construction activities associated with the proposed action would not occur. Thus, no impacts to eastern indigo snake would result.

4.1.3.2. Florida Scrub Jay

Since the majority of the proposed action site is not classified as potential scrub-jay habitat and jays do not typically utilize this area, impacts to scrub-jays at the proposed site are expected to be insignificant. Additionally, the jays are expected to benefit from the clearing of the right-of-way easement since it will result in a permanent opening within LMU 101. Clearing would be restricted to outside the scrub-jay nesting season, which runs from March 1 through June 30, in those areas where scrub-jays are known to be nesting. Underground line installation will be conducted outside of the scrub-jay nesting season to prevent impact to the birds within the area.

Under the no-action alternative, construction activities associated with the proposed action would not occur; therefore, no impacts to the Florida scrub-jay would result.

4.1.3.3. Southeastern Beach Mouse

Since no burrows have been observed, impacts to the southeastern beach mouse at the proposed site are expected to be insignificant.

Under the no-action alternative, construction activities associated with the proposed action would not occur. Thus, no impacts to southeastern beach mouse would result.

4.1.3.4. Gopher Tortoise

Gopher tortoises would be vulnerable to mortality as a result of injuries sustained during activities such as vegetation clearing and grading. Individuals also have the potential to be crushed by vehicles. Incidental take in the form of mortality to gopher tortoises would be avoided through preconstruction surveys and relocation of any individuals present within the boundaries of the work area. Monitoring during vegetation clearing and grading activities would provide the opportunity to relocate individuals found within the construction site to adjacent suitable habitat.

Impacts to the gopher tortoise are expected to be insignificant.

Under the no-action alternative, construction activities associated with the proposed action would not occur; therefore, no impacts to the gopher tortoise would result.

4.1.3.5. Sea Turtles

The 45th Space Wing Instruction (45 SWI) 32-7001, *Exterior Lighting Management*, implements the Biological Opinion and explains management responsibilities, exterior lighting restrictions and reporting requirements necessary for the 45 SW to remain in compliance with Federal, State and local standards. This 45 SWI requires that an area Light Management Plan (LMP) be developed for new, large construction projects within 45 SW jurisdiction to ensure lighting issues for that particular site are addressed from design to post construction. Only emergency floodlights will be installed at the substation. These lights will be included in the EPF LMP, which is currently in progress (A. Chambers, personal communication, July 2007). Impacts to the sea turtle are expected to be insignificant.

Under the no-action alternative, construction activities associated with the proposed action would not occur; therefore, no impacts to the sea turtle would result.

4.2 Hazardous Materials and Waste Management

4.2.1 Hazardous Materials

For the proposed action, the potential for adverse impacts to the natural environment exists. Hazardous materials, primarily in the form of oil and lubricants, would be used for operating construction equipment.

The transformers will contain mineral oil. The potential exists for unexpected releases of the aforementioned materials. The construction contractor is responsible for implementing the procedures outlined in the 45 SW FSTR 10-2, Volume II, as appropriate. The following Spill Prevention, Control and Countermeasures (SPCC) spill prevention measures will be implemented:

- Provide secondary containment (e.g., dikes, basins, or spill pallets) that have the capacity to hold 110% of the volume of the largest container stored in the area.
- Position or locate to prevent spilled oil from reaching navigable waters.
- Maintain all applicable spill response equipment on-site (i.e. absorbent pads, spill kit).

If the aforementioned spill prevention measures are properly implemented, impacts associated with hazardous materials would be insignificant.

Under the no-action alternative, the substation would not be constructed. Thus, no impacts would occur as a result of hazardous material usage.

4.2.2 Hazardous Waste

Hazardous waste and other regulated waste, such as used oil, may be generated during construction activities and maintenance of the substation and associated components. These wastes shall be managed on-site in accordance with OPlan 19-14, *Waste Petroleum Products and Hazardous Waste Management Plan*, to prevent adverse impacts to the environment.

If hazardous waste generated during the construction and maintenance of the substation is managed in accordance with the aforementioned plan, impacts associated with hazardous waste would be insignificant.

Under the no-action alternative, the substation would not be constructed; therefore, no impacts would occur as a result of hazardous waste generation.

4.3 Noise

According to the Occupational Safety and Health Administration (OSHA) regulations, employees should not be subjected to sound exceeding a L_{eq} of 90 dB for an 8-hour period. Exposure up to a L_{eq} of 115 dB is permitted for a maximum of only 15 minutes during an 8-hour workday and no exposure above 115 dB is permitted. For this analysis, OSHA standards are used as the “not to exceed” significance criteria as they are the most appropriate standards available; however, in this assessment, “employees” would refer instead to personnel working on or visiting CCAFS that may be affected by the proposed action but are not associated with its construction activities.

The construction associated with the proposed action would temporarily increase the ambient noise levels in the project area. Construction noise levels would be variable and intermittent based on the type of equipment being operated, Table 4.2. The substation would be constructed with conventional grading and construction equipment. Grading would be utilized to establish desired site grades. Additionally, minor excavations would be necessary to provide concrete footings for transformers and other equipment. Construction of pole foundations, erection of poles, and stringing of lines will generate short-term noise. Construction of the power lines may

require the use of cranes, drilling and digging equipment, compressors, tampers, generators, trucks and other equipment.

Table 4.2 Construction Equipment Source Noise Levels

Equipment Type	Typical Equipment at 50 Feet (in dBA)	Quieted Equipment at 50 Feet (in dBA)[A]
Air Compressor	81	71
Backhoe	85	75
Concrete Pump	82	75
Concrete Vibrator	76	75
Concrete Breaker	82	75
Dozer	80	75
Generator	78	75
Loader	79	75
Paver	88	80
Water Pump	76	75
Trucks	88	83
Pile Drivers	101	95

Source: Bolt, Beranek, and Newman, 1971.
[A] Quieted equipment can be designed with enclosures, mufflers, or other noise-reducing features.

The primary effect of noise generated may affect employees nearest to the site during the construction period. Construction workers would be located closer to the noise sources and may experience longer exposure durations than the employees. However, based on the magnitude of the construction activities and estimated noise levels that would be generated (Table 4.3), the maximum noise level exposures established by OSHA, and the expected exposure time to the construction noise, it is anticipated that no adverse impacts would result. Construction workers would follow standard industry and OSHA procedures regarding the implementation of a hearing protection program, as required.

Table 4.3 L_{eq1h} Noise Levels as a result of construction activities

Distance from Construction Area (feet)	Structural Work (dB)	Concrete Work (dB)	Road Construction (dB)
50	89.1	89.6	80.6
100	84.6	85.1	76.1
300	77.4	77.9	69.0
500	74.1	74.6	65.6

Source: Final EA New NRO EPF, 2005.

Upon completion of construction, the potential for noise impacts associated with the proposed action would be from three major sources:

- corona from the transmission lines;
- operation of the transformers at the substations; and
- maintenance work and vehicles.

Transmission line corona is the partial electrical breakdown of the insulating properties of air around the conductors of a transmission line, which can produce audible noise. This type of noise is typically described as a hissing and crackling sound that, under certain conditions, may be accompanied by a hum. Audible noise from transmission lines is most noticeable when conductors are wet, which may occur during periods of rain and fog. The voltage of the transmission line will also affect audible noise levels.

Audible noise produced by an electric substation is dependent on the equipment used in the substation. The main source of audible noise produced by substation equipment is generally associated with transformers used to step transmission voltages down to distribution levels.

During the operational phase of the project, substation equipment is not anticipated to generate noise levels above maximum noise level exposures established by OSHA. If the levels exceed OSHA exposure levels, appropriate personal protective equipment (PPE) will be issued and utilized. Noise impacts from maintenance activities would be intermittent and not expected to be significant.

Under the no-action alternative, the proposed substation would not be constructed. Thus, no noise related impacts associated with construction or operation would occur.

4.4 Water Resources - Stormwater

To further streamline environmental permitting, the St. Johns River Water Management District (SJRWMD) and the Florida Department of Environmental Protection (FDEP) have entered into an operating agreement titled *Operating Agreement Concerning Regulation Under Part IV, Chapter 373, F.S., and Aquaculture General Permits Under Section 403.814, F.S., Between St. Johns River Water Management District and Department of Environmental Protection*. Per this agreement, Section II.A.1.f., FDEP is responsible for reviewing and taking final action on Environmental Resource Permits (ERP) associated with *power plants and electrical distribution and transmission lines and other facilities related to the production, transmission and distribution of electricity.*

For the proposed action, certain regulatory requirements may be necessary in regards to stormwater. An ERP and a Construction NDPES Permit through the Florida Department of Environmental Protection (FDEP) will be required, to include the development of a Stormwater Pollution Prevention Plan (SWPPP). The ERP and the SWPPP would include specific measures that would be implemented to control both wind and water erosion of soils before and during construction activities. Implementation of these measures would reduce potential adverse impacts to water resources to a less than significant level.

Under the no-action alternative, the proposed substation would not be constructed. Thus, no stormwater permitting requirements would be necessary.

4.5 Post Construction Conditions

4.5.1 Electromagnetic Fields

A number of national and international organizations have formulated guidelines establishing limits for occupational and residential EMF exposures. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) developed exposure limits for EMF fields through the review of scientific literature. The main conclusion is that EMF exposures below the limits recommended in the ICNIRP international guidelines do not appear to have any known consequences on health. The ICNIRP recommended standard for general public exposure is 83.3 μT or 833 mG. EMF field strength decreases with increasing distance from the line (Florida Department of Environmental Protection, 2003).

The maximum magnetic field limit for new transmission lines in the FDEP Electric and Magnetic Fields Rule Chapter 62-814, Florida Administrative Code, ranges from 150 mG to 250 mG. This is more stringent than the ICNIRP guideline. Compliance with the established guidelines would reduce potential adverse impacts associated with EMF to a less than significant level.

Under the no-action alternative, the proposed substation would not be constructed. Thus, no EMF related impacts associated with operation would occur.

4.5.2 Radio and Television Interference

Transmission lines designed and operated at 115 kilovolts typically do not interfere with radios and televisions. The proposed substation and transmission facilities will be designed to industry standards to avoid interference with reception. Even though transmission lines are designed so no interference occurs, the presence of the transmission and substation structure may cause interference in areas where radio and/or television are weak. Interference caused by electrical noise is very uncommon and is typically the result of loose hardware, which can be easily repaired (Minnesota Environmental Quality Board, 2004).

4.6 Cumulative Effects

Cumulative impacts result from the incremental effect of an action when added to other past, present and reasonably foreseeable future actions, regardless of what agency undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The following proposed projects identified by SGS Master Planning were considered in the cumulative impact analysis:

Project 1 – Construction of a new Administrative Campus Area to consolidate Navy and Air Force personnel into a central location. Construction is planned for the year 2007. The project consists of four (4) administrative buildings with associated parking lots, a pavilion and retention areas. The campus will be built in phases, with the first phase consisting of the NOTU Engineering Services Facility. The facility is proposed 100 feet south of Pier Road at Facility 74100 and northwest of Facility 1125. Facility 74100 would have to be demolished. The entire campus will result in the loss of approximately 50 acres of overgrown scrub. See Appendix C, Figures C-1 and C-2. Informal Section 7 consultation has been completed for this project and measures have been identified to minimize impacts to less than significant.

Project 2 – Construction of a new Satellite Operations Support Facility to support technical operations. Construction is planned for the year 2007. The project consists of constructing a new two story 25,500 ft^2 building to house approximately 180 Air Force and DoD contractor personnel who will perform time critical data collection/reduction, anomaly resolution, computer simulation, technical data processing, quality control functions, logistic accounting, aerospace engineering, safety engineering and security management of various programs. The facility is proposed just southwest of Facility 55893 at Area 59 within close proximity of the Satellite Processing Area on CCAFS. The proposed action also includes dismantling and removal of one modular building located southeast of the proposed project area. The proposed location would occupy the northwest concern of an existing parking lot and would require the removal of approximately 0.5 acres of scrub habitat. See Appendix C, Figures C-3 and C-4. Informal Section 7 consultation has been completed for this project and measures have been identified to minimize impacts to less than significant.

Project 3 – Construction of a new Eastern Processing Facility (EPF) to support processing of the National Reconnaissance Office (NRO) payloads. Construction commenced in the year 2006. This facility will be located on the corner of Samuel C. Phillips Parkway and Lighthouse Road. Construction of the EPF will necessitate the permanent removal of approximately 45 acres of oak scrub vegetation with no opportunity for restoration. See Appendix C, Figures C-5 and C-6. Formal Section 7 consultation has been completed for this project and measures have been identified to minimize impacts to less than significant.

Project 4 – Upgrades to the CCAFS Skid Strip. Construction is planned for the year 2009. Construction/renovations are planned to take approximately ten (10) years. The project consists of demolition of existing facilities, re-routing of ditches, and construction of a new hangar, control tower and taxiway. Additional clearing around the airfield will also be required. This project would require the removal of approximately 400 acres of occupied and unoccupied scrub habitat. See Appendix C, Figures C-7 and C-8. Formal Section 7 consultation was recently initiated for this project and measures have been identified that are expected to minimize impacts to less than significant.

The potential environmental impacts of the first three projects have been fully analyzed. Measures were identified during the formal/informal Section 7 consultation process with USFWS that minimized impacts to less than significant for each individual project. Since each of these projects would not have a significant impact to biological resources, individually, the cumulative impacts are not expected to be significant. Cumulative impacts associated with the Skid Strip will be analyzed in a future document.

5.0 AGENCIES AND PERSONS CONTACTED

Angy Chambers. 45 CES/CEVP, CCAFS, Florida.

Christine Davis. Florida Power and Light (FPL), Florida.

Donald Barker. The Aerospace Corporation, CCAFS, Florida.

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Appendix A

Biological Opinion

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
6620 Southpoint Drive, South
Suite 310
Jacksonville, Florida 32216-0912

IN REPLY REFER TO:
FWS/R4/ES-JAFL/05-1077

August 1, 2005

45 SW/CC
Attn: Colonel Mark H. Owen
1201 Edward H. White II Street, MS-7100
Patrick AFB, Florida 32925-3299

Re: FWS Log No: 05-1077

Dear Colonel Owen:

This document is the Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed National Reconnaissance Office (NRO) Eastern Processing Facility (EPF) on Cape Canaveral Air Force Station (CCAFS) in Brevard County, Florida, and its effects on the Florida scrub-jay (*Aphelocoma coerulescens*), southeastern beach mouse (*Peromyscus polionotus niveiventris*), and the eastern indigo snake (*Drymarchon corais couperi*) pursuant to section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your request for formal consultation for these species was received on March 7, 2005.

This biological opinion is based on information provided in the draft Environmental Assessment (EA) of the new EPF, a meeting conducted on February 1, 2005, with representatives from the NRO, CCAFS, and the Service, the final draft EA of the EPF received on March 7, 2005, telephone conversations on April 4, 2005, with Angy Chambers and Randall Rowland, a site visit conducted at CCAFS with the Service and representatives of the 45th Space Wing on April 14, 2005, followed by a meeting with the Wing Commander of the 45th Space Wing, Colonel Mark H. Owen, and other sources of information. A complete administrative record is on file at the Ecological Services Office in Jacksonville, Florida.

CONSULTATION HISTORY

On August 17, 2004, the Service met with representatives of the 45th Space Wing to discuss another project. At that meeting, the EPF was briefly discussed, and the August 2004 draft Environmental Assessment (EA) for the new EPF at CCAFS was given to the Service. On September 15, 2004, the Service met with representatives from the NRO and CCAFS to discuss the EPF. The Service expressed concern for the preferred location of the site and recommended investigating other alternatives listed in the draft environmental assessment that would minimize impacts to the Florida scrub-jay population. A copy of the report containing the results of a two-year analysis for determining the preferred project site was requested by the Service. In addition,

the Service also said that the draft EA was deficient in covering direct and indirect effects of the project on scrub-jays, and offered assistance in reviewing these impacts. The impacts to listed species which may result from lack of prescribed burns for scrub-jay habitat due to the sensitivity of the equipment in this facility were discussed.

On March 7, 2005, the Service received the final draft EA for the EPF and requested formal consultation with the Service. The draft EA stated with respect to the Florida scrub-jay, "the project would result in a loss of habitat which would be considered a significant adverse effect" (page 28 of the draft final Environmental Assessment).

On March 31, 2005, two weeks into the Service's review period of the EA, the Service received a phone message from representatives of the 45th Space Wing, Angy Chambers and Randall Rowland, stating that the majority of the area in the location of the proposed EPF was mistakenly cleared. On April 4, 2005, it was communicated to the Service that approximately 38 acres of scrub-jay habitat were cleared, which provided habitat for approximately 6 groups of scrub-jays. By follow-up letter dated April 13, 2005, Colonel Mark H. Owen, Commander of the 45th Space Wing, notified the Service of the clearing activity.

On April 14, 2005, the Service met with the representatives of the 45th Space Wing to discuss the effects of the clearing and performed a site visit. CCAFS staff relayed at that meeting that the draft EA was incorrect and that prescribed burning would be allowed up to the limits of the area being proposed for the EELV facility. The Service stressed the importance of the CCAFS population of scrub-jays for recovery of the species and expressed concern for the piecemeal approach being taken by CCAFS in the submittal of proposals. The Service requested that CCAFS staff take the time to generate a master plan so we will know what may be coming in the future. CCAFS relayed that they were working on a 10-year plan and are planning to initiate consultation with the Service on that planning process once it is completed. The Service reminded CCAFS staff that the Integrated Natural Resources Management Plan (INRMP) was taken seriously, and that we are willing to help CCAFS achieve 300 breeding pairs of scrub-jays, as set in the INRMP. Existing facilities are already impacting CCAFS's ability to conduct prescribed burns, and we're reluctant to add to the problem for fear that it will keep them from achieving the INRMP goal. Later that day, the Service met with Colonel Mark Owen, to discuss the impacts related to the unauthorized clearing activity. The Service reiterated the importance of CCAFS's scrub-jays toward overall recovery of the species and stressed the importance of continued management for reaching the INRMP goal of 300 breeding pairs.

On April 25, 2005, a conference call was held with the Service, representatives from the NRO, and the 45th Space Wing to discuss the Service's preference for Alternative 3 identified in the Final Draft EA, which minimized the effects of the impacts on the Florida scrub-jay as compared to the NRO's preferred alternative. Alternative 3 proved to be within a flight hazard area and would result in multiple evacuations of people within the vicinity of Launch Complex 37 during all launch events and attempts. The NRO confirmed that they will modify the proposed project to fit the building with equipment to allow for prescribed burns within the vicinity of the building. These fittings would reduce direct and indirect effects of the preferred alternative on the Florida scrub-jay population by lessening limitations on scrub habitat management with prescribed burning in the areas around this facility.

On April 26, 2005, during a conference call with representatives of the 45th Space Wing, the Service discussed the possibility of permanently setting aside areas of core scrub-jay habitat to help achieve a sustainable Florida scrub-jay population. On May 5, 2005, the 45th Space Wing conveyed that setting scrub-jay areas aside would "encroach" on the mission of CCAFS and is not allowed by the Department of Defense. As an alternative to minimize the impacts of the EELV Payload Processing Facility, CCAFS staff discussed the possibility of restoring all of the existing Quantity Distance (QD) arc areas, since they cannot be developed for safety reasons. These QD arcs are located in areas where scrub-jays are currently present or have the potential to be present following restoration of habitat.

On May 25, 2005, representatives of the 45th Space Wing and the Service met to discuss the impacts of the proposed project. The first issue dealt with the number of scrub-jay pairs required on CCAFS to promote recovery of the Merritt Island/Cape Canaveral core metapopulation. CCAFS staff is currently having problems meeting management goals as set in the INRMP, and thinks that 300 breeding pairs of scrub-jays is an unreasonable goal. They are looking to establish a more realistic number of scrub-jay breeding pairs.

The second issue discussed pertained to a proposal that the NRO fund a 5-year, peer-reviewed mechanical clearing study. It was emphasized that mechanical clearing should not take the place of prescribed burning on the CCAFS but should only be used in areas where prescribed burning would be delayed and only as a temporary solution to land management conflicts.

Scrub management at CCAFS through prescribed burning has its limitations due to the sensitivity of equipment to smoke in the various facilities. A prescribed burn working group has been established at CCAFS to help resolve some of these issues. The Service recommended a goal of fitting buildings in the major scrub-jay areas with the latest technology to allow for burning the areas around them.

Both the Service and representatives from CCAFS agreed that there is not sufficient scrub habitat located in the QD arcs to support the number of groups of scrub-jays that CCAFS needs for recovery, but the QD arcs would be a good base for concentrating management in areas that would not be developed. Restoration and/or management of the scrub-jay habitat located within the QD arcs would be a good way to stabilize the existing population of scrub-jays. CCAFS should then expand the areas of scrub-jay habitat by restoring scrub areas outside of the QD arcs. CCAFS proposes to place emphasis on the management of scrub-jays in their INRMP, currently under revision.

Finally, the restoration of compartment 6, located on the northern end of CCAFS, was discussed as a means of minimizing impacts of the proposed facility on scrub-jays, by helping to maintain a dispersal corridor with MINWR and to stabilize the population of scrub-jays located there.

On June 6, 2005, the Service sent a letter to representatives of the 45th Space Wing requesting the following information for the analysis of impacts with respect to the proposed project: (1) copy of two-year study conducted on alternative sites by the NRO; (2) budget for restoration of

Compartment 6; and (3) number of scrub-jays that will be CCAFS's contribution to the recovery of the metapopulation.

On June 14, 2005, the Service received an email from representatives of the 45th Space Wing with information about the funding for restoration of Compartment 6.

On June 15, 2005, the Service received an email containing the two-year site selection study. Because the MINWR Comprehensive Conservation Planning document is still in draft, for the purposes of this biological opinion, we will use 300 breeding pairs of scrub-jays as a goal for CCAFS to achieve, as outlined in their current INRMP.

On June 23, 2005, the Service received an email from representatives of the 45th Space Wing with a response to our June 6, 2005, letter, the mechanical treatment study proposal, and an analysis of cumulative effects. Representatives of the 45th Space Wing, called the Service to verify receipt of the email. The Service notified the representatives of the 45th Space Wing that all the necessary information from the Air Force was received to complete the biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The NRO proposes to construct a new EPF on CCAFS that can support processing of satellites that use multiple launch vehicles, and that provide operational flexibility by allowing the various programs to support their launch complex activities simultaneously. A building 425 feet long by 365 feet wide will be constructed, and an additional 130 feet will be cleared from the building to a proposed fence. The amount of scrub habitat to be removed for the building, fence, and grounds is 45 acres. All of this habitat was or is restored oak scrub; however, 38 acres were previously cleared during consultation. This biological opinion will address the impacts of clearing the remaining seven (7) acres of scrub habitat that was not cleared and is required for project completion.

The action area (area including all direct and indirect effects), for the purpose of this consultation, will include all of CCAFS. If acceptable mechanical clearing methods are discovered during the 5-year study, and are agreed upon by the 45th Space Wing and the Service, they will be used in the immediate vicinity of the EPF only as a means to temporarily delay prescribed burn treatments. The scrub habitat surrounding the 45 acres impacted by this project will continue to be managed by prescribed burns to maintain the habitat so it will be suitable for occupation by scrub-jays, and as described in the current INRMP for CCAFS.

Conservation measures agreed to by CCAFS include funding a five-year scrub management technique study in Compartments 97 and 101, and restoration of Compartment 6 to allow for occupancy by the Florida scrub-jay.

STATUS OF THE SPECIES/CRITICAL HABITAT

This section provides pertinent biological and ecological information for the Florida scrub-jay, southeastern beach mouse, and eastern indigo snake, as well as information about their status and trends of throughout their entire range. We use this information to assess whether a federal action is likely to jeopardize the continued existence of the above-mentioned species. The "Environmental Baseline" section summarizes information on status and trends of the Florida scrub-jay, southeastern beach mouse, and eastern indigo snake specifically within the action area. These summaries provide the foundation for our assessment of the effects of the proposed action, as presented in the "Effects of the Action" section.

FLORIDA SCRUB-JAY (*APHELOCOMA COERULESCENS*)

Species/Critical Habitat Description

Florida scrub-jays are about 10 to 12 inches long and weigh about 3 ounces. They are similar in size and shape to the blue jay (*Cyanocitta cristata*), but differ significantly in coloration (Woolfenden and Fitzpatrick 1996a). Unlike the blue jay, the scrub-jay lacks a crest. It also lacks the conspicuous white-tipped wing and tail feathers, black barring, and bridle of the blue jay. The Florida scrub-jay's head, nape, wings, and tail are pale blue, and its body is pale grey on its back and belly. Its throat and upper breast are lightly striped and bordered by a pale blue-grey "bib." Scrub-jay sexes are not distinguishable by plumage, and males, on the average, are only slightly larger than females (Woolfenden 1978). The sexes may be differentiated by a distinct "hiccup" call vocalized only by females (Woolfenden and Fitzpatrick 1986). Scrub-jays that are less than about five months of age are easily distinguishable from adults; their plumage is smokey grey on the head and back, and they lack the blue crown and nape of adults. Molting occurs between early June and late November and peaks between mid-July and late September (Bancroft and Woolfenden 1982). During late summer and early fall, when the first basic molt is nearly done, fledgling scrub-jays may be indistinguishable from adults in the field (Woolfenden and Fitzpatrick 1984). The wide variety of vocalizations of the scrub-jay is described in detail in Woolfenden and Fitzpatrick (1996b).

No critical habitat has been designated for this species; therefore none will be affected by the proposed project.

Life History/Population Dynamics

Scrub-jays are non-migratory, extremely sedentary, and have very specific habitat requirements (Woolfenden 1978). They usually reside in oak scrub vegetated with sand live oak, myrtle oak, inopine oak, and Chapman oak, along with saw palmetto, scrub palmetto, scattered sand pine, and rosemary. Such habitat occurs only on fine, white, drained sand, along the coastlines in Florida, and in dunes deposited during the Pleistocene, when sea levels were much higher than at present (Laessle 1958, 1968). Scrub-jays are rarely found in habitats with more than 50 percent canopy cover over three meters in height (U.S. Fish and Wildlife Service 1990). The habitat required for the scrub-jay greatly restricts the bird's distribution. Active management either through burning or mechanical clearing is necessary to maintain optimum conditions. In general,

scrub-jay habitat consists of dense thickets of scrub oaks less than nine feet tall, interspersed with bare sand used for foraging and storing of acorns (U.S. Fish and Wildlife Service 1990).

Florida scrub-jays are monogamous and remain mated throughout the year (Sprunt 1946; Woolfenden 1978). Scrub-jays have a social structure that involves cooperative breeding, a trait that the other North American species of scrub-jays do not show (Woolfenden and Fitzpatrick 1984). Scrub-jays live in families ranging from two birds (a single mated pair) to extended families of eight adults and one to four juveniles. Fledgling scrub-jays stay with the breeding pair in their natal territory as "helpers, forming a closely-knit cooperative family group. Pre-breeding numbers are generally reduced to either a pair with no helpers or families of three to four individuals (a pair plus one or two helpers. The presence of helpers generally increases reproductive success and survival within the group, which naturally causes family size to increase (Woolfenden and Fitzpatrick 1978).

Scrub-jays have a well-developed intrafamilial dominance hierarchy with breeder males most dominant, followed by helper males, breeder females, and finally, female helpers (Woolfenden and Fitzpatrick 1977). Helpers take part in sentinel duties (McGowan and Woolfenden 1989), territorial defense, predator-mobbing, and the feeding of both nestlings (Stallcup and Woolfenden 1978) and fledglings (McGowan and Woolfenden 1990). The well-developed sentinel system involves having one individual occupying an exposed perch watching for predators or territory intruders. When a predator is seen, the sentinel scrub-jay gives a distinctive warning call, and all family members seek cover in dense shrub vegetation (Fitzpatrick *et al.* 1991).

Florida scrub-jay pairs occupy year-round, multi-purpose territories (Woolfenden and Fitzpatrick 1984; Fitzpatrick *et al.* 1991). Territory size averages 22 to 25 acres, with a minimum size of about 12 acres. The availability of territories is a limiting factor for scrub-jay populations. Because of this limitation, non-breeding adult males may stay at the natal territory as helpers for up to five years, waiting for either a mate or territory to become available (Fitzpatrick *et al.* 1991). Birds may become breeders in several ways: (1) by replacing a lost breeder on a non-natal territory (Woolfenden and Fitzpatrick 1984); (2) through "territorial budding," where a helper male becomes a breeder in a segment of its natal territory (Woolfenden and Fitzpatrick 1978); (3) by inheriting a natal territory following the death of a breeder; (4) by establishing a new territory between existing territories (Woolfenden and Fitzpatrick 1984); or (5) through "adoption" of an unrelated helper by a neighboring family followed by resident mate replacement (B. Toland, USFWS, pers. comm. 1996). Territories can also be created by restoring habitat through effective habitat management efforts in areas that are overgrown (Thaxton and Hingtgen 1994).

To become a breeder, a scrub-jay must find a territory and a mate. Evidence presented by Woolfenden and Fitzpatrick (1984) suggests that scrub-jays are monogamous. The pair retains ownership and sole breeding privileges in its particular territory year after year. Courtship to form the pair is lengthy and ritualized, and involves posturing and vocalizations made by the male to the female (Woolfenden and Fitzpatrick 1996b). Copulation between the pair is generally out of sight of other scrub-jays (Woolfenden and Fitzpatrick 1984). These authors also reported never observing copulation between unpaired scrub-jays or courtship behavior between

a female and a scrub-jay other than her mate. Age at first breeding in the scrub-jay varies from one to seven years, although most individuals become breeders between two and four years of age (Fitzpatrick and Woolfenden 1988). Persistent breeding populations of scrub-jays exist only where there are scrub oaks in sufficient quantities to provide an ample winter acorn supply, cover from predators, and nest sites during spring (Woolfenden and Fitzpatrick 1996a).

Nesting is synchronous, normally occurring from 1 March through 30 June (Woolfenden and Fitzpatrick 1990; Fitzpatrick *et al.* 1991). On the Atlantic Coastal Ridge and southern Gulf coast, nesting may be protracted through the end of July (B. Toland, USFWS, pers. comm.. 1996; J. Thaxton, Uplands, Inc., pers.comm. 1998). In suburban habitats, nesting is consistently initiated earlier (March) than in natural scrub habitat (Fleischer 1996), although the reason for this difference is unknown.

Clutch size ranges from 1 to 5 eggs, but is typically 3 or 4 eggs. Clutch size is generally larger (up to 6 eggs) in suburban habitats, and the birds try to rear more broods per year (Fleischer 1996). Eggs are incubated for 17 to 18 days, and fledging occurs 16 to 21 days after hatching (Woolfenden 1974, 1978; Fitzpatrick *et al.* 1991). Only the breeding female incubates and broods eggs and nestlings (Woolfenden and Fitzpatrick 1984). Annual productivity must average at least two fledged per pair for a population of scrub-jays to support long-term stability (Woolfenden and Fitzpatrick 1990; Fitzpatrick *et al.* 1991).

Fledglings depend upon adults for food for about 10 weeks, during, which time they are fed by both breeders and helpers (Woolfenden 1975; McGowan and Woolfenden 1990). Survival of scrub-jay fledglings to yearling age class averages about 35 percent in optimal scrub, while annual survival of both adult males and females averages about 80 percent (Fitzpatrick *et al.* unpubl. data). Data from Archbold Biological Station, however, suggest that survival and reproductive success of scrub-jays in sub-optimal habitat is substantially lower (Woolfenden and Fitzpatrick 1991). These data help explain why local populations inhabiting unburned, late successional habitats become extirpated. The longest observed lifespan of a Florida scrub-jay is 15.5 years at Archbold Biological Station in Highlands County (Woolfenden and Fitzpatrick 1996b).

Scrub-jays are nonmigratory and permanently territorial. Juveniles stay in their natal (Woolfenden and Fitzpatrick 1984). Once scrub-jays pair and become breeders, generally within two territory for up to five years before dispersing to become breeders and territories of their natal area, they stay on their breeding territory until death. In suitable habitat, fewer than five percent of scrub-jays disperse more than five miles (Fitzpatrick *et al.* 1991). All documented long distance dispersals have been in unsuitable habitat such as woodland, pasture, or suburban plantations. Scrub-jay dispersal behavior is affected by intervening land uses. Protected scrub habitats will most effectively sustain scrub-jay populations if they are located within surrounding habitat types that can be used and traversed by scrub-jays.

Brushy pastures, scrubby corridors along railways and road rights-of-way, and open burned flatwoods offer links for colonization among scrub-jay subpopulations. Stith *et al.* (1996) believed that a dispersal distance of five miles is close to the biological maximum for scrub-jays.

Scrub-jays forage mostly on or near the ground, often along the edge of natural or man-made openings. They visually search for food by hopping or running along the ground beneath the scrub or by jumping from shrub to shrub. Insects, particularly orthopterans (e.g., locusts, crickets, grasshoppers, beetles) and lepidopteran (e.g., butterfly and moth) larvae, form most of the animal diet throughout most of the year (Woolfenden and Fitzpatrick 1984). Acorns are the most important plant food (Fitzpatrick *et al.* 1991). From August to November each year, scrub-jays may harvest and cache 6,000 to 8,000 oak acorns throughout their territory . It is estimated that 1/3 of these acorns are later recovered and eaten. Caching allows scrub-jays to eat acorns every month of the year. This reliance on acorns and caching may constitute a major reason for the scrub-jay's restriction to the oak scrub and sandy ridges within Florida (Fitzpatrick *et al.* 1991).

Status and Distribution

The Florida scrub-jay is found exclusively in peninsular Florida, and is restricted to scrub habitat (U.S. Fish and Wildlife Service 1990). The Florida scrub-jay was listed as a threatened species on June 3, 1987 (52 FR 20715-20719). The main causes responsible for the decline were as follows:

The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range: The existence of scrub-jays throughout their range depends on the existence of a particular seral stage of oak scrub habitat with unvegetated openings in sandy soils. This habitat occurs naturally only in localized patches associated with recent or ancient shoreline deposits. By the time of listing, large proportions of these habitat patches had been converted for human use, or were slated for imminent conversion. Most of the coastal scrub habitat had already been cleared for beachfront hotels, houses, and condominiums, and much of the central Florida scrub had been converted to citrus groves, housing developments, and commercial real estate. It was estimated that 40 percent of occupied scrub habitat had already been converted to other uses, and total population of the species had declined by at least half. As a result of rapid increase in human population numbers throughout central Florida, the pace of housing and agricultural development had accelerated since the 1960s, and it showed no signs of slowing.

Overutilization for Commercial, Recreational, Scientific, or Educational Purposes: Reported shooting of scrub-jays and collection of the species as pets were considered threats.

Disease or Predation: Disease and predation were not believed to be major threats at the time of listing.

The Inadequacy of Existing Regulatory Mechanisms: The only laws protecting the Florida scrub-jay prior to the time of listing were the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. 703 *et seq.*) and Florida State Law (Chapter 68A-27.004, Florida Administrative Code). Neither of these laws protected the birds from habitat destruction, which constituted the major threat to the species.

Other Natural or Manmade Factors Affecting its Continued Existence: Suppression of fire by humans was identified as a factor in species' decline at the time of the listing. Historically,

lightning strikes started fires, which maintained the sparse low scrub habitat needed by Florida scrub-jays. Human efforts to suppress these fires to protect human interests allowed the scrub to become too dense and tall to support populations of scrub-jays. Vehicular mortality of scrub-jays due to accidental collisions along roadsides was recognized as a cause of the decline in some parts of the species' range.

Continued and current threats to the species include:

The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range: Scrub habitats continued to decline throughout peninsular Florida since listing occurred, and habitat destruction continues to be one of the main threats to the Florida scrub-jay. Cox (1987) noted local extirpations and major decreases in numbers of scrub-jays and attributed them to the clearing of scrub for housing and citrus groves. Eighty percent or more of the scrub habitats have been destroyed along the Lake Wales Ridge since pre-human settlement (Fitzpatrick *et al.* 1991). Fernald (1989), Fitzpatrick *et al.* (1991, 1994), and Woolfenden and Fitzpatrick (1996a) noted that habitat losses due to agriculture, silviculture, and commercial and residential development have continued to play a role in the decline in numbers of scrub-jays throughout the state. State-wide, estimates of scrub habitat loss range from 70 to 90 percent (Bergen 1994; Woolfenden and Fitzpatrick 1996a; Fitzpatrick *et al.* unpubl. data).

Toland (1999) estimated that about 85 percent of pre-European settlement scrub habitats had been converted to other uses in Brevard County. This is due mainly to development activity and citrus conversion, which were the most important factors that contributed to the scrub-jay decline between 1940 and 1990. A total of only 10,656 acres of scrub and scrubby flatwoods remain in Brevard County (excluding federal ownership), of which only 1,600 acres (15 percent) is in public ownership for the purposes of conservation. Less than 1,977 acres of an estimated pre-settlement of 14,826 acres of scrubby flatwoods habitat remain in Sarasota County, mostly occurring in patches averaging less than 2.5 acres in size (Thaxton and Hingtgen 1996). Only 10,673 acres of viable coastal scrubby flatwoods remained in the Treasure Coast region of Florida (Indian River, Saint Lucie, Martin, and Palm Beach Counties) according to Fernald (1989). He estimated that 95 percent of scrub had already been destroyed for development purposes in Palm Beach County.

Habitat destruction not only reduces the amount of area scrub-jays can occupy, but also increases fragmentation of habitat. As more scrub habitat is altered, the habitat is cut into smaller and smaller pieces, separated from other patches by larger distances; such fragmentation increases the probability of genetic isolation, which is likely to increase extinction probability (Fitzpatrick *et al.* 1991; Woolfenden and Fitzpatrick 1991; Snodgrass *et al.* 1993; Stith *et al.* 1996; Thaxton and Hingtgen 1996). Dispersal distances of scrub-jays in fragmented habitat are further than in optimal unfragmented habitats, and demographic success is poor (Thaxton and Hingtgen 1996; Breininger 1999).

Overutilization for Commercial, Recreational, Scientific, or Educational Purposes: The Service knows of only a few cases where scrub-jays have been shot. One was in Volusia County which was investigated and prosecuted under the MBTA (J. Oliveros, USFWS, pers. comm.). The Florida Fish and Wildlife Conservation Commission (FWC) investigated a case in which three

scrub-jays were shot in Highlands County (N. Douglass, FWC, pers. comm.). It does not seem that the small number and infrequent occurrence of scrub-jays taken in this manner has had an impact on the species.

Disease or Predation: Most Florida scrub-jays mortality probably is from predation (Woolfenden and Fitzpatrick 1996b). The second most frequent cause may be disease, or predation on disease-weakened jays (Woolfenden and Fitzpatrick 1996b). Known predators of Florida scrub-jays are listed by Woolfenden and Fitzpatrick (1990), Fitzpatrick *et al.* (1991), Breininger (1999), and K. Miller (FWC, in litt. 2004); the list includes eastern coachwhip (*Masticophis flagellum*, known to eat adults, nestlings, and fledglings), eastern indigo snake (*Drymarchon corais couperi*, known to eat adults and fledglings), rat snake (*Elaphe obsolete*), and corn snake (*E. guttata*). Mammalian predators include bobcats (*Lynx rufus*), raccoons (*Procyon lotor*), sometimes cotton rats (*Sigmodon hispidus*, known to eat eggs), and domestic cats (*Felis cattus*, known to eat adults). Franzreb and Puschock (2004) also have documented spotted skunks (*Spilogale putorius*) and grey fox (*Urocyon cinereoargenteus*) as mammalian predators of scrub-jay nests. Fitzpatrick *et al.* (1991) suspect that populations of domestic cats are able to eliminate small populations of scrub-jays. Avian nest predators include great horned owls (*Bubo virginianus*), eastern screech-owl (*Otus asio*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), fish crow (*Corvus ossifragus*), boat-tailed grackle (*Quiscalus major*), common grackle (*Q. quiscula*), American crow (*C. brachyrhynchos*), blue jay (*Cyanocitta cristata*), and swallow-tailed kites (*Elanoides forficatus*). Fitzpatrick *et al.* (1991) reported that overgrown scrub habitats are often occupied by the blue jay, which may be one factor limiting scrub-jay populations in such areas. Raptors which seem to be important predators of adult scrub-jays are merlin (*Falco columbarius*), sharp-shinned hawk (*Accipiter striatus*), and Cooper's hawk (*A. cooperii*), and northern harrier. During migration and winter, these four raptor species are present in areas which contain scrub habitat, and scrub-jays may experience frequent confrontations (as many as one pursuit a day) with them (Woolfenden and Fitzpatrick 1990). In coastal scrub, Woolfenden and Fitzpatrick (1996b) report that scrub-jays are vulnerable to predation by raptors in October, March, and April, when high densities of migrating accipiters and falcons are present. Woolfenden and Fitzpatrick (1996b) and Toland (1999) suggest that in overgrown scrub habitats, hunting efficiency for scrub-jay predators is increased. Bowman and Averill (1993) noted that scrub-jays occupying fragments of scrub found in or near housing developments were more prone to predation by house cats and competition from blue jays and mockingbirds. Woolfenden and Fitzpatrick (1996a, 1996b) stated that proximity to housing developments (and increased exposure to domestic cats) needs to be taken into consideration when designing scrub preserves. Young scrub-jays are especially vulnerable to ground predators (e.g., snakes and mammals) before they are fully capable of sustained flight.

The Florida scrub-jay hosts 2 protozoan blood parasites (*Plasmodium cathemerium* and *Haemoproteus danilewskyi*), but incidence is low (M. Garvin pers. comm., cited in Woolfenden and Fitzpatrick 1996b). Several scrub-jays sick from these two agents in March 1992 survived to become breeders. The Florida scrub-jay carries at least 3 types of mosquito-borne encephalitis (St. Louis, eastern equine, and "Highlands jay"; M. Garvin and J. Day pers. comm., cited in Woolfenden and Fitzpatrick 1996b). Of particular concern is the arrival of West Nile virus (the agent of another type of encephalitis) in Florida during 2001; since corvids have been

particularly susceptible to the disease in states north of Florida, it is expected that scrub-jays will be affected.

Woolfenden and Fitzpatrick (1996b) noted 3 episodes of elevated mortality (especially among juveniles) in 26 years at Archbold Biological Station. Each of these incidents occurred in conjunction with elevated water levels following unusually heavy rains in the fall, although high mortality does not occur in all such years. During the most severe of these presumed epidemics (August 1979 through March 1980), all but one of the juvenile cohort and almost half of the breeding adults died (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1990). The 1979-1980 incident coincided with a known outbreak of eastern equine encephalitis among domestic birds in central Florida (J. Day pers. comm., cited in Woolfenden and Fitzpatrick 1996b). From the fall of 1997 through the spring of 1998, the continuing population decline of Florida scrub-jays along the Atlantic coast and in central Florida may have been augmented by an epidemic of unknown origin (Breininger 1999).

At CCAFS, Stevens and Hardesty (1999) noted a decline in juvenile survival from 60 to 70 percent in the preceding years to only 16 percent in 1997-98. It stayed low (only 25 percent) in 1998-99 before again climbing into the mid-60 percent range. Also, adult survival dropped from 70 to 80 percent survival in the preceding years to 50 to 60 percent in 1997-98. Overall, their annual surveys documented the largest one-year drop (pairs decreased by 17 percent and birds by 20 percent) in this population at the same time as the presumed state-wide epidemic.

In winter-summer of 1973, 15 species of helminth fauna (including 8 nematodes, 5 trematodes, 1 cestode, and 1 acanthocephalan) were found in 45 Florida scrub-jays collected in south-central Florida; the parasite load was attributed to a varied arthropod diet (Kinsella 1974). These naturally-occurring parasites are not believed to have a negative impact on scrub-jay population levels.

Larvae of a fly, *Philornis* (= *Neomusca*) *porteri*, occur irregularly on scrub-jay nestlings. The species pupates in the base of the nest; larvae locate in nares, mouth flanges, bases of remiges, and toes; apparently no serious effect on the scrub-jay host occurs (Woolfenden and Fitpatrick 1996b). Additionally, one undescribed chewing louse (*Myrsidea* sp., R. Price pers. comm., cited in Woolfenden and Fitzpatrick 1996b), one wing-feather mite (*Pterodectes* sp.), two chiggers (*Eutrombicula lipovskyana*), and a flea (*Echidnophaga gallinacea*; J. Kinsella pers. comm., cited in Woolfenden and Fitzpatrick 1996b) occur on some individuals, usually at low densities. Nymphs and larvae of four ticks (*Amblyomma americanum*, *A. tuberculatum*, *Haemaphysalis leporispalustris*, and *Ixodes scapularis*) are known to occur on scrub-jays, as well as the larvae of the tick *Amblyomma maculatum* (L. Durden and J. Keirans pers. comm., cited in Woolfenden and Fitzpatrick 1996b). These naturally occurring parasites are not believed to have a negative impact on scrub-jay population levels.

<u>The Inadequacy of Existing Regulatory Mechanisms:</u> Woolfenden and Fitzpatrick (1996a) state the importance of enforcing existing federal laws regarding the management of federal lands as natural ecosystems for the long-term survival of the Florida scrub-jay. The Service consults regularly on activities on federal lands which may affect scrub-jays and also works with private landowners through section 10(a)(1)(B) incidental take permitting process of the Act when take

is likely to occur and no federal nexus is present. Florida's State Comprehensive Plan and Growth Management Act of 1985 is administered mostly by regional and local governments. Regional Planning Councils administer the law through Development of Regional Impact Reviews; at the local level, although comprehensive plans contain policy statements and natural resource protection objectives, they are only effective if counties enact and enforce ordinances. As a general rule, counties have not enacted and/or enforced ordinances that are effective in protecting scrub-jays (Fernald 1989).

The Wildlife Code of the state of Florida (Chapter 68A, Florida Administrative Code) prohibits taking of individuals of threatened species, or parts thereof, or their nests or eggs, except as authorized. The statute does not prohibit clearing of habitat occupied by protected species, which limits the ability of the FWC to protect the Florida scrub-jay and its habitat.

Other Natural or Manmade Factors Affecting its Continued Existence: Human interference with natural fire regimes has continued to play a major part in the decline of the scrub-jay and today may exceed habitat loss as the single most important factor (Woolfenden and Fitzpatrick 1991, 1996a; Fitzpatrick *et al.* 1994). Lightning strikes cause virtually all naturally-occurring fires in south Florida scrub habitat (Abrahamson 1984; Hofstetter 1984). Fire has been noted to be important in maintenance of scrub habitat for decades (Nash 1895; Harper 1927; Webber 1935; Davis 1943; Laessle 1968; Abrahamson *et al.* 1984). Human efforts to prevent and/or control natural fires have allowed the scrub to become too dense and tall to support populations of scrub-jays, resulting in the decline of local populations of scrub-jays throughout the state (Fernald 1989; Fitzpatrick *et al.* 1994; Percival *et al.* 1995; Stith *et al.* 1996; Thaxton and Hingtgen 1996; Woolfenden and Fitzpatrick 1990, 1996a; Toland 1999). Woolfenden and Fitzpatrick (1996a) cautioned, however, that fire applied too often to scrub habitat also can result in local extirpations. Experimental data at Archbold Biological Station (Fitzpatrick and Woolfenden, unpubl. data) show that fire-return intervals varying between 5 and 15 years are optimal for long-term maintenance of productive Florida scrub-jay populations in central Florida. These intervals also correspond with those yielding healthy populations of listed scrub plants (Menges and Kohfeldt 1995; Menges and Hawkes 1998). Optimal fire-return intervals may, however, be shorter in coastal habitats (Breininger and Schmalzer 1990; Schmalzer and Hinkle 1992a, b; Breininger *et al.* 1995, 1998).

Stith *et al.* (1996) estimated that at least 2,100 breeding pairs were living in overgrown habitat. Toland (1999) reported that most of Brevard County's remaining scrub (estimated to be only 15 percent of the original acreage) is extremely overgrown due to fire suppression. He further suggests that the overgrowth of scrub habitats reduces the number and size of sand openings which are crucial to not only scrub-jays, but also many other scrub plants and animals. Reduction in the number of potential scrub-jay nesting sites, acorn cache sites, and foraging sites presents a problem for scrub-jays. Fernald (1989) reported that overgrowth of scrub results not only in the decline of species diversity and abundance but also a reduction in the percentage of open sandy patches (Fernald 1989; Woolfenden and Fitzpatrick 1996b). Fitzpatrick *et al.* (1994) believed that fire suppression was just as responsible as habitat loss in the decline of the scrub-jay, especially in the northern third of its range. Likewise, the continued population decline of scrub-jays within Brevard County between 1991 and 1999 has been attributed mainly to the overgrowth of remaining habitat patches (Breininger *et al.* 2001). Breininger *et al.* (1999a)

concluded that optimal habitat management is essential in fragmented ecosystems maintained by periodic fire, especially to lessen risks of decline and extinction resulting from epidemics and hurricanes.

Fitzpatrick *et al.* (1991, 1994) and Woolfenden and Fitzpatrick (1996a) expressed concern for the management practices taking place on federal lands at Ocala National Forest, MINWR/KSC, and CCAFS, all supporting large contiguous populations of Florida scrub-jays. They predicted that fire suppression and/or too frequent fires (on the latter two) and silvicultural activities involving the cultivation of sand pine on Ocala National Forest would be responsible for continuing decline of scrub-jays in these large contiguous areas of scrub. These areas should be those where populations are most secure because of federal agencies' responsibilities under section 7(a)(1) of the Act. Monitoring of scrub-jay populations, demography, and nesting success is ongoing on all of these properties to assess the effectiveness of management practices in meeting scrub-jay recovery objectives.

Housing and commercial developments within scrub habitats are accompanied by the development of roads. Since scrub-jays often forage along roadsides and other openings in the scrub, they are often killed by passing cars. Research by Mumme *et al.* (2000) along a two-lane paved road indicated that clusters of Florida scrub-jay territories found next to the roadside represented population sinks (breeder mortality exceeds production of breeding-aged recruits), which could be supported only by immigration. Since this species may be attracted to roadsides because of the open habitat characteristics, road mortality presents a significant and growing management problem throughout the remaining range of the Florida scrub-jay (Dreschel *et al.* 1990; Mumme *et al.* 2000), and proximity to high-speed paved roads needs to be considered when designing scrub preserves (Woolfenden and Fitzpatrick 1996a).

Another potential problem in suburban areas supporting Florida scrub-jays is supplemental feeding by humans (Bowman and Averill 1993; R. Bowman unpubl. data, cited in Woolfenden and Fitzpatrick 1996a; Bowman 1998). The presence of additional food may allow scrub-jays to persist in fragmented habitats, but recruitment in these populations is lower than in native habitats. However, even though human-feeding may postpone local extirpations, long-term survival cannot be ensured in the absence of protecting native oak scrub habitat, necessary for nesting.

Scrub-jays in suburban settings often nest high in tall shrubbery. During March winds, these nests tend to be susceptible to destruction (R. Bowman and G.E. Woolfenden unpubl data, cited in Woolfenden and Fitzpatrick 1996b; Bowman 1998).

Hurricanes pose a potential risk for Florida scrub-jays, although the exact impact of such catastrophic events remains unknown. Breininger *et al.* (1999b) modeled the effects of epidemics and hurricanes on scrub-jay populations in varying levels of habitat quality. Small populations of scrub-jays are more vulnerable to extirpation where epidemics and hurricanes are common. Storm surge from a category 3 to 5 hurricane could inundate entire small populations of scrub-jays, and existing habitat fragmentation could prevent repopulation of affected areas. However, this model also predicted that long-term habitat degradation had greater influence on extinction risk than hurricanes or epidemics.

Fernald (1989) reported that many of the relatively few remaining patches of scrub within the Treasure Coast region of Florida had been degraded by trails created by off-road vehicles, illegal dumping of construction debris, abandoned cars and appliances, or household waste. The invasion of these areas by exotic species, including Brazilian pepper (*Schinus terebinthifolius*), cypress pine (*Callitris* sp.), and Australian pine (*Casuarina equisetifolia*) also was a problem. Other human-induced impacts identified by Fernald include the introduction of domestic dogs (*Canis familiaris*) and cats, black rats (*Rattus rattus*), greenhouse frogs (*Eleutherodactylus planirostris*), giant toads (*Bufo marinus*), Cuban tree frogs (*Osteopilus septentrionalis*), brown anoles (*Anolis sagrei*), and other exotic animal species. These exotic species may compete with scrub-jays for both space and food, although scrub-jays sometimes feed on them.

A statewide scrub-jay census was last conducted in 1992-1993, at which time there were an estimated 4,000 pairs of scrub-jays left in the Florida (Fitzpatrick *et al.* 1994). The scrub-jay was considered extirpated in 10 counties (Alachua, Broward, Clay, Dade, Duval, Gilchrist, Hernando, Hendry, Pinellas, and St. Johns), and were considered functionally extinct in an additional 5 counties (Flagler, Hardee, Levy, Orange, and Putnam), where ten or fewer pairs remained. Recent information indicates that there are at least 12 to 14 breeding pairs of scrub-jays located within Levy County, higher than previously though (K. Miller, FWC, pers. comm.. 2004), and there is at least one breeding pair of scrub-jays remaining in Clay County (K. Miller, FWC, pers. comm.. 2004). A scrub-jay has been documented in St. Johns County as recently as 2003 (J.B. Miller, FDEP, in litt. 5/13/03). Populations are close to becoming extirpated in Gulf coast counties (from Levy south to Collier) (Fitzpatrick *et al.* 1994; Woolfenden and Fitzpatrick 1996a). In 1992-1993, population numbers in 19 of the counties were below 30 or fewer breeding pairs. In the past, most of these counties would have contained hundreds or even thousands of groups (Fitzpatrick *et al.* 1994). Based on the amount of destroyed scrub habitat, scrub-jay population loss along the Lake Wales Ridge is 80 percent or more since pre-European settlement (Fitzpatrick *et al.* 1991). Since the early 1980s, Fitzpatrick *et al.* (1994) estimated that in the northern third of the species' range, the Florida scrub-jay has declined somewhere between 25 and 50 percent. The species may have declined by as much as 25 to 50 percent in the last decade alone (Stith *et al.* 1996).

On protected lands, scrub-jays have continued to decline due to inadequate habitat management (Stith 1999). However, over the last several years, steps to reverse this decline have occurred, and management of scrub habitat is continuing in many areas of Florida (Hastie and Eckl 1999; Stith 1999; TNC 2001; A. Birch, Brevard County Environmentally Endangered Lands (EEL), pers. comm.; M. Camardese, CCAFS, pers.comm.).

Analysis of Brevard County historic aerial photography and soil maps suggest that pre-European settlement oak scrub, scrubby pine flatwoods, and coastal scrub/strand covered at least 53,000 acres outside of federal lands (Toland 1999). Assuming average territory size of 25 acres per breeding pair, there were probably originally 2,200 to 2,500 Florida scrub-jay territories within Brevard County. The 1992-1993 statewide survey estimated that on federal lands within Brevard County, there were 860 pairs of Florida scrub-jays remaining; outside of federal lands, 276 breeding pairs of scrub-jays were present (Fitzpatrick *et al.* 1994). The figure on non-federal lands within Brevard County had dropped to 185 in 1999 (Toland 1999), illustrating a

precipitous decline of the scrub-jay population within the county. Part of this decline may be attributed to a possible rare epidemic in 1997-1998. A total of 1,620 acres of scrub habitat have been purchased (outside federal ownership) for preservation by Brevard County EEL, the St. Johns River Water Management District (SJRWMD), and the Florida Department of Environmental Protection (FDEP); 2,500 acres more of potential scrub-jay habitat are proposed for acquisition by EEL and the SJRWMD (Toland 1999). All of these parcels need extensive restoration and management to obtain maximum usage by scrub-jays. Over the last several years, an extensive effort to restore and manage these parcels has been undertaken by EEL, the SJRWMD, and FDEP (A. Birch, pers. comm.).

In some areas of the range of the scrub-jay, it appears that the 1992-1993 state-wide census underestimated populations of scrub-jays, especially in areas where little was known about the status of the species. The state-wide census in 1992-1993 estimated about 145 pairs of scrub-jays remained within Sarasota County (Fitzpatrick *et al.* 1994), although Christman (2000) found 196 pairs of scrub-jays. Likewise, Miller and Stith (2002) documented 54 pairs of scrub-jays within the Deep Creek area of Charlotte County, while the state-wide census in 1992-1993 documented only 19 pairs (Fitzpatrick *et al.* 1994). Given that habitat has continued to degrade and development activity has increased in these areas, it is unlikely that these increased numbers reflect a population increase, but rather a greater effort in the survey process over that undertaken in 1992-1993 (Miller and Stith 2002). Two possible reasons that the 1992-1993 state-wide census underestimated some populations are (1) there was inadequate time and/or resources to survey poorly-known areas and (2) scrubby flatwoods were often overlooked because surveyors relied on soil maps, which are not reliable predictors of where scrubby flatwoods occur.

Stith (1999) utilized a spatially explicit individual-based population model developed specifically for the Florida scrub-jay to complete a metapopulation viability analysis of the species. The species' range was divided into 21 metapopulations demographically isolated from each other. Metapopulations are defined as collections of relatively discrete demographic populations distributed over the landscape; these populations are connected within the metapopulations through dispersal or migration (National Research Council 1995). A series of simulations were run for each of the 21 metapopulations based on different scenarios of reserve design ranging from the minimal configuration consisting of only currently protected patches of scrub (no acquisition option) to the maximum configuration, where all remaining significant scrub patches were acquired for protection (complete acquisition option). The assumption was made that all areas that were protected were also restored and properly managed.

Results from Stith's (1999) simulation model included estimates of extinction, quasi-extinction (the probability of a scrub-jay metapopulation falling below 10 pairs), and percent population decline. These were then used to rank the different state-wide metapopulations by vulnerability. The model predicted that five metapopulations (NE Lake, Martin, Merritt Island, Ocala National Forest, and Lake Wales Ridge, see Figure 1) have low risk of quasi-extinction. Two of the five (Martin and NE Lake), however, experienced significant population declines under the "no acquisition" option; the probability for survival of both of these metapopulations could be improved by more acquisitions.

Eleven of the remaining 21 metapopulations were shown to be highly vulnerable to quasi-extinction if no more habitat was acquired (Central Brevard, N Brevard, Central Charlotte, NW Charlotte, Citrus, Lee, Levy, Manatee, Pasco, St. Lucie, and W Volusia). The model predicted that the risk of quasi-extinction would be greatly reduced for 7 of the 11 metapopulations (Central Brevard, N Brevard, Central Charlotte, NW Charlotte, Levy, St. Lucie, and W Volusia) by acquiring all or most of the remaining scrub habitat. The model predicted that the remaining four metapopulations (Citrus, Lee, Manatee, and Pasco) would moderately benefit if more acquisitions were made.

Stith (1999) classified two metapopulations (S Brevard and Sarasota) as moderately vulnerable with a moderate potential for improvement; they both had one or more fairly stable subpopulations of scrub-jays under protection, but the model predicted large population declines. The rest of the metapopulations could collapse without further acquisitions, making the protected subpopulations there vulnerable to epidemics or other catastrophes.

Three of the metapopulations evaluated by Stith (1999) (Flagler, Central Lake, and S Palm Beach) were classified as highly vulnerable to quasi-extinction and had low potential for improvement, since little or no habitat is available to acquire or restore.

Analysis of the Species/Critical Habitat Likely to be Affected

The Florida scrub-jay's status since it's listing in 1987 has not improved. The above analysis clearly shows two items that are essential for recovery of this species: (1) additional purchase of scrub lands for preservation in key areas and (2) restoration and management of publicly-owned scrub lands already under preservation. Without both, it is unlikely that recovery can be achieved.

SOUTHEASTERN BEACH MOUSE (*PEROMYSCUS POLIONOTUS NIVEIVENTRIS*)

Species/Critical Habitat Description

The southeastern beach mouse was listed as a threatened species under the Act in 1989 (54 FR 20598). Critical habitat was not designated for this subspecies.

Life History/Population Dynamics

The following account is from the South Florida Multi-Species Recovery Plan, Southeastern Beach Mouse Chapter (U.S. Fish and Wildlife Service 1999) and includes minor additions and changes to update the information.

Taxonomy

Peromyscus polionotus is a member of the order Rodentia and family Cricetidae. The southeastern beach mouse (SEBM) is one of 16 recognized subspecies of oldfield mice *P. polionotis* (Hall 1981); it is one of the eight of those subspecies that are called beach mice. The SEBM was first described by Chapman (1889) as *Hesperomys niveiventris*. Bangs (1898)

subsequently placed it in the genus *Peromyscus*, and Osgood (1909) assigned it the subspecific name *P. polionotus niveiventris*.

Description

The SEBM is the largest of the eight recognized subspecies of beach mice, averaging 139 mm in total length (range of 10 individuals = 128 to 153 mm), with a 52 mm tail length (Osgood 1909; Stout 1992). Females are slightly larger than males. These beach mice are slightly darker in appearance than some other subspecies of beach mice, but paler than inland populations of *P. polionotus* (Osgood 1909). Southeastern beach mice have pale, buffy coloration from the back of their head to their tail, and their underparts are white. The white hairs extend up on their flanks, high on their jaw, and within 2 to 3 mm of their eyes (Stout 1992). There are no white spots above the eyes as with *P. p. phasma* (Osgood 1909). Their tail is also buffy above and white below. Juvenile *P. p. niveiventris* are more grayish in coloration than adults; otherwise they are similar in appearance (Osgood 1909).

Habitat

Essential habitat of the SEBM is the sea oats *(Uniola paniculata)* zone of primary coastal dunes (Humphrey and Barbour 1981; Humphrey *et al.* 1987; Stout 1992). This subspecies has also been reported from sandy areas of adjoining coastal strand/scrub vegetation (Extine 1980; Extine and Stout; 1987; Rich *et al.* 1993), which refers to a transition zone between the fore dune and the inland plant community (Johnson and Barbour 1990). Beach mouse habitat is heterogeneous, and distributed in patches that occur both parallel and perpendicular to the shoreline (Extine and Stout 1987). Because this habitat occurs in a narrow band along Florida's coast, structure and composition of the vegetative communities that form the habitat can change dramatically over distances of only a few meters.

Primary dune vegetation described from SEBM habitat includes sea oats, dune panic grass (*Panicum amarum*), railroad vine (*Ipomaea pes-caprae*), beach morning glory (*Ipomaea stolonifera*), salt meadow cordgrass (*Spartina patens*), lamb's quarters (*Chenopodium album*), saltgrass (*Distichlis spicata*), and camphor weed (*Heterotheca subaxillaris*) (Extine 1980). Coastal strand and inland vegetation is more diverse, and can include beach tea (*Croton punctatus*), prickly pear cactus (*Opuntia humifusa*), saw palmetto (*Serenoa repens*), wax myrtle (*Myrica cerifera*), rosemary (*Ceratiola ericoides*), sea grape (*Coccoloba uvifera*), oaks (*Quercus sp.*) and sand pine (*Pinus clausa*) (Extine and Stout 1987). Extine (1980) observed this subspecies as far as 1 km inland on Merritt Island; he concluded that the dune scrub communities he found them in represent only marginal habitat for the SEBM. SEBM have been documented in coastal scrub several km from the beach habitat at Kennedy Space Center/Merritt Island NWR and CCAFS (Stout, personal communication, 2004). Extine (1980) and Extine and Stout (1987) reported that the SEBM showed a preference for areas with clumps of palmetto, sea grape, and expanses of open sand.

Within their dune habitat, beach mice construct burrows to use as refuges, nesting sites, and food storage areas. Burrows of *P. polionotus*, in general, consist of an entrance tunnel, nest chamber, and escape tunnel. Burrow entrances are usually placed on the sloping side of a dune at the base of a shrub or clump of grass. The nest chamber is formed at the end of the level portion of the entrance tunnel at a depth of 0.6 to 0.9 m, and the escape tunnel rises from the nest chamber to

within 2.5 cm of the surface (Blair 1951). A beach mouse may have as many as 20 burrows within its home range. They are also known to use old burrows constructed by ghost crabs (*Ocypode quadrata*).

Foraging

Beach mice typically feed on seeds of sea oats and dune panic grass (Blair 1951). The SEBM probably also eats the seeds of other dune grasses, railroad vine, and prickly pear cactus. Although beach mice prefer the seeds of sea oats, these seeds are only available as food after they have been dispersed by the wind. Beach mice also eat small invertebrates, especially during late spring and early summer when seeds are scarce (Ehrhardt 1978). Beach mice will store food in their burrows.

Behavior

P. polionotus is the only member of the genus that digs an extensive burrow for refuge, nesting, and food storage (Ehrhart 1978). To dig the burrow, the mouse assumes a straddling position and throws sand back between the hind legs with the forefeet. The hind feet are then used to kick sand back while the mouse backs slowly up and out of the burrow (Ivey 1949). Burrows usually contain multiple entrances, some of which are used as escape tunnels. When mice are disturbed in their burrows, they open escape tunnels and quickly flee to another burrow or to other cover (Ehrhart 1978). Beach mice, in general, are nocturnal. They are more active under stormy conditions or moonless nights and less active on moonlit nights. Movements are primarily for foraging, breeding, and burrow maintenance. Extine and Stout (1987) reported movements of the SEBM between primary dune and interior scrub on Merritt Island, and concluded that their home ranges overlap and can reach high densities in their preferred habitats.

Reproduction and Demography

Studies on *Peromyscus* species in peninsular Florida suggest that these species may achieve greater densities and undergo more significant population fluctuations than their temperate relatives, partially because of their extended reproductive season (Bigler and Jenkins 1975). Subtropical beach mice can reproduce throughout the year; however their peak reproductive activity is generally during late summer, fall, and early winter. Extine (1980) reported peak reproductive activity for *P. p. niveiventris* on Merritt Island during August and September, based on external characteristics of the adults. This peak in the timing and intensity of reproductive activity was also correlated to the subsequent peak in the proportion of juveniles in the population in early winter (Extine 1980). This pattern is typical of other beach mice as well (Rave and Holler 1992).

Sex ratios in beach mouse populations are generally 1:1 (Extine 1980; Rave and Holler 1992). Blair (1951) indicated that beach mice are monogamous; once a pair is mated they tend to remain together until death. He also found, however, that some adult mice of each sex show no desire to pair. Nests of beach mice are constructed in the nest chamber of their burrows, a spherical cavity about 4 to 6 cm in diameter. The nest comprises about one fourth of the size of the cavity and is composed of sea oat roots, stems, leaves and the chaffy parts of the panicles (Ivey 1949).

The reproductive potential of beach mice is generally high (Ehrhardt 1978). In captivity, beach mice are capable of producing 80 or more young in their lifetime, and producing litters regularly

at 26-day intervals (Bowen 1968). Litter size of beach mice, in general, ranges from two to seven, with an average of four. Beach mice reach reproductive maturity as early as 6 weeks of age (Ehrhart 1978).

Population Dynamics

Status and Trends

The distribution of the beach mouse is limited due to modification and destruction of its coastal habitats. On the Atlantic coast of Florida, the Anastasia Island beach mouse (*P. p. phasma*) and the SEBM were federally listed as endangered and threatened, respectively, in 1989 (54 FR 20602). One additional Atlantic coast subspecies, the pallid beach mouse (*P. p. decoloratus*), was formerly reported from two sites in Volusia County, but extensive surveys provide substantial evidence that this subspecies is extinct (Humphrey and Frank 1992).

The distribution of the SEBM has declined significantly, particularly in the southern part of its range. Historically, it was reported to occur along about 280 km of Florida's central and southeast Atlantic coast from Ponce (Mosquito) Inlet, Volusia County, to Hollywood Beach, Broward County (Hall 1981). Bangs (1898) reported it as extremely abundant on all the beaches of the east peninsula from Palm Beach at least to Mosquito (Ponce) Inlet. During the 1990s, the SEBM was reported only from Volusia County (Canaveral National Seashore); in Brevard County (Canaveral National Seashore, Kennedy Space Center/Merritt Island NWR, and CCAFS); a few localities in Indian River County (Sebastian Inlet SRA, Treasure Shores Park, and several private properties), and St. Lucie County (Pepper Beach County Park and Fort Pierce Inlet SRA) (Humphrey *et al.* 1987; Robson 1989; Land Planning Group, Inc. 1991; Humphrey and Frank 1992; U.S. Fish and Wildlife Service 1993). The SEBM is geographically isolated from all other subspecies of *P. polionotus*.

Populations of the SEBM are still found on the beaches of Canaveral National Seashore, Merritt Island NWR, and CCAFS in Brevard County, all on federally protected lands. In April 2002, a population of SEBM was documented at the Smyrna Dunes Park, at the north end of New Smyrna Beach (A. Sauzo, personal communication, 2004). Populations from both sides of Sebastian Inlet appear to be extirpated (A. Bard, personal communication, 2004).

The status of the species south of Brevard County is currently unknown. The surveys done during the mid-1990s indicate the distribution of this subspecies in the counties south of Brevard was severely limited and fragmented. There are not enough data available to determine population trends for these populations. These surveys revealed that it occurred only in very small numbers where it was found. In Indian River County, the Treasure Shores Park population experienced a significant decline in the 1990s, and it is uncertain whether populations still exist at Turtle Trail or adjacent to the various private properties (D. Jennings, personal communication, 2004). Trapping efforts documented a decline from an estimated 300 individuals down to numbers in the single digits. No beach mice were found during surveys in St. Lucie County and it is possible that this species is extirpated there. The SEBM no longer occurs at Jupiter Island, Palm Beach, Lake Worth, Hillsboro Inlet or Hollywood Beach (U.S. Fish and Wildlife Service 1999).

The primary reason for the significant reduction in the range of the SEBM is the loss and alteration of coastal dunes. Large-scale commercial and residential development on the coast of Florida has eliminated SEBM habitat in the southern part of its range. This increased urbanization has also increased the recreational use of dunes, and harmed the vegetation essential for dune maintenance. Loss of dune vegetation results in widespread wind and water erosion and reduces the effectiveness of the dune to protect other beach mouse habitat. In addition to this increased urbanization, coastal erosion is responsible for the loss of the dune environment along the Atlantic coast, particularly during tropical storms and hurricanes. The extremely active 2004 hurricane season had a pronounced affect on Florida's Atlantic coast beaches and beach mouse habitat.

The encroachment of residential housing onto the Atlantic coast also increases the likelihood of predation by domestic cats and dogs. A healthy population of SEBM on the north side of Sebastian Inlet SRA in Brevard County was completely extirpated by 1972, presumably by feral cats (A. Bard, personal communication 2004). Urbanization of coastal habitat could also lead to potential competition of beach mice with house mice and introduced rats.

Beach mice along the Gulf Coasts of Florida and Alabama generally live about nine months (Swilling 2000). Field trapping research indicates that 68 percent (average) of mice alive in one month will survive to the next month. Actual survival rates indicate that 18.5 to 87 percent of individuals survive no more than four months and some mice live between 12 and 20 months (Blair 1951; Rave and Holler 1992). Holler *et al.* (1997) found that 44.26 percent of beach mice captured for the first time survived to the next season (winter, spring, summer, and fall). The mean survival rate for mice captured for a second time to subsequent capture was higher (53.90 percent). More than ten percent of mice survived three seasons after first capture, and four to eight percent survived more than one year after initial capture. Mice held in captivity by Blair (1951) and at Auburn University (Holler 1995) have lived three years or more.

Analysis of the Species/Critical Habitat Likely to be Affected

The southeastern beach mouse was listed as an endangered species primarily because of the fragmentation, adverse alteration and loss of habitat due to coastal development. The above analysis shows three items that are essential for recovery of this species: (1) purchase of coastal dune habitat for preservation; (2) removal of predation or competition by animals related to human development (cats and house mice); and (3) increase the regulations regarding coastal development.

EASTERN INDIGO SNAKE (*DRYMARCHON CORAIS COUPERI*)

Species/Critical Habitat Description

The eastern indigo snake is one of eight subspecies of a primarily tropical species; only the eastern indigo and the Texas indigo (*Drymarchon corais erebennus*) occur within the United States (U.S. Fish and Wildlife Service 1982). The eastern indigo snake is isolated from the Texas indigo snake by more than 600 miles (Moler 1992). The eastern indigo snake is the longest snake in North America, obtaining lengths of up to 104 inches (Ashton and Ashton

1981). Its color is uniformly lustrous-black, dorsally and ventrally, except for a red or cream-colored suffusion of the chin, throat, and sometimes the cheeks. Its scales are large and smooth (central 3-5 scale rows are lightly keeled in adult males) in 17 scale rows at midbody. Its anal plate is undivided. Its antepenultimate supralabial scale does not contact the temporal postocular scales.

The eastern indigo snake was listed as a threatened under the Act in 1978 (43 FR 4621). No critical habitat has been designated for this species; therefore none will be affected by the proposed project.

Life History/Population Dynamics

Historically, the eastern indigo snake occurred throughout Florida and into the coastal plain of Georgia, Alabama, and Mississippi (Loding 1922; Haltom 1931; Carr 1940; Cook 1954; Diemer and Speake 1983; Moler 1985a). It may have occurred in South Carolina, but its occurrence there cannot be confirmed. Georgia and Florida currently support the remaining endemic populations of eastern indigo snake (Lawler 1977). In 1982, only a few populations remained in the Florida panhandle, and the species was considered rare in that region. Nevertheless, based on museum specimens and field sightings, the eastern indigo snake still occurs throughout Florida, even though they are not commonly seen (Moler 1985a).

In south Florida, the eastern indigo snake is thought to be widely distributed and probably more abundant than in the northern limits of the range, especially compared to the low densities found in the panhandle of Florida. Given their preference for upland habitats, indigos are not found in great numbers in wetland complexes of the Everglades region, even though they are found in pinelands and tropical hardwood hammocks in extreme south Florida (Steiner *et al.* 1983).

Indigo snakes also occur in the Florida Keys. They have been collected from Big Pine and Middle Torch Keys, and are reliably reported from Big Torch, Little Torch, Summerland, Cudjoe, Sugarloaf, and Boca Chica Keys (Lazell 1989). Given the ubiquitous nature of the eastern indigo throughout the remainder of its range, it is likely that it also occurs on other Keys.

Over most of its range, the eastern indigo snake frequents a diversity of habitat types such as pine flatwoods, scrubby flatwoods, xeric sandhill communities, and tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human altered habitats. Eastern indigo snakes need a mosaic of habitats to complete their annual cycle. Interspersion of tortoise-inhabited sandhills and wetlands improves habitat quality for the indigo snakes (Landers and Speake 1980; Auffenberg and Franz 1982). Eastern indigo snakes require sheltered retreats from winter cold and desiccation (Bogert and Cowles 1947). Whenever the eastern indigo snake occurs in xeric habitats, it is closely associated with the gopher tortoise (*Gopherus polyphemus*), the burrows of which shelter the indigo snakes from the winter cold and desiccating sandhills environment (Bogert and Cowles 1947; Speake *et al.* 1978; Layne and Steiner 1996). This dependence seems especially pronounced in Georgia, Alabama, and the panhandle of Florida, where the eastern indigo snake is largely restricted to the vicinity of the sandhill habitats occupied by gopher tortoises (Diemer and Speake 1981; Moler 1985b; Mount 1975). The high use of xeric sandhill habitats throughout the northern portion of the eastern

indigo's range can be attributed primarily to the availability of thermal refuge afforded by gopher tortoise burrows in the winter. No such refugia is widely available off of the sandhills regions of southern Georgia and northern Florida. In wetter habitats that lack gopher tortoises, eastern indigo snakes may take shelter in hollowed root channels, hollow logs, or the burrows of rodents, armadillos (*Dasypus novemcinctus*), or crabs (Lawler 1977; Moler 1985b; Layne and Steiner 1996).

In the milder climates of central and southern Florida, eastern indigo snakes exist in a more stable thermal environment, where the availability of thermal refugia may not be as critical to the snake's survival, especially in extreme southern Florida. Throughout peninsular Florida, the eastern indigo snake can be found in all terrestrial habitats, which have not suffered high urban development. They are especially common in hydric hammocks throughout this region (Moler 1985a). In central and coastal Florida, eastern indigo snakes are typically found in the state's high sandy ridges. In extreme south Florida, these snakes are mainly found in pine flatwoods, pine rockland, tropical hardwood hammock habitats, and in most other undeveloped areas (Kuntz 1977). Eastern indigo snakes also use some agricultural lands (e.g., citrus) and various types of wetlands (Layne and Steiner 1996).

Even though thermal stresses may not be a year-round limiting factor in southern Florida, eastern indigo snakes seek and use underground refugia. On the sandy central and coastal ridges of south Florida, indigo snakes use gopher tortoise burrows (62 percent) more than other underground refugia (Layne and Steiner 1996). Other underground refugia used by indigo snakes include burrows of armadillos, cotton rats (*Sigmodon hispidus*), and land crabs; burrows of unknown origin; natural ground holes; hollows at the base of trees or shrubs; ground litter; trash piles; and in the crevices of rock-lined ditch walls (Layne and Steiner 1996). These refugia sites are used most frequently where tortoise burrows are not available, principally in the low-lying areas off of the central and coastal ridges.

Smith (1987) radio-tagged hatchling, yearling, and gravid eastern indigo snakes and released them in different habitat types on St. Marks National Wildlife Refuge in Wakulla County, Florida, in 1985 and 1986. Smith monitored the behavior, habitat use, and oviposition sites selected by gravid female snakes and concluded that the diverse habitats, including high pineland, pine-palmetto flatwoods, and permanent open ponds were important for the eastern indigo snake's seasonal activity. In this study, habitat use also differed by age-class and season; adult indigo snakes often used gopher tortoise burrows during April and May, while juveniles used root and rodent holes. The indigo snakes used gopher tortoise burrows for oviposition sites in high pineland areas, but stumps were chosen in flatwoods and pond edge habitats (Smith 1987).

Monitoring of radio-fitted indigo snakes on the central ridge of south Florida indicate that snakes in this part of the state use a wide variety of natural, disturbed, and non-natural habitat types throughout the year. On the ridge itself, indigos favor mature oak phase scrub, turkey oak sandhill, and abandoned citrus grove habitats, while snakes found off the sandy ridges use flatwoods, seasonal ponds, improved pasture, and active and inactive agricultural lands. There was no apparent selection for one habitat type over another as the use of habitats closely

reflected the relative availability and distribution of the vegetation types in these areas (Layne and Steiner 1996).

In extreme south Florida (the Everglades and Florida Keys), indigo snakes are found in tropical hardwood hammocks, freshwater marshes, abandoned agricultural lands, coastal prairie, mangrove swamps, and human altered habitats (Steiner *et al.* 1983). It is suspected that they prefer hammocks and pine forests since most observations occur there, and use of these areas are disproportionate compared to the relatively small total area of these habitats (Steiner *et al.* 1983).

Reproduction: Most information on the reproductive cycle of the eastern indigo snake is from data collected in northern Florida. Here, breeding occurs between November and April, and females deposit four to twelve eggs during May or June (Moler 1992). Speake (1993) reported an average clutch size of 9.4 for 20 captive bred females. Young hatch in approximately three months, from late May through August. Peak hatching activity occurs during August and September, while yearling activity peaks in April and May (Groves 1960; Smith 1987). Limited information on the reproductive cycle in south-central Florida suggests that the breeding and egg-laying season may be extended in south-central and south Florida. In this region, breeding extends from June to January, laying occurs from April to July, and hatching occurs during mid-summer to early fall (Layne and Steiner 1996).

Female indigo snakes can store sperm and delay fertilization of eggs; there is a single record of a captive snake laying five eggs (at least one of which was fertilized) after being isolated for more than four years (Carson 1945). There is no information on how long eastern indigo snakes live in the wild; in captivity, the longest an eastern indigo snake lived was 25 years, 11 months (Shaw 1959).

Feeding: The eastern indigo snake is an active terrestrial and fossorial predator that will eat any vertebrate small enough to be overpowered. Layne and Steiner (1996) documented several instances of indigos flushing prey from cover and then chasing it. Though unusual, indigo snakes may also climb shrubs or trees in search of prey. An adult eastern indigo snake's diet may include fish, frogs, toads, snakes (venomous and nonvenomous), lizards, turtles, turtle eggs, juvenile gopher tortoises, small alligators, birds, and small mammals (Keegan 1944; Babis 1949; Kochman 1978; Steiner *et al.* 1983). Juvenile indigo snakes eat mostly invertebrates (Layne and Steiner 1996).

Movements: Indigo snakes range over large areas and into various habitats throughout the year, with most activity occurring during summer and fall (Smith 1987; Moler 1985b; Speake 1993). The average home range of an eastern indigo snake is 12 acres during the winter (December - April), 106 acres during late spring early summer (May - July), and 241 acres during late summer and fall (August - November) (Speake *et al.* 1978). Adult male eastern indigo snakes have larger home ranges than adult females and juveniles; their home range may encompass as much as 553 acres in the summer (Moler 1985b; Speake 1993). By contrast, a gravid female may use from 4 to 106 acres (Smith 1987). These estimates are comparable to those found by Layne and Steiner (1996) in south central Florida, who determined adult male home ranges average about 183 acres, while adult females average about 42 acres.

Status and Distribution

As stated earlier, the eastern indigo snake was listed based on population decline caused by habitat loss, over-collection for the pet trade, and mortality from gassing gopher tortoise burrows to collect rattlesnakes (Speake and Mount 1973; Speake and McGlincy 1981). At the time of listing, the main factor in the decline of the eastern indigo snake was attributed to exploitation for the pet trade. As a result of effective law enforcement, the pressure from collectors has declined, but still remains a concern (Moler 1992).

The eastern indigo snake utilizes a majority of habitats available, but tends to prefer open, undeveloped areas (Kuntz 1977). Because of its relatively large home range, this snake is especially vulnerable to habitat loss, degradation, and fragmentation (Lawler 1977; Moler 1985b). Lawler (1977) noted that eastern indigo snake habitat had been destroyed by residential and commercial construction, agriculture, and timbering. He stated that the loss of natural habitat is increasing because of these threats in Florida and that indigo snake habitat is being lost at a rate of five percent per year. Low-density residential housing is also a potential threat to the species, increasing the likelihood that the snake will be killed by property owners and domestic pets. Extensive tracts of wild land are the most important refuge for large numbers of eastern indigo snakes (Diemer and Speake 1981; Moler 1985b).

Additional human population growth will increase the risk of direct mortality of the eastern indigo snake from property owners and domestic animals. Pesticides that bioaccumulate through the food chain may present a potential hazard to the snake as well pesticide use on crops or for forestry/silviculture would propose a pulse effect to the indigo snake (Speake 1993). Direct exposure to treated areas and secondary exposure by ingestion of contaminated prey could occur. Secondary exposure to rodenticides used to control black rats may also occur (Speake 1993).

The wide distribution and territory size requirements of the eastern indigo snake makes evaluation of status and trends very difficult. We believe that activities such as collecting and gassing have been largely abated through effective enforcement and protective laws. However, despite these apparent gains in indigo snake conservation, we believe that the threats described above are acting individually and collectively against the eastern indigo snake. Though we have no quantitative data with which to evaluate trends of the eastern indigo snake in Florida, we surmise that the population as a whole is declining because of continued habitat destruction and degradation. Natural communities continue to be altered for agriculture, residential, and commercial purposes, most of which are incompatible with the habitat needs of the eastern indigo snake (Kautz 1993). Habitat destruction and alteration is probably most substantial along the coasts, Keys, and high central ridges of southcentral Florida, where human population growth is expected to continue to accelerate. Agricultural interests (principally citrus) continue to destroy large expanses of suitable natural habitat in south Florida.

Even with continued habitat destruction and alterations, indigo snakes will probably persist in most localities where small, fragmented pieces of natural habitat remain. Tracts of appropriate habitat of a few hundred to several thousand acres may be sufficient to support a small number of snakes. Unfortunately, we believe that current and anticipated habitat fragmentation will

result in a large number of isolated, small groups of indigo snakes. Fragmented habitat patches probably cannot support a sufficient number of indigo snakes to ensure viable populations.

One of the primary reasons for listing of the species was the pressure on wild populations caused by over-collecting for the pet trade and commerce. Since the listing of the species, private collectors have engaged in a very active captive breeding program to fulfill the desires of individuals wanting specimens for personal pets. The Service controls the interstate commerce of the species via a permit program. The Service believes that this has significantly reduced the collection pressures on the species.

Analysis of the Species/Critical Habitat Likely to be Affected

The eastern indigo snake was listed in January 1978 as a threatened species primarily due to habitat loss and to over-collecting for the pet trade. The above analysis shows two items that are essential for recovery of this species: (1) acquire and/or manage habitat to maintain viable populations and (2) study their movement, food habitats, and population ecology.

ENVIRONMENTAL BASELINE

Action Area

The action area for this biological opinion is defined as all habitat within the boundaries of CCAFS.

Status of the Species in the Action Area

Florida scrub-jay: The Florida scrub-jay population on CCAFS was approximately 276 birds (99 groups of two or more birds and seven single birds) in 2003-2004. The number of jays decreased slightly (9 percent) from the previous year, and the current population is at its lowest point in the past ten years. The trend in population size over the last ten years has been downward, with an occasional increase in numbers within the ten-year study. The smaller population size was partly due to low reproductive success in 2002-2003, when breeding pairs fledged at a rate of 40 percent and 44 percent, respectively. Significant numbers of young were lost after they fledged (about 50 percent), likely due to predation. Adult survivorship was 74 percent between 2003 and 2004, which is about average for the eight years of study. Breeder survivorship was slightly higher than average (81 percent), and juvenile survivorship was above average (68 percent). Forty-seven percent of the 91 nesting groups produced young, yielding 73 juveniles by the end of the 2003-2004 breeding season (Stevens and Knight 2004).

The populations of scrub-jays occurring on CCAFS are a subset of the larger MINWR/KSC/ CCAFS metapopulation. Based on the amount of existing and potentially restorable scrub habitat on the stations, CCAFS has responsibility for approximately one-third of the recovery of this metapopulation. The current INRMP for CCAFS has a goal of 300 breeding pairs of scrub-jays to be established; without continued management and restoration of overgrown scrub on the facility, this number will be impossible to reach.

As stated in the cumulative effects analysis provided by the representatives of the 45th Space Wing, CCAFS has approximately 5,175 acres of unoccupied scrub habitat within existing management compartments. Based upon 25 acres/breeding pair of scrub-jays, restoration of these areas could result in habitat for an additional 206 breeding pairs, bringing the total to 312 breeding pairs at CCAFS, if all available habitat could be managed for scrub-jays.

The restoration of Compartment 6 will occur as part of the proposed action, which is important to the recovery of the metapopulation, as restoration of this area will link the groups of scrub-jays found at CCAFS and KSC. Fire suppression over the years created an area of unsuitable habitat between CCAFS and KSC, and restoration of the scrub in Compartment 6 will provide habitat suitable for occupation between the two facilities. Accordingly, restoration of the habitat will allow mixing of the two existing populations, and lead to further expansion and growth of scrub-jays and their territories.

Southeastern beach mouse: The southeastern beach mouse is found along the entire reach of coastline on CCAFS in addition to the KSC and Cape Canaveral National Seashore. The known distribution is a result of cursory surveys and intermittent trapping involving different construction projects. There has not been a systematic trapping study done in order to determine the status throughout its range on these Federal lands. It is likely that this species is found within the action area.

Eastern indigo snake: The eastern indigo snake is likely to occur within the boundaries of the project site due to the presence of suitable habitat, although none have been seen. The eastern indigo snake standard protection measures will be used during the construction of the project.

Factors Affecting Species' Environment within the Action Area

This analysis describes factors affecting the environment for scrub-jays, southeastern beach mice, and eastern indigo snakes in the action area. There are no State, tribal, local, or private actions affecting the species or that will occur contemporaneously with this consultation. Federal actions have taken place within the action area that have impacted Florida scrub-jays, southeastern beach mice, and eastern indigo snakes. These projects sometimes resulted in incidental take anticipated through section 7 of the Act. The impacts associated with some of these projects resulted in the loss of occupied habitat or habitat suitable for occupation within the action area.

Prescribed burning and restoration of overgrown scrub for the benefit of the scrub-jay are not currently being conducted at a rate that will allow CCAFS to reach its goal of 300 breeding pairs of scrub-jays, as outlined in their INRMP, because existing facilities have placed restrictions on the timing of burns to protect valuable payloads from smoke impacts. While the Service continues to be concerned about the slow rate of restoration and continuous management of already restored habitat on CCAFS, we are working with CCAFS staff to resolve the issues involved in the delays. We are hopeful that we will come to satisfactory resolution of those issues.

The development of a 5-year study to compare mechanical clearing and burning to effectively manage scrub will lead to better management practices in lieu of delayed prescribed burns that have previously led to creation of unsuitable scrub-jay habitat. NRO will have state-of-the-art filtering systems on the EPF. Some flight hardware is extremely susceptible to contamination from byproducts of burning as well as additional safety risk to personnel, facility, and flight hardware due to explosives/propellant residing in facility. During those periods when such flight hardware is within the facility and cannot be protected through shutdown of HVAC or isolating outside makeup air, etc., prescribed burns cannot be conducted in the immediate vicinity of the EPF (i.e., within ½ mile) depending on forecasted conditions (i.e., wind direction, speed, delta T, etc.) at the time of the burn. If no flight hardware/explosives/propellants exist within the facility, there will be no restrictions on prescribed burns. The scrub and the scrub-jay population within the vicinity of the EPF will be assessed annually. If the EPF facility prevents prescribed burn treatments from occurring and the scrub becomes unsuitable habitat and directly affects the scrub-jays utilizing this area, the NRO will have two years in which to schedule work to allow for prescribed burning by CCAFS within the vicinity of the EPF building. The NRO will be active members of the CCAFS burn working group and will make every effort to meet the burn program objectives within mission requirements.

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action on the species and its interrelated and interdependent activities. To determine whether the proposed action is likely to jeopardize the continued existence of threatened or endangered species in the action area, we focus on consequences of the proposed action that affect rates of birth, death, immigration, and emigration because the probability of extinction in plant and animal populations is most sensitive to changes in these rates.

Factors To Be Considered

The effects of the proposed project of the Florida scrub-jay, southeastern beach mouse, and eastern indigo snake may occur as direct and indirect effects.

Direct Effects

The installation of the EPF may result in the direct "take" of Florida scrub-jays, eastern indigo snakes, and southeastern beach mice as a result of permanent loss of 7 acres of scrub habitat. The probability and level of incidental take is dependent upon the number of Florida scrub-jays, southeastern beach mice, and eastern indigo snakes within the region; their ability to disperse; and the amount and distribution of available suitable habitat. It is possible that as construction proceeds, they will move away from the construction site; however, the Service anticipates that "take" will occur.

The proposed activity will result in the direct permanent loss of 7 acres of scrub habitat occupied by 2 groups of Florida scrub-jays, southeastern beach mice and eastern indigo snakes. The proposed project will impact a portion of each Florida scrub-jay family's territory as these

families of scrub-jays do occupy areas adjacent to this site. Impacts to the species will be minimized by restoring Compartment 6 and developing a 5-year study that will improve management of scrub-jay habitat at CCAFS. Another significant threat to scrub-jay recovery at CCAFS is fire suppression and/or lack of management in scrub habitat. Impacts to the species will be minimized by conducting a 5-year study to determine the best land management techniques at CCAFS to aid in the recovery of the Florida scrub-jay metapopulation.

The proposed project will permanently impact existing southeastern beach mouse burrows and habitat found within the project area. It is possible that as construction proceeds, they will move away from the construction site; however, the Service anticipates that "take" will occur. Similar direct effects are expected for any eastern indigo snakes occurring within the project site.

Indirect Effects

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action. Indirect effects may include other Federal actions that have not undergone section 7 consultations, but will result from the action under consideration. The indirect effects will occur in two ways: (1) operation of the EPF will add traffic along roadways adjacent to occupied habitat, possibly resulting in scrub-jays and snakes being struck by vehicles or (2) clearing associated with the EPF will isolate groups of scrub-jays from other groups and interrupt dispersal corridors between metapopulations.

Dreschel *et al.* (1990), Fitzpatrick *et al.* (1991), and Mumme *et al.* (2000) provide the best scientific and commercial data on the likelihood of incidental take as the result of scrub-jays being killed by the vehicles. The only scientific documentation of road-kill mortality in Florida scrub-jays are from jays living in a territory immediately adjacent to a road, not from dispersing some unknown distance across a road to a new territory.

The proposed project will result in habitat destruction, which reduces the amount of area scrub-jays can occupy, but also increases fragmentation of habitat. As more scrub habitat is altered, the habitat is cut into smaller and smaller pieces, separated from other patches by larger distances; such fragmentation increases the probability of genetic isolation, which is likely to increase extinction probability (Fitzpatrick *et al.* 1991; Woolfenden and Fitzpatrick 1991; Snodgrass *et al.* 1993; Stith *et al.* 1996; Thaxton and Hingtgen 1996). Dispersal distances of scrub-jays in fragmented habitat are further than in optimal unfragmented habitats (Thaxton and Hingtgen 1996; Breininger 1999).

Indirect effects will result from continued loss of foraging habitat for the southeastern beach mouse.

The eastern indigo snake has a high probability of being impacted by increased traffic on the roads. Since a portion of their suitable habitat will be impacted by the proposed development, the snakes may have to go elsewhere and cause them to cross busy roads which could result in road-kill mortality.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

CONCLUSION

After reviewing the current status of the Florida scrub-jay, southeastern beach mouse, and the eastern indigo snake, the environmental baseline for the action area, the effects of the proposed EPF and the cumulative effects, it is the Service's biological opinion that the EPF, as proposed, is not likely to jeopardize the continued existence of the Florida scrub-jay, the southeastern beach mouse, and the eastern indigo snake. No critical habitat has been designated for the three species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation under section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply.

The Federal agency has a continuing responsibility to regulate the activity that is covered by this incidental take statement. If the agency (1) fails to assume and implement the terms and conditions or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the agency must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. (50 CFR 402.14(I) (3))

Sections 7(b) (4) and 7(o) (2) of the Act do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that the Act requires a Federal permit for removal or reduction to possession of endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any State or in the course of any violation of a State criminal trespass law.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service has reviewed the biological information for this species, information presented by the applicant's consultant, and other available information relevant to this action, and based on our review; incidental take in the form of harm or harassment is anticipated for two (2) Florida scrub-jay groups.

The Service expects the level of incidental take of southeastern beach mice and eastern indigo snakes will be difficult to determine for the following reasons: eastern indigo snakes are wide-ranging and elusive; southeastern beach mice are elusive because of their burrowing habits; finding a dead or impaired specimen is unlikely; losses may be masked by predators removing dead or injured animals. The Service has reviewed the biological information for these species, information provided by representatives of the 45th Space Wing, and has determined that incidental take in the form of harm or harassment is anticipated for all the southeastern beach mice and eastern indigo snakes utilizing the 7-acre area.

If during the course of this action, the project description changes, this would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide modification of the reasonable and prudent measures.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and minimize impacts of incidental take of Florida scrub-jays, southeastern beach mice, and eastern indigo snakes:

<u>Florida scrub-jay</u>

1. Avoid construction during the nesting season from March 1 through June 30 to the maximum extent practicable.
2. Notify the Service of any unauthorized take of Florida scrub-jays identified during the construction of the proposed facility.
3. Restore and manage 166 acres of scrub habitat within Compartment 6 by using prescribed burning and mechanical means.

4. Conduct a research study in Compartments 97 & 101 on the effectiveness of mechanical clearing and burning as techniques that most effectively manage scrub on the CCAFS. The Service must approve the study design prior to the study being carried out.

Southeastern beach mouse

1. Notify the Service of any unauthorized take of southeastern beach mice identified during the construction activity.

Eastern indigo snake

1. Minimize impacts to eastern indigo snakes from heavy equipment by implementing the standard protection measures.
2. Only individuals with permits should attempt to capture the eastern indigo snakes.
3. If an eastern indigo snake is held in captivity, it should be released as soon as possible in release sites approved by the Service on the CCAFS.
4. Notify the Service of any unauthorized take of eastern indigo snakes identified during the construction of the proposed facility.

TERMS AND CONDITIONS

To implement the above reasonable and prudent measures, the Service has outlined the following terms and conditions for incidental take. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measures for incidental take:

Florida scrub-jay

1. If clearing of habitat occupied by Florida scrub-jays is to occur within the species' nesting season (typically March 1 through June 30), that area should be surveyed prior to clearing to determine if there are any active scrub-jay nests located within the vegetation. If an active scrub-jay nest is located, to the maximum extent practicable, clearing activities cannot take place within 150 feet of the nest site until nestlings have fledged or until it has been determined that the nest has failed.

2. Unauthorized take of scrub-jays associated with the proposed activity should be reported immediately by calling the Jacksonville Field Office of the U.S. Fish and Wildlife Service in Jacksonville at 904-232-2580. If a dead Florida scrub-jay is found on the project site, the specimen should be thoroughly soaked in water and frozen for later analysis of cause of death or injury.

3. NRO will provide funding to the 45th Space Wing to clear 166 acres of compartment 6 for scrub jay habitat within one year of beginning construction of the EPF facility. A prescribed burn of this compartment will follow as soon as it is deemed ready for burning.

4. NRO will provide funding for a 5-year study within one year of beginning construction of the EPF facility. The study goals will be to determine the effectiveness of different land management practices as a temporary management tool when prescribed burning has not occurred on the Florida scrub-jay habitat. The results of this study will be used, in part, to develop a sound management plan for scrub restoration and maintenance when there has been a delay in the prescribed burn treatments on the CCAFS and further allow CCAFS to meet their goal of 300 groups as stated in the INRMP.

Southeastern beach mouse

1. If a dead southeastern beach mouse is found on the project site, the specimen should be thoroughly soaked in water and frozen, and the applicant should notify the Jacksonville Field Office immediately at (904) 232-2580. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

Eastern indigo snake

1. An eastern indigo snake protection/education plan shall be developed by the 45th Space Wing for all construction personnel to follow. The plan shall be provided to the Service for review and approval at least 30 days prior to any clearing activities. The educational materials for the plan may consist of a combination of posters, videos, pamphlets, and lectures (*e.g.*, an observer trained to identify eastern indigo snakes could use the protection/education plan to instruct construction personnel before any clearing activities occur). Informational signs should be posted throughout the construction site and contain the following information:
   a. A description of the eastern indigo snake, its habits, and protection under Federal Law;
   b. Instructions not to injure, harm, harass or kill this species;
   c. Directions to cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site on its own before resuming clearing; and,
   d. Telephone numbers of pertinent agencies to be contacted if a dead eastern indigo snake is encountered. The dead specimen should be thoroughly soaked in water, and then frozen.

2. Only an individual who has been either authorized by a section 10(a)(1)(A) permit issued by the Service, or authorized by the Florida Fish and Wildlife Conservation Commission for such activities, is permitted to come in contact with or relocate an eastern indigo snake.

3. If necessary, eastern indigo snakes shall be held in captivity only long enough to transport them to a release site; at no time shall two snakes be kept in the same container during transportation.

4. An eastern indigo snake monitoring report must be submitted to the Jacksonville Field Office within 60 days of the conclusion of clearing activity. The report should be submitted when any eastern indigo snakes are observed or relocated. The report should contain the following information:
   a. Any sightings of eastern indigo snakes;
   b. Summaries of any relocated snakes if relocation was approved for the project (*e.g.*, locations of where and when they were found and relocated);
   c. Other obligations required by the Florida Fish and Wildlife Conservation Commission, as stipulated in the permit.

5. If a dead eastern indigo snake is found on the project site, the specimen should be thoroughly soaked in water and frozen, and the applicant should notify the Jacksonville Field Office immediately at (904) 232-2580. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

These reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no more that two groups of Florida scrub-jays, and all the southeastern beach mice, and all eastern indigo snakes utilizing the 7-acre area will be incidentally taken. If, during the course of the action, this level of incidental take is exceeded (e.g., burning restrictions placed on scrub habitat adjacent to the new NRO Processing Facility which results from payloads in the facility), such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the Act directs Federal agencies to use their authority to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

1. Incorporate the southeastern beach mouse and eastern indigo snake in the 5-year study of scrub management techniques in Compartment 93.
2. Leave and use native scrub vegetation in landscaping around the retention areas and the right-of-way to provide scrub habitat for the scrub-jays utilizing the site.
3. Signs should be placed on the fences that explain to the occupants the importance of the onsite and adjacent scrub areas for the listed species.
4. In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation measures.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required when discretionary Federal agency involvement or control over the action has been retained and if: (1) the amount or extent of incidental take is exceeded (specifically if adjacent scrub habitat is fire suppressed due to the new NRO EPF); (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion; (3) the Air Force's action is later modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

For this biological opinion, the incidental take would be exceeded when the take exceeds two (2) groups of Florida scrub-jays, and all the southeastern beach mice and eastern indigo snakes utilizing the 7 acres of scrub, which is what has been exempted from the prohibitions of section 9 by this opinion. The Service appreciates the cooperation of the Air Force during this consultation. We would like to continue working with you and your staff regarding the NRO EPF project. For further coordination please contact Ann Marie Maharaj at (904) 232-2580 ext. 111 of this office.

Sincerely,

Stephen R. Ritter

for David L. Hankla
Field Supervisor

cc: Joe Johnston
Atlanta RO, FWS

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Appendix B

Section 7 Consultation Letter

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DEPARTMENT OF THE AIR FORCE

45TH SPACE WING (AFSPC)

MEMORANDUM FOR UNITED STATES DEPARTMENT OF THE INTERIOR
U. S. FISH AND WILDLIFE SERVICE
6620 SOUTHPOINT DRIVE SOUTH, SUITE 310
JACKSONVILLE FL 32216-0912
ATTENTION: ANN MARIE LAURITSEN

FROM: 45 CES/CD
1224 Jupiter Street, MS 9125
Patrick AFB FL 32925-3343

SUBJECT: Reinitiation of Section 7 Consultation for Construction of the Eastern Processing Facility, Cape Canaveral Air Force Station (CCAFS), Florida

1. The 45th Space Wing (45 SW) received a Biological Opinion (BO) from your office in August 05 for the National Reconnaissance Office (NRO) Eastern Processing Facility (EPF) (reference FWS Log No: 05-1077). During the design for the proposed project, it became apparent that the existing electrical system was not sufficient to provide power for the facilities to be constructed. A new electrical substation is required to provide sufficient power to the EPF. As per our conversation on 27 March 07, this letter serves to reinitiate consultation to include this new substation.

2. The NRO is proposing to construct an electrical substation on CCAFS to support the EPF, currently under construction, as well as the existing Spin Test Support Facility (SSF), located to the south of the EPF. The proposed site is located west of the Samuel C. Phillips Parkway and directly east of the EPF (see attached site plan for general location and layout), in the north central portion of CCAFS Land Management Unit (LMU) 101.

3. To reduce transmission line losses and minimize the length of new electrical line, the substation must be in the general area of the two facilities it will be supporting and must be near Florida Power and Light's (FPL) main transmission line that runs adjacent to the Banana River. The substation was initially sited just west of its current location, in untreated scrub habitat that was left to protect cultural resources in the area. Since this was an area that was not included in the scrub restoration program due to the presence of cultural resources, this site would have avoided impact to the Florida scrub-jays *(Aphelocoma coerulescens)*. However, to the west of the proposed substation is a large recorded archaeological site. This site contains prehistoric Native American remains, as well as a historic cemetery. Additionally, the site is eligible for the National Register of Historic Places (NRHP). In 2006, a Phase I archaeological survey was conducted for the proposed substation location. It was recommended that the substation location be moved slightly to the east to avoid site disturbance. The proposed location of the substation was

moved further east so the Air Force could remain in compliance with the Native American Graves Protection and Repatriation Act (NAGPRA) and the Archaeological Resource Protection Act (ARPA).

4. The substation will be approximately 2.5 acres in area and will include stormwater retention (see the attached site plan). Overhead power will extend from the western high voltage line to the substation, via two lines, for a distance of approximately 678' (1.9 acres impacted). A clear zone under the power lines will be required for maintenance purposes and to keep vegetation from growing into the power lines and poles. This will not be a paved surface, rather just a cleared path (sand and/or grass) that allows trucks to access the line. An underground line will run from the substation east to the EPF site and then south to the SSF. This will require initial clearing of vegetation; however, the vegetation will be permitted to grow back once the line is installed. See attached aerial location map for the general layout.

5. The new substation will result in the loss of approximately 1.4 acres of Banana River maritime hammock and 1.1 acres of treated scrub located in LMU 101. The majority of the area where the substation is being proposed is not part of the scrub restoration program due to the type of vegetation that is present. Also, as described above, this area serves as a buffer to an archeological site. The clear zone under the power line will result in the removal of approximately 1.9 acres of treated scrub vegetation. LMU 101 was cut and burned in 1995 and 80 acres were again burned in 2000 and, although the height is optimal for scrub-jay use, the vegetation is fairly thick. This LMU is part of the scrub habitat restoration study currently being conducted as compensation for the NRO's EPF. Approximately 3.0 acres of the 107 acre study site will be impacted by construction of the substation.

6. Based on 2007 census data, the nearest group of jays is approximately 600 feet to the north in LMU 101. The second nearest group is located approximately 0.6 miles to the south, at the extreme southern edge of LMU 101. The locations of these two groups are shown as red dots on the attached site plan. The 2007 census data has not been imported into GIS; therefore, the nearest two groups are the only jay data shown. According to the Florida Natural Areas Inventory, the substation site is on the periphery of these two groups' territories. The groups may occasionally fly into the area, but do not utilize the area regularly.

7. In addition to jays, it is possible the habitat could support the eastern indigo snake (*Drymarchon corais couperi*). It is doubtful that southeastern beach mice (*Peromyscus polionotus niveiventris*) are present due to the thickness of the vegetation and soil type. Recent surveys of the area did not result in any observations of small mammal burrows.

8. Any impact to scrub-jays at the substation site is expected to be negligible since the majority of the area is not classified as potential scrub-jay habitat and jays do not regularly use this area. Clearing for the overhead power lines is expected to benefit the jays since it will result in permanent openings within LMU 101. Clearing for installation of the underground line will be conducted outside scrub-jay nesting season to prevent

impact to the birds in this area. Although the substation is proposed within the compensated study area, the amount of area that will be impacted is very low, 3 acres of the 107-acre study area.

9. Other than the loss of 4.4 acres of habitat, no other adverse impacts to indigo snakes are expected. The 45 SW Indigo Snake Protection/Education Plan will be presented to the project manager, construction manager and personnel. An educational sign will be displayed at the site informing personnel of the snake's appearance, its protected status, and who to contact if any are spotted in the area. If any indigo snakes are encountered during clearing activities, they will be allowed to safely leave the area on their own. Furthermore, any indigo encountered during gopher tortoise burrow excavation, if required, will be safely moved out of the project area.

10. Impacts to beach mice are expected to be negligible at the substation site since no burrows have been observed.

11. Based on our review of the project and site visits conducted by 45 SW biologists, the Air Force believes the proposed project is not likely to adversely affect the Florida scrub-jay, eastern indigo snake, or southeastern beach mouse. It is also the Air Force's opinion that additional compensation should not be required for the proposed project.

12. Please review the proposed project in accordance with Section 7 of the Endangered Species Act and provide a response to this office at your convenience. POC for this action is Ms Angy Chambers, 45 CES/CEVP, 321-853-6822 or E-mail, angy.chambers@patrick.af.mil.

Original Signed

WILLIAM J. GIBSON, DAFC
Deputy, Range/Base Civil Engineer

2 Attachments:
1. NRO Substation Site Plan
2. Aerial Location Map

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
6620 Southpoint Drive, South
Suite 310
Jacksonville, Florida 32216-0912

Surname
SS 06/04/07
Cm 06/04/07

IN REPLY REFER TO:
Fws No. 41910-7-F-0461

June 4, 2007

45 SW/CC
Attn: Brigadier General Susan J. Helm
1201 Edward H. White II Street, MS-7100
Patrick AFB, Florida 32925-3299

Re: Reinitiation of Section 7 Consultation for the Addition of a Substation for the Eastern Processing Facility (EPF) at Cape Canaveral Air Force Station (CCAFS) in Brevard County, Florida (FWS Log No. 41910-2007-F-0461)

Dear Brigadier General Helm:

The U.S. Fish and Wildlife Service (Service) has reviewed your reinitiation letter, dated April 25, 2007. The National Reconnaissance Office (NRO) proposes to construct an electrical substation on Cape Canaveral Air Force Station (CCAFS) to support the Eastern Processing Facility (EFP) and the Spin Test Support Facility (SSF). The proposed substation will be approximately 2.5 acres in area and will include a storm water retention area. The overhead power line will extend for a distance of approximately 678 feet. A clear zone consisting of sand or grass will be placed under the power lines. We provide the following comments in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

On August 2005, we provided the Air Force with our Biological Opinion (BO) (FWS Log: 05-1077) on the effects of the EPF construction on the Florida scrub-jay (*Aphelocoma coerulescens*), the southeastern beach mouse (*Peromyscus polionotus niveiventris*), and the eastern indigo snake (*Drymarchon corais couperi*). On March 27, 2007, the Service met with representatives of the 45th Space Wing to discuss the addition of the substation to the EPF project. The Air Force reinitiated consultation on April 25, 2007. On May 15, 2007, the Service received additional information on the proposed project from representatives of the 45th Space Wing.
The following information was provided:
1. Prescribed burns will not be prohibited or cancelled due to proximity to, or from smoke/ash deposition on any of these facilities.
2. Scrub vegetation on the proposed substation site is not currently occupied by scrub-jays.
3. Previous research at CCAFS, showed that scrub-jays utilized corridors. The clear zone created for the power lines may create preferred habitat where none previously exists.
4. Construction of the substation or the power lines will not affect the NRO study presently being conducted as a 'Term and Conditions of the BO dated August 2005.

Based on the preceding information, the Service concurs with the Air Force that the proposed substation and power lines do not alter the findings and conclusions, including incidental take and reasonable and prudent measures and their implementing terms and conditions, described in our August 2005 Biological Opinion.

If you have any questions, please contact Ann Marie Lauritsen at (904) 525-0661.

Sincerely,

Candace Martinez

For David L. Hankla
Field Supervisor

Appendix C

Potential Future Projects Considered for Cumulative Impact Analysis

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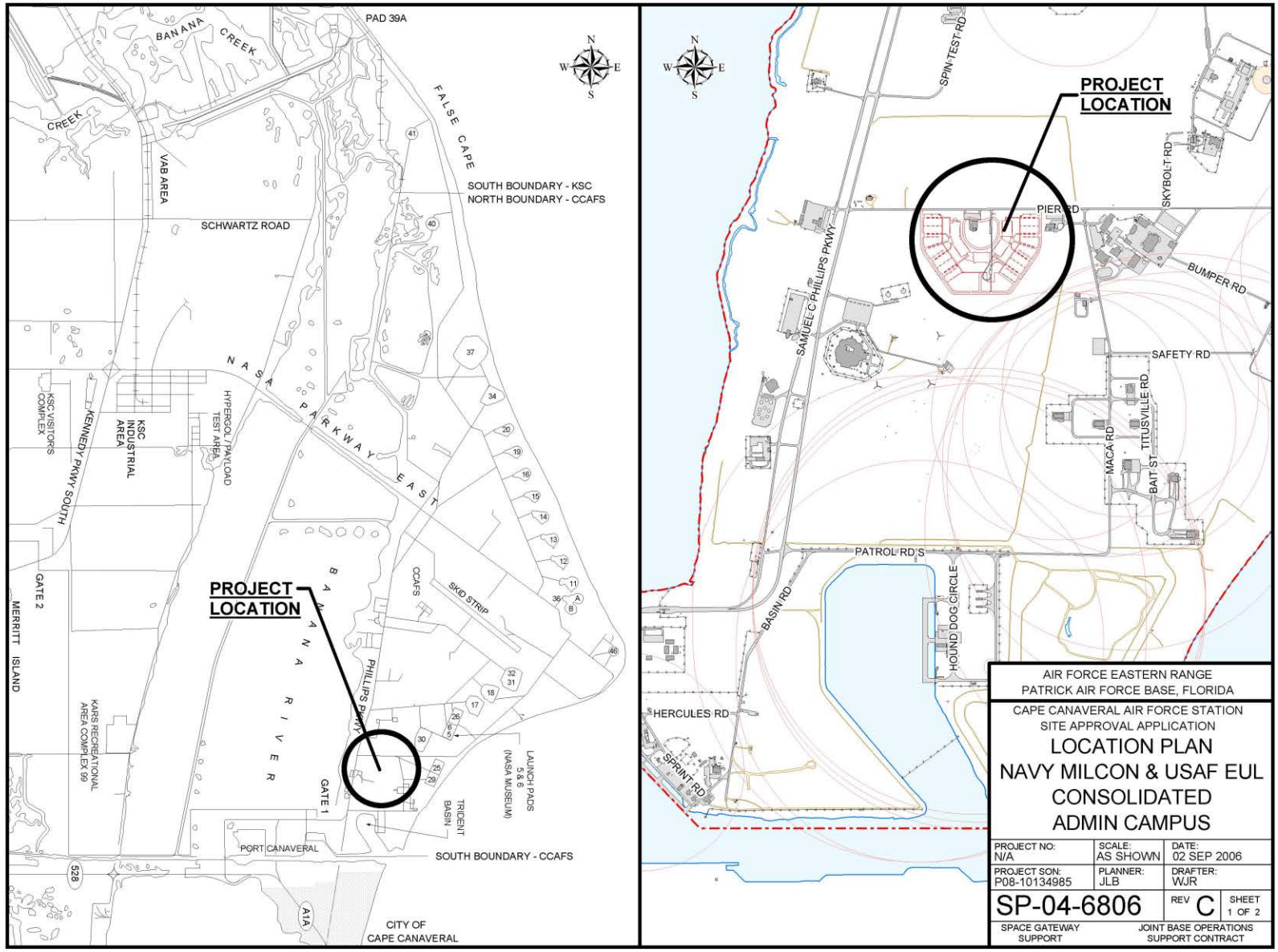

Figure C.1 General Location of the Administrative Campus Area

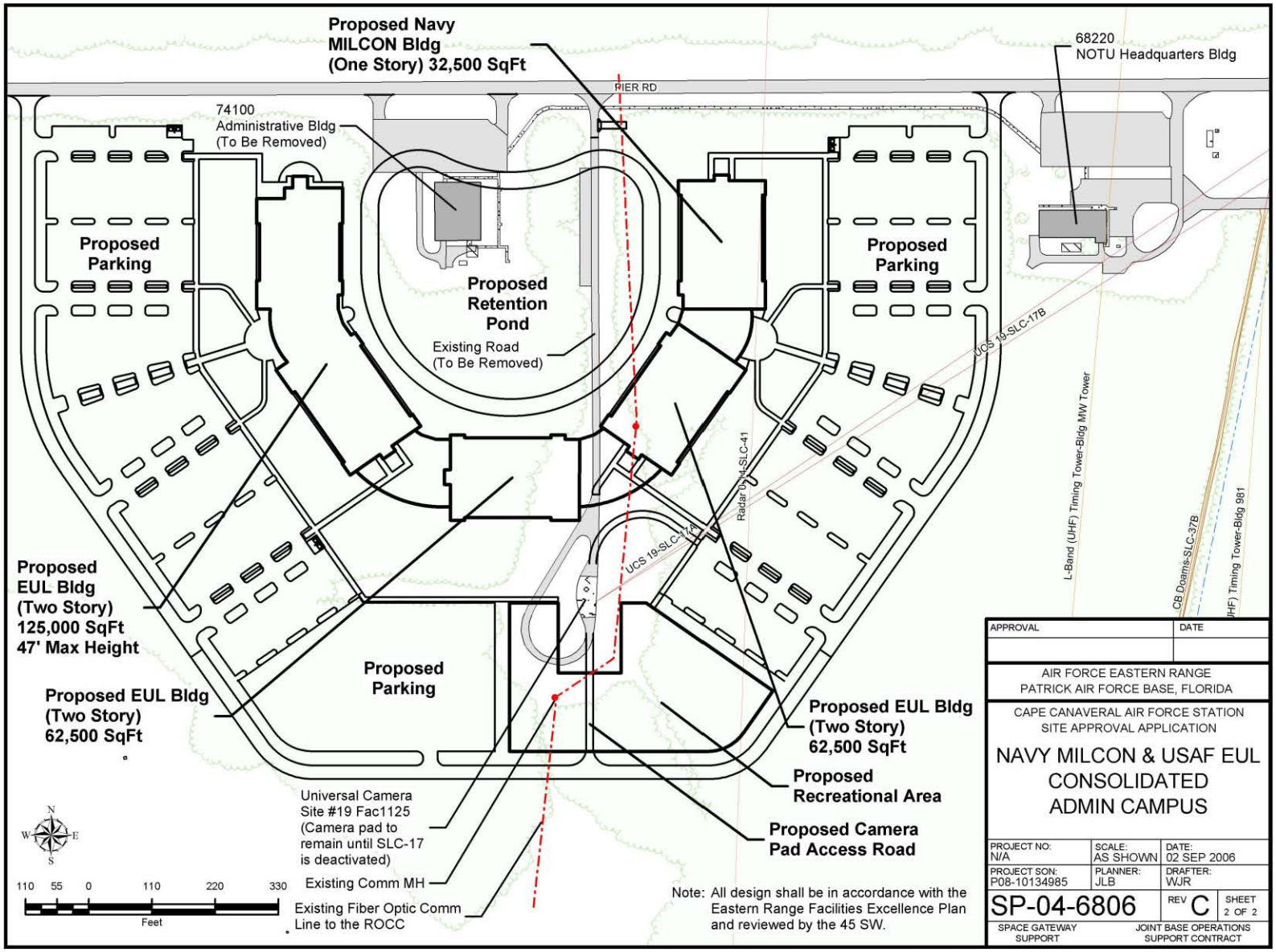

Figure C.2 Proposed Layout of the Administrative Campus Area

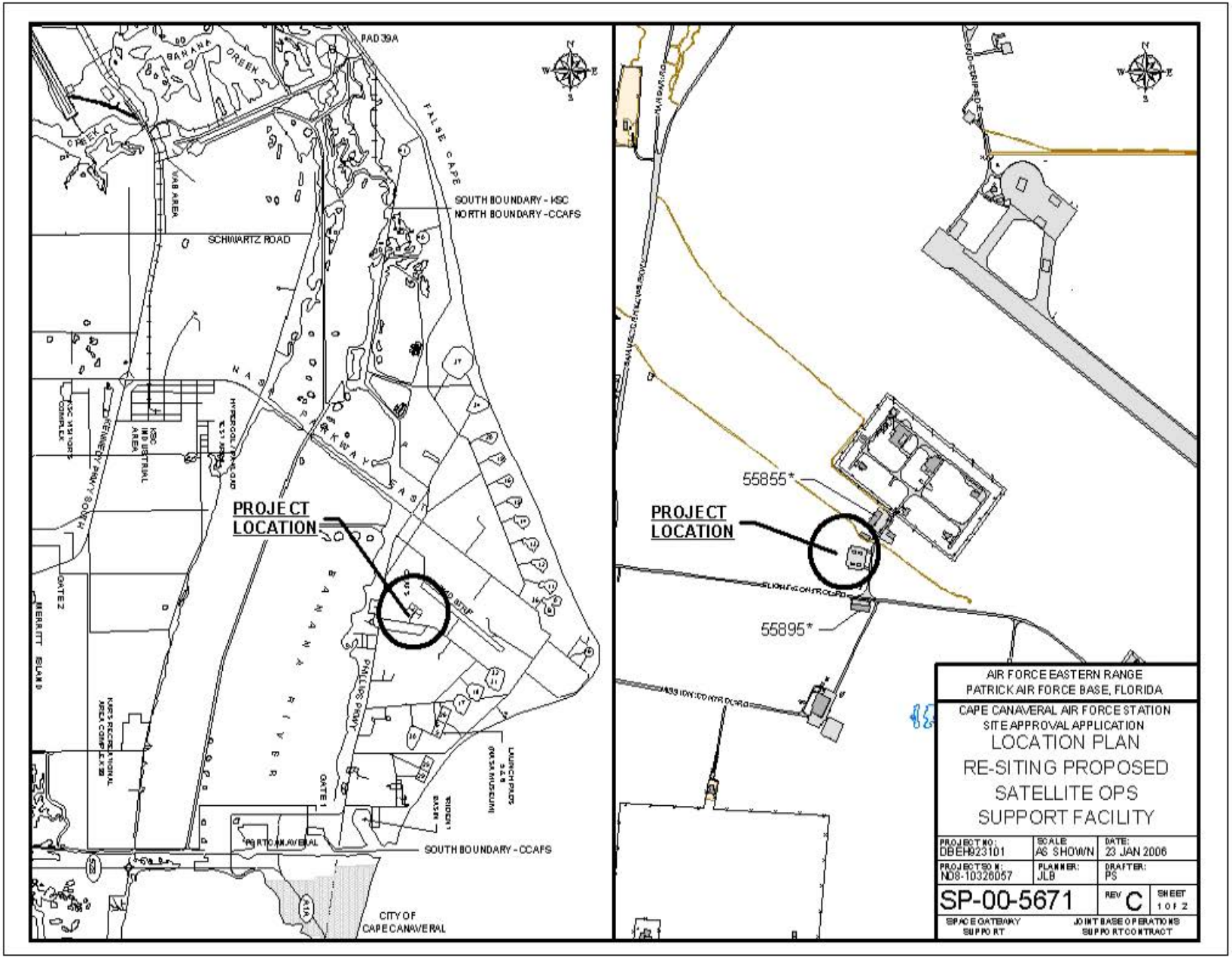

Figure C.3 General Location of the Satellite Operations Support Facility

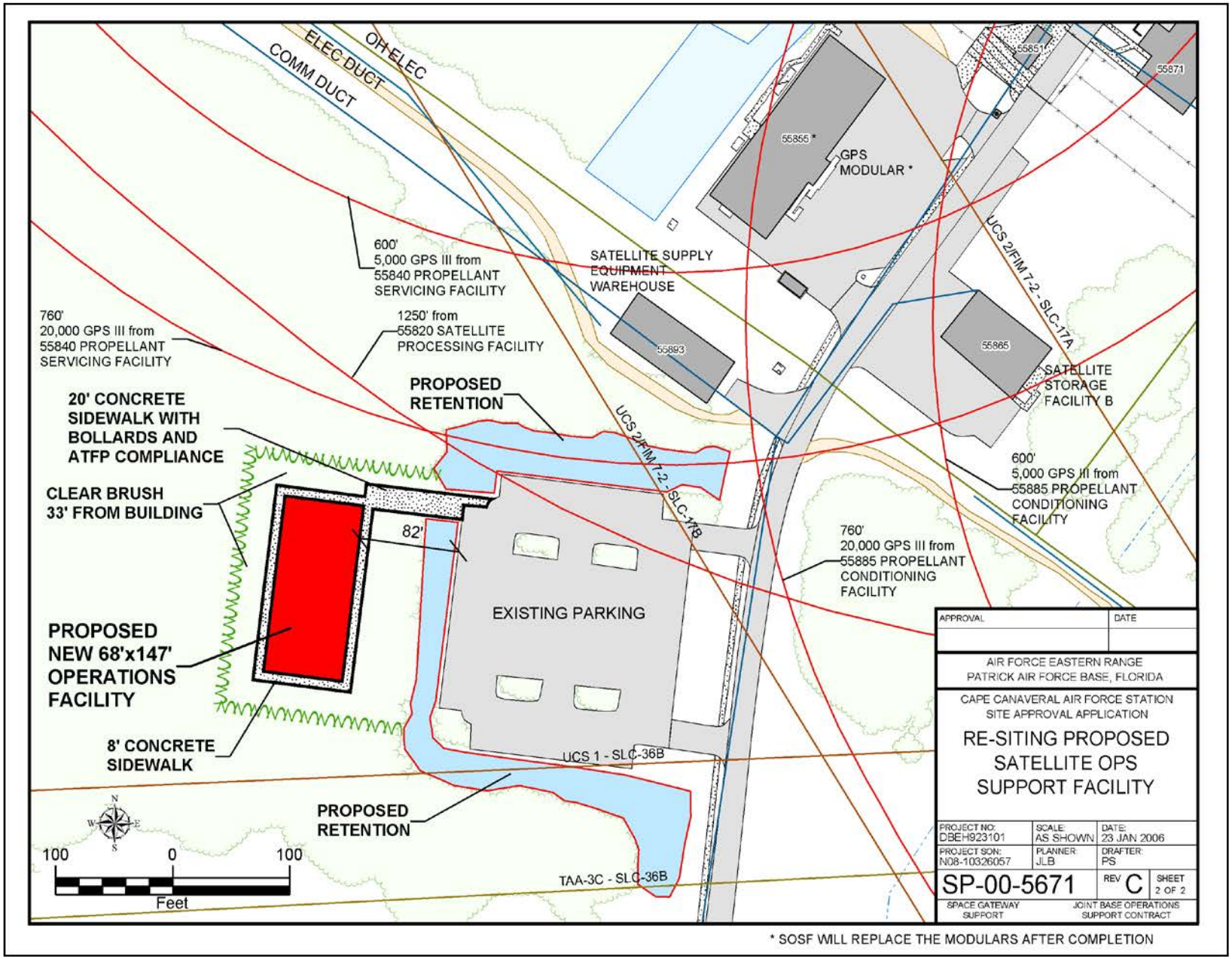

Figure C.4 Proposed Layout of the Satellite Operations Support Facility

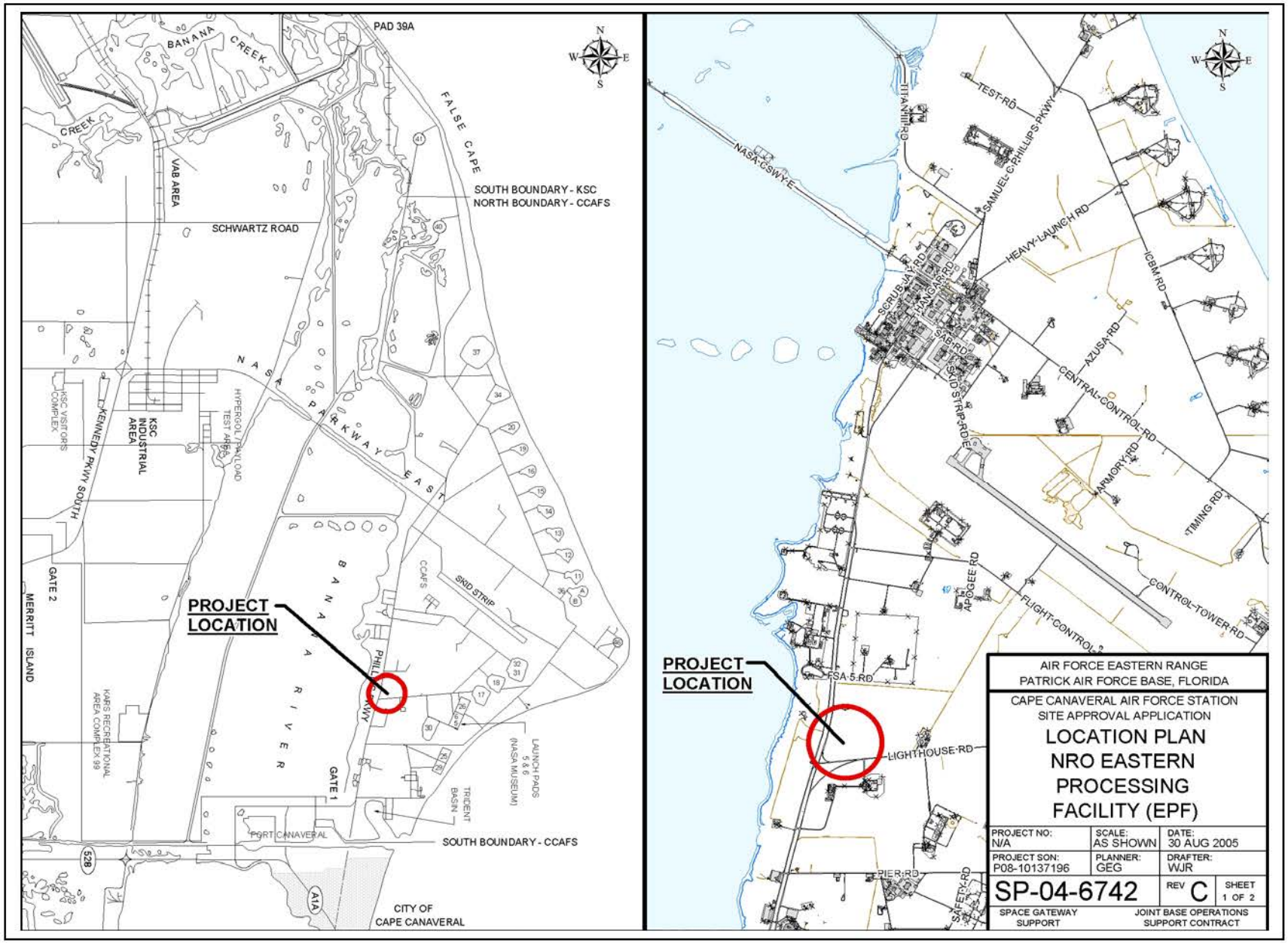

Figure C.5 General Location of the Eastern Processing Facility

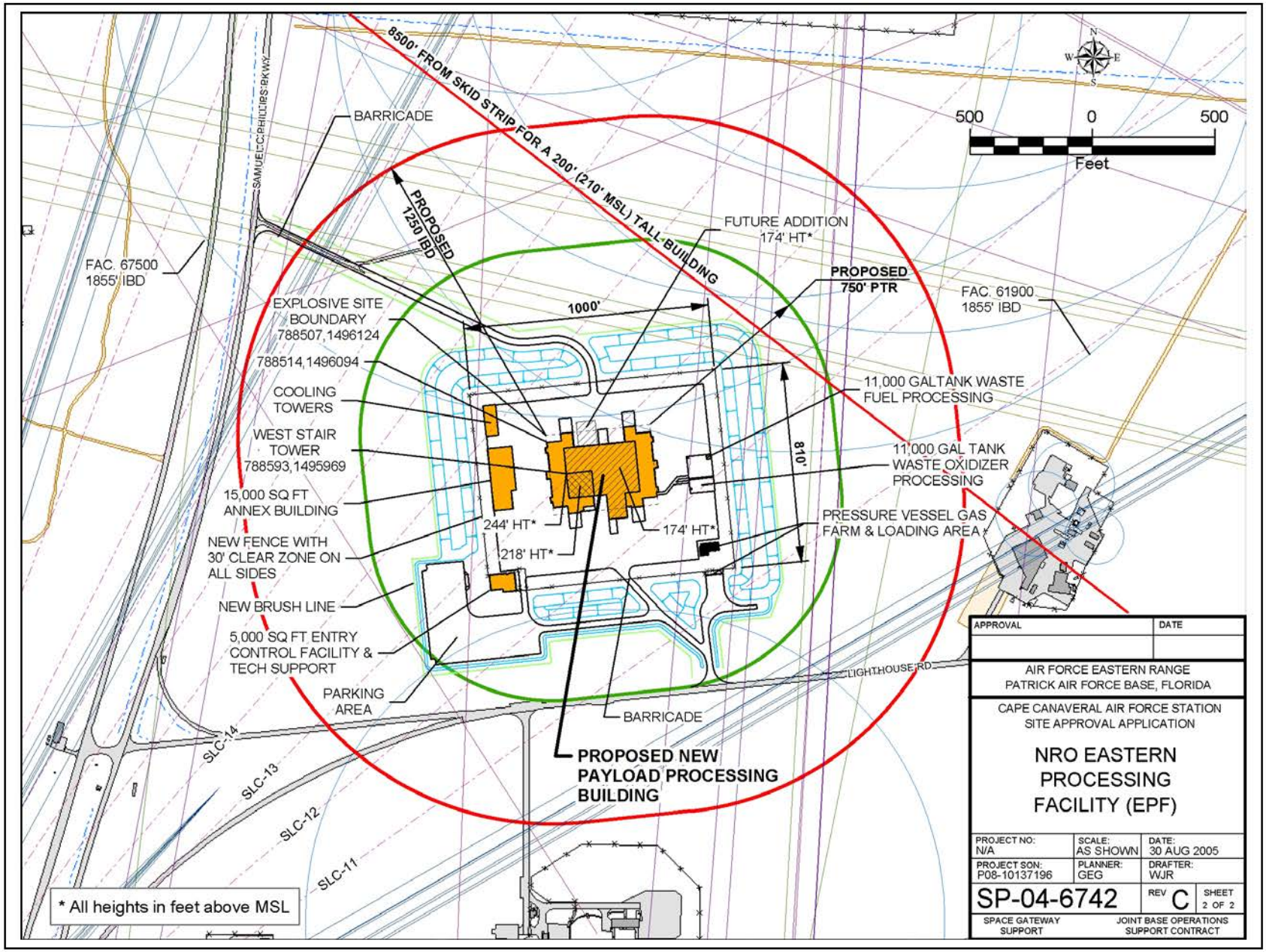

Figure C.6 Proposed Layout of the Eastern Processing Facility

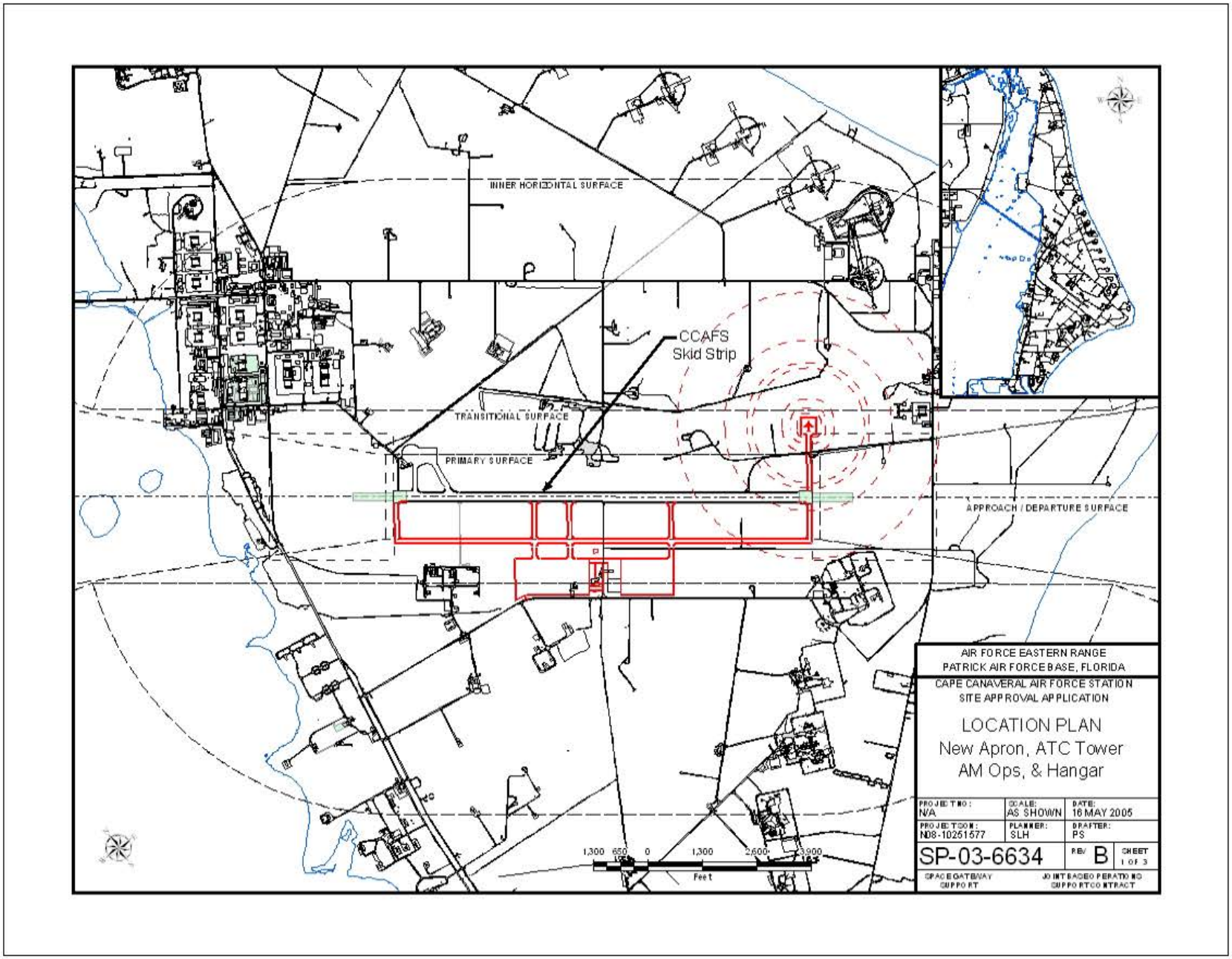

Figure C.7 General Location of the CCAFS Skid Strip

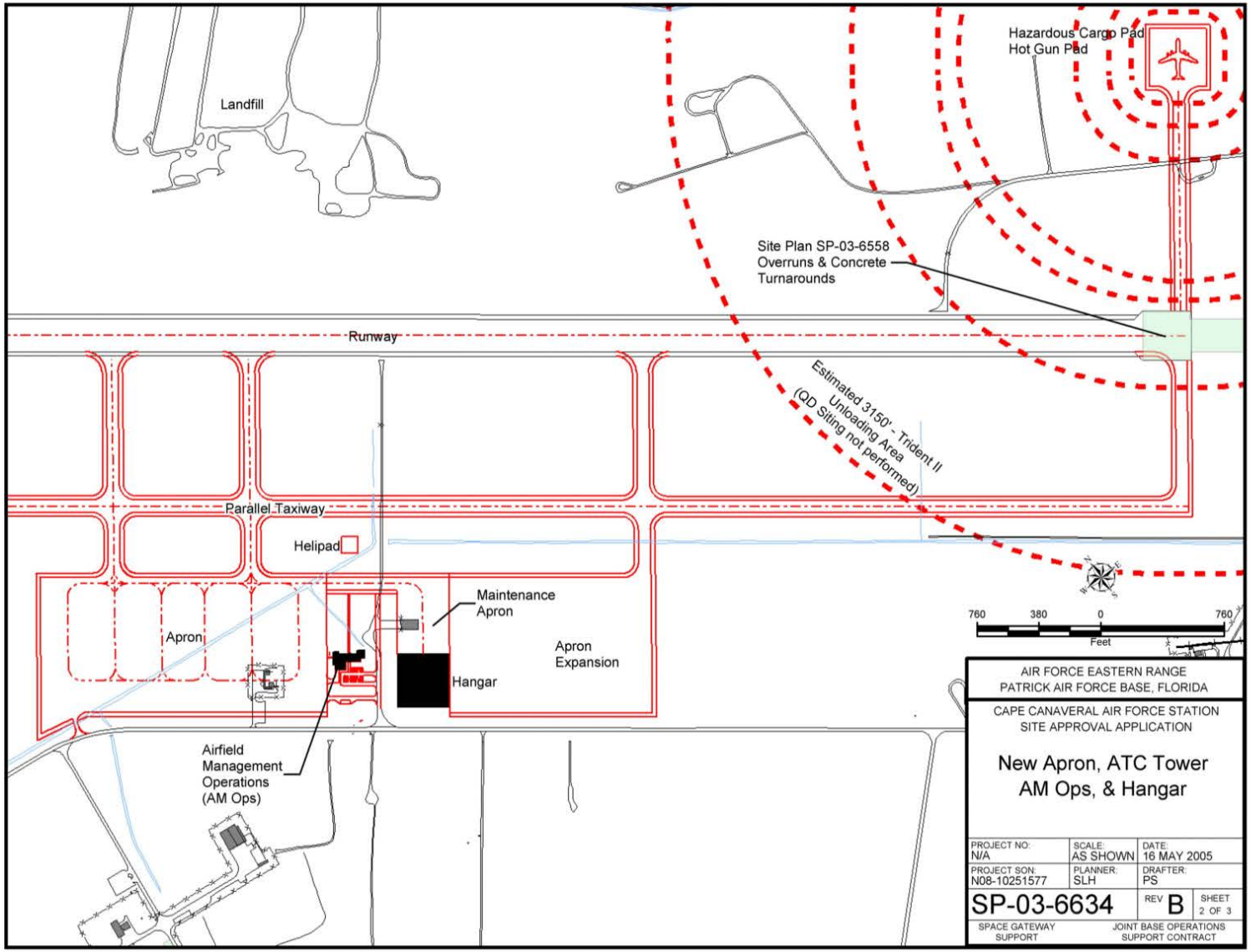

Figure C.8 Proposed Layout of the CCAFS Skid Strip

Appendix D

Florida State Clearinghouse Correspondence

Florida Department of
Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

September 25, 2007

Ms. Angy L. Chambers
Department of the Air Force
45 CES/CEVP
1224 Jupiter Street, MS 9125
Patrick AFB, FL 32925-3343

RE: Department of the Air Force - Supplemental Environmental Assessment for the Lighthouse Electrical Substation at Cape Canaveral Air Force Station - Brevard County, Florida.
SAI # FL200709213774C

Dear Ms. Chambers:

Florida State Clearinghouse staff, pursuant to Presidential Executive Order 12372, Gubernatorial Executive Order 95-359, the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended, and the National Environmental Policy Act, 42 U.S.C. §§ 4321, 4331-4335, 4341-4347, as amended, has reviewed the referenced Supplemental Environmental Assessment (EA).

As noted in the EA, an Environmental Resource Permit (ERP) will be required for the proposed site improvements. Please contact Ms. Debra Laisure, P.E., at the Department's Central District office in Orlando at (407) 893-7874, to obtain additional ERP permitting information. A National Pollutant Discharge Elimination System (NPDES) permit will also be required from the Department - please contact the NPDES Stormwater Section in Tallahassee at (850) 245-7589 for further information on NPDES permitting requirements.

In addition, any onsite or offsite improvements associated with the project that impact Florida Department of Transportation (FDOT) facilities will require the appropriate FDOT permits. Required permits may include access management, utility, drainage, or other permits depending on the work planned. The applicant should contact Mr. Jack West at FDOT's local maintenance office, phone (321) 690-3242, for a more detailed review once plans are available.

Based on the information contained in the Supplemental EA, the state has determined that, at this stage, the proposed federal activities are consistent with the Florida Coastal Management Program (FCMP). The federal agency must, however, address the concerns identified above prior to project implementation. Please continue to coordinate with the

DEP, FDOT and Florida Department of State, State Historic Preservation Office to ensure compliance with the applicable ERP, FDOT permitting and historic preservation requirements. The state's final concurrence of the project's consistency with the FCMP will be determined during the environmental permitting stage.

Thank you for the opportunity to review the subject document. Should you have any questions regarding this letter, please contact Ms. Lauren P. Milligan at (850) 245-2170.

Yours sincerely,

Sally B. Mann

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lm