

DRAFT

**Environmental Assessment
for the
Space Exploration Technologies Vertical Landing
of the Falcon Vehicle and
Construction at Launch Complex 13
at
Cape Canaveral Air Force Station
Florida**

Prepared For

**Space Exploration Technologies Corporation
El Segundo, California
and
45th Space Wing
Patrick Air Force Base, Florida**

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ACRONYMS AND ABBREVIATIONS

AADT	Average Annual Daily Traffic	CO	Carbon Monoxide
ACHP	Advisory Council on Historic Preservation	COPC	Contaminants of Potential Concern
ACM	Asbestos Containing Material	COPV	Carbon Overwrap Pressure Vessel
AE	Adverse Effect	CRM	Cultural Resources Manager
AFB	Air Force Base	CRMP	Cultural Resources Management Plan
AFI	Air Force Instruction	CSEL	C-Weighted Sound Exposure Level
AFSPC	Air Force Space Command	CSLA	Commercial Space Launch Act
AFMAN	Air Force Manual	CWA	Clean Water Act
AFTOX	Air Force Toxic Chemical Dispersion Model	CZMA	Coastal Zone Management Act
AIRFA	American Indian Religious Freedom Act	CZMP	Coastal Zone Management Program
Al ₂ O ₃	Aluminum Oxide	dB	Decibel
AMU	Applied Meteorology Unit	dBA	A-Weighted Decibel
ANSI	American National Standards Institute	DCE	Dichloroethene
ARPA	Archaeological Resources Protection Act	DCG	Disaster Control Group
ASME	American Society of Mechanical Engineers	DNL	Day-Night Average Sound Level
AST	Aboveground Storage Tanks	DoD	Department of Defense
Avg	Average	DOT	Department of Transportation
AW SPL	A-Weighted (dBA) Sound Pressure Levels	EA	Environmental Assessment
BE BR	Bureau of Economic and Business Research	EDC	Economic Development Commission of Florida's Space Coast
bls	below land surface	EELV	Evolved Expendable Launch Vehicle
BMP	Best Management Practices	EEZ	Exclusive Economic Zone
CAA	Clean Air Act	EFH	Essential Fish Habitat
CCA FS	Cape Canaveral Air Force Station	EIAP	Environmental Impact Analysis Process
CCEMP	Consolidated Comprehensive Emergency Management Plan	EIS	Environmental Impact Statement
CDNL	C-Weighted Day-Night Average Sound Level	EO	Executive Order
CE	Commercially Exploited	EPCs	Envelope Payload Characteristics
CEQ	Council of Environmental Quality	EPCRA	Emergency Planning and Community Right-to-Know Act
CERCLA	Comprehension Environmental Response Compensation and Liability Act	ER	Eastern Range
CERL	Construction Engineering Research Laboratories	ERA	Ecological Risk Assessment
CFR	Code of Federal Regulations	ERAP	Environmental Risk Assessment Program
CMD	Corrective Measures Design	ERP	Environmental Resource Permits
CMI	Corrective Measures Implementation	ESA	Endangered Species Act
CMS	Corrective Measures Studies	ESB	Engineering Support Building
		ESC	Environmental Support Contractor
		EWRSP	Eastern and Western Range Safety Policies and Processes
		FAA	Federal Aviation Administration
		FAAQS	Florida Ambient Air Quality Standards

FAC	Florida Administrative Code	KSC	Kennedy Space Center
FCMA	Florida Coastal Management Act	kVA	Kilo-Volt Amperes
FCMP	Florida Coastal Management Program	LBP	lead-based paint
FDCA	Florida Department of Community Affairs	LC	Launch Complex
FDEP	Florida Department of Environmental Protection	LDCG	Launch Disaster Control Group
FDOT	Florida Department of Transportation	LEO	Low-Earth Orbit
FEIS	Final Environmental Impact Statement	LOX	Liquid Oxygen
FETSA	Florida Endangered and Threatened Species Act	LTM	Long Term Monitoring
FFWCC	Florida Fish and Wildlife Conservation Commission	LUCIP	Land Use Control Implementation Plan
FMOs	Fishery Management Officials	MACT	Maximum Available Control Technology
FNAI	Florida Natural Areas Inventory	max	Maximum
FONSI	Finding of No Significant Impact	MBTA	Migratory Bird Treaty Act
FONPA	Finding of No Practical Alternative	MCL	Maximum Contaminant Level
FSTR	Full Spectrum Threat Response	MEK	Methyl Ethyl Ketone
ft	feet	MGD	Million Gallons per Day
ft2	square feet	µg/m ³	Micrograms per Cubic Meter
FTS	Flight Termination System	MHz	Mega-Hertz
GDSS	General Dynamics Space Systems	MMH	Monomethylhydrazine
GLV	Generic Launch Vehicle	MMPA	Marine Mammal Protection Act
GPS	Global Positioning System	MNA	Monitored Natural Attenuation
GSDO	Ground Systems Development and Operations	MOA	Memorandum of Agreement
HABS	Historic American Building Survey	MPPF	Multi-Payload Processing Facility
HAER	Historic American Engineering Record	MR	Mitigation Required
HAP	Hazardous Air Pollutants	MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
HAPCs	Habitat Areas of particular Concern	MSL	Mean Sea Level
HAZMAT	Hazardous Material	MST	Mobile Service Tower
HCI	Hydrogen Chloride	MW	Mega-watt
HHRA	Human Health Risk Assessment	MWH	Mega-watt Hours
HMTA	Hazardous Materials Transportation Act	N/A	Not Applicable
HQ AFSPC	Headquarters Air Force Space Command	NAAQS	National Ambient Air Quality Standards
IM	Interim Measure	NAGPRA	Native American Graves Protection and Repatriation Act
IMS	Incident Management System	NASA	National Aeronautic and Space Administration
INRMP	Integrated Natural Resources Management Plan	NEPA	National Environmental Policy Act
IPA	Isopropyl Alcohol	NESHAP	National Emission Standards for Hazardous Air Pollutant
IRP	Installation Restoration Program	NFRAP	No-Further Remedial Action Planned
ISS	International Space Station	NHPA	National Historic Preservation Act
		NMFS	National Marine Fisheries Service
		NO ₂	Nitrogen Dioxide
		NOAA	National Oceanic and Atmospheric Administration

NOI	Notice of Intent	RP-1	Rocket Propellant 1 (standard kerosene rocket fuel MIL-P-25576)
NOx	Nitrogen Oxides	RPM	Remedial Project Manager
NPDES	National Pollutant Discharge Elimination System	SAFMC	South Atlantic Fishery Management Council
NPL	National Priorities List	SARA	Superfund Amendments and Reauthorization Act
NRHP	National Register of Historic Places	SCTL	Soil Cleanup Target Level
NTO	Nitrogen tetroxide	SEL	Sound Exposure Level
NWS	National Weather Service	SHPO	State Historic Preservation Officer
NWSO	National Weather Service Office	SJRWMD	St. Johns River Water Management District
O3	Ozone	SLC	Space Launch Complex
OCST	Office of Commercial Space Transportation	SO2	Sulfur Dioxide
ODS	Ozone Depleting Substances	SPIF	Spacecraft Processing and Integration Facility
OFW	Outstanding Florida Water	SPL	Sound Pressure Level
OPLAN	Operations Plan	SR	State Route
OSHA	Occupational Safety and Health Act	SSC	Species of Special Concern
OASPL	Overall Sound Pressure Level	SW	Space Wing
OWS	Oil-Water Separator	SWI	Space Wing Instruction
PAE	Potentially Adverse Effect	SWMU	Solid Waste Management Unit
PAFB	Patrick Air Force Base	SWPPP	Storm Water Pollution Prevention Plan
PAH	Poly-nuclear aromatic hydrocarbons	T&E	Threatened and Endangered
Pb	lead	TCE	Trichloroethylene
PCB	Poly-chlorinated biphenyl	THC	Toxic Hazard Corridor
PE	Positive Effect	TPH	Total Petroleum Hydrocarbons
PFDP	Preliminary Flight Data Package	TPY	Tons per Year
PHSF	Payload Hazardous Servicing Facility	TSCA	Toxic Substance Control Act
PHV	Peak-hour volume	TSD	Treatment, Storage, or Disposal
PM10	Particulate matter equal to or less than 10 microns in diameter	TSDF	Treatment, Storage, or Disposal Facility
PM2.5	Particulate matter equal to or less than 2.5 microns in diameter	TSP	Total Suspended Particulate
POL	Petroleum Products, Oils, Lubricants	UFC	Unified Facilities Criteria
PPF	Payload Processing Facility	U.S.	United States
ppm	parts per million	US	U.S. Highway
PPMP	Pollution Prevention Management Action Plan	USACE	U.S. Army Corps of Engineers
RCRA	Resource Conservation Recovery Act	USAF	United States Air Force
REEDM	Rocket Exhaust Effluent Dispersion Model	U.S.C.	United States Code
RFI RCRA	Facility Investigation	USEPA	U.S. Environmental Protection Agency
RLV	Reusable Launch Vehicle	USFWS	U.S. Fish and Wildlife Service
RMP	Risk Management Plan	VAFB	Vandenberg Air Force Base
ROI	Regions of Influence	VC	Vinyl Chloride
		VOC	Volatile Organic Compounds
		WWTP	Wastewater Treatment Plant

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

Space Exploration Technologies Corporation (SpaceX) has prepared this Environmental Assessment (EA) to evaluate the potential environmental impacts resulting from activities associated with conducting vertical landings of the Falcon first stage vehicle at Launch Complex (LC) 13 at Cape Canaveral Air Force Station (CCAFS), in Brevard County, Florida. This EA also addresses related land clearing and construction of a main landing pad, contingency pads, and supporting infrastructure modifications to the existing facility. In order to operate LC-13 as a landing facility for its Falcon family of vehicles, SpaceX intends to work towards obtaining a 5-year real property license from the United States Air Force (USAF) and receive a launch license from the Federal Aviation Administration (FAA) Office of Commercial Space Transportation, which would include the landing event. In accordance with agreements between the USAF and the FAA, the USAF will act as the lead agency for the preparation and coordination of the National Environmental Policy Act (NEPA) documentation for the Proposed Action, and the FAA will act as a cooperating agency. The National Aeronautics and Space Administration (NASA) will also participate as a cooperating agency. This EA has been prepared in accordance with the requirements of NEPA (42 United States Code [U.S.C.] §4321 et seq.), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508), USAF Environmental Impact Analysis Process (EIAP) (32 CFR Part 989), Department of Defense (DoD) Directive 6050, and FAA Order 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures*. It is NASA's mission to expand commercial uses of space and the space industry; this directive is detailed in the NASA Authorization Act of 2010 and the Space Act of 1958, as amended. Since NASA is a cooperating agency, this EA considers the Procedures of Implementation of NEPA for NASA [Title 14, Code of Federal Regulations, part 1216 subparts 1216.1 and 1216.3].

In 2006, NASA awarded SpaceX a Commercial Orbital Transportation Services (COTS) contract to design and demonstrate a launch system to resupply cargo to the International Space Station (ISS). Later, NASA also awarded SpaceX a contract to develop and demonstrate a human-rated Dragon capsule as part of its Commercial Crew Development program to transport crew to the ISS. In November 2007, the USAF published the *Environmental Assessment for the Operation and Launch of the Falcon 1 and Falcon 9 Space Vehicles at Cape Canaveral Air Force Station, Florida* (2007 EA) and in December 2007 the USAF issued a Finding of No Significant Impact (FONSI) for that EA. The FAA issued its own FONSI in January 2009. The 2007 EA analyzed the potential environmental impacts of constructing support facilities, and operating the Falcon 1 and Falcon 9 launch vehicles, payloads, and Cargo Dragon capsule at LC-40. The 2007 EA also included USAF leasing land and facilities to SpaceX, and supported cooperating agency actions for the FAA to issue launch licenses and reentry licenses and NASA to contract with SpaceX for launch services. Additionally, in 2013 a supplemental EA was published that assessed the potential environmental impacts of the Falcon 9 Block 2 vehicle, also referred to as Version 1.1 (v1.1), launch operations at LC-40 which included the Dragon capsule and other payloads for 2013 and beyond. The USAF published a FONSI in September 2013. The FAA issued its own FONSI in October 2013.

After rocket takeoff and stage separation, rocket stages can free fall or fall under parachute into the Atlantic Ocean. Often, the stages are left to sink to the ocean bottom, eliminating chances for stage recovery. SpaceX has designed

the first stage of their Falcon rocket to be completely reusable by enabling the stages to return or "boost-back" the expended stages of the launch vehicle to a landing site near the original launch point.

In addition to NASA, SpaceX has signed contracts with private sector companies, foreign government agencies, and the Department of Defense (DoD) for its launch services at its collective launch locations. The Falcon 9 vehicle has successfully launched 12 times from CCAFS LC-40 under an FAA license. The maiden flight took place on June 4, 2010. The Falcon 9 v1.1 has successfully launched seven times; the first time on December 3, 2013 and most recently on September 21, 2014

The Commercial Space Launch Act of 2011 (51 U.S.C. Subtitle V, ch. 509, §§ 50901-50923) declares that the development of commercial launch vehicles, reentry vehicles, and associated services would enable the United States to retain its competitive position internationally, contributing to the national interest and economic well-being of the United States. The Act authorizes the Secretary of Transportation to oversee and coordinate the conduct of commercial launch and reentry operations, issue commercial licenses authorizing those operations, and protect the public health and safety, safety of property, and national security and foreign policy interests of the United States. Within the Department of Transportation, the Secretary of Transportation's authority has been delegated to the FAA's Office of Commercial Space Transportation.

In addition to the EA, applicants for an FAA license must complete a policy review and approval, safety review and approval, payload review and determination, and a financial responsibility determination. Launch "activities" also includes the re-entry and return (splash-down or landing) of both expendable launch vehicles (ELV) and re-usable launch vehicles (RLV). All of these reviews, including the environmental review, must be completed prior to receiving a launch license. All FAA safety analyses would be conducted separately and would be included in the terms and conditions of the license.

1.2 LOCATION AND BACKGROUND

CCAFS occupies approximately 15,800 acres (25 square miles) of land on Florida's Cape Canaveral barrier island (Figure 1-1). Cape Canaveral is on the east coast of Brevard County, Florida, approximately 155 miles south of Jacksonville, 210 miles north of Miami, and 60 miles east of Orlando. It is approximately 4.5 miles wide at its widest point. CCAFS has 81 miles of paved roads connecting various launch support facilities with the centralized Industrial Area. The northern boundary of CCAFS adjoins the Kennedy Space Center (KSC) boundary on the Merritt Island barrier island. The Banana River Lagoon separates CCAFS from KSC to the west. The Port of Cape Canaveral adjoins CCAFS to the south. CCAFS's eastern boundary is the Atlantic Ocean. The base is accessible primarily from U.S. Highway 528 to the south and from KSC to the west and north. A total of 33 LCs have been constructed and used at CCAFS.

The USAF 45th Space Wing (45 SW) is currently the host wing under Air Force Space Command and conducts east coast military, civilian, and commercial launch operations. LC-13 is located in the east-central portion of CCAFS between LC-12 to the south and LC-14 to the north (Figures 1-2 and 1-3). Throughout many years of operation at LC-13, the facility launched various versions of the Atlas rocket. Since the Air Force's first launch in 1958 of an Atlas B rocket, LC-13 has supported 51 rocket launches from its pad. The last launch from LC-13 was an Atlas vehicle in

April 1978. The USAF demolished the LC-13 Mobile Service Tower and its associated infrastructure (2005) and the block house (2012).

1.3 PURPOSE AND NEED FOR ACTION

The **purpose** of this action is to provide a RLV landing area by constructing a landing pad and associated supporting infrastructure for landing operations of the Falcon 9 or Falcon Heavy vehicle in order to reuse it for future launches. This purpose continues to support SpaceX's over-all missions for NASA and the USAF. The action continues to fulfill the United States' expectation that space transportation costs are reduced in order to make continued exploration, development, and use of space more affordable. The Space Transportation section of the National Space Transportation Policy of 1994 addressed the commercial launch sector, stating that "assuring reliable and affordable access to space through U.S. space transportation capabilities is fundamental to achieving National Space Policy goals."

This action is **needed** in order to increase the effective and cost efficient operation of space flight by providing a truly returnable, re-usable space vehicle close to the location that it was launched from. The need for the Proposed Action is also in line with NASA's Space Act Agreement (SAA) and the FAA's Office of Commercial Space Transportation mission, which is to continue to support of the U.S. goal of encouraging activities by the private sector to strengthen and expand U.S. space transportation infrastructure. The Proposed Action would provide greater capability in its mission to support the ISS and other commercial enterprises. Demand for launch services has increased over the past 20 years and the demand projections indicate that this would continue into the foreseeable future. In order for the United States to be competitive, the cost and frequency of launches needs to keep pace with world demand.

1.4 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

1.4.1 Lead and Cooperating Agency Actions

This EA addresses site development at LC-13, the maintenance of areas around the landing facility, and vertical landing operations of the Falcon RLV at LC-13. The Proposed Action would require SpaceX to enter into a real property agreement with the USAF. The USAF will use the subject environmental analyses as a basis for the decision to issue SpaceX a 5-year license to conduct operations from LC-13. If, after public review of the EA, the USAF determines that the Proposed Action would not individually or cumulatively result in significant impacts on the human environment, the USAF will issue a final Finding of No Significant Impact (FONSI) and proceed with the license.

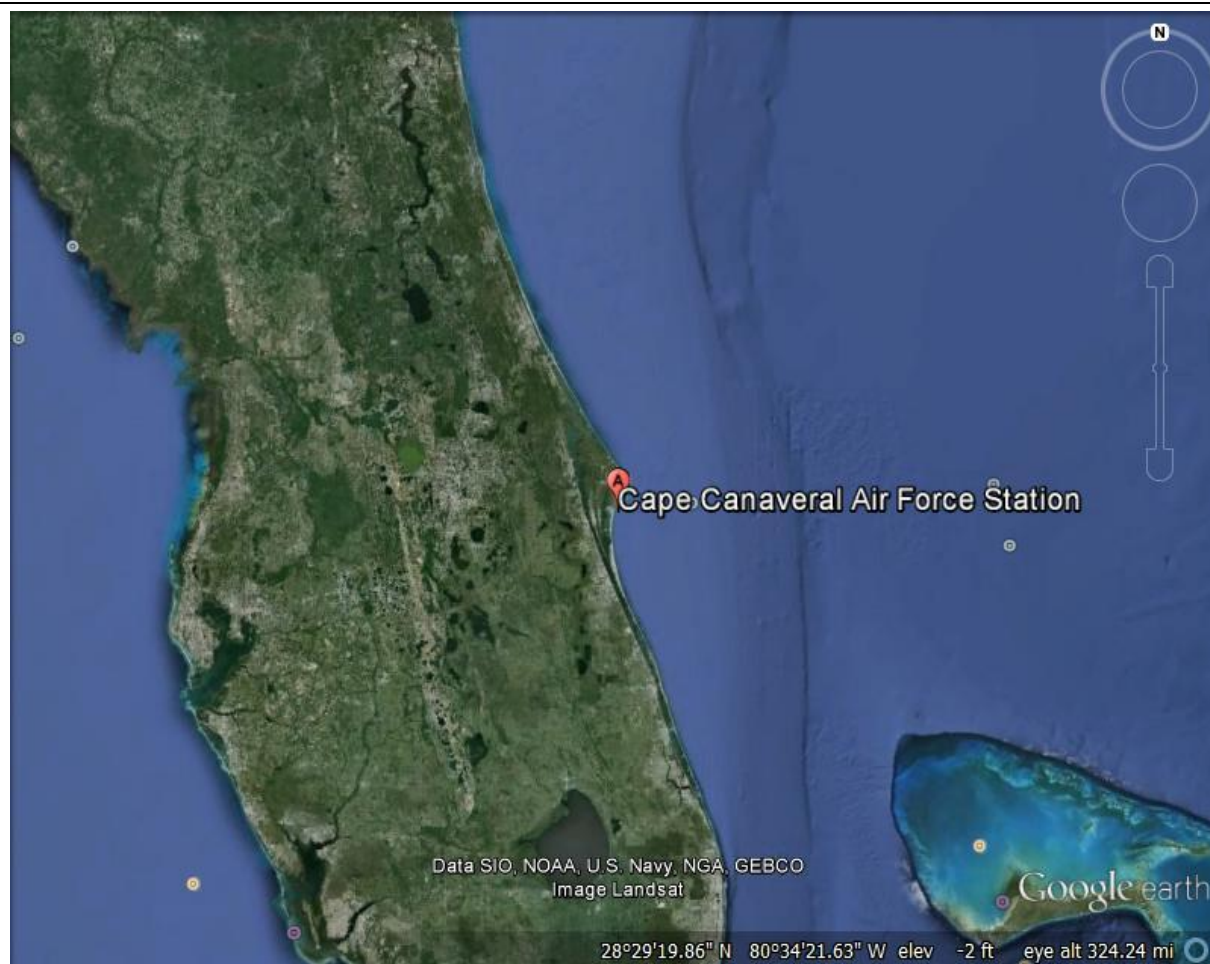
The FAA will rely on this analysis to support its environmental review when it is evaluating SpaceX's license application to conduct RLV landing operations at LC-13. If, after reviewing the EA, the FAA determines the Proposed Action would not individually or cumulatively result in significant impacts on the human environment, the FAA would issue its own FONSI to support issuing a launch (operations will only include landing) license to SpaceX at LC-13. The FAA will draw its own conclusions from the analysis presented in this EA and assume responsibility for its environmental decision and any related mitigation measures. In order for the FAA to use this analysis to support its determination, the EA must meet the requirements of FAA Order 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures*, which contains the FAA's policies and procedures for compliance with NEPA.

NASA is also a cooperating agency and provides special expertise with respect to potential environmental impacts from space launches and the operation of a launch site. NASA also has special expertise and interest in the operation of reusable suborbital rockets through its programs, such as its Flight Opportunities Program, which are intended to help foster the development of the commercial reusable suborbital transportation industry.

1.4.2 Structure of this EA

This EA presents the analysis and description of potential environmental impacts that could result from the Proposed Action and the No Action Alternative. As appropriate, the affected environment and environmental consequences of the Proposed Action and the No Action Alternative are discussed in context with resource area descriptions. The structure of the EA is as follows:

- Section 2.0 of this EA describes the Proposed Action the No Action Alternative, and Alternatives Considered But Eliminated From Analysis; it also discusses standards for alternative selection, or non-selection based upon Title 32 CFR Part 989.8.
- Section 3.0 provides a description of the affected environment for the following resource areas: land use/visual resources, noise, biological resources, cultural resources, air quality, hazardous materials/hazardous waste, water resources, geology and soils, transportation, utilities, health and safety, socioeconomics, environmental justice, and Section 4(f) properties. The information included in this section describes existing conditions, which provides background for understanding the context of the action.
- Section 4.0 addresses the potential direct and indirect effects of the Proposed Action and the No Action Alternative on the resource areas discussed in Section 3.0. Any proposed or required mitigation measures are also discussed in Section 4.0.
- Section 5.0 describes cumulative impacts on the resource areas from other similar past, present, and reasonably foreseeable future actions.
- Section 6.0 presents a list of key personnel and agencies who were contacted in the preparation of the EA and a summary of public coordination and review of the document, Section 7 lists those who prepared the EA, and Section 8 lists references cited during the EA's preparation.



LOCATION OF CAPE CANAVERAL



LAUNCH COMPLEX 13
CAPE CANAVERAL AIR FORCE STATION

Figure 1-1

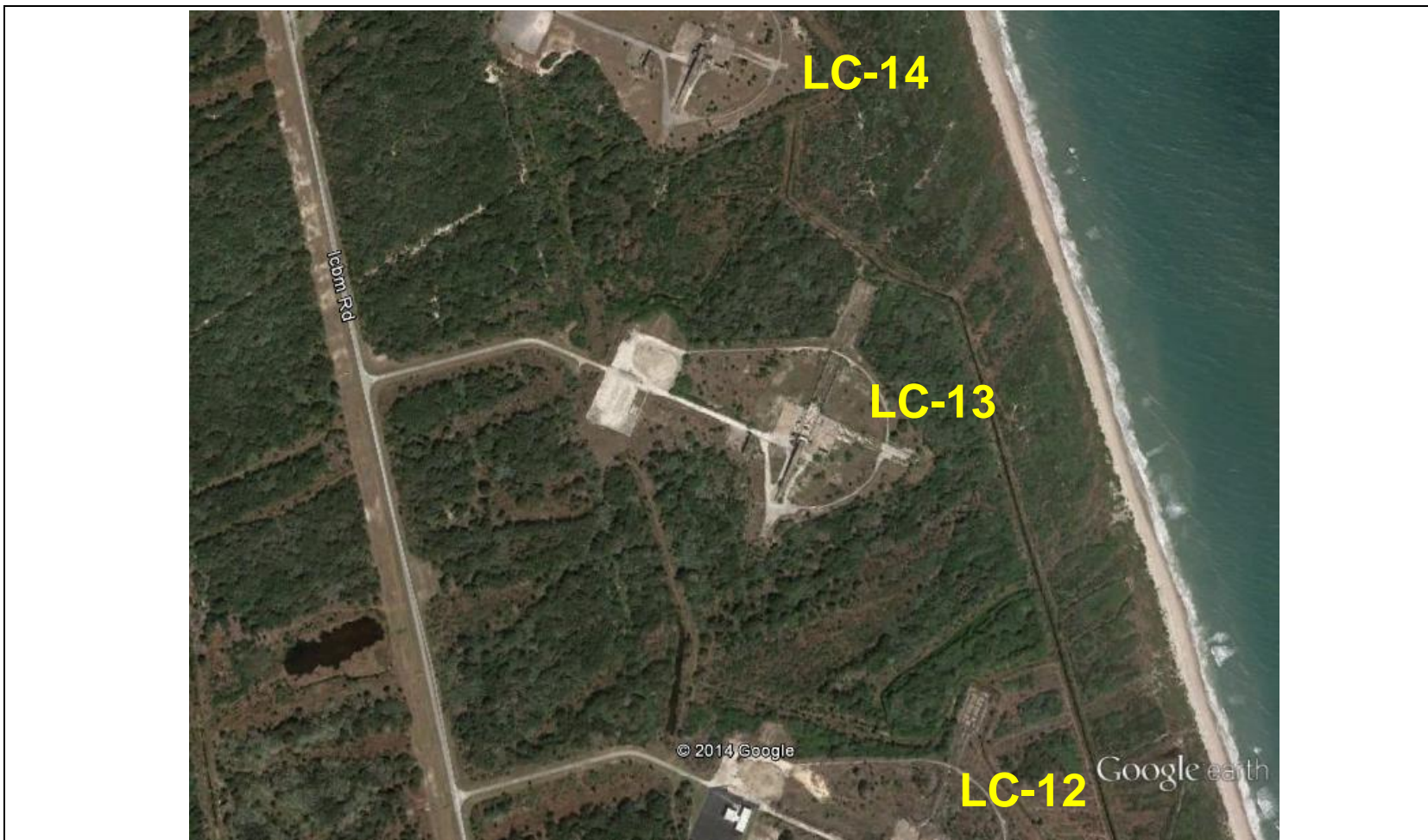


LOCATION OF LC-13 AREA AT CCAFS



LAUNCH COMPLEX 13
CAPE CANAVERAL AIR FORCE STATION

Figure 1-2



LC-13 LOCATION



LAUNCH COMPLEX 13
CAPE CANAVERAL AIR FORCE STATION

Figure 1-3

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION AND BACKGROUND

SpaceX, founded in 2002, is a commercial space transportation company headquartered in Hawthorne, California. SpaceX developed the Falcon 1 and the Falcon 9, and is currently developing the Falcon Heavy vertical launch vehicle. These vehicles have been built with the goal of becoming reusable launch vehicles. Since 2010, SpaceX has successfully launched the Falcon 9 under an FAA license from LC-40 12 times, which includes seven launches of the Falcon 9 v1.1 (see Table 2-1 below). NASA awarded SpaceX a contract to develop and demonstrate a human-rated Dragon capsule as part of its Commercial Crew Development program to transport crew to the ISS. On May 31, 2012, SpaceX successfully completed the COTS 2/3 mission that made Dragon the first commercial spacecraft to visit the ISS, as well as the first commercial cargo resupply vehicle to return to Earth from the ISS.

Table 2-1: Falcon 9 Launch History at LC-40, CCAFS			
Flight Number	Vehicle (Falcon 9 Block 1)	Flight Name/Reason	Date
1	Falcon 9	Inaugural Flight (test)	June 4, 2010
2	Falcon 9 with Dragon capsule	NASA COTS Demo-1	December 8, 2010
3	Falcon 9 with Dragon capsule	NASA COTS Demo-2/3	May 22, 2012
4	Falcon 9 with Dragon capsule	NASA ISS Resupply Flt 1	October 7, 2012
5	Falcon 9 with Dragon capsule	NASA ISS Resupply Flt 2	March 1, 2013
Falcon 9 Block 2 (v1.1) Launch History at LC-40, CCAFS			
6	Falcon 9 v1.1	SES Satellite	December 3, 2013
7	Falcon 9 v1.1	THAICOM 6 Satellite	January 8, 2014
8	Falcon 9 v1.1 with Dragon	NASA ISS Resupply Flt 3	April 18, 2014
9	Falcon 9 v1.1	Orbcomm	July 14, 2014
10	Falcon 9 v1.1	AsiaSat 8	August 5, 2014
11	Falcon 9 v1.1	AsiaSat 6	September 7, 2014
12	Falcon 9 v1.1 with Dragon	NASA ISS Resupply CRS-4	September 21, 2014

The Falcon Launch Vehicle Program has been designed for minimal vehicle assembly or processing on the launch pad, with most of the vehicle checkout and preparation occurring at the hangar and annex just south of the LC-40 launch pad but within site boundaries (USAF 2007). The goal is to launch within a few days to several weeks of payload arrival at the launch sites. An additional goal of the Falcon program is to reduce the cost of space travel by utilizing RLVs which would land nearby and shorten delays between launches due to standard water landings. Figure 2-1 shows a Falcon 9 launch vehicle at LC-40 CCAFS preparing for launch.

The scope for this EA is limited to the landing of the first stage of a Falcon 9 vehicle, or a Falcon Heavy single first stage, at LC-13, and the activities to support redeveloping LC-13 into a landing location. This EA does not include a multiple booster landing scenario since only one booster will be landing at this facility during a landing event. This EA assumes a normal launch mission of a Falcon vehicle continues forward with the successful separation of the second stage and payload, while the first stage begins its landing sequence. Therefore specific details of only the returning Falcon 9 first stage will be discussed; details of the full vehicle launch/takeoff and potential environmental impacts can be found in the 2007 EA and 2013 SEA (USAF 2007, 2013). Launches/takeoffs of the Falcon Heavy vehicle would be addressed in a separate NEPA document.

The Falcon 9 is a medium-lift class launch vehicle with a gross lift-off weight of approximately 1,100,000 pounds (lbs) with an approximate length of 224 ft, and a lift-off thrust of about 1.3 million pounds of thrust. The Falcon 9 uses liquid oxygen (LOX) and highly refined kerosene, also known as rocket propellant-1 or refined petroleum-1 (RP-1), as propellants to carry payloads into orbit. The Falcon Heavy is a heavy-lift class launch vehicle with an approximate lift-off weight of 3,300,000 lbs.

FIGURE 2-1 FALCON 9 LAUNCH VEHICLE

First Stages

The first stage of the Falcon 9 is approximately 12 ft wide by 150 ft tall and includes nine Merlin 1D engines with a total lift off thrust of about 1.3 million pounds. The Merlin 1D contains a pump-fed gas generator cycle, turbine exhaust roll control, and hydraulic thrust-vector control. The first stage consists of aluminum LOX and RP-1 tanks that hold approximately 62,000 gallons (gal) of LOX and 38,000 gal of RP-1. The Falcon Heavy first stage is essentially three Falcon 9 cores structurally held together in a row. Each core contains nine Merlin 1D engines for a total of 27 separate engines. Thrust on lift-off of the Heavy is approximately 3.9 million lbs of force.



The Falcon Heavy first stage center core and boosters each carry landing legs, which would have the capability to land each core safely on earth after takeoff at some point in the future. After the side boosters separate, the center engine in each would burn to control the booster's trajectory safely away from the rocket. The legs would then deploy as the boosters turn back to Earth, landing each softly on the ground. The center core would continue to fire until stage separation, after which its legs would deploy and land on Earth. This document assumes that only one of the two boosters (or one center core) would return to LC-13. A multiple booster landing scenario would require additional infrastructure and study not included as part of this Proposed Action. Figures 2-2 and 2-3 below show the engine arrangement for the Falcon 9 and the Falcon Heavy launch vehicles, respectively.

Currently, the Falcon 9 first stage drops by parachute approximately 500 nautical miles downrange into the Atlantic Ocean, east of and well beyond the east coast of Florida, and is recovered by a salvage ship that, during a launch, is stationed in a Range Safety-designated safe zone near the anticipated area of splash-down. Recovery operations are described in the 2007 EA (USAF 2007). It is anticipated that the stage would return to the landing pad within approximately 10 minutes after lift-off. Preliminary trajectory analysis indicates that a point directly beneath the vehicle at stage separation falls approximately 16 nautical miles from the launch site.

2.2 DESCRIPTION OF PROPOSED ACTION

Construction

The Proposed Action would include constructing an approximately 200 foot by 200 foot square concrete landing pad at LC-13 as shown in Figure 2-4. The pad would be designed to support the weight and thrust energy of the Falcon first stage and would comply with all CCAFS and other relevant construction requirements. The main pad would be constructed on previously disturbed land, and it would be surrounded by an approximately 750 foot diameter compressed soil and gravel, flat pervious surface. Four additional, 150 foot diameter concrete “contingency” pads would also be constructed. The contingency pads would only be utilized in order to enable the safe landing of a single vehicle should last-second navigation and landing diversion be required. There are no plans to utilize the contingency pads in order to enable landing multiple stages at LC-13 during a single landing event. The two western-most contingency pads would be constructed on previously disturbed land. The two eastern-most contingency pads would be constructed in previously undisturbed land. Two access roads would also be constructed to those contingency pads for a retrieval crane movement following a landing. At the location of the former blockhouse, a steel and concrete “stand” would be built to secure the Falcon stage during post-landing operations. The stand would consist of four Individual pedestal structures which would be transported to site and bolted to a concrete base. Each of the four pedestals, would weigh approximately 15,000 lbs, and would be 107 inches tall and 96.25 inches wide. A mobile crane would lift the stage from the landing pad, and transport and place it on the stand. Activities such as allowing the landing legs to be removed or folded back to the stage (flight position) prior to placing the stage in a horizontal position would occur there.

The Proposed Action would require clearing existing vegetation from the land between the LC-13 operations area to the ditch to the east, and then up to the beach area as shown within the orange outline in Figure 2-5. That area is approximately 49 acres. The ditch and the beach dune area would not be cleared. Removed vegetation would be either taken off site to an approved burn or burial area or burnt onsite with appropriate coordination/permissions. It is anticipated that site grading would be required in order to provide a flat, compacted area to construct the two eastern-most landing pads, connecting roads, and the eastern half of the main pad and surrounding compacted soil. Soil relocation and placement is considered to be moderate and may exceed 50,000 cubic yards to support this effort. The existing concrete pad may be removed as part of the Proposed Action in order to access underlying fill material.

The existing roadways at the LC-13 pad operations area would be improved to handle mobile crane movement and the first stage transportation vehicle; road corners would be designed to support required turning radius. The entrance road and existing parking lots could be resurfaced. The new roadways to and between the main and contingency pads would be designed and built using compacted, pervious, gravel and/or river rock type material.

Existing power distribution infrastructure which consists of a duct bank that runs from the ICBM road along the LC-13 entrance road to the former pad support buildings has been found to no longer be serviceable due to deterioration of the conduit. The Proposed Action would therefore include replacing the old with a new concrete encased PVC duct bank at the same location in to provide power supply to LC-13. Although undetermined at this time, it is assumed that an existing communications duct back would be in a similar state of disrepair and would also need to be replaced

as part of the Proposed Action. These utilities, and water, video camera and nitrogen gas lines would be contained within a buried concrete utility vault-tunnel approximately 3ft by 3ft. A small 500 gallon above ground propane tank would be installed, also on the western side, to supply a small electrical generator. Up to four lattice towers, approximately 20 ft high, would also be positioned on the site; one of those four would be attached to a mobile command trailer. The towers would contain equipment needed to ensure adequate wifi service for the site. Up to two safety related lightening protection towers would also be installed on the western side of the parking area.

A FireX system would be constructed with three or four remote controlled water cannons mounted on posts above ground to allow for remote firefighting capabilities. An above ground 12,000 gallon water storage tank would be placed on the western site of the LC-13 area and would be pressurized with nitrogen and provide the water for the fire-fighting equipment. Nitrogen would be supplied to the tank using a mobile trailer. The tank would be filled using the existing pad water supply. Water supply lines to the pads would be run in the utility vault.

SpaceX would use portable “port-o-potties” during landing operations. The landing pads would be constructed to control all stormwater runoff from the landing pad. An access security fence would be installed on the access road leading from ICBM road to the LC-13 area. In addition, all storm water flowing off the landing pads would be directed to a retention basin or similar infiltration feature according to Federal, State and local storm water run-off regulations. Further site design is required to determine the exact location and size of the storm water management infrastructure so that wetlands or any T&E species are not affected.

Falcon Vehicle Boost-back and Landing Operations

Following a nominal launch from LC-40 or LC-39A as described in USAF 2013 and NASA 2013 respectively, the Falcon first stage would return to LC-13 at CCAFS for potential reuse rather than splashing down in the Atlantic Ocean. The first stage of the Falcon family of vehicles has carbon overwrapped pressure vessels (COPVs) which are filled with either nitrogen or helium, and are used to orient the position of the first stage. After the first stage engine cutoff, exoatmospheric cold gas thrusters would be triggered to flip the first stage into position for retrograde burn, and three of the nine first stage Merlin engines would be restarted to conduct the retrograde burn in order to reduce the velocity of the first stage and to place the first stage in the correct angle to land. Once the first stage is in position and approaching its landing target, two of the three engines would be shut down to end the boost-back burn. During the boost-back stage a sonic boom occurrence is anticipated. The landing legs on the first stage would then deploy in preparation for a final single engine burn that would slow the first stage to a velocity of zero before landing at the landing pad at LC-13.

The detailed sequence of events for first stage landing along with trajectory data would be provided in the Flight Safety Data Plan (FSDP) once it is finalized. Although propellants would be burned to depletion during flight, there is a potential for approximately 15 gal of LOX and a maximum of 150 gal of RP-1 to remain in the Falcon first stage upon landing. Final volumes of fuel would be included in the FSDP. A small amount of ordnance, such as small explosive bolts and on-board batteries, would typically also be onboard. Any hazardous materials would be handled in accordance with Federal, State, and local laws and regulations. SpaceX has an established emergency response team and any unexpected spills would be contained and cleaned up per the procedures identified in the SpaceX Emergency Action Plan (EAP) and Spill Control and Countermeasures (SPCC) Plan.

The guidance, navigation, and control system of the Falcon vehicle is triplicated such that the system is one-fault tolerant. The system consists of three inertial measurement units, three GPS receivers, three flight computers, and thrust vector control on the first stage. A destructive Flight Termination System (FTS) would also be active, as described in the 2013 SEA. As part of the safety review process for a normal launch, a Falcon 9 debris model was completed and included as Appendix C to the 2007 EA. The debris analysis was developed to be compliant with AFSPCMAN 91-710 and presents estimated debris lists for FTS activation, explosions, and aerodynamic breakup modes. Also, well in advance of any planned mission (launch and re-landing), SpaceX has, and would continue to, develop a Preliminary Flight Data Package (PFDP) which takes into consideration the landing trajectory which avoids over-flights of known structures such as oil rigs, and establishes potential debris corridors for the vehicle.

Operations of LC-13 would support preparations for, and the landing of the Falcon stage. It would also support the post-flight landing and safing. Safing activities would begin upon completion of all landing activities and engine shutdown. The LOX oxidizer system would be purged, and any excess fuel would be drained into a suitable truck mounted container or tanker. Any remaining pressurants (i.e., helium or nitrogen) would be vented, and any FTS explosives would also be rendered “inert” prior to declaring the vehicle safe. The vehicle would then be lifted and placed on to the stand; the landing legs would then be removed or folded back into place. The vehicle would then be lowered into a horizontal position, placed on a transport vehicle and taken to a SpaceX facility. A ground crew would perform and supervise all landing operations and would be familiar with the operating protocol including all potential “off nominal” events.

It is anticipated that no more than 12 landings would take place per year for the initial five year license. SpaceX certainly prefers to conduct all of their launch operations during daylight hours but based on mission needs there is a possibility that some of the fly-back missions could be performed during the night; up to three night landings are assumed for this EA. These operations would continue for the duration of any operator license issued for the Proposed Action.

2.3 ALTERNATIVES CONSIDERED AND ELIMINATED FROM FURTHER CONSIDERATION

Title 32 Code of Federal Regulations (CFR) 989.8 discusses the analysis of alternatives. Reasonable alternatives to the Proposed Action and the “No-Action” alternative must be analyzed in EAs. “Reasonable” alternatives are those that meet the underlying purpose and need for the Proposed Action. In addition, alternatives may be expressly eliminated from detailed analysis, based on reasonable selection standards (for example, operational, technical, or environmental standards) suitable to a particular project. Certain selection standards were discussed and developed in accordance with these requirements. For an alternative to be considered “reasonable” it first had to fully support the stated purpose and need discussed in Section 1 of this EA. Other required selection standards include the following:

- The landing location should be as close to the launch pad as practical.
- The Action should be undertaken at a location that minimizes major modifications to (including the removal of) existing infrastructure.
- The Action should take place at a location that is readily available (i.e., with no current or future use declared for the site).

- The Action should take place at a location that minimizes ground disturbance of undisturbed areas to the maximum extent possible.
- Water, electrical and communication infrastructure required for a landing site must exist at the location.
- The landing flight profile should avoid to the greatest extent possible inhabited areas and existing structures.

Complexes at KSC were considered; however, no sites were readily available or within reasonable distances from the launch and stage refurbishment location. Therefore, there were no reasonable landing sites available at KSC. Several complexes at CCAFS were also considered, many of which have been inactive for numerous years. Specific facilities considered but removed from further analysis include LC-1, LC-36A and B, LC-46 (both of which are currently used by Space Florida), LC-2, LC-12, and LC 47. These facilities are located along the coast and away from inhabited areas and structures; however they are all not available due to existing operational requirements and incompatibility with previously planned actions. The USAF would have to end operations or have them curtailed. Based on current USAF operational needs, and the potential for significant additional demolition and re-construction at some facilities, therefore these locations were not considered reasonable alternatives.

In addition, new locations on previously undisturbed land at CCAFS were considered but dismissed from detailed analysis in this EA because locating landing operations on previously undisturbed land would result in greater and unacceptable environmental impact to various resources, including wetlands, biological, and archeological resources and were therefore determined to be unreasonable alternatives.

2.4 DESCRIPTION OF THE NO ACTION ALTERNATIVE

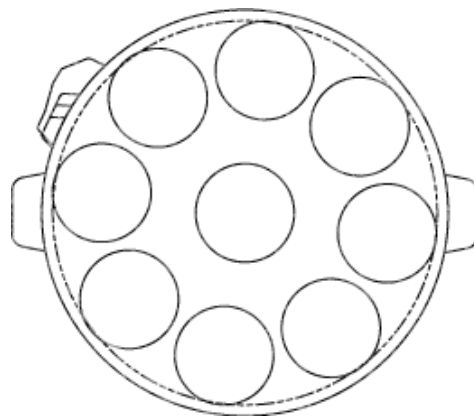
Under the No-Action Alternative the concrete pad and other support facilities would not be built and the controlled landing of the Falcon stage would not occur. The Falcon family of rockets would be launched from LC-40 (and soon from 39A) however the first stage would continue to fall into the Atlantic Ocean down range. SpaceX's ability to fully meet the National Space Transportation Policy goals of providing low-cost reliable access to and from space would be negatively affected. Therefore this alternative is not preferred.

2.5 PREFERRED ALTERNATIVE

LC-13 has been selected as the Preferred Alternative for the following reasons:

- It is relatively close to the launch pad and it is well positioned on the coast, away from populated areas.
- LC-13 offers an area removed from most current CCAFS operations and has had all vertical buildings and towers removed during previous demolition activities.
- LC-13 was previously used as a launch complex facility and so the majority of the area is previously disturbed.
- LC-13 is the preferred USAF location as it is compatible with current and future land use plans

LC-13 would enable SpaceX to meet the project Purpose and Need. The Proposed Action is therefore the Preferred Alternative.

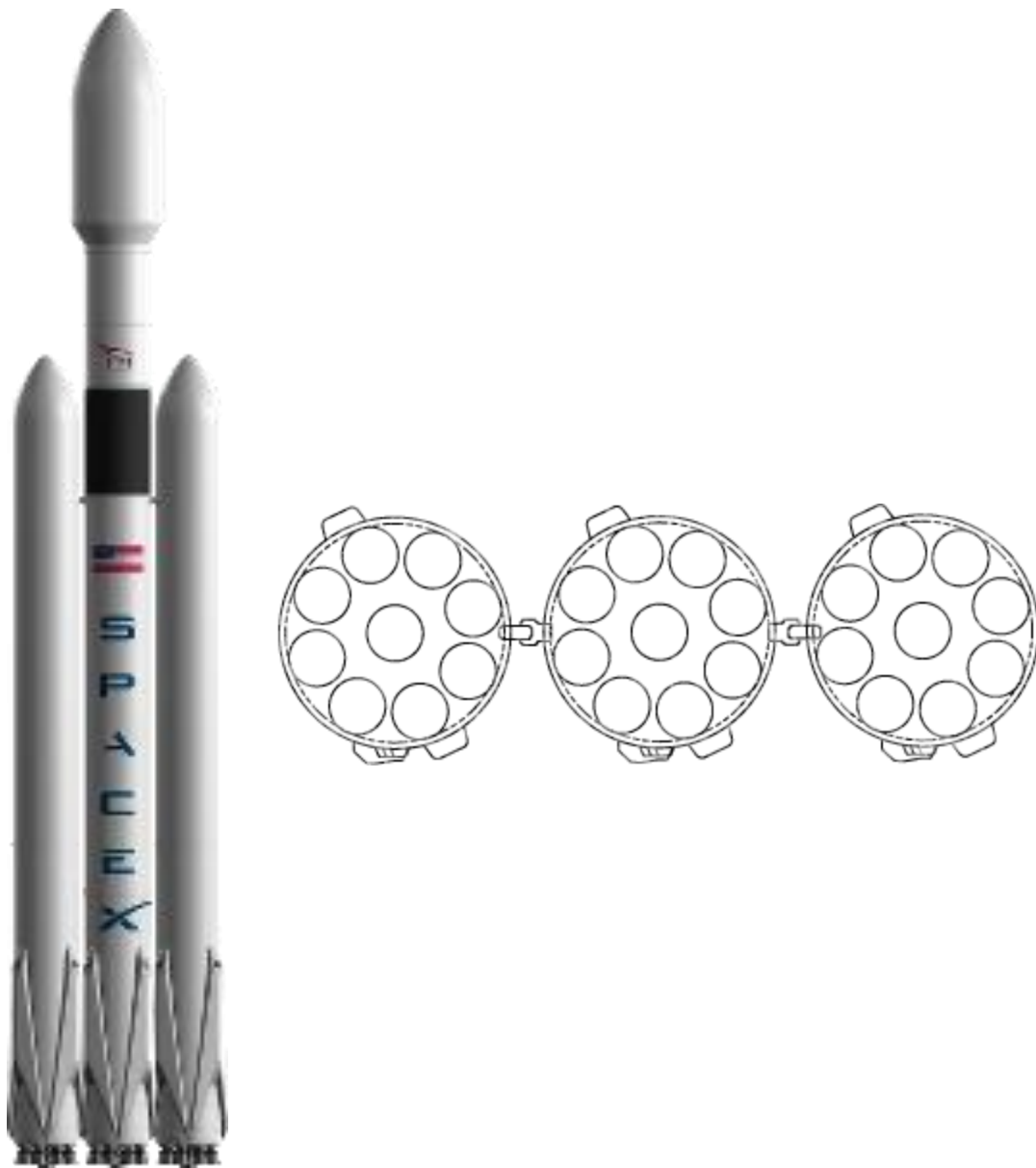


FALCON 9 VEHICLE AND FIRST STAGE ENGINE ARRANGEMENT



LAUNCH COMPLEX 13
CAPE CANAVERAL AIR FORCE
STATION

Figure 2-2

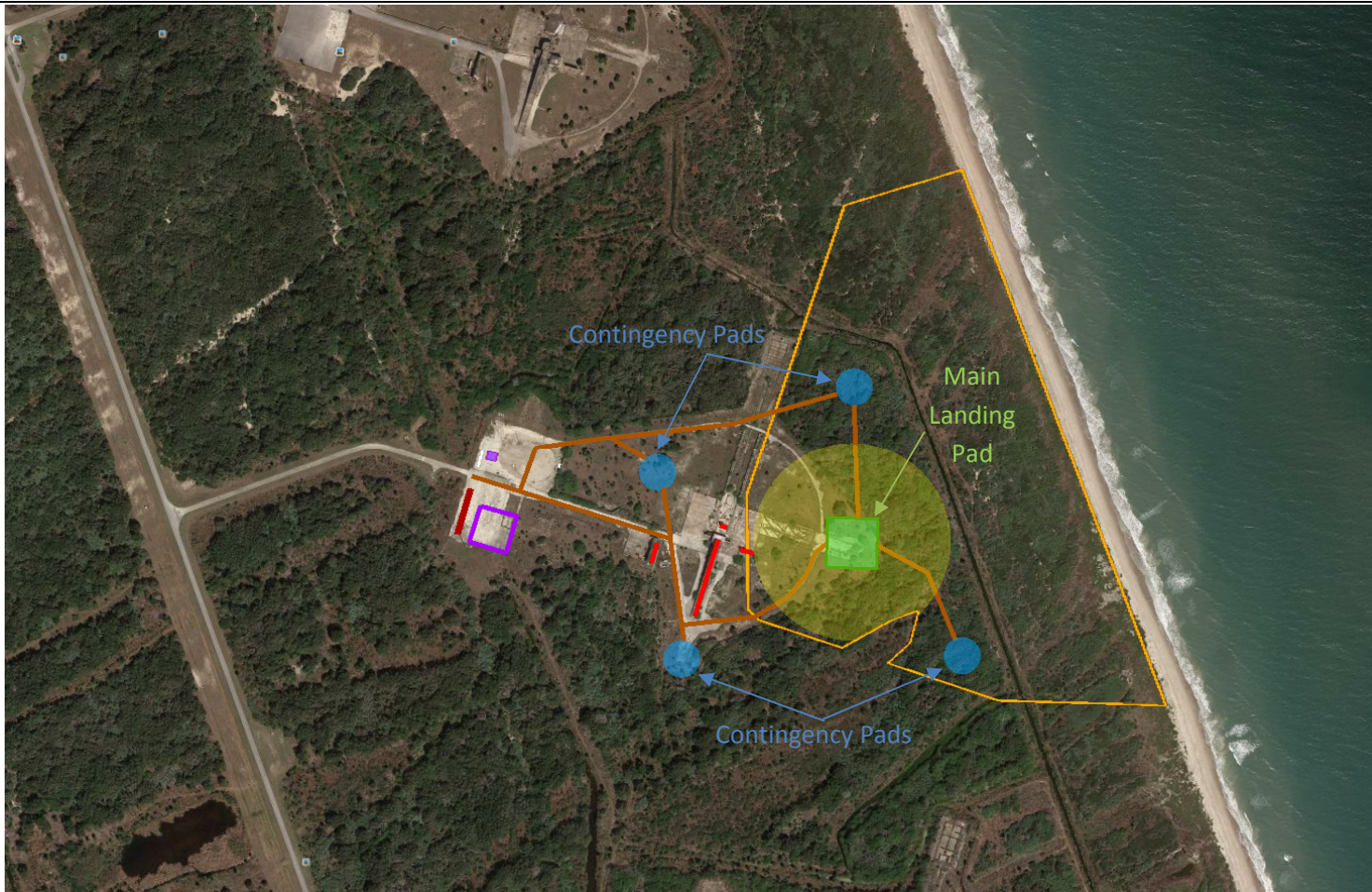


FALCON HEAVY VEHICLE AND FIRST STAGE ENGINE ARRANGEMENT



LAUNCH COMPLEX 13
CAPE CANAVERAL AIR FORCE
STATION

Figure 2-3

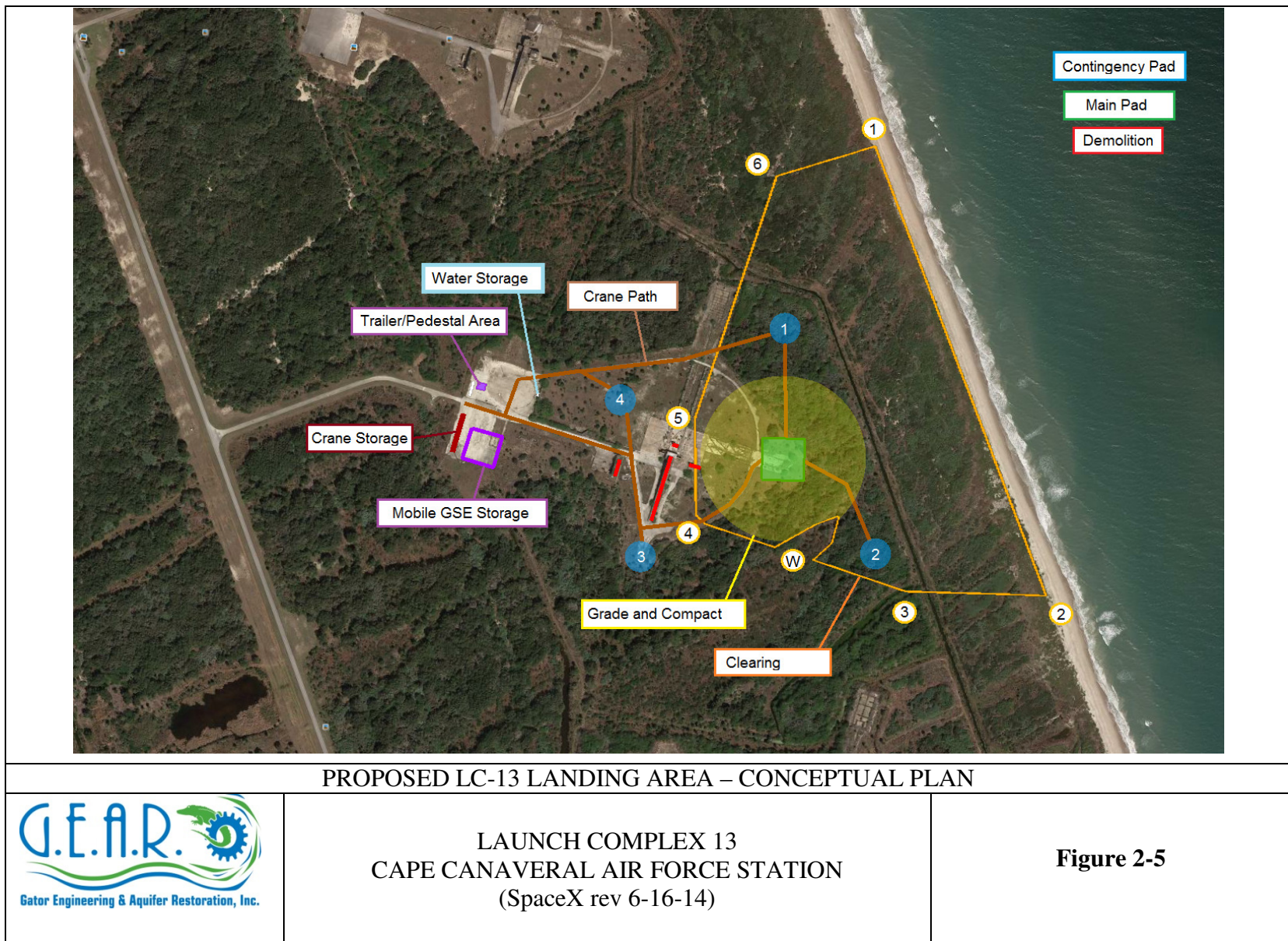


LC-13 SITE PLAN SHOWING LANDING PADS



LAUNCH COMPLEX 13
CAPE CANAVERAL AIR FORCE STATION
(SpaceX rev 6-13-14)

Figure 2-4



3.0 AFFECTED ENVIRONMENT

In compliance with NEPA and CEQ regulations, this section describes the existing environment at CCAFS associated with the Proposed Action and location. Each sub-section summarizes the affected environment for the resource areas analyzed in detail in this EA. Fourteen broad environmental resource areas were considered to provide a context for understanding the potential effects of the Proposed Action and as a basis for assessing the significance of potential impacts. The areas which were reviewed include land use zoning and visual resources, noise, biological resources, historical and cultural resources, air quality, hazardous materials and waste, water resources, geology and soils, transportation, utilities, health and safety, socioeconomics, environmental justice, and Section 4(f) Properties. This information serves as a baseline from which to identify and evaluate environmental changes resulting from activities associated with the Proposed Action at LC-13 at CCAFS, Florida.

The environmental documentation from the Final Programmatic Environmental Assessment for the Reactivation/Reuse of 12 Space Launch Complexes dated March 2005 (USAF 2005) and the Falcon SEA 2013 (USAF 2013) are incorporated by reference into each of these summaries. For each resource area, a region of influence (ROI) was established. The ROI is an area within which a federal action, program or activity may cause an impact. Generally the ROI for this assessment is LC-13 and the land directly east of the complex to the Atlantic Ocean and the surrounding CCAFS area. The land area within the yellow borders in Figure 3-1 shows that area of LC-13 which has been previously disturbed and is generally inside the fence line; the area within the orange border shows the additional area of the Proposed Action, which has not been previously disturbed.

3.1 LAND USE ZONING / VISUAL RESOURCES

Brevard County and the City of Cape Canaveral are the local planning authorities for incorporated and unincorporated areas near CCAFS. Port Canaveral is used by NASA, the U.S. Navy, the USAF, and the U.S. Coast Guard to support space vehicle operations and shipping activities. Neither Brevard County nor the City of Cape Canaveral has land use or zoning authority over CCAFS land because it is federally owned. The general plans of Brevard County and City of Cape Canaveral designate compatible land uses and zoning around CCAFS. The CCAFS General Plan defines the installation's land uses and zoning.

CCAFS encompasses an area of 15,800 acres, representing approximately two percent of the total land area of Brevard County. Land uses at CCAFS include launch operations, and range support, airfield, port operations, station support areas and open space. It does not include prime farm land. Launch operations land use areas are present along the Atlantic Ocean shoreline and include both inactive and active launch sites and support facilities. While the CCAFS Skid Strip has always supported landing operations of "horizontal" vehicles like planes, jets, and even unguided missiles, with this Proposed Action, CCAFS operations would also include RLV landings. Open space is dispersed throughout the station. There are no public beaches located on CCAFS.

The area surrounding LC-13 is generally flat with scrub oak and palmettos. LC-13 is located on the eastern side of CCAFS, between ICBM Road to the west and the Atlantic Ocean to the east; LC-14 is adjacent to the north and LC-12 is adjacent to the south. The area that comprises LC-13 is already extensively developed and has been designated by CCAFS for use as a launch complex since the late 1950s. LC-13 is a designated Solid Waste Management Unit (SWMU-038). A Land Use Control Implementation Plan (LUCIP) was implemented as a result of

past actions (refer to Section 3.6 and 4.6 below). The property is prohibited from residential or other non-industrial development without prior written notification to Florida Department of Environmental Protection (FDEP) and United States Environmental Protection Agency (EPA) concerning potential land use changes. The LUCIP is reviewed periodically and generally will remain in effect until prescribed remedial actions and clean-up goals are met (USAF 2005a).

KSC, which is north and west of CCAFS, includes predominantly industrial uses associated with NASA launch programs and open space associated with the Merritt Island National Wildlife Refuge. Uses of the river and ocean water areas surrounding CCAFS include commercial fishing, marine recreation and marine transportation. The Canaveral National Seashore is located north of CCAFS and is operated by the National Park Service (NPS).

Federal activity in or affecting a coastal zone requires preparation of a Coastal Zone Consistency Determination, in accordance with the federal Coastal Zone Management Act (CZMA) of 1972, as amended (P.L. 92-583), and implemented by the National Oceanic and Atmospheric Administration (NOAA). Responsibility for administering the Coastal Zone Management Program (CZMP) has been delegated to states that have developed state-specific guidelines and requirements. In Brevard County, the Florida Coastal Management Program (FCMP), formed by the Florida Coastal Management Act (FCMA), applies to activities occurring in or affecting the coastal zone. The entire State of Florida is defined as being part of a coastal zone (NOAA, 2004); therefore, the Proposed Action is subject to the requirements of the Federal Coastal Zone Management Act. The FDEP is the state's lead coastal zone management agency. The USAF is responsible for making the final coastal zone consistency determinations for its activities within the state, and the FDEP along with FCMP member agencies will review the coastal zone consistency determination.

3.2 NOISE

Noise is usually defined as unwanted sound. High-amplitude noise can be unwanted because of potential structural damage. The ROI for this resource includes the area around LC-13, CCAFS and surrounding communities, and the Atlantic Ocean east of LC-13. CCAFS is a relatively isolated facility, which reduces the potential for noise impacts on adjacent communities. The closest residential communities to LC-13 are the City of Merritt Island, located approximately seven miles to the west southwest and the City of Cape Canaveral, located approximately seven miles to the south. Ambient noise levels in these communities are normally low, with higher noise levels occurring in the communities' industrial areas, and lower noise levels (normally about 45 to 55 A-weighted sound level (dBA)) in the residential areas and along the beaches. Infrequent aircraft fly-overs and rocket launches from CCAFS and KSC increase noise levels for short periods of time. Existing noise sources at CCAFS include construction related noise, aircraft noise associated with aircraft take-off and landing facilities and current rocket launch operations at CCAFS and KSC. Other noise sources resulting from industrial operations are present in the vicinity of LC-13, but these sources are considered minor in comparison to launch noise, which includes both engine noise and sonic booms produced as launch vehicles reach supersonic speeds. While the Proposed Action does not include "launch" operations; use of "launch" data and experience with noise is used for comparison purposes to "landing" noise levels.

3.2.1 General Description

The decibel (dB) is the accepted standard unit for the measurement of sound. It is a logarithmic unit that accounts for the large variations in amplitude. Sound levels that have been adjusted to correspond to the frequency sensitivity of the human ear are referred to as A-weighted (dBA) sound pressure levels (AWSPL). If structural damage is a concern, then the overall sound pressure level (OASPL) is used. This quantity has no frequency weighting and therefore includes low frequencies that are not audible but can affect structures from vibration-related impacts. The largest portion of the total acoustic energy produced by a launch vehicle is usually contained in the low-frequency end of the spectrum (1 to 100 Hz). Launch and landing vehicles also can generate sonic booms. A sonic boom, the shock wave resulting from the displacement of air in supersonic flight, differs from other sounds in that it is impulsive and very brief; up to several seconds for launch vehicles. Landing vehicles such as the Shuttle may also produce a sonic boom as flight speeds transition from supersonic to subsonic speeds. In the past, landings by the Shuttle at KSC landing strip typically produced two short sonic booms over east central Florida area, both within a few seconds of each other.

Descriptors are used to assess and correlate the various effects of noise on humans, including land use compatibility, sleep and speech interference, annoyance, hearing loss, and startle effects. Although derived for humans, these descriptors can also be used to qualitatively assess the effects of noise on wildlife. These descriptors are the A-weighted sound level. An A-weighted sound level is the momentary magnitude of sound weighted to approximate the human ear's frequency sensitivity. A-weighted sound levels are typically measured between 20 hertz and 20 kilohertz. The long-term equivalent A-weighted sound level (Leq) is an A-weighted sound level that is "equivalent" to an actual time-varying sound level. Table 3-1 shows the A-weighted sounds levels of commonly encountered sounds. C-weighting measures sound levels in dB, with no adjustment to the noise level over most of the audible frequency range except for a slight de-emphasis of the signal below 100 hertz and above 3,000 hertz. C-weighting is used as a descriptor of low-frequency noise sources, such as blast noise and sonic booms.

TABLE 3-1: A-Weighted Sound Levels of Common Sounds		
Common Sounds	Sound Level Range (dB)	Region of Comfort
Threshold of Hearing	0-10	JUST AUDIBLE
Recording Studio	10-20	
Bedroom at Night	20-30	
Quiet Urban Nighttime	30-40	QUIET
Quiet Urban Daytime	40-50	
Air Conditioner at 100 Feet	50-60	
Automobile at 100 Feet Vacuum Cleaner at 10 Feet	60-70	MODERATE
Heavy Truck at 50 Feet	70-80	
Garbage Disposal	80-90	
Jackhammer @50ft	90-100	VERY LOUD
Textile Mill or Discotheque	100-110	
Oxygen Torch	110-120	UNCOMFORTABLE
Chainsaw	120-130	

* Source: EELV FEIS April, 1998

3.2.2 Ambient Noise Levels

Noise levels around facilities at CCAFS and KSC approximate those of any urban industrial area, reaching levels of 60 to 80 dBA. Additional on-site sources of noise are the aircraft landing facilities at the CCAFS Skid Strip and the KSC Shuttle Landing Facility. Other less frequent but more intense sources of noise in the region are launches from CCAFS and KSC. The relative isolation of the CCAFS and KSC facilities reduces the potential for noise to affect adjacent communities.

3.2.3 Construction Related Noise Description and Considerations

Under the Clean Air Act, the EPA administrator established the Office of Noise Abatement and Control (ONAC) to carry out investigations and studies on noise and its effect on the public health and welfare. Through ONAC, the EPA coordinated all Federal noise control activities, but in 1981 the Administration concluded that noise issues were best handled at the State and local level. As a result, ONAC was closed and primary responsibility of addressing noise issues was transferred to State and local governments. However, EPA retains authority to investigate and study noise and its effect, disseminate information to the public regarding noise pollution and its adverse health effects, respond to inquiries on matters related to noise, and evaluate the effectiveness of existing regulations for protecting the public health and welfare, pursuant to the Noise Control Act of 1972 and the Quiet Communities Act of 1978.

The Noise Control Act identified 65 dB (A-scale) as a desirable noise level for compatible land uses. This level is not regarded as a noise standard, but as a basis to set appropriate standards that should also factor in local considerations and issues. Noise impacts from the operation of construction equipment are usually limited to a distance of 1,000 feet or less. Equipment and vehicles associated with the Proposed Action typically have a dBA between 65 and 100, at a distance of 50 feet as shown in Table 3-2 below.

TABLE 3-2: Selected Construction Equipment Noise Emission Levels	
Equipment	Noise Level (dBA) 50ft from source
Air Compressor	81
Backhoe	80
Bull Dozer or Grader	95
Concrete Mixer	85
Portable Generator	81
Loader	85
Pneumatic Tool	85
Pump	76
Saw	76

(USEPA, 1971). "Noise from Construction Equipment and Operations, Building Equipment and Home Appliances, NTID 300.1, Dec 31 1971

3.2.4 Launch Operations Related Noise Description and Considerations

Operation-related noise refers to noise generated from activities such as actual launches or landings and also temporary ongoing noise generated from worker traffic to and from the selected site. The amount of vehicle launch engine noise produced is directly related to total vehicle lift-off thrust; therefore, the more thrust, the more noise. Historically, the highest recorded noise levels were those produced by the launches of the Space Shuttle, which in the launch vicinity could exceed 160 dBA. Prior to the end of the shuttle program in 2011, Space Shuttle launch noise at Port Canaveral would have been expected to be typical of the noise levels at an industrial facility, reaching levels of 60 to 80 dBA (USAF, 1998). Peak overpressures exist from large vehicles such as the Titan IVB and approach 49 kg /m² (10 lb/ft²) in focal zones (USAF, 1998). Space vehicles currently launched at CCAFS are the Falcon 9, the Delta IV and the Atlas V, usually with a liquid center core and additional solid rocket motors attached (Falcon 9 uses only liquid fuel). Currently, vertical landing events have not occurred at CCAFS. Three distinct noise events are associated with launch and ascent of a launch vehicle: on-pad engine noise, in-flight engine noise, and sonic booms. Landing events would be similar but occur essentially in reverse order.

3.2.4.1 Engine Noise

Launches are a major source of operational noise; all other noise sources in the launch area are considered minor compared to launch noise. Generally, three types of noise occur during a standard vehicle launch, or landing: (1) combustion noise from the launch vehicle chambers, (2) jet noise generated by the interaction of the exhaust jet and the atmosphere, and (3) combustion noise from post-burning of combustion products. The initial loud, low frequency noise heard in the immediate vicinity of the launch pad is a result of the first three types of noise combined. SpaceX measured noise levels for their May 22, 2012 Falcon 9 (Block 1) launch at LC-40. Table 3-3 below and the associated figure present that data. The launch time was 3:44 in the afternoon (nine Merlin engines firing).

TABLE 3-3 Falcon 9 (Block 1) Acoustic Data		
Location	Distance from vehicle (feet)	Acoustics (OASPL)
1	800	145 db
2	975	136 db
3	1450	132 db
4	1600	130 db
5	1900	129 db
6	2500	126 db

3.2.4.2 On-Pad Noise

On-pad engine noise occurs when engines are firing but the vehicle is still on the pad. On-pad noise levels are typically much lower than in-flight noise levels because sound propagates in close proximity to the ground and undergoes substantial attenuation when the vehicle is on or near the pad. While landing events at LC-13 would not have the benefit of deflectors, exhaust tunnels, or deluge water; the Falcon stage would be landed with one engine, or one ninth of the thrust energy used on launch.

3.2.4.3 In-Flight Noise

In-flight noise occurs when a standard vehicle is in the air, and the engine exhaust plume is in line with the vehicle. In the early part of the flight when the vehicle's motion is primarily vertical, typical noise contours are circular, particularly for the higher levels near the center. The outer contours tend to be somewhat distorted. They can be stretched out in the launch direction or broadened across the launch direction, depending on specific details of the launch. As the contours are approximately circular, it is often adequate to summarize noise by giving the sound levels at a few distances from the launch site. The basic contours for a landing vehicle would be similar.

The emitted acoustic power from a standard rocket engine and the frequency spectrum of the noise can be calculated from the number of engines, their size and thrust, and their flow characteristics. Normally, the largest portion of the total acoustic energy is contained in the low-frequency end of the spectrum (1 to 100 hertz).

3.2.5 Sonic Booms

Another characteristic of typical launch or landing vehicles is that they reach and or operate at supersonic (faster than the speed of sound) speeds and will generate sonic booms. A sonic boom, the shock wave resulting from the displacement of air in supersonic flight, differs from other sounds in that it is impulsive and very brief (less than 1 second for aircraft; up to several seconds for launch or landing vehicles). Sonic booms are measured in pounds per square foot of overpressure. This is the amount of the increase over the normal surrounding atmospheric pressure (2,116 psf/14.7 psi). At one pound overpressure, no damage to structures would be expected. Overpressures of 1 to 2 pounds are produced by supersonic aircraft flying at normal operating altitudes. Some public reaction could be expected between 1.5 and 2 lb. Rare, minor damage may occur with 2 to 5 lb overpressure (NASA, 2014).

As a sonic boom is not generated until the vehicle operates at supersonic speeds, the event occurs either some time after launch and/or during deceleration; the launch and landing site itself does not experience a sonic boom. The crescent shape of the typical contours from launch vehicles reflects this "after launch" nature of sonic boom. The entire boom footprint is down track, and the portions of the footprint to the side of the trajectory represent the overpressures caused as the shock wave expands radially from the line of travel of the launch vehicle. During a launch scenario the focal zone "super boom" region is very narrow, typically less than 100 yards wide and is "down-track". During a landing event the focal zone of the sonic boom would also be "on-track", but would not occur on the landing site.

3.3 BIOLOGICAL RESOURCES

This section describes the existing vegetation and animal species that occur or could potentially occur at the CCAFS area immediately surrounding LC-13, and at LC-13 which could be affected by construction activities and the effects of launch and landing operations. Biological resources include native or naturalized plants and animals, and their habitats in which they exist. Sensitive and protected biological resources include plant and animal species that are threatened or endangered (T&E) and species of special concern (SSC) as listed by the USFWS and the Florida Wildlife Conservation Commission (FWCC). Listed species that are known to be present or near the station boundaries are presented in Table 3.4.

The USAF, particularly the 45th SW, is committed to the long-term management of all natural areas on its installations, as directed by Air Force Instruction (AFI) 32-7064, Integrated Natural Resources Management. Long-term management objectives are identified in the 45th SW's 2008 Integrated Natural Resources Management Plan (INRMP) with specific land management objectives identified in the Scrub-Jay and Sea Turtle Management Plans located in the appendices of the INRMP. The following information was derived from several sources, including the 45th SW 2008 INRMP. Additionally, recent information has been included from a Biological Assessment (BA) for this project area completed in August 2014. The BA was completed after the 45th SW determined that the Proposed Action may affect federally listed species. As a result of this BA, the USFWS issued a Biological Opinion (BO) to address impacts to listed species; see Section 4 and Appendix G.

3.3.1 Vegetation

3.3.1.1 Native Vegetation Communities

At least 10 high-quality natural communities of vegetation exist on CCAFS, despite the communities being fragmented by mission-related construction and clearing activities. Parallel to the coastline, CCAFS has a series of ridges and swales that support these communities. These communities include oak scrub, rosemary scrub, maritime hammock, coastal strand, coastal dunes, grasslands, seagrasses, hydric hammock, interdunal swales, and estuarine tidal swamps and marshes. Vegetation on CCAFS consists mainly of the indigenous Florida coastal scrub (including oak and rosemary scrub) and xeric and maritime hammocks. These scrub habitats also contain the Brazilian pepper, a non-native aggressive plant, which invades these communities along disturbed areas, and then becomes established as it out competes native species. Eight species of state listed plants have been documented to be present on CCAFS; however those eight species have not been identified within the boundaries of LC-13, or the land east of the complex. There are no federally listed plants at CCAFS.

The Proposed Action area is located at the LC-13 facility and in the area east to the Atlantic Ocean beach dune. The facility is overgrown with native and non-native grasses, bushes, and Brazilian pepper. Species observed within this area include sand cordgrass (*Spartina bakerii*), crowfoot grass (*Dactyloctenium aegyptium*), prickly pear (*Opuntia humifusa*), saw palmetto (*Serenoa repens*), Brazilian pepper (*Schinus terebinthifolius*), sand live oak (*Quercus geminata*), cabbage palm (*Sabal palmetto*), beach sunflower (*Helianthus debilis*), dog fennel (*Eupatorium capillifolium*), ragweed (*Ambrosia* sp.), and pepper grass (*Lepidium virginicum*).

Vegetation beyond the fence line is forested and categorized as coastal/oak scrub. Scrub oaks are the dominant species with a closely associated shrub layer of saw palmetto (*Serenoa repens*). Along the eastern side of LC-13, species such as live oak (*Quercus virginiana*), sand live oak, wax myrtle (*Myrica cerifera*), nakedwood (*Myrsianthes fragrans*) and tough buckthorn (*Bumelia tenax*) are found in higher densities. These identified community types have joined and developed into a closed canopy, maximized height forest generally categorized as xeric hammock. Most of the coastal/oak scrub mix between the LC-13 fence line and eastern ditch contains oaks that appear to be at or close to their maximum height of 25 feet to 30 feet. Land between the ditch and the beach dune area is similarly vegetated, but over-all density and height is significantly less. Tree-sized cabbage palms (*Sabal palmetto*) and red bays (*Persea borbonia*) are interspersed with shrubby saw palmetto, wax myrtle, tough buckthorn, nakedwood and rusty lyonia (*Lyonia ferruginea*). The coastal/oak scrub is dominated by live oak. Myrtle oak (*Quercus myrtifolia*),

sand live oak (*Quercus geminata*) and chapman oak (*Quercus chapmannii*) are also found. Large bays are found within the forest along the eastern side of the LC-13 facility, adding to the hammock structure. Many different vascular species are in the understory, such as saw palmetto, rusty lyonia, tough buckthorn, wax myrtle, nakedwood, tallow wood (*Ximenia americana*) and beautywood (*Callicarpa americana*).

In areas categorized as disturbed coastal oak/scrub, generally east of the ditch, there are scattered sandy, shelly openings which contain several small shrubby and herbaceous species such as sand cordgrass (*Spartina bakerii*), gopher apple (*Licania michauxii*), prickly pear cactus (*Opuntia humifusa*), partridge pea (*Galactia elliotii*), milkwort (*Polygala* sp.), blueberry (*Vaccinium* sp.), hempvine (*Mikania scandens*), and Madagascar periwinkle (*Catharanthus roseus*). Brazilian pepper (*Schinus terebinthifolius*) is also found along the edges of the dunes, ditches, fencelines, and formerly cleared areas. Other species include tough buckthorn (*Bumelia tenax*), cabbage palm, and Spanish bayonet (*Yucca aloifolia*). This habitat type has a closed canopy along with a dense understory comprised of saw palmetto, greenbrier (*Smilax* sp.), beauty berry (*Callicarpa americana*), wax myrtle (*Myrica cerifera*), rusty lyonia (*Lyonia ferrunginea*), partridge pea (*Galactia elliotii*), bracken fern (*Pteridium aquilinum*), and morning glory (*Ipomoea indica*). A Saw Palmetto plain runs north and south east of the ditch, and up to within approximately 80 to 40 feet of the beach dune crown. In that area closest to the dune vegetation height is between one and two feet.

3.3.1.2 Invasive Species

Most of the areas on CCAFS that are disturbed, including roads, utility corridors, launch complexes, and areas around the ditch have a healthy invasive species component. Brazilian pepper predominates the invasive flora at CCAFS with six other invasive weeds present in lower densities; the most wide spread of these is Australian pine (*Casuarina equisetifolia*). Australian pine trees grow singly or as small, dense groves scattered across the base. In addition, cogon grass (*Imperata cylindrica*), melaleuca (*Melaleuca quinquenervia*), mistletoe (*Phoradendron serotinum*), and small populations of thistles (*Cirsium* spp.) and nettles (*Urtica* spp.) are present (Invasive Plant Species Control Plan for CCAFS, 2004). In the LC-13 facility and the area east to the beach dune the most predominate invasive species is Brazilian pepper; Australian pine did not appear to be present.

3.3.2 Wildlife

The coastal scrub and associated woodlands provide habitat for a wide range of wildlife including migratory birds and mammals including the white-tailed deer, armadillo, bobcat, feral hog, raccoon, long-tailed weasel, round-tailed muskrat, and the Florida mouse (a State species of special concern). Amphibians observed at CCAFS include the spade foot and eastern narrow-mouth toads, squirrel and southern leopard frogs, and green tree frogs. Reptiles observed include the American alligator, the Florida box turtle, the gopher tortoise, the Florida softshell, the green anole, the six-lined racerunner, the broadhead skink, the southern ringneck snake, everglades racer, the eastern coachwhip, and the mangrove salt marsh snake. Numerous marine mammals populate the coastal and lagoon waters including the bottlenose dolphin, the spotted dolphin, and the manatee. The seagrass beds in the northern Indian River system provide important nursery areas, shelter, and foraging habitat for a wide variety of fish and invertebrates, and for manatees. The inland rivers and lagoons provide habitat for marine worms, mollusks and crustaceans. The Mosquito Lagoon is an important shrimp nursery area.

A number of saltwater fish species can be found within Indian and Banana River Systems including the bay anchovy, pipefish, goby, silver perch, lined sole, spotted sea trout, and oyster fish. The small freshwater habitats found on CCAFS contain bluegill, garfish, largemouth bass, killifishes, sailfin molly, and top minnow (USAF, 1998).

The following paragraphs give a broad overview of specific species of concern at the Proposed Action location.

3.3.2.1 Migratory Birds

At CCAFS, resident and migrating bird species include numerous common land and shore birds. Cape Canaveral is situated along a major flyway route for migratory birds and therefore home to numerous birds listed on the USFWS migratory bird list, all of which are protected at the Federal level by the Migratory Bird Treaty Act (MBTA). All but a few bird species (i.e. pigeons, European starlings, etc.) found on CCAFS are on this list. Multiple species of birds, such as mockingbirds, grackles and great horned owls, have been documented nesting along ICBM Road and LC-13. Executive Order 13186, signed in 2001, requires federal agencies to protect migratory birds and their habitats. This would require that if nests may be impacted, the nest be empty of eggs or young prior to relocation or removal. CCAFS also supports a large population of ospreys. They are most often found near water, nesting near the top of large trees, bore-sight towers, utility poles, antennas and gantries. The osprey is federally protected by the MBTA, which makes it illegal to destroy a nest without the proper permits. At this time, ospreys do not appear to be nesting on or in any trees or structures at LC-13, in part since the only tall existing structures at LC-13 at this time appear to be 11 out-of-service telephone poles.

3.3.3 Threatened and Endangered and Species of Special Concern

CCAFS contains habitat utilized by a large number of federal and state- listed species. Listed species that are known to be present or near (within 100 feet of the perimeter fence) LC-13 boundaries, or in the Proposed Action clear area east of the complex, are presented in Table 3-4. For a list of Federal and state regulatory requirements which address vegetation and wildlife that may be present on CCAFS, and a more detailed description of protected species present at CCAFS, see the Biological Assessment or the USAF 45 Space Wing Integrated Natural Resource Management Plan (INRMP) dated October 2008 which contains descriptions of plants and animals occurring at CCAFS. There is designated critical habitat under Section 4 of the ESA for the North Atlantic right whale in the area east of the LC-13 complex.

TABLE 3-4: Protected Species Flora/Fauna Found in the Vicinity of LC-13			
Common Name	Scientific Name	Status	
		Federal	State
Plants			
Beach star	<i>Remirea maritime</i>		E
Coastal vervain	<i>Verbena maritime</i>		E
Curtiss' milkweed	<i>Asclepias curtissii</i>		E
Giant Leather Fern	<i>Acrostichum danaeifolium</i>		CE
Golden polypody	<i>Phlebodium aurea</i>		T
Hand fern	<i>Ophioglossum palmatum</i>		E
Nodding pinweed	<i>Lechea cernua</i>		T

TABLE 3-4: Protected Species Flora/Fauna Found in the Vicinity of LC-13			
Common Name	Scientific Name	Status	
		Federal	State
Satin leaf	<i>Chrysophyllum olivaeforme</i>		E
Inkberry	<i>Scaevola plumier</i>		T
Nakedwood, Simpson's Stopper	<i>Mycianthes fragrans</i>		T
Sand dune spurge	<i>Chamaesyce cumulicola</i>		E
Satin leaf	<i>Chrysophyllum olivaeforme</i>		E
Sea lavender	<i>Tournefortia gnaphalodes</i>		E
Shell mound prickly-pear cactus	<i>Opuntia stricta</i>		T
Birds			
American oystercatcher	<i>Haematopus palliatus</i>	T (S/A)	SSC
Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>		E
Bald Eagle	<i>Haliaeetus leucocephalus</i>		T
Florida Scrub-Jay	<i>Aphelocoma coerulescens</i>	T	T
Least Tern	<i>Sterna antillarum</i>		T
Piping Plover	<i>Charadrius melodus</i>	T	T
Red Knot	<i>Calidris canutus</i>	Proposed T	Potential
Roseate spoonbill	<i>Ajaia ajaja</i>		SSC
Roseate tern	<i>Sterna dougallii dougallii</i>	T	T
Snowy egret	<i>Egretta thula</i>		SSC
Southeastern American Kestrel	<i>Falco sparverius paulus</i>		T
Tricolored heron	<i>Egretta tricolor</i>		SSC
White ibis	<i>Eudocimu albus</i>		SSC
Wood Stork	<i>Mycteria Americana</i>	E	E
Reptiles and Amphibians			
Atlantic Green Sea Turtle	<i>Chelonia mydas</i>	E	E
Atlantic Hawksbill Sea Turtle	<i>Eretmochelys imbricata imbratica</i>	E	E
Atlantic Loggerhead Sea Turtle	<i>Caretta caretta</i>	T/E	T
American Alligator	<i>Alligator mississippiensis</i>	T (S/A)	SSC
Eastern Indigo Snake	<i>Drymarchon corais couperi</i>	T	T
Florida Gopher Frog	<i>Rana capito</i>		SSC
Florida Pine snake	<i>Pituophis melanoleucus mugitus</i>		SSC
Gopher Tortoise	<i>Gopherus polyphemus</i>		T
Hawksbill Sea Turtle	<i>Eretmochelys imbricate imbricata</i>	E	E
Kemp's Ridley Sea Turtle	<i>Lepidochelys kemp</i>	E	E
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	E	E
Loggerhead Sea Turtle	<i>Caretta caretta</i>	T	T
Mammals (Whales listed for completeness even though they are not near LC-13)			
West Intian Manatee	<i>Trichechus manatus</i>	E	E
Southeastern Beach Mouse	<i>Peromyscus polionotus niveiventris</i>	T	T
Finback whale	<i>Balaenoptera physalus</i>	E	E
Humpback whale	<i>Megaptera novaeangliae</i>	E	E
Northern Atlantic right whale	<i>Eubalaena glacialis</i>	E	E

TABLE 3-4: Protected Species Flora/Fauna Found in the Vicinity of LC-13

Common Name	Scientific Name	Status	
		Federal	State
Sei whale	<i>Balaenoptera borealis</i>	E	E
Sperm whale	<i>Physeter catodon</i>	E	E

CE – Commercially Exploited

S/A – Similar in Appearance

E – Endangered

T – Threatened

SSC – Species of Special Concern

Sources: NASA 2010 KSC Environmental Resource Document, March 2010, USFWS. USFWS: 2103**NOTE:** Bald eagles were removed from the endangered species list in June 2007 because their populations recovered sufficiently. However, the protections under the Bald and Golden Eagle Act (Eagle Act) continue to apply. Please see the eagle information on the national website at<http://www.fws.gov/migratorybirds/baldeagle.htm> for information regarding new requirements.

During winter months, the endangered North Atlantic right whale (*Eubalaena glacialis*) heads south from feeding grounds off the coast of Canada and New England to give birth in the warmer waters of the Atlantic, along the Florida and Georgia coastlines. In 2004, the NMFS proposed these coastal areas, including off-shore of CCAFS, be designated as critical habitat to reduce ship-whale collisions. In critical habitat areas boats are not to get within 500 yards of the Right Whale. In 2008 the rule was finalized and included mandatory reduced speed for ships greater than 65 feet in length for certain areas in the Atlantic Ocean. That area of reduced speed however, extends no further south than the Daytona Beach area. The final rule had a “sunset provision” of ending on December 9, 2013; however on June 6, 2013 the Federal Register published a proposed rule and requested comments to eliminate that sunset provision.

On September 22, 2011 the Federal Register announced the determination of the NMFS and the USFWS that the Loggerhead sea turtle (*Caretta caretta*) is composed of nine distinct population segments (DPSs) that constitute “species” that may be listed as threatened or endangered under the ESA. In this final rule, they listed four DPSs as threatened and five as endangered under the ESA. They also proposed to designate critical habitat for the two loggerhead sea turtle DPSs occurring within the United States in a future rulemaking (50 CFR Parts 223 and 224 Endangered and Threatened Species; Proposed Listing of Nine Distinct Population Segments of Loggerhead Sea Turtles as Endangered or Threatened). The closest DPS location to CCAFS for the endangered Loggerhead sea turtle is the Northeast Atlantic Ocean DPS which is north of the equator, south of 60° N. Latitude, and east of 40° W. Longitude, so is essentially outside the ROI. NOAA recently designated offshore & near-shore critical habitat (within the ROI) for breeding and reproductive activities of this species. FWS excluded the nesting beaches of CCAFS from critical habitat designation.

3.3.3.1 Florida Scrub-Jay

The Florida scrub-jay (*Aphelocoma coerulescens*) is a federally threatened bird endemic to open, oak-dominated scrub habitats of Florida. Widespread destruction and degradation of scrub habitat over the last century has resulted in dramatic declines in the distribution and abundance of this species. Because the scrub-jay is intimately tied to open, oak-dominated scrub, conservation of the species depends upon restoration of sufficient optimal habitat to support large populations. The scrub-jay population on CCAFS figures prominently in recovery plans for the species. Believed to be one of the largest remaining populations, the CCAFS population has been designated as belonging to one of three core populations for the species.

Until 2007, the USAF had contracted with Florida Natural Areas Inventory, Florida State University, to study the demography of Florida scrub-jays on CCAFS. Since 2007 all suitable accessible jay habitat is generally surveyed on a yearly basis between January and March by the USAF. Nesting activity is monitored from February to July of each year. The 2013 census resulted in 138 groups with a total of 476 birds. This data represented a decrease of 14 groups from the 2009 census, but an increase of 78 birds. In 2009 and 2013 the closest scrub-jay groups to LC-13 were north near LC-14. Scrub-jay groups or birds did not appear to be on the site in May of 2014.

Management actions for scrub-jays on CCAFS are primarily oriented toward habitat improvement. Since the majority of CCAFS is or could be scrub-jay habitat, land clearing activities have the potential to adversely impact scrub-jays and their habitat. The USFWS has designated CCAFS as part of a core scrub-jay area, indicating that all scrub habitat on CCAFS is highly valuable to the recovery of the species. Consultations between the USFWS and the USAF led to the development of a *Scrub-Jay Management Plan* for CCAFS and includes a requirement to mitigate loss of scrub or potential scrub at a rate of 2:1. A *Scrub Habitat Restoration Plan* was developed subsequent to the management plan, and provides a strategy for restoring the scrub habitat needed by this federally threatened species on CCAFS. The CCAFS land area is divided into Land Management Units (LMU), which are used to account for and manage many items including scrub jay populations and burn strategies. The objective of scrub habitat restoration on CCAFS is to restore the over-mature scrub to a condition suitable to support the Florida scrub-jay. The main methods used for habitat restoration are mechanical treatment and prescribed burning of mechanically treated sites within the LMU. Mechanical treatment reduces the height of the scrub. Prescribed burning provides open areas of sand and prevents the accumulation of fuels. Currently, the USAF uses prescribed fires in most of the potential scrub-jay habitat.

The Proposed Action site is located within LMU 41 which runs east of the ditch and parallel with the Atlantic Ocean, and LMU 51 which is south and east of LC-13. LMU 42 is adjacent to and north of LC-13. Evidence of past land management activities exist (cut and burned vegetation) in certain areas of these units. According to the 45th SW a controlled burn occurred in LMU 41 in 2003. LMU 42 was managed by mechanical cutting and treatment of Brazilian pepper in 2008 and has been under monitor and control for invasive species. LMU 51 was treated for a patch of cogon grass in 2007 and remains under monitor and control. In 2008 mechanical cutting was employed to treat Brazilian pepper and has been under monitor and control for invasive species since then. These are the only LMU affected by the proposed clearing where scrub-jays habitat exists. Figure 3-2 includes the locations of scrub-jay groups observed during the 2009 and 2013 census.

3.3.3.2 Southeastern Beach Mouse

The southeastern beach mouse (*Peromyscus polionotus niveiventris*) is a subspecies of the widely distributed beach mouse (*P. polionotus*). Originally occurring on coastal dunes and coastal strand communities along the Atlantic coast of Florida, this beach mouse generally occurs along the primary dune line of the Atlantic Ocean. It is presently known to exist in six sites in Brevard, Indian River, and St. Lucie Counties. Past studies have shown the beach mouse to be present in a discontinuous pattern. Most breeding activity occurs November through January, and females can produce two or more litters per year, with litters averaging three to four (USAF 2010).

On CCAFS, the mice occur from the coastal dunes inland to the west side of Samuel C. Phillips Parkway, and are generally found where the sand is suitable for burrows, coastal scrub is present, and the water table is not close to the surface. While inland populations may be more stable, their abundance varies from site to site inland of the dune system. However, nearly every coastal scrub site surveyed on CCAFS could support the beach mouse.

The majority of the area around the LC-13 is extremely overgrown and not likely to support beach mice; however, the area of treated scrub east of the ditch and especially at the dune area may provide limited habitat. The *Report on southeastern beach mouse (Peromyscus polionotus niveiventris) habitat occupancy survey on Cape Canaveral Air Force Station dated February 2013*, used tracking, modeling, and probability methods over a three month period to determine “absence-presence”, which included the beach area of the SpaceX Proposed Action. The report found that one station of the study (Station 21) located near the beach adjacent to LC-13 reported beach mice exist in the area. In support of this EA and the associated BA, a limited beach mouse survey was accomplished between June 8 and June 12, 2014. The survey used the standard 200 Trap-night method approved by the FWCC and the USFWS. The 50 Single Sherman live traps were placed at locations along the western side of the approximate 2000 foot beach dune area, and scrub area. Traps were opened in the late afternoon, baited with oats, and checked for captures the following morning. During the four nights of trapping a total of seventeen (17) southeastern mice were caught and released. All mice trapped were generally closer to the dune crown area as shown in Figure 3-3.

3.3.3.3 Eastern Indigo Snake

The longest of North American snakes (up to 8.6 ft), the eastern indigo snake (*Drymarchon corais couperi*) is locally abundant in parts of Florida, but as a top carnivore, population densities are typically low. The eastern indigo snake has been found on CCAFS and likely occurs throughout the station. This primarily diurnal snake is known to occur in most types of habitat and is often associated with gopher tortoise burrows, although this has never been observed on CCAFS, and was not observed during the May 2014 gopher tortoise survey or the June 2014 beach mouse survey at the LC-13 facility and surrounding area. The reproductive season encompasses copulation (November through April), egg laying (May through June), and hatching (late July through October). Home ranges for male indigo snakes range from 191 to 360 acres and female home ranges vary between 14 and 130 acres. Major threats to the indigo snake on CCAFS are habitat loss and vehicle traffic. There has not been an installation wide census completed for indigo snakes; however, based on the different habitat types around LC-13, it is likely to occur within the areas to be cleared.

3.3.3.4 Marine Turtles

Three species of federally protected sea turtles have been documented as nesting on CCAFS: the loggerhead (*Caretta caretta*), green (*Chelona mydas*) and leatherback (*Dermochelys coriacea*) sea turtles. While sea turtles spend much of their lives in the ocean, females come ashore each year to nest. Research has shown that females will avoid highly illuminated beaches and postpone nesting. Artificial lights have also resulted in hatchling mortality as disoriented hatchlings move toward these light sources rather than the ocean.

In 1988, in compliance with Section 7 of the ESA, the USAF developed Light Management Plans (LMPs) for various areas and facilities on CCAFS to protect sea turtles. A BO issued by the USFWS requires that LMPs be developed

for all new facilities that are in close proximity to the beach, are not compliant with wing lighting policies, have lighting directly visible from the beach, and/or may cause significant sky glow. In addition, USAF biologists conduct nighttime inspections to ensure all exterior lighting is being operated in accordance with policies. The BO authorizes no more than 3% incidental take of turtles as the result of disorientation on CCAFS. In 2007, the incidental take reported to USFWS was 2.5% and in 2013 the incidental take reported was 0.34%. SpaceX maintains a current, USAF approved light management plan for operations at CCAFS.

3.3.3.5 Gopher Tortoise

The gopher tortoise is listed as a threatened species in the state of Florida, and is a Candidate species for federally-listed in several other regions of the U.S. Gopher tortoises inhabit upland habitats common in central Florida, including scrub, pine flatwoods, and the dune area along beaches, ditches, fence lines, and other mounded areas. Their diet consists mainly of grasses, grass-like plants, and legumes. It is illegal to take, harm or harass this species. Likewise, the destruction of gopher tortoise burrows constitutes a “take” under this law except as authorized by specific permit. Although the gopher tortoise is not federally protected in Florida, it is afforded protection by the USAF due to its state ranking and the commensurable use of its burrow by other federally protected species. The area around LC-13 is habitat for gopher tortoises. To support Proposed Action at LC-13, a gopher tortoise survey was accomplished between May 27 and May 30, 2014. A 100% survey was conducted on the LC-13 facility that included area within 25 feet of the fence line, which means 100% of the area was viewed. A 15% (of land) survey was also conducted during the same period in the area between LC-13 and the Atlantic Ocean; a total of 72 burrows were marked and recorded as shown in Figure 3-4. Since the 15% survey basically addressed approximately 15% of the area, expectation are that additional burrows exist in the area.

3.4 HISTORICAL AND CULTURAL RESOURCES

Historical and cultural resources include prehistoric and historic sites, man-made structures or remnants of legacy launch vehicles, districts, artifacts or any other physical evidence of human activity considered important to a culture or community for scientific, traditional, religious or any other reasons. For ease of discussion, cultural resources have been divided into archaeological resources (prehistoric and historic), historic buildings and structures, and Traditional Cultural Properties (e.g., Native American sacred or ceremonial sites). Also to be considered in any discussion of related resources is the presence of paleontological sites at CCAFS.

3.4.1 Archaeological Resources

Numerous laws and regulations require that possible effects to cultural resources be considered during the planning and execution of federal undertakings. These laws and regulations stipulate a process of compliance, define the responsibilities of the federal agency proposing the action and prescribe the relationship among other involved agencies (e.g., the State Historic Preservation Officer [SHPO], Tribal Historic Preservation Officers [THPOs], and the Advisory Council on Historic Preservation). In addition to NEPA, the primary laws that pertain to the treatment of cultural resources during environmental analysis are Sections 106 and 110 of the National Historic Preservation Act (NHPA), the Archaeological Resources Protection Act (ARPA) (1979), the American Indian Religious Freedom Act (AIRFA) (1978), and the Native American Graves Protection and Repatriation Act (NAGPRA) (1990). Only those cultural resources determined to be significant or potentially significant under the above-cited legislation are subject

to protection from adverse impacts resulting from an undertaking. To be considered significant, a cultural resource must meet one or more of the criteria established by the NPS that would make that resource eligible for inclusion in the National Register of Historic Places (NRHP). The term "eligible for inclusion in the National Register" includes all properties that meet the NRHP listing criteria, which are specified in the Department of the Interior regulations Title 36 CFR 60.4 and NRHP Bulletin 15. Whether prehistoric, historic, or traditional, significant cultural resources are referred to as "historic properties."

Data suggests humans first occupied Florida as early as 15,000 years ago. However, archaeological investigations at CCAFS indicate that human occupation of the area first occurred at least 5,000 years ago. Prehistoric occupation periods of CCAFS are, the following: Archaic Period (divided into early, middle, late subperiods), Mt. Taylor Period, the Orange Period, and the Malabar I and II Periods. Early settlement was focused within the Banana River Lagoon salt marsh area; however, there is archaeological evidence that the entire peninsula was exploited for a wide variety of marine, estuarine and terrestrial resources. At the time of European colonization, the Cape Canaveral and Banana River areas were populated by tribal groups of the Ais Indian tribe. Based on Spanish accounts the Ais were a non-agricultural chiefdom who continued a hunter-fisher-gatherer subsistence pattern more than unlikely unchanged from the end of the Late Archaic Period.

Prehistoric archaeological sites within CCAFS are typically middens and mounds. A midden is a refuse deposit resulting from human activities, generally consisting of soil, food remains (bone and shell), and discarded artifacts. At CCAFS there are two types of middens. A black earth or sheet midden is, as the name implies identifiable by the presence of black organic soils. They tend to be linear and can range in size from a few meters to a kilometer (or more) in size. A shell midden (or shell mound) is a mound-like deposit of shell. At CCAFS both were used as living floors and may contain human remains. A mound can be just soil or a combination of shell and soil. They typically were used for interment of the dead, ceremonial centers, or as the home of high status individuals. Other prehistoric archaeological sites at CCAFS include isolated finds or small clusters containing a few artifacts.

Historic occupation periods of CCAFS are: First Spanish (1513-1763), British (1763-1783), Second Spanish (1783-1821), American Territorial (1821-1842), Early Statehood (1842-1861), Civil War (1861-1865), Reconstruction and Late Nineteenth Century (1865-1899), and Twentieth Century (1900+). The earliest documented continuous human occupation of CCAFS was in the mid-1840s when veterans of the Seminole Indian Wars were granted land patents for their service in the wars. In 1844, the first lighthouse was established on what is now CCAFS. The population remained low until after the Civil War. During the years following the Civil War displaced southerners, former slaves, and veterans from the north moved to Florida to begin a new life. CCAFS remained somewhat isolated until well into the 1880s and was accessible only by boat. In the early 1900s roads were constructed which opened CCAFS to more people and by the time of the Florida Land Boom in the 1920s small communities were springing up on the island. This ended with the start of the Great Depression and remained after World War II.

Historic archaeological sites on CCAFS tend to be homestead/farmstead sites, small surface scatters, small house sites, linear resources such as former unpaved roads or trails, and cemeteries. Most tend to be Twentieth Century in origin and not NRHP eligible.

A National Historic Landmark district was established in the 1980s and consists of those launch complexes directly associated with the manned space program. Several other launch complexes and associated facilities are eligible for

inclusion in the NRHP due to their association with the Cold War ICBM and IRBM programs or due to unique architecture style or engineering/construction methods. CCAFS also owns the Cape Canaveral Lighthouse, one of the oldest standing structures in Brevard County. The lighthouse is eligible for inclusion in the NRHP

3.4.2 Traditional Cultural Properties

Significant traditional cultural properties (TCPs) are subject to the same regulations as other types of historic properties and are afforded the same protection. Traditional resources associated with the Ais could include archaeological sites, burial sites, mounds, ceremonial areas, caves, hillocks, water sources, plant habitat or gathering areas, or any other natural area important to this culture for religious or heritage reasons. By their nature, traditional resource sites often overlap with (or are components of) archaeological sites. As such, the National Register listed or eligible sites (as well as any archaeologically sensitive areas) could also be considered traditional sites or could contain traditional resource elements. There are no remaining Ais Indians. They are represented by the Seminole and Miccosukee Tribes of Indians of Florida. While burial sites are sacred sites they have not been declared TCPs on CCAFS but are afforded protection under NAGPRA and ARPA. There are no TCPs on CCAFS property.

3.4.3 Paleontological Sites

Paleontology is the study of fossils; what fossils tell us about the ecologies of the past, about evolution, and about our place, as humans, in the world. The major laws protecting fossils on federal lands are the Federal Land Policy and Management Act (1976) and NEPA and various sections of Part 43 of the Code of Federal Regulations. No paleontological sites have been documented on CCAFS. However, several fossil sites have been documented within five miles of the CCAFS boundaries. Fossil sites in this region of Florida tend to be deeply buried (12-18 ft below ground surface on average) linear deposits of accumulated bone dating to the Pleistocene.

3.4.4 LC-13 Proposed Action Location Status

Within the context of the descriptive paragraphs above, LC-13 was constructed in 1956 and was the third of four complexes built for the Atlas Missile Program. It was operated by GDSS from 1956 until 1978 as a checkout and launch facility for the Atlas Missile. LC-13 supported its first Atlas launch on 2 August 1958. After its final Atlas missile launch on 13 February 1962, LC-13 was converted into an Atlas/Agena launch complex. Three pairs of Vela satellites were launched before the site was turned over to NASA in 1966. Following a series of civilian Atlas/Agena missions, LC-13 was returned to the USAF in March 1968. The site supported 11 Atlas/Agena space flights for the DoD between 6 August 1968 and 7 April 1978. In all, LC-13 supported 51 Atlas and Atlas/Agena launches and was deactivated in April 1978 (BEM 2003a). The MST at LC-13 was erroneously declared a part of the Cape Canaveral National Historic Landmark District in April 1984 (Florida Master Site File Number 8Br216). The nomination for LC-13 stated that it was the only remaining example of the support facilities for the Atlas/Mercury manned space flights, and that the MST was the only one still standing that was associated with the early manned space program. In fact, no manned missions were ever flown from LC-13, and the MST was constructed to support Atlas/Agena after the original LC 13-MST was demolished in 1964 (USAF 2005). Although it was nominated in error, the site has never been officially delisted, and a 1988 Memorandum of Agreement (MOA) between NASA, the USAF and the SHPO established management protocols for the site. New South Associates (1996) recommended that the USAF petition

the SHPO to delist the MST and the LC-13 site from the National Register. Despite this history, the “new” MST was demolished in 2012 and the complex was never listed as a historical landmark.

While there were no previously identified historic properties or archeological sites located within the complex boundary or in the immediate vicinity based upon earlier reviews (USAF 2005), the 45th SW determined that a Phase I Archeological Survey would be required and would be accomplished by 45th SW personnel prior to the implementation of the Proposed Action. Between June and August 2014 the 45 SW Cultural Resource Manager (CRM) visited LC-13 as part of a Cultural Resource Assessment Survey (CRAS) and conducted an archeological and historical survey for the proposed project area. The 45 SW CRM investigated three previously unrecorded archeological sites 8BR3176 through 8BR3178. Angy’s scatters (8BR3176) is a 20th century domestic refuse scatter. The Atlas Missile Debris Site (8BR3177) is associated with a 1959 missile mishap on the LC-12 Pad. The Canaveral Rose’s Garden (8BR3178) is a coquina midden that contained no diagnostic artifacts. The 45 SW CRM determined that these sites were ineligible for listing in the NRHP. Appendix H contains a letter of concurrence from the State of Florida’s Historical Division with additional information about this subject.

3.5 AIR QUALITY

This section describes air quality conditions at CCAFS for the atmosphere at altitudes below 914 m (3000 ft), which contains the atmospheric boundary layer for CCAFS and is considered the ROI for this EA on the landing vehicle. Atmospheric monitoring for chemicals at CCAFS occurs within the atmospheric boundary layer that people inhabit.

CCAFS is located in Brevard County and is classified as “an attainment area” with National Ambient Air Quality Standards (NAAQS) and Florida Ambient Air Quality Standards (FAAQS). Air quality at CCAFS is regulated federally under Title 40 CFR 50 NAAQS, Title 40 CFR 51 (Implementation Plans), Title 40 CFR 61 and 63 (National Emission Standards for Hazardous Air Pollutants [NESHAPs]), and Title 40 CFR 70 (Operating Permits). Table 3-5 below presents data for FAAQS and NAAQS. CCAFS is considered a major source of air pollution for regulated criteria pollutants and is now classified as a minor source of regulated Hazardous Air Pollutants HAPs under the current Title V Operating Permit. No conformity determination is required as the facility is located within a NAAQS attainment area for all regulated criteria pollutants.

FAAQS are not substantially different from the NAAQS. Specific regulations that may be applicable to launch complex operational activities include Rule 62-204.240, F.A.C. ([FAAQS]), Rule 62-210, F.A.C. (Stationary Source General Requirements) establishes general requirements for stationary sources of air pollutant emissions and provides criteria for determining the need to obtain an air construction or air operation permit., Rule 62-212, F.A.C. (Stationary Source Preconstruction Permitting), Rule 62-213, F.A.C. (Operating Permits), and Rule 62-242, F.A.C. (Mobile Sources). CCAFS and KSC are classified as major sources because emissions are above major source thresholds. CCAFS and KSC have Title V permits.

Table 3-5: Florida and National Ambient Air Quality Standards				
Regulated Pollutant	Averaging Time	Florida Standards ($\mu\text{g}/\text{m}^3$)	National Primary Standards	National Secondary Standards
CO	8 Hours 1 Hour	10,000 40,000	9 ppm 35 ppm	NA NA
Lead (Pb)	Rolling 3 month average	1.5	0.15 $\mu\text{g}/\text{m}^3$ (1)	0.15 $\mu\text{g}/\text{m}^3$ (1)
NO ₂	Annual arithmetic mean	100	53 ppb (2)	53 ppb (2)
	1 Hour	-	100ppb	-
O ₃	8 Hour	-	0.075 ppm (3)	0.075 ppm (3)
	1 Hour	235	-	-
PM ₁₀	Annual 24 Hours	50 150	150 $\mu\text{g}/\text{m}^3$	150 $\mu\text{g}/\text{m}^3$
PM _{2.5}	Annual 24 Hours	- -	35 $\mu\text{g}/\text{m}^3$	35 $\mu\text{g}/\text{m}^3$
SO ₂	Annual	60	-	-
	24 Hours	260	-	-
	3 Hours	1,300	-	0.5 ppm
	1 Hour	-	75 ppb (4)	-

Notes:

(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 $\mu\text{g}/\text{m}^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

(2) The official level of the annual NO₂ standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

(3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

(4) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO₂ standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

Sources: USEPA Air Criteria as of Oct 2011 and 40 CFR 50 and Rule 62-204.240, F.A.C.

Ambient air quality measurement data for the region are available up through 2012. Table 3-6 includes data from 2010, 2011, and 2012. The updated table below shows that ground-level concentrations of criteria pollutants in the region around LC-13 continue to be within the NAAQS and FAAQS.

Table 3-6: Measured Ambient Air Concentrations of Criteria Pollutants in the Region

Pollutant	Averaging Time	Nearest Monitoring Station	Maximum Measured Concentration (ppm, except PM in $\mu\text{g}/\text{m}^3$)		
			2010	2011	2012
O₃	8 Hours	Palm Bay-Titusville	0.064(4 th max)	0.066(4 th max)	0.065(4 th max)
CO	8 Hour	Orlando-Kissimmee	1.3	1.0	1.1
NO₂	1 Hour	Orlando-Kissimmee	0.040	0.033	0.035
SO₂	1 Hours	Palm Bay-Titusville	7.0	Not Avail	Not Avail
PM₁₀	24 Hours	Palm Bay-Titusville	51	33	28
PM_{2.5}	Annual	Palm Bay-Titusville	6.8	6.4	6.0
Lead	Quarterly	No lead monitors are located within 100 miles of LC-13	-	-	-

a The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standards, average over three consecutive years, is equal to or less than one. By this statistic, the standard is met when the fourth-highest average concentration in each of the three years is less than the value of the standard.

Source: EPA, 20014

Presented below in Table 3-7 is a summary of both the 2011 and 2013 CCAFS Air Emissions Inventory Report (most recent) actual and potential annual emissions estimates for all NAAQS and FAAQS regulated criteria pollutants and total HAPs (included in the current Title V Air Operating Permit). CCAFS is still listed as a “synthetic minor” source for HAPs but remains a Title V “major” source of criteria pollutants (Pius Sanabani email 7/1/2014). In all categories CCAFS has reduced HAPs emissions from 2011 levels.

Table 3-7: Summary of CCAFS Criteria Pollutant & HAPs Emissions (Tons per Year-TPY) for 2011 and 2013

Pollutant	2011 Actual (TPY)	2011 Potential (TPY)	2013 Actual (TPY)	2013 Potential (TPY)
PM	364.923	430.230	172.230	229.631
PM10	167.561	185.920	78.082	96.157
NOx	65.525	150.877	36.595	150.877
SO2	4.160	7.266	2.094	7.283
CO	15.018	84.561	11.731	84.561
VOC	10.816	77.168	9.695	79.959
HAPs	0.945	1.372	0.725	1.237

Green House Gases (GHG) are gas emissions that trap heat in the atmosphere. These emissions occur from natural processes and human activities. Some scientific evidence indicates a trend of increasing global temperature over the past century which may be due to an increase in GHG emissions from human activities. The climate change that

may be associated with this global warming may produce negative economic and social consequences across the globe. In February 2010, the CEQ issued NEPA guidance for considering the effects of climate change and GHG emissions. Specifically, if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of CO₂-equivalent GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public. For long-term actions that have annual direct emissions of less than 25,000 metric tons of CO₂-equivalent, CEQ encourages Federal agencies to consider whether the action's long-term emissions should receive similar analysis. CEQ does not propose this as an indicator of a threshold of significant effects, but rather as an indicator of a minimum level of GHG emissions that may warrant some description in the appropriate NEPA analysis for agency actions involving direct emissions of GHGs (CEQ Memorandum 18 February 2010). Table 3-8 below shows the most recent summary of GHG for all activities at CCAFS (Pius Sanabani email 8/7/2014). Note that the threshold for reporting GHG is 25,000 MtCO₂ per year (40 CFR 98).

TABLE 3-8 Summary of Greenhouse Gases Emissions for CCAFS (Years 2011 through 2013)			
GHG	GHG Emissions for 2011		
	Ton (Short)	Ton (Metric)	MtCO ₂ e
CO ₂	3,160.034	2,866.735	2,866.735
N ₂ O	0.052	0.047	14.624
CH ₄	122.215	110.872	2,328.303
TOTAL REPORTABLE GHG* for 2011			5,209.662
GHG	GHG Emissions for 2012		
	Ton (Short)	Ton (Metric)	MtCO ₂ e
CO ₂	2,827.90	2,565.43	2,565.42
N ₂ O	0.05	0.04	13.21
CH ₄	211.41	191.79	4,027.65
TOTAL REPORTABLE GHG* for 2012			6,606.28
GHG	GHG Emissions for 2013		
	Ton (Short)	Ton (Metric)	MtCO ₂ e
CO ₂	6,148.266	5,577.651	5,577.651
N ₂ O	227.900	206.500	61,153.000
CH ₄	241.542	219.085	5,433.214
R-22	0.085	0.077	0.004
R-123	0.076	0.069	0.002
TOTAL REPORTABLE GHG* for 2013			72,547.870

NOTE: MtCO₂e = Metric Ton Carbon Dioxide Equivalent

R-22 = Chlorodifluoromethane or difluoromonochloromethane is a hydrochlorofluorocarbon (HCFC-22) refrigerant being phased out.

R-123= 2,2-Dichloro-1,1,1-trifluoroethane or HCFC-123 is a replacement refrigerant being phase in.

3.6 HAZARDOUS MATERIALS/HAZARDOUS WASTE

Numerous types of hazardous materials are used to support the missions and general maintenance operations at CCAFS and at launch operations complexes such as LC-13. Typical material has included petroleum products, oils, lubricants, volatile organic compounds, corrosives, refrigerants, adhesives, sealants, epoxies, and propellants (USAF, 2000). Management of hazardous materials and petroleum related fuels is the responsibility of each individual organization on the installation. Resource Conservation and Recovery Act (RCRA) requirements would be accomplished by the directives listed in the respective permits issued to KSC or CCAFS (Comprehensive Emergency Management Plan 10-2, VOLUME II, 45 SW Management Plan 19-14, and KHB 8800.6). There are no sites at CCAFS listed or under consideration for listing on the National Priorities List (EPA, 2013). There are no underground or above ground storage tanks at LC-13.

In the event of a spill of hazardous materials at LC-13, the USAF would provide initial emergency spill response; however, the remaining emergency/corrective actions would be the responsibility of SpaceX. SpaceX is responsible for preparing its own Emergency Response Plan for the Falcon Launch Vehicle Program in accordance with the CCAFS Hazardous Materials Emergency Response Plan. The CCAFS Hazardous Materials Emergency Response Plan ensures that adequate and appropriate guidance, policies, and protocols regarding hazardous material incidents and associated emergency response are available to and followed by all installation personnel and commercial entities.

Hazardous waste management at CCAFS is regulated under RCRA (40 CFR 260-280) and Rule 62-730, SpaceX is responsible for the management and disposal of its own hazardous wastes. SpaceX has developed its own Hazardous Waste Management Plan for the Falcon Launch Vehicle Program in accordance with the 45 SW Hazardous Waste Management Plan to document how SpaceX would control hazardous wastes for the program. In addition, all hazardous waste must be handled and disposed per the requirements established by the Federal and State regulations. SpaceX is responsible for the collection and transport of hazardous wastes (including propellant waste) from the satellite accumulation points (SAPs) to a 90-day hazardous accumulation area, then to an offsite permitted treatment, storage, and disposal facility (TSDF).

While SpaceX has developed its own Spill Prevention Control and Countermeasure (SPCC) plans for petroleum related storage tanks and systems at other CCAFS facilities, there are no plans to build or install any Underground Storage Tank (UST) or Above Ground Storage Tank (AST) petroleum tanks at LC-13.

Installation Restoration Program

The DoD established the Installation Restoration Program (IRP) to identify, characterize, and evaluate past disposal sites and remediate associated contamination as needed to protect human health and the environment. The IRP was initiated at CCAFS in 1984. The IRP efforts at CCAFS have been conducted in parallel with the program at PAFB and in close coordination with the EPA, the FDEP and NASA. CCAFS is not a National Priorities List (NPL) site, and the IRP sites are being evaluated and remediated under RCRA authority while meeting the CERCLA regulations.

The environmental status of each launch complex is constantly changing as remedial activities and associated projects occur. The launch complexes go through a series of processes ranging from solid waste management unit (SWMU) identification through No Further Action. A SWMU can be defined as any discernible unit where solid wastes have been placed at any time. A RCRA Facility Assessment identifies releases or migration of contaminants from a SWMU. Listed in the paragraphs below is a brief history of the remedial activities at LC-13. Copies of the IRP "Fact Sheet" and Land Use Control Implementation Plan (LUCIP) for LC-13 can be found in Appendix C.

As a former active launch complex, a number of hazardous chemicals were stored and used at LC 13 (SWMU C038), onsite, including trichloroethylene (TCE), trichloroethane, fuels, methyl ethyl ketone, alcohols, oils, hydrazine, red fuming nitric acid, paints, lubricants, Freon and PCBs. It has also been established that historical paint formulations used on launch structures included PCBs and lead. Routine sand blasting activities following launches dispersed the PCBs throughout site surface soils. Additionally, paint delamination from the launch structure also contributed to PCB and lead contamination throughout the site (3E, 2013a).

As a result of the Preliminary Assessment and Site Investigation activities VOCs (attributed to industrial solvent use at the site) were identified in groundwater at concentrations that could be potentially harmful to human health. Additionally, PCBs, lead, arsenic, and benzo(a)pyrene were present in the surface soils at concentrations that could be potentially harmful to human health. A RCRA Facility Investigation (RFI) was recommended to fully assess the nature and extent of contamination at the site.

Concurrent with the RFI, an interim measure (IM) was conducted to remove approximately 154 tons of contaminated soils and sediment that had accumulated in the launch complex deluge basin and to decontaminate the flume trench and deluge basin. Also, a soil IM was conducted to remove approximately 22 tons of the most contaminated soils from LC 13. As part of a full-scale Corrective Action Measures Implementation effort, tower/soil cleanup and groundwater remediation projects were implemented in 2005 (USAF 2005).

Since 2005 an additional significant amount of environmental remedial actions have taken place at LC-13 to eliminate or reduce the long-term effects of both soil and groundwater contamination. Remaining contaminated soils throughout the site were excavated and properly disposed of. Residual soil contamination in the area of the deluge basin, flume trench and blockhouse are safe under all but residential land use scenarios. Remaining soils Land use controls have been implemented to ensure industrial re-use in the impacted areas.

Additionally, an in-situ, ozone injection system was installed in 2005 as the selected groundwater treatment remedy. The treatment system was decommissioned in 2011 when approximately 80% reduction in contaminants was documented in the treatment area.

Additional groundwater sampling was performed in 2010 to assess areas where access was previously restricted by safety concerns, and in 2011 vegetable oil injection was selected to treat a hotspot identified outside the ozone treatment footprint. In 2012, additional comprehensive groundwater sampling was performed to completely identify and delineate any remaining groundwater hotspots and to prepare a fate and transport model to assist with determining if any additional treatment was needed to accelerate the overall time to cleanup. The contaminated ground water plume is approximately 20 feet thick and extends from about 18 to 40 feet below land surface. Plume-

wide monitored natural attenuation (MNA) has been on-going throughout all treatment actions and is on-going to assess the continued natural degradation of residual groundwater contamination. The groundwater is monitored on a semi-annual basis, the last report was dated September 29, 2013 (3E 2013b). Available information indicates that contamination does not extend eastward beyond the current fence line of LC-13. Dependent on site conditions and the nature and intensity of the proposed land use change, additional site investigations and assessments could be required for the United States Air Force (USAF). Prior to any land disturbances the 45 SW Installation Restoration Program Office must be contacted to obtain additional information, including: the 45 SW Land Use Controls Management Plan; the CCAFS HSWA Permit; a complete record of corrective actions at SLC-13; or other related documents, guidance, and regulations.

3.7 WATER RESOURCES

Water resources include groundwater and surface water bodies and wetlands, and their physical, chemical and biological characteristics. CCAFS is within the Florida Middle East Coast Basin watershed and situated on a barrier island that separates the Banana River Lagoon (BRL) from the Atlantic Ocean. This basin contains three major bodies of water: the BRL to the immediate west, Mosquito Lagoon to the north, and the Indian River Lagoon (IRL) to the west of Merritt Island. Several water bodies in the Middle East Coast Basin have been designated as Outstanding Florida Waters in Chapter 62-3 of the Florida Administrative Code, including most of Mosquito Lagoon and the BRL, Indian River Aquatic Preserve, Banana River State Aquatic Preserve, Pelican Island National Wildlife Refuge, and Canaveral National Seashore. These water bodies are afforded the highest level of protection, and any compromise of ambient water quality is prohibited. In addition, in 1990 the IRL system was designated as an Estuary of National Significance under the National Estuary Program. The BRL has been designated a Class III surface water; a designation under the Clean Water Act that intends for a level of water quality suitable for recreation and the production of fish and wildlife communities. Other than the constructed ditch or canal to the east of LC-13 mentioned below, and the Atlantic Ocean further to the east, there are no other open surface bodies of water in the area of the Proposed Action.

Groundwater

The surficial and the Floridan aquifer system underlie CCAFS. The surficial aquifer system, which is comprised generally of sand and marl, is under unconfined conditions and is approximately 70 ft thick. The water table in the aquifer is generally a few feet below the ground surface. The surficial aquifer is recharged by infiltration of precipitation through the thin vadose zone. Assuming negligible runoff, the amount of recharge is approximately equal to the amount of precipitation minus the amount returned to the atmosphere through evaporation and transpiration (USACE 2005). Overall groundwater flow direction across LC-13 is predominantly to the southwest under a relatively flat hydraulic gradient that averaged 0.0009 ft/ft. in April 2013. Depth to groundwater varies but generally ranges between 2 and 6 ft in areas off LC-13 and beyond the fence line, and between 8ft and 10 ft on the LC-13 raised areas (3E 2013a).

Wetlands and Floodplains

Wetlands are defined in AFI 32-7041, Water Quality Compliance (10 December 2003), as those areas that are inundated by surface or ground waters that support plants and animals that need saturated or seasonally saturated soil to grow and reproduce. Wetlands include swamps, marshes, bogs, sloughs, mud flats and natural ponds, and the ecosystems are considered to be some of the most biologically productive of all habitats. There is a constructed ditch east of the LC-13 facility that runs north and south as shown in Figure 3-5. The ditch drains land between ICBM road-based launch complex's and the Atlantic Ocean. The ditch leads south to another set of ditches to the south of LC-13 and LC-12 which then eventually drain to the BRL to the west. The ditches usually contain water and have been noted to support various water species such as mullet, mud turtles and at times nesting alligators.

Wetlands in and near the Proposed Action area are also shown in green on Figure 3-5. On May 28, 2014 the off-site wetland boundaries closest to the project area were delineated and flagged in accordance with State and Federal guidelines utilizing pink flagging tape. These wetland limits were also captured using a handheld GPS device. The wetland area flagged is approximately 0.75 acres and is classified using the Florida Land Use Cover Forms Classification System (FLUCFCS) as a 618 –Willow and Elderberry wetland. It has recently been subject to invasive species management to control Brazilian pepper or other nuisance/exotic wetland vegetation. Vegetation within the area consists of white top sedge (*Dichromena colorata*), sawgrass (*Cladium jamaicense*), thistle (*Cirsium nuttallii*), white beggar ticks (*Bidens alba*), broom grass (*Andropogon virginicus*), wax myrtle (*Myrica cerifera*), saltbush (*Baccharis halimifolia*), grape vine (*Vitis* sp.), and St. Johns wort (*Hypericum* sp.). The wetland is surrounded by a designated 25-foot “buffer zone” which is intended to protect the wetland. Appendix F contains a copy of the USACE Wetland Determination Data Form for the flagged area.

Floodplains are lowland and relatively flat areas adjoining inland and coastal waters and other flood prone areas such as offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year. The base floodplain is typically called the 100-year floodplain (one percent chance floodplain). The 100-year floodplain is located immediately east of LC-13 and essentially extends to the beach as shown on the Brevard County Flood Insurance Rate Map, Panel 360 (Map number 12009C0360G) dated March 17, 2014 (<https://MSC.FEMA.gov>).

DOT has implemented EO 11988 through policies and procedures documented in DOT Order 5650.2, Floodplain Management and Protection. DOT Order 5650.2 defines the natural and beneficial values provided by floodplains to include “natural moderation of floods, water quality maintenance, groundwater recharge, fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, and forestry.” Since some of the new construction will occur in a floodplain, based on DOT Order 5650.2, the analysis (presented in Section 4.7) shall indicate if the encroachment would be a “significant encroachment,” that is, whether it would cause one or more of the following to occur:

- The action would have a considerable probability of loss of human life;
- The action would likely have substantial, encroachment-associated costs or damage, including interrupting aircraft service or loss of a vital transportation facility (e.g., flooding of a runway or taxiway, important navigational aid out of service due to flooding, etc.);
- The action would cause notable adverse impact on natural and beneficial floodplain values.

3.8 GEOLOGY AND SOILS

CCAFS topography consists of a series of relic dune ridges formed by wind and wave action, indicating that gradual beach deposits occurred throughout time. The higher naturally occurring elevations occur along the eastern portion of CCAFS, with a gentle slope to lower elevations toward the marshlands along the BRL. Land surfaces are level to gently sloping along the LCs with elevations that range from sea level to 15 feet above mean sea level (MSL). The geology underlying CCAFS can be generally defined by four stratigraphic units: the surficial sands, the Caloosahatchee Marl, the Hawthorn Formation, and the limestone formations of the Floridan aquifer. The surficial sands immediately underlying the surface are marine deposits that are typically approximately 10 to 30 feet below the surface. The Caloosahatchee Marl underlies the surficial sands and consists of sandy shell marl that extends to a depth of 70 feet below the surface. The Hawthorn Formation, which consists of sandy limestone and clays, underlies the Caloosahatchee Marl and is the regional confining unit for the Floridan aquifer. This formation is generally 80 to 120 feet thick, typically extending to a depth of approximately 180 feet below the surface. Beneath the Hawthorn Formation lie the limestone formations of the Floridan aquifer, which extend several thousand feet below the surface of CCAFS (USAF 2005).

The Soil Survey of Brevard County, Florida, 1974, identifies eleven different soil types within CCAFS, with the three most prominent soils comprising the Canaveral-Palm Beach-Welaka association. It is about 37 percent Canaveral soil, 17 percent Palm Beach soils, nine percent Welaka soils, and 37 percent soils of minor extent. This association is made up of nearly level and gently sloping ridges interspersed with narrow wet sloughs that generally parallel the ridges and extends the entire length of the county along the coast near the Atlantic Ocean. The most prevalent type of soil is Canaveral Peninsula. Canaveral soils are on moderately low ridges and consist of a mixture of light-colored quartz sand grains and multicolored shell fragments. The major soils in this area are moderately well drained to excessively drained, and sandy throughout. The soils are exceptionally dry, even though the water table is often near the surface during rainy periods (ET 1998).

The general geology topography and soils underlying LC-13 are marine deposits that typically extend to depths of approximately 10 to 30 ft below the surface. The Caloosahatchee Marl underlies the surficial sands and consists of sandy shell marl that extends to a depth of 70 ft below the surface. The Hawthorn Formation, which consists of sandy limestone and clays, underlies the Caloosahatchee Marl and is the regional confining unit for the Floridan aquifer. A copy of the Brevard County, Florida Soils Map for the area around LC-13 is included in APPENDIX D.

3.9 TRANSPORTATION

Regional Access

The CCAFS area can be accessed from Daytona Beach via U.S. Highway (US) 1 or Interstate 95; Orlando lies approximately 50 miles to the west on State Route (SR) 528; and Miami is approximately 187 miles to the south on US 1 or Interstate 95.

Local Access

The majority of the employees and other related support services providers for CCAFS reside within the unincorporated areas of Brevard County and in the cities of Cape Canaveral, Cocoa, Cocoa Beach, and Rockledge,

which are all within 14 miles of the station. The key roads providing access to CCAFS from the surrounding local communities include SR A1A, SR 520, SR 528, SR 401, SR 3, and SR 405. The NASA Causeway (SR 405), Beach Road, and SR 528 connect CCAFS with KSC, the inner barrier islands and the mainland. Southern access into CCAFS occurs through Gate 1. Gate 1 is accessed by SR 401 via SR A1A, SR 520, and SR 528. Western access onto CCAFS is provided by SR 3 and SR 405. From the north, CCAFS can be accessed through Gate 4 and Gate 6 at KSC. Conditions for key roads on/near CCAFS were presented in Table 3.10-2 of the 2007 EA (USAF 2007). However since the Shuttle Program was terminated in 2011, the general work force that would be using these roadways has substantially declined.

The main on-site roadway on CCAFS is Samuel C. Phillips Parkway, a four-lane divided highway that accommodates most of north-south traffic and connects with KSA to the north. LC-13 is located on ICBM Road which also runs north and south and can be accessed from Samuel C. Phillips Parkway by Central Control Road on the south and by Heavy Launch Road on the north. ICBM road is a lightly traveled road.

Additionally, the Port of Canaveral affords a significant amount of ocean-going transportation through its channel south of CCAFS. This traffic includes, commercial shipping and cruise lines, commercial and private fishing and pleasure boats. The channel is also used by the US Navy, the US Coast Guard, and recovery vessels that are associated with rocket launches, including the SpaceX Falcon 9 vehicle.

3.10 UTILITIES

Utility systems were evaluated as to their capability to provide service to CCAFS and to the individual operational launch pad sites such as LC-13. Sufficiency is based upon review of CCAFS demand, other installation facilities, and incorporated and unincorporated areas of the applicable county. Attributes considered include processing, distribution/storage capacities, and related factors, such as average daily consumption and projected peak demand. Historic and projected utility use was determined from records of purveyors, regulatory compliance reports and the application of generally accepted average growth rates. The utility systems addressed in this analysis include the following facilities and infrastructure elements:

- Water (potable and deluge)
- Wastewater (domestic and industrial)
- Electricity
- Stormwater
- Solid Waste

During operations at LC-13 from the late 1950s until the late 1970s these services were provided to the facility. During demolition activities, piping and cabling systems were terminated at various points along the entrance to LC-13 from ICBM Road.

Water Supply, Treatment, and Distribution

Water for CCAFS is acquired from the City of Cocoa's municipal potable water distribution system under a long-term agreement. The City's contract is with the U.S. Government and includes KSC, CCAFS and Patrick Air Force Base

(PAFB). A total of 6.5 million gallons per day (MGD) is allocated for all three facilities. Historically, total consumption of water for all three facilities has averaged 3.7 MGD. CCAFS, in turn, recovers a portion of the cost of water under its contracts with commercial contractors operating on CCAFS. Water is utilized at CCAFS for both potable and non-potable purposes. Non-potable use includes fire protection, limited irrigation and launch-related consumption. CCAFS recently upgraded the distribution facilities to improve water quality in the potable distribution system.

Currently, the City of Cocoa utilizes groundwater from the Floridan aquifer at its well field in eastern Orange County. The city owns and operates a water treatment facility at the same location. For planning purposes, treatment plant capacity is considered to be either the plant's physical treatment capacity or its permitted withdrawal capacity, whichever is smaller. Generally, the treatment capacity exceeds the withdrawal capacity of a given facility. Treatment capacities are based upon the mechanical equipment installed, which typically provides for redundant or back-up reliability.

Wastewater Collection and Treatment

CCAFS treats both domestic and industrial wastewater at an on-base wastewater treatment plant (WWTP). The WWTP was upgraded in 2000 to provide higher levels of treatment and reliability. The WWTP has a permitted capacity of 0.8 MGD. CCAFS has individual industrial wastewater permits from FDEP for each launch facility to discharge deluge water to the ground (in lined retention facilities). LC-13 may reconnect to the system, however there will not be a need for deluge discharge water since a deluge system is not necessary for landing events.

Electrical Supply

Historically, CCAFS's use of Brevard County's electricity demand represented 0.4% of the total. Transmission lines enter the station at three locations: from the southwestern boundary, across the NASA Causeway and from Merritt Island. The three feeds are capable of providing 1,320 mega-watt hours (MWH)/day to CCAFS, which is well in excess of that required. Reduction of voltages to typical levels is accomplished through a combination of substations and local transformers. The existing distribution system appears to be capable of supplying electricity to the existing launch facilities. Current capacity is available should the need arise. Electrical service to LC-13 would be reinstalled under the Proposed Action to supply basic needs to support landing support functions.

Stormwater Collection

Impervious areas constructed after 1992 are subject to the rules of SJRWMD to provide for the treatment of pollutants and the attenuation of potential flooding impacts. As facilities are improved, stormwater systems must be built or upgraded to be consistent with the requirements of SJRWMD rule 40C-4, F.A.C. The CCAFS roadway system is drained to a swale system, which removes potential floodwater from the road surfaces. As previously mentioned, the stormwater management system at CCAFS is multibasin. Because of the relatively flat topography, constructed canals and ditches have been created to facilitate drainage around developed areas. Current stormwater flow from LC-13 follows pre-existing flow paths, both constructed and natural. Land east of the LC-13 facility is generally drained by normal saturation into the ground, or by flowing east to the constructed ditch.

Solid Waste Collection and Disposal

General solid refuse at CCAFS is collected by a private contractor and disposed of off-site at the Brevard County Landfill, a Class I landfill located near the City of Cocoa, or other appropriate and permitted facilities. The USAF 45th SW also manages a recycling program for appropriate waste material from CCAFS sites.

3.11 HEALTH AND SAFETY

The discussion of human health and safety includes both workers and the general public. Safety issues include injuries or deaths, which are usually the result of one-time accidents. Injuries include impacts on a human resulting from an exposure to toxic concentrations of chemicals/hazardous materials, radiant heat, or overpressures from accidental releases or explosions (such as flying debris), or accidents resulting from working in confined spaces, and that require medical treatment or hospitalization. Health issues result from activities where people may be impacted over a long period of time rather than immediately. The standards applicable to the evaluation of health and safety effects differ for workers and the public; thus, it is useful to consider each separately.

Occupational Safety and Health Administration (OSHA) is responsible for protecting worker health and safety in non-military workplaces. OSHA regulations are found in 29 CFR. During clearing and construction phases, all workers will be subject to OSHA and safety programs. Standard construction methods would be used and all safety regulations and guidelines would be followed.

With regard to launch and landing operations, the areas in and around CCAFS that could be affected by payload processing, vehicle safing, transport, and launch/landing operations are the subject of health and safety concerns. Range safety organizations review, approve, monitor, and impose safety holds, when necessary, on all pre-launch and launch operations in accordance with AFSPC 91-710. Landing operations would also be reviewed by the same organizational structure. The objective of the range safety program is to ensure that the general public, launch and landing area personnel, foreign land masses, and launch and landing area resources are provided an acceptable level of safety, and that all aspects of prelaunch and launch operations adhere to public laws. SpaceX has been compliant with all facility safety procedures. Range safety procedures are also in place. Impact debris corridors for returning launch vehicles would be similar to one established for the launched Falcon 9 and other vehicles as part of the program's safety review using the results of the Falcon 9 debris analysis (USAF 2013). Debris data developed for other vehicles in compliance with AFSPCMAN 91-710 also satisfies FAA requirements. Impact debris corridors would be established off the Brevard County, Florida coast to meet security requirements and reduce the hazard to persons and property similar to a launch-related activity. However, the returning landing vehicle, a Falcon 9 first stage would have significantly less fuel, therefore the impact corridor would be smaller.

Explosive safety quantity-distance criteria are used to establish safe distances from launch and landing operational complexes and associated support facilities to non-related facilities and roadways. DoD and USAF Explosive Safety Standards establish these regulations. The criteria utilize the trinitrotoluene, also called TNT, explosive equivalent of propellant to determine safe distances from space launch operations or processing and holding areas. LC-13 was originally sited to meet these criteria under the Atlas program. Per AFSPCMAN 91-710, all facilities including launch complexes used to store, handle, or process ordnance items or propellants shall be properly sited and

approved in accordance with DoD quantity distance criteria and explosives safety standards as specified in DoD 6055.9-STD and implemented in AFMAN 91-201.

3.12 SOCIOECONOMICS

CCAFS is located in eastern Brevard County, Florida which has an estimated population of approximately 543,376 according to the 2010 census of Brevard County. The median household income for 2011 in Brevard County was \$50,068, and the unemployment rate was approximately 11.4 percent. Space Florida's report titled *Brevard Workforce-Aerospace Work Force Outlook Report Phase III*, dated January 2010, estimated that over 9,000 workers may be affected by the loss of the Shuttle Program. However as reported by the Florida Department of Economic Development, unemployment was estimated to be approximately 7.4 percent (Floridatoday, 2013). In general, the economic influence of the aerospace industry has declined somewhat with the termination of the Shuttle program. However commercial space launch companies such as SpaceX have had a positive impact on the economics of Brevard County.

3.13 ENVIRONMENTAL JUSTICE

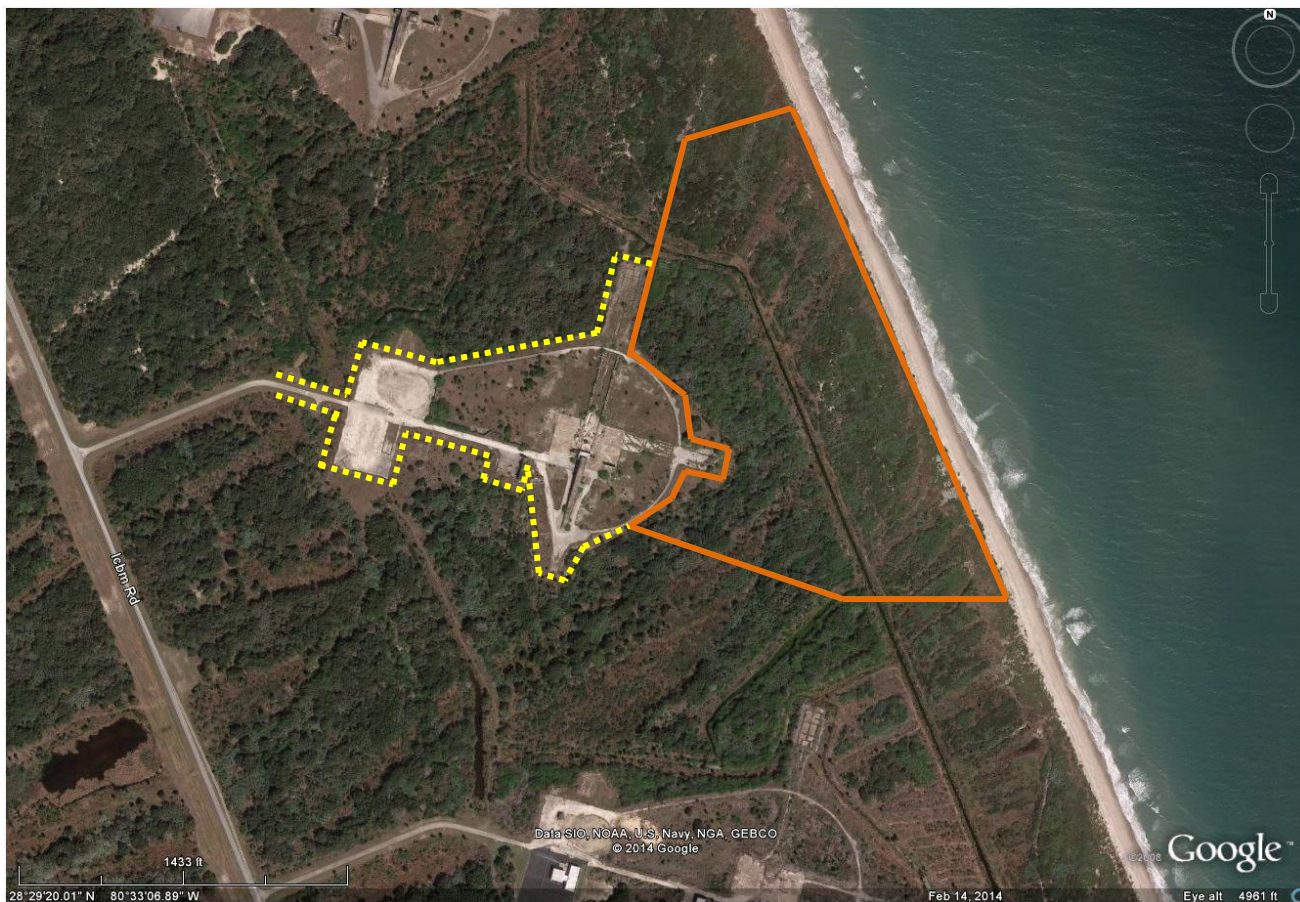
Environmental justice is defined by the EPA as "The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires all federal agencies to adopt strategies to address environmental justice concerns within the context of agency operations. Section 989.33 of AFI 32-7061, Environmental Impact Analysis Process requires that a project proponent comply with EO 12898 to ensure that these types of impacts are considered in EAs and other environmental documents.

The 2010 Census of Population and Housing reports numbers of minority residents are as follows: Minority populations included in the census are identified as Black or African American, American Indian and Alaskan Native, Asian, Native Hawaiian/Other Pacific Islander, Hispanic, or Other. Based upon the US Census Bureau 2011 quickFacts information, Brevard County had a population of 543,376 persons. Of this total, 8.4 percent were Hispanic, 10.5 percent were Black, and 77.3 percent were considered White but not Hispanic, and approximately 3.8 percent were other races. (Brevard 2013).

3.14 SECTION 4(f) PROPERTIES

The Federal statute that governs impacts in this Resource Area is Department of Transportation (DOT) Act, Section 4(f) provisions. Section 4(f) of the DOT Act, which is codified and renumbered as Section 303(c) of 49 U.S.C., provides that the Secretary of Transportation will not approve any program or project that requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance or land from an historic site of national, State, or local significance as determined by the officials having jurisdiction thereof, unless there is no feasible and prudent alternative to the use of such land and such program, and the project includes all possible planning to minimize harm resulting from the use. This order continues to be referred to as Section 4(f) matters or properties.

No designated 4(f) properties, including public parks, recreation areas, or wildlife refuges, exist within the boundaries of CCAFS. There are however public parks and recreation areas, in addition to the Merritt Island Wildlife Refuge and the Cape Canaveral National Seashore, which are adjacent to Kennedy Space Center and CCAFS. The nearest public park, Jetty Park, is located about 7.5 miles south of LC-13 in the City of Cape Canaveral. Other public parks within an approximate 15 mile radius of the launch site include, the following: Kelly Park, Kars Park, Kings Park, and Manatee Cove Park. Additionally, the St. John's National Wildlife Refuge and Tosohatchee State Game Preserve are located west of Interstate 95 in Orange County. The Merritt Island Wildlife Refuge overlaps the northwestern portion of the KSC; All areas of KSC not directly utilized for NASA operations are managed by MINWR and NPS. Cape Canaveral National Seashore is adjacent to the Merritt Island Wildlife Refuge and north of CCAFS.



PREVIOUSLY DISTURBED AND DEVELOPED



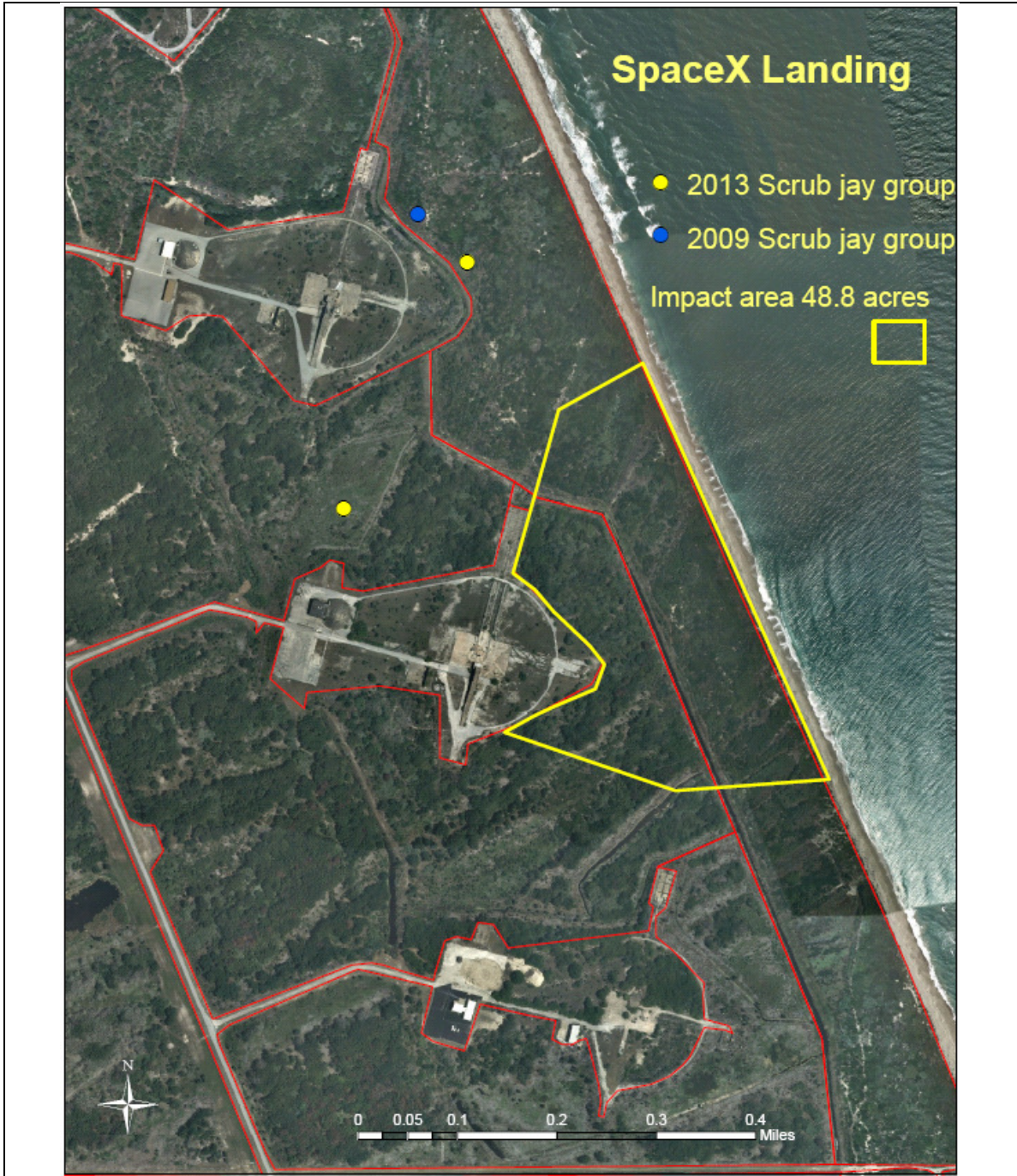
LIMITED DISTURBANCE

PROPOSED ACTION AFFECTED LANDS




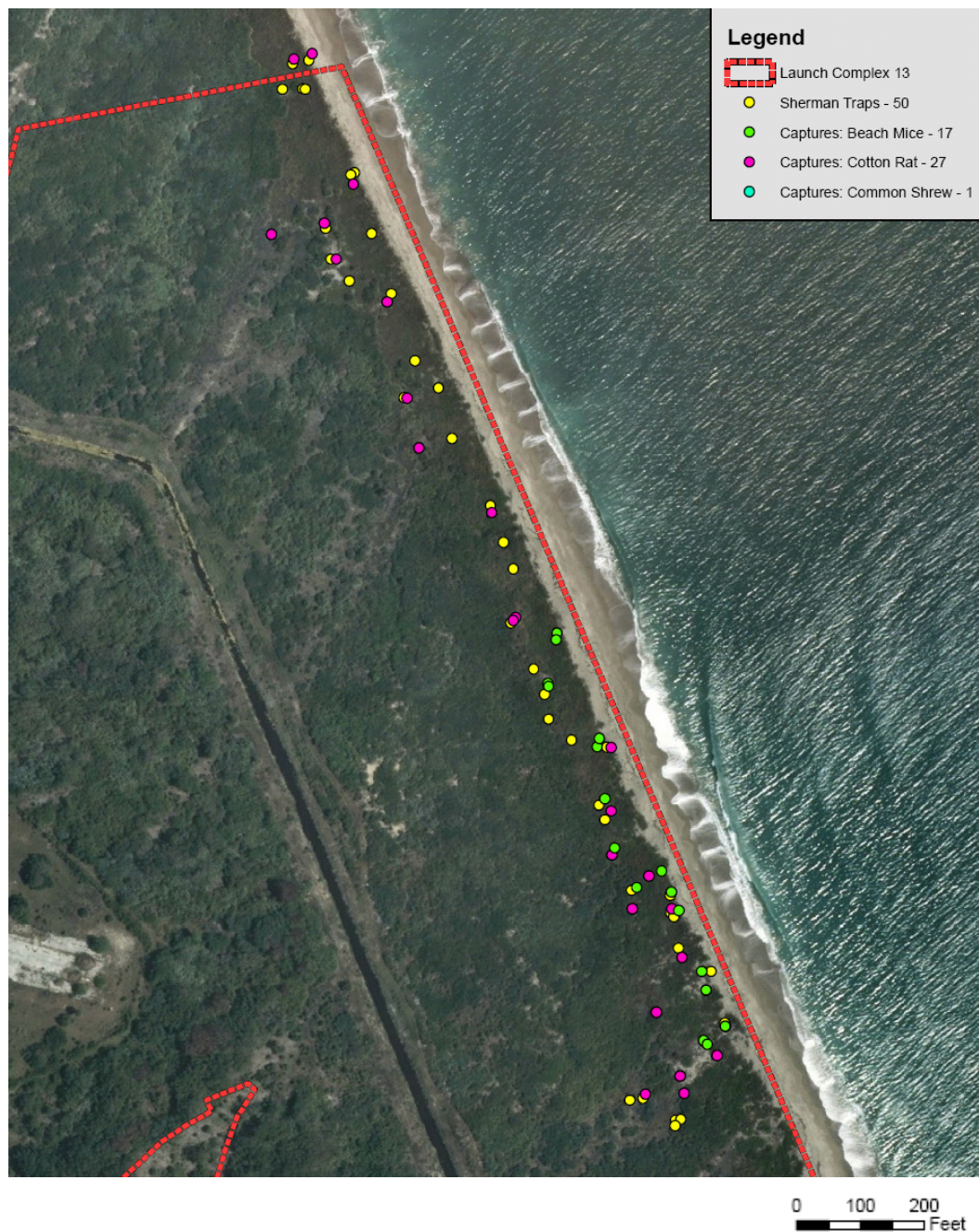
LAUNCH COMPLEX 13
CAPE CANAVERAL AIR FORCE STATION

Figure 3-1



SCRUB-JAY SURVEY

	<p>LAUNCH COMPLEX 13 CAPE CANAVERAL AIR FORCE STATION</p>	<p>Figure 3-2</p>
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LAUNCH COMPLEX 13
CAPE CANAVERAL AIR FORCE
STATION
(results 6-12-14)

Figure 3-3



GOPHER TORTOISE SURVEY



LAUNCH COMPLEX 13
CAPE CANAVERAL AIR FORCE
STATION
(May 27-30, 2014)

Figure 3-4



U.S. Fish and Wildlife Service
National Wetlands Inventory

LC-13

Jun 10, 2014



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

NATIONAL WETLANDS INVENTORY MAP



LAUNCH COMPLEX 13
CAPE CANAVERAL AIR FORCE STATION

Figure 3-5

4.0 ENVIRONMENTAL CONSEQUENCES

This section discusses the potential environmental consequences or impacts associated with the Proposed Action and the No Action Alternative. This section will analyze the level of significance associated with project-related environmental impacts.

Changes to the natural and human environment that could result from the Proposed Action are evaluated relative to the existing environmental conditions as described in Section 3.0. Under NEPA (42 U.S.C. 4321 *et seq.*), “significant impacts” are those that have potential to significantly affect the quality of the human environment. The “human environment” is a comprehensive phrase that includes the natural and physical environments and the relationship of people to those environments (40 CFR Section 1508.14). CEQ Regulations specify that in determining the significance of effects, consideration must be given to both “*context*” and “*intensity*” (40 CFR Part 1508.27):

Context refers to the geographic, biophysical and social context in which the effects will occur. Society as a whole, affected regions and affected interests are examples of context. In other words, “context” measures how the effect would be “felt” for a given setting.

Intensity refers to the magnitude or severity of the effect, whether it is beneficial or adverse. Intensity refers to the “punch strength” of the effect within the context involved. The intensity of an action refers to the severity of the impacts, both regionally and locally, and may be determined by:

- Unique characteristics in the area (i.e., wetlands, parklands, ecologically critical areas, cultural resources, and other similar factors);
- Overall beneficial project effect versus individual adverse effect(s);
- Adverse effects to public health and safety;
- Degree of controversy;
- Degree of unique or unknown risks;
- Precedent-setting effects for future actions;
- Potential for adverse effects to cultural or historic resources;
- Potential for adverse effects to special-status species or habitats;
- Cumulatively significant effects;
- Potential for violation of Federal, state, or local environmental laws.

Fourteen broad environmental resource areas were initially considered to provide a context for understanding the potential effects of the Proposed Action and as a basis for assessing the significance of potential impacts. The areas which were reviewed included land use zoning and visual resources, noise, biological, historical and cultural, air quality, hazardous materials and waste, water resources, geology and soils, transportation, utilities, health and safety, socioeconomics, environmental justice, and Section 4(f) Properties. The level at which an impact is considered significant varies for each environmental resource. Based on the criteria discussed above, a resource-specific definition of what constitutes a significant impact was prepared for each of the resource areas analyzed in this chapter. This provides the EA reviewer with a basis for determining if a specific program activity would result in a significant impact to a specific resource area. A summary overview of the anticipated environmental consequences to the resources as a result of the Proposed Action is presented in Table E-1 of the Executive Summary.

4.1 LAND USE ZONING / VISUAL RESOURCES

An impact may be considered significant if the project results in nonconformance with approved land use plans, conversion of prime agricultural land to other uses, a decrease in the land's productivity, or an irreconcilable conflict with existing uses or values of the project area or other properties.

Proposed Action

The Proposed Action would occur at LC-13 which has been designated for space launch activities. Operating as a "landing pad" for a launched vehicle would be consistent with both the CCAFS General Plan and its mission. It would also be consistent with past operations at LC-13. The Proposed Action would not convert prime agricultural land, since prime agricultural land does not exist at CCAFS, and would not conflict with existing uses or values of the project area or other base properties. Activities associated with "re-utilizing" and preparing LC-13 and the land area east of the facility would not itself be contrary to the current land use. Proposed activities at LC-13 would be in conformance with its designated use (for space launch activities) and would not result in significant impacts to land-use zoning.

As part of the safety review process for a normal launch, a Falcon 9 debris model was completed and included as Appendix C to the 2007 EA. The debris analysis was developed to be compliant with AFSPCMAN 91-710 and presents estimated debris lists for FTS activation, explosions, and aerodynamic breakup modes. Also, well in advance of any planned mission (launch and re-landing), SpaceX has, and would continue to, develop a Preliminary Flight Data Package (PFDP) which takes into consideration the landing trajectory which avoids over-flights of known structures such as oil rigs, and establishes potential debris corridors for the vehicle. The returning Falcon 9 first stage vehicle would be carrying less than one percent of the fuel it contained upon lift-off. Should there be a need to activate the FTS, it would occur over the open ocean and would result in a much smaller explosion and less debris.

Since the Falcon first stage would land at LC-13, there may be a short-term visible contrail which would dissipate quickly as wind and air currents affect the trail. Although the visual aspect would be different from a launch and the novelty of a landing event may draw additional attention, the Proposed Action would not generate significant impacts on visual resources. Issuance of a Federal license or permit for an activity in or affecting a coastal zone must be consistent with the CZMA, which is managed by the Florida Department of Community Affairs. CZMA requires Federal agency activities with reasonably foreseeable effects on coastal zones to be consistent with state programs that are approved under Federal coastal management programs. The state agency that implements or coordinates a state's Federally approved coastal management program is responsible for Federal consistency reviews. Minimal construction, operation, and landing activities at LC-13 would take place in the designated coastal zone similar to other space operation related activities. Therefore, no impacts to natural shoreline processes and coastal resources would be expected. A copy of the Draft Final EA was submitted to the Florida FDEP CLEARINGHOUSE for a consistency review; a copy of their concurrence letter is included in Appendix A.

No Action Alternative

Under the No Action Alternative the concrete pad and other support facilities would not be built, and the landing of the Falcon stage would not occur. The Falcon family of rockets would continue to be launched from LC-40 (and soon from LC-39A) and the first stage would continue to fall into the Atlantic Ocean down range. Therefore no impacts to

approved land use plans or the coastal zone would occur, and there would be no conflict with existing uses or values of the project area or other properties, however SpaceX's ability to fully meet the National Space Transportation Policy goals of providing low-cost reliable access to [and from] space would be negatively impacted.

4.2 NOISE

Noise impact criteria are based on land use compatibility guidelines and on factors related to the duration and magnitude of noise level changes. Annoyance effects are the primary consideration for most noise impact assessments on humans. Noise impacts on wildlife are discussed in Section 4.3, Biological Resources. Since the reaction to noise level changes involves both physiological and psychological factors, the magnitude of a noise level change can be as important as the resulting overall noise level. A readily noticeable increase in decibel noise levels would often be considered a significant effect by the local residents, even if the overall decibel noise level was still within land use compatibility guidelines. On the other hand, small decibel noise level increases that are unnoticed by most people are not considered a significant change, even if the overall decibel noise level is somewhat above land use compatibility guidelines. Finally, certain noise levels (e.g., from sonic booms) have the potential to break glass or damage structures. A high risk or high potential to break glass or damage structures caused by high noise levels generated from the proposed project would be considered a significant impact. Also, in accordance with FAA Order 1050.1E, a significant noise impact would occur if the Proposed Action would cause noise sensitive areas to experience an increase in noise of DNL 1.5 dBA or more at or above DNL 65 dBA noise exposure when compared to the No Action Alternative during the same time frame.

Proposed Action

Clearing and Construction

There are no sensitive receptors (e.g., schools, hospitals) in the vicinity of LC-13. Low to moderate levels of noise would be generated by heavy equipment, work vehicles, and other construction equipment during land clearing and construction. Vehicles associated with the Proposed Action typically have a dBA between 65 and 100, at a distance of 50 feet (USEPA, 1971). No impacts would be anticipated since all work activities of the Proposed Action would be confined to daylight hours to avoid nuisance noise in the evenings. In accordance with 29 CFR 1910.95, protection against the effects of noise exposure would be provided. When employees are subjected to sound levels, exceeding those listed in Table 4-1, feasible administrative or engineering controls would be utilized.

Table 4-1: Permissible Noise Exposures Duration Per Day (Hours)	
Number of Hours	Sound Level (dBA)
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110

If such controls do not reduce sound levels to the levels presented in Table 4-1, hearing protection would be provided and used to reduce exposure at the project site, therefore there would be no adverse impacts to the local area or to workers. Noise levels during construction would not exceed current levels in the area. The relative isolation of LC-13 reduces the potential for noise to affect adjacent communities. The closest residential areas to CCAFS are about 7.5 miles to the south, in the cities of Cape Canaveral and Cocoa Beach. Residential areas and resorts along the beach would expect to have low overall noise levels, normally about 45 to 55 dBA. Clearing and construction noise would not be an impact on CCAFS or nearby communities.

Operational Noise

Operational noise during landing events would either be the result of engine noise as the RLV descends and lands, or the result of the RLV flight path towards LC-13 at supersonic speeds creating a sonic boom. Regulations state that exposure to impulsive or impact noise should not exceed a 140 dB peak sound pressure level. Table 4-2 below provides overall sound pressure levels (OASPL) versus distance for the Falcon 9 Block 1 vehicle. Note that “Block 1” refers to the first version of the Falcon 9 and constituted the first five (5) launches at LC-40. Levels do not include attenuation due to atmospheric absorption, nor noise suppression from the water deluge system.

Engine Noise

Noise levels at the launch site are directly correlated to the thrust of the space launch vehicle at lift-off. The thrust for the Falcon 9 Block 1 is approximately 1.01 million pounds force (Mlbf). The current version of Falcon 9 is approximately 1.4 mlbf.

Table 4-2: Modeled engine noise levels for the Falcon 9 Block 1		
Distance (ft)	Falcon 9 Block 1	
	Unweighted OASPL (dB) ¹ ± 4.9 dB	A-weighted OASPL (dB) ¹ ± 4.9 dB
125	156.1	149.0
500	146.7	135.6
1,000 (0.2 mile)	139.2	129.3
1,500	134.9	125.6
2,000	132.0	123.1
2,500 (0.5 mile)	129.8	121.1
3,000	128.0	119.5
3,500	126.5	118.1
4,000	125.2	116.9
4,500	124.1	115.9
5,000	123.1	115.0
5,500 (1.0 mile)	122.2	114.2
6,000	121.4	113.4
6,500	120.6	112.7
7,000	120.0	112.0
7,500	119.3	111.4
8,000 (1.5 miles)	118.7	110.9
8,500	118.2	110.4
9,000	117.7	109.9
9,500	117.2	109.4
10,000 (1.9 miles)	116.7	108.9

Notes:

1. OASPL in dB (ref 20 micropascals). Thrust assumed to be 846,971 lbs for Falcon 9 Block 1.

The A-weighted OASPL noise level for the Falcon 9 Block 1 at 9,500 ft was estimated to be 109.4 dBA (SpaceX 2010).

During analysis of the Falcon 9 v1.1 expected acoustical performance, the noise study by Blue Ridge noted that exposure levels of 119 dB or greater would be within 3.4 miles of the launch site at CCAFS, and there would be exposure to levels of 111 dB up to 9.1 miles, which is below the regulatory value of 140 dBA (USAF 2013). There are no homes within a 7.5 mile radius of either LC-40 where these vehicles launch, or LC-13 where the Falcon 9 would land. Based on the existing baseline noise levels at CCAFS from current launches, and the modeled launch noise for the Falcon 9 v1.1, the 2013 SEA concluded that noise levels under the Falcon 9 launch would not exceed the FAA's noise significance threshold; which is an increase in noise of DNL 1.5 dBA or more at or above DNL 65 dBA noise exposure for the closest noise sensitive areas, which are the residential areas of Cape Canaveral approximately 7.5 miles away (USAF 2013).

The Falcon RLV would land at LC-13 with one Merlin engine operating, or one ninth of the total thrust energy. Since noise is a function of acoustical energy, the expected noise profile from a landing vehicle at LC-13 would be less by a direct proportion, perhaps up to 80% less.

SpaceX has been conducting a robust research and development program to support the development of the technology needed for landing operations. The two primary avenues for this development have been through the Grasshopper and F9-R Development Programs. In the EA for Issuing an Experimental Permit to SpaceX for Operation of the Grasshopper Vehicle at the McGregor Test Site, noise levels were estimated to be approximately 138 dBA at the launch pad, approximately 97 dBA 3 miles from the pad and 54 dBA 4 miles from the test site. The EA concluded that flying the Grasshopper Vehicle would not cause significant noise impacts (FAA, 2011).

The F9R Development program involves flying a vehicle that is an exact representation of a Falcon RLV at their Rocket Development and Testing Facility located in McGregor, Texas. During two recent 1000 meter altitude flights, SpaceX used datalogger high accuracy microphones to collect noise data from the vehicle at various distances from the landing site (0.5, 1.0, 1.5, 2.0 and 3.0 miles). Data collected from the test was then post-processed in order to enable the creation of noise contours.

Results from the tests and analysis show a 1.5 dBA increase above an assumed baseline ambient noise level of 65dBA would occur approximately .5 miles from the rocket landing area, which is not a "noise sensitive area", for the 1000 meter flight data. Data was used to extrapolate to a 3000 meter altitude approach; that analysis showed a 1.5 dBA increase could occur approximately 1.7 miles from the rocket landing area. The closest sensitive receptor is approximately seven miles away. Therefore, according to FAA 1050.1E, a significant noise impact would not occur in a noise sensitive area as a result of the Proposed Action. A summary of the study is found in Appendix E. Based on the discussion above, noise effects from landing operations at LC-13 would be less than other launch actions and would not cause a significant noise impact in sensitive areas, nor would it exceed FAA DNL guidelines.

Sonic Boom.

Sonic boom footprints for the heavy, medium-plus, and medium vehicles have maximum focus boom amplitudes of up to 7.2 psf for the heavy vehicle. The carpet boom amplitude diminishes rapidly as the vehicle gains altitude. Most

of the boom footprints are below 1 psf at which level no adverse effects would be expected, even over land, from an occasional sonic boom (USAF 1998). At one pound overpressure, no damage to structures would be expected. Overpressures of 1 to 2 pounds are produced by supersonic aircraft flying at normal operating altitudes. Some public reaction could be expected between 1.5 and 2 lb. Rare minor damage may occur with 2 to 5 lb overpressure (NASA, 2014). Recently SpaceX performed a sonic noise study for the Falcon 9 RLV landing at LC-13, CCAFS . Figure 4-1 presents the expected sonic noise pattern for a Falcon 9 RLV flying back to LC-13 from an approximant trajectory of between 040 degrees and 060 degrees. The maximum focus boom would be 3psf or less and occur beyond over the ocean 30 miles from the coast. CCAFS and the Daytona Beach area may experience a slight over pressure of up to 1 psf, but generally about .4 psf or less. A copy of the study is included in APPENDIX E. Based on the discussion above, sonic boom effects from landing operations at LC-13 would be less than other launch actions and would not cause a significant noise impact in sensitive areas.

No Action Alternative

Under the No-Action Alternative the concrete pad and other support facilities would not be built, and the landing of the Falcon stage would not occur. The Falcon family of rockets would continue to be launched from LC-40 (and soon from 39A) and the first stage would continue to fall into the Atlantic Ocean down range. Therefore no impact from construction or operational noise would occur at the LC-13 ROI area.

4.3 BIOLOGICAL RESOURCES

An impact to biological resources may be considered significant if the Federal action would have major impacts on a threatened or endangered species, substantially diminish habitat for a plant or animal species, substantially diminish a regionally or locally important plant or animal species, interfere substantially with wildlife movement or reproductive behavior, and/or result in a substantial infusion of exotic plant or animal species.

Any action that may affect Federally-listed species or their critical habitats requires consultation with the USFWS under Section 7 of the ESA of 1973 (as amended). Also, the Marine Mammal Protection Act of 1972 prohibits the taking of marine mammals, including harassing them, and may require consultation with the NMFS. The NMFS is also responsible for evaluating potential impacts to Essential Fish Habitat (EFH) and enforcing the provisions of the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (50 CFR 600.905 et seq.).

4.3.1 Vegetation

Proposed Action

The Proposed Action would result in the clearing of approximately 48.3 acres of vegetation; construction activities will necessitate the clearing of both native and invasive vegetation. The Proposed Action would clear and remove all vegetation located in and around the existing LC-13 complex. The area located within the fence line has been loosely maintained, comprised of a few scattered trees and herbaceous groundcover. Species observed within the LC-13 fence line that would be removed include sand cordgrass, crowfoot grass, prickly pear, saw palmetto, Brazilian pepper, sand live oak, cabbage palm, beach sunflower, dog fennel, ragweed, and pepper grass. Vegetation within

the ditch would not be removed. Vegetation observed between the LC-13 fence line and the eastern ditch, and between the ditch and the dune area would be removed. Since some of the 48.8 acres of vegetation planned to be removed is invasive species, clearing would include a limited positive effect.

Of the 48.3 acres requiring clearing, approximately 22.68 acres extends east of the fence line and to the western limits of the onsite ditch. Once vegetation is removed from this area using heavy machinery, much of it would be graded using large, heavy tracked bull dozers. Material would either be removed to a suitable off-site area, or burned on location in accordance with USAF regulations as schedule and burn conditions permit. The grading of this area would be required.

The beach dune area, which is a part of the approximate 48.8 acres extends from the crown of the dune west between 20 feet and 100 feet to a predominately palmetto scrub area. Beach mice typically inhabit the primary and secondary dunes in association with sea oats (*Uniola paniculata*) and other seed producing plants. These dunes, which are comprised of low grassy vegetation and some large patches of sea grapes (*Coccoloba uvifera*) is generally one to two feet tall and covers approximately 5 acres. Much of this area, especially at the crown would remain. Limited clearing using heavy machinery would not take place from the landward Toe of Slope (TOS) of the dune eastward (to the beach) or in areas that have been determined to be occupied by southeastern beach mice. These areas which contain tall or “woody” plants such as sea grapes (*Coccoloba uvifera*) would be selectively hand-cut to prevent disturbance to beach mice burrows; beach mouse habitat would be marked with flagging.

Conversion of vegetative community from scrub to open grass area, and loss of habitat and native vegetation would be compensated through the restoration of overgrown scrub-jay habitat located elsewhere on CCAFS and is addressed in section 4.3.3 below. All vegetation between the ditch or canal and the beach dune area would be cleared using wheeled cut and grubbing equipment and in some sensitive areas near the beach dune, by hand. The area would be over-seeded with sea oats or similar grasses which would provide opportunity for restoration and future habitat for vegetation and wildlife and would not cause significant impact.

No Action Alternative

Under the No Action alternative, no changes to the landscape or vegetation would occur and current species of vegetation would remain. While there would be no impacts to vegetation or wildlife, the benefit of removing a relatively large amount of invasive species such as Brazilian pepper would also not occur.

4.3.2 Wildlife and Migratory Birds

Proposed Action

Construction

Clearing and construction activities associated with the Proposed Action would occur over a relatively short period of time. Wildlife present in the area could be affected by construction noise. Wildlife response to noise can be physiological or behavioral. Physiological responses can range from mild, such as an increase in heart rate, to more damaging effects on metabolism and hormone balance. Behavioral responses to man-made noise include attraction, tolerance, and aversion. Each has the potential for negative and positive effects, which vary among species and

among individuals of a particular species due to temperament, sex, age, and prior experience with noise. Responses to noise are species-specific; therefore, it is not possible to make exact predictions about hearing thresholds of a particular species based on data from another species, even those with similar hearing patterns (USAF 2010). In addition to construction related noise impact, clearing would eliminate potential habitat for wildlife. It is anticipated that the moderate level of noise generated from construction activities would act as a warning mechanism for wildlife within the construction site, and should help minimize impacts to animals inhabiting land affected by the Proposed Action.

Mammals

Potential noise related impacts to mammalian species during construction activities would include disruption of normal activities due to noise and ground disturbances. These impacts would be minor and short-term and, therefore, would not cause significant impact to mammalian populations within the vicinity of the project area.

Reptiles and Amphibians

Reptile and amphibian hearing is poorly studied. However, reptiles and amphibians are sensitive to vibrations, which provide information about approaching predators and prey. Vibration and noise associated with construction activities would potentially cause short-term disturbance to amphibians and reptiles. These impacts would be considered short-term and would not cause a significant impact to reptilian and amphibian populations within the vicinity of the project area (USAF 2010).

Migratory Birds

Potential impacts to birds resulting from construction and human generated noise include disruption in foraging, roosting, and courtship activities. Biological monitoring would occur during clearing of vegetation and would provide the opportunity to mark areas where birds are known to be nesting. These areas would be avoided until birds have fledged from the nest. If the construction occurs during the 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 only affect individuals at or near the construction site; thus, construction would not cause a significant impact to migratory bird populations. Monitoring during construction activities would identify any potential disturbances of nests so measures could be implemented to avoid adverse effects. Other avian species protected under the MBTA, such as ground nesting birds, have the potential to occur within the project area and vicinity (USAF 2010). Note that under the MBTA, the taking, killing or possessing of migratory birds (including their eggs, nests, and feathers) is unlawful. If construction (including grading and clearing) is to occur during the migratory bird nesting season, pre-construction surveys should be conducted. Less than significant impact would occur to migratory birds.

Landing Operations

The Proposed Action would begin when the Falcon first stage separates from the second stage and begins its decent and “fly-back” to LC-13 for landing. Rather than launching with a full load of fuel and payload, and the energy and engine noise that accompanies the thrust of nine Merlin engines, the RLV would descend with less weight, less fuel, no payload, and with approximately 11 percent of total thrust energy and therefore much less noise energy.

The final phase of the actual landing event as the RLV crosses the ocean-beach ROI at LC-13 would have a substantially less impact than a launch of a Falcon 9. The only noise that may cause some, but less than significant

impact would be noise from the engines or a possible sonic boom as shown in Figure 4-1. If the boom would be heard over land it would be a small area and thus any potential exposure to terrestrial species would be limited and less than significant. Wild animals exposed to sudden intense noise can panic and injure themselves or their young; however, this is usually the result of the noise in association with the appearance of something perceived by the animals as a pursuit threat, such as a low-flying aircraft. RLV noise is not expected to cause more than a temporary startle-response because a “pursuit threat” would not actually be present. Any loss or injury as a result of this startle response would be incidental and not a population-wide effect. Just as noise associated with rocket launches may startle many species within the area including the Indian River habitat (USAF 1998), noise associated with landing may do the same; but actual noise impact to wildlife are expected to be minimal. Additionally, regarding current and past launch programs on CCAFS, neither the Falcon 9, Atlas, the Titan, nor the Delta launches have been documented to cause any animal mortality or significant impact to wildlife habitat on CCAFS (USAF 2013).

Most of the expected sonic booms created by the landing event would occur over the open Atlantic Ocean. Figure 4-1 shows the modeled sonic boom of a landing event with an incoming azimuth trajectory of between 040 degrees and 050 degrees from LC-13. The effects of a sonic boom on whales or other open ocean species are not known. Because these sonic booms are infrequent, the marine species in the ocean’s surface waters are present in low densities (although spring and fall migration would see periodic groups of migrating whales that follow the coastline), and the sonic boom footprint lies over 30 miles from CCAFS, the sonic booms associated with landings are not expected to negatively affect the survival of any marine species (USAF 1998). The sonic boom analysis for a landing event is included in APPENDIX E. The maximum Pmax anticipated over 30 miles from the coast would only be between 1 (one) and 2 (two) psf. Therefore the effect on ocean species is expected to be less than a normal launch and therefore not significant.

No Action Alternative

Under the No Action alternative, no changes to the landscape and availability of habitat and nesting areas utilized by wildlife and migratory species would occur, and noise from construction or operation would also not occur. Therefore, no impact to wildlife and/or migratory bird species would occur.

4.3.3 Threatened and Endangered (T&E) Species of Concern

Federal and state threatened and endangered wildlife species that occur or have the potential to occur within the project area of the Proposed Action are shown below in Table 4-3. Potential project related impacts to these species are also listed in this table and are further discussed below. Construction activities have the potential to result in the take of some special status wildlife species from activities such as disturbance, excavation, crushing or burial. The USAF determined that the proposed project may affect and is likely to adversely affect Florida scrub-jay, southeastern beach mouse, and the eastern indigo snake. The USFWS concurred with that determination. The USAF also determined that the proposed project may affect, but is not likely to adversely affect the loggerhead, green, leatherback, hawksbill, and Kemp's ridley sea turtles, the American Alligator, and the Piping Plover. The USFWS concurred with this determination. The USAF prepared a Biological Assessment (BA) and submitted it to the USFWS in accordance with section 7 consultation. The USFWS issued a subsequent Biological Opinion (BO) stating that the Proposed Action is not likely to jeopardize the continued existence of any Federally listed species. In its BO, the USFWS listed terms and conditions for which USAF must comply. Appendix G contains a copy of the BO.

During informal discussions between the USAF and NMFS in January, 2014 about RLV landing events of the Falcon vehicle at CCAFS, the USAF received concurrence from NMFS (both protected species and essential fish habitat) that further consultation for this action is not required from their offices. They concurred that this [action] is a "no effect" for species under their jurisdiction. A copy of the email correspondence with NMFS (NOAA) is included in Appendix A.

Table 4-3 Potential Impacts to Federal and State Protected Wildlife Species that Occur or Have Potential to Occur within the Proposed Action Area

Common Name Scientific Name	Status ¹		Occurrence	Potential Impacts
	USFWS	FWCC		
Florida Scrub-Jay <i>Aphelocoma coerulescens</i>	T	T	Documented	Loss of breeding habitat. Disruption due to noise.
Southeastern Beach Mouse <i>Peromyscus polionotus niveiventris</i>	T	T	Documented	Crushing by equipment. Disruption due to noise.
Eastern Indigo Snake <i>Drymarchon corais couperi</i>	T	T	Potential	Crushing by equipment. Loss of habitat. Disruption due to noise.
Marine Turtles (Hawksbill, Green, Loggerhead, Kemps Ridley)	E E/T	E T	Documented	Disruption and disorientation due to light
Gopher Tortoise <i>Gopherus polyphemus</i>	----	T	Documented	Crushing by equipment. Disruption due to noise.
Piping Plover <i>Charadrius melodus</i>	T	T	Potential	Loss of breeding habitat. Disruption due to noise.
Red Knot <i>Calidris canutus</i>	Proposed T	—	Potential	Loss of breeding habitat. Disruption due to noise.
American Alligator <i>Alligator mississippiensis</i>	T	SSC	Documented	Crushing by equipment. Loss of habitat. Disruption due to noise.

T – Threatened SSC – Species of Special Concern

----Not Listed in Florida (but listed as threatened west of the Tombigbee River, Alabama)

4.3.3.1 Florida Scrub-Jay

Proposed Action

Direct Effect

The Federally threatened Florida scrub-jay inhabits areas north of the Proposed Action site and its vicinity. The Proposed Action would involve clearing all vegetation and some limited construction at and east of LC-13 that would result in the loss of approximately 48.3 acres of vegetation as described in Section 2.0. Clearing of this area would result in the direct permanent loss of approximately 48.3 acres of scrub-jay habitat. A take may occur as the result of loss of habitat. The probability and level of incidental take is dependent upon the number of Florida scrub-jays within

the region; their ability to disperse; and the amount and distribution of available suitable habitat. It is possible that as construction proceeds, they would move away from the construction site; however, the USFWS anticipates that “take” would occur.

Indirect Effect

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 would result from the action under consideration. The indirect effects would occur in two ways: (1) operation of LC-13 would add activity adjacent to occupied habitat, possibly resulting in scrub-jays being struck by vehicles or (2) proposed habitat restoration and management activities are expected to enhance scrub-jay dispersal when complete. 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 vehicles. The only scientific documentation of road-kill mortality in Florida scrub-jays are from scrub-jays living in a territory immediately adjacent to a road, not from dispersing some unknown distance across a road to a new territory.

Mitigation Measures

Mitigation for direct and indirect impacts to the scrub-jay would help lessen or compensate for impacts caused by the Proposed Action. Provided the following mitigation measures are implemented, the Proposed Action would not significantly impact the scrub-jay population at CCAFS. Clearing would be restricted to outside nesting season; therefore, mortality associated with actual clearing activities is not expected to occur. Approximately 100 acres of potential scrub-jay, southeastern beach mouse and eastern indigo snake habitat at CCAFS would be restored over a five-year period. In accordance with the ESA, the USFWS prepared and issued a BO on this Action in September of 2014 and has issued an “Incidental Take Statement” for this Action. Reasonable and prudent measures as listed in the BO shown in Appendix G are included by reference. The Terms and Conditions listed in the BO of Appendix G are also included by reference.

The USAF proposes to restore unoccupied scrub-jay habitat at a ratio of 2:1 (every acre lost would require compensation in the amount of two acres). The proposed areas to be restored would be located in Land Management Unit (LMU 33). A combination of mechanical treatment and prescribed burning would be used to restore habitat. In addition to the creation of habitat, CCAFS would avoid construction in scrub-jay occupied areas during the nesting season from March 1 through June 30; ensure that, prior to clearing of scrub-jay habitat, there is suitable habitat within 1200 feet; that the USFWS would be notified of any unauthorized taking of scrub-jays identified during construction; and that CCAFS would conduct routine scrub-jay monitoring and submit reports describing the actions taken to implement the terms and conditions of the “Incidental Take Statement” of the BO. Appendix G contains an overview of where both clearing and restoration activities would take place.

If a dead scrub-jay is found at the project site, it would be salvaged in accordance with proper protocols and notification would be made to the USFWS office in Jacksonville.

4.3.3.2 Southeastern Beach Mouse

Proposed Action

Direct Effect

The proposed action would involve clearing around LC-13 and east of the ditch/canal to the Atlantic Ocean beach dune area that would result in the loss of approximately 48.3 acres of vegetation. The majority of the area around and east of LC-13 is extremely overgrown and not likely to support beach mice; however, in an approximate 2000 foot long stretch of scrub near the beach dune trapping was conducted between June 8th and June 12, 2014. This resulted in the capture of 17 beach mice. A take of beach mice is expected to occur as the result of loss of habitat and the potential destruction of beach mice burrows from equipment conducting clearing activities. Based on observations made in the field during the recent limited survey, it appears that approximately less than five acres along the beach proposed for limited clearing of tall and woody plants contains habitat that support beach mice.

The proposed project may temporarily impact existing southeastern beach mouse burrows and habitat found within the project area. It is possible that as construction proceeds, they would move away from the construction site; however, the Service anticipates that “take” would occur. In accordance with Section 7 of the ESA, the USFWS prepared a response concerning the southeastern beach mouse in the BO attached in Appendix G and has issued an “Incidental Take Statement” for this Action.

Indirect Effect

It is expected there would be no indirect effects, since habitat may return over time for the southeastern beach mouse.

Mitigation Measures

Mitigation for direct impacts to the southeastern beach mouse would help lessen or compensate for impacts caused by the Proposed Action. Provided the following mitigation measures are implemented, the proposed action would not significantly impact the southeastern beach mouse population at CCAFS.

The proposed restoration of habitat for the scrub-jay is expected to be beneficial to southeastern beach mice. Based on past studies completed for CCAFS, beach mice benefit from the same land management activities being conducted for scrub-jays, and the population is expanding into inland locations. Therefore, the potential exists to create approximately 100 acres of additional habitat for beach mice. Additionally, long-term restoration of the limited cleared area near the beach dune would be over-seeded with sea oats which may restore habitat. If a dead beach mouse is found at the project site, it would be salvaged in accordance with proper protocols and notification would be made to the USFWS office in Jacksonville.

4.3.3.3 Eastern Indigo Snake

Proposed Action

Direct Effect

The Proposed Action would involve clearing in and around LC-13 and all vegetation east to the beach dune area that would result in the loss of approximately 48.3 acres of vegetation. Clearing and construction activities have the potential to result in incidental take of some individuals of eastern indigo snake from disturbance and possible mortality during project activities. A take may occur as the result of this habitat loss, although adjacent habitat is available. Eastern indigo snakes would also be vulnerable to mortality as a result of injuries sustained during activities such as vegetation clearing and grading.

The probability and level of incidental take is dependent upon the number of 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 would move away from the construction site; however, the USFWS anticipates that “take” would occur. Incidental take in the form of mortality to eastern indigo snakes would be avoided through preconstruction surveys and relocation of any individuals present within the boundaries of the work area. Prior to any land disturbance activities, a survey would be required to identify locations of gopher tortoise burrows within the project area. This survey would include a burrow count and habitat characterization and would be conducted in accordance with FWCC guidelines. Any eastern indigo snakes encountered during gopher tortoise burrow excavation would be safely relocated outside the project area. In accordance with Section 7 of the ESA, the USFWS prepared a response concerning the eastern indigo snake in the attach BO and has issued an “Incidental Take Statement” take’ for this Action.

Indirect Effect

It is expected that indirect effects could occur from increased traffic at LC-13 due to the operation of the landing pad adjacent to occupied habitat, possibly resulting in indigo snakes being struck by vehicles. Since a portion of their suitable habitat would be impacted by the Proposed Action, the indigo snakes may have to go elsewhere and cause them to cross busy roads which could result in road-kill mortality.

Mitigation Measures

Mitigation for direct and indirect impacts to the eastern indigo snake would help lessen or compensate for impacts caused by the Proposed Action. Therefore, the proposed action would not significantly impact the eastern indigo snake population at CCAFS provided the reasonable and prudent measures as listed in the BO in Appendix G and the Terms and Conditions are implemented. Generally, those mitigation measures include the following discussion.

The 45th SW Indigo Snake Protection/Education Plan would be presented to the project manager, construction manager and personnel. An educational sign would 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 would be allowed to safely leave the area on their own. Furthermore, any indigo snakes encountered during gopher tortoise burrow excavation, if required, would be safely moved out of the project area. An eastern indigo snake monitoring report would be submitted in the event that any indigo snakes are observed. If a dead indigo is found at the project site, it would be salvaged in accordance with proper protocols and notification would be made to the USFWS office in Jacksonville. Approximately 100 acres of potential scrub-jay, beach mouse and eastern indigo snake habitat at CCAFS would be restored over a five-year period. Only individuals with permits would attempt to capture the eastern indigo snakes. If an indigo snake is held in captivity, it would be released as soon as possible in release sites approved by the USFWS on the CCAFS.

4.3.3.4 Marine Turtles

Proposed Action

Direct Effect

The Proposed Action would involve clearing vegetation up to the western side of the beach dune. Although the proposed clearing and construction of new facilities would not impact the nesting beach, exterior lighting proposed for the new facilities has the potential to be visible from the beach. Disorientation of adult or hatchling sea turtles could result in an indirect take on the adjacent beach. Lighting visible from the beach can cause adult and hatchling sea turtles to move landward, rather than seaward, which increases the chances of mortality. The USFWS concurs with the 45th SW's determination that the proposed project "may affect but is not likely to adversely affect" the loggerhead, green, leatherback, hawksbill, and Kemps ridley sea turtles provided a Light Management Plan is prepared for the LC-13 area operations and is approved by the USAF and by the USFWS.

Indirect Effect

It is not expected that indirect effects would occur from the Proposed Action.

Mitigation Measures

Significant impacts to sea turtles are not expected provided mitigation measures are implemented. To prevent or minimize impacts to sea turtles from new or temporary facility lighting, all exterior lighting proposed for this project would be in accordance with the 45th SW Instruction 32-7001, *Exterior Lighting Management* dated January 25, 2008. Additionally, a Light Management Plan would be required for the new facilities. Adherence to "45th SW Instruction 32-7001, *Exterior Lighting Management*" would reduce the potential for disorientation to occur". Strict adherence to the plan would be monitored to ensure disorientation is kept to a minimum. This Plan would be approved by the USAF and by the USFWS prior to any facility construction. Clearing of vegetation at the LC-13 area would not have an impact to nesting or hatchling sea turtles; therefore, no mitigation is required for those activities.

4.3.3.5 Gopher Tortoise

Proposed Action

Direct Effect

The Proposed Action would involve clearing vegetation up to the western side of the beach dune. A tortoise survey indicated that there are over 72 burrows in the area. Although the proposed clearing and construction of new facilities would eliminate current burrows, a pre-construction tortoise trapping and burrow excavation process would be implemented. Construction activities have the potential to cause harm to gopher tortoises during such project activities as ground clearance, grading, and moving equipment. The proposed clearing would result in the loss of approximately 40 acres of potential gopher tortoise habitat.

Mitigation Measures

Significant impacts to gopher tortoises are not expected provided that minimization measures are implemented. To minimize impacts to gopher tortoises, pre-construction surveys would be conducted to locate tortoises within the project area. Tortoises found during pre-construction surveys, and trappings or burrow excavations, would be relocated to nearby viable habitat within CCAFS areas. The tortoise surveys would include a burrow count and habitat characterization and would be conducted in accordance with FWCC guidelines. A monitoring report would be submitted in the event that any gopher tortoises are relocated. If a dead gopher tortoise is found at the project site, it would be salvaged in accordance with proper protocols and notification would be made to the FWCC. Gopher tortoises would be relocated in accordance with Gopher Tortoise Relocation Permit WR04151c.

4.3.3.6 American Alligator

Proposed Action

Construction and land clearing activities near the constructed ditch / canal east of LC-13 have the potential to cause harm to the alligator. The proposed clearing would result in the potential harassment of alligators; no loss of habitat is expected.

Mitigation Measures

Mitigation measures for potential impacts on alligators are not proposed. However construction crews would be alerted to the potential of alligator presence.

4.3.3.7 Piping Plover and the Red Knot

Proposed Action

Construction activities would reduce potential piping plover and red knot habitat. The proposed clearing would result in the loss of approximately 30 acres of potential bird habitat. Noise effects would be minimal and only cause a "startle" effect.

Mitigation Measures

Loss of 30 acres of potential habitat is not considered significant impact to the birds. An additional 100 acres of habitat would be available (see Scrub-Jay discussion above).

No Action Alternative

Under the No Action Alternative, no changes to the landscape, would occur, land and vegetation clearance would not occur and the Falcon 9 first stage would not land on or near LC-13. Therefore there would be no impact to scrub-jay, southeastern beach mouse, eastern indigo snake, marine turtles, gopher tortoises, alligators, or the piping plover and red knot birds.

4.4 HISTORICAL AND CULTURAL RESOURCES

Impacts on cultural resources would be considered significant if they resulted in the disturbance or loss of value or data that qualify a site for listing in the National Register of Historic Places (NRHP); if there was substantial

disturbance or loss of data from newly discovered properties or features prior to their recordation, evaluation, and possible treatment; or if the project substantially changed the natural environment or access to it such that the practice of traditional cultural or religious activities was restricted.

Proposed Action

LC-13 is not considered a historic complex; the “new” MST was demolished in 2012 and the complex was not listed as a historical landmark. There are no identified historic properties located within the complex boundary or in the immediate vicinity. During an archeological phase I survey and historical survey accomplished by the 45th SW at the site, while the CRM found three potential sites as discussed in Section 3.4, however all three sites were determined to be ineligible for listing on the HRHP and would not be impacted as discussed in the Florida SHPO letter shown in Appendix H. Consequently, no impacts to historic or archeological resources are expected as a result of the Proposed Action.

No Action Alternative

Under the No Action Alternative clearing would not occur, the concrete pad and other support facilities would not be built, and the landing of the Falcon stage would not occur. The Falcon family of rockets would continue to be launched from LC-40 (and soon from 39A), the first stage would continue to fall into the Atlantic Ocean down range, therefore no impacts to historical or cultural resources would occur.

4.5 AIR QUALITY

This section describes the potential effects to air quality resulting from implementation of the Proposed Action, and the No Action Alternative. A significant impact on regional air quality would be defined as major short and long-term exceedance in current Federal and state air quality standards within Brevard County. This exceedance would apply to both lower and upper atmospheres.

Proposed Action

The Proposed Action includes clearing activities, construction activities, and the landing of the Falcon 9 first stage vehicle. Land clearing activities would pose a short term increase in the amount of various regulated air pollutants in the immediate area of LC-13. However, these temporary construction and land clearing related fugitive emissions increases would not be substantial enough to cause a resulting change to the National Ambient Air Quality Standards (NAAQS) attainment status. CCAFS is in an air “attainment” area; therefore no air conformity determination is required. Particulates and fugitive dust from these activities can be adequately controlled through periodic controlled water spraying and other planning activities normally performed during construction projects. Any potential air emissions associated with the planned land clearing and construction would be conducted in the same way that current activities are conducted elsewhere on CCAFS in order to protect construction workers and other station personnel. The present amount of disturbed acres contained in the current Title V Air Operating permit would not be exceeded as a result of this Proposed Action.

Temporary increases in local vehicle use and other light/heavy duty construction and land clearing related equipment would be insignificant and would not adversely impact the existing NAAQS standards for CCAFS and the surrounding area. Installation of one small propane driven electrical generator that would only operate once a month during

landing operations would not affect existing NAAQS.

Table 4-4 below lists the quantity of criteria pollutants and Hydrogen Chloride (HCl) that would be emitted into the lowest 3,000 ft of atmosphere during each launch of the five comparison launch vehicles. The criteria pollutants include volatile organic compounds (VOC), nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂), and particulate matter (PM) less than 10 microns in diameter (PM₁₀).

Emission of aluminum oxide from the Solid Rocket Motors (SRM)s is included in the PM₁₀ column. These five vehicles represent the largest emission sources from various combinations of liquid engines and SRMs on comparison vehicles. Specifically, they represent: a) LH₂/LOX engines (Delta IV-H), b) RP1/LOX engines (Atlas V Heavy), c) A-50/NTO engines (Titan II), d) LH₂/LOX engines with SRMs (Delta IV M+ (5,4), and e) RP1/LOX engines with SRMs (Atlas V 551/552). By comparison, the Falcon 9 engines would not produce sulfur dioxide and only small quantities of the other emissions. During a landing event only one of nine Merlin engines would operate.

Table 4-4: Air Emissions (tons) per Launch of Comparison Vehicles into Lowest 3,000 Feet of Atmosphere						
Vehicle	VOC	Nox	CO	SO ₂	PM ₁₀	HCl
Delta IV Heavy	0	1.6	0	0	0	0
Atlas V Heavy	0	1.2	0	0	0	0
Titan II	0	0.04	0.06	0	0	0
Delta IV Medium+	0	0.71	0.0054	0	10	5.1
Atlas V 551/552	0	1.1	0.01	0	15	7.8

Sources: USAF, 2000a & USAF, 1987

Launch Vehicle Emissions

Air emissions from launches and landings have been shown to result in emissions associated with combustion of fuel during takeoff and landing. Emissions were estimated for carbon dioxide (CO₂), CO, hydrogen (H₂), and water (H₂O). No emissions data for NO_x, VOC, and PM are available for the Merlin engine. However, the very efficient combustion conditions that occur during engine operation would tend to minimize the formation of these pollutants. Accordingly, emissions of NO_x, VOC, and PM are expected to be minimal. Atmospheric impacts from catastrophic failures would depend on the frequency of such failures. All reasonable and feasible measures would be taken by SpaceX personnel to minimize landing related failures. To minimize the risk of failures, SpaceX would fully comply with the safety requirements set forth in internal and AF regulation. Therefore, landing failures would not be expected to result in significant air quality impacts. (FAA, 2011)

The CAA does not list rocket engine combustion emissions as ODSs, and therefore rocket engine combustion emissions are not subject to limitations on production or use. While not regulated, rocket engine combustion is known to produce gases and particles that reduce stratospheric ozone concentrations locally and globally (WMO, 1991). Launch emissions are considered mobile source emissions and are not required to obtain air permits. Air permits are not required for emissions from the actual landing, as these are mobile sources and are temporary in nature, and therefore not considered to be "significant" or major emissions, neither for criteria nor HAPs pollutants. All of the types of emissions described for the Proposed Action are exempt from air permitting requirements at CCAFS pursuant to FAC Rule 62-210.300(3)(a), Categorical Exemptions, although these type emissions are required

to be estimated and would be included in the next Title V Air Emissions Inventory Update for the CCAFS facility-wide emissions estimations. These types of categorically excluded emissions units or activities are considered to produce “insignificant” emissions pursuant to FAC Rule 62-213.430(6). The liquid fuel unloading operations on CCAFS are categorically excluded from air permitting and are considered to be insignificant sources of air pollution by the FDEP.

Most CO emitted by the liquid fuel engines is oxidized to CO₂ during afterburning in the exhaust plume. Thus, CO₂, a GHG, is the primary emission from the actual landing vehicle. Other pollutants could be emitted during landing operations, including CO that is not oxidized to CO₂. Only a small proportion of the emissions associated with the Falcon RLV event would have the potential to affect ambient air quality, which is defined as the area below the mixing height, typically defined as 3,000 ft AGL. The amount of CO released by the re-landing would be between 60 and 88 percent less than a Falcon 9 launch, since only three engines would be re-lit, and only one would operate during landing. This amount is not enough to result in an exceedance of the NAAQS for CO and represents less than 0.02 percent of Brevard Counties CO emissions for 2008 (USEPA Air Emission sources). Brevard County and CCAFS is in attainment, and therefore the General Conformity Rule does not apply. In conclusion, the operational impacts from the Proposed Action on air quality would not be significant.

The GHG emissions associated with the Proposed Action is compared with estimated emissions for the Falcon 9 and then compared to U.S. 2010 GHG emissions (EPA 2012d) and the 2011 global CO₂ emissions in Table 4-5. The estimated CO₂ emissions from probable annual operations of the Falcon 9 at CCAFS are less than a millionth of 1 percent of the total GHG emissions generated by the U.S. in 2010 and less than a millionth of 1 percent of the total CO₂ emissions generated worldwide (European Commission–Joint Research Centre 2012). Therefore the emissions of GHGs from the Falcon 9 landing event would be much less than that of a Falcon 9 launch event and would not cause any appreciable addition of GHG gases into the atmosphere. At present, no methodology exists that would enable estimating the specific impacts (if any) that this increment change in GHG gases would produce locally or globally. Locally, landing a Falcon first stage using one engine would not increase yearly levels of GHG at CCAFS.

Table 4-5: Estimated Carbon Dioxide (CO ₂) Emissions Comparison	
Annual Emissions Source	Metric Tons CO ₂ e per Year
Global Total CO ₂ Emissions	3,400 x 10 ⁷
U.S. 2010 Total GHG Emissions	6,821.8x 10 ⁶
2013 CCAF GHG Emissions (Total)	72,547
12 Falcon 9 launches	4,645
12 Falcon RLV landings (approx. 11% of launch)	511
Falcon 9 GHG Percent of Global GHG	.000000114
Percent of US GHG	.000000567
Percent of CCAFS GHG	1%

The Proposed Action would therefore not have an impact on air quality or climate change.

No Action Alternative

Under the No Action Alternative clearing would not occur, the concrete pad and other support facilities would not be built, and the landing of the Falcon stage would not occur. The Falcon family of rockets would continue to be launched from LC-40 (and soon from 39A), the first stage would continue to fall into the Atlantic Ocean down range, therefore no significant impacts to air quality or climate change would occur. However there would be a slight increase in emissions for stage recovery and/or actions associated with transporting a new first stage to CCAFS.

4.6 HAZARDOUS MATERIALS/HAZARDOUS WASTE

A project may result in a significant impact regarding hazardous materials/hazardous waste if it increases the potential for adverse exposure to hazardous materials/waste or increases the likelihood of a hazardous materials release to the environment. Impacts would also be considered significant if they resulted in major noncompliance issues with applicable regulatory guidelines or increased the amounts of hazardous waste beyond available management capacities.

Proposed Action

The Falcon first stage engines use RP-1 and liquid oxygen as fuel. All hazardous materials would continue to be handled and disposed of per the requirements established by OSHA (Hazardous Materials) and per the Hazardous Materials Contingency Plan developed for the Falcon Launch Vehicle Program (USAF 2007). Approximately 2,160 pounds of RP-1 fuel would remain on-board a returning vehicle. Minimal cleaning of the vehicle would occur onsite after landing. The vehicle would be transported, shortly after landing, to another facility for processing activities including maintenance and cleaning. Since all applicable Federal, State, county, and USAF rules and regulations would continue to be followed for the proper storage, handling, and usage of hazardous materials under the Falcon Launch Vehicle Program, less than significant impacts for hazardous materials management should occur under the Proposed Action. Typically designed “launch deluge water” wastewater would not be generated by the Proposed Action, since a deluge system is not planned to be installed.

Construction activities associated with the Proposed Action may require or generate small quantities of hazardous materials or wastes. All waste generated by the construction contractor would be managed in accordance with all Federal, State, local and Installation regulations and directives. Since demolition is not included in this Proposed Action, asbestos and lead-based paint waste would not be a consideration. Management of hazardous materials would be completed in accordance with 40 CFR 260-279. The Proposed Action does not include buildings; any required equipment or cleaning material would be portable and self-contained.

The Proposed Action would therefore not have a significant impact from hazardous materials/hazardous waste management.

IRP Program

The LC-13 area within the general fence line is also known as SWMU 038 since there has been recorded site contamination and several removal actions that have taken place since the late 1970's. Soil remediation activities have taken place, groundwater contamination still exists (E3, 2013a). Appendix C contains a synopsis of the events which caused the contamination, and the current status. Appendix C also contains a copy of the current Land Use

Control Implementation Plan (LUCIP) which states that prior to any intrusive work; the USAF IRP department must be notified.

Since groundwater contamination exists at the site, any planned construction that would involve contact/digging to groundwater must be coordinated with the IRP office. Since groundwater contamination begins at approximately 18 feet bls, any planned construction is not expected to affect the existing groundwater plume. All groundwater monitoring wells around the facility would need to be either protected from damage, or be properly abandoned and replaced so that required quarterly and annual sampling may continue.

Soil in the currently vegetated areas to the east was not impacted by contamination. The consequences associated with disturbed soil in the area of the old launch pad and deluge trough are from dermal contact, incidental ingestion, or inhalation, dermal contact would only result from earth-moving activities. The risk associated with dust inhalation and incidental ingestion results from personnel movement between facilities and to/from their vehicles and facilities, as well as work conducted outside. Dust exposure could be minimized through engineering controls (dust control measures). Incidental ingestion could be reduced through dust control and the practice of proper personal decontamination procedures. Any disturbance of soil should be coordinated with the IRP office. The Proposed Action would therefore not have a significant impact on the CCAFS IRP program.

No Action Alternative

Under the No Action Alternative clearing would not occur, the concrete pad and other support facilities would not be built, and the landing of the Falcon stage would not occur. The Falcon family of rockets would continue to be launched from LC-40 (and soon from 39A), the first stage would continue to fall into the Atlantic Ocean down range, therefore no significant impacts from hazardous materials or hazardous waste management would occur.

4.7 WATER RESOURCES

A project may have a significant impact on water resources if it substantially affects the chemical, biological, and physical quality of a water body, such as an ocean, stream, lake, or bay; causes substantial flooding or exposes people to reasonably foreseeable hydrologic hazards such as flooding; substantially affects surface or groundwater quality or quantity; or exceeds the existing potable water or wastewater system capacities for CCAFS. This section describes the potential effects to surface water and groundwater, including hydrology and water quality, wetlands, and floodplains resulting from either implementation of the Proposed Action or the No Action Alternative.

Proposed Action

The Proposed Action includes vegetation clearing and construction activities and would not be expected to impact water resources around LC-13 or CCAFS. Under the Proposed Action, a typical deluge water system would not be used, therefore there would not be no wastewater generated by the landing of a Falcon vehicle. A stormwater management system would be required for the impervious surface construction at the landing site. The design would be developed and an Environmental Resource Permit (ERP) would be reviewed and approved by the SJRWMD. Any stormwater run-off during construction would be managed according to a Stormwater Pollution Prevention Plan (SWPPP) approved by the SJRWMD. Potential impact to surface waters of the Banana River Lagoon or the

Atlantic Ocean of a failed landing from spilled fuel, if not consumed by combustion, would be relatively minor and would be much less than a similar event from fully fueled vehicles during normal launches.

Potable water would be supplied by the existing water distribution systems at CCAFS and would have a negligible impact on system capacity or surface and groundwater resources. Portable “port-o-potties” would be placed on site during landing operations. Any other waste water would be processed through the existing wastewater collection and treatment systems at CCAFS and would have a negligible impact on system capacity and would not impact surface or groundwater resources. There would be no impact to local and regional water demand would since there would be no substantial increase in use of the potable water supply.

Wetlands and 100-year Floodplain

Proposed Action

Wetlands have been surveyed and delineated generally south of the project site; construction or land management activities would avoid wetland areas. Additionally, a designated 25 foot buffer zone has been designed and delineated in place, as required by the SJRWMD, to ensure separation of construction and operations activities from the wetlands. This buffer would be in place to protect the wetland from potential direct or secondary impacts. Land clearing and construction activities east of the existing LC-13 facility would occur in a 100-year flood plain.

Because SpaceX's activities are subject to receiving a license from the FAA, whether the project would be a significant floodplain encroachment per DOT Order 5650.2 was assessed by considering each of the three scenarios listed in Section 3.7:

1. The action would have a considerable probability of loss of human life.

Construction of the proposed landing site would not result in considerable probability of loss of human life. No part of LC-13 would be designed or constructed for human habitation or as a human dwelling. The proposed landing site would not prohibit people from entering or exiting the area should a flood event occur.

2. The action would likely have substantial, encroachment-associated costs or damage, including interrupting aircraft service or loss of a vital transportation facility (e.g., flooding of a runway or taxiway, important navigational aid out of service due to flooding, etc.).

The proposed landing site would be constructed within a large contiguous floodplain that spans the coast of Florida. Construction would result clearing approximately 50 acres of vegetation within the floodplain. This is a small area compared to amount of floodplain in the vicinity of CCAFS. The Proposed Action would not result in new areas being subject to 100-year floods, nor would it result in existing areas subject to 100-year floods becoming more prone to floods.

3. The action would cause a notable adverse impact on natural and beneficial floodplain values.

Based on the analysis in Section 4.3 (Biological Resources), the FAA has determined that construction activities (namely clear cutting and grubbing of vegetation) would result in notable adverse impacts to one of the natural and beneficial floodplain values identified in DOT Order 5650.2: wildlife (including Federally threatened or endangered species).

Based on the expected adverse impacts on one of the natural and beneficial floodplain values (i.e., wildlife), the FAA has determined the Proposed Action would result in a floodplain encroachment per DOT Order 5650.2. The USAF formally consulted with the USFWS per Section 7 of the Endangered Species Act to minimize potential impacts on Federally protected species. No significant impacts on water resources (including floodplains) are expected. It should be noted for comparison, the 100-year floodplain is also located within the boundary of the following LC's: LC-11, 12, 14, 36A, 36B, and most of LC-46, as discussed in the reactivation and reuse EA (USAF 2005). The required site plan affords no other practicable alternative that would meet the requirements of the project.

Mitigation Measures

Significant impacts to the floodplain are not expected. Stormwater management systems would mitigate flooding potential due to constructed impervious surfaces (landing pads).

No Action Alternative

Under the No Action Alternative clearing would not occur, the concrete pad and other support facilities would not be built, and the landing of the Falcon stage would not occur. The Falcon family of rockets would continue to be launched from LC-40 (and soon from 39A), the first stage would continue to fall into the Atlantic Ocean down range, therefore negligible impacts to water resources would occur.

4.8 GEOLOGY AND SOILS

A project may result in a significant geologic impact if it increases the likelihood of, or results in exposure to, foundation instability, land subsidence, or other severe geologic hazards. It may also be considered a significant geologic impact if it results in the loss of the use of soil for agriculture or habitat, loss of aesthetic value from a unique landform, loss of mineral resources, or causes severe erosion or sedimentation.

Proposed Action

No unique geologic features of exceptional interest or mineral resources occur in the project area. Soil in the currently vegetated areas to the east was not impacted by contamination (please refer to IRP Program discussion in Sec 4.6. Prior to and during construction, erosion and sediment control measures such as siltation fences (Best Management Practices) are required to retain sediment on-site and to prevent violations of state water quality standards. There are no unique geologic features in the project area. The Proposed Action would therefore not have a significant impact on geology and soils at LC-13.

No Action Alternative

Under the No Action Alternative clearing would not occur, the concrete pad and other support facilities would not be built, and the landing of the Falcon stage would not occur. The Falcon family of rockets would continue to be launched from LC-40 (and soon from 39A), the first stage would continue to fall into the Atlantic Ocean down range,

therefore no impacts to geology and soils would occur.

4.9 TRANSPORTATION

This section discusses the projected traffic conditions along roadways which may be affected by the construction at LC-13 and the landing operations of a Falcon first stage vehicle. A project would have a significant impact on transportation if it caused an exceedance of the capacity of roadways or impact structural sections of roadways.

Proposed Action

Minor short-term interruptions to traffic flow or utilities may occur during clearing and construction activities. Since landing operations would occur approximately 12 times a year, on-base traffic near LC-13 would not change appreciably. While difficult to calculate, there may be a slight positive impact on traffic since the re-landed vehicle would be transported to a local SpaceX facility, rather than transporting a new Falcon first stage vehicle from Texas to CCAFS. Recovery vessels would also not be required to transit the Port of Canaveral area to retrieve the first stage from the ocean.

Overall launch viewing traffic per year has declined significantly since the Shuttle program was terminated in 2011. Traffic volume has increased for a Falcon launch but has been less than that of a Shuttle launch. There may be a slight increase in viewing traffic for the landing since it would be a novelty. Any increased visitation would cause less than a significant impact on CCAFS and local traffic patterns. The Proposed Action at LC-13 would therefore not have a significant impact on transportation.

No Action Alternative

Under the No Action Alternative clearing would not occur, the concrete pad and other support facilities would not be built, and the landing of the Falcon stage would not occur. The Falcon family of rockets would continue to be launched from LC-40 (and soon from 39A) and the first stage would continue to fall into the Atlantic Ocean down range. Recovery vessels would continue to transit the Port of Canaveral canal. As a new first stage would need to be transported from Texas to CCAFS, a negligible negative impact on transportation would occur as a result of the implementation of the No Action Alternative.

4.10 UTILITIES

This section describes the potential effects to the water supply system, the solid waste management aspect, and the electrical supply system by implementing the Proposed Action or the No Action Alternative. The action may have a significant impact on these resources if it substantially affects capacity of the systems to maintain existing services.

Proposed Action

There would be no utility requirement for the clearing and construction phase. Landing operations would require a minimum amount of potable water, sewer, and electrical power.

Water Supply

Current potable and non-potable water supply which could be available to LC-13 was originally designed to support Atlas launches. Since the Proposed Action would include landing a RLV, typical launch deluge water would not be used. The Proposed Action does not include building any habitable structures at the facility. The Proposed Action's reliance on the water supply would be relatively small; a pressurized 12,000 gallon tanks would be filled via the fire-main system and used to supply water cannon nozzles in the event of a fire. The Proposed Action would therefore not have a significant impact on CCAFS's water supply.

Solid Waste Management

Impacts on solid waste would be considered significant if they resulted in noncompliance with applicable regulatory guidelines or increased the amount of waste beyond available management capacities. Operation of the EELV Program was anticipated to generate approximately 0.3 ton of solid waste per day (USAF 1998). The Proposed Action is expected to generate much less solid waste than the EELV Program and less than a launch of the Falcon 9 vehicle. Examples of solid waste may include cardboard packaging, wood, rag material, plastic and aluminum bottles and cans. The Proposed Action at LC-13 would therefore not have a significant impact on CCAF's solid waste management. Current plans are to conduct approximately one landing per month, therefore the Proposed Action would generate less than significant impacts on solid waste.

Electrical Power

The electrical power capabilities for operation at LC-13 were designed to support the Atlas launch program. If needed, electrical demand for construction activities would be satisfied by a small propane driven electrical generator. Electrical needs during a landing event would be minimal and would include lights, small pumps, communications equipment and site cameras. Therefore the Proposed Action would not have a significant impact on electrical power demand or supply.

No Action Alternative

Under the No Action Alternative clearing would not occur, the concrete pad and other support facilities would not be built, and the landing of the Falcon stage would not occur. The Falcon family of rockets would continue to be launched from LC-40 (and soon from 39A), the first stage would continue to fall into the Atlantic Ocean down range and no impacts to water supply, solid waste management, or electrical power would occur.

4.11 HEALTH AND SAFETY

An impact would be considered significant if it created a devastating public health hazard or involved the use, production, or disposal of materials that pose a substantial hazard to the population of the affected area.

Proposed Action

Clearing and Construction

Safety hazards are inherently associated with heavy equipment operation and construction activities. All appropriate regulations, including OSHA Regulation 29 CFR 1926, *Safety and Health Regulations for Construction*, and local

USAF health and safety regulations would be followed and SpaceX procedures would be followed during project activities to minimize potential minor impacts. Clearing and construction activities would therefore not have a significant impact on health and safety. SpaceX would have an on-site safety manager who would ensure safety meetings are held and proper safety procedures are followed.

Landing Operations

CCAFS range safety regulations ensure that the general public, launch area personnel, and affected land area are provided an acceptable level of safety, and that all aspects of pre-launch and launch operations adhere to public laws (USAF 2013). The Range Safety organizations at CCAFS have used models to predict launch hazards to the public and on-site personnel prior to every launch. These models calculate the risk of injury resulting from toxic gases, debris, and blast overpressure both from nominal launches and launch failures. Launches are postponed if predicted risk of injury exceeds acceptable limits. The allowable collective public risk limit in use at CCAFS is extremely low (30×10^{-6}). Range safety organizations review, approve, monitor, and impose safety holds, when necessary, on all pre-launch and launch operations.

A landing event at LC-13 would follow a nominal launch from either LC-40 or Pad 39A. The operation and management of the landing would be managed similar to other vehicle launches; however, the returning first stage vehicle would contain substantially less propellant (RP-1 and LOX) than when it was launched. Expected thrust energies would only be approximately 11 percent of a launch vehicle since only one engine would be firing. The RLV would not contain any second stage material or propellant or payload; clear areas and stand-off distances at sea and at CCAFS would be developed in conjunction with Range Safety and adhered to; any anomalies in a the landing event plan would cause a destruct signal to the vehicle to occur over the ocean. Additionally, as part of the FAA license application review process, the FAA would conduct a safety review of operations.

Payload processing equipment and procedures would not be required. However some remaining ordnance items and propellants would require an Explosive Quantity-Distance Site Plan. Hazardous materials such as propellant, ordnance, or chemicals would be transported back to a processing facility at CCAFS in accordance with DOT regulations for transport of hazardous substances (Title 49 CFR 100- 199). Hazardous materials such as liquid rocket propellant are transported in specially designed containers to reduce the potential of a mishap should an accident occur. Injuries would not be anticipated if facility personnel follow standard operating and emergency procedures. Therefore landing events would not result in a significant impact to health and safety.

No Action Alternative

Under the No Action Alternative clearing would not occur, the concrete pad and other support facilities would not be built, and the landing of the Falcon stage would not occur. The Falcon family of rockets would continue to be launched from LC-40 (and soon from 39A), the first stage would continue to fall into the Atlantic Ocean down range and no health and safety impacts would occur (USAF 2007).

4.12 SOCIOECONOMICS

Socioeconomic impacts would be considered significant if they substantially altered the location and distribution of

the local population, caused the population to exceed historic growth rates, decreased jobs so as to substantially raise the regional unemployment rates or reduce income generation, substantially affected the local housing market and vacancy rates, or resulted in the need for new social services and support facilities.

Proposed Action

During a short but intense period for clearing and construction activities at LC-13, SpaceX would use their current workforce, but would also bring onboard up to 50 additional temporary workers and other local consultants. The addition of these workers at CCAFS does not represent a significant increase in the population or growth rate of the region which was 543,376 people recorded during the 2010 census. During landing operational periods and long-term operations, SpaceX would continue to use their current internal work force. The Proposed Action would not significantly affect the local housing market and would not negatively affect the local economy. Therefore, the Proposed Action would generate no negative socioeconomic impacts on the region and may generate a negligible positive impact due to increased jobs and tourism.

No Action Alternative

Under the No Action Alternative clearing would not occur, the concrete pad and other support facilities would not be built, and the landing of the Falcon stage would not occur. The Falcon family of rockets would continue to be launched from LC-40 (and soon from 39A) and the first stage would continue to fall into the Atlantic Ocean down range. A negligible negative impact on socioeconomics would occur as a result of the implementation of the No Action Alternative since jobs would not be created during the construction period and sightseers would not travel to the region to watch the landing events.

4.13 ENVIRONMENTAL JUSTICE

A significant impact to environmental justice would occur if:

- There was a significant adverse impact to the natural or physical environment or to health that affected a minority or low -income population or children;
- There was a significant adverse environmental impact on minority or low-income populations or children that appreciably exceeded those on the general population or other comparison group;
- The risk or rate of environmental hazard exposure by a minority or low-income population was significant and exceeded those by the general population or other comparison group; or
- A health or environmental effect occurred in a minority or low-income population affected by cumulative or multiple adverse exposures from environmental hazards.

Proposed Action

The landing of the Falcon first stage at LC-13 would occur within the boundaries of CCAFS and over the Atlantic Ocean similar to current operations of existing launch vehicles. While minority or low income groups exist in areas of Brevard County, environmental impacts generated by the Proposed Action would not disproportionately affect any particular population group, including minority or low-income populations (USAF 2013).

No Action Alternative

Under the No Action Alternative clearing would not occur, the concrete pad and other support facilities would not be built, and the landing of the Falcon stage would not occur. The Falcon family of rockets would continue to be launched from LC-40 (and soon from 39A) and the first stage would continue to fall into the Atlantic Ocean down range.

4.14 SECTION 4(f) PROPERTIES

Section 4(f) impacts would be considered significant if the action occurred on, or caused any required use of publicly owned land such as a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance or land from an historic site of national, State, or land of local significance as determined by the officials having jurisdiction. The action would have to be for a significant period of time and/or cause harm to that public land.

Proposed Action

There are no Section 4(f) properties located within the boundaries of CCAFS. Therefore, there would be no physical use of a Section 4(f) property via permanent use of land, and there would be no temporary occupancy of a Section 4(f) property. When there is no physical use and no temporary occupancy, but there is the possibility of constructive use, the FAA must determine if the impacts would substantially impair¹ the 4(f) property. Section 4(f) properties located within approximately a 15 miles radius of LC-13 include Merritt Island National Wildlife Refuge, Cape Canaveral National Seashore, Jetty Park, Kelly Park, Kars Park, Kings Park, and Manatee Cove Park. Additionally, the St. John's National Wildlife Refuge and Tosohatchee State Game Preserve are located west of the launch site. Noise levels at these 4(f) properties may increase slightly and temporarily during the landing of the Falcon first stage but, it would only last a few seconds and would only be planned to occur approximately once per month.

For decades, the 4(f) properties have been experiencing increased noise levels during launches taking place at CCAFS and adjacent KSC, and sonic boom noises during shuttle landings. Due to the long history of these 4(f) properties experiencing noise from launches at CCAFS and KSC, and because there is only one planned landing per month, the FAA has determined the Proposed Action would not substantially diminish the protected activities, features, or attributes of any of the Section 4(f) properties identified, and thus would not result in substantial impairment of the properties.

No Action Alternative

Under the No Action Alternative clearing would not occur, the concrete pad and other support facilities would not be built, and the landing of the Falcon stage would not occur. The Falcon family of rockets would continue to be launched from LC-40 (and soon from 39A) and the first stage would continue to fall into the Atlantic Ocean down range; therefore, no Section 4(f) property impacts would occur.

4.15 SECONDARY OR INDUCED IMPACTS

CEQ Regulations require agencies to evaluate indirect effects, including “growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and

water and other natural systems” (40 CFR §1508.8). FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures, Change 1*, requires the FAA to identify any induced impacts to surrounding communities which may result from a Proposed Action. Secondary or induced impacts are those impacts that are caused by the Proposed Action but occur later in time and/or farther removed in distance, but are foreseeable. Types of potential secondary or induced impacts include, but are not limited to:

- Increased public service demands
- Changes in regional land use
- Changes to the regional economy
- Induced growth
- Shifts in population movement

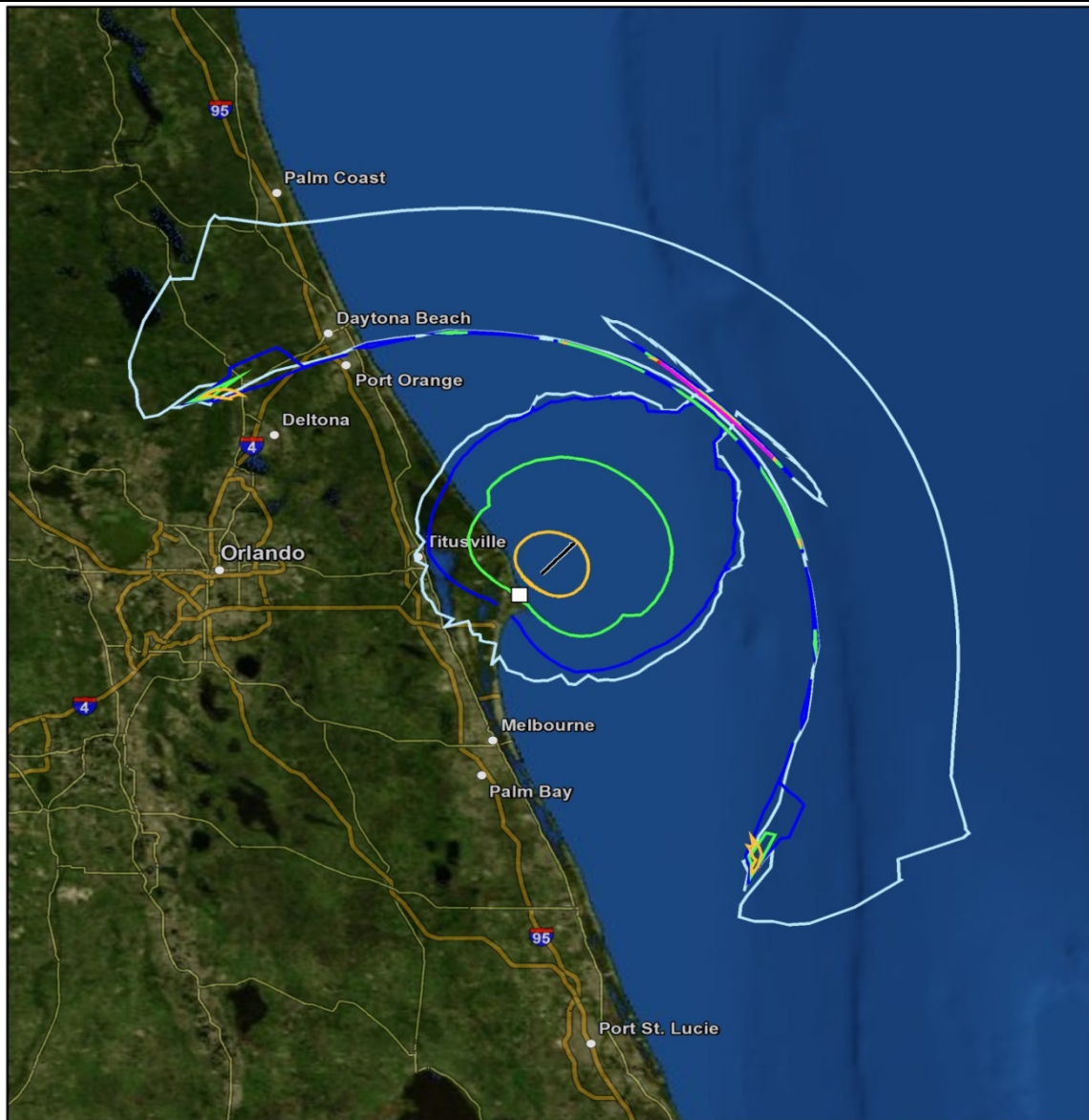
Proposed Action

Under the Proposed Action, local and regional construction contractors would be hired for the planned short-term construction activities. Additionally, construction materials, primarily clean fill, concrete, and limited hardware would be purchased within the region and would only contribute to a temporary, short-term beneficial impact to the economy. Construction activities are not anticipated to induce growth within the area or result in shifts in population or result in increases in public service demand. Therefore, there would be no significant secondary impacts to public services or to the economy.

The operation of LC-13 as a landing pad is not expected to induce significant population growth in the area or result in shifts in population. The operation of LC-13 would result in temporary impacts to the local and regional economy during launch campaign periods due to temporary increases in transient employees and visitors. The proposed landing operations would be expected to attract tourists who travel to the area specifically to view a landing event. Spending by tourists would generate revenue for local businesses, particularly in the hospitality industry resulting in a small beneficial impact on the local economy. Therefore, the Proposed Action would not result in significant impacts as a result of secondary or induced impacts.

No Action Alternative

Under the No Action Alternative construction of facilities and landing operations at LC-13 would not take place. No significant secondary or induced impacts would therefore occur.



LANDING VEHICLE MODELED SONIC BOOM CONTOUR



LAUNCH COMPLEX 13
CAPE CANAVERAL AIR FORCE
STATION

Figure 4-1

5.0 CUMULATIVE IMPACTS

According to 40 CFR § 1508.7, cumulative impacts are defined as “...the incremental impact of the actions when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions.” Within the realm of space vehicle operations, this EA addresses only the landing of RLVs. Cumulative impacts include impacts from space vehicle operations at CCAFS and other past, present, and reasonably foreseeable future activities that could affect the resources impacted by the Proposed Action. Reasonably foreseeable future activities include construction projects occurring at CCAFS and surrounding areas that would meaningfully interact in time and space with the Proposed Action such that potential cumulative impacts could result.

5.1 REASONABLY FORESEEABLE FUTURE ACTIONS

Current and future actions include vehicle launches, RLV landings and substantial land clearing and construction. Documents that were reviewed for reasonably foreseeable actions at CCAFS and KSC include:

- NASA Final Environmental Assessment for Suborbital Processing, Launch, and Recovery Operations, August 24, 2012
- Final Environmental Assessment for Multi-Use of Launch Complexes 39A and 39B, John F. Kennedy Space Center, FL, June 25, 2013
- FAA Aerospace Forecast Fiscal Years 2011–2031, 2013
- FAA Final Supplemental Environmental Assessment to the September 2008 Environmental Assessment for Space Florida Launch Site Operator License, July 2010
- FAA Draft Environmental Impact Statement (in development) for the Shiloh Commercial Launch Complex
- Space Florida Cape Canaveral Spaceport (CCS) Complex Master Plan 2013
- KSC Master Plan, 2012-2032
- CCAFS General Plan (Limited 1-page summary since it is not yet releasable)
- Port of Canaveral “State of the Port” 2014

Generally, each of the documents listed above promotes future space related operations success by emphasizing reuse or modernization of existing facilities at CCAFS and KSC, rather than significant development and construction of new facilities. The following paragraphs briefly discuss general future plans.

5.1.1 CCAFS Future Actions

A new CCAFS General Plan is currently being developed. The summary states that future development would be guided by sustainability. To accomplish this, 50-year Long Term Development Plans (LTDPs) were created for each installation. The LTDPs are the 45 SW’s vision for future development. They provide land use options that support the mission of the Wing, its partners and future government and commercial space operations. The LTDPs are rooted in the 45 SW’s Strategic Plans and illustrate how increases in launch tempo and associated support activities

can occur sustainably, and compatible with the efficient use of land and energy, the conservation of natural resources and the safe operation of launch vehicles and processing facilities. Future facilities and launch complexes would be developed as to minimize any potential impact or compatibility with current facilities and the environment.

The short-term forecast for CCAFS and KSC launches during the next several years are shown below in Table 5-1.

TABLE 5-1 Future planned Vehicle Launches at KSC and CCAFS					
Year	Launch Vehicles (number of Launches)				TOTAL
	Falcon 9 (LC-40)	Falcon Heavy (Pad 39A KSC)	Atlas V	Delta IV	
2014	2		1	1	4
2015	9	2	3	2	16
2016	3				3
2017		1			1
2018	1				1
Total Launches	22	3	4	3	33

Source: SpaceX and www.spacelaunch.com

As reflected in Table 5-1, SpaceX also intends to launch their Falcon Heavy Rocket from KSC's Pad 39A, a former Shuttle launch complex. The Falcon Heavy, the world's most powerful rocket, represents SpaceX's entry into the heavy lift launch vehicle category. The vehicle would provide SpaceX with the ability to carry satellites or interplanetary spacecraft weighing over 53 metric tons to Low Earth Orbit (LEO). Two flights of the Falcon Heavy are planned for 2015. While current data and active scheduled missions are relatively low, the projected annual launch rate from CCAFS for the Atlas launch family ranges from 11 to 13, and the projected annual launch rate from CCAFS for the Delta launch family ranges from 11 to 13 as well from 2014 to 2020. The Delta II is launched from Space LC-17 (pads A and B) at CCAFS (*Environmental Assessment for Space Florida Launch Site Operator License at Launch Complex-46*)

5.1.1 Shiloh Launch Complex

Space Florida proposes to develop a non-Federal launch site that is State-controlled and State-managed. Space Florida's goal is to provide launch site options other than Federal installations/ranges. Under the Proposed Action, Space Florida would construct and operate a commercial space launch site (known as the Shiloh Launch Complex) consisting of two vertical launch facilities and two off-site operations support areas. This facility is located immediately north of KSC property, includes approximately 150 acres and straddles the Volusia County and Brevard County boarder. The Shiloh Launch Complex would accommodate up to 24 launches per year (12 launches per vertical launch facility), as well as up to 24 static fire engine tests or wet dress rehearsals per year (12 static fire engine tests or wet dress rehearsals per vertical launch facility). The vehicles to be launched include liquid fueled, medium- to heavy-lift class orbital and suborbital vertical launch vehicles. The FAA is the lead Federal agency for preparing an Environmental Impact Statement (EIS) in accordance with the NEPA. The U.S. Army Corps of Engineers, the NASA, U.S. Fish and Wildlife Service, National Park Service, and the Florida Department of State, Division of Historical Resources, State Historic Preservation Office are cooperating agencies. The FAA published a Notice of Intent (NOI) on December 26, 2013, held scoping meetings in the local area on February 11th and 12, 2014. A summary of those meetings were published in 2014. A draft of the EIS is not yet available.

5.1.2 KSC Redevelopment Plans

Based upon the *Final Environmental Assessment for Suborbital Processing, Launch, and Recovery Operations*; August 24, 2012 the following Proposed Actions are in planning for the KSC area. First to increased flight operations at the Shuttle Landing Facility (SLF), second to include horizontal take-off (launch) and landing (HTOL) of suborbital rocket powered vehicles from the SLF, and third to development a site to process, launch, and land Vertical Take-off and Landing (VTOL) vehicles conducting suborbital flights.

Increased flight operations at the SLF would involve construction of new facilities at the south-field and mid-field sites and increased flight operations at the SLF in the following broad categories: commercial spaceflight program and mission support aviation, aviation test operations including unpiloted aerial vehicles (UAV), airborne research and technology development and demonstration, parabolic flight missions, testing and evaluation of experimental spacecraft, ground based research and training, and development and demonstration of future supersonic passenger flight vehicles. To take full advantage of the capabilities of the SLF, new construction would occur at both the south-field and mid-field sites.

The HTOL of suborbital rocket powered vehicles is proposed to occur at a single location, the SLF. The HTOL site would support medium thrust rockets. The HTOL vehicles would take off horizontally using rocket powered engines of no greater than 26,689 Newtons (N) (6,000 pounds-force [lbs-f]) of thrust, and would use a steep ascent trajectory. Multiple users with their own vehicles could be utilizing the site for these operations. The VTOL site would support reusable vehicles in the small to medium classes with thrusts of up to 13,345 N (3,000 lb-f). Such vehicles could fly up to 105km (65 mi) in altitude, return to launch site, and land in a powered mode. Their rocket engines would be processed and the vehicle would either be prepared for another flight or removed from the launch area. The site improvements for this proposed facility would include a launch and landing concrete pad, two surface systems regolith test beds, parking areas for trucks, fuel tankers, trailers and cars, power hook-ups, LOX loading area, LOX tanker truck parking, and a GHe loading/unloading area. The VTOL is anticipated to be a multi-user facility supporting the integration and launch of two or more vehicle systems using a single launch pad. It is anticipated that the combined average annual launch rate would exceed 100 launches per year. The VTOL site location would be selected from one of three alternatives. After the Space Shuttle Program ended in 2011, activity level and operations at the SLF greatly decreased. Many facilities, including those addressed in this EA, would either be maintained at a reduced level, maintained in long-term storage mode, or disassembled.

5.1.3 KSC Pad 39A, 39B Redevelopment

This document was reviewed for future planned development and because it addresses the future use of LC-39A for the SpaceX Falcon Heavy launch vehicle. Based upon the *Final Environmental Assessment for Multi-Use of Launch Complexes 39A and 39B, John F. Kennedy Space Center, FL, June 25, 2013*, the Proposed Action includes the following. First to construction of a Horizontal Integration Facility (HIF) at one or more of five potential locations, Second, to provide RP-1 Storage at individual locations or at a common location, and third to allow multiple user launch capabilities at LC 39A and LC 39B. Flight operations at LC 39A and LC 39B by multiple users would require construction of new RP-1 storage and transfer facilities. Options for these facilities include either individual storage locations at each launch pad or at a centrally located common storage facility. Delivery of RP-1 by railcar is being considered and, therefore, railroad connections to chosen storage location(s) would be necessary to provide a mode of transport for incoming fuel supplies. These railroad connections would be constructed within existing roadways. A

HIF is proposed to provide housing for launch vehicle preparation prior to launch. Five location options for the HIF were reviewed. Launch vehicles include Atlas V, Delta IV, Delta IV Heavy, Liberty, Falcon 9, Falcon Heavy, Antares, RSLV-S, Athena IIc, Xaero and the SLS. The potential for up to two launches per month by NASA and/or commercial users would provide the ability to continue space exploration.

The construction of new facilities and associated infrastructure, modifications of existing facilities and infrastructure, and proposed launch procedures and activities would be consistent with existing KSC activities and pose no new types of impacts. The maximum number of launches would be no more than two per month in any combination of users for the Proposed Action. Additional current actions at KSC include the Ground Systems Development and Operations (GSDO) leading the center's transformation from a historically government-only launch complex to a spaceport with activity involving government and commercial vehicles alike. The program's primary objective is to prepare the center to process and launch the next-generation vehicles and spacecraft designed to achieve NASA's goals for space exploration. To achieve this transformation, program personnel are developing the necessary ground systems while refurbishing and upgrading infrastructure and facilities to meet tomorrow's demands. This modernization effort keeps flexibility in mind, in order to accommodate a multitude of government, commercial and other customers. KSC future actions include the launch of suborbital vehicles from the SLF and LC 39A locations. This would expand KSC's spaceport capabilities to include the processing, launch, and recovery of horizontally and vertically launched suborbital rocket powered vehicles. The Finding of No Significant Impact (FONSI) for this action was published in December 2012.

5.1.4 Cape Canaveral Spaceport

Based upon Space Florida's *Cape Canaveral Spaceport Complex Master Plan* developed in 2013, the following paragraphs describe plans for future activities. The Cape Canaveral Spaceport (CCS) primarily consists of Kennedy Space Center (KSC) and the Cape Canaveral Air Force Station (CCAFS), as geographically defined by section 331.304 of the Florida Statutes. Section 331.360(3) of the Florida Statutes requires Space Florida to "develop a spaceport master plan for the expansion and modernization of space transportation facilities within spaceport territories "to meet current and future commercial, national, and state space transportation requirements." The Master Plan provides information and analysis to guide Space Florida in its efforts to face the market, grow the space industry, and attract commercial space, technology, and life science related businesses through expansion and modernization of facilities infrastructure at the CCS. During the past 10 years, Florida has invested over \$500 million in financing and infrastructure at the CCS in support of commercial, national and state space transportation requirements. Those funds, in part provided efforts for a FAA Launch Site Operator License for LC-46. This would allow Space Florida to offer the site for launches of solid- and liquid-propellant launch vehicles to launch operators for several types of vertical launch vehicles, including 139 Athena-1 and Athena-2, Minotaur, Taurus, Falcon 1, Alliant Techsystems small launch vehicles and launches of Minuteman-derivative booster vehicles. Space Florida proposes to support a maximum of 24 annual launches from LC-46, including 12 solid propellant launches and 12 liquid propellant launches. The proposed launch vehicles and their payloads would be launched into low earth orbit or geostationary orbit. All vehicles are expected to carry payloads, including satellites (FAA, 2008). Much of the future plans involve re-development and re-use of legacy facilities at both KSC and CCAFS. Space Florida is also discussing adding a rail component to the transportation plans, which parallels current efforts by the Port of Canaveral for a connecting rail line.

5.1.5 Port of Canaveral

The Port is located on the coastal barrier island along the East Coast of Central Florida and abuts the Atlantic Ocean on the east, the City of Cape Canaveral on the south, the Banana River on the west, and Cape Canaveral Air Force Station on the north. It is composed of two sections – the Harbor and the Barge Canal. The Canaveral Harbor is a man-made, deepwater Port located on the barrier island north of the City of Cape Canaveral. The Port also controls the land on Merritt Island known as the Barge Canal, which includes the man-made canal connecting the Indian and Banana Rivers and State Road 528 also known as the Beachline. The Port's authority for Master Plan is provided for in the Port's Charter and by Florida Statute, which requires each deepwater Port in Florida to have a master plan. In addition, state law requires each deepwater Port that has spoil disposal responsibility to provide for or identify disposal sites for dredged materials in the future land use to ensure proper long-term management of dredged materials. The Port has played a major role in addressing the regional transportation needs. In addition to the maritime transportation facilities of the Port, SR 528, also known as the Beachline, is constructed on property made available by the Port. The Port also constructed a flyover on SR 401 to improve traffic flow among cruise terminal, Port, and Canaveral Air Force Station traffic. The Port has conducted regular traffic analysis to ensure the free flow of traffic within the Port. As a result of these studies, the Port has widened a portion of George King Boulevard and has plans to widen the remainder of the road in the future. The Port is working with the Cities of Cocoa Beach and Cape Canaveral to develop an aquifer storage and recovery system to temporarily store reclaimed water to be used for irrigation purposes. The Port is also designing a pump out system for waste from gaming ships to address the dumping of such wastes off-shore. The Port has also implemented a comprehensive program of environmental protection including manatees, sea turtles, right whales, dunes, and addressing beach erosion. A summary of the Port's future development plans includes but is not limited to the following areas.

- Complete Cruise Terminal #1 this November
- New 10 Year Royal Caribbean Contract with two 5-year Options – *Explorer of the Seas*
- New 3-year NCL contract – Home Port Ship Fall 2015
- New Carnival Ships – *Sunshine* – *Liberty*
- 3 Disney Home Port Ships; adding – *Magic Spring* - *Wonder Fall*
- Add Holland America – *Celebrity* – *Princess* – *Cunard* – *Regent*
- Develop new Cruise Terminal #3
- Develop Backup areas of 20 acres for container areas and an expanded 35 acres for autos and other commodities
- Morton Salt signed a 10-year lease expansion including 2 added acres and expanded plant, facilities and warehouse
- Increase current 17,000+ jobs to 50,000
- Connecting via Rail to Inland Ports, include rail line via NASA property
- Beeline (528) Widening-8 lanes Orlando to I-95, 6 lanes to the Port
- Cruise will grow from 4 million to 5 million passenger movements in 2016 and to 6 million by 2018
- Cargo growth will triple to over 12 million tons in the next 3 years

Much of this growth is connected to federal agencies and will require EAs or EIS NEPA documentation; the Port has a proven record of good environmental management.

5.2 CUMULATIVE IMPACT ANALYSIS ON RESOURCE AREAS

The following resource areas briefly discuss the cumulative impacts associated with landing interacting with relevant past, present, and reasonably foreseeable future actions. As described in the Section 4.0, no direct impacts were identified for historical and cultural resources, geology and soils, health and safety, environmental justice, 4(f) properties, or secondary impacts. When considered with other past, present, and foreseeable future actions, the Proposed Action would therefore not contribute to any cumulative impacts associated with these resource categories and are therefore not considered further in this analysis.

The actions listed in Table 5.1 as well as other projects described above, considered in conjunction with the Proposed Action, formed the basis for the cumulative impacts analysis. This section analyzes the interaction of the Proposed Action with the actions described in the section preface and evaluates the potential cumulative impacts from these interactions. With the exception of land use, air quality, noise, socioeconomics, and transportation the ROI for each resource area discussed below is limited to CCAFS and KSC. The ROIs for land use, air quality, noise, socioeconomics, and transportation extend beyond CCAFS and KSC and are consistent with the ROIs presented in past EA for LC-13 reuse (USAF 2005), SpaceX used of LC-14 (USAF 2007) and the Falcon 9 v1.1 operations at LC-40 (USAF 2013).

Land Use/Visual Resources

The Proposed Action would not result in any significant impacts to land use compatibility since CCAFS and KSC currently allow space vehicle operations; use of CX13 for the landing operation does not limit use of surrounding launch complexes even if there would be minor operational constraints during launches. Furthermore, the Proposed Action would not generate impacts on visual resources within the flight range other than a possible short-lived visible vehicle contrail.

Cumulative impacts on land use from increased launch vehicle and landing operations at KSC and CCAFS would be minimal. These impacts would be a result of increased quantities and types of commodities used and stored at the KSC's shuttle landing facility or other existing facilities, as well as potential additional land use category designations. New safety setbacks may also be established as necessary, but these would be determined during the individual projects' licensing process with the FAA. Development of the Vertical Take Off and Landing (VTOL) site at KSC is expected to have a moderate effect on land use due to the undisturbed/undeveloped nature of the area. Currently, the land at KSC is set aside primarily for conservation, being managed by the Merritt Island Natural Wildlife Refuge (MINWR) for wildlife and habitat diversity. However, relatively few natural areas on KSC are being converted to operational use. Mitigation for impacts to these sites could be accomplished through habitat restoration in other degraded areas of KSC, which similar to CCAFS, has ongoing efforts installation-wide to improve habitat for managed species. Additionally, since the Proposed Action at LC-13 is being constructed on developed land and in natural habitat that will be mitigated, the overall cumulative impact to natural areas is negligible to minor. As a result, the overall cumulative effect of other past, present, and reasonably foreseeable future actions on land use and visual resources is considered negligible and less than significant. When considered with other past, present, and

foreseeable future actions, it is not anticipated that the Proposed Action would contribute a noticeable incremental impact to the overall negligible and less than significant effect on land use and visual resources.

Noise

A short-term, small increase in the noise level received in the community from the proposed landing of the Falcon vehicle may occur; the event would be within 10 or 15 minutes of a launch and would therefore be a relatively short-term impact. Sonic booms may occur but the focused over pressure would be over the ocean, would be less than 3.0 psf of over pressure in the surrounding areas, and would not be considered a significant impact. The noise associated with small lift type RLVs landings addressed in NASA's EA is also considered insignificant. Noise associated with the construction, operations, and launch/landing activities associated with the VTOL are common to each site. Differences in overall impact are associated with the magnitude in changes in land use and proximity to non-direct launch workplaces. Minimal impacts to the current noise environment would be observed at current launch complex sites. The nearest communities are not expected to experience a significant adverse impact. Construction related noise would be local, short term, and would be managed using OSHA guidance.

As a result, the overall cumulative effect when combined with other past, present, and reasonably foreseeable future actions from noise is considered minor and not significant. Additionally, two simultaneous launches in the ROI would never occur. When considered with other past, present, and foreseeable future actions, it is not anticipated that the Proposed Action would contribute a noticeable incremental impact to the overall minor and less than significant impact from noise.

Biological Resources

The landing event would not be expected to have a significant impact on terrestrial vegetation and wildlife, marine species, or protected species. An anomaly on the landing pads such as an explosion could injure or kill wildlife found adjacent to the launch pad or within debris impact areas. However payloads would not be involved and the fuel load would be substantially less than a typical launch. An improbable mishap from downrange would occur over the open ocean and would not likely jeopardize any wildlife, given the relatively low density of species within the surface waters of these open ocean areas (USAF, 1998). Debris from launch failures has a small potential to adversely affect managed fish species and their habitats in the vicinity of the project area.

Potential cumulative adverse impacts would occur for the Florida scrub-jay and eastern indigo snake. When evaluated with other projects occurring or proposed on CCAFS KSC or the Port of Canaveral area, the proposed removal of 48.32 acres of occupied/potential habitat would result in a reduction of available breeding habitat, as well as a reduction in the availability of scrub habitat for restoration. However, the restoration of approximately 100 acres of habitat within LMU 33 (mitigation for the Proposed Action) will result in habitat that could support an additional four scrub-jay territories. The current INRMP (Integrated Natural Resources Management Plan) goal is for CCAFS to support 300 breeding pairs of jays. Cumulative impacts on the gopher tortoise are not anticipated with the Proposed Action. Gopher tortoises observed within any area to be impacted by ground disturbance would be excavated and relocated to an onsite recipient area approved and managed by the USAF. Cumulative Impacts on beach mice are not anticipated for the Proposed Action. Although beach mice are known to occur in the area west of the ditch, those areas in which beach mice were captured will be hand-cut and the area will remain as beach mouse habitat.

Cumulative impacts on sea turtles have the potential to occur. The new facilities will result in more exterior lighting than is currently present at LC-13. Adherence to the Light Management Plan and Air Force lighting policies will help reduce these impacts. Amber LED lighting will be used to minimize potential adverse impacts on nesting turtles and/or their young. Cumulative impacts on American alligator, Piping Plover, and Red Knot are not expected to occur with the Proposed Action. There are no activities proposed within the onsite ditch or the shoreline.

The overall cumulative effect of other past, present, and reasonably foreseeable future actions (reuse of existing facilities) on biological resources are considered minor and not significant. When considered with other past, present, and foreseeable future actions, it is not anticipated that operations would contribute a noticeable incremental impact to the overall minor effect on biological resources.

Mitigation actions discussed in Section 4 and the BO shown in Appendix G would be accomplished to minimize the effect on threatened and endangered species due to construction activities. Impacts from other construction related actions would not be significant. The numbers of listed species that occur within areas which may be reused are low, and loss of the habitats at sites would not contribute to the decline of any protected species populations. Limited acreage of scrub lost would be small and could be mitigated through restoration of degraded scrub habitat elsewhere on KSC and CCAFS. Maintenance of the site at LC-13 would actually benefit the beach mouse, and by not landing in the ocean as traditionally done, there would be benefit from a cumulative standpoint for each landing event. As a result, the overall cumulative effect when considered with other past, present, and foreseeable future actions, the Proposed Action is not anticipated to contribute a noticeable incremental impact to the overall minor and less than significant effect on biological resources.

Air Quality

CCAFS, KSC and Brevard County are in an "Attainment" area and the operational emissions for the proposed Falcon landing represent an extremely small percentage of the Brevard County regional emissions and would not cause an exceedance of any NAAQS or greenhouse gases (GHG). Analysis of air impacts for RLV launch and landing actions discussed in the NASA document also concludes there would be no significant impacts on the air resource area.

In addition, there are a number of Executive Orders such as EO 13514 Federal Leadership in Environmental, Energy, and Economic Performance that provide emission reduction expectations for federal agencies. The public in and around the landing sites is also unlikely to be exposed to concentrations of any vehicle emissions that exceed the allowable public exposure limits adopted by the range safety organizations. Potential emissions resulting from RLV landings would be small in comparison to launches of the Falcon 9, Delta, Atlas, Titan, Saturn V rockets, and the Space Shuttle. Therefore, operations would have minimal cumulative impacts. Carbon emissions from transportation associated with the RLV site locations are expected to be less than what is emitted as a result of the energy used for facilities or building and transporting new rocket stages, rather than reusing them.

As a result, the overall cumulative effect when combined with other past, present, and reasonably foreseeable future actions on air quality is considered minor and not significant. When considered with other past, present, and foreseeable future actions, it is not anticipated that the Proposed Action would contribute a noticeable incremental impact on air quality.

Water Resources including Wetlands and Floodplains

Based upon discussions in Section 4.3, and discussed in the NASA EA, current and future landing events would not have a significant impact on wetlands and floodplains. New construction at CCAFS and KSC is expected to be limited and would occur at a relatively slow pace. Construction of new facilities in the surrounding (non-federal) area supporting Port of Canaveral development or Shiloh may occur sooner and may have impacts which would be defined in respective NEPA documentation. With the implementation of normal Best Management Practice (BMP) controls in the form of a stormwater management system, development of the future sites would have a minor cumulative effect on hydrology and water quality. Regionally, vegetated lands are increasingly being covered by impermeable surfaces (buildings, roads, parking lots), which increases runoff and limits replenishment of groundwater. Although stormwater management has been implemented for construction efforts since the 1990s, these retention and detention ponds are sometimes not able to accommodate large amounts of water associated with heavy rainfall, resulting in some excess runoff flowing into canals and wetlands. However, because extreme rainfall events are rare, these quantities are generally small, and can be absorbed by water management systems.

The cumulative effects on surface water quality in local waterways from the development would be minor. Surface water discharges from the selected site would be managed according to requirements of the SJRWMD conditions for issuance of Environmental Resource Permits. Water quality impacts would be minimized by the design, operation, and maintenance of a stormwater management system that would meet or exceed all requirements of the SJRWMD (SJRWMD Rule 40C-42.026(4)). Storm water analyses would be conducted to determine the amount of land necessary to provide adequate treatment and storage capacity, for both pre- and post-developed conditions. The resulting stormwater storage and treatment areas would help filter much of the suspended solids out of the water percolating into the ground. In addition, the biological and chemical processes that take place in stormwater detention/retention ponds would reduce the amount of contaminants found in runoff, and fewer pollutants would make their way into the water table. As a result, the overall cumulative effect when combined with other past, present, and reasonably foreseeable future actions on water resources is considered less than significant. When considered with other past, present, and foreseeable future actions, it is not anticipated that the Proposed Action would contribute a noticeable incremental impact on water resources.

Hazardous Materials/Hazardous Waste

Operations supporting the Falcon landings would use a small amount of products containing hazardous materials, including paints, solvents, oils, lubricants, acids, batteries, propellants, and chemicals. Hazardous material associated with payload components or residual fuels would not exist. Continued implementation of existing handling and management procedures for hazardous materials, hazardous wastes, and solid wastes generated would limit the potential for impacts. Numerous types of hazardous materials are used to support the missions and general maintenance operations at CCAFS and KSC. Management of hazardous materials is the responsibility of each individual or organization and is regulated under RCRA (40 CFR 260-280) and Rule 62-730. Although releases of hazardous materials and wastes can occur in the environment, it is not expected that there would be substantial cumulative contamination issues as a result of the Proposed Action. Safeguards are in place to minimize the release of toxic chemicals in the environment, and rapid emergency response plans would ensure that accidental spills would be cleaned up quickly.

Land clearing and construction practices for foreseeable future actions discussed in section 5.1.2 are not expected to introduce hazardous materials and hazardous wastes into the environment.. As a result, the overall cumulative effect when combined with other past, present, and reasonably foreseeable future actions from hazardous materials and waste are considered minor and less than significant. When considered with other past, present, and foreseeable future actions, it is not anticipated that the Proposed Action would contribute a negligible incremental impact from hazardous materials and waste.

Utilities and Transportation

There would be a low demand for additional electrical power for the Proposed Action and therefore direct impact would be negligible. Water supply requirements would be minimal, less than the need during a launch sequence. Current and future actions would require a water supply in order to successfully function. Water for CCAFS and KSC is acquired from the City of Cocoa's municipal potable water distribution system under a long-term agreement which has a 37 million gallon per day (MGD) capacity. The City's contract is with the U.S. Government and includes KSC, CCAFS and Patrick Air Force Base. A total of 6.5 MGD is allocated for all three facilities. Historically, total consumption of water from the city for all three facilities has averaged only 3.7 MGD.

From a transportation standpoint, as the Port of Canaveral continues its growth plans, additional shipping and follow-on passenger and cargo transportation needs will increase. More cruise ships are scheduled for arrivals and departures, as well as cargo shipping. The Proposed Action would reduce the potential need for ocean-going vessels associated with a first-stage recovery operation to transit the Port water-ways. Additionally, every re-landed first stage vehicle at LC-13 would eliminate the need for over-the-road transportation of a new first-stage delivery from Texas. Therefore there would be a positive effect on the cumulative impact of the sea port use and heavy over-the-road transport. As a result, the overall cumulative effect when combined with other past, present, and reasonably foreseeable future actions on utilities and transportation are considered negligible and less than significant in the context of supply. Transportation would be a slightly positive effect.

Socioeconomics

The Proposed Action would not significantly affect the local housing market. The Proposed Action would generate no negative socioeconomic impacts on the region and may generate a small one-time positive impact during construction activities. The Spaceport (KSC and CCAFS) is Brevard County's major employer. The presence of these employers causes a chain of economic reactions throughout the local region and nearby counties. These employment opportunities and resultant local economic contributions (housing, services, and recreation) cumulatively have a positive influence on socioeconomics, through contributions to the local economy. As a result, the overall cumulative effect when combined with other past, present, and reasonably foreseeable future actions on socioeconomics is considered beneficial and not significant. When considered with other past, present, and foreseeable future actions, it is anticipated that the Proposed Action would contribute a noticeable incremental minor beneficial impact on socioeconomics.

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The Florida State Clearinghouse reviews EAs for projects planned at CCAFS pursuant to Gubernatorial Executive Order 95-359; the Coastal Zone Management Act; 16 U.S.C. SS 1451-1464 as amended; and NEPA, 42 U.S.C. §4321, §§4331–4335, and §§4341–4347. The State of Florida Clearinghouse sends copies of the draft EA to applicable regulatory agencies for review and submits any comments to be addressed in the final EA. Therefore, this EA will be submitted for Clearinghouse review. This EA's process is also required to follow, and has been following, regulatory coordination, approval, and permits with other agencies other than the USAF and FAA. These regulatory coordination, approval, and permits include:

- Consultation with the U.S. Fish and Wildlife Service (USFWS) pursuant to the federal Endangered Species Act (ESA) and the Migratory Bird Treaty Act (MBTA).
- Informal Consultation with the National Marine Fisheries Service (NMFS) pursuant to the federal Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, and ESA.
- Coordination with Department of Transportation to renew and/or maintain transportation permits.
- Consultation with Florida State Historic Preservation Office
- Saint John's River Water Management District Environmental Resource Permit
- Florida Department of Environmental Protection Pre- Construction Permit

The USAF invites public participation in decision-making on new proposals through the NEPA process. Public participation with respect to decision-making on the Proposed Action is guided by 38 CFR Part 26. Consideration of the views and information of all interested persons promotes open communication and enables better decision-making. Copies of the draft EA and FONSI will be made available to the public in local public libraries and the local USAF Public Affairs Office. A Notice of Availability (NOA) will be published in the local newspaper announcing the availability of the documents at the appropriate time. Agencies, organizations, and members of the public with a potential interest in the Proposed Action, such as minority, low-income, and disadvantaged persons, are urged to participate. A record of any agency coordination and, /or public involvement associated with the documents would will be kept.

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