



Federal Aviation  
Administration



# Final Environmental Assessment for Jacksonville Aviation Authority Launch Site Operator License at Cecil Field, Florida

July 2009





**Environmental Assessment for Jacksonville Aviation Authority Launch Site Operator License at Cecil Field, Florida**

**AGENCY:** Federal Aviation Administration (FAA), lead agency

**ABSTRACT:** The Final Environmental Assessment (EA) for Jacksonville Aviation Authority Launch Site Operator License at Cecil Field, Florida addresses the potential environmental impacts of the Proposed Action, where the FAA would issue a Launch Site Operator License to Jacksonville Aviation Authority (JAA) to operate a commercial launch facility at Cecil Field Airport (Cecil Field) in Duval County, Florida. The EA evaluates the impacts of launching two types of horizontal, reusable launch vehicles (RLV), including the Concept X and Concept Z vehicles. JAA proposes to support a maximum of 52 annual launches, including 48 launches of the Concept X vehicle and four launches of the Concept Z vehicle.

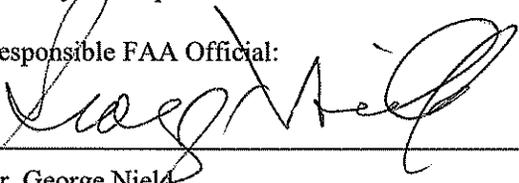
Potential impacts of the Proposed Action and No Action Alternative were analyzed in the EA. Potential environmental impacts of successful launches include impacts to climate and air quality; coastal resources; compatible land use; Department of Transportation Act, Section 4(f) resources; farmlands; fish, wildlife, and plants; floodplains; hazardous materials, pollution prevention, and solid waste; historic, architectural, archaeological, and cultural resources; light emissions and visual resources; natural resources, energy supply, and sustainable design; noise; socioeconomics; water quality; wetlands; wild and scenic rivers; children's environmental health and safety risks; environmental justice; construction impacts; secondary (induced) impacts; airports/airport users; airspace; and transportation. Potential cumulative impacts of the Proposed Action are also addressed in the EA. The EA found that there would be no significant impacts to any of the resource areas analyzed as a result of issuing a Launch Site Operator License to JAA. A Finding of No Significant Impact (FONSI) has been included in the EA.

The FAA responded to all comments received during the public review process in the Final EA.

**CONTACT INFORMATION:** Questions regarding the Final EA or FONSI for the Cecil Field Launch Site Operator License can be addressed to Mr. Daniel A. Czelusniak, FAA Environmental Protection Specialist, 800 Independence Avenue, SW, Room 331, Washington, D.C. 20591, telephone (202) 267-5924, E-mail Daniel.Czelusniak@faa.gov.

This Environmental Assessment becomes a Federal document when evaluated and signed and dated by the responsible FAA official.

Responsible FAA Official:



Dr. George Nield  
Associate Administrator for  
Commercial Space Transportation

6/25/09

Date



## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

Office of Commercial Space Transportation; Finding of No Significant Impact

**AGENCY:** The Federal Aviation Administration (FAA), Department of Transportation (DOT)

**ACTIONS:** Finding of No Significant Impact

**SUMMARY:** The Federal Aviation Administration (FAA) prepared an Environmental Assessment (EA) to evaluate Jacksonville Aviation Authority's (JAA's) proposal to operate a commercial space launch site at Cecil Field Airport (Cecil Field) in Jacksonville, Florida. The EA evaluated the potential environmental impacts associated with the Proposed Action and alternatives regarding the issuance of a Launch Site Operator License to JAA for Cecil Field and responded to all comments received during the public review process. After reviewing and analyzing currently available data and information on existing conditions and project impacts, the FAA has determined that issuing a Launch Site Operator License to JAA for the operation of a commercial space launch site at Cecil Field would not significantly impact the quality of the human environment within the meaning of the National Environmental Policy Act. Therefore, the preparation of an Environmental Impact Statement is not required, and the FAA is issuing a Finding of No Significant Impact. The FAA made this determination in accordance with all applicable environmental laws.

**FOR A COPY OF THE ENVIRONMENTAL ASSESSMENT:** Visit the following internet address:

[http://www.faa.gov/about/office\\_org/headquarters\\_offices/ast/licenses\\_permits/launch\\_site/environmental/](http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_site/environmental/) or contact Mr. Daniel A. Czelusniak, FAA Environmental Protection Specialist, 800 Independence Avenue, SW, Room 331, Washington, D.C. 20591. You may also send e-mail requests to [Daniel.Czelusniak@faa.gov](mailto:Daniel.Czelusniak@faa.gov) or via telephone to (202) 267-5924.

**PURPOSE AND NEED:** The purpose of the FAA's action in issuing the Launch Site Operator License is to ensure compliance with international obligations of the United States and to protect the public health and safety, safety of property, and national security and foreign policy interest

of the United States during commercial launch or reentry activities; to encourage, facilitate, and promote commercial space launches and re-entries by the private sector; and to facilitate the strengthening and expansion of the United States space transportation infrastructure, in accordance with the requirements of the Commercial Space Launch Amendments Act of 2004, the Commercial Space Transportation Act of 2000, Executive Order (EO) 12465, 14 Code of Federal Regulations (CFR) Parts 400-450, the National Space Transportation Policy, and the National Space Policy.

The Proposed Action is needed to meet the demand for lower cost access to space. Less expensive space launch capability is necessary to support rising industries, such as more cost-effective commercial, governmental, and scientific satellite launches. Given the infrastructure and development costs associated with constructing launch facilities, the Federal government has been the owner/operator or has leased/sold unused or excess infrastructure and provided expertise to commercial launch operators for the majority of commercial launches. The Secretary of Transportation has assigned the FAA Office of Commercial Space Transportation responsibility, under the Commercial Space Launch Amendment Acts and EO 12465, for oversight of commercial space launch activities, including licensing of launch and reentry sites.

**PROPOSED ACTION:** Under the Proposed Action, the FAA would issue a Launch Site Operator License to JAA for Cecil Field. A Launch Site Operator License, which is valid for five years, would allow JAA to offer the site for piloted launches of reusable launch vehicles (RLV). Potential commercial launch vehicle operators would be required to obtain a Launch License from the FAA to conduct launch operations at Cecil Field.

Under the Proposed Action, JAA would offer the launch site to launch operators for two types of horizontal, piloted RLVs, referred to as Concept X and Concept Z launch vehicles. The Concept X vehicle contains two turbojet engines and two rocket engines powered by Jet-A fuel and liquid oxygen (LOX). The Concept Z vehicle consists of two components - a carrier aircraft mated with a suborbital launch vehicle. The carrier vehicle would have turbo jet engines while the launch vehicle would use a hybrid rocket engine powered by nitrous oxide and hydroxyl-terminated polybutadiene. JAA proposes to support a maximum of 48 annual launches of the

Concept X vehicle and 4 annual launches of the Concept Z vehicle. The proposed launch vehicles would take off under jet power from Runway 18L-36R at Cecil Field and continue to the offshore Warning Area, located 60 miles over the Atlantic Ocean. Once the vehicles reach the offshore Warning Area, rocket engines would ignite and the vehicles would ascend into low earth orbit of approximately 330,000 feet before returning to Cecil Field. The Concept Z carrier vehicle would return to Cecil Field along the same flight path under jet power. Concept X and Z vehicles would return to Cecil Field as maneuverable gliders along the departure flight path. All vehicles, including the carrier vehicle, would land on Runway 18L-36R.

The Proposed Action does not include any construction or modification to the site. Launches would be conducted using existing infrastructure. Periodic maintenance, such as mowing or repairs, would occur on the site to ensure launch safety.

**ALTERNATIVES CONSIDERED:** Alternatives analyzed in the EA include (1) the Proposed Action and (2) the No Action Alternative. Under the No Action Alternative, the FAA would not issue the Launch Site Operator License to JAA. Launches would not occur at Cecil Field. General aviation activities, such as military and training exercises would not be impacted.

## **ENVIRONMENTAL IMPACTS:**

### **Climate and Air Quality**

Emissions of any criteria pollutants associated with the Proposed Action would be well below Federal *de minimis* levels and would not be expected to cause exceedances of the National Ambient Air Quality Standards or Florida Ambient Air Quality Standards. Emissions of carbon dioxide (CO<sub>2</sub>) to the stratosphere under the Proposed Action would be negligible in comparison with U.S. annual emissions of CO<sub>2</sub>, and therefore would not have a significant impact on global climate change. Emissions of water vapor (H<sub>2</sub>O) to the stratosphere under the Proposed Action would not have a significant impact on global climate change due to the large number of natural and anthropogenic sources of H<sub>2</sub>O. The ozone-depleting chemicals, nitrogen oxide (NO<sub>x</sub>), sulfur oxide (SO<sub>x</sub>), and chlorine, would not be emitted in the stratosphere, and therefore would not have a significant impact on ozone. Emissions of NO<sub>x</sub> in the troposphere would be extremely small relative to Cecil Field's baseline conditions and U.S. annual emissions; therefore, the presence of

this chemical in rocket emissions associated with the Proposed Action would have a negligible impact on ground-level ozone creation.

### **Coastal Resources**

The Proposed Action would not have significant impacts on coastal resources due to Cecil Field's inland location. The proposed flight routes were selected to minimize potential impacts on coastal resources. The Florida Department of Environmental Protection has concluded that the Proposed Action is consistent with the Florida Coastal Management Program.

### **Compatible Land Use**

Implementation of the Proposed Action would not change any planned or existing land use designations. Cecil Field is currently part of the Air Installation Compatible Use Zone, which allows for the proposed airport activities. A City of Jacksonville ordinance restricts the type of land use around Cecil Field. JAA does not anticipate the construction of new facilities as a result of the Proposed Action.

### **Department of Transportation, Section 4(f) Resources**

The Proposed Action would not significantly impact potential Section 4(f) lands. There are five potential Section 4(f) lands within the vicinity of Cecil Field. However, the Proposed Action does not require the use of the identified Section 4(f) resources. The Proposed Action would not significantly increase noise levels at these resources; therefore, no significant impacts due to noise would be expected. Approximately, 1.5 acres of Brannan Field Park Wildlife and Environmental Area falls within the Inhabitable Building Distance. During the proposed launches, JAA and the Florida Fish and Wildlife Conservation Commission would ensure that park visitors are not within the designated zone.

### **Farmlands**

A U.S. Department of Agriculture survey did not identify any prime or unique farmlands at Cecil Field; therefore, no impacts on farmlands would be expected.

### **Fish, Wildlife, and Plants**

The Proposed Action would not significantly change current activities at Cecil Field, and therefore, would not have a significant impact on terrestrial vegetation and wildlife. Cecil Field is known to provide suitable habitat for several threatened or endangered species, including Florida gopher tortoise, Florida pine snake, eastern indigo snake, Florida mouse, Sherman's fox squirrel, and Bachman's sparrow. The Proposed Action does not require construction or grading activities, and therefore would not disturb such habitat. Birds and terrestrial mammals in the immediate area could be startled during launch activities. However, birds and terrestrial mammals would be expected to return to pre-launch behavior soon after the launch. Terrestrial mammals could also experience temporary threshold shift effects. However, these effects would be temporary and would not have significant impacts on local populations. The Proposed Action does not require the use of additional lighting systems. All proposed launches would be expected to occur during daylight hours; therefore, there would not be a need for night lighting. The Proposed Action may create sonic booms over the Atlantic Ocean during ascent and descent. However, the impacts from such booms would be expected to be low since they would occur at high altitudes over the open ocean. The majority of effects from launch activities would be short-term, of relatively low intensity, and would occur relatively infrequently due to the launch rate.

Fueling would occur in designated areas within the Cecil Field property. Accidental spills or releases would be contained and cleaned up in accordance to existing policies in order to minimize impacts on the local environment. Therefore, the Proposed Action would not significantly impact fish, wildlife, or plants.

### **Floodplains**

The Proposed Action would not significantly impact floodplains located within the vicinity of Cecil Field. No construction activities would be conducted and no new discharges would be released under the Proposed Action. Therefore, no significant impacts would be expected as a result of the Proposed Action.

### **Hazardous Materials, Pollution Prevention, and Solid Waste**

The primary hazardous materials used under the Proposed Action would be propellants, including Jet-A fuel and hydroxyl-terminated polybutadiene and the oxidizers, including LOX and nitrous oxide. In addition to the propellants and oxidizers, other hazardous materials (e.g., various composites, synthetics, and metals) may be used for rocket operation, including solvents, oils, and paints. The hazardous waste resulting from the Proposed Action would be similar to the type of waste currently handled at Cecil Field. All hazardous materials and hazardous waste would be handled and disposed of in accordance with Cecil Field's Standard Operating Procedures. The Proposed Action would not be expected to generate more hazardous waste than can be safely handled by Cecil Field.

JAA would take appropriate mitigation measures to ensure that hazardous material was handled and stored appropriately. JAA would store bulk hazardous material in containers that met or exceeded the National Fire Protection Association industrial fire protection codes. Additionally, JAA would ensure that appropriate spill response material and tools were readily accessible in the unlikely event of a spill or launch failure.

Portions of Cecil Field are listed on the U.S. Environmental Protection Agency's National Priority List (NPL). No construction activities planned as a result of the Proposed Action. Therefore, no impacts would be expected.

### **Historical, Architectural, Archaeological, and Cultural Resources**

No buildings at Cecil Field are eligible for listing or listed on the National Registry of Historic Places. Additionally, no construction or demolition activities would occur at Cecil Field. Therefore, no significant impacts on historical, architectural, archaeological, and cultural resources would be expected.

### **Light Emissions and Visual Impacts**

The Proposed Action would not involve construction or development, and would be similar to existing activities at Cecil Field; therefore, there would not be any new or additional visual resource impacts, or any coastal resource impacts. Light emissions would be minimized through

the use of low-pressure sodium light fixtures, shielding of lights, and special light management steps where lights are visible from the beach.

### **Natural Resources, Energy Supply, and Sustainable Design**

The Proposed Action would not require major changes to stationary sources, including airfield lighting or facilities. Cecil Field's demand for energy resources would not experience a major change. Additionally, the Proposed Action would not require the use of energy or natural resources that are in short supply.

### **Noise**

The jet engine noise created by pre-take-off activities, take-off, and landing of the Concept X and Concept Z vehicles would be similar to noise levels resulting from current aviation activities at Cecil Field. Noise from the Concept Z vehicle, which would produce the highest noise level of the proposed vehicles, would be similar to noise created from an F-18 aircraft, which operates at Cecil Field. Additionally, the launch of the RLVs would occur in the offshore Warning Area, located 60 miles off the coast of Florida. Rocket engine noise created during launches would have a minimal impact due to the remote launch location.

Sonic booms may occur during ascent and descent as vehicles reach Mach 1. Both RLVs have the potential to create sonic booms. The magnitude of sonic booms associated with the Proposed Action would be 1.1 to 1.9 pounds per square foot (psf) for the Concept X vehicle and 0.5 to 0.7 psf for the Concept Z vehicle. Furthermore, the sonic booms would occur over the open ocean resulting in minimal impacts to human health, physical structures, and the environment. Sonic booms associated with the Proposed Action would not be expected to have a significant impact on the surrounding areas. Additionally, sonic booms would not have a significant impact on marine animals.

### **Socioeconomics**

The Proposed Action would not result in the relocation of residents or businesses. Furthermore, temporary increases in population due to launch activities would be beneficial to local businesses as visitors would require and use local amenities, such as restaurants, hotels, and entertainment.

The City of Jacksonville is well equipped to accommodate the influx of visitors. The City has hosted several large events, including the Super Bowl, which draws crowds larger than those expected for the proposed launches. Therefore, no significant impacts on socioeconomic resources would be expected. Any impact would likely be viewed as positive.

### **Water Quality**

The Proposed Action would not significantly impact water resources. Launch operators using Cecil Field would be required to follow all standard operating procedures. Additionally, the launch operators would be required to develop their own Spill Prevention, Control, and Containment Plan. If a spill occurs, Cecil Field has appropriate policies and procedures in place to minimize any potential harm. Therefore, no significant impacts on water quality would be expected.

### **Wetlands**

The Proposed Action would not require the construction of new infrastructure. Additionally, all fueling and launch activities would occur on runways currently used for general aviation activities. If a spill were to occur, the launch operator would be required to follow the Spill Prevention Control and Containment Plan. Therefore, no significant impacts to wetlands would be expected.

### **Wild and Scenic Rivers**

There are no wild and scenic rivers in the vicinity of Cecil Field. Therefore, there would be no impacts on wild and scenic rivers.

### **Children's Environmental Health and Safety Risks**

The Proposed Action would not disproportionately affect children. The Jacksonville Christian Academy, the closest school to the launch site, is located 1.4 miles northeast. Additionally, there is a recreation area located 0.5 miles northeast of Runway 9L. While jet noise from the Proposed Action may be audible from this distance, it would not exceed current levels. Some of the launch activities would occur during non-school hours (i.e., Saturday), thus reducing the

potential noise impacts on children. Therefore, the impacts to children's environmental health and safety would be negligible.

### **Environmental Justice**

The Proposed Action would not disproportionately impact minority or low-income populations near Cecil Field. The Proposed Action would not displace local residents. Additionally, there is a smaller or similar population of minority and low-income residents living near the proposed launch site compared to Duval and Clay Counties, the State of Florida, and the United States. Therefore, the Proposed Action would not significantly impact environmental justice populations.

### **Construction Impacts**

The Proposed Action would not include construction activities. All proposed launch activities would occur on existing infrastructure. Therefore, there would be no significant impacts from construction.

### **Secondary (Induced) Impacts**

As a result of the Proposed Action, local businesses might experience a slight positive benefit from increased sales. There would be no other secondary (induced) impacts.

### **Airports/Airport Users**

Cecil Field is a general aviation airport with numerous public and private tenants. Under the Proposed Action, Runways 9L-27R and 9R-27L would remain open. Runways 18L-36R and 18R-36L would be closed once the oxidizer had been loaded. These runways would reopen once the RLVs had departed Cecil Field. Upon return, activities on Runway 18L-36R would be suspended until the RLV was towed from the runway area. Activities on other runways, taxiways, and aprons would not be restricted. Additionally, the RLV flight path to the offshore Warning Area was specifically designed to avoid airspace of all publicly-owned airports. The RLVs would only impact nearby airports during an emergency or aborted launch. Due to the low frequency of launches, the possibility of impacts on nearby airports is negligible. Therefore, there are no significant impacts to Cecil Field tenants or nearby airports.

## **Airspace**

Under the Proposed Action, the RLVs will travel along the same flight path for departing and returning to Cecil Field. JAA has worked with the Jacksonville Air Route Traffic Control Center, and the Fleet Area Control and Surveillance Facility Jacksonville to design the flight path. The RLVs would leave Cecil Field's airspace under jet power and be managed using a "real-time" management approach, which is similar to the procedures used for other aircraft approaching and departing Cecil Field. Rocket launches would occur completely within the airspace of the offshore Warning Area. The RLVs would return to Cecil Field as maneuverable gliders. Airspace would be cleared using the "moving altitude reservation" concept, which would sequentially block lower airspace as the RLVs approached. Using this method of blocking airspace would minimize the closure duration of any specific airspace. Therefore, there would be no significant impacts on airspace.

## **Transportation**

The Proposed Action would not have a significant impact on transportation resources in and around Cecil Field. Components of the RLVs, propellant, and personnel may arrive via ground transport. The carrier vehicle for the Concept Z vehicle would be able to fly to Cecil Field for the proposed launches. Transport of vehicle parts, propellant, and personnel would follow applicable state and Federal safety revisions and payload requirements.

While the launch of the proposed RLVs may invite spectators, the transportation infrastructure around Cecil Field has the capacity to accommodate the additional traffic. Therefore, there would be no significant impacts to transportation resources under the Proposed Action.

## **Cumulative Impacts**

Cumulative impacts are "the incremental impact of the actions when added to other past, present, and reasonably foreseeable future action regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). For this analysis, cumulative impacts include impacts from the vehicles that would be launched under JAA's license and the past, present, and reasonably foreseeable future activities that would affect the resources impacted by the Proposed Action.

### *Cumulative Socioeconomic Impacts*

Within the vicinity of Cecil Field, The Bridgestone/Firestone company is building a tire distribution center. The facility will employ 250 workers. In an effort to ease traffic congestion in Duval and Clay Counties, a series of roadway improvements are being conducted along the Branan Field-Chaffee Expressway (State Road 23). At Cecil Commerce Center North, Florida Community College is building a new center. These projects would likely have a positive cumulative impact on local residents and businesses. Additionally, the new tire distribution center and Florida Community College center would provide new jobs as well as additional tax revenue for the area. Therefore, any impacts would be viewed as positive.

### *Cumulative Noise Impacts*

The Cecil Field 2008 Master Plan Update forecast indicates total operations at Cecil Field, exclusive of spaceport operations, would equal to 113,763 in 2014. While the proposed license would expire in 2013, the total number of forecasted operations at Cecil Field was not calculated for 2013. Therefore, the projected total number of 104 spaceport operations (52 launches and landings) for 2013 was used to calculate the percent increase in operations at Cecil Field in 2014. The result would equate to a 0.09-percent increase in total 2014 operations at Cecil Field. The 2014 projections would increase noise impacts at and near Cecil Field. However, the City of Jacksonville has established an Air Installation Compatible Use Zone under Ordinance 656, Part 10. This ordinance ensures development near Cecil Field would be compatible with airport operations and would minimize the impacts to sensitive noise receptors. Additionally, the noise associated with takeoff and landing operations would be temporary. Due to the established measures to minimize noise impacts from the 2014 projected operations, the Proposed Action would not result in a significant cumulative noise impact.

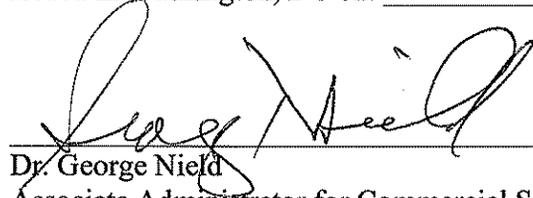
### *Static Rocket Engine Testing*

In the foreseeable future, JAA may offer Cecil Field as a location for static rocket engine testing. Such tests would be performed in a designated area on the south side of Runway 9R-27R. Testing would be conducted on engines similar to the Rocketdyne 88, which uses up to approximately 12,700 pounds of LOX and 5,300 pounds of RP-1 per test. The testing would increase localized levels of carbon monoxide, water vapor, and hydrogen gas. Assuming

complete combustion, the testing would not produce tropospheric ozone precursors, such as VOCs, NO<sub>x</sub> or PM. The tests would not be expected to cause exceedances of state or Federal air quality standards. Therefore, the potential impacts of static rocket engine testing would be negligible.

**DETERMINATION:** An analysis of the Proposed Action has concluded that there would be no significant short-term, long-term, or cumulative effects to the environment or surrounding populations. After careful and thorough consideration of the facts herein, the undersigned finds that the proposed Federal action is consistent with existing national environmental policies and objectives set forth in Section 101(a) of the National Environmental Policy Act of 1969 and that it will not significantly affect the quality of the human environment or otherwise include any condition requiring additional consultation pursuant to Section 102(2)(c) of the National Environmental Policy Act. Therefore, an Environmental Impact Statement for the Proposed Action is not required.

Issued in Washington, DC on: June 25, 2009



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Dr. George Nield  
Associate Administrator for Commercial Space Transportation

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## ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation	HTPB	hydroxyl-terminated polybutadiene
AST	Office of Commercial Space Transportation (Federal Aviation Administration)	IFR	instrument flight rules
BGS	below ground surface	JAA	Jacksonville Aviation Authority
CAA	Clean Air Act	LOX	liquid oxygen
CAAA	Clean Air Act Amendments	N <sub>2</sub>	nitrogen
CDNL	C-weighted day-night average noise level	N <sub>2</sub> O	nitrous oxide
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	NAAQS	National Ambient Air Quality Standards
CFC	chlorofluorocarbons	NASA	National Aeronautics and Space Administration
CFR	Code of Federal Regulations	NEPA	National Environmental Policy Act
CO	Carbon monoxide	NO	nitric oxide
CO <sub>2</sub>	Carbon dioxide	NO <sub>2</sub>	nitrogen dioxide
dB	decibel	NO <sub>x</sub>	nitrogen oxides
DNL	Day-night average noise level	NOAA	National Oceanic and Atmospheric Administration
DOD	U.S. Department of Defense	O <sub>2</sub>	oxygen
EA	environmental assessment	O <sub>3</sub>	ozone
EIS	environmental impact statement	Pb	lead
EPA	U.S. Environmental Protection Agency	PM	particulate matter
°F	degrees Fahrenheit	RLV	reusable launch vehicle
FAA	Federal Aviation Administration	RP-1	rocket propellant-1
H <sub>2</sub>	hydrogen	SO <sub>2</sub>	sulfur dioxide
H <sub>2</sub> O	water	SO <sub>x</sub>	sulfur oxides
HCl	hydrochloric acid	µg/m <sup>3</sup>	microgram per cubic meter
He	helium	U.S.C.	United States Code
		UV	ultraviolet
		VFR	visual flight rules
		VOC	volatile organic compound



## 1. INTRODUCTION

The Federal Aviation Administration (FAA), Office of Commercial Space Transportation (AST), is evaluating an application for a Launch Site Operator License from the Jacksonville Aviation Authority (JAA) for the operation of a commercial space launch site at Cecil Field Airport, which is approximately 15 miles from downtown Jacksonville, Florida. Under the Proposed Action, JAA would offer the site for horizontal launches and landings of suborbital manned launch vehicles.

JAA must obtain a license from the FAA/AST to operate a commercial launch site. The proposed Federal action that is the subject of this Environmental Assessment (EA) is for the FAA to issue a Launch Site Operator License to the JAA. The National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [U.S.C.] 4321 *et seq.*) requires all Federal agencies to prepare detailed statements on major Federal actions significantly affecting the quality of the human environment (42 U.S.C. 4332(C)). The President's Council on Environmental Quality administers the NEPA implementing regulations (40 Code of Federal Regulations [CFR] 1500 *et seq.*). The purpose of a NEPA analysis is to ensure full disclosure and consideration of environmental information in Federal agency decisionmaking, and to inform the public of potential impacts and alternatives to a proposed Federal action before decisions are made and actions are taken. The decision to license a commercial launch or the operation of a commercial launch site is considered a Federal Action. Therefore, the FAA must analyze the environmental impacts associated with licensing proposed commercial launches and the operation of proposed commercial launch sites. The FAA is the lead Federal agency for this NEPA process and has determined that an EA is appropriate for the Proposed Action to operate a commercial launch site at Cecil Field. An EA is designed to briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact.

### 1.1 Background

The space launch environment is evolving to include the use of small orbital and commercial suborbital launches, in addition to the medium and heavy-lift orbital launches that dominate today's space launch environment. This shift is largely due to the development of smaller satellites, an emerging suborbital space tourism market, and an altered national security environment demanding quick launch capability. In addition, privatization, greater efficiency, and lower costs are among the economic pressures driving a marketplace that favors the creation of commercial spaceports.

This changing environment has led to the marketing of small, responsive, commercially focused vehicles as low-cost solutions for both private and government clients. However, there are a limited number of spaceports to accommodate this new class of vehicles. This is due in part to the unique infrastructure requirements for space launch activities.

The proper infrastructure must be available for a viable commercial spaceport to become a reality. Such infrastructure would include:

- Hangars for processing bays and the storage of nonhazardous materials
- Facilities for storing, processing, and supplying hazardous materials
- Power and data links
- Ground and range safety systems
- Proper road access for the transportation of launch vehicles
- Runways of sufficient length (for some vehicles, a 10,000-foot runway is desirable)
- Standard weather services to collect high-altitude wind data

JAA owns and manages the Jacksonville Airport System, which is comprised of four strategically located airports in northeast Florida and includes Jacksonville International, Craig, Herlong, and Cecil Field Airports.

JAA has defined its mission as one to “manage, operate, maintain, and develop a system of airports that meet and exceed the aviation needs of northeast Florida and southeast Georgia.” One of JAA’s organizational priorities is to “grow and develop our business.” To that end, JAA is exploring opportunities to operate a commercial spaceport within its system of airports.

## **1.2 Purpose and Need for the Proposed Action**

The purpose of the Project requested by JAA is to enable Cecil Field Airport to provide a site to operate a launch facility as an alternative to Federal facilities or other commercial sites for horizontally launched reusable launch vehicles (RLVs) using suborbital trajectories.<sup>1</sup> The Project would allow JAA to offer Cecil Field to customers wishing to conduct launch operations. Customers operating under a launch license could use the facility to provide for-profit launch services that might include tourism, selling merchandise flown in the vehicle, or other activities. These activities are consistent with the Commercial Space Launch Amendments Act of 2004 (Public Law 108-492) and the FAA/AST’s mission to encourage, facilitate, and promote private-sector commercial launch and reentry activities.

The need for the FAA action on JAA’s request is to facilitate the growth of the United States commercial space transportation industry by providing the infrastructure necessary to support the operation of RLVs while protecting public health and safety, the safety of property, and ensuring that the launch services provided are consistent with national security and foreign policy interests of the United States.

The purpose of the FAA action in connection with JAA’s request for licensure is to ensure compliance with international obligations of the U.S. and to protect the public health and safety, safety of property, and national security and foreign policy interests of the U.S. during commercial launch or reentry activities; to encourage, facilitate, and promote commercial space launches and reentries by the private sector; and to facilitate the strengthening and expansion of the U.S. space transportation infrastructure, in accordance with the requirements of the

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<sup>1</sup> A suborbital trajectory is one in which the intentional flight path of a launch vehicle, reentry vehicle, or any portion thereof, whose vacuum instantaneous impact point (point where the vehicle or vehicle debris would land if its engines stopped) does not leave the surface of Earth (49 U.S.C. 70102(20)).

Commercial Space Launch Act of 1984, the Commercial Space Transportation Competition Act of 2000 (49 U.S.C. 70101-70121), the FAA’s commercial space transportation regulations (14 CFR Parts 400-450), the National Space Transportation Policy, and the National Space Policy.

The FAA action is necessary because the Secretary of Transportation has assigned the FAA/AST responsibility for the oversight of commercial space launch activities, including licensing of launch and reentry sites, under Executive Order 12465, *Commercial Expendable Launch Vehicle Activities* (February 24, 1984), and the Commercial Space Launch Amendments Act.

### **1.3 FAA Licenses, Regulations, and Approvals**

The FAA issues licenses for commercial launches and reentries and the operation of commercial space launch sites. The FAA issues a Launch Site Operator License when it determines that an applicant’s proposal to operate a launch or reentry site would not jeopardize public health and safety, the safety of property, United States national security or foreign policy interests, or international obligations of the United States. A license to operate a launch site authorizes a licensee to offer its launch site to a launch operator for each launch point, launch vehicle type, and weight class identified in the license application and upon which the licensing determination is based. Issuance of a license to operate a launch site does not relieve a licensee of its obligation to comply with any other laws or regulations, nor does it confer any proprietary, property, or exclusive rights in the use of airspace or outer space (14 CFR 420.41). A Launch Site Operator License remains in effect for 5 years from the date of issuance unless surrendered, suspended, or revoked before the expiration of the term and is renewable upon application by the licensee (14 CFR 420.43).

The FAA issues separate licenses for operation of the vehicles and operation of the launch site. Therefore, if JAA obtained a Launch Site Operator License for Cecil Field, vehicle operators would need to obtain individual licenses from the FAA before launching from Cecil Field. The FAA may use this EA to support the environmental determination for an individual launch license. However, if proposed launch operations fall outside the scope of this analysis, the new action would be subject to a separate environmental review. The following paragraphs describe the licenses.

***Reusable Launch Vehicle (RLV) Mission-Specific License*** – “[A]uthorizes a licensee to launch and reenter, or otherwise land, one model or type of RLV from a launch site approved for the mission to a reentry site or other location approved for the mission” (14 CFR 431.3[a]).

***RLV Mission Operator License*** – “[A]uthorizes a licensee to launch and reenter, or otherwise land, any of a designated family of RLVs within authorized parameters” (14 CFR 431.3[b]).

## 1.4 Public Involvement Process

The following agencies and interested parties were consulted during preparation of this EA:

- Local/Regional/State Agencies
  - City of Jacksonville
  - Jacksonville Aviation Authority
  - Clay County
  - First Coast Metropolitan Planning Organization
  - Florida Department of Transportation
  - Florida Department of Natural Resources
  
- Federal Agencies
  - U.S. Department of the Interior, National Park Service
  - U.S. Department of Agriculture, Forestry Service
  - U.S. Fish and Wildlife Service
  - U.S. Environmental Protection Agency
  - Federal Emergency Management Agency
  - Federal Aviation Administration, Airport District Orlando

Appendix A of this EA contains copies of the correspondence related to these consultations.

On November 27, 2007, the FAA held a public information meeting at the Cecil Commerce Center in Jacksonville, Florida. The FAA provided general information on the Launch Site Operator License evaluation and the EA review process. Three members of the public provided comments during the public information meeting. The transcript of the public information meeting is available on FAA's website at [www.ast.faa.gov](http://www.ast.faa.gov) or available upon request from the FAA.

The FAA published a Notice of Availability of the Draft EA in the *Federal Register* on April 21, 2009, which started a 30-day public review and comment period. The FAA hosted a public hearing on May 14, 2009, in Jacksonville, Florida, during which members of the public, organizations, tribal groups, and government agencies had the opportunity to provide oral and written comments on the Draft EA. Two members of the public provided comments during the meeting (see Appendix C). The public comment period ended on May 20, 2009. The FAA received one written comment document during the public comment period (see Appendix C).

## 1.5 Prior Environmental Analyses

Council on Environmental Quality NEPA implementing regulations state that agencies shall incorporate material by reference when the effect would be to cut down on bulk without impeding agency and public review of the action. The FAA and NASA have previously analyzed the environmental effects of launches from a variety of locations. To avoid repetitive

discussion and focus on the analysis of Cecil Field, relevant sections of the following documents are summarized and incorporated by reference where applicable:

- *Final Environmental Assessment for the Oklahoma Spaceport* (FAA, 2006)
- *Final Environmental Assessment for the Kodiak Launch Complex* (FAA, 1996)
- *Final Environmental Assessment for the Launch Re-entry and Recovery Operations at the Kistler Launch Facility* (FAA, 2002)
- *Final Environmental Assessment for the East Kern Airport District Launch Site Operator License for the Mojave Airport* (FAA, 2004)

In accordance with Council on Environmental Quality NEPA implementing regulations, this EA tiers from the following programmatic documents:

- *Final Programmatic Environmental Impact Statement for Licensing Launches* (FAA, 2001)
- *Final Programmatic Environmental Impact Statement for Horizontal Launch and Reentry of Reentry Vehicles* (FAA, 2005)



## **2. PROPOSED ACTION AND ALTERNATIVES**

### **2.1 Proposed Action**

The Proposed Action for this Environmental Assessment (EA) is for the Federal Aviation Administration (FAA) to issue a Launch Site Operator License to Jacksonville Aviation Authority (JAA) to operate a commercial space launch site at Cecil Field in Jacksonville, Florida. In accordance with the National Environmental Policy Act (NEPA), FAA requirements, and all relevant State of Florida and local requirements, the FAA is analyzing the potential environmental impacts of activities associated with JAA's application to operate the proposed spaceport at Cecil Field.

The vehicles proposed for launch and reentry at Cecil Field would be horizontally launched reusable launch vehicles (RLVs)<sup>2</sup> using suborbital trajectories. These vehicles, when operated out of Cecil Field, could carry space flight participants,<sup>3</sup> scientific experiments, or payloads. JAA has identified two types of horizontally launched RLVs, Concept X and Concept Z, which are considered typical of vehicles proposed to launch from Cecil Field. Section 2.1.4 describes these vehicles. The Proposed Action includes the operation of a launch site to support the launch of both types of vehicles.

Although the proposed vehicles are currently considered experimental, the Proposed Action would not include the launch and reentry of any vehicles operating under an experimental permit. JAA proposes only the launch and reentry of vehicles operating under a license from Cecil Field. The proposed Concept X and Z vehicles are representative of the types of vehicles that would be expected to launch from Cecil Field under the Proposed Action. Therefore, this EA addresses potential impacts from Concept X and Concept Z vehicle launch and landing activities.

This EA addresses overall impacts to the environment of the FAA issuing JAA a Launch Site Operator License, including the proposed operations anticipated for the reasonably foreseeable future (the 5-year period of a Launch Site Operator License). Therefore, the activities analyzed under the Proposed Action are those associated with RLV launches and landings at Cecil Field. Analyzed activities include:

- Transporting the vehicle, vehicle components, and propellants to Cecil Field via road, rail, air, or a combination of these methods
- Assembling the various vehicle components
- Conducting checkout activities
- Loading the propellants into the launch vehicle

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<sup>2</sup> An RLV means a launch vehicle that is designed to return to Earth substantially intact and therefore may be launched more than one time or that contains vehicle stages that may be recovered by a launch operator for future use in the operation of a substantially similar launch vehicle (14 CFR part 401.5).

<sup>3</sup> A space flight participant is an individual, who is not crew, carried in a launch vehicle or reentry vehicle (49 United States Code 70102(17)).

- Loading the pilot, passengers, and other payload
- Towing or moving the launch vehicle to the proper launch or takeoff location
- Departing Cecil Field as an aircraft
- Igniting the rocket engines once the vehicle has reached a designated area over the Atlantic Ocean
- Collecting any debris from the runway prior to vehicle landing
- Recovering and transporting the launch vehicle from the runway after landing

JAA proposes to use Cecil Field's existing infrastructure, such as hangars, control tower, and runways for commercial space launch operations. Therefore, JAA does not anticipate new construction activities at Cecil Field related to the proposed spaceport.

### ***2.1.1 Present and Future Uses of Cecil Field***

Cecil Field, which served as a Naval Auxiliary Air Station from 1943 through 1999, is in northeast Florida, in Duval County, and within the Jacksonville city limits, as shown in Exhibits 2-1 and 2-2. The Airport is approximately 15 miles southwest of downtown Jacksonville, which sits on the St. Johns River, approximately 160 miles east of Tallahassee, 130 miles north of Orlando, and 300 miles southeast of Atlanta, Georgia.

Cecil Field is 6 miles south of Interstate Highway 10 and 7 miles west of Interstate Highway 295 along State Road 228 (Normandy Boulevard) and State Road 134 (103<sup>rd</sup> Street). The Airport is accessed directly from the intersection of State Roads 228 and 134 on New World Avenue or Aviation Avenue directly off State Road 134 (see Exhibit 2-3).

Cecil Field covers approximately 6,000 acres of property. Facilities at the Airport, shown in Exhibit 2-4, include four runways, taxiways, landside facilities, and aviation support infrastructure. There are two north/south oriented runways and two east/west oriented runways. Exhibit 2-5 shows the locations of proposed spaceport-related activities.

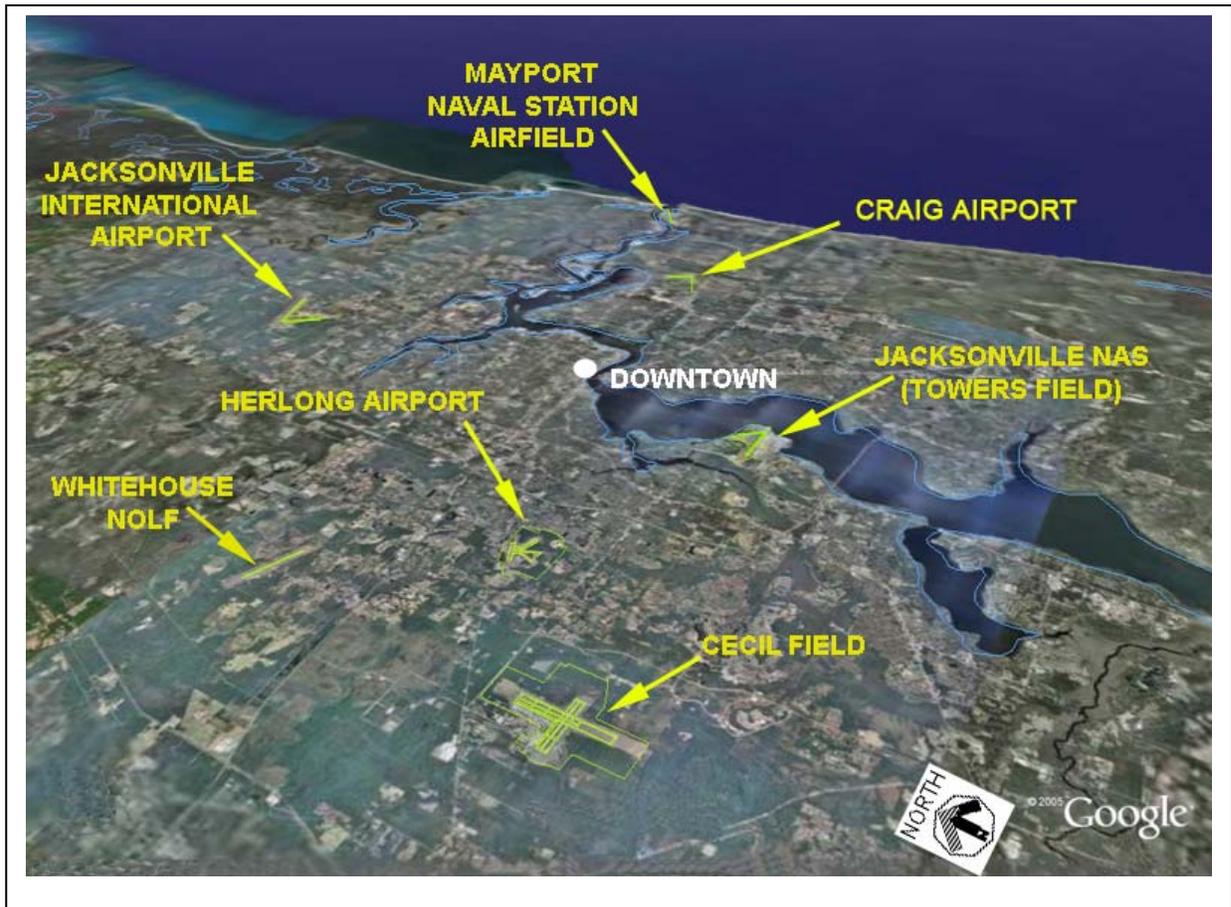
#### **2.1.1.1 Present Uses**

##### ***2.1.1.1.1 Building Infrastructure***

Cecil Field is classified as a general aviation airport and it is used for civilian and military flight training, maintenance, repair, and overhaul activities, and operations by military installations. JAA leases most of the structures along the two flight lines to various companies and government organizations. Many tenants also lease the smaller buildings near the JAA primary facility. Exhibit 2-6 shows landside and support facilities at Cecil Field. Appendix B describes tenant locations and activities.



**Exhibit 2-2. Cecil Field Location Map**

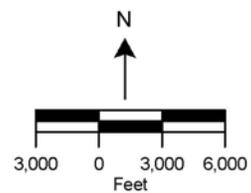


Source: Google, 2008b.

**Exhibit 2-3. Access to Cecil Field Airport**



- |   |                |   |                |
|---|----------------|---|----------------|
|  | Limited Access |  | Other Road     |
|  | Highway        |  | Ramp           |
|  | Major Road     |  | Ferry          |
|  | Local Road     |  | Pedestrian Way |
|  | Minor Road     |  | Runway         |
|   |                |  | Airport Area   |
|   |                |  | Rivers (Local) |



**Exhibit 2-4. Cecil Field Airport Diagram**

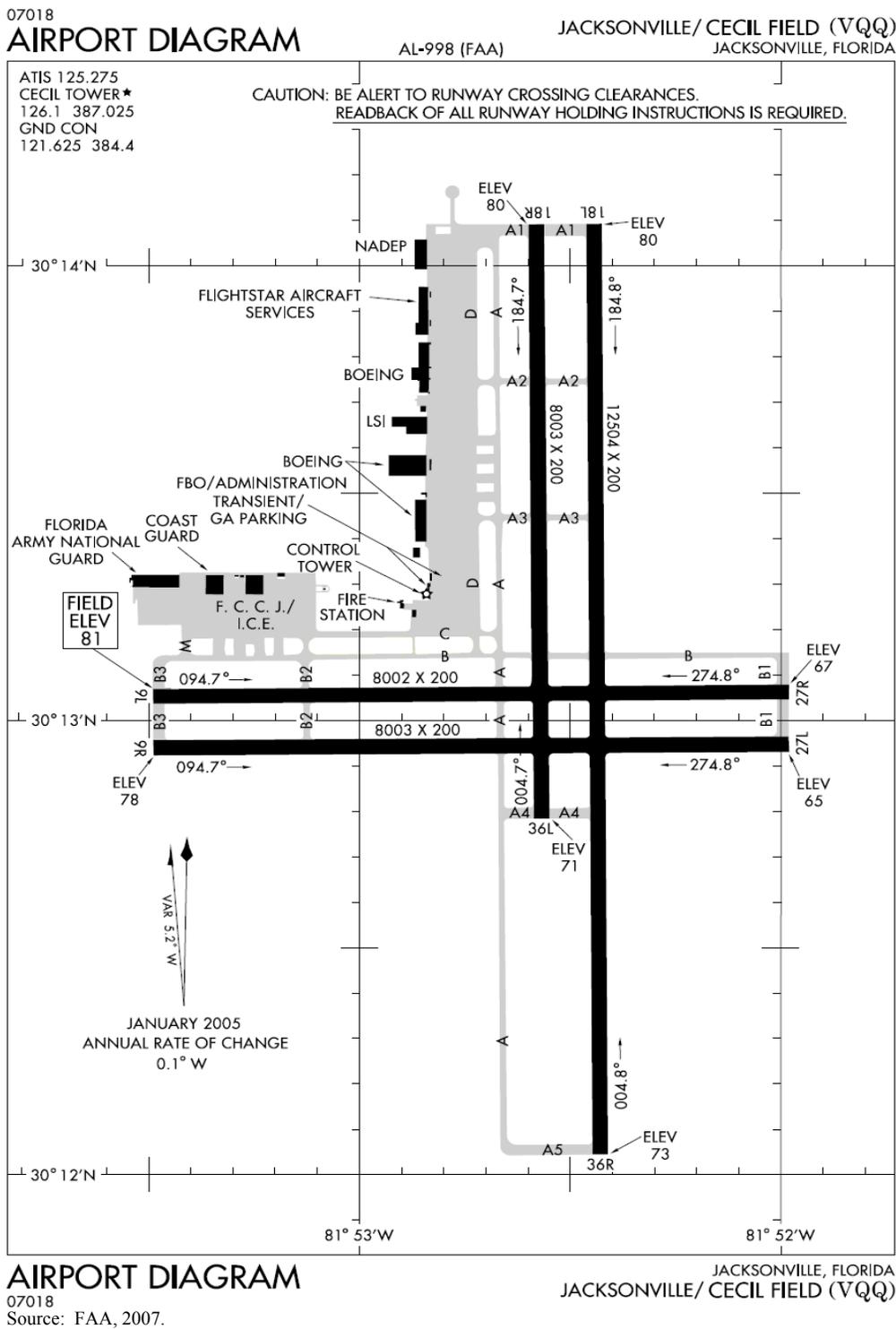
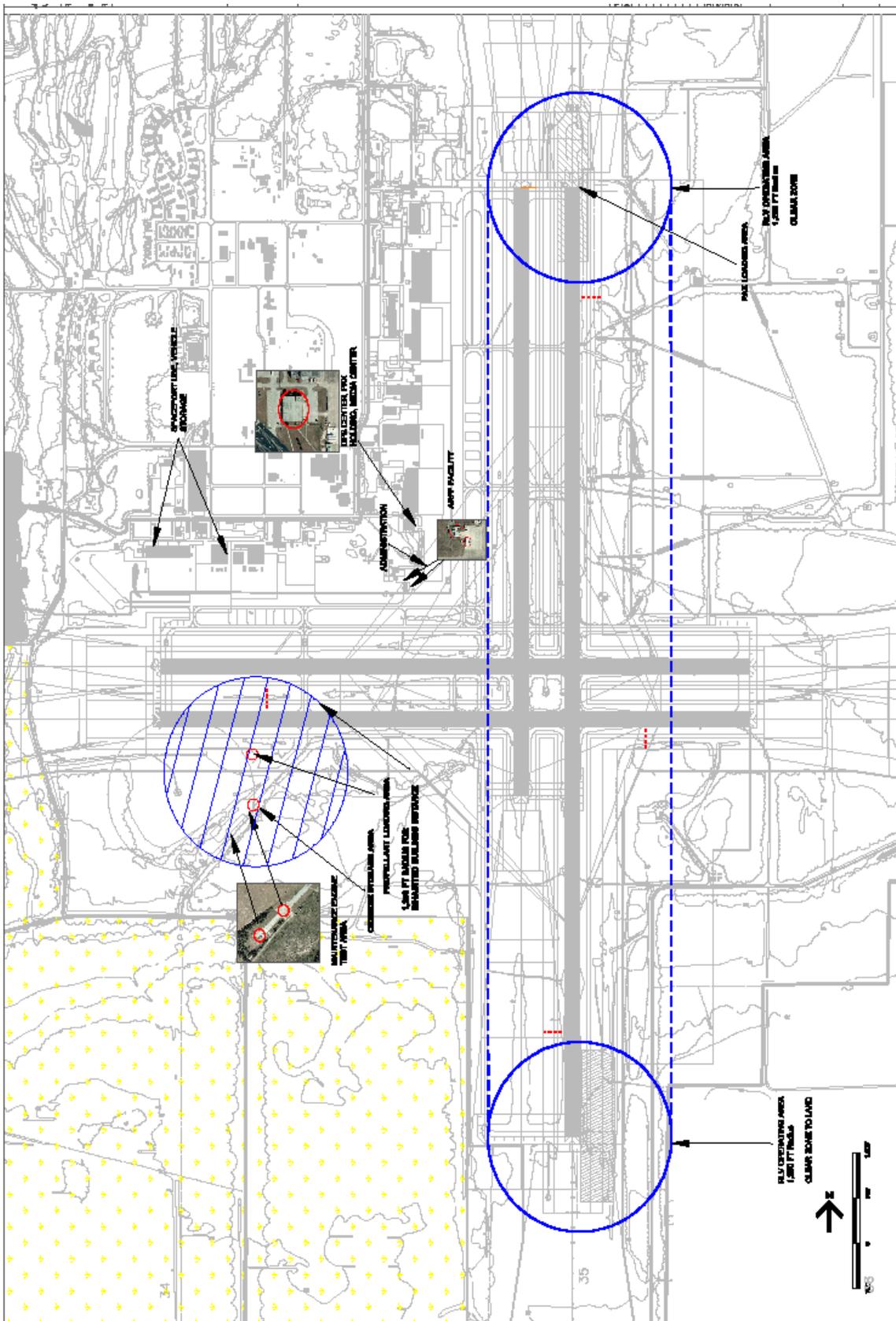
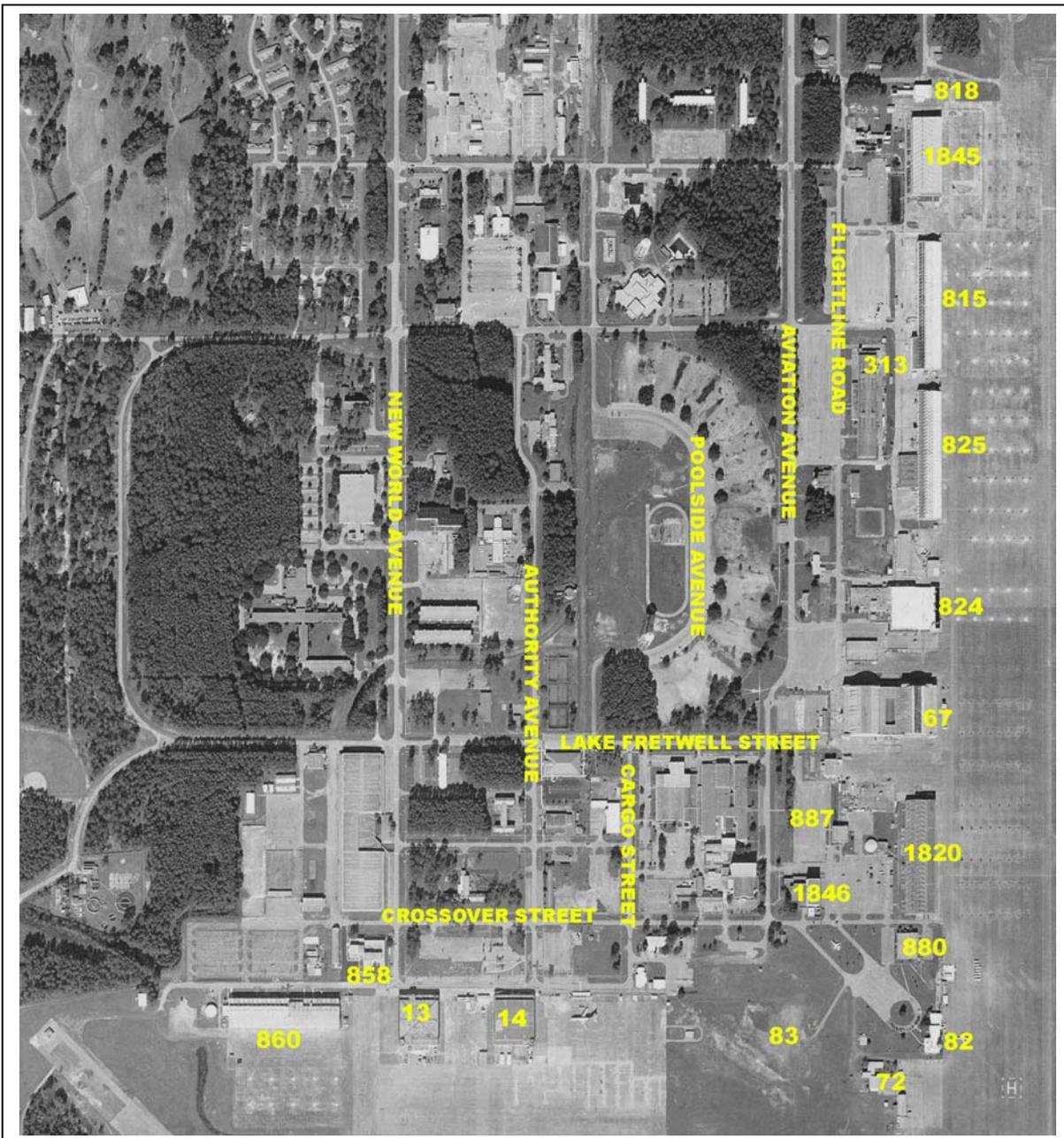


Exhibit 2-5. Spaceport Activity Locations



**Exhibit 2-6. Landside and Support Facilities at Cecil Field<sup>a,b</sup>**



- a. Source: JAA, 2008b
- b. Numerical references are building numbers.



### **2.1.1.1.2 Airfield**

The airfield facilities shown in Exhibit 2-4 include runways and taxiways. The runways consist of two north/south oriented runways and two east/west oriented runways. The primary runway at Cecil Field is Runway 18L-36R, which is oriented in a north/south direction and is 12,504 feet long and 200 feet wide. Approximately 5,460 feet of the runway are concrete; the remaining 7,040 feet are asphalt. The runway is equipped with a high-intensity runway light system and precision runway markings. All runways have 700 feet of concrete at each end.

Runway 18R-36L, 700 feet west of the primary runway, is 8,003 feet long and 200 feet wide. The runway is constructed of both asphalt and concrete and has non-precision runway markings, but no runway edge or centerline lights.

Runway 9L-27R is oriented in an east/west direction and is 8,002 feet long and 200 feet wide. The runway is constructed of both asphalt and concrete and has non-precision runway markings, but no runway edge or centerline lights.

Runway 9R-27L is 8,003 feet long and 200 feet wide, and like the other runways is constructed of both asphalt and concrete. The runway equipped with a high-intensity runway light system and is a non-precision runway. Touchdown zone markings are included on the Runway 9R end only.

Each of the runways at Cecil Field is designed for a weight-bearing capacity of single wheel 105,000 pounds, dual wheel 165,000 pounds, and dual tandem wheel 315,000 pounds. JAA anticipates that only Runway 18L-36R would be used for proposed spaceport operations.

The taxiways provide access to and between the runways. There are two primary parallel taxiways – A and B. In addition, there are several taxiway connectors that connect the parallel taxiways to the runways they serve.

Taxiway A serves as a parallel taxiway to Runways 18R-36L and 18L-36R with a centerline separation from Runway 18R-36L of 500 feet and a separation of 1,200 feet from Runway 18-36R. The taxiway is approximately 12,504 feet long and 75 feet wide, and is constructed of asphalt.

Taxiway B serves as a full-length parallel taxiway to Runways 9R-27L and 9L-27R. The taxiway is approximately 8,000 feet long and 75 feet wide and is constructed of asphalt.

Taxiway C extends from the westernmost apron edge and terminates at its intersection with Taxiway A. The taxiway is 3,995 feet long and 75 feet wide, and is constructed of concrete.

Taxiway D serves as a partial, parallel taxiway to the north/south oriented runways. The taxiway is 5,750 feet long and 75 feet wide, and is constructed of concrete.

### **2.1.1.2 Future Uses**

Operations activities at Cecil Field are not reflective of the traditional general aviation airport due to the various tenants that occupy hangar space there. However, JAA expects that Cecil

Field will mature into a very active executive-level general aviation facility over the next 20 years. The Cecil Field 2008 Master Plan Update provides data as to the general aviation activity currently taking place at Cecil Field as well as the activity projected to occur in the foreseeable future (JAA, 2008b).

The 2008 Master Plan Update indicates that in 2004, general aviation aircraft accounted for 42,303 of the 83,920 total operations at Cecil Field, approximately 50 percent. The Master Plan forecast indicates that the percentage of general aviation operations will likely increase to approximately 59 percent of the total operations at Cecil Field by 2009. In addition, the 2008 Master Plan Update shows a doubling in the number of aircraft based at Cecil Field over a 10-year period. Existing conditions in 2004 showed that 6 of the 38 aircraft based at Cecil Field were general aviation aircraft; the rest were military aircraft. General aviation aircraft are expected to dramatically increase according to the forecast. Exhibit 2-7 lists the number of existing and forecast aircraft based at Cecil Field.

**Exhibit 2-7. Existing and Forecast Cecil Field Based Aircraft**

Year	Government	General Aviation	Total
2004	32	6	38
2009	34	31	65
2014	36	37	72

Source: JAA, 2008b.

### **2.1.2 Scheduling of Spaceport Operations**

As part of the licensing process, an applicant is required to complete an agreement with the FAA Air Traffic Control office with jurisdiction over the airspace through which launches will take place (14 CFR 420.31). Launches would be scheduled as outlined in the Letter of Agreement between the Air Traffic Control Center, Jacksonville Approach Control, Cecil Field Air Traffic Control Tower, Fleet Area Control and Surveillance Facility, Jacksonville, and the JAA/Cecil Spaceport Operations Office (2008).

### **2.1.3 Flight Routes**

JAA initiated coordination with the FAA Jacksonville Air Route Traffic Control Center, the FAA Airports District Office, the FAA Air Traffic Control System Command Center, the Jacksonville Air Traffic Control Center Airspace and Procedures Office, the Jacksonville Air Traffic Control Center Traffic Management Unit, and the U.S. Navy’s Jacksonville Fleet Area Control and Surveillance Facility, Jacksonville, and detailed discussions determined a potential flight route to be used by the vehicles to and from Cecil Field to the designated launch area (see Exhibit 2-8).

It is anticipated that a vehicle would depart the primary runway at Cecil Field traveling in a southerly direction. It would ascend to an altitude coordinated with the above-named organizations while traveling along the route shown in Exhibit 2-8. Upon reaching the coordinated designated launch area over the Atlantic Ocean, the rocket engines would be fired and the vehicle would travel through the rocket portion of the flight over the ocean. Once the propellants had been expended and the vehicle descended from apogee, it would essentially

**Exhibit 2-8. Potential RLV Flight Route**



Source: DOT and RS&H, 2008.

- = FLIGHT ROUTE BOUNDARIES AND ALTITUDE BLOCKS
  - = FLIGHT ROUTE CENTERLINE
  - ◆ = WAYPOINTS
-

be an unpowered, but maneuverable, glider. It would perform a few maneuvers over the ocean to expend any remaining propellant then return to Cecil Field along the same flight route by which it left. It would glide to a landing on the primary runway at Cecil Field.

JAA plans to support RLVs with proven reliability. It is not anticipated that the airspace over Florida would be shut down to accommodate RLV launches; therefore, there would be no impacts to operations of nearby airports. If future RLV operations would be outside the scope of this analysis, those operations would be subject to a separate environmental review.

There are six instrument approaches in use at Cecil Field. These approaches include one precision approach (ILS 36R) and five non-precision approaches (VOR RWY 09R, GPS RWY 09R, GPS RWY 18L, GPS RWY 27L, and GPS RWY 36R). In addition to procedures for these six instrument approaches, there are four standard terminal arrival procedures at Cecil Field that are used to assist air traffic controllers in reducing workload and sequencing aircraft.

#### ***2.1.4 Launch Vehicle Concepts***

JAA has identified two types of suborbital horizontally launched RLVs considered typical of the vehicles that would operate from Cecil Field. Potential users of the launch site would be responsible for obtaining an FAA launch license. The FAA may use this EA as a basis for determining whether to license launches of vehicles proposing to launch from Cecil Field. Launch vehicles proposed to be launched from Cecil Field would use only suborbital trajectories. Launch vehicles would launch and land horizontally and would not require runway lengths in excess of existing infrastructure at Cecil Field.

##### **2.1.4.1 Concept X**

Launch vehicles included in Concept X would be single-component vehicles. The vehicle would have two turbojet engines using Jet-A fuel and two rocket engines using kerosene and liquid oxygen as propellants. Total thrust of the engines would be 36,000 pounds force. The wingspan of the representative vehicle would be approximately 25 feet, and the vehicle would be approximately 43 to 45 feet long. The weight of the launch vehicle when fully fueled would be approximately 19,500 pounds. Specifications for individual vehicles within their concept type would likely vary. Exhibit 2-9 shows a representative Concept X launch vehicle.

##### ***2.1.4.1.1 Flight Profile***

Concept X vehicles would takeoff horizontally under turbojet power from the primary runway at Cecil Field. Concept X vehicles require a runway length of 8,000 feet for takeoff. The vehicle would travel under jet power to the Warning Area located in the open ocean off the coast of Florida. Rocket ignition would occur at approximately 40,000 feet and at a horizontal orientation. Engine cutoff would occur at 150,000 feet at a maximum speed Mach 3.5 and with an apogee above 62 miles. Reentry would be ballistic descent with an unpowered horizontal landing. Total flight time would be less than 1 hour.

### Exhibit 2-9. Concept X Vehicle



Source: Rocketplane 7 Global, Inc., undated.

#### ***2.1.4.1.2 Pre-Launch Activities***

Launch operators would be required to notify JAA before a planned launch. JAA would coordinate all operations with the control tower chief. The JAA Cecil Field Airport/Spaceport Manager would notify the launch operator of other activities at the Airport, resolve potential conflicts for spaceport use, and notify other appropriate airspace scheduling agencies. Missions would be rehearsed with all flight and ground support crews prior to each launch, and rehearsals would be repeated with various failure scenarios and irregular performance to ensure crew readiness.

Before launch, the Concept X vehicle would roll out of its hangar and receive Jet-A fuel to top off the tanks. The vehicle would then taxi to the rocket propellant fueling area for fuel loading. The vehicle would then taxi north on Runway 18R to the north end of Runway 18L, and would meet the liquid oxygen tanker truck and any required portable filtering/pumping equipment. Liquid oxygen would be added to the vehicle. The area would be cleared of any hazardous fumes and the passengers would be loaded onto the vehicle; the vehicle would takeoff under turbojet power along the flight route shown in Exhibit 2-8 to the offshore Warning Area to be used for the launch area.

#### ***2.1.4.1.3 Launch Activities***

The vehicle would follow the departure route to the offshore Warning Area. The vehicle would ascend to 40,000 feet (about 7.6 miles) and proceed to the launch point. The rocket engine would be ignited and the jet engine shut down. The vehicle would ascend to 150,000 feet (about 28 miles) and the rocket engine would be shut down. The vehicle would coast to 330,000 feet (about 62.5 miles). The vehicle would follow a ballistic descent reentry and an unpowered glide to the arrival route. The pilot might dump excess propellants prior to arrival or landing. If the rocket engines were not fired or if burn was terminated, the pilot would dump all rocket propellants.

**2.1.4.1.4 Land Activities**

The pilot in command of the vehicle would request authorization from air traffic control to land at Cecil Field. The vehicle would make an unpowered horizontal landing on the designated runway. At present, there are no vehicles under development that would land under turbojet power during normal operations.

In the unlikely event of an emergency landing, the pilot in command would attempt to reach the nearest potential abort site. Potential abort sites could include existing airports in Florida and Georgia, including Jacksonville, Florida (Jacksonville International Airport, Jacksonville Naval Air Station, Mayport Naval Air Station); St. Augustine, Gainesville, Daytona Beach, and Orlando, Florida; and Brunswick and Savannah, Georgia. However, any airport within range with a runway at least 4,000 feet long would be a candidate for an emergency landing location.

**2.1.4.1.5 Launch Manifest**

The maximum number of launches that could occur per year for Concept X launch vehicles is as shown in Exhibit 2-10. JAA does not propose to exceed these maximum numbers. The total maximum number of launches of Concept X launch vehicles would be 144 over the 5-year licensing period.

**Exhibit 2-10. Maximum Number of Concept X Vehicle Launches per Year**

	2009	2010	2011	2012	2013
Maximum Number of Launches	12	12	24	48	48

**2.1.4.2 Concept Z**

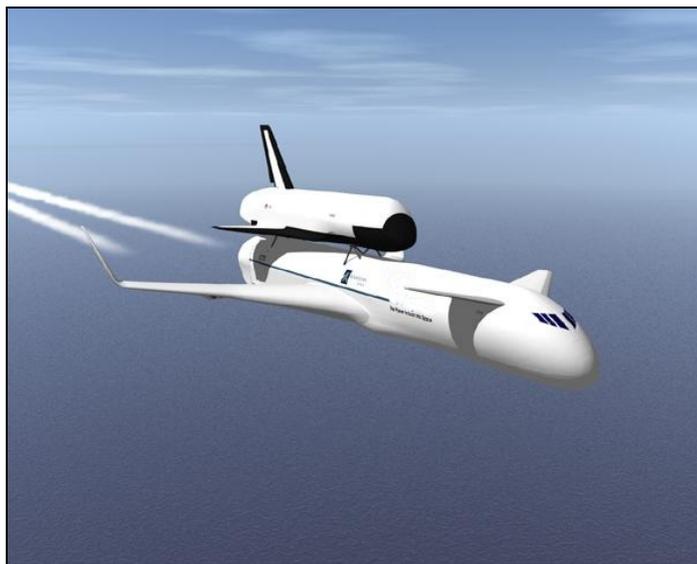
Vehicles included in the Concept Z RLV type consist of two components, a carrier aircraft and a mated suborbital launch vehicle. The carrier aircraft would have turbojet engines using Jet-A fuel. The carrier aircraft would carry the launch vehicle to the designated launch release altitude. The launch vehicle could use a hybrid rocket engine with nitrous oxide (N<sub>2</sub>O) and hydroxyl-terminated polybutadiene (HTPB) as propellants. The launch vehicle would use only suborbital trajectories. Concept Z vehicles would launch and land horizontally and would not require runway lengths in excess of existing infrastructure at the Cecil Field. Exhibit 2-11 shows a representative Concept Z vehicle.

The carrier aircraft and launch vehicle would both be piloted. The wingspan of a representative carrier aircraft, the White Knight Two developed by Scaled Composites, would be approximately 141 feet and it would be 79 feet long. The wingspan of the representative launch vehicle would be approximately 17 feet, and the vehicle would be approximately 20 feet long.

**2.1.4.2.1 Flight Profile**

The vehicle would follow the departure route to the offshore Warning Area. It would ascend to 50,000 feet and proceed to the launch point. The suborbital vehicle would separate from the carrier vehicle once at the launch area. The suborbital vehicle rocket engine would be ignited

### Exhibit 2-11. Concept Z Vehicle



Source: Andrews Space, Inc., undated

and the vehicle would ascend to 330,000 feet. The carrier aircraft would make a jet-powered horizontal landing on the designated runway at Cecil Field after releasing the launch vehicle. The launch vehicle would then descend and glide, unpowered, along the designated flight route to a horizontal landing at Cecil Field.

#### ***2.1.4.2.2 Pre-Launch Activities***

Launch operators would be required to notify JAA before a planned launch at Cecil Field and JAA would coordinate all operations with the control tower chief. The JAA Cecil Field Airport/Spaceport Manager would notify the launch operator of other activities at the Airport, resolve potential conflicts for use, and notify other appropriate airspace scheduling agencies. Missions would be rehearsed with all flight and ground support crews before each launch, and rehearsals would be repeated with various failure scenarios and irregular performance to ensure crew readiness. In addition, the launch vehicle would undergo propellant loading activities and the installation of a rocket motor prior to launch.

Before launch, the Concept Z carrier aircraft would roll out of its hangar mated with the launch vehicle. The launch vehicle would have the HTPB solid fuel installed and the carrier aircraft would subsequently receive Jet-A fuel in the ramp area to top off the tanks. The carrier aircraft would then taxi north on Runway 18R to the north end of the runway and would meet the N<sub>2</sub>O tanker truck and any required portable filtering/pumping equipment. The N<sub>2</sub>O would be added to the launch vehicle. The area would be cleared of any hazardous fumes and the passengers would be loaded onto the launch vehicle.

#### ***2.1.4.2.3 Launch Activities***

The carrier aircraft, mated to the launch vehicle, would take off under turbojet power along the flight route shown in Exhibit 2-8 to the Atlantic Ocean and the offshore Warning Area to be used

for the launch area. The launch vehicle would be released from the carrier aircraft when the carrier aircraft reaches an altitude of approximately 50,000 feet (about 9.5 miles) and the rocket engine on the launch vehicle would be ignited. The launch vehicle would climb at an angle of approximately 85 degrees until the propellant is consumed (after approximately 65 seconds of climbing). The launch vehicle would continue to coast to apogee. Concept Z vehicles would likely reach apogee at approximately 330,000 feet (about 62.5 miles). After reaching apogee, the vehicle would descend in a controlled manner. The pilot might dump excess N<sub>2</sub>O prior to arrival or landing. If the rocket engines were not fired or if burn was terminated, the pilot would dump all N<sub>2</sub>O.

**2.1.4.2.4 Land Activities**

After releasing the launch vehicle, the pilot in command of the carrier aircraft would request authorization from the air traffic control tower to land at Cecil Field. The carrier aircraft would make a powered horizontal landing on the designated runway. Upon descent to a designated altitude, the pilot in command of the launch vehicle would request authorization from the air traffic control tower to land at Cecil Field. The launch vehicle would make a maneuverable unpowered horizontal landing on the designated runway at Cecil Field.

In the unlikely event of an emergency landing, the pilot in command would attempt to reach potential abort sites. Potential abort sites could include existing airports in Florida and Georgia, including Jacksonville, Florida (Jacksonville International Airport, Jacksonville Naval Air Station, Mayport Naval Air Station); St. Augustine, Gainesville, Daytona Beach, and Orlando, Florida; and Brunswick and Savannah, Georgia. However, any airport within range with a runway at least 4,000 feet would be a candidate for an emergency landing location.

**2.1.4.2.5 Launch Manifest**

Exhibit 2-12 shows the maximum number of JAA-proposed annual launches for Concept Z vehicles. The total maximum number of launches of Concept Z vehicles would be 15 over the 5-year licensing period.

**Exhibit 2-12. Maximum Number of Concept Z Vehicle Launches per Year**

	2009	2010	2011	2012	2013
Maximum number of launches	2	2	3	4	4

**2.1.4.3 Summary of Launch Vehicle Concepts Analyzed in this Environmental Assessment**

Exhibit 2-13 summarizes the different launch vehicle concepts proposed for launch from Cecil Field.

**2.1.5 Propellant Storage**

Under the Proposed Action, both liquid and solid propellants could be stored temporarily at Cecil Field. These propellants could include jet fuel, kerosene (RP-1), alcohol, liquid oxygen, nitrous oxide, and HTPB. The staging area for fuels would be on the ramp. The oxidizer staging area would be in the same area but a minimum distance of 100 feet from the propellant(s). The

**Exhibit 2-13. Summary of Vehicle Concepts<sup>a</sup>**

<b>Vehicle</b>	<b>Ignition Source at Ground</b>	<b>Launch Vehicle Propellant Type<sup>b</sup></b>	<b>Use of Carrier Aircraft</b>	<b>Landing Type</b>
Concept X	Jet power	Kerosene (RP-1) or alcohol and LOX	No	Unpowered
Concept Z	Jet power	N <sub>2</sub> O and HTPB	Yes	Unpowered <sup>c</sup>

a. Source: Representative vehicle manufacturers.

b. RP-1 = rocket propellant 1; LOX = liquid oxygen; N<sub>2</sub>O = nitrous oxide; HTPB = hydroxyl-terminated polybutadiene.

c. The carrier aircraft would have a powered landing; only the launch vehicle would land unpowered.

staging area would be outside the quantity distance area for the flight vehicles. It is anticipated that the propellants and the oxidizers would be trucked to Cecil Field and the staging areas by trailer. It is not anticipated that the trailers, propellants, or oxidizers would be housed while they are at Cecil Field. If an electrical storm entered the area of Cecil Field, the Cecil Field Air Traffic Control Tower would notify all parties within the staging area to evacuate until the electrical storm had passed.

## **2.2 Alternatives**

### **2.2.1 Proposed Action**

As noted earlier, the Proposed Action for this study is for the FAA to issue a Launch Site Operator License to JAA to operate a commercial spaceport at Cecil Field in Jacksonville, Florida.

### **2.2.2 No Action Alternative**

The only alternative to the Proposed Action is the No Action Alternative. Under this alternative, the FAA would not issue a Launch Site Operator License to JAA and there would be no commercial space launches from Cecil Field. The Airport would continue to be available for existing general aviation and training-related activities.

### **2.2.3 Alternatives Considered but Not Carried Forward**

Five other alternatives were considered and eliminated from further analysis, as described in Sections 2.2.3.1 through 2.2.3.5.

#### **2.2.3.1 Launches of Concept Y Vehicles from Cecil Field**

JAA considered whether to allow Concept Y vehicles to launch from Cecil Field. Launch vehicles included in Concept Y are single-component vehicles. The rocket engine would be ignited while the launch vehicle was on the runway at Cecil Field. The vehicles would launch horizontally from a runway at Cecil Field and would turn east to fly to the Atlantic Ocean, then fly northeast or southwest over the Atlantic Ocean along a steep trajectory until the propellants were expended or rocket engines were turned off. At no point during the flight would the vehicle reach supersonic speeds. The vehicles would coast unpowered along a parabolic trajectory until reaching apogee. They would then coast down until pullout and glide to a descent to Cecil Field. Before reaching Cecil Field, it might be necessary to conduct additional maneuvers to expend excess fuel prior to conducting an unpowered horizontal landing.

JAA determined that it would be very difficult to maneuver the vehicle around the very busy flight aviation corridors between Cecil Field and the Atlantic Ocean once it was airborne. Because Concept Y vehicles would be considered rockets upon takeoff, it is probable that all airspace through which they would fly would have to be closed to all other aircraft for the duration of their flight through that airspace. This and the potential for increased noise at Cecil Field due to the ignition of the rockets prompted the decision to not include the Concept Y vehicle in the Proposed Action.

### **2.2.3.2 Operation of Vertical Launch Vehicles**

JAA has decided not to pursue vertical launches from Cecil Field at this time and rather to focus its development and marketing efforts on horizontally launched RLVs using suborbital trajectories. If in the future JAA decided to consider vertical launches from Cecil Field, that action would be subject to a separate environmental review.

### **2.2.3.3 Horizontally Launched RLVs Using Aerial Fueling**

Horizontally launched RLVs using aerial fueling would take off under jet engine power from a conventional runway. At a designated altitude (typically between 20,000 and 50,000 feet) above mean sea level, a tanker airplane would transfer liquid propellants to the launch vehicle. The tanker airplane would disengage after the propellants were transferred and the launch vehicle would ignite its rocket engines once the tanker airplane cleared the area. Both the tanker aircraft and the launch vehicle would return and land under jet power. Although launch vehicles based on this concept have been proposed, they are in a less mature stage of development than the two vehicle concepts described in Section 2.1.4. The production and launch of this vehicle concept is not reasonably foreseeable within the 5-year timeframe of the subject license; therefore, it is not analyzed in this EA. In the future if this vehicle concept becomes ready for analysis, that action would be subject to a separate environmental review.

### **2.2.3.4 Vehicles Launched from Other Sites and Landing at Cecil Field Spaceport**

Although launch vehicle operators have proposed to develop launch vehicles that would launch from one location and land in another location, the development of these vehicles is not considered reasonably foreseeable within the 5-year timeframe of the subject license. Therefore, this EA does not consider that vehicle concept. In the future if this vehicle concept becomes ready for analysis, that action would be subject to a separate environmental review.

### **2.2.3.5 Alternative Airport/Spaceport Locations**

The alternative airport sites for use as a spaceport must have adequate infrastructure and available airspace. Required infrastructure in this case would include a runway long enough to accommodate takeoff of horizontal launch vehicles (at least 8,000 feet), suitable land, and building infrastructure to house and accommodate pre- and post-launch activities, airspace suitable for the proposed flight requirements, and minimal impacts to current uses resulting from closure of runways or taxiways during launch operations.

Of the airports JAA operates, only Cecil Field and Jacksonville International Airport have the infrastructure necessary to accommodate spaceport operations. The others, Craig and Herlong, do not have the runway lengths or land-use compatibility required for spaceport activities.

Although the infrastructure at Jacksonville International Airport would likely be capable of supporting a commercial spaceport, operations related to spaceport activities would likely conflict with the Airport's aviation activities, severely hampering passenger throughput. Cecil Field possesses the resources, infrastructure, and operational flexibility needed to support Concept X and Z vehicles and has been identified as the preferred spaceport site. Other locations could, in the future, identify specific launch vehicle concepts or specific launch operators for which their facility possesses the resources and the infrastructure necessary to support the proposed operations.

### **2.3 Potential Emergency Landing Sites**

While a 10,000-foot-long runway would be preferred, Exhibit 2-14 provides a detailed list of alternative landing sites with the required length of runway for landing distance. Several locations have runways of at least 8,000 feet needed to accommodate Concept X launch vehicle takeoff. However, Runway 18L-36R at Cecil Field is the longest in the region (12,504 feet).

Locations identified in bold in Exhibit 2-14 have sufficient runway lengths (4,000 feet) to accommodate an emergency landing or aborted launch of a Concept X or Z vehicle. Therefore, while these locations are not carried forward as spaceport alternatives, they are considered possible emergency landing sites.

**Exhibit 2-14. Summary of Potential Emergency Landing Sites<sup>a,b</sup> (page 1 of 3)**

State	Airport	Distance From Cecil Field (nautical miles)	Runway			Runway			Runway		
			Orientation	Length x Width (meters <sup>c</sup> )	Single-Wheel Pavement Strength (kilo-grams <sup>d</sup> )	Orientation	Length x Width (meters <sup>c</sup> )	Single-Wheel Pavement Strength (kilo-grams <sup>d</sup> )	Orientation	Length x Width (meters <sup>c</sup> )	Single-Wheel Pavement Strength (kilo-grams <sup>d</sup> )
Florida	Cecil Field	0	18L/36R	3,811 x 61	47,627	9R/27L	2,439 x 61	47,627	18R/36L	2,439 x 61	47,627
Florida	Herlong	4.9	7/25	1,219 x 30	13,608	11/291	1,067 x 30	13,608			
Florida	Jacksonville NAS	10.2	9/27	2,438 x 61	N/A	14/32	1,824 x 61	N/A			
Florida	Jacksonville International	19.9	7/25	3,048 x 46	45,360	13/31	2,347 x 46	45,360			
Florida	Craig	20.3	5/23	1,220 x 46	13,608	14/32	1,219 x 30	13,608			
Florida	Keystone Airpark	23.5	4/22	1,525 x 30	18,144	10/28	1,493 x 23	13,608			
Florida	Mayport NAS	26.5	5/23	2,439 x 61	43,545						
Florida	Fernandina Beach	31.9	4/22	1,615 x 30	19,050	13/31	1,570 x 30	19,051	8/26	1,523 x 30	19,051
Florida	St. Augustine	32.4	13/31	2,437 x 46	27,215	6/24	823 x 18	40,823	2/20	797 x 23	N/A
Florida	Palatka	34.1	9/27	1,829 x 30	9,525	17/35	1,067 x 23	14,061	12/30	914 x 23	4,536
Florida	Lake City	35.6	10/28	2,439 x 46	34,019	5/23	1,219 x 23	N/A			
Georgia	St. Marys	36	4/22	1,524 x 30	9,072	13/31	1,219 x 23	N/A			
Florida	Gainesville	37.7	11/29	2,287 x 46	34,019	7/25	1,267 x 30	34,019			
Florida	Regional Flagler County	57	6/24	1,524 x 30	27,216	11/29	1,524 x 30	27,216			
Florida	Suwannee County	59.7	7/25	1,230 x 23	9,072						
Florida	Williston	60.4	5/23	1,948 x 46	20,865	14/32	1,320 x 30	17,237			

Exhibit 2-14. Summary of Potential Emergency Landing Sites<sup>a,b</sup> (page 2 of 3)

State	Airport	Distance From Cecil Field (nautical miles)	Runway				Runway				
			Orientation	Length x Width (meters <sup>c</sup> )	Single-Wheel Pavement Strength (kilo-grams <sup>d</sup> )	Orientation	Length x Width (meters <sup>c</sup> )	Single-Wheel Pavement Strength (kilo-grams <sup>d</sup> )	Orientation	Length x Width (meters <sup>c</sup> )	Single-Wheel Pavement Strength (kilo-grams <sup>d</sup> )
Florida	Ocala International	65.3	18/36	2,105 x 46	27,216	8/26	917 x 15	13,608	13/31	1,075 x 23	8,165
Georgia	Brunswick Golden Isles	65.9	7/25	2,439 x 46	54,431						
Georgia	Waycross	67.4	18/36	1,829 x 30	20,412	5/23	1,535 x 30	8,165	13/31	1,075 x 23	8,165
Georgia	Homer-ville	68.3	14/32	1,219 x 23	13,608						
Florida	Cross City	72.8	4/22	1,526 x 23	5,897	13/31	1,524 x 30	5,897			
Florida	Dunnellon	74.1	5/23	1,506 x 30	N/A	9/27	4,702 x 60	N/A			
Florida	Daytona Beach	75.5	7L/25R	3,200 x 46	58,967	16/34	1,829 x 46	34,019	7R/25L	973 x 30	13,608
Florida	Deland	75.7	12/30	1,829 x 30	27,216 (DW)	5/23	1,311 x 23	18,144 (DW)			
Georgia	Valdosta	79.9	17/35	1,921 x 46	27,216	4/22	1,706 x 30	10,886	13/31	1,108 x 23	10,886
Georgia	Jessup	80.1	10/28	1,676 x 23	9,752						
Florida	Leesburg	83.8	13/31	1,524 x 30	N/A	3/21	1,511 x 30	9,072			
Florida	New Smyrna Beach	84.9	6/24	1,524 x 23	24,948	11/29	1,316 x 30	24,948	2/20	1,219 x 30	24,948
Georgia	Bacon County	85.4	15/33	1,524 x 30	13,608						
Florida	Crystal River	88.8	9/27	1,388 x 23	N/A	18/36	920 x 30	N/A			
Florida	Perry-Foley	88.9	18/36	1,520 x 30	13,608	12/30	1,449 x 46	13,608	6/24	1,334 x 46	13,608
Georgia	Douglas	90.9	4/22	1,830 x 46	11,793						
Georgia	Berrien County	91.7	10/28	1,221 x 23	10,433						

Exhibit 2-14. Summary of Potential Emergency Landing Sites<sup>a,b</sup> (page 3 of 3)

State	Airport	Distance From Cecil Field (nautical miles)	Runway			Runway			Runway		
			Orientation	Length x Width (meters <sup>c</sup> )	Single-Wheel Pavement Strength (kilo-grams <sup>d</sup> )	Orientation	Length x Width (meters <sup>c</sup> )	Single-Wheel Pavement Strength (kilo-grams <sup>d</sup> )	Orientation	Length x Width (meters <sup>c</sup> )	Single-Wheel Pavement Strength (kilo-grams <sup>d</sup> )
Florida	Orlando Sanford	92	9L/27R	2,926 x 46	13,608	18/36	1,829 x 46	13,608	9C/27C	1,090 x 23	5,443
Georgia	Baxley	93.6	8/26	1,525 x 23	8,618						
Georgia	Hazelhurst	107.5	14/23	1,374 x 23	13,608						
Georgia	Spence	109.2	14/32	1,372 x 23	29,484						
Georgia	Tifton	110.3	15/33	1,678 x 30	19,051	10/28	1,160 x 23	13,608			
Georgia	Thomasville	111.4	4/22	1,678 x 30	13,608	14/32	1,524 x 30	9,072			
Florida	Orlando International	111.4	18L/36R	3,659 x 61	74,843	18R/36L	3,659 x 61	45,359	17R/35L	3,048 x 46	34,019
Georgia	Moultrie Municipal	112.2	4/22	1,563 x 30	13,608	16/34	1,182 x 23	5,670			
Georgia	Claxton	118.6	9/27	1,525 x 23	13,608						
Georgia	Savannah	119.7	9/27	2,850 x 46	34,019	18/36	2,140 x 46	34,019			

a. Source: AirNav, 2007.

b. Bold text indicates runways with lengths of at least 1,219 meters.

c. To convert meters to feet, multiply by 3,2808.

d. To convert kilograms to pounds, multiply by 2.2046.

### **3. AFFECTED ENVIRONMENT**

This chapter describes the existing natural and human (manmade) environment at and around the Cecil Field Airport that the Proposed Action, if implemented, could affect. This information establishes a baseline for use in determining potential impacts of the Proposed Action and the No Action Alternative, as described in Chapter 4.

The area of potential effect for this assessment includes the geographic area within which direct and indirect impacts could reasonably be expected to occur and cause a change in the existing conditions of the impact category of interest. The area of potential effect includes areas contained within the boundaries of Cecil Field and all areas underlying the reusable launch vehicle (RLV) flight route described in Chapter 2.

Federal Aviation Administration (FAA) Order 1050.1E, Change 1, Environmental Impacts: Policies and Procedures, requires an evaluation of impacts for specific impact categories. This chapter describes existing conditions for the following impact categories:

- Climate and Air Quality (Section 3.1)
- Coastal Resources (Section 3.2)
- Compatible Land Use (Section 3.3)
- Department of Transportation Act, Section 4(f), Resources (Section 3.4)
- Farmlands (Section 3.5)
- Fish, Wildlife, and Plants (Section 3.6)
- Floodplains (Section 3.7)
- Hazardous Materials, Pollution Prevention, and Solid Waste (Section 3.8)
- Historical, Architectural, Archaeological, and Cultural Resources (Section 3.9)
- Light Emissions and Visual Resources (Section 3.10)
- Natural Resources, Energy Supply, and Sustainable Design (Section 3.11)
- Noise (Section 3.12)
- Socioeconomics (Section 3.13)
- Water Quality (Section 3.14)
- Wetlands (Section 3.15)
- Wild and Scenic Rivers (Section 3.16)
- Children's Environmental Health and Safety Risks (Section 3.17)
- Environmental Justice (Section 3.18)

In addition, this chapter describes existing conditions for impact categories not specifically identified in FAA Order 1050.1E, Change 1, as follows:

- Airports/Airport Users (Section 3.19)
- Airspace (Section 3.20)
- Transportation (Section 3.21)

### **3.1 Climate and Air Quality**

#### **3.1.1 Climate**

The City of Jacksonville's climate is subtropical, but tends to be cooler than the Florida peninsula to the south. Winters can be marked by periods of cold weather, and once every few years there is limited snow or ice.

The hottest month is July, with an average high of 92 degrees Fahrenheit (°F) and an average low of 70 °F. December is usually the coldest month, with an average high of 61°F and an average low of 38 °F.

Normal annual precipitation is 51.3 inches, with monthly totals accumulating from July through September.

#### **3.1.2 Air Quality**

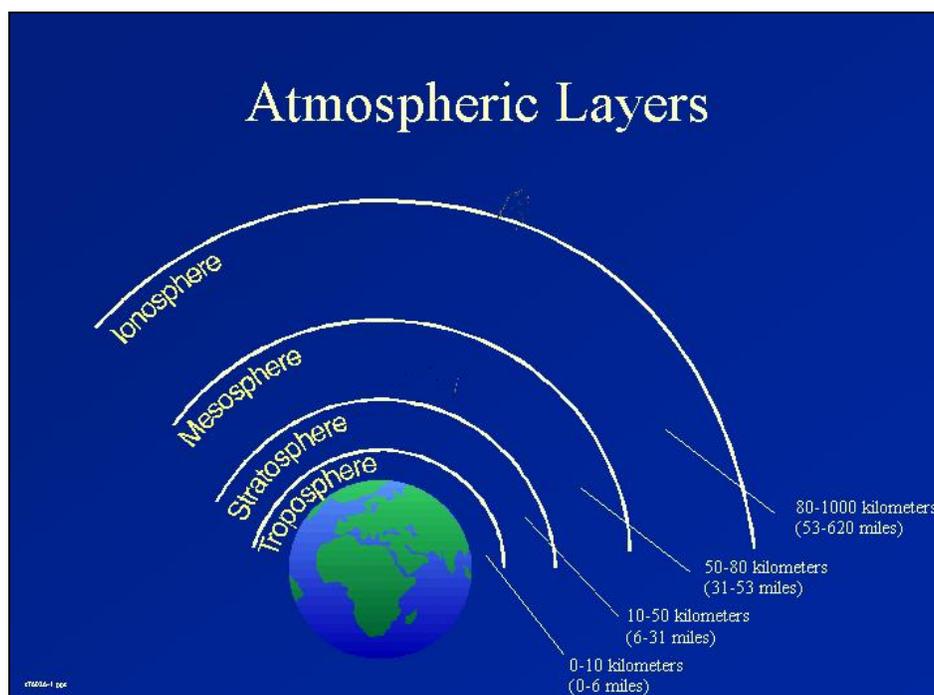
##### **3.1.2.1 Atmospheric Layers**

Earth's atmosphere consists of four main layers – troposphere, stratosphere, mesosphere, and ionosphere – separated by narrow transition zones. Each layer is characterized by altitude, temperature, structure, density, composition, and degree of ionization (*i.e.*, the positive or negative electric charge associated with each layer). For purposes of this EA, lower atmosphere refers to the troposphere, which extends from sea level to an altitude of approximately 6.2 miles. Upper atmosphere refers to the stratosphere, which extends from an altitude of 6.2 miles to approximately 31 miles. Exhibit 3-1 depicts the altitude ranges associated with the atmospheric layers.

More than 99 percent of the total atmospheric mass is concentrated within 25 miles of Earth's surface. The upper boundary at which gases disperse into space lies at an altitude of approximately 620 miles above sea level (FAA, 2005). The higher layers of the atmosphere, which are comprised of the mesosphere and ionosphere, differ significantly in composition from the lower layers and also contain a considerable proportion of ionized (electrically charged) gas atoms and molecules (FAA, 2005). The following paragraphs describe the approximate altitude, temperature, air density, and air composition of each atmospheric layer.

##### **3.1.2.1.1 Troposphere**

The troposphere is the region of the atmosphere where weather occurs and includes the air that living organisms breathe. Ambient air quality in the lower atmosphere is usually measured in terms of the concentration of various air pollutants in the atmosphere. The impact of exposure to ambient contaminants is a function of the pollutant involved, the duration of the exposure, and the concentrations reached during the exposure. The significance of a pollutant concentration is determined by comparing the concentration with appropriate Federal and State ambient air quality standards. These standards represent the pollutant concentration thresholds at which public health and welfare are protected and include a reasonable margin of safety (see Section 3.1.2.2).

**Exhibit 3-1. Altitude Range for Atmospheric Layers**

Source: FAA, 2005; not to scale; vertical dimension of atmosphere is exaggerated for clarity.

Ground-level or tropospheric ozone ( $O_3$ ), which can cause harmful effects to humans and the environment, is among the pollutants regulated by ambient air quality standards. Ozone is made up of three oxygen molecules and is highly reactive. Ground-level ozone is not emitted directly, but is formed in the presence of sunlight by tropospheric chemical reactions among precursor pollutants that are emitted, primarily volatile organic compounds (VOCs) and nitrogen oxides ( $NO_x$ ). Ground-level ozone is different from the stratospheric ozone layer (discussed below) which protects Earth from harmful ultraviolet (UV) radiation.

### ***3.1.2.1.2 Stratosphere***

The stratosphere is the second major layer of the atmosphere and occupies the region from 6.2 to 31 miles above Earth's surface. The stratosphere also contains the area known as the ozone layer, which is between 12 and 19 miles above Earth's surface. Ozone plays a major role in regulating the thermal regime of the stratosphere. The temperature increases with ozone concentration because solar energy is converted to molecular kinetic (heat) energy when ozone molecules absorb UV radiation, resulting in heating of the stratosphere (FAA, 2005). Air temperature in the stratosphere remains relatively constant up to an altitude of 16 miles, where it then gradually increases to a temperature of about  $-95^\circ\text{F}$  at the lower boundary of the stratopause (the upper boundary of the stratosphere) (FAA, 2005).

The stratosphere contains 90 percent of Earth's atmospheric ozone and acts as a UV radiation shield for the plants and animals on the surface of Earth. Stratospheric ozone is generated by the action of sunlight causing an oxygen molecule ( $O_2$ ) to combine with an atom of oxygen. Stratospheric ozone is continually created and destroyed by naturally occurring photochemical

processes and its concentration fluctuates geographically (generally increasing from equatorial latitudes to the polar regions), seasonally (about 25 percent in temperate regions), and annually (1 to 2 percent globally) (FAA, 2005).

### **Ozone Depletion**

Ozone in the atmosphere shields Earth from harmful levels of UV radiation by absorbing some of the UV rays emitted by the sun. Excess levels of UV radiation can result in adverse human health effects ranging from sunburn to skin cancer and immune deficiencies. Most of the UV-shielding ozone layer over Earth's surface is contained within the stratosphere. This protective ozone is different from ground level or tropospheric ozone, which can result in harmful effects to humans and the environment via direct exposure. Stratospheric ozone can be destroyed through chemical and photochemical reactions. As a result, the presence of pollutants that are key components of these reactions (especially chlorine) can result in ozone depletion. Particulate matter might also affect stratospheric ozone; however, the exact impact of particulate matter on ozone depletion is unclear.

Ozone concentrations in the stratosphere have been on a long-term, global downward trend due to ozone-depleting substances such as chlorofluorocarbons (CFCs) and halons, which were formerly used as refrigerants, solvents, and fire-extinguishing agents (FAA, 2005). When these substances reach the stratosphere, UV radiation breaks up the molecules, releasing chlorine and bromine atoms that destroy ozone. One chlorine atom can destroy more than 100,000 ozone molecules. Decreasing ozone levels reduce the effectiveness of the UV shield and allow more Ultraviolet Radiation Band "B" (UVB) radiation to reach Earth's surface. Because UVB radiation is known to be particularly damaging to cellular nucleic acids, this raises the risk of human health problems and biological damage (FAA, 2005). Aluminum oxide particulates and soot aerosols emitted from solid and liquid propellant rocket engines and related to volcanism and wildfires can also provide reaction surfaces for the destruction of ozone. Nitrogen dioxide (NO<sub>2</sub>) also functions as a catalyst for the destruction of ozone in the stratosphere.

The release of ozone-depleting substances has resulted in an annual "ozone hole" over Antarctica since the 1980s. In the worst years, the ozone concentration can be decreased by 60 percent, allowing twice the amount of normal UVB radiation to reach Earth's surface (FAA, 2005). Ozone depletion has become a global issue and has been observed over North America, South America, Europe, Asia, Africa, and Australia (FAA, 2005). In response to the decreasing ozone levels, the United States placed a ban on CFC use in aerosol sprays in the 1970s. In 1994, the United States and other developed countries halted production of halons, and in 1996, under the Montreal Protocol, ended the production of CFCs. In addition, under the Clean Air Act, as amended (42 U.S.C. 7401 *et seq.*), the United States regulates carbon monoxide (CO), NO<sub>x</sub>, VOCs, and sulfur dioxide (SO<sub>2</sub>) because of their roles in influencing the formation and destruction of both tropospheric and stratospheric ozone in addition to other ground-level air quality issues (see Section 3.1.2.2). Because of measures taken under the Montreal Protocol, emissions of ozone-depleting substances are decreasing. Based on measurements of total inorganic chlorine in the atmosphere, which stopped increasing in 1997 and 1998, stratospheric chlorine levels have peaked and are no longer increasing. The natural ozone production process is expected to restore the naturally occurring levels of stratospheric ozone in about 50 years (FAA, 2005).

## **Climate Change**

Climate change refers to long-term fluctuations in temperature, precipitation, wind, and other elements of Earth's climate system. Atmospheric gases affect Earth's surface temperature by absorbing solar radiation that is reflected by Earth's surface back into space. The concentration of these gases, known as greenhouse gases, is increasing as a result of human activities. The primary greenhouse gases are carbon dioxide (CO<sub>2</sub>), CFCs, methane, and nitrous oxide. CO<sub>2</sub> is the most significant greenhouse gas resulting from human activity and represented approximately 85.4 percent of total greenhouse gas emissions in 2007 (EPA, 2009).

The greatest source of CO<sub>2</sub> and greenhouse gas emissions overall is fossil fuel combustion from stationary sources (e.g., power plants, industry, and manufacturing processes) and mobile sources (e.g., automobiles, trucks, aircraft, construction equipment, and small engines, such as lawn mowers). Electric-power generation from both utilities and non-utilities accounted for the greatest source of greenhouse gas emissions in the United States in 2001, closely followed by transportation sources and industrial processes. Annually, the total consumption of fossil fuels in the United States and the emissions from the combustion of those fuels generally fluctuate in response to changes in general economic conditions, energy prices, weather (temperature extremes during winters and summers), and the availability/acceptance of non-fossil fuel alternatives (FAA, 2005).

The possibility of global climate change due to the increased introduction of greenhouse gases into the atmosphere through human activity is a widely publicized, global issue with potential major long-term implications for ecosystems. Most scientists now agree that climate change is largely a result of greenhouse gas emissions from human activities.

### ***3.1.2.1.3 Mesosphere***

The mesosphere is between 31 and 50 miles above Earth's surface. The mesosphere is the coldest layer of the atmosphere, with the temperature decreasing as altitude increases. The coldest temperatures at the mesopause (the upper boundary of the mesosphere) can reach -180 °F (FAA, 2005). Ozone and water (H<sub>2</sub>O) are found in negligible concentrations in this layer. The air composition in this layer is made up of lighter gases that are stratified according to their molecular weight due to gravitational separation (FAA, 2005). In the mesosphere, objects entering Earth's atmosphere at high speeds begin to heat up due to friction with air molecules (FAA, 2005). Because air thickness is negligible, objects tend to maintain high speeds and molecular friction typically causes meteors or space debris to burn up before they impact the surface of Earth.

### ***3.1.2.1.4 Ionosphere***

The ionosphere (also known as the thermosphere) is above the mesosphere and begins between approximately 53 and 65 miles above the surface of Earth and is considered to extend upward to 1,200 miles, although it has no well-defined upper boundary (FAA, 2005). The ionosphere accounts for only a fraction of the atmosphere's mass because gas molecules are extremely sparse in this layer. This portion of the atmosphere is known as the ionosphere because radiation causes its scattered gas molecules to become electrically charged (ions). This layer of the

atmosphere is also known as the thermosphere because solar activity, which releases very short-wavelength solar energy, can raise the temperature of the gas molecules to more than 3,600 °F (FAA, 2005). While temperatures would seem extreme on a measured scale, heat sensation in the thermosphere is actually relative to the collision of sparse gas molecules with a foreign body. Therefore, a satellite orbiting Earth in the thermosphere would achieve a temperature based on the amount of solar radiation it absorbs and not the temperature of the surrounding air (FAA, 2005).

The ionosphere is of practical importance because it is what enables long-distance radio communications on Earth because the radio waves reflect off the ionosphere. Shorter wavelength radio waves can penetrate the ionosphere and are used in satellite communications. The upper regions of the ionosphere are also of practical importance because, although the atmospheric density is very low compared to that in the lower atmosphere, it still acts to slow artificial satellites through friction and limit the length of time a satellite can stay in low-altitude orbits around Earth (FAA, 2005).

The ionosphere is noted for its concentration of ions and free electrons. Gases such as helium (He), argon, atomic oxygen (O), O<sub>2</sub>, CO<sub>2</sub>, atomic nitrogen, nitric oxide (NO), and molecular nitrogen absorb solar radiation passing through the ionosphere and are split into ions and free electrons. The level of ionization depends on sunspot activity, season, geographic location, and the gas being ionized. In general, the ionization levels increase in the sunlit atmosphere and decrease in the shadowed atmosphere. The ionosphere is a dynamic system and is influenced by parameters, such as acoustic motions of the atmosphere, electromagnetic emissions, and variations in geomagnetic field (FAA, 2005).

Beyond the ionosphere, the exosphere starts and continues until it merges with interplanetary gases, or space. The exosphere is considered to be beyond Earth's atmosphere. In this region, atomic hydrogen (H) and He are the prime components and are only present at extremely low densities (FAA, 2005).

### **3.1.2.2 Pollutants of Concern in the Troposphere**

Public awareness of the effects of air pollution has increased noticeably in recent years. Air pollution is a concern because of its demonstrated effects on human health. In addition to their general toxic effects, respiratory effects are a special concern. This is evidenced by the passage of the Clean Air Act in 1970 and subsequent Clean Air Act Amendments in 1977 and 1990. The purpose of the Clean Air Act is to preserve air quality and to protect public health and welfare. Under the authority of the Clean Air Act and its amendments, the U.S. Environmental Protection Agency (EPA) established a set of National Ambient Air Quality Standards (NAAQS) for criteria pollutants – CO, NO<sub>2</sub>, ozone, particulate matter with an aerodynamic diameter of 10 micrometers or less (PM<sub>10</sub>) and 2.5 micrometers or less (PM<sub>2.5</sub>), SO<sub>2</sub>, and lead (Pb). The NAAQS include primary and secondary standards. Primary standards protect the public health with an adequate margin of safety and the secondary standards protect the public welfare from any known or anticipated adverse effects of a pollutant (*e.g.*, damage to crops and materials). Under the Clean Air Act, States may adopt ambient air quality standards if they are at least as stringent as the NAAQS. Florida's Ambient Air Quality Standards are similar to the Federal standards, as listed in Exhibit 3-2.

**Exhibit 3-2. National and Florida Ambient Air Quality Standards<sup>a</sup>**

Pollutant	Standard Type	Averaging Period	National <sup>b</sup>	Florida
Ozone	Primary and Secondary	1 hour <sup>c</sup>	0.12 <sup>c</sup> ppm	Same as NAAQS
	Primary	8 hours <sup>d</sup>	0.075 ppm	—
Particulate matter (PM <sub>10</sub> )	Primary and Secondary	24 hours	150 µg/m <sup>3</sup>	Same as NAAQS
	Primary and Secondary	Annual <sup>e</sup>	—	50 µg/m <sup>3</sup>
Fine particulate matter (PM <sub>2.5</sub> )	Primary	24 hours <sup>f</sup>	35 µg/m <sup>3</sup>	—
	Primary	Annual <sup>g</sup>	15.0 µg/m <sup>3</sup>	—
Nitrogen dioxide	Primary and Secondary	1 hour	—	—
	Primary and Secondary	24 hours	—	—
	Primary and Secondary	Annual	0.053 ppm	Same as NAAQS
Sulfur dioxide	—	1 hour	—	—
	Secondary	3 hours <sup>c</sup>	0.50 ppm	Same as NAAQS
	Primary	24 hours <sup>c</sup>	0.14 ppm	260 µg/m <sup>3</sup>
	Primary	Annual	0.03 ppm	60 µg/m <sup>3</sup>
Carbon monoxide	Primary and Secondary	1 hour <sup>c</sup>	35 ppm	Same as NAAQS
	Primary and Secondary	8 hours <sup>c</sup>	9 ppm	Same as NAAQS
Lead	Primary and Secondary	Rolling 3-Month Average <sup>h</sup>	0.15 <sup>c</sup> µg/m <sup>3</sup>	—
	Primary and Secondary	Calendar quarter	1.5 µg/m <sup>3</sup>	Same as NAAQS
	—	30 days	—	—

a. Sources: 40 U.S.C. 50; Florida Standards, Rule 62-204.240, Administrative Code.

b. ppm = parts per million; µg/m<sup>3</sup> = micrograms per cubic meter.

c. Not to be exceeded more than once per year.

d. Fourth daily maximum 8-hour running mean (based on a 3-year average).

e. Because of a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the EPA revoked the annual PM<sub>10</sub> standard in 2006 (effective December 17, 2006). Corresponding changes to the State of Florida PM standards have not yet been made.

f. Based on a 3-year average of the 98th percentile; in October 2006, EPA revised the former NAAQS of 65 µg/m<sup>3</sup> downward to 35 µg/m<sup>3</sup> effective December 17, 2006 (71 *Federal Register* 61143-61233. October 17, 2006).

g. Based on the 3-year average of the weighted annual mean PM<sub>2.5</sub> concentrations from single or multiple community-oriented monitors, must not exceed 15.0 µg/m<sup>3</sup>.

h. Final EPA rule signed October 15, 2008. States may adopt this standard in the future.

The following paragraphs describe the criteria pollutants and their health effects.

- Volatile organic compounds (VOCs) are a general class of compounds containing hydrogen and carbon and are a precursor to the formation of the pollutant ozone. While concentrations of VOCs in the atmosphere are not generally measured, ground-level ozone is measured and used to assess potential health effects. Emissions of VOCs and nitrogen oxides react in the presence of sunlight to form ozone in the atmosphere. These reactions occur over periods of hours to days during atmospheric dilution and transport downwind. Accordingly, ozone is regulated as a regional pollutant and is not assessed on a project-specific basis.
- Nitrogen oxides are produced in combustion processes when combustion temperatures are extremely high, as in aircraft engines, through atmospheric nitrogen gas combining with oxygen gas. Of the various oxides of nitrogen that are produced, nitric oxide and nitrogen

dioxide are the most significant air pollutants. Nitric oxide is a colorless and odorless gas. It is relatively harmless to humans, but quickly converts to NO<sub>2</sub>. Nitrogen dioxide has been found to be a lung irritant capable of producing pulmonary edema and can lead to respiratory illnesses such as bronchitis and pneumonia. Nitrogen oxides, along with VOCs, are also precursors to ozone formation.

- Ozone is a strong oxidizer and a pulmonary irritant that affects the respiratory mucous membranes, other lung tissues, and respiratory functions. Exposure to ozone can impair the ability to perform physical exercise, can result in symptoms, such as tightness in the chest, coughing, and wheezing, and can ultimately result in asthma, bronchitis, and emphysema.
- Carbon monoxide is a colorless and odorless gas, which is a product of incomplete combustion. It is absorbed by the lungs and reacts with hemoglobin to reduce the oxygen carrying capacity of the blood. At low concentrations, CO has been shown to aggravate the symptoms of cardiovascular disease. It can cause headaches and nausea and, at sustained high concentration levels, can lead to coma and death.
- Sulfur dioxide is a colorless gas, which is formed during the combustion of fuels containing sulfur compounds. It can cause irritation and inflammation of tissues with which it comes into contact. Inhalation can cause irritation of the mucous membranes causing bronchial damage, and it can exacerbate pre-existing respiratory diseases such as asthma, bronchitis, and emphysema. Exposure to sulfur dioxide can cause damage to vegetation, corrosion damage to many materials, and soiling of clothing and buildings.
- Particulate matter is made up of small solid particles and liquid droplets. PM<sub>10</sub> refers to particulate matter with a nominal aerodynamic diameter of 10 micrometers and smaller, and PM<sub>2.5</sub> refers to particulate matter with an aerodynamic diameter of 2.5 micrometers and smaller. Particulates enter the body by way of the respiratory system. Particulates over 10 micrometers in size remain in the nose and throat and are readily expelled from the body. Particles smaller than 10 micrometers, and especially particles smaller than 2.5 micrometers, can reach the air ducts (bronchi) and the air sacs (alveoli). Particulates, especially PM<sub>2.5</sub>, have been associated with increased incidence of respiratory diseases, such as asthma, bronchitis, and emphysema, cardiopulmonary disease, and cancer.
- Lead (Pb) is no longer considered to be a pollutant of concern for transportation projects because the major source of lead emissions to the atmosphere had been from motor vehicles burning fuels with lead-containing additives. However, emissions from this source have been nearly eliminated as unleaded fuels have replaced leaded fuels nationwide. Although lead is still present in Avgas, which is used by piston aircraft, this source of lead emissions is expected to be insignificant. Therefore, the EA does not address lead emissions.

### **3.1.2.3 Pollutants of Concern in the Stratosphere and Beyond**

Because humans do not live in the upper layers of the atmosphere, exposure to pollutants is not an issue; therefore, EPA has not yet regulated emissions in the upper atmosphere. All emissions into these upper layers have more of an indirect effect on human health by either upsetting a protective layer or by changing the global climate.

The two major environmental concerns with the stratosphere are global warming and ozone depletion. These are global impacts, as opposed to local or regional impacts. The following paragraphs describe pollutant species of environmental concern.

- Carbon dioxide - Global climate change refers to Earth's increased surface temperature due to absorption of heat by certain gases, referred to as greenhouse gases. The increased emissions of these gases from human activity can affect temperatures and weather patterns on a global scale. A gas is called a greenhouse gas if it can absorb the heat radiation that comes off Earth's surface. These gases act much like a blanket, by preventing heat loss from Earth's surface. Without these gases, Earth's surface temperature would be roughly 54 °F cooler. There have been both natural fluctuations in temperatures and in the concentration of these gases throughout Earth's history, but at present there is concern that a dramatic increase of these gases due to human activity would adversely impact our climate. Carbon dioxide comprised approximately 85.4 percent of the total greenhouse gas emissions in 2007; therefore, it is considered the most significant greenhouse gas resulting from human activity (EPA, 2009a). Although these gases, especially carbon dioxide, are not presently regulated, their emissions would be calculated.
- Chlorine, water, particulate matter, and nitric oxides - The other environmental concern in the stratosphere is the issue of ozone depletion. Ozone can be photochemically destroyed very rapidly with trace amounts of chlorine because of catalytic reactions. These are reactions that destroy a set of ozone molecules, but leave the chlorine atom to react again with another set of ozone molecules. These destructive catalytic cycles can be repeated many times over, before the chlorine is eventually removed by combining with another chemical species. The length of time it takes for the chlorine to be changed to a non-ozone destroying form is what determines how destructive the chlorine is. Any reaction that impedes chlorine from being removed from its atomic form is in essence contributing to ozone destruction. The presence of particulate matter, nitric oxides, and water can affect stratospheric ozone by creating chemical conditions that either keep or remove chlorine from its ozone destroying form. The exact reactions are still debated in the scientific community.
- Hydrogen, oxygen, and nitrogen - In the ionosphere, the emissions from rocket-launched vehicles, like the space shuttle, can lead to a temporary "hole" in the ions in this region. The ion layer is important for life because it protects the Earth from dangerous high energy radiation from the sun. The created "hole" is temporary and local to the space vehicles flight path. The emissions of hydrogen, oxygen, and nitrogen can catalytically react with the existing ions and destroy them. This tends to occur at heights above 50 miles, the ionosphere. The RLVs in this study are not proposed to travel to the ionosphere. Therefore, no impacts in this atmospheric layer are anticipated.

#### **3.1.2.4 Regulations/Requirements**

Pursuant to the Clean Air Act, EPA designates geographical regions of the country as "attainment areas" if ambient pollutant concentrations are in compliance with the NAAQS; as "nonattainment areas" if ambient pollutant concentrations are not in compliance with the NAAQS; and as "maintenance areas" if the area was previously in nonattainment and has achieved attainment. Florida is one of only three states to be designated as in attainment for all

criteria pollutants. The nearest nonattainment area is Macon, Georgia, which is designated a nonattainment area for PM<sub>2.5</sub> and a Subpart 1 maintenance area for 8-hour ozone (EPA, 2009b). Since Florida is in attainment for all criteria pollutants, a General Conformity applicability assessment is not required for the proposed project.

### **3.1.2.5 Existing Conditions**

EPA classifies the State of Florida, including the area around Cecil Field, as in attainment (compliance) for all criteria pollutants. To determine compliance with the NAAQS, the Florida Department of Environmental Protection routinely performs long-term air quality monitoring of CO, NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub>. While VOCs are not monitored, the Florida Department of Environmental Protection routinely monitors O<sub>3</sub>. Measurement instruments and quality assurance procedures must comply with EPA techniques and criteria. The Florida Department of Environmental Protection operates Pb monitoring sites only in the Tampa Bay/St. Petersburg area; therefore, Pb is not reported. For all other criteria pollutants, the nearest representative monitors to the Cecil Field area are all in the Jacksonville area.

Exhibit 3-3 lists the maximum measured pollutant concentrations for criteria pollutants, compiled from the nearest representative Florida Department of Environmental Protection monitoring stations for 2005, 2006, and 2007. This data can be compared to the NAAQS and Florida Ambient Air Quality Standards listed in Exhibit 3-2. Except for the revised 24-hour PM<sub>2.5</sub> standard, the maximum concentrations of all pollutants measured in the Jacksonville area in 2005, 2006, and 2007 were well below the applicable Federal and State standards. At present, the entire State of Florida is designated as in attainment for PM<sub>2.5</sub>.

The nearest monitoring station to Cecil Field that measures PM<sub>2.5</sub> is 14932 Mandarin Road in Jacksonville. This station recorded maximum concentrations that exceeded the new Federal 24-hour PM<sub>2.5</sub> standard in 2005 and 2007. Measured maximum 24-hour PM<sub>2.5</sub> concentrations were 43 and 75.8 micrograms per cubic meter for each year, respectively. However, these measured exceedances did not violate the PM<sub>2.5</sub> standard because the compliance level is defined as the 3-year average of the 98th percentile of 24-hour concentrations at a monitoring location (see Exhibit 3-2). The 98th percentile measurements at this location were below the PM<sub>2.5</sub> standard.

The measured ambient concentration data show that no violations of the NAAQS or Florida Ambient Air Quality Standards have occurred at these monitoring stations and indicate that existing pollutant levels in the Cecil Field area are expected to be within the standards.

## **3.2 Coastal Resources**

### **3.2.1 Regulations/Requirements**

Coastal resources are protected under three statutes – the Coastal Barrier Resources Act of 1982 as amended by the Coastal Barriers Improvement Act of 1990 (16 U.S.C. 3501-3510; Public Law 97-348), the Coastal Zone Management Act as amended (16 U.S.C. 1451-1461; Public Law 92-583), and Executive Order 13089, *Coral Reef Protection* (63 *Federal Register* 32701, June 16, 1998).

**Exhibit 3-3. Highest Measured Ambient Air-Pollutant Concentrations in 2005, 2006, and 2007<sup>a</sup>**

Pollutant <sup>b</sup>	Averaging Period <sup>c</sup>	Measurement Station in Jacksonville	Approximate Distance from Cecil Field	Units <sup>d</sup>	Measured Data		
					2005	2006	2007
CO	1 hour	Lasalle Street	14.8 miles	Maximum (ppm)	4.5	7.6	3
	8 hours			Maximum (ppm)	2.3	1.4	1.4
NO <sub>2</sub>	1 hours	2900 Bennett Street	17.3 miles	Maximum (ppm)	0.064	0.061	0.05
	Annual			Arithmetic Mean (ppm)	0.013	0.012	0.0099
Ozone	8 hours	13333 Lanier Road	24.9 miles	Maximum (ppm)	0.080	0.083	0.078
SO <sub>2</sub>	1 hours	Lasalle Street	14.8 miles	Maximum (ppm)	0.033	0.025	0.033
	3 hours			Maximum (ppm)	0.027	0.021	0.019
	24 hours			Maximum (ppm)	0.007	0.007	0.005
	Annual			Arithmetic Mean (ppm)	0.002	0.0014	0.0014
PM <sub>2.5</sub>	24 hours	14932 Mandarin Road	15.6 miles	Maximum (µg/m <sup>3</sup> )	43	24	75.8
	Annual			Arithmetic Mean (µg/m <sup>3</sup> )	10.1	9.36	9.75
PM <sub>10</sub>	Annual	600 Georgia St.	16.1 miles	Maximum (µg/m <sup>3</sup> )	22	21	22.9

a. Source: EPA, 2008a.

b. CO = carbon monoxide; NO<sub>2</sub> = nitrogen dioxide; SO<sub>2</sub> = sulfur dioxide; PM<sub>2.5</sub> = particulate matter with an aerodynamic diameter less than 2.5 micrometers; PM<sub>10</sub> = particulate matter with an aerodynamic diameter less than 10 micrometers.

c. Annual data are arithmetic means; other values are maximums for the averaging periods indicated.

d. ppm = parts per million; µg/m<sup>3</sup> = micrograms per cubic meter.

The Coastal Barrier Resources Act prohibits most Federal financial assistance for development within the Coastal Barriers Resource System that contains undeveloped coastal barriers. This pertains only to coastal areas along the Great Lakes, Atlantic Ocean, and Gulf Coast. Executive Order 13089 protects the ecosystems associated with coral reefs in all maritime jurisdictions and zones of the United States.

The Coastal Zone Management Act, adopted in 1972, encourages coastal states to develop federally approved coastal management programs. In 1978, the Florida State Legislature adopted the Florida Coastal Management Act, which authorized the development of a coastal management program. The Florida Coastal Management Program was officially approved in 1981 and is based on a network of agencies implementing 23 statutes that protect and enhance the State's natural, cultural, and economic coastal resources.

### 3.2.2 Existing Conditions

Geographically, Florida has low land elevation, a generally high water table, and an extensive coastline with many rivers emptying into coastal waters. The result is an interrelationship between the land and coastal waters. Therefore, the entire State of Florida is considered to be

within the boundaries of the Florida Coastal Management Program. For issuance of a Federal license, the Proposed Action must comply with the Florida Coastal Zone Management Program and the activity associated with the Proposed Action must be conducted in a manner consistent with the Program.

### **3.3 Compatible Land Use**

#### **3.3.1 Regulations/Requirements**

Compatibility of existing and planned land uses adjacent to an airport usually focuses on the impacts of the airport's noise on the surrounding neighborhood. Airport development actions, such as air traffic changes, new approaches and departures, fleet mix changes, and changes in the number of aircraft operations can create noise impacts that affect land uses.

It is the responsibility of the airport sponsor to ensure that appropriate zoning laws have been adopted, which to the extent possible restrict the existing and planned use of land adjacent to or in the immediate vicinity of an airport to those activities that are compatible with normal airport activities. The Airport Development Grant Program requires that a project not be approved unless the Secretary of Transportation is satisfied that the project is consistent with plans (existing at the time the project is approved) of public agencies for development of the area in which the airport is located.

#### **3.3.2 Existing Conditions**

This section describes both on and off-airport land use and zoning surrounding Cecil Field. Cecil Field is on the border of Duval and Clay Counties. While Cecil Field is completely within Duval County, to properly evaluate surrounding land uses and possible impacts to those land uses, this section addresses land use and zoning for both counties.

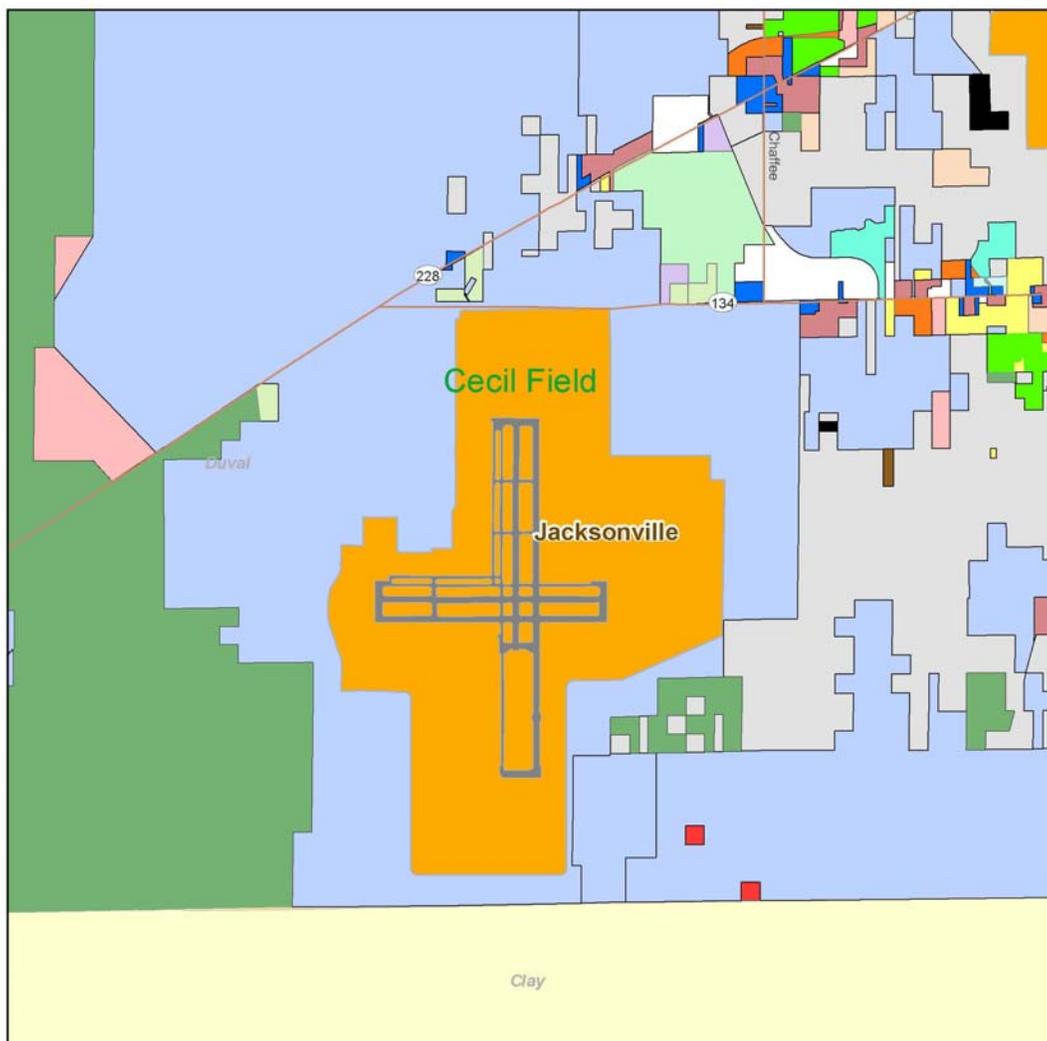
In general, the area surrounding Cecil Field is still somewhat rural. However, as the population expands in the Jacksonville metropolitan area and there are transportation improvements that increase access to outlying areas, it can be expected that there would be continued population growth in the area immediately surrounding Cecil Field. In addition, the City of Jacksonville 2010 Comprehensive Plan outlines an objective to continue to develop Cecil Field into the Cecil Commerce Center to reestablish and expand its economic contribution while making efficient use of existing runways, buildings, infrastructure, and public facilities and ensuring land use compatibility (City of Jacksonville, 1999).

##### **3.3.2.1 Duval County**

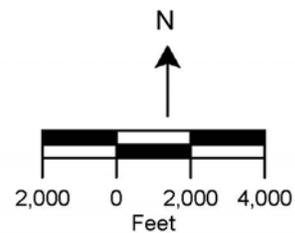
The Duval County land in the immediate vicinity of Cecil Field consists of a Planned Unit Development Area (see Exhibit 3-4). Ordinance Code of the City of Jacksonville, FL, Chapter 656, Part 10 states that the portion of Cecil Field and the Cecil Commerce Center, designated as a Planned Unit Development Area, shall (City of Jacksonville, 2007):

*Be utilized to create living environments that are responsive to the needs of their inhabitants; to provide flexibility in planning, design and development; to encourage innovative approaches to the design of community environments; to encourage the*

**Exhibit 3-4. Duval County Zoning Map**



Runway	RR	PBF-2
Airport Area	CG-2	RMD-A
AGR	CG-1	RLD-A
PUD	IBP-1	RLD-MH
PBF-1	CSV	RLD-G
CN	IBP-2	RLD-D
IL	CO	RMD



Source: City of Jacksonville, 2005.

*fulfillment of housing needs appropriate to various lifestyles and income levels; to encourage the integration of different housing types within a development; provide an opportunity for new approaches to ownership; to provide for an efficient use of land; to provide an environment compatible with surrounding land use; to adapt the zoning process to changes in construction and development technology; to encourage the preservation of the natural site features; to provide community environments that are so designed and located as to be an integral part of the total ecosystem; to encourage the design of communities and structures adapted to the local climate; thereby promoting the public health, safety, morals, order, comfort, convenience, appearance, prosperity, and general welfare of the City of Jacksonville. It is further intended that the Planned Unit Development district may be utilized to implement the Comprehensive Plan.*

While used in implementing the 2010 Jacksonville Comprehensive Plan, the Planned Unit Development Area is designated as a multi-use area within the Plan. A multi-use area allows for the following land uses (City of Jacksonville, 1999):

- Low-Density Residential - This category permits housing developments in a gross density range of up to seven dwelling units per acre.
- Medium Density Residential - This category permits housing developments in a gross density range of up to 20 dwelling units per acre.
- Residential-Professional-Institutional - A mixed-use category primarily intended to accommodate office, limited commercial retail and service establishments, institutional, and medium density residential uses.
- Neighborhood Commercial - Uses in this category include convenience goods, personal services, veterinarians, gasoline stations, and other low intensity retail and office-professional commercial uses.
- Community/General Commercial - Uses in this category include outlets and establishments that offer a wide range of goods and services including general merchandise, apparel, food, and related items.
- Business Park - Land uses permitted in this category include business/professional offices including banks and financial institutions, research and development activities, radio and television studios, light manufacturing, fabrication and assembly, service establishments, major institutions, light industrial, and warehousing uses carried out in completely enclosed structures with no open storage.
- Light Industrial - This category includes industrial uses that have fewer objectionable impacts such as noise, odor, toxic chemical, and wastes.
- Heavy Industrial - Heavy industrial uses are generally the most likely to produce adverse physical and environmental impacts such as noise, land, air, and water pollution and transportation conflicts.
- Recreation and Open Space - This category includes lands used for activities that are associated with outdoor recreation, such as parks, playgrounds, golf courses, driving ranges,

marinas, fairgrounds, and spectator sports facilities in public and private ownership. Pastoral open space managed by the Jacksonville Recreation and Parks Department is also included.

- Public Buildings and Facilities - This is a broad land-use category intended to identify major public use or community service activities.
- Conservation - Conservation lands are areas with valuable environmental resources, such as sensitive vegetation, high-value habitat, wetlands, high aquifer recharge potential, and unique coastal areas.

These land uses indicate that there are residential areas in the Planned Unit Development Area. Local zoning maps do not subdivide these areas so as to discern which areas are residential and which are used for other purposes. It can be assumed that all areas within the Planned Unit Development Area have the potential to be used for residential areas. However, the definition provided above indicates that the entire Planned Unit Development Area around Cecil Field was established to provide for a mixed-use area with a diverse mix of commercial, industrial, open space, and residential areas.

Exhibit 3-4 shows Duval County zoning surrounding Cecil Field on the west, north, and east and consists of the following zoning categories:

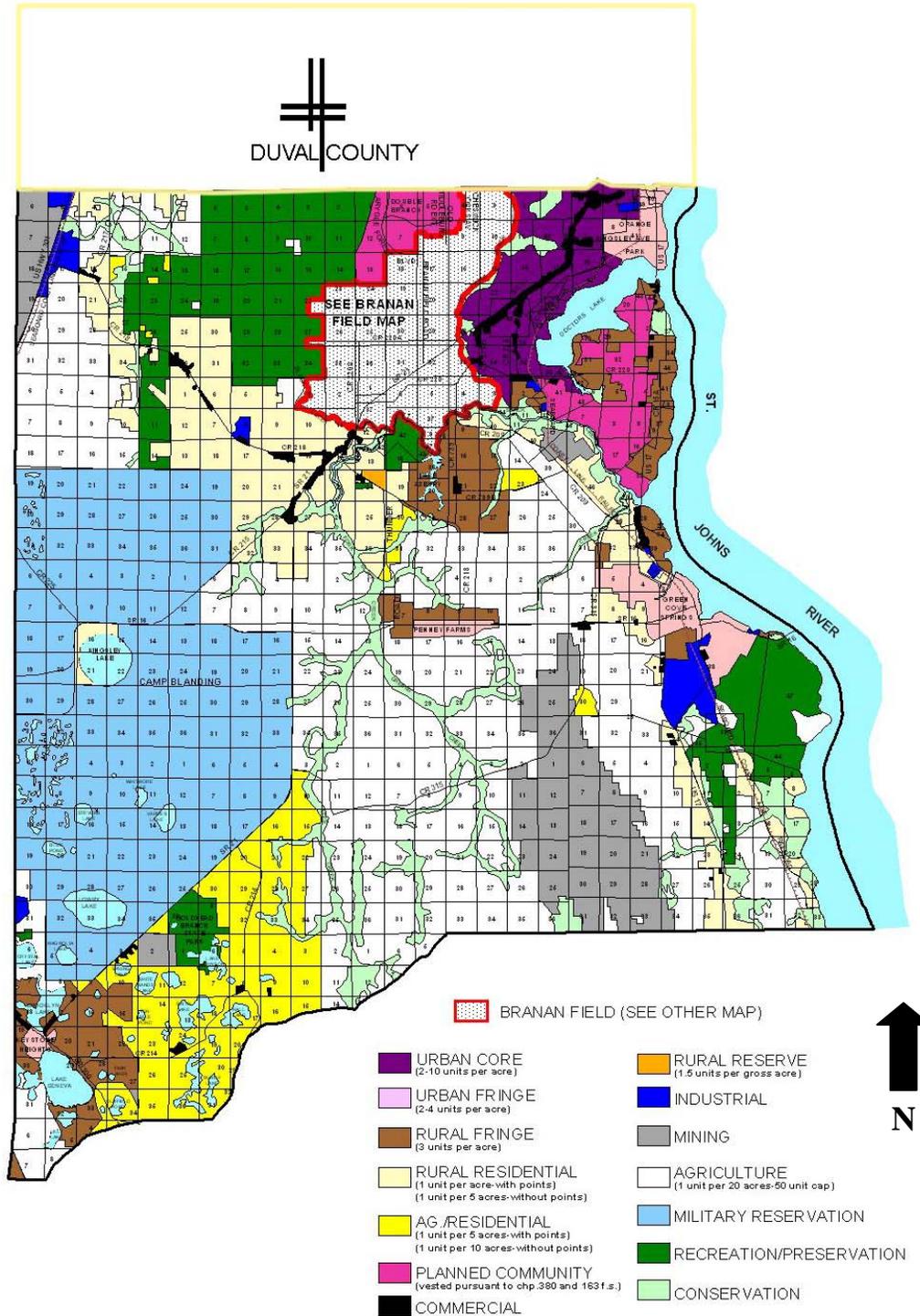
- Agricultural
- Government use public buildings and facilities
- Public buildings and facilities for public and private use
- Neighborhood commercial uses
- Light Industrial uses
- Rural residential areas
- General community commercial uses
- Industrial business park uses
- Conservation uses
- Commercial office space
- Medium density residential
- Low density residential

### **3.3.2.2 Clay County**

Exhibit 3-5 is the map of future land uses from the Clay County Comprehensive Plan (Clay County, 1998) with the location of Cecil Field noted in Duval County to the north of Clay County.

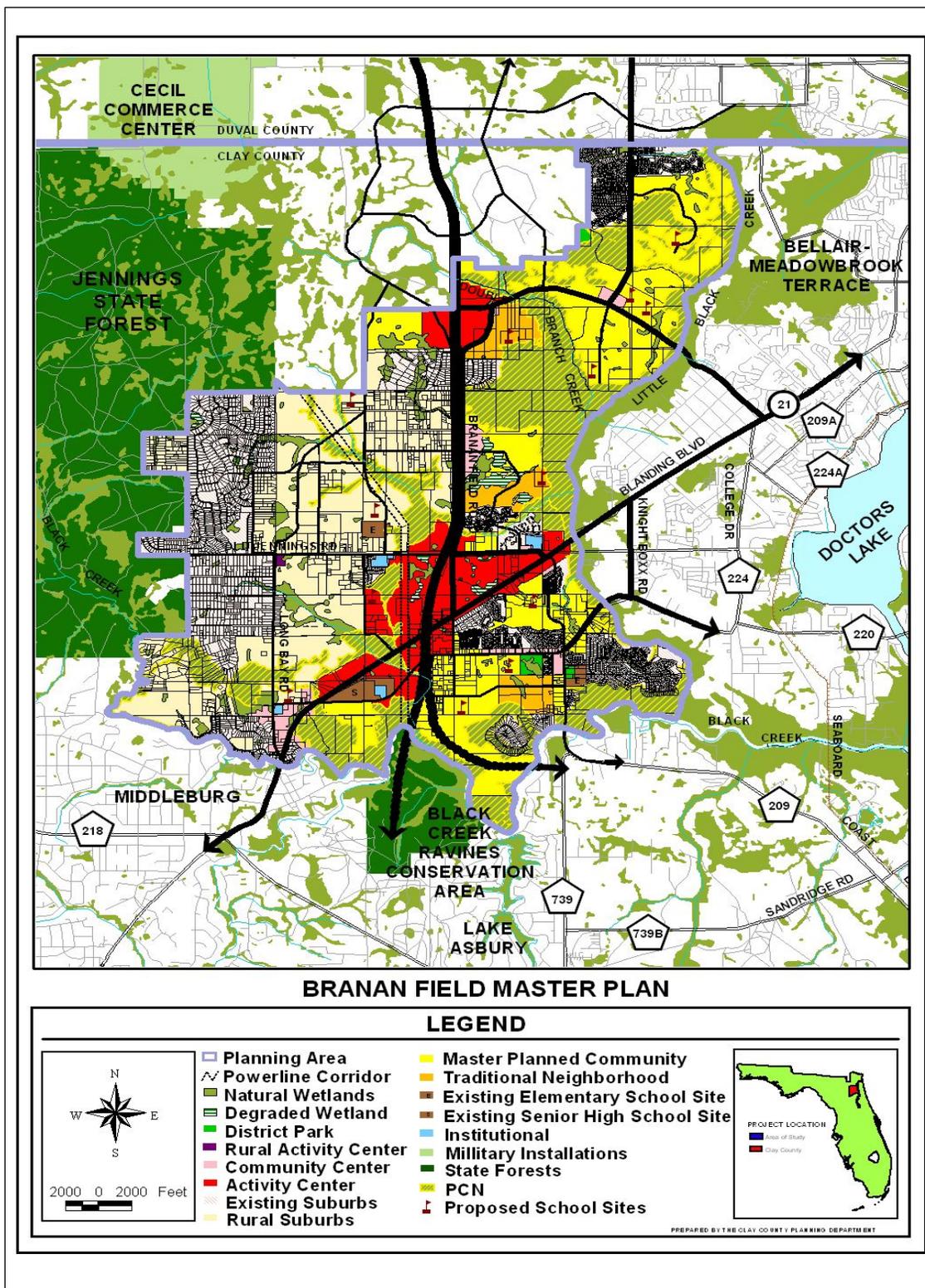
The land bordering the southern edge of Cecil Field and in north-central Clay County consists mostly of areas of recreation/preservation use. This is predominately due to Jennings State Forest directly south of Cecil Field. This area is very rural. However, farther to the southeast, the Branan Field area has been targeted for continued growth due to the development of the Cecil Commerce Center and the completion of Branan Field Road (Clay County, 2003). This area is approximately 4 miles south/southeast of the south end of Cecil Field Runway 18L-36R. Exhibit 3-6 shows potential land uses for this area.

Exhibit 3-5. Clay County Future Land Use Plan



Source: Clay County, 1998.

**Exhibit 3-6. Branan Field Land Use Plan**



Source: Clay County, 2003.

### **3.3.2.3 Villages of Argyle**

The Villages of Argyle are approximately 0.62 mile southeast of Cecil Field, in both Duval and Clay Counties. As illustrated in Exhibit 3-7, Villages of Argyle Master Plan, much of the land closest to Cecil Field is zoned for preservation and recreation. However, there are parcels of land zoned for mixed use adjacent to the dedicated park land.

## **3.4 Department of Transportation Act, Section 4(f) Resources**

### **3.4.1 Regulations/Requirements**

Section 4(f) of the Department of Transportation Act of 1966 (Public Law 97-499) 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, wildlife and waterfowl refuge, or land from a historic site of National, State, or local significance unless there is no feasible or prudent alternative and the use of such land includes all possible planning to minimize harm resulting from the use.

### **3.4.2 Existing Conditions**

Jennings State Forest and Veterans Park (not shown in Exhibit 3-8) are directly south of Cecil Field. This area is very rural. The Florida Natural Areas Inventory indicates three other Section 4(f)-eligible areas near Cecil Field – Branan Field Mitigation Park Wildlife and Environmental Area, Cecil Field Conservation Corridor, and Sal Taylor Creek Preserve (see Exhibit 3-8). These areas could be affected by noise, hazardous materials, or other spaceport-related activities

Exhibit 3-9 shows Section 4(f) lands beneath the proposed RLV flight route to the Atlantic Ocean and the offshore Warning Area beyond.

## **3.5 Farmlands**

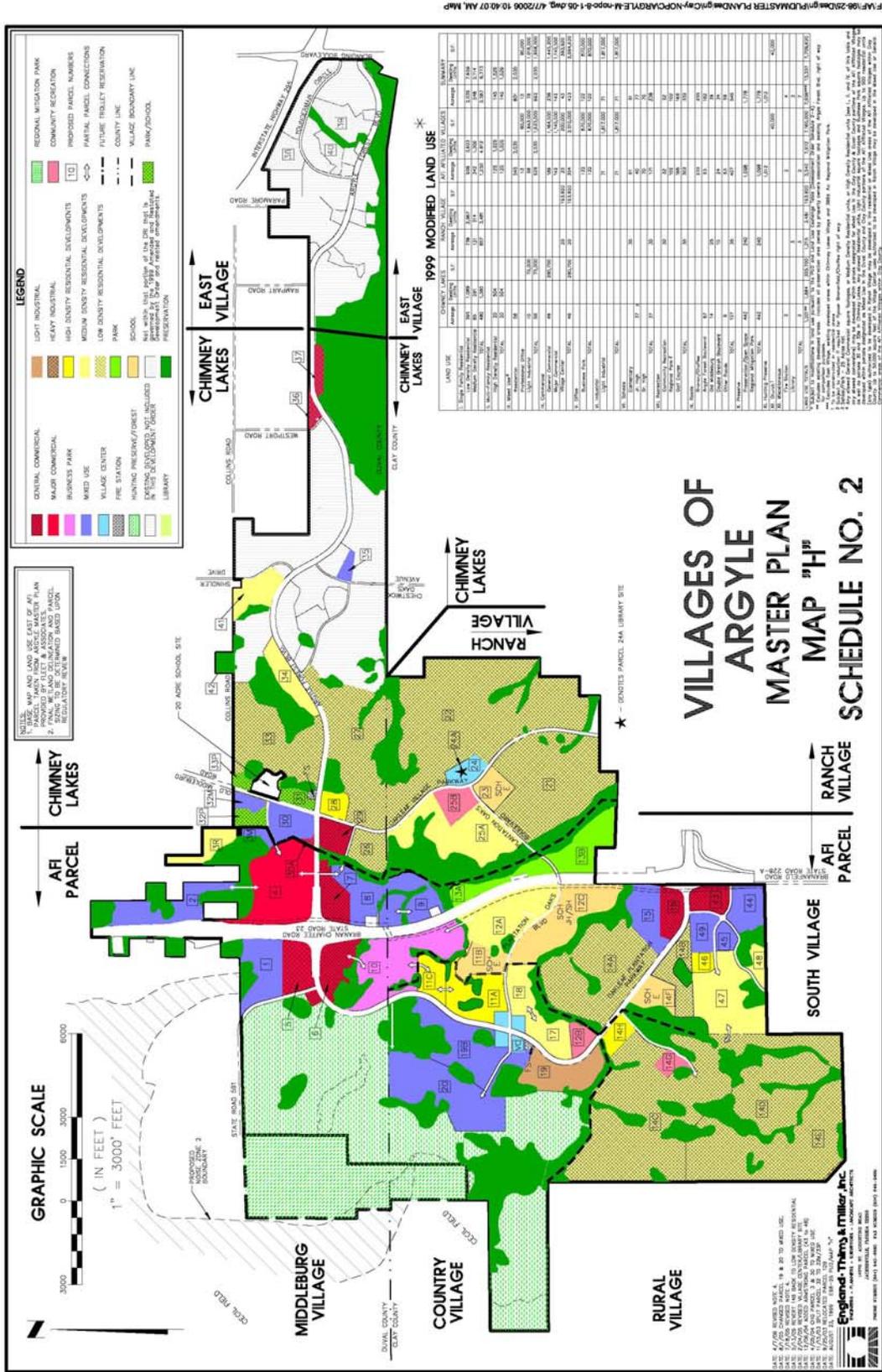
### **3.5.1 Regulations/Requirements**

*Farmlands* are prime or unique farmlands determined by the appropriate state or unit of local government to be farmland of statewide or local importance. The Farmland Policy Protection Act (7 U.S.C. 4201-4209) regulates Federal actions with the potential to convert farmland to nonagricultural uses.

### **3.5.2 Existing Conditions**

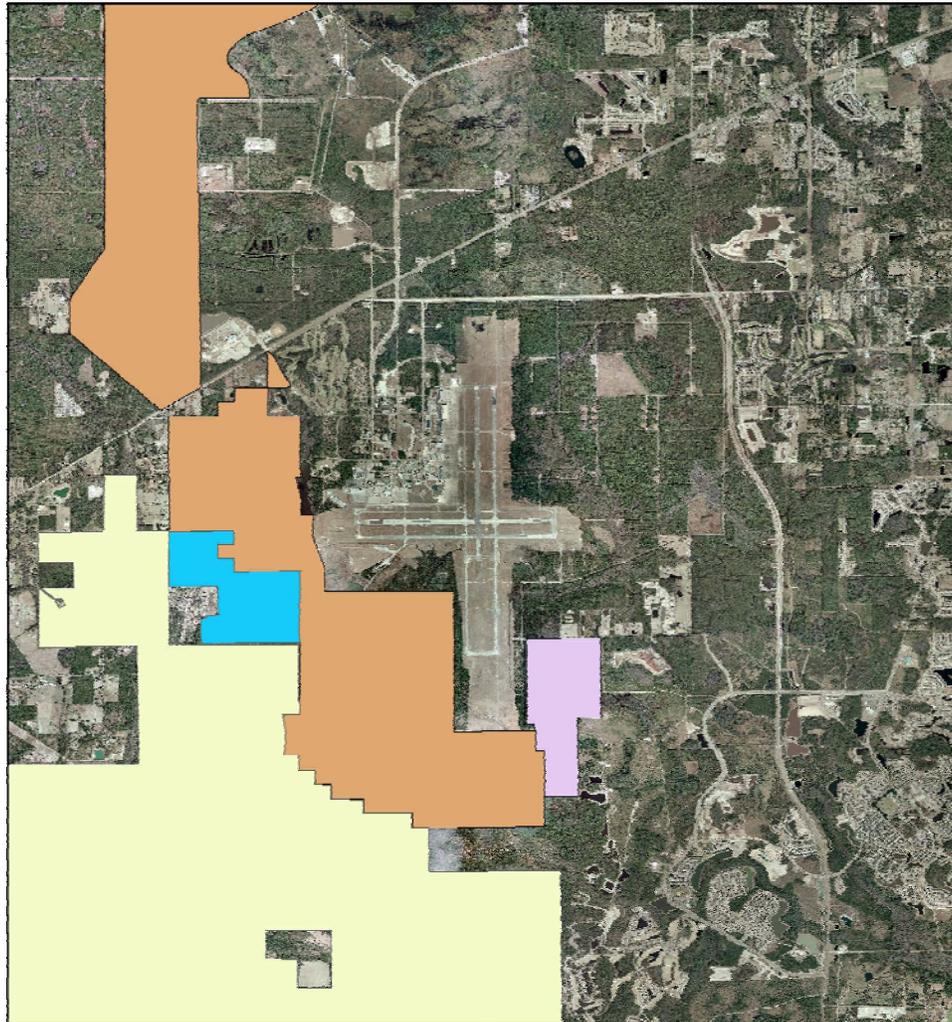
An examination of the Florida Geographic Data Library (undated), a Global Imaging Systems source maintained at the University of Florida's GeoPlan Center, and according to the U.S. Department of Agriculture Natural Resources Conservation Service Web Soil Survey 2.0 indicates that there are no significant farmlands on or near Airport property.

Exhibit 3-7. Villages of Argyle Master Plan



Source: England-Thoms & Miller, Inc., 2006.

**Exhibit 3-8. Section 4(f) Lands in the Vicinity of Cecil Field**



Source: Florida Natural Areas Inventory, 2009.

-  Branan Field Mitigation Park Wildlife and Environmental Area
-  Sal Taylor Creek Preserve
-  Jennings State Forest
-  Cecil Field Conservation Corridor

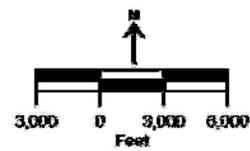
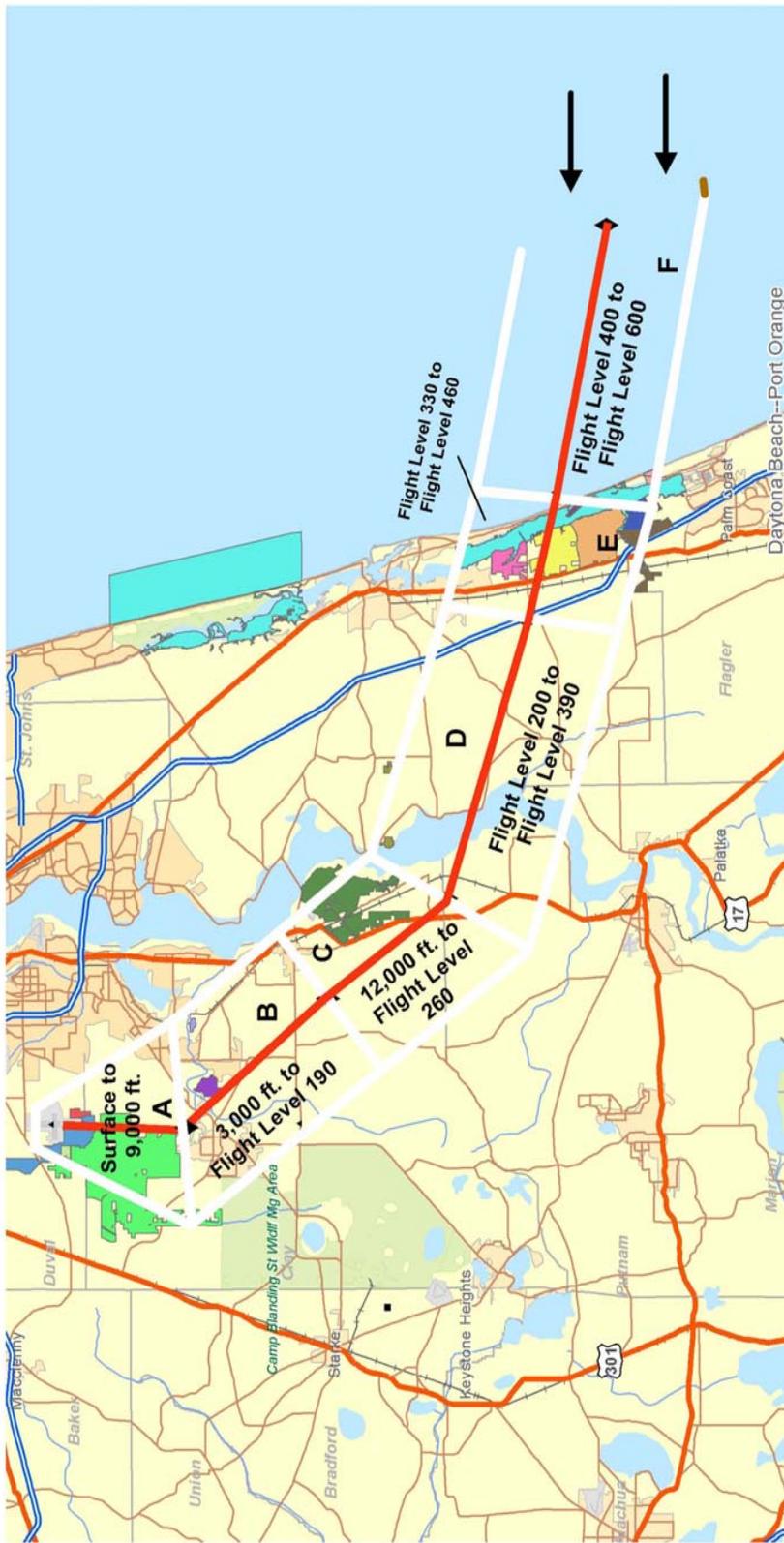


Exhibit 3-9. Section 4(f) Lands under the RLV Flight Route



- Source: Florida Natural Areas Inventory, 2009.
- BAYARD CONSERVATION AREA
  - BLACK CREEK RAVINES CONSERVATION AREA
  - BRANAN FIELD MITIGATION PARK WILDLIFE AND ENVIRONMENTAL AREA
  - CECIL FIELD CONSERVATION CORRIDOR
  - FAVER-DYKES STATE PARK
  - FORT MATANZAS NATIONAL MONUMENT
  - GUANA TOLOMATO MATANZAS NATIONAL ESTUARINE RESEARCH RESERVE
  - JENNINGS STATE FOREST
  - MATANZAS STATE FOREST
  - MOSES CREEK CONSERVATION AREA
  - PELLICER CREEK CORRIDOR CONSERVATION AF
  - PRINCESS PLACE PRESERVE
  - RIVER TO SEA PRESERVE AT MARINELAND
  - SAL TAYLOR CREEK PRESERVE
  - SKINNER-SMITH PARCEL
  - WASHINGTON OAKS GARDENS STATE PARK
  - WATSON ISLAND STATE FOREST
  - CAMP BLANDING WILDLIFE MANAGEMENT AR

### 3.6 Fish, Wildlife, and Plants

#### 3.6.1 Regulations/Requirements

The environmental process provides for the protection of fish, wildlife, and plants of local and national significance. The Endangered Species Act of 1973 (7 U.S.C. 136; 16 U.S.C.1531 *et seq.*), the Sikes Act (Public Law 86-797), the Fish and Wildlife Coordination Act (16 U.S.C. 661-667e), the Fish and Wildlife Conservation Act (16 U.S.C. 2901-2911), and the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712) are among these provisions. Coordination with the U.S. Fish and Wildlife Service and the Florida Department of Environmental Protection will take place throughout the process to ensure that the Proposed Action would not jeopardize the continued existence of an endangered or threatened species, or to a lesser extent, have a significant impact on non-listed species. If an agency determines that a Proposed Action “may affect” a threatened or endangered species, then each agency must consult with the Fish and Wildlife Service, the National Marine Fisheries Service, or the Florida Department of Environmental Protection to ensure that the agency action would not be likely to jeopardize the continued existence of any Federal- or State-listed endangered or threatened species, or result in the destruction or adverse modification of critical habitat.

#### 3.6.2 Existing Conditions

Exhibit 3-10 lists the Federal- and State-listed species with special protection status that have been reported to occur or potentially occur in Clay and Duval Counties. The information in this exhibit is from the U.S. Fish and Wildlife Service, the Florida Fish and Wildlife Conservation Commission, and the Florida Natural Areas Inventory.

**Exhibit 3-10. Listed Species Known to Exist in Duval and Clay Counties<sup>a</sup> (page 1 of 2)**

Species		Status <sup>b</sup>	
Common Name	Scientific Name	Federal	State
<b>Mammals</b>			
Black Right Whale	<i>Eubalaena glacialis</i>	E	E
Florida Black Bear	<i>Ursus americanus floridanus</i>	Not Listed	T
West Indian (Florida) Manatee	<i>Trichechus manatus latirostris</i>	E	E
Sherman’s Fox Squirrel	<i>Sciurus niger shermani</i>	Not Listed	SSC
Florida Mouse	<i>Podomys floridanus</i>		SSC
<b>Birds</b>			
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T	T
Piping Plover	<i>Charadrius melodus</i>	T	T
Wood Stork	<i>Mycteria Americana</i>	E	E
Red-cockaded Woodpecker	<i>Picoides borealis</i>	E	SSC
Limpkin	<i>Aramus guarauna</i>	Not Listed	SSC
Florida Burrowing Owl	<i>Athene cunicularia floridana</i>	Not Listed	SSC
Worthington’s Marsh Wren	<i>Cistothorus palustris griseus</i>	Not Listed	SSC
Little Blue Heron	<i>Egretta caerulea</i>	Not Listed	SSC
Snowy Egret	<i>Egretta Thula</i>	Not Listed	SSC
Tricolored Heron	<i>Egretta tricolor</i>	Not Listed	SSC
White Ibis	<i>Eudocimus albus</i>	Not Listed	SSC
Peregrine Falcon	<i>Falco peregrinus</i>	Not Listed	E
Southeastern American Kestrel	<i>Falco sparverius paulus</i>	Not Listed	T
American Oystercatcher	<i>Haematopus palliatus</i>	Not Listed	SSC
Osprey	<i>Pandion haliaetus</i>	Not Listed	SSC

**Exhibit 3-10. Listed Species Known to Exist in Duval and Clay Counties<sup>a</sup> (page 2 of 2)**

Common Name	Species	Scientific Name	Status <sup>b</sup>	
			Federal	State
<b>Birds (continued)</b>				
Brown Pelican		<i>Pelecanus occidentalis</i>	Not Listed	SSC
Black Skimmer		<i>Rynchops niger</i>	Not Listed	SSC
Least Tern		<i>Sterna antillarum</i>	Not Listed	T
Florida Scrub-Jay		<i>Aphelocoma coerulescens</i>	Not Listed	T
<b>Fish</b>				
Shortnose Sturgeon		<i>Acipenser brevirostrum</i>	E	E
Atlantic Sturgeon		<i>Acipenser oxyrinchus oxyrinchus</i>	Not Listed	SSC
<b>Reptiles</b>				
Eastern Indigo Snake		<i>Dymarchon corais couperi</i>	T	T
Green Sea Turtle		<i>Chelonia mydas</i>	E	E
Hawksbill Sea Turtle		<i>Eremochelys imbricate</i>	E	Not Listed
Leatherback Sea Turtle		<i>Dermochelys coriacea</i>	E	E
Kemp's Ridley Sea Turtle		<i>Lepidochelys kempii</i>	E	E
Loggerhead Sea Turtle		<i>Caretta caretta</i>	T	T
American Alligator		<i>Alligator mississippiensis</i>	Not Listed	SSC
Florida Pine Snake		<i>Pituophis melanoleucus mugitus</i>	Not Listed	SSC
Gopher Tortoise		<i>Gopherus polyphemus</i>	Not Listed	SSC
<b>Amphibians</b>				
Flatwoods Salamander		<i>Ambystoma cingulatum</i>	Not Listed	SSC
Gopher Frog		<i>Rana capito</i>	Not Listed	SSC
<b>Plants</b>				
Chapman's Rhododendron		<i>Rhododendron Chapmanii</i>	E	E
Incised Groove-bur		<i>Agrimonia incise</i>	Not Listed	E
Purple Honeycomb-head		<i>Balduina atropurpurea</i>	Not Listed	E
Many-flowered Grass-pink		<i>Calopogon multiflorus</i>	Not Listed	E
Bartram's Ixia		<i>Calydorea coelestina</i>	Not Listed	E
Large Rosebud Orchid		<i>Cleistis divaricata</i>	Not Listed	T
Florida toothache-grass		<i>Ctenium floridanum</i>	Not Listed	E
Spoon-leaved Sundew		<i>Drosera intermedia</i>	Not Listed	T
Hartwrightia		<i>Hartwrightia floridana</i>	Not Listed	T
West's Flax		<i>Linum westii</i>	Not Listed	E
Pondspice		<i>Litsea aestivalis</i>	Not Listed	E
Southern Marshallia		<i>Marshallia ramose</i>	Not Listed	E
Florida Spiny-pod		<i>Matelea floridana</i>	Not Listed	E
Giant Orchid		<i>Pteroglossaspis ecristata</i>	Not Listed	T
Florida Mountain-mint		<i>Pycnanthemum floridanum</i>	Not Listed	T
St. John's Black-eyed Susan		<i>Rudbeckia nitida</i>	Not Listed	E
Scrub Stylisma		<i>Stylisma abdita</i>	Not Listed	E
Southern Lip Fern		<i>Cheilanthes microphylla</i>	Not Listed	E
Piedmont Jointgrass		<i>Coelorachis tuberculosa</i>	Not Listed	T
Atlantic Coast Florida Lantana		<i>Lantana depressa var. floridana</i>	Not Listed	E
Terrestrial Peperomia		<i>Peperomia humilis</i>	Not Listed	E
Green Ladies'-tresses		<i>Spiranthes polyantha</i>	Not Listed	E

a. Source: FWS, 2006.

b. E = endangered; T = threatened; SSC = species of special concern.

### 3.7 Floodplains

#### 3.7.1 Regulations/Requirements

Executive Order 11988, *Floodplain Management* (May 24, 1977), directs Federal agencies to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by

floodplains. Floodplains are defined as “lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, those that are subject to a one percent or greater chance of flooding in a given year (100-year floodplain).” Therefore, the objective would be to avoid, to the extent practicable, notable adverse impacts to natural and beneficial floodplain values.

Nationally, the term *floodplain* means the land area that would be inundated by the overflow of water resulting from a 100-year flood (a flood that has a 1-percent chance of occurring in any given year, not a flood that occurs once every 100 years). Floodplains often contain wetlands and other areas vital to a diverse and healthy ecosystem. Loss of wetlands inside and outside of floodplains exacerbates flood events because it decreases the ability of the watershed, as a whole, to hold water.

### **3.7.2 Existing Conditions**

Duval and Clay Counties have relatively flat topographic relief of the land surfaces and slight elevations above sea level. This results in significant floodplain areas across both counties. The flood-prone areas in the vicinity of Cecil Field are generally the result of flat, poorly drained land where accumulated rainfall runs in a sheet flow or ponds on the surface. The streams comprising most floodplain areas near Cecil Field are Sal Taylor Creek, Rowell Creek, and Yellow Water Creek. Exhibit 3-11 shows the 100-year floodplain at Cecil Field.

## **3.8 Hazardous Materials, Pollution Prevention, and Solid Waste**

### **3.8.1 Regulations/Requirements**

There are several laws that govern the handling and disposal of hazardous materials, chemicals, substances, and wastes. The two statutes most relevant for consideration of potential environmental impacts associated with the Proposed Action are the Resource Conservation and Recovery Act, which governs the generation, treatment, storage, and disposal of hazardous wastes, and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), which provides for consultation with natural resources trustees and cleanup of any release of a hazardous substance (excluding petroleum) into the environment. The Proposed Action does not involve property on the EPA National Priorities List.

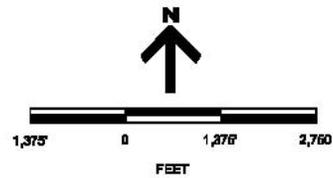
### **3.8.2 Existing Conditions**

Cecil Field has in place policies and procedures for handling, disposing of, and cleaning up hazardous materials, chemicals, substances, and wastes. These policies and procedures are delineated in the Cecil Field Airport Certification Manual, which the Airport is required to produce, maintain, and follow as part of its certification under 14 CFR Part 139. These policies and procedures cover the handling of hazardous materials, solid waste, chemicals, and other substances, including jet fuel. Cecil Field also has a Storm Water Pollution Prevention Plan for all of the property within the Cecil Field Airport boundary.

**Exhibit 3-11. 100-Year Floodplain at Cecil Field**



 **100 Year Floodplain**



Source: Modified from JAA, 2008b, Exhibit 6-41.

### 3.9 Historical, Architectural, Archaeological, and Cultural Resources

#### 3.9.1 Regulations/Requirements

The National Historic Preservation Act of 1966 (16 U.S.C. 470 *et seq.*), as amended, establishes the Advisory Council on Historic Preservation and the *National Register of Historic Places* within the National Park Service. Section 110 of the Act governs Federal agency responsibilities to preserve and use historic buildings; designate an agency Federal Preservation Officer; and identify, evaluate, and nominate eligible properties under the control or jurisdiction of the agency to the National Register. Section 106 requires Federal agencies to consider the effects of their undertaking on properties listed on or eligible for listing on the National Register.

#### 3.9.2 Existing Conditions

The 1998 *Final Environmental Impact Statement, Disposal and Reuse of Naval Air Station Cecil Field, Jacksonville, Florida* (Navy, 1998) reported that there no known archaeological sites at Cecil Field. For that EIS, all standing structures (buildings and equipment) at Cecil Field were evaluated and determined to be ineligible for listing on the National Register.

### 3.10 Light Emissions and Visual Impacts

#### 3.10.1 Regulations/Requirements

Visual resources can be described as any naturally occurring or man-made feature that contributes to the aesthetic value of an area. Impacts to visual or aesthetic resources, direct or indirect, are inherently difficult to define because of the subjectivity involved. Consideration should be given to impacts on people and properties covered by Section 4(f) lands. Lighting associated with an action could create an annoyance to people in the vicinity or interfere with their normal activities.

#### 3.10.2 Existing Conditions

Lighting at Cecil Field consists of that associated with on-airport buildings, streetlights, the airport beacon, taxiway lighting, runway lighting, and approach lighting. Of all the lighting at Cecil Field, the existing airport beacon and the runway lighting likely result in the most significant impacts to visual resources in surrounding areas. Exhibit 3-12 lists the existing runway lighting at Cecil Field.

**Exhibit 3-12. Runway Lighting at Cecil Field**

Runway	Lighting
18L-36R	Two four-light precision approach path indicators High-intensity runway edge lights Medium-intensity approach lighting system with runway alignment indicator lights
9R-27L	Two four-light precision approach path indicators Runway end identifier lights
18R-36L	None
9L-27R	None

Source: AirNav, 2007.

The aesthetic environment at Cecil Field varies significantly, comprising undeveloped areas and personnel support areas. Tall pine trees, which are dominant in undeveloped areas and scattered in developed areas, provide a unifying feature throughout the Airport. Additionally, these trees dominate the undeveloped portions of Aviation Avenue and New World Avenue leading away from the main entrances. Traffic circulation is positive and access to most of the developed areas of Cecil Field is relatively easy. The design of existing parking areas, however, tends to detract from a positive aesthetic experience as a result of poor entrance visibility, insufficient buffering to the roadways, and encroachments onto the streets.

Existing utilities tend to negatively affect visual resources at the Airport. Many of these facilities are surrounded by chain-link fences that provide no visual buffer.

The architectural design of structures at Cecil Field is utilitarian. Buildings range from those constructed during World War II to modern three-story buildings. Most buildings were constructed during the 1950s and many have flat roofs.

Vistas are limited throughout the Airport because of the tall pines and the flat topography. Views occur primarily along major roads and in the air operations area.

The air operations area is an open area characterized by aircraft hangars, operations buildings, parking areas, and miscellaneous industrial, warehouse, and training buildings. Aircraft are visible along the runway apron. The edge of the air operations area along Aviation Avenue is characterized by steam lines and a collection of structures of various types and sizes.

Recreational areas such as Lake Fretwell, Lake Newman, and the golf course are generally well designed and surrounded by tall pines. These areas are not visible from the built-up area of the Airport.

### **3.11 Natural Resources, Energy Supply, and Sustainable Design**

#### ***3.11.1 Regulations/Requirements***

It is FAA policy, consistent with the National Environmental Policy Act (NEPA) and Council on Environmental Quality NEPA implementing regulations, to encourage the development of facilities that exemplify the highest standards of design, including the principles of sustainability. These high standards should apply to the conservation of resources such as energy.

#### ***3.11.2 Existing Conditions***

JAA endeavors to manage the amount of energy resources it uses. As a part of a system-wide Green Initiative, JAA intends to begin requiring sustainable design in future building projects and to apply the practices of the U.S. Green Building Council's program for Leadership in Energy and Environmental Design, a nationally recognized benchmark for the design, construction, and operation of high-performance green buildings. JAA has also started a system-wide paper recycling program as a part of this Green Initiative.

## **3.12 Noise**

### ***3.12.1 Regulations/Requirements***

Noise is primarily regulated through local noise ordinances designed to protect noise-sensitive areas. Several Federal laws, including the Aviation Safety and Noise Abatement Act of 1979, as amended (49 U.S.C. 47501-47507), and various commercial standards regulate commercial aircraft noise from airports. Through 14 CFR 36, the FAA regulates noise from commercial aircraft. Land-use compatibility is federally regulated through 14 CFR 150, Airport Noise Compatibility Planning. Other Federal noise standards are designed to protect worker safety.

Noise is unwanted sound that disturbs routine activities and peace and quiet and can cause annoyance. Three characteristics are used to measure noise – amplitude, frequency, and duration. Amplitude is the intensity of the noise and is described in units called decibels (dB). Frequency measures the number of wavelengths received over a period of time. High-frequency noises have a high number of wavelengths per time period, while low frequency noises have fewer wavelengths per time period. An example of high frequency noise is the characteristic high pitch whine from a jet engine. Sonic booms and blast noise are examples of low frequency noise. Duration is simply the length of time over which the noise continues. Common metrics for quantifying noise include A-weighted decibels (dBA), which simulates the frequency response of the human ear, and day-night average noise level (DNL), which is a 24-hour average of noise levels with a 10 dB penalty for noises at night. The 10 dB adjustment is made to account for increased human sensitivity to noise at night.

Aircraft noise is one of the major concerns of both airport operators and airport neighbors in an evaluation of the impacts of a proposed airport development project. The major effect of aircraft noise at the levels typically encountered in airport environs is the annoyance caused by noise exposure.

For the noise analysis, the FAA determined that the cumulative noise energy exposure of individuals resulting from aviation activities must be established in terms of annual average DNL. The FAA considers that there would be a significant noise impact if analysis shows that the Proposed Action would cause noise-sensitive areas to experience a noise increase of 1.5 dBA or more at or above DNL 65 noise exposure when compared to the No Action Alternative for the same period (FAA Order 1050.1E, Change 1).

The most common tool used to describe the noise environment in the vicinity of an airport is the FAA's Integrated Noise Model. This model creates noise contours or lines of equal noise exposure, based on an average noise exposure over a 24-hour period. These noise contours are analogous to topographic contour maps in the set of concentric contours representing successively lower noise levels extending outward from the airport's runways.

Estimates of noise effects resulting from aircraft operations can be interpreted in terms of the probable effect on human activities characteristic of specific land uses. The FAA developed broad guidelines for evaluating land-use compatibility in aircraft noise exposure areas (see Exhibit 3-13). The guidelines reflect the average response of large groups of people to noise. Therefore, these guidelines might not reflect an individual's perception of an actual noise

Exhibit 3-13. Land Use Noise Sensitivity Matrix

		55-65 DNL	65-75 DNL	75+ DNL
 <b>Residential</b>	1-2 Family	Yellow	Red	Red
	Multi-Family	Yellow	Red	Red
	Mobile Homes	Yellow	Red	Red
	Dorms, etc.	Yellow	Red	Red
 <b>Institutional</b>	Churches	Yellow	Red	Red
	Schools	Yellow	Red	Red
	Hospitals	Yellow	Red	Red
	Nursing Homes	Yellow	Red	Red
	Libraries	Yellow	Red	Red
 <b>Recreational</b>	Sports/Play	Yellow	Yellow	Red
	Arts/Instructional	Yellow	Red	Red
	Camping	Yellow	Yellow	Red
<b>Commercial</b>	All Uses	Yellow	Yellow	Yellow
<b>Industrial</b>	All Uses	Yellow	Yellow	Yellow
<b>Agricultural</b>	All Uses	Yellow	Yellow	Yellow

PER FAR PART 150	COMPATIBLE	Yellow
	INCOMPATIBLE	Red

Source: FAA, 2006.

environment. Compatible or incompatible land use is determined by comparing the predicted or measured DNL at a specific site with the compatibility guidelines provided in Exhibit 3-13.

### ***3.12.2 Existing Conditions***

Exhibit 3-14 shows noise contours for the existing conditions at Cecil Field. These contours result from existing operations at Cecil Field, because RLV operations would be similar to those of aircraft operations. The noise contours shown were developed for the 2008 Cecil Field Master Plan.

## **3.13 Socioeconomics**

### ***3.13.1 Regulations/Requirements***

If acquisition of real property or displacement of persons would be involved in a proposed action, the action must comply with the provisions of the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (49 CFR Part 24) as amended. The provisions of this Act apply to all Federal projects and projects involving Federal funding. The FAA also complies with state and local laws, regulations, and ordinances concerning topics such as zoning, transportation, economic development, and housing, when planning, assessing, or implementing a proposed action.

### ***3.13.2 Existing Conditions***

The service region for Cecil Field extends throughout Duval and Clay Counties. Both counties would likely be influenced by any environmental impacts resulting from the Proposed Action. Therefore, the demographic data of both counties is included in this EA as the basis for evaluating any potential future growth in the region and any potential economic impacts under the Proposed Action.

#### **3.13.2.1 Population Trends**

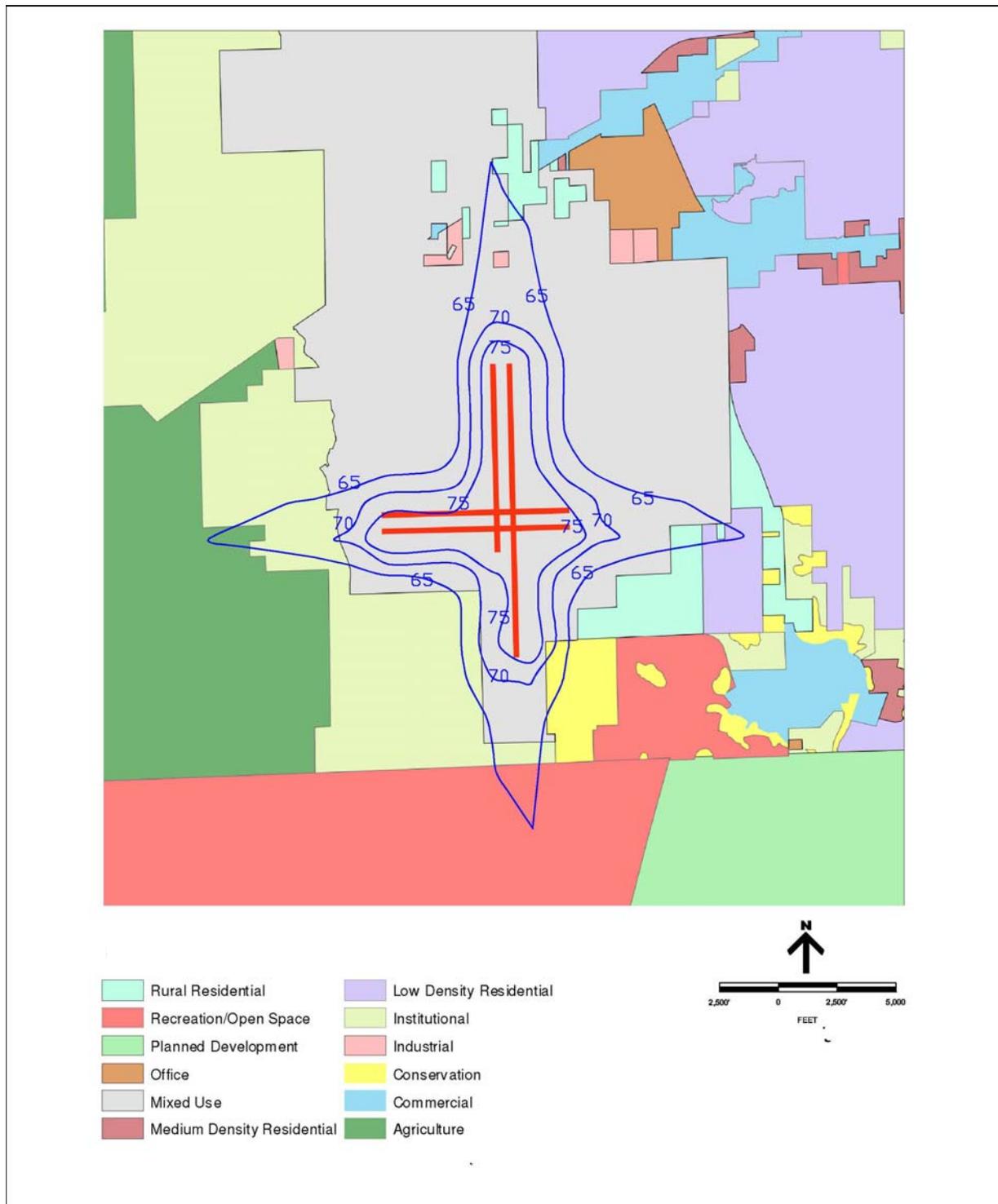
Based on projected growth rates, the U.S. Census Bureau has issued a 2007 population estimate of 849,159 for Duval County and 182,023 for Clay County (Census Bureau, 2008a). This implies a percentage population growth of 45 percent for Duval County and 21 percent for Clay County between the 2000 and 2007 (Census Bureau, 2008b). These are not unreasonable estimates because the percentage of growth of the population between the 1990 and 2000 Census in Duval and Clay Counties were 15.7 and 32.9 percent, respectively.

The population growth of surrounding areas means the increased likelihood of effects on local residents. This is considered in the assessment of socioeconomic impacts in Section 4.13 of this EA.

#### **3.13.2.2 Employment Trends**

As of 2005, the U.S. Census Bureau reports that the educational services, health care, and social assistance industries are the largest employers in Duval and Clay Counties. Exhibits 3-15 and 3-16 list major employers in Duval and Clay Counties, respectively.

**Exhibit 3-14. Existing Noise Contours at Cecil Field**



Source: JAA, 2008b.

**Exhibit 3-15. Duval County Major Employers**

<b>Employer</b>	<b>Sector</b>	<b>Number of Employees</b>
Naval Air Station	U.S. Navy	19,537
Duval County Public Schools	Public Education	16,003
Naval Station Mayport	U.S. Navy	15,239
Blue Cross & Blue Shield of Florida	Health Insurance Regional Headquarters	9,000
City of Jacksonville	Municipal Government	8,493
Publix Distribution Center	Regional Supermarket Distribution Center	6,615
Winn-Dixie Stores, Inc.	Corporate Headquarters and Regional Distribution Center	6,200
Baptist Health System	Hospital	5,600
Citibank (Citi-Cards)	Credit Card Company - Division Headquarters	5,000
Mayo Clinic	Multi-Specialty Health Center	5,000

Source: Northeast Florida Regional Development Partnership, 2005.

**Exhibit 3-16. Clay County Major Employers**

<b>Employer</b>	<b>Sector</b>	<b>Number of Employees</b>
Clay County School Board	Public Education	4,000
Orange Park Medical Center	Hospital	909
Jacksonville Kennel Club	Restaurants/Racetracks	600
Clay County Sheriff's Office	Law Enforcement	526
Hospital Corporation of American, Patient Account Service Center	Healthcare	500
Clay Electric Cooperative Inc.	Electric Utility Company	432
CCAR Services, Inc.	Disabled Services	342
BellSouth Corporation	Telecommunications Call Center	250
Kindred Hospital North Florida	Long-Term Care	225
VAC-CON	Truck Manufacturer	225

Source: Northeast Florida Regional Development Partnership, 2005.

Duval County had an average per capita income of \$25,386 from 2005-2007; Clay County had an average per capita income of \$26,298 (Census Bureau, 2008c).

### **3.14 Water Quality**

#### **3.14.1 Regulations/Requirements**

The Clean Water Act of 1977, as amended (33 U.S.C. 1251 *et seq.*), establishes water pollution control standards and programs with the objective of restoring and maintaining the chemical, physical, and biological integrity of U.S. water resources. The Clean Water Act and its regulations specify (1) that actions must comply with Federal and state water quality criteria, (2) that permits are required under the National Pollutant Discharge Elimination System (NPDES) for storm water discharge, and (3) that states assess non-point source water pollution problems and develop pollution management plans. The Clean Water Act requires permits for activities that result in the discharge of pollutants to water resources or in the placement of fill material in waters of the U.S. Storm Water Pollution Prevention Plans. Such plans are typically prepared and permitted under the NPDES program to ensure construction activities do not lead to unacceptable levels of erosion and water pollution. Other regulations relevant to the protection of freshwater systems include the Safe Drinking Water Act and Executive Order 11988, *Floodplain Management*.

EPA regulates groundwater used as drinking water under the Safe Drinking Water Act. The Act allows EPA to set maximum contaminant level standards for drinking water, allows individual states to establish wellhead protection areas, and allows EPA to regulate and permit underground injection wells. In addition to the Safe Drinking Water Act, EPA also regulates underground storage tanks (40 CFR 280), which allows individual states to develop underground storage tank programs. Such programs are used to monitor underground storage tanks, prevent or detect leaks early, and prevent aquifer degradation.

This section provides an overview of surface water and groundwater resources in the area of potential effect around Cecil Field. The area of potential effect for water resources includes existing Airport property and the area within the immediate drainage areas of systems in the vicinity of the Airport.

### ***3.14.2 Existing Conditions***

#### **3.14.2.1 Surface Water**

Cecil Field is in the St. Johns River basin. Most surface water in Duval County comes from rainfall, except for a small amount of inflow from neighboring Baker County to the west. Groundwater infiltration and seepage from springs also contribute substantially to Cecil Field flow in streams.

Drainage at Cecil Field consists of sheet flow across areas of low topographic relief combined with low-order streams and canals (those having few to no tributaries). In the St. Johns River basin, streams from west to east include Yellow Water Creek, Rowel Creek, and Sal Taylor Creek. Sal Taylor Creek drains the eastern part of the Airport. Rowel Creek receives drainage from the central part of the Airport and flows into Sal Taylor Creek in the south-central part of the Airport. Sal Taylor Creek then flows west into Yellow Water Creek, which flows southward and joins Black Creek approximately 1.5 miles south of the Airport boundary. Black Creek eventually flows into the St. Johns River.

Cecil Field lies within two separate water quality planning units. These units, as defined by the Florida Department of Environmental Protection, include the Black Creek Planning Unit and the Ortega River Planning Unit. The Florida Department of Environmental Protection has published a River Basins Status Report for the lower St. Johns River Basin. Sections 3.14.2.1.1 and 3.14.2.1.2 summarize the water quality assessment for the two water quality planning units potentially affected by activities at Cecil Field.

##### ***3.14.2.1.1 Black Creek Planning Unit***

The water quality assessment shows 13 potentially impaired waterbody segments – Black Creek (two segments), Little Black Creek, North Fork Black Creek, South Fork Black Creek, Grog Branch, Swimming Pen Creek, Mill Log Creek, Bradley Creek, Peters Creek, Bull Creek, Greene Creek, and Doctors Lake. Potential impairments are noted for conventionals, nutrients, metals, and biology. Low dissolved oxygen and metals (including lead, silver, and copper) are the leading parameters of concern. Sediment accumulations from soil erosion and storm-water runoff contribute to flooding and surface water quality problems in the planning unit.

### ***3.14.2.1.2 Ortega River Planning Unit***

The water quality assessment shows nine potentially impaired waterbody segments – the Ortega River (2 segments), McGirts Creek, Cedar River, McCoys Creek, Wills Branch, Williamson Creek, Butcher Pen Creek, and Fishing Creek. Potential impairments are noted for conventionals, nutrients, and metals. Low dissolved oxygen, fecal coliforms, total coliforms, and metals (including lead and iron) are the primary parameters of concern.

### **3.14.2.2 Groundwater**

There are three principal hydrogeological units of concern at Cecil Field. In descending order of importance, these units are the surficial aquifer system, the intermediate aquifer system, and the Floridan aquifer system, as described in Sections 3.14.2.2.1 through 3.14.2.2.2.

#### ***3.14.2.2.1 Surficial Aquifer System***

The surficial aquifer system consists of an upper and lower water-bearing unit, separated by beds of lower permeability. The upper unit (also known as the water table aquifer) consists of medium- to fine-grained unconsolidated quartz sand and is found at 1 to 10 feet below ground surface.

The lower water-bearing unit within the surficial aquifer system (also known as the shallow rock aquifer) is composed of semiconfined shell, limestone, and sand deposits of Pliocene and Upper Miocene age. It is commonly found at depths of 40 to 100 feet below ground surface in Duval County. Water from the surficial aquifer system is used primarily for domestic purposes. However, industrial, commercial, and agricultural uses are also prevalent.

Regional recharge to the surficial aquifer system occurs primarily through infiltration of rainwater or from rivers, lakes, or marshes. Local recharge to the surficial aquifer system occurs from surface water infiltration in the undeveloped wooded areas of Cecil Field and the Cecil Commerce Center. Water is released from the water table zone by evapotranspiration, infiltration into lower layers, seepage into water bodies, and pumpage.

#### ***3.14.2.2.2 Intermediate Aquifer System***

The surficial aquifer system is underlain by the intermediate aquifer system, which occurs at depths of 60 to 110 feet below ground surface in the area of Cecil Field. The intermediate aquifer system, or confining unit, consists of sediment of the Miocene Hawthorn Group, whose water-producing zones and confining zones act collectively as a confining unit for the Floridan aquifer system (Franks and Phelps, 1979). The Hawthorn Group is composed of interbedded phosphatic sand, clay, marl, and limestone. The upper part of the Hawthorn Group locally contains a continuous carbonate-rich unit of dolostone, which forms an artesian water-bearing unit used regionally as a private drinking water source. In the area of Cecil Field, this unit is approximately 15 to 25 feet thick and occurs at depths of 60 to 110 feet below ground surface (BGS), with the shallower depths encountered along incised streams. The total thickness of the entire Hawthorn Group, including the underlying clayey confining beds, exceeds 300 feet in the Cecil Field area. Regional groundwater flow in the upper producing zone of the Hawthorn Group is to the east.

There is a potential for upward discharge of groundwater in the intermediate aquifer system into the surficial aquifer system near creeks such as Rowell Creek and Yellow Water Creek. However, in areas away from streams, the likelihood of downward discharge of groundwater from the surficial aquifer system into the intermediate aquifer system increases.

### **3.14.2.2.3 Floridan Aquifer System**

The intermediate aquifer system is underlain by the thick limestone layers of the Floridan aquifer system, the principal source of groundwater derived for public drinking water in most of northern peninsular Florida. At Cecil Field, at least one irrigation well and five public supply wells extract water from this aquifer system. In the area of the Main Station and in the Yellow Water Area, the Floridan aquifer system is composed of (from oldest to youngest) the Oldsmar Formation, the Avon Park Formation, and the Ocala Limestone Formation. The Hawthorn Group, which forms a confining zone, unconformably overlies the Floridan aquifer system. The top of the limestone of the Floridan aquifer system is encountered at a 260 feet below ground surface and reaches a depth of more than 600 feet below ground surface in Duval County. The aquifer ranges in thickness from 1,500 to 2,000 feet. Groundwater in the Floridan aquifer system flows east to northeast in the vicinity of Cecil Field.

Principal recharge to the Floridan aquifer system occurs in the lakes region of southwestern Clay County, eastern Bradford County, and western Alachua County, where the confining beds are either thin or missing. Groundwater reservoirs in the area are recharged primarily by rainfall outside the area, and to a lesser extent by rainfall within the area.

The quality of water from the Floridan aquifer system at Cecil Field and in the Cecil Commerce Center is considered good (soft water, less dissolved mineral content) because the recharge area is in the western part of Duval County (Navy, 1988). However, water quality along the St. Johns River and near the coast in Duval County is poor because of high concentrations of chloride and other constituents (Navy, 1988). The upper Floridan aquifer system is classified as a G-II aquifer. This classification protects groundwater used for potable water supply from contamination. The potability of water from the Floridan aquifer system in the coastal areas of Duval County could be threatened by the intrusion of saltwater resulting from withdrawal of large quantities of fresh water.

## **3.15 Wetlands**

### **3.15.1 Regulations/Requirements**

Executive Order 11990, *Protection of Wetlands* (May 24, 1977), defines wetlands as “those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.”

Federal agencies are required to minimize the destruction, loss, or degradation of wetlands. The FAA must ensure the protection, preservation, and enhancement of the Nation’s wetlands, to the fullest extent practicable, during planning, construction, funding, and operation of transportation facilities and projects.

The Florida Department of Environmental Protection's Office of Submerged Lands and Environmental Resources addresses dredging, filling, and construction in wetlands. The Office also ensures that activities in uplands, wetlands, or other surface waters do not degrade water quality or the habitat for wetland-dependant wildlife. In addition, Florida wetlands fall under the Federal jurisdiction of the U.S. Army Corps of Engineers.

Florida Wetlands are defined as (Florida, 1994):

*Those areas that are inundated or saturated by surface water or groundwater at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Soils present in wetlands generally are classified as hydric or alluvial, or possess characteristics that are associated with reducing soil conditions. The prevalent vegetation in wetlands generally consists of facultative or obligate hydrophytic macrophytes that are typically adapted to areas having soil conditions described above. These species, due to morphological, physiological, or reproductive adaptations, have the ability to grow, reproduce or persist in aquatic environments or anaerobic soil conditions.*

### **3.15.2 Existing Conditions**

Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands, sloughs, wet prairies, riverine swamps and marshes, hydric seepage slopes, tidal marshes, mangrove swamps, and other similar areas. Florida wetlands generally do not include longleaf or slash pine flatwoods with an understory dominated by saw palmetto. Exhibit 3-17 shows defined wetlands in the general vicinity of Cecil Field.

## **3.16 Wild and Scenic Rivers**

### **3.16.1 Regulations/Requirements**

The Wild and Scenic Rivers Act of 1968 (Public Law 98-542), as amended, describes river segments designated as, or eligible to be included in, the Wild and Scenic Rivers System. Impacts should be avoided or minimized to the extent possible when a proposed action might affect the rivers or river segments that fall under this Act. In addition, the President's 1979 Environmental Message Directive on Wild and Scenic Rivers directs Federal agencies to avoid or mitigate adverse effects to rivers identified in the Nationwide Rivers Inventory as having potential for designation under the Wild and Scenic Rivers Act.

### **3.16.2 Existing Conditions**

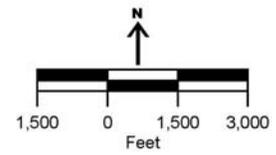
The National Wild and Scenic Rivers System lists only two federally designated rivers in the State of Florida, the nearest of which is the Wekiva River. The Wekiva River flows from its confluence with the St. Johns River to Wekiva Springs in central Florida and its closest point to Cecil Field is approximately 100 miles from the Airport.

**Exhibit 3-17. Wetlands in the General Vicinity of Cecil Field**



Source: U.S. Fish and Wildlife Service, 2006

-  Runway
-  Wetlands



### 3.17 Children’s Environmental Health and Safety Risks

#### 3.17.1 Regulations/Requirements

Pursuant to Executive Order 13045, *Protection of Children From Environmental Health Risks and Safety Risks* (April 21, 1997), Federal agencies are directed to make it a high priority to identify and assess environmental health and safety risks that could disproportionately affect children.

The President’s Task Force on Environmental Health Risks and Safety Risks to Children has identified both the development of asthma in children and the environmental safety of schools as potential risks. Asthma among children has been identified as being a result of impurities in the air. These impurities can be caused by pollution created by aircraft operating in the vicinity of children.

#### 3.17.2 Existing Conditions

Exhibit 3-18 shows the distribution of population by age in Duval and Clay Counties compared to the rest of the Nation and the State of Florida.

**Exhibit 3-18. Distribution of Population by Age (percent)**

Age Category	United States <sup>a</sup>	Florida <sup>b</sup>	Duval County <sup>c</sup>	Clay County <sup>d</sup>
Under 5 Years	7	6	8	6
Under 18 Years	25	23	27	25
18 Years and Over	75	77	73	75

- a. Source: U.S. Census Bureau, 2006a.
- b. Source: U.S. Census Bureau, 2006b.
- c. Source: U.S. Census Bureau, 2006c.
- d. Source: U.S. Census Bureau, 2006d.

An area on Airport property where children frequently gather is limited to a recreation area approximately 0.5 mile northeast of the Runway 9L threshold.

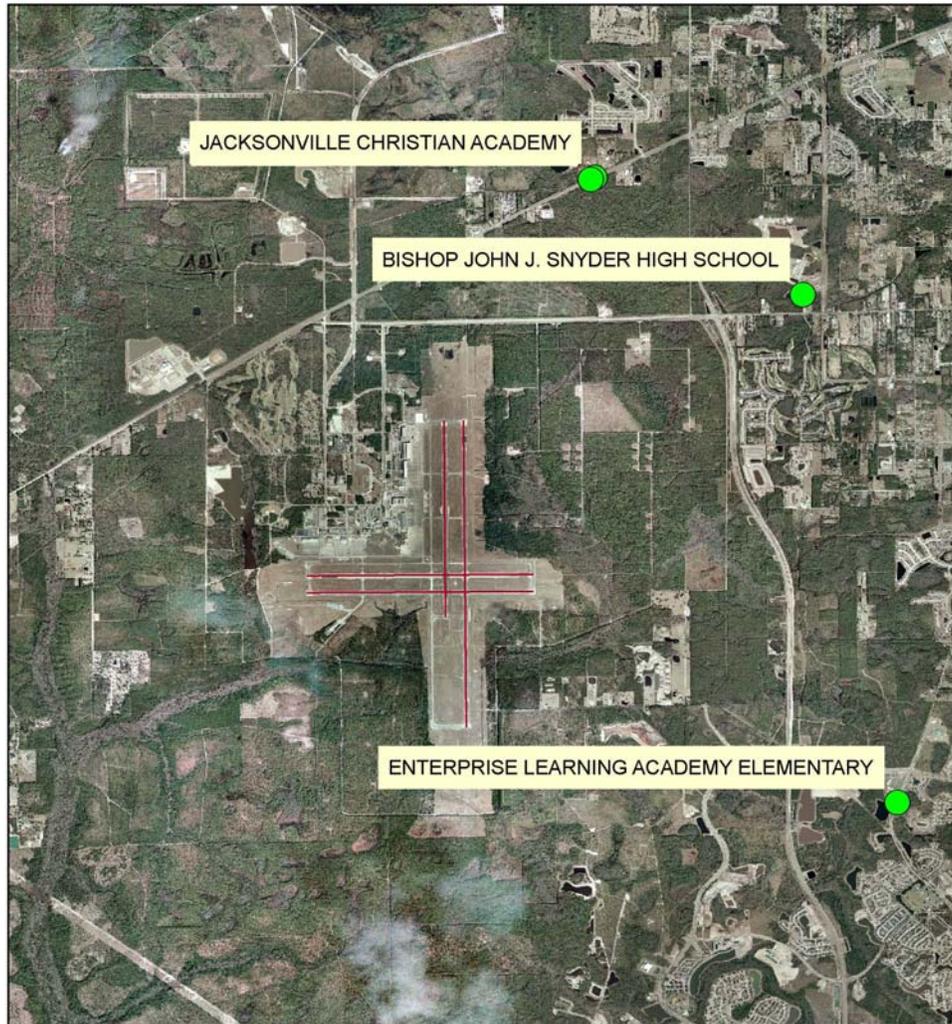
Exhibits 3-19 and 3-20 identify and show the locations of public and private schools within 5 miles of Cecil Field.

### 3.18 Environmental Justice

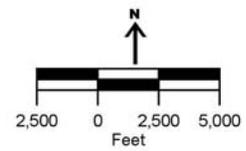
#### 3.18.1 Regulations/Requirements

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations* (February 11, 1994) (The White House, 1994), and U.S. Department of Transportation Order 5610.2, *Environmental Justice in Minority and Low-Income Populations* (DOT, 1997), encourage the consideration of environmental justice impacts, especially to determine whether high and adverse impacts would fall disproportionately on minority and low-income populations. The Department of Transportation defines a disproportionate adverse effect as one that “...is predominately borne...and suffered by the minority population and/or low-income population and is appreciably more severe or greater in

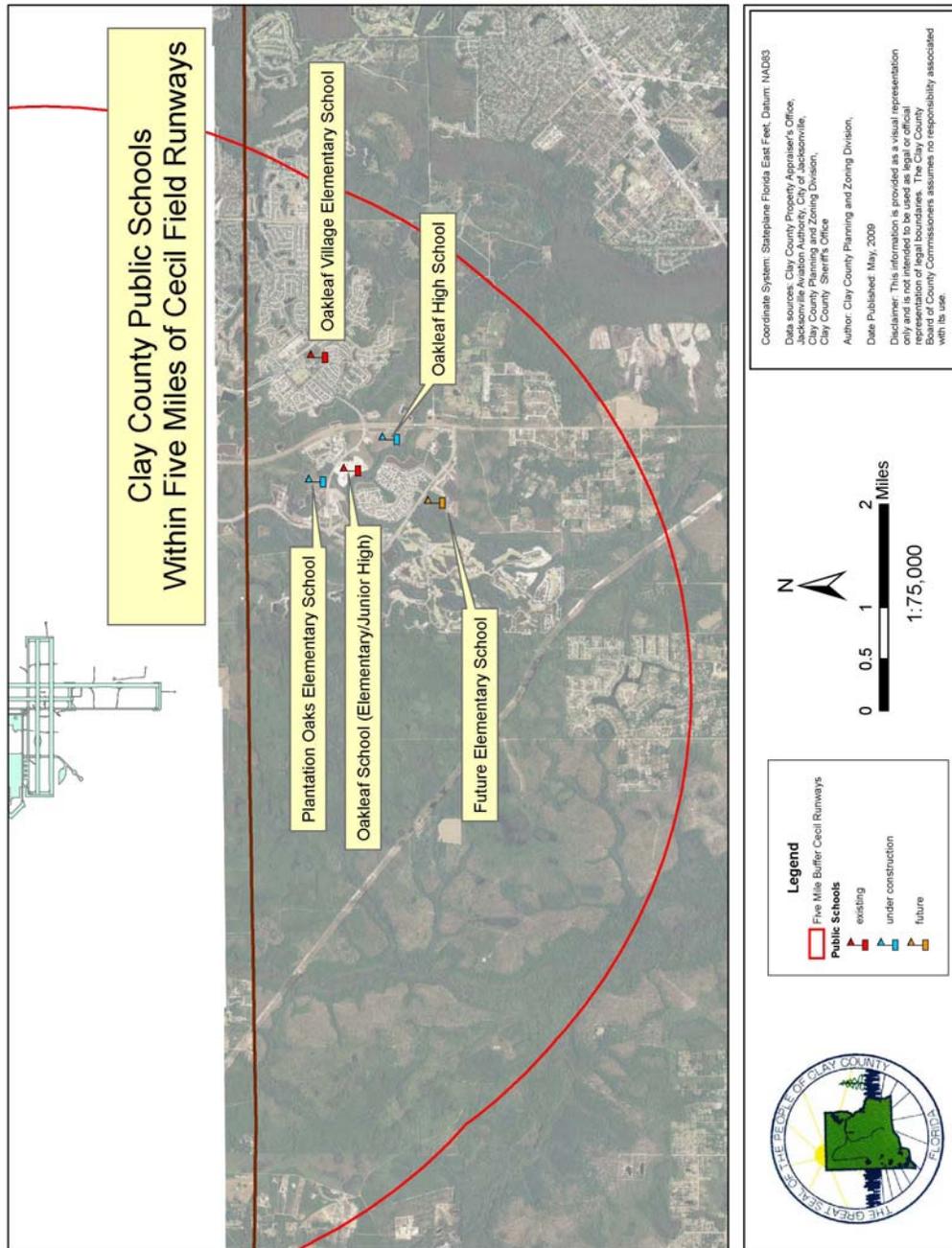
**Exhibit 3-19. Public and Private Schools within 5 Miles of Cecil Field in Duval County**



Source: Florida Geographic Data Library, undated.



**Exhibit 3-20. Public and Private Schools within 5 Miles of Cecil Field in Clay County**



Source: Clay County, 2009.

magnitude than the adverse effect that would be suffered by the non-minority population and/or non-low-income population.”

### 3.18.2 Existing Conditions

Exhibit 3-21 compares social and economic characteristics in the immediate area surrounding Cecil Field in both Duval and Clay Counties with the same characteristics for the United States and Florida as a whole.

**Exhibit 3-21. Social and Economic Characteristics around Cecil Field Compared to the United States and the State of Florida**

Characteristic	United States	Florida	Duval County	Clay County	Zip Code 32221
Percentage of individuals living below the poverty level	13.3	12.8	11.9	9.5	7.2
Percentage of minorities	25	23	37	15	15

Source: U.S. Census Bureau, 2008c.

## 3.19 Airspace

### 3.19.1 Regulations/Requirements

Within the United States, airspace is classified as either controlled or uncontrolled. Special-use airspace and other airspace areas are additional classifications that can include both controlled and uncontrolled segments.

Controlled airspace means airspace of defined dimensions within which air traffic control service is provided to instrument-flight-rules (IFR) flights and to visual-flight-rules (VFR) flights in accordance with the airspace classification. Controlled airspace is a generic term covering Class A, B, C, D, and E airspace. Class G airspace is airspace not designated Class A, B, C, D, or E airspace and is essentially uncontrolled. Exhibit 3-22 further defines airspace designations.

The following paragraphs describe other airspace designations not included in Exhibit 3-22.

- Special-use airspace – This airspace used to confine certain flight activities and to place limitations on aircraft operations that are not part of these activities. Special-use airspace may be designated as prohibited, restricted, warning, alert, military operations areas, controlled firing areas, and national security areas.
- Military training routes – these routes are established below 10,000 feet above mean sea level for both IFR and VFR operations and to VFR operations at speeds in excess of 250 knots.
- En route airways and jet routes – Commercial and private aircraft use these established IFR flight paths.
- Temporary flight restrictions – The FAA imposes temporary flight restrictions to protect persons and property on the surface or in the air. For example, the FAA would normally issue a notice to airmen to provide a safe environment for rescue/relief operations and to prevent unsafe congestion above an incident or event that could generate high public interest.

**Exhibit 3-22. U.S. Airspace Classifications**

<b>Classification</b>	<b>Controlled/ Uncontrolled</b>	<b>Description</b>
Class A	Controlled	Within the contiguous United States and including 12 nautical miles from the coastline over the oceans, Class A airspace extends from 18,000 feet above mean sea level up to and including Flight Level 600. Aircraft must be equipped with a two-way radio capable of maintaining communications with air traffic control. All aircraft must receive appropriate air traffic control clearance and operate under IFR unless otherwise authorized.
Class B	Controlled	Ranges from the surface to 10,000 feet above mean sea level surrounding the Nation’s busiest airports in terms of IFR operations or passenger enplanements. Individually tailored and consists of a surface area and two or more layers, and is designed to contain all published instrument procedures once an aircraft enters the airspace.
Class C	Controlled	Ranges from the surface to 4,000 feet above the airport elevation and surrounding those airports that have an operational control tower, that are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Usually consists of a surface area with a 5-nautical-mile radius, and an outer circle with a 10-nautical-mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation.
Class D	Controlled	Ranges from the surface to 2,500 feet above the airport elevation and surrounding those airports that have an operational control tower. Individually tailored, and when instrument procedures are published, the airspace would normally be designed to contain the procedures.
Class E	Controlled	Generally, defined as any controlled airspace that is not Class A, B, C, or D and includes uncontrolled airspace above Flight Level 600.
Class G	Uncontrolled	Air traffic control does not have responsibility for or authority over aircraft in Class G airspace; however, most of the regulations affecting pilots and aircraft still apply.

Source: 14 CFR Part 91.

**3.19.2 Existing Conditions**

Cecil Field is a controlled airfield within Class D airspace during the hours in which the control tower is operating and reverts to Class E airspace once the control tower closes. The Class D airspace extends out horizontally for a 7-nautical-mile radius from the center of the airfield and vertically up to 2,600 feet above mean sea level. The Class E airspace extends out 8.5 nautical miles from the center of the Airport and vertically up to, but not including, 18,000 feet above mean sea level.

Airspace outside the Class D service area includes the Class C airspace associated with Jacksonville International Airport, which begins approximately 15 miles to the northeast, and a controlled firing area that skirts the southern boundary of the Cecil Fields Class D airspace (see Exhibit 3-23).

The airspace over Duval and Clay Counties also consists of various Victor airways and Jet Routes. These “highways in the sky” provide a means to organize air traffic traversing the local airspace. The Victor airways are below 18,000 feet above mean sea level, are 8 nautical miles wide, and connect ground-based navigational aids. Victor airways in the vicinity of Cecil Field

Exhibit 3-23. Jacksonville Sectional Chart<sup>a,b,c</sup>



- a. Source: DOT, 2007.
- b. 1 inch = 5 nautical miles.
- c. 10 centimeters = 37 kilometers.



are depicted in Exhibit 3-24 as black lines and denoted with numbers in black boxes that have a “V” designation

Jet routes are high-altitude airways in Class A airspace above 18,000 feet above mean sea level. Exhibit 3-25 shows the jet routes in the vicinity of Cecil Field; these are depicted as black lines distinguished as numbers in black boxes that have a “J” designation.

### **3.20 Transportation**

Transportation is usually classified by the medium in which the movement occurs, such as by land, air, water or rail. Transportation resources available in the vicinity of Cecil Field include road, air, and train access.

#### **3.20.1 Roadways**

Cecil Field is served by a system of roads that is part of a regional and interstate system providing access to the State of Florida and the southeastern United States. See Exhibits 2-3 and 2-6 for the relative components of this road network, which the following paragraphs describe in detail:

- Interstate 295 is a limited-access freeway that bypasses the western periphery of downtown Jacksonville and connects with Interstate 95 to the north and south of the urbanized area of the City.
- Interstate 10 is a limited-access freeway that traverses the State of Florida and the Nation from east to west, and connects with the major north/south freeways in the State – Interstate 75 to the west and Interstate 295/Interstate 95 to the east.
- U.S. 301 is a principal arterial that runs from north to south through the City of Baldwin, west of Cecil Field.
- U.S. 90 is a principal arterial that runs parallel to Interstate 10 and provides access to downtown Jacksonville to the east and cities of the Florida panhandle to the west.
- Florida State Route 228 (Normandy Boulevard) is a principal arterial that provides access from the southwest to the high-density development to the east.
- Florida State Route 134 (103<sup>rd</sup> Street) is a principal arterial that provides access to Interstate 295 from the Cecil Field area.

The system of local roads adjacent to Cecil Field serves traffic attracted to and generated from the Airport and neighboring land uses. The local system includes the following roads:

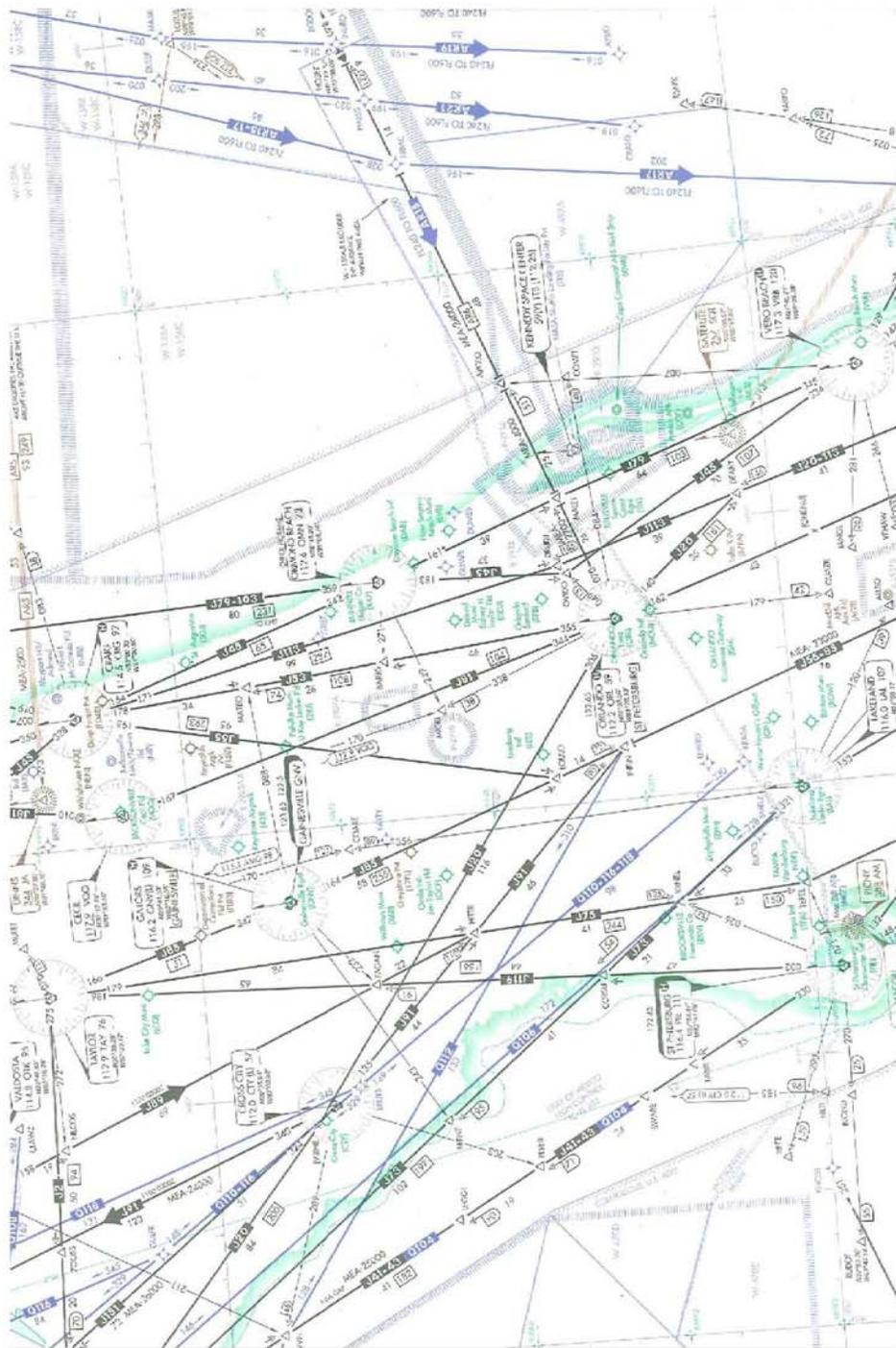
- Chaffee Road, a minor arterial road that provides access from State Route 134 north to Interstate 10
- Blanding Boulevard, a minor arterial road that serves as a primary connection between Clay County and the developed areas east of Cecil Field
- Crystal Springs Road, a collector road that provides access to the east of Chaffee Road

Exhibit 3-24. Victor Airways



Source: FAA, 2008.

Exhibit 3-25. Jet Routes



Source: FAA, 2008

- Old Middleburg Road, a collector road that provides access into Clay County from State Route 134
- Otis Road, a collector road that provides access to Nassau County from U.S. 90

Cecil Field is served by a network of internal paved and unpaved roads. Aviation Avenue and New World Avenue are the primary north-south circulation routes to and from Cecil Field. The primary east-west collector roads are 9<sup>th</sup> Street, 6<sup>th</sup> Street, 4<sup>th</sup> Street, and 2<sup>nd</sup> Street.

Secondary roads provide access to runways, recreation areas, and the more remote areas of Cecil Field. The principal Airport parking areas are near the developed areas of Cecil Field. Exhibit 3-26 shows the internal (on-airport) transportation network for Cecil Field.

### ***3.20.2 Mass Transit***

The Jacksonville Transportation Authority provides mass transit service in the Jacksonville area. This service provides transportation throughout the metropolitan area using local and express buses, including buses equipped for the disabled.

The Transportation Authority provides service to Cecil Field at the western service boundary of the Jacksonville metropolitan area. Route P7 serves the Airport, arriving daily via Normandy Boulevard. Individuals utilizing this route can transfer to routes that access the eastern, northern, and southern portions of the metropolitan area.

### ***3.20.3 Rail Facilities***

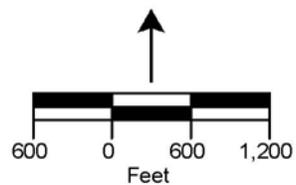
Three major rail carriers operate in the Jacksonville area – CSX Transportation, Norfolk Southern Corporation, and Florida East Coast Railway.

The only active rail corridor in the vicinity of Cecil Field runs parallel to Interstate 10 and U.S. 90. Both CSX and Amtrak use the lines in this corridor to connect service from Jacksonville with a CSX corridor adjacent to U.S. 301.

**Exhibit 3-26. On-Airport Transportation Network**



- |  |                                 |  |                |
|--|---------------------------------|--|----------------|
|  | National Park or Forest         |  | Major Road     |
|  | State Park or Forest            |  | Local Road     |
|  | Local Park or Recreational Area |  | Minor Road     |
|  | Runway                          |  | Other Road     |
|  | Airport Area                    |  | Ramp           |
|  | Limited Access                  |  | Ferry          |
|  | Highway                         |  | Pedestrian Way |



Source: Google, 2008a.

#### **4. ENVIRONMENTAL CONSEQUENCES**

This chapter describes the potential environmental impacts of the Proposed Action and the No Action Alternative to the impact areas described in Chapter 3. The analysis focuses on resources that would be directly, indirectly, and cumulatively affected.

The area of potential effect includes the geographic area within which direct and indirect impacts could reasonably be expected to occur and cause a change in the existing conditions of the impact category of interest. The area of potential effect includes all areas underlying the flight route described in Chapter 2.

Federal Aviation Administration (FAA) Order 1050.1E, Change 1, Environmental Impacts: Policies and Procedures, requires an evaluation of impacts for specific impact categories. For some categories, impacts were determined through calculation, measurement, or observation. For other categories, impacts were determined through correspondence with appropriate Federal, State of Florida, or local agencies. This chapter describes potential environmental impacts to the following impact categories, as required by FAA Order 1050.E, Change 1.

- Climate and Air Quality (Section 4.1)
- Coastal Resources (Section 4.2)
- Compatible Land Use (Section 4.3)
- Department of Transportation Act, Section 4(f), Resources (Section 4.4)
- Farmlands (Section 4.5)
- Fish, Wildlife, and Plants (Section 4.6)
- Floodplains (Section 4.7)
- Hazardous Materials, Pollution Prevention, and Solid Waste (Section 4.8)
- Historical, Architectural, Archaeological, and Cultural Resources (Section 4.9)
- Light Emissions and Visual Resources (Section 4.10)
- Natural Resources, Energy Supply, and Sustainable Design (Section 4.11)
- Noise (Section 4.12)
- Socioeconomics (Section 4.13)
- Water Quality (Section 4.14)
- Wetlands (Section 4.15)
- Wild and Scenic Rivers (Section 4.16)
- Children's Environmental Health and Safety Risks (Section 4.17)
- Environmental Justice (Section 4.18)
- Construction Impacts (Section 4.19)
- Secondary (Induced) Impacts (Section 4.20)
- Cumulative Impacts (Section 4.24)

In addition, this chapter describes potential environmental impacts for impact categories not specifically identified in FAA Order 1050.1E, Change 1. These impact categories are:

- Airports/Airport Users (Section 4.21)
- Airspace (Section 4.22)
- Transportation (Section 4.23)

#### 4.1 Climate and Air Quality

This section describes potential impacts to climate and air quality under the Proposed Action and the No Action Alternative in accordance with National Environmental Policy Act (NEPA) requirements as specified in Council on Environmental Quality regulations,<sup>4</sup> FAA Order 1050.1E, Change 1, and FAA Air Quality Procedures for Civilian Airports and Air Force Bases (DOT, FAA, and USAF, 2005). This section addresses potential impacts to air quality by evaluating the impact of the Proposed Action on the National Ambient Air Quality Standards (NAAQS) and the Florida Ambient Air Quality Standards described in Chapter 3. At present, the Cecil Field project area is in attainment for all criteria pollutants under the Clean Air Act Amendments. Therefore, the air quality in the area is considered to be good.

##### 4.1.1 Proposed Action

###### 4.1.1.1 Launch Vehicles

JAA has proposed two types of reusable launch vehicles (RLVs),<sup>5</sup> both of which would be horizontally launched suborbital vehicles designed to be used multiple times. Exhibit 4-1 lists the maximum number of proposed launches for each year under an FAA operating license. The agreement between JAA and the FAA Jacksonville Air Route Traffic Control Center regarding the proposed spaceport at Cecil Field is not yet complete. However, it is not expected that the number of launches from Cecil Field would exceed those indicated.

**Exhibit 4-1. Proposed Maximum Number of Launches of Each Concept Vehicle**

Vehicle	2009	2010	2011	2012	2013
Concept X	12	12	24	48	48
Concept Z	2	2	3	4	4

###### 4.1.1.1.1 Concept X

Concept X is a vehicle that has both a jet engine and a rocket engine. It would takeoff using a jet engine, such as the CJ610-6 used by the Learjet 25c. In the troposphere, at 40,000 feet (or about 7.6 miles), the rocket engine would be ignited. The rocket engine would continue to operate through the remainder of the troposphere and into the stratosphere. At higher altitudes, this vehicle would coast with no engine power. Emissions of concern from this RLV are from the jet engines in take-off mode and rocket engines in the upper troposphere and stratosphere. The components in the rocket propellant include liquid oxygen and kerosene.

<sup>4</sup> *Regulations for Implementing the National Environmental Policy Act*, 40 CFR Parts 1500-1508 (43 *Federal Register* 55978, November 29, 1978; amended 51 *Federal Register* 15618, April 25, 1986).

<sup>5</sup> The naming of the concept vehicles is identical to those used in the Programmatic EIS for Horizontal Launches and Reentries of Reentry Vehicles (FAA, 2005).

#### 4.1.1.1.2 Concept Z

The Concept Z vehicle would be transported in a piggy-back fashion on a jet (such as the F-5F Tiger II using J85-GE-5F engines) into the stratosphere. The rocket would be ignited at approximately 50,000 feet (or about 9.5 miles) and burn for approximately 1 minute. It would then coast for the remainder of its voyage, including the landing. All rocket emissions would occur in the stratosphere only. This vehicle would use nitrous oxide (N<sub>2</sub>O) and a synthetic rubber, hydroxyl-terminated polybutadiene (HTPB) as propellants.

#### 4.1.1.2 Analysis Methodology

The composition of exhaust emissions from launches would vary depending on the type of propellant and the type of propulsion system used (jet and/or rocket). Emissions of concern that could be generated include particulate matter (PM), nitrogen oxides (NO<sub>x</sub>), sulfur oxides (SO<sub>x</sub>), carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), hydrogen (H<sub>2</sub>), water (H<sub>2</sub>O), and volatile organic compounds (VOCs). Emissions of other main exhaust products would be either negligible or would not have an adverse impact on any layer of the atmosphere.

Exhaust emissions are estimated using fuel usage profiles based on the concept vehicle (fuel consumed by each concept vehicle in each layer of the atmosphere) (EPA, 2002). These profiles were then multiplied by the emission weight fractions based on fuel type and the total emissions were calculated using the total proposed launches shown in Exhibit 4-1.

#### 4.1.1.3 Potential Impacts

##### 4.1.1.3.1 Assessment

### Troposphere

Exhibit 4-2 lists the non-project airport-related 2005 baseline emissions for Cecil Field.

**Exhibit 4-2. 2005 Baseline Emissions from Airport Operations at Cecil Field<sup>a</sup> (kilograms<sup>b</sup>)<sup>c</sup>**

<b>Emission Source</b>	<b>CO</b>	<b>VOCs</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>	<b>PM<sub>2.5</sub></b>
Aircraft	1,076,566	346,017	498,017	41,309	97,136	97,136
GSE/APU	219,875	13,425	83,982	10,107	4,782	4,636
Roadways	246,160	18,534	35,770	444	539	353
<b>Totals</b>	<b>1,542,601</b>	<b>377,976</b>	<b>617,769</b>	<b>51,860</b>	<b>102,457</b>	<b>102,125</b>

a. Source: KM Chng Environmental, Inc., 2008.

b. To convert kilograms to pounds, multiply by 2.2046.

c. CO = carbon monoxide; VOCs = volatile organic compounds; NO<sub>x</sub> = nitrogen oxides; SO<sub>x</sub> = sulfur oxides; PM<sub>10</sub> = particulate matter with an aerodynamic diameter of 10 micrometers or less; PM<sub>2.5</sub> = particulate matter with an aerodynamic diameter of 2.5 micrometers or less.

Exhibit 4-3 lists the emissions estimated per launch for each concept vehicle. Impacts in the troposphere from the proposed RLV launches would result from engine emissions during takeoff and climb-out. Exhibit 4-4 lists the annual emissions for maximum launches of RLVs. Concepts X and Z emissions come from both jet engines and rocket engines.

Even at the maximum launch possibilities in 2013 and considering that only emissions below 3,000 feet are assessed for the non-project Airport emissions, CO emissions from RLVs would

**Exhibit 4-3. Emissions (kilograms<sup>a</sup>) in the Troposphere per RLV Launch<sup>b,c,d</sup>**

Vehicle	PM	NO <sub>x</sub>	SO <sub>x</sub>	CO	CO <sub>2</sub>	H <sub>2</sub> O	VOC	H <sub>2</sub>
Concept X	22	1.2	0.3	144	2,151	893	3.9	1.8
Concept Z	42	3.7	0.8	109	4,899	1,928	9.3	0

- a. To convert kilograms to pounds, multiply by 2.2046.
- b. Source: KM Chng Environmental, Inc., 2008.
- c. These emissions are for both the rocket engines and the jet engines that are involved in the launch.
- d. PM = particulate matter; NO<sub>x</sub> = nitrogen oxides; SO<sub>x</sub> = sulfur oxides; CO = carbon monoxide; CO<sub>2</sub> = carbon dioxide; H<sub>2</sub>O = water; VOCs = volatile organic compounds; H<sub>2</sub> = hydrogen.

**Exhibit 4-4. Annual Emissions (kilograms<sup>a</sup>) from RLV Launches in the Troposphere Each Year of License<sup>b,c</sup>**

Pollutant	2009	2010	2011	2012	2013
Particulate matter	348	348	653	1,223	1,223
Nitrogen oxides	22	22	450	72	72
Sulfur oxides	5	5	10	18	18
Carbon monoxide	1,941	1,941	3,774	7,329	7,329
Carbon dioxide	35,606	35,606	66,313	122,829	122,829
Water	14,567	14,567	27,206	50,557	50,557
Volatile organic compounds	65	65		224	224
Hydrogen	22	22	44	87	87

- a. To convert kilograms to pounds, multiply by 2.2046.
- b. Source: KM Chng Environmental, Inc., 2008.
- c. These emissions are from the jet engine emissions involved in the takeoff and landing phases of the RLV flight, either from the carrier plane used in Concept Z or from the jet engines used in Concept X.

account for only about 1 percent of all CO emissions from the Airport operations at Cecil Field. PM emissions from RLVs would also account for about 1 percent of the Airport PM emissions. Emissions of the other criteria air pollutants would be at even smaller percentages. In relation to the baseline conditions, these RLV emissions would result in a negligible impact to area air quality and would not cause or contribute to violations of the NAAQS.

Hydrochloric acid and chlorine are considered air toxics and are sometimes components of rocket engine emissions, depending on propellant type. None of the proposed launch vehicles would use propellants that would result in emissions of these pollutants.

### **Stratosphere**

Under the Proposed Action, potential impacts to the stratosphere would include impacts to global climate change and depletion of the ozone layer. Exhibit 4-5 lists total emissions to the stratosphere per vehicle launch. Exhibit 4-6 lists the estimated annual emissions in the stratosphere for the Proposed Action.

**Exhibit 4-5. Emissions (kilograms<sup>a</sup>) in the Stratosphere per RLV<sup>b,c,d</sup>**

Vehicle	PM	NO <sub>x</sub> <sup>e</sup>	SO <sub>x</sub>	CO	CO <sub>2</sub>	H <sub>2</sub> O	VOCs	H <sub>2</sub>
Concept X	-	-	-	649	1,589	973	-	14
Concept Z	-	-	-	305	46	335	-	-

- a. To convert kilograms to pounds, multiply by 2.2046.
- b. Source: KM Chng Environmental, Inc., 2008.
- c. These emissions are for both the rocket engines and the jet engines that are involved in the launch.
- d. PM = particulate matter; NO<sub>x</sub> = nitrogen oxides; SO<sub>x</sub> = sulfur oxides; CO = carbon monoxide; CO<sub>2</sub> = carbon dioxide; H<sub>2</sub>O = water; VOCs = volatile organic compounds; H<sub>2</sub> = hydrogen.
- e. A small amount of NO<sub>x</sub> could be created by hot exhaust contact with atmospheric nitrogen and oxygen.

**Exhibit 4-6. Annual Emissions (kilograms<sup>a</sup>) from RLVs in the Stratosphere Each Year of License**

Pollutant	2009	2010	2011	2012	2013
Particulate matter	-	-	-	-	-
Nitrogen oxides	-	-	-	-	-
Sulfur oxides	-	-	-	-	-
Carbon monoxide	8,392	8,392	16,480	32,351	32,351
Carbon dioxide	19,160	19,160	38,725	76,458	76,458
Water	12,345	12,345	24,355	48,039	48,039
Volatile organic compounds	-	-	-	-	-
Hydrogen	163	163	327	654	654

a. To convert kilograms to pounds, multiply by 2.2046.

b. Source: KM Chng Environmental, Inc., 2008.

### ***Global Climate Change***

Under the Proposed Action, potential launch emissions that could affect global climate change would be from CO<sub>2</sub>. As of 2004, the United States annually emits 6 trillion tons of CO<sub>2</sub>, of which about 200 billion tons are from aviation, or approximately 3 percent of total emissions (EPA, 2008a). Therefore, the almost 80 tons (40 billionths of a percent) of CO<sub>2</sub> emissions from the proposed spaceport would be negligible in comparison. Though the amount of CO<sub>2</sub> would be very small compared to the total emissions from the United States, consideration must be given to the fact that CO<sub>2</sub> has a much longer life in the stratosphere than in the troposphere. Because the temperatures increase with height in the stratosphere and the air is much drier (no loss from rain), gases, once they reach the stratosphere, require a longer time to be removed. For example, in the troposphere the average life of water is about 9 days, but in the stratosphere the life is on the order of months to years, roughly a 50 times increase. Therefore, all emissions in the stratosphere must be considered with this in mind. Even with the increased life, at this small number of launches, CO<sub>2</sub> emissions would remain insignificant in the total contribution from aviation in the United States.

The Concept Z vehicle might release N<sub>2</sub>O, which is a greenhouse gas, during both nominal and non-nominal missions. During nominal missions, 100 pounds of N<sub>2</sub>O would be released during descent at altitudes between 180,000 and 120,000 feet. In comparison, the United States emitted approximately  $6.86 \times 10^{11}$  pounds in 2006 alone (EPA, 2009a). The Proposed Action would represent a fraction of 1 percent of the total U.S. emissions. Due to the small quantity of the release and the small number of launches (up to four), the potential impacts to global climate change from the Concept Z vehicle would be negligible.

The effects of climate change are global. Emissions from the proposed RLV launches would not create any measurable changes in the global environment.

### ***Ozone Depletion***

Chlorine atoms or molecules are the major chemicals that contribute to ozone depletion. None of the proposed rocket engines would emit chlorine. NO<sub>x</sub> can also affect ozone chemistry. In the upper troposphere and lower stratosphere, increased NO<sub>x</sub> has been seen to reduce the loss of ozone. In the upper stratosphere, the opposite effect is expected. None of the proposed RLVs would emit NO<sub>x</sub> into the stratosphere, so there would be no perturbation in the ozone layer from

NO<sub>x</sub>, PM, SO<sub>x</sub>, and H<sub>2</sub>O that create aerosols in the vehicle contrails might affect ozone loss, but once again, the effect would not be linear. It is unclear if these aerosols have any long-term effect.

### **Mesosphere and Ionosphere/Thermosphere**

As noted above, the Concept Z vehicle might release N<sub>2</sub>O during both nominal and non-nominal missions within the mesosphere. However, the release quantity would be small (100 pounds) and have a negligible impact.

There would be no expected emissions in the ionosphere or thermosphere because the concept vehicles would not be powered at these altitudes. Both of the RLVs considered under the Proposed Action would coast unpowered in these regions and no impacts would be expected.

### **Impacts of Landing**

#### ***Heat Dissipating Effects***

During landing from altitudes of above 50 miles, there is extreme heating because of collision with atmospheric gases. As the RLVs reentered the denser atmosphere, they would collide with gas molecules. This would result in a slowing of the RLV, but would increase random kinetic energy (temperature). This heat must be dissipated, and ablative materials would be used. Basically, ablative material is designed to slowly burn away in a controlled manner, so that heat can be carried away from the spacecraft by the generated gases, while the remaining solid material insulates the craft from superheated gases. The materials are typically a honeycomb base, consisting of oxygen, carbon, hydrogen, and nitrogen, with fillers made of calcium, silicon, and sodium. The charred fibers could increase particulate loading in the atmosphere along the landing trajectory; however, EPA has studied this issue and believes subsequent consequences are negligible (EPA and FAA, 1992).

A second impact comes from the extreme heat that creates similar reactions as in an engine. Atmospheric oxygen and nitrogen would dissociate and react to form nitric oxides. Nitric oxides have the potential to destroy ozone. Nitric oxides formed from reentry would be minor and negligible.

#### ***Emissions***

Both launch vehicles would glide unpowered to landing, so there would be no emissions from these RLVs. The ferrying jet plane used in Concept Z and the actual RLV in Concept X would emit in the troposphere. These emissions have been added to the results in Exhibit 4-3. They would not be expected to be significant compared to emissions from the total operations at Cecil Field.

#### ***4.1.1.3.2 Conclusion***

The Proposed Action would have a negligible impact on area air quality, would not cause or contribute to violations of the NAAQS or Florida Air Quality Standards, would not create any measurable changes in the global environment, would not emit ozone-depleting chemicals, and

would not result in emissions to the mesosphere, ionosphere, or thermosphere. Therefore, there would be no significant impacts to climate or air quality as a result of the Proposed Action.

#### ***4.1.2 No Action Alternative***

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no impacts to climate and air quality as a result of this alternative.

### **4.2 Coastal Resources**

Airport facilities are generally of coastal management concern when their construction or expansion could significantly impact coastal resources, including possible impacts to freshwater wetlands. The State of Florida has a Coastal Zone Management Program and the entire state falls within the jurisdiction of the Florida Department of Environmental Protection. All Federal, State, and local reviewing agencies that propose activities within the defined coastal zone must determine the action's consistency with the Coastal Zone Management Act or Gubernatorial Executive Order 95-359.

Section 4.2.1 describes the analysis of potential impacts to coastal resources in the State of Florida from the Proposed Action.

#### ***4.2.1 Proposed Action***

##### **4.2.1.1 Assessment**

The nearest Coastal Barrier Resource Unit to Cecil Field is approximately 30 miles northeast of the airfield on Talbot Island. Due to the location of both Cecil Field and the proposed RLV flight routes and launch corridors, no significant impacts to this area would be expected as a result of the Proposed Action.

In addition, the Florida Department of Environmental Protection has determined that the Proposed Action would be consistent with the Florida Coastal Management Program (see Appendix A for a copy of the letter from the Department).

##### **4.2.1.2 Conclusion**

Both the location of the Proposed Action and the determination of the Florida Department of Environmental Protection indicate that there would be no significant impacts to Florida coastal resources as a result of the Proposed Action.

#### ***4.2.2 No Action Alternative***

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no launches from Cecil Field. There would be no impacts to coastal resources as a result of this alternative.

### **4.3 Compatible Land Use**

FAA Order 1050.1E, Change 1, states that the compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of the airport's noise impacts. Therefore, there must be assurances that the proposed spaceport location and forecast noise contours would be compatible with zoning laws, current infrastructure, and the adoption of new zoning regulations.

Significance thresholds for day-night average noise levels (DNL) have been established when evaluating the compatibility of surrounding land uses. These are provided in FAA Order 1050.1E, Change 1, Appendix A, and have been used in this analysis to determine the significance of noise impacts. In general, residences, schools, hospitals, nursing homes, and places of public assembly, including places of worship, are considered noise-sensitive areas and are not generally compatible with aircraft operations when those noise-sensitive areas are within the 65 DNL noise contour. Exhibit 3-13 provides a general outline of noise-sensitive land uses.

The City of Jacksonville has adopted Ordinance 656, Part 10, for the establishment of an Air Installation Compatible Use Zone around airports within the city limits, including Cecil Field. The purpose of the ordinance is to protect public safety, health, and welfare, while forestalling degradation of the operational capability of airports. The main intent of the ordinance is to ensure that development of surrounding lands would be compatible with the noise levels associated with airport operations. As a result, no use may be made of land or water within the ordinance zone in such a manner as to create electrical interference with navigational signals or radio communication between the airport and aircraft; lighting that makes it difficult for pilots to distinguish between airport lights and others; or obstructions that penetrate FAA-established imaginary surfaces.

The City of Jacksonville has established Airport Height Zones that include all of the land lying beneath the approach, transitional, horizontal, and conical surfaces as they apply to Cecil Field. The intent is to restrict the creation of structures that might penetrate these established imaginary surfaces.

#### **4.3.1 Proposed Action**

##### **4.3.1.1 Assessment**

JAA does not anticipate the need for new structures under the Proposed Action because several existing facilities could be used for the proposed activities. The available facilities are in good condition and could be revamped as required to accommodate uses relative to proposed spaceport operations.

No major changes to land use would be needed to accommodate the Proposed Action, and JAA does not plan to alter the existing land use for the areas surrounding Cecil Field. Therefore, there would be no impacts to land use compatibility under the Proposed Action.

#### **4.3.1.2 Conclusion**

The City of Jacksonville has established an Air Installation Compatible Use Zone and an Airport Height Zone around Cecil Field. The Proposed Action would not result in additional construction, changes in land use, or additional noise. Therefore, there would be no significant impacts to surrounding land uses as a result of the Proposed Action.

#### **4.3.2 No Action Alternative**

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no impact to land use compatibility under this alternative.

### **4.4 Department of Transportation Act, Section 4(f) Resources**

The land in the immediate vicinity of Cecil Field and the areas beneath the proposed RLV flight route were examined to determine the extent to which the Proposed Action would likely impact Section 4(f) Lands.

#### **4.4.1 Proposed Action**

##### **4.4.1.1 Assessment**

There are Section 4(f) lands in the vicinity of Cecil Field (see Exhibit 3-8) and beneath the proposed RLV flight route (see Exhibit 3-9). Assuming spaceport operations began in 2009, the Cecil Field Master Plan Update forecast indicates total operations at Cecil Field, exclusive of spaceport operations, would equal 106,246 in 2009. Therefore, the total number of 28 spaceport operations (14 launches and landings) under the Proposed Action would be equal to a 0.03-percent increase in total Cecil Field operations in 2009. The total number of Cecil Field operations projected for 2014 is 113,763. Note that the proposed license would expire in 2013. However, the total number of operations at Cecil Field was not calculated for 2013. Therefore, the projected total number of 104 spaceport operations (52 launches and landings) for 2013 was used to calculate the percent increase in operations at Cecil Field in 2014. Thus, the maximum number of 104 spaceport operations (52 launches and landings) would equate to a 0.09-percent increase in the total 2014 operations at Cecil Field. Half of the proposed annual spaceport operations would involve no jet engine noise because the vehicles would return to Cecil Field as gliders. Because the maximum 104 annual operations projected for the spaceport would be less than 1 percent of the total 2004 operations, the spaceport annual operations would not significantly affect existing noise contours. Therefore, there would be no direct use or constructive use of Section 4(f) properties as a result of the Proposed Action and no supplemental noise analysis would be necessary for Section 4(f) properties in accordance with FAA Order 1050.1E, Change 1.

Noise impacts were examined to determine if proposed RLV operations would create impacts outside the boundaries of the Airport. Existing noise contours were developed as a part of the 2008 Cecil Field Master Plan Update (see Sections 3.12). Under present conditions, the 65 DNL noise contour extends outside the existing property boundary of Cecil Field. These noise contours have been incorporated into the City of Jacksonville's Zoning Atlas and the City has

designated underlying areas as Airport Noise Zones. The noise contours for the 2008 Cecil Field Master Plan were based on a total of 130,473 annual operations. The addition of the 104 maximum annual proposed RLV operations (the Proposed Action) to the 130,473 annual operations would be less than 1 percent of the total operations projected to occur at Cecil Field. This small addition to total Cecil Field operations would not significantly extend existing noise contours. Therefore, the Proposed Action would not impact any Section 4(f) properties.

As shown in Exhibit 3-9, there are several Section 4(f) lands along the proposed RLV flight path. The proposed RLVs would travel to the warning area along this flight path under jet power. Section 4(f) lands would experience an increase in noise and air emissions; however, the vehicles would be traveling at high altitudes, which would minimize the noise and emission levels affecting the ground. In addition, some of the areas lie along a busy commercial flight corridor and experience noise levels similar to those estimated as a result of the Proposed Action. Therefore, the addition of up to 104 flights would have a negligible impact on the Section 4(f) lands beneath the flight path. Upon return to Cecil Field, the RLVs would be unpowered maneuverable gliders. Under such conditions, the RLVs would not produce noise or air emissions; therefore, there would be no impacts to Section 4(f) lands on the return flight.

A maximum of 1.5 acres of the Branan Field Mitigation Park Wildlife and Environmental Area, shown in Exhibit 3-8, falls within the boundaries of the Inhabited Building Distance, a type of safety zone, outlined in the Explosive Site Plan section of the Cecil Field Spaceport Launch Site Operator License Application (JAA, 2008a). As a result, Park users would not be allowed to enter or be present in the portions of the park that lie within the Inhabited Building Distance. Correspondence with the Florida Fish and Wildlife Conservation Commission, provided in Appendix A, indicates that this portion of the Park would not be significantly affected so long as no land acquisition would be required. JAA does not expect to acquire this land.

Prior to the launch of an RLV, JAA would coordinate with the Florida Fish and Wildlife Conservation Service to ensure Branan Field Mitigation Park Wildlife and Environmental Area users do not enter and are not present in the portions of the Park that lie within the Inhabited Building Distance. JAA officers would be posted to ensure that Park users do not enter the Inhabited Building Distance during the RLV launch. All Park lands outside the Inhabited Building Distance, which include most of the Park, would remain open to the public during launches.

#### **4.4.1.2 Conclusion**

The Proposed Action would not require the construction of facilities on or the acquisition of any Section 4(f) lands. Projected noise contours would not change as a result of the Proposed Action. Therefore, there would be no significant impacts to Section 4(f) lands, either in the vicinity of the Airport or beneath the flight route as a result of the Proposed Action.

#### **4.4.2 No Action Alternative**

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no launches from Cecil Field. There would be no impacts to Section 4(f) lands as a result of this alternative.

## **4.5 Farmlands**

### **4.5.1 Proposed Action**

#### **4.5.1.1 Assessment**

As stated in Section 3.5.2, there are no prime or unique farmlands in the area of potential effect.

#### **4.5.1.2 Conclusion**

Because there are no prime or unique farmlands in the area of potential effect, there would be no impacts to such resources under the Proposed Action.

### **4.5.2 No Action Alternative**

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no launches from Cecil Field. There would be impacts to prime or unique farmlands as a result of this alternative.

## **4.6 Fish, Wildlife, and Plants**

This section describes potential impacts to species on Cecil Field property and in areas beneath the proposed RLV flight route.

### **4.6.1 Proposed Action**

#### **4.6.1.1 Assessment**

##### **4.6.1.1.1 Impacts to Species on Cecil Field Property**

The Proposed Action would not result in a significant change in activities at Cecil Field. There is suitable habitat for the Federal- and State-listed species discussed in Section 3.6, such as the Florida gopher tortoise, Florida pine snake, eastern indigo snake, Florida mouse, Sherman's fox squirrel, and Bachman's sparrow in the drier pinelands. Although only the gopher tortoise, Sherman's fox squirrel, and Bachman's sparrow have been confirmed at the Airport, the extent of suitable habitat for these listed species makes it possible that other species are present at the Airport.

However, since there would be no additional construction or grading of forested areas under the Proposed Action, these species would likely not be affected. Impacts to suitable habitat for Federal- and State-listed species would be similar to those resulting from current operations. If the implementation of the Proposed Action at Cecil Field ultimately required construction, that would be subject to a separate environmental review.

Wildlife near the launch site are exposed to similar levels of jet engine noise from current operations at Cecil Field. While wildlife may suffer a startle response and leave the vicinity, no long-term impacts are expected to foraging and breeding patterns.

Much of the near-field vegetation has been removed or paved over to create a buffer along the runways, taxiways, and apron. Furthermore, the remaining vegetation (*i.e.*, grasses) around the runways, taxiways, and apron is regularly mowed to prevent scorching. Vegetation near the runways would not be significantly impacted since the Proposed Action would occur on designated runways away from flora. The Proposed Action is not expected to significantly impact flora and fauna within the boundaries of Cecil Field.

#### ***4.6.1.1.2 Impacts to Species beneath the RLV Flight Route***

Species beneath the flight path of the proposed RLVs could experience increased noise from launch activities. Terrestrial animals could scatter upon hearing the noise; however, these species would quickly return. No impacts to feeding patterns would be expected due to noise.

The flight of Concept X and Z vehicles could generate sonic booms over the Atlantic Ocean. Sonic booms have been found to affect both wildlife and domestic animals (Galdwin, Asherin, and Mancini, 1988). As discussed in Section 4.12, the sonic booms generated by Concept X and Z vehicles would have relatively small overpressures that would result in minimal impacts to wildlife and domestic animals. These sonic booms would be expected to occur over the ocean approximately 60 miles from the shoreline and at very high altitudes.

If the sonic booms were even heard, they could initiate a startle response or heighten alertness. However, studies have found that most domestic animals and wildlife tend to become accustomed to sonic booms fairly quickly (Galdwin, Asherin, and Mancini, 1988).

Sonic booms resulting from the Proposed Action would occur in a designated offshore Warning Area. This well-defined airspace has activities related to large-scale military operations. These operations include regularly firing weapons at sea level. The infrequent, high-altitude sonic booms resulting from the Proposed Action would not be expected to result in noise impacts greater than those already occurring in the offshore warning area.

#### **4.6.1.2 Conclusion**

As the Proposed Action would not require additional construction or grading of forested areas in the foreseeable future, the species identified in Section 3.6 would likely not be affected. Impacts to suitable habitat for Federal- and State-listed species would be similar to those resulting from existing operations at Cecil Field and there should be no additional impacts under the Proposed Action.

In addition, based on the following, there would be no impacts to wildlife and marine and domestic animals as a result of sonic booms related to the Proposed Action:

- Small number of annual launches;
- Relatively small overpressure resulting from sonic booms;
- Likely location of the sonic booms over the ocean;
- Wildlife and domestic animals tend to become accustomed to sonic booms; and
- Existing large-scale military operations in the offshore Warning Area.

#### **4.6.2 No Action Alternative**

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no launches from Cecil Field. There would be no impacts to fish, wildlife, and plants as a result of this alternative.

### **4.7 Floodplains**

#### **4.7.1 Proposed Action**

##### **4.7.1.1 Assessment**

Implementation of the Proposed Action would not result in significant impacts to floodplains because no new infrastructure would be constructed and no new discharges would be released into floodplain areas as a result of the Proposed Action.

##### **4.7.1.2 Conclusion**

As JAA would not build new infrastructure under the Proposed Action, there would be no significant impacts to floodplains.

#### **4.7.2 No Action Alternative**

Under the No Action Alternative, the FAA would not issue a Launch Site Operator License and there would be no launches from Cecil Field. There no impacts to floodplains as a result of this alternative.

### **4.8 Hazardous Materials, Pollution Prevention, and Solid Waste**

#### **4.8.1 Proposed Action**

##### **4.8.1.1 Assessment**

The EPA National Priorities List identifies portions of Cecil Field as a Superfund site. However, under the Proposed Action there would be no construction activities, siting of additional facilities, or acquisition of land on National Priorities List-designated parcels. All launch operators proposing to use Cecil Field would be responsible for complying with applicable Federal, State, local, and tribal laws and regulations when conducting operations involving hazardous materials and waste.

The primary hazardous materials used in support of launch activities at Cecil Field would be propellants. Concept X rocket propellants include kerosene and/or alcohol, which have similar hazardous characteristics to the jet fuels currently used and stored at Cecil Field without adverse impact. The main oxidizer used for Concept X vehicles is LOX, a non-toxic cryogenic liquid. The propellant and oxidizer for Concept Z launch vehicles are solid HTPB and liquid nitrous oxide (N<sub>2</sub>O), respectively, which are relatively inert.

Cecil Field has standard operating procedures for transporting and storing jet fuel and JAA would implement procedures to minimize hazards associated with transporting and storing other propellants. JAA developed these procedures as part of its Launch Site Operator License application. All propellant shipments would be escorted from the point of entry into Cecil Field to the designated staging or storage area. Emergency response personnel would be on standby during these shipments. All liquid propellants would be shipped to Cecil Field in bulk tanker trucks, each with a capacity of approximately 4,000 gallons, which would also serve as temporary storage containers. During receipt of the HTPB, all oxidizers would remain more than 100 feet from the HTPB transportation route and storage facility. The solid propellant is stable and non-reactive until combined with its oxidizer and ignited. No propellants would be stored for extended periods; propellant shipments would be brought to Cecil Field to support launches as needed.

Jet fueling operations would take place at existing onsite fueling areas. If a jet fuel spill occurs, the launch operator would be responsible for any necessary cleanup and remediation actions following the spill. While JAA has its own Spill Prevention Control and Countermeasures Plan for Cecil Field, each individual spaceport operator would be required to have their own plan.

In addition to propellants, it is anticipated that minor amounts of other hazardous materials, such as paints, oils, lubricants, and solvents, would be used. No adverse impacts would be anticipated from these additional hazardous materials. JAA would maintain a current inventory of all hazardous materials stored and used at Cecil Field by type, quantity, and location. All propellants and other hazardous materials would be handled, stored, and used in compliance with applicable regulations.

#### **4.8.1.2 Conclusion**

Hazardous materials that would be used under the Proposed Action are similar to materials that have been or are now handled at Cecil Field. The transport, use, or disposal of hazardous materials associated with Cecil Field operations under the Proposed Action would not pose a substantial hazard to the public or the environment.

Cecil Field would comply with all existing and future requirements of being a hazardous waste generator for operation of the proposed launch facility, and would implement measures to ensure that hazardous materials are handled, stored, and used in compliance with applicable regulations. Such measures would include, but not be limited to, implementing spill prevention, containment, and control measures while transporting equipment and materials; storing bulk hazardous materials in approved containers that meet National Fire Protection Association industrial fire protection codes and required containment systems; and storing hazardous materials in protected and controlled areas designed to comply with site-specific spill prevention, control, and countermeasures plans.

Overall, no significant impacts would be anticipated from hazardous materials use or hazardous waste management that would exceed the threshold of significance described in FAA Order 1050.1E, Change 1, Appendix A, Section 10.

#### **4.8.2 No Action Alternative**

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no launches from Cecil Field. There would be no impacts associated with hazardous materials and waste under this alternative.

### **4.9 Historical, Architectural, Archaeological, and Cultural Resources**

FAA/AST must determine whether the Proposed Action is an “undertaking” as defined in 36 CFR 800.16(y), and whether it is a type of activity that has the potential to cause adverse effects to historic properties eligible for listing or listed on the *National Register of Historic Places*.

#### **4.9.1 Proposed Action**

##### **4.9.1.1 Assessment**

Under the Proposed Action, JAA would not build new infrastructure or demolish existing infrastructure. An examination of the *National Register of Historic Places* database indicates that there are no buildings at Cecil Field that are listed on or eligible for listing on the National Register. The database indicates that the nearest listed site is the William Clarke Estate, approximately 10 miles east of the Airport.

In addition, the Florida State Historic Preservation Officer (SHPO) receives notification of projects that have a potential to affect historical resources through the Florida State Clearinghouse. The Florida State Clearinghouse determined that the Proposed Action was exempt from review by the SHPO.

##### **4.9.1.2 Conclusion**

No new infrastructure would be constructed and no existing infrastructure would be demolished as a result of the Proposed Action. In addition, there are no designated historical sites within the vicinity of Cecil Field. Therefore, the Proposed Action is not expected to result in significant impacts to historical, architectural, archaeological, or cultural resources.

#### **4.9.2 No Action Alternative**

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no impacts to nearby historical, architectural, archaeological, or cultural sites under this alternative.

### **4.10 Light Emissions and Visual Impacts**

Aviation lighting is required for security, obstruction clearance, and navigation, and is the chief contributor to light emissions from airports. An analysis is necessary when projects introduce new airport lighting facilities that could affect residential or other sensitive land uses. Only in unusual circumstances, for example, when high-intensity strobe lights shine directly into a

residence, is the effect of light emissions considered sufficient to warrant special study and planning to reduce such effects.

Visual effects resulting from airport development projects are largely related to an action's purpose, size, and the locations of needed facilities or equipment on the airfield.

Potential light emissions and visual effects under the Proposed Action are evaluated primarily in terms of the potential for human annoyance, consistency with FAA and other relevant design standards, and compatibility with existing structures.

#### ***4.10.1 Proposed Action***

##### **4.10.1.1 Assessment**

JAA does not propose new lighting systems under the Proposed Action. All RLV launches would occur during daylight hours. Therefore, RLV lights (such as navigation lights and landing lights) would not result in a significant visual impact.

Horizontal landing activities would be classified as “visually subordinate” because of the large number of existing touch-and-go operations performed by various sizes of military aircraft at Cecil Field daily. Both powered and unpowered landings should appear similar to existing landing activities at Cecil Field.

The visual impact of most horizontal launches would be “visually co-dominant.” There were approximately 83,920 aircraft operations at Cecil Field in 2004 and the general public in the area of Cecil Field is accustomed to seeing various military and civilian aircraft performing maneuvers at the Airport. Therefore, the visual presence of horizontal launches would not be new to the area. Most of the existing aircraft operations at Cecil Field involve jet-powered aircraft. Both Concept X and Z vehicles would take off from Cecil Field as jet-powered aircraft, and would return to Cecil Field as unpowered, but maneuverable, vehicles. The Concept Z carrier aircraft would return under jet power but would not be likely to be immediately discernable from existing jet traffic at Cecil Field.

##### **4.10.1.2 Conclusion**

Because all RLV launches would be during daylight hours, no additional lighting systems would be required. There would be no significant light emissions or visual impacts under the Proposed Action.

#### ***4.10.2 No Action Alternative***

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no significant impacts related to light emissions or visual effects under this alternative.

## **4.11 Natural Resources, Energy Supply, and Sustainable Design**

The effects of airport development on energy and natural resources are generally related to the amount of energy required for aircraft, ground support vehicles, airport lighting, terminal buildings and other facilities, and motor vehicle travel. Two types of energy uses must be considered in determining the environmental impact of a proposed action; these are as follows:

- Energy use, which relates to major changes in stationary sources, such as a terminal building or airfield lighting. The proposed development must be examined to identify any proposed major changes in stationary facilities that would have a measurable effect on local supplies of energy resources.
- Energy use, which involves the movement of aircraft or ground vehicles. Increased consumption of fuel by aircraft need only be examined if the time required for aircraft operations would increase substantially without offsetting efficiencies in operational procedures. The fuel consumption of ground vehicles must be examined only if the action would add appreciably to access time or if there would be a substantial change in movement patterns for on-airport service or other vehicles.

The use of natural resources would become an issue warranting discussion only if the airport required use of unusual materials or materials that are in short supply. Most day-to-day airport operations do not require use of any natural resources that are unusual or in short supply.

### ***4.11.1 Proposed Action***

#### **4.11.1.1 Assessment**

The Proposed Action would not create any major changes that would have a measurable effect on local supplies of fuel, energy, or natural resources. JAA does not plan any construction under the Proposed Action. If major changes would be anticipated, power companies or other suppliers of energy would be contacted to determine if projected demands could be met by existing or planned source facilities and what steps could be taken to conserve energy resources and incorporate sustainable design initiatives.

#### **4.11.1.2 Conclusion**

Under the Proposed Action, JAA would not use unusual materials or materials in short supply and there would be no measurable effect on local supplies of energy or natural resources.

### ***4.11.2 No Action Alternative***

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no impacts to local supplies of energy and natural resources under this alternative.

## 4.12 Noise

Aircraft sound emissions are often the most noticeable environmental effect of airports. Noise-related patterns, based on future aviation activity, must be analyzed to determine their impacts. This section describes the methodology employed to develop the appropriate noise contours for Cecil Field and to perform a thorough noise impact analysis for the Proposed Action.

### 4.12.1 Methodology

This analysis addresses potential noise impacts that might occur as a result of launching and landing Concept X and Z vehicles. Three types of noise were analyzed, as described in Sections 4.12.1.1 through 4.12.1.3.

#### 4.12.1.1 Jet Engine Noise

There is existing jet engine noise at Cecil Field as part of general aviation operations at the Airport. In 2004, there were approximately 83,920 operations at Cecil Field. Exhibit 3-14 shows the existing noise contours for 2004. While launch-related operations were not specifically included in the existing noise contours developed in 2004 for the 2008 Master Plan Update, the noise associated with an individual operation at the spaceport would not be greater than that already present at the Airport with existing aircraft.

Assuming spaceport operations began in 2009, the Cecil Field 2008 Master Plan Update forecast indicates total operations at Cecil Field, exclusive of spaceport operations, would equal 106,246 in 2009. Therefore, the projected total number of 28 spaceport operations (14 launches and landings) under the Proposed Action would be equal to a 0.03-percent increase in total Cecil Field operations in 2009. The total number of Cecil Field operations projected for 2014 is 113,763. Note that the proposed license would expire in 2013. However, the total number of forecasted operations at Cecil Field was not calculated for 2013. Therefore, the projected total number of 104 spaceport operations (52 launches and landings) for 2013 was used to calculate the percent increase in operations at Cecil Field in 2014. Thus, the maximum number of 104 spaceport operations (52 launches and landings) under the Proposed Action would equate to a 0.09-percent increase in the total 2014 operations at Cecil Field. Half of the proposed annual spaceport operations would involve no jet engine noise because the vehicles would return to Cecil Field as gliders. Furthermore, the volume of spaceport operations would be negligible and would not cause a significant noise impact (1.5 DNL increase [FAA Order 1050.1E, Change 1, Appendix A, Section 14.3]).

In accordance with the airspace agreement with FAA (JAA, 2008a), the maximum number of annual launches from the proposed spaceport would be 52 (one per week). This would equal no more than 48 Concept X vehicle launches and no more than four Concept Z vehicle launches annually. RLV operations over land would be either unpowered or under turbojet power. The maximum number of operations forecast for the spaceport over a year would be too few to affect the yearly DNL compared to the operations forecast for aviation activity alone. Because the maximum 104 (52 launches and landings) annual operations projected for the spaceport would be less than 1 percent of the total 2004 operations, the spaceport annual operations would not significantly affect the existing noise contours.

#### **4.12.1.2 Rocket Engine Noise**

Concept X and Z vehicles would be lifted to altitude using jet engines. Rocket engine noise for these two types of vehicles would begin when the vehicle is at a considerable altitude (at least 30,000 feet) and in the offshore Warning Area out over the Atlantic Ocean approximately 60 miles from shore.

#### **4.12.1.3 Sonic Booms**

When an object travels through the atmosphere faster than the speed of sound (Mach 1), a sonic boom is generated as the object pushes aside air molecules with great force and subsequently forms a shockwave. This shockwave propagates away from the object, and depending on various factors including the shape and trajectory of the vehicle and meteorological conditions, it can propagate and impinge on Earth. Because sonic booms can occur during ascent and descent, the location of the sonic boom footprints on the ground would vary depending on the exact location of the vehicle in relation to the ground at Mach 1 or greater. If the sonic boom impinges on an observer, the observer would hear a noise comparable to one or two closely spaced cannon shots.

Sonic booms are typically quantified in pounds per square foot of peak overpressure. Overpressure refers to the pressure caused by the sonic boom above air pressure at ground level. No low altitude supersonic flights are anticipated under the Proposed Action. Sonic booms associated with launch activities would occur at high altitudes where sonic boom noise would dissipate substantially because of distance attenuation (that is, because of the great distance between the noise source and the observer on the ground or at sea level).

While both the Concept X and Z launch vehicles have the potential to produce sonic booms, the sonic booms produced by either vehicle would occur over the Atlantic Ocean in an offshore Warning Area approximately 60 miles from shore. However, because the sonic booms could be perceived on shore, this analysis considers the impacts from the production of sonic booms from the Concept X and Z launch vehicles.

Lower-magnitude sonic booms can be annoying and can be evaluated by established human annoyance criteria. DNL is the noise metric used by most Federal and State agencies, including the FAA, to assess noise impacts and has been found to be the best noise metric for predicting human annoyance. DNL is a function of the number of noise events per day and is typically calculated on an annual average basis. For impulsive sounds such as sonic booms, it has been found that impact correlates well with C-weighted DNL (CDNL). C-weighting emphasizes low-frequency sound and excludes sound energy below 25 Hertz and above 10,000 Hertz. Exhibit 4-7 shows the relationships between noise level metrics DNL, CDNL, and annoyance.

EPA has established an annual average DNL of 55 decibels (dB) as a level that protects public health and welfare with an adequate margin of safety (EPA, 1974). However, the FAA and many other agencies use 65 DNL as the dividing line between acceptable and unacceptable noise levels. Therefore, 61 CDNL would be the appropriate threshold for evaluating the impact of sonic booms.

**Exhibit 4-7. Relationship between Noise Level Metrics, DNL, CDNL, and Annoyance<sup>a,b</sup>**

DNL (dBA)	CDNL (dBC)	Average Percent of Population Highly Annoyed
55	52	3.3
60	57	6.5
65	61	12.3
70	65	22.1
75	69	36.5

a. Sources: Finegold, Harris, and von Gierke, 1994; National Research Council, 1981.

b. DNL = day-night average noise level; dBA = A-weighted decibels; CDNL = C-weighted DNL; dBC = C-weighted decibels.

#### **4.12.2 Proposed Action**

Noise produced by RLV takeoffs and landings at Cecil Field would consist primarily of jet engine noise during the subsonic takeoff, flight, and landing. Rocket engine noise and sonic booms would occur within the offshore Warning Area approximately 60 miles from shore over the Atlantic Ocean.

##### **4.12.2.1 Assessment**

###### **4.12.2.1.1 Impacts from Launch**

#### **Jet Engine Noise**

The noise generated from the jet engines used for Concept X and Z vehicle takeoffs and landings would be similar to the noise produced by existing aircraft takeoffs and landings at Cecil Field. At present, there are regular B-727, B-757, B767, and DC-10 aircraft and helicopter flights at Cecil Field. With a maximum of 52 launches per year of Concept X and Z vehicles, the noise impacts of the jet engines from these vehicles would be minimal compared to the approximately 83,920 annual flight operations at Cecil Field. Unless the annual frequency of RLV launch operations approached several thousand, the noise contours shown in Exhibit 3-14 would not change substantially.

The loudest noise for jet aircraft would consist of the carrier aircraft used for transporting Concept Z launch vehicles to the appropriate altitude for launch. These types of aircraft could produce noise similar to the F-18 aircraft, which currently operates from Cecil Field.

The additional noise sources from proposed horizontal launches would be similar to the noise generated by large military aircraft currently using Cecil Field. The jet engines used would be commercially available models and would not require any modifications that would substantially increase their noise output. As long as the launch frequency of Concept X and Z vehicles is limited to a maximum of 52 launches per year, the noise generated by their jet engines would not differ enough from current noise sources to result in noise exposure in excess of applicable thresholds of significance.

#### **Rocket Engine Noise**

After the vehicle had reached the offshore Warning Area approximately 60 miles offshore over the Atlantic Ocean, Concept X and Z vehicles could ignite rocket engines at altitudes as low as 30,000 feet above mean sea level. Assuming a conservative estimate of 20,000 feet using a

simple rocket engine noise model and assuming 60,000 pounds of thrust, noise levels reaching the ocean would range from 85 to 95 dB (unweighted). A-weighted sound pressure levels would be approximately 20 to 25 dB less than the unweighted levels because rocket launch noise is primarily low frequency noise (below approximately 200 Hertz, which is attenuated by applying A-weighting). For this example, A-weighted sound pressure levels would range from 65 to 75 dBA.

These instantaneous sound pressure levels would be lower than those caused by military aircraft activity. As the vehicle rocket engines ignite over the Atlantic Ocean and the vehicle climb, noise levels reaching the ocean would become lower as the distance from the vehicle to the ocean increases. The rocket engines would fire for approximately 175 to 180 seconds; however, the rocket launch noise might not be audible for that entire time because the increasing distance between the rocket and the ocean would diminish the launch noise.

### **Sonic Booms**

As Concept X and Z vehicles reach supersonic speeds, they would have the potential to produce sonic booms. The shape and geometry of Concept X and Z vehicles are considerably different and the altitudes at which they would generate sonic booms would be different. Therefore, the sonic boom signatures would be different for each vehicle.

The Concept X vehicle would reach Mach 1 at 40,000 feet (about 7.6 miles) above mean sea level, at which point there would be a sonic boom. The vehicle's velocity would continue to increase, and then it would decrease near the apogee of the trajectory. Near the apogee at 327,000 feet (about 62 miles) above mean sea level, the vehicle would slow to a velocity less than Mach 1, and then increase in velocity during descent to exceed Mach 1. There would be a sonic boom, but at such high altitudes the atmosphere is rarefied and there would be no substantial shock wave formed. There would also be substantial distance attenuation at this high altitude. The vehicle would produce a third sonic boom as it slows below Mach 1, at approximately 54,000 feet (about 10 miles) above mean sea level. This sonic boom would have a lower magnitude than the one generated during ascent because of greater distance attenuation. It is anticipated that of the three sonic booms associated with the Concept X vehicles, all would largely occur over the ocean and would result in little to no impact to those on shore. The sonic boom near apogee would likely not result in any impact.

The Concept Z vehicle would exceed Mach 1 at 51,000 feet (about 9.7 miles) above mean sea level, continue to increase in velocity until engine shutdown, and then slow to less than Mach 1 at 319,000 feet (about 60.4 miles) above mean sea level. The vehicle would reach apogee and then begin descent. During descent, the vehicle would exceed Mach 1 again at 319,000 feet (about 60.4 miles) above mean sea level, with no appreciable sonic boom. The vehicle would continue to descend and its velocity would decrease to below Mach 1 at 78,000 feet (about 14.8 miles) above mean sea level. Therefore, the Concept Z vehicle would generate its highest-magnitude sonic boom during ascent, at 51,000 feet above mean sea level. It is anticipated that the Concept Z vehicle sonic booms would occur over the ocean, with little to no impact to those on shore.

The sonic boom predictions were determined from modeling performed for the northwest and southwest corridors of the Oklahoma Spaceport (FAA, 2006). The footprint size, location, and signature (waveform shape), including peak overpressures and rise times, of sonic booms depend on many factors, including vehicle trajectory, maneuvering occurring during supersonic flight, and meteorological conditions during the flight. It is expected that sonic boom conditions would be similar for the offshore Warning Area launch site. Exhibit 4-8 lists estimated sonic boom peak overpressure and resulting CDNL, assuming 52 launches per year combined for Concept X and Z vehicles.

**Exhibit 4-8. Estimated Sonic Boom Overpressure<sup>a,b</sup>**

Vehicle	Peak Overpressure (psf)	CDNL (dBC)
Concept X	1.1 to 1.9	45 to 49
Concept Z	0.5 to 0.7	38 to 41

a. Source: FAA, 2006.

b. psf = pounds per square foot; CDNL = C-weighted day-night average noise level; dBC = C-weighted decibels.

As these CDNL values are lower than 61, there would be no noise impacts associated with sonic booms for Concept X and Z vehicles at sea level below the launch area that would exceed the applicable thresholds of significance. In the areas near the coast and those beneath the flight corridor, sonic booms would likely be audible, but not significant.

In addition to the above-mentioned models, an analysis of the impact of sonic booms was conducted from the John F. Kennedy Space Center Shuttle Landing Facility. This analysis simulated profiles of suborbital launch vehicles similar to those that are proposed to operate from Cecil Field (Comprehensive Health Services Inc., and NASA, 2007).

Three monitoring stations were used for measuring sound – two along the coastline and a third at midfield of the Shuttle Landing Facility runway. These stations were used to determine the sound level during the flight, with specific interest in the sound from sonic booms.

There were two test flights – a mid-morning flight followed by an early afternoon flight. The flight path took an F104 aircraft over the coastline at an altitude of approximately 18,000 to 20,000 feet. The Proposed Action requires RLVs to cross the coastline at an altitude of at least Flight Level 330 (nominally 33,000 feet above mean sea level). The F104 then continued to an offshore area approximately 12 to 15 miles from the coastline and at an altitude of 40,000 feet. In comparison, the Proposed Action’s transonic actions would occur approximately 60 miles from the coastline and at an altitude of at least 30,000 feet above mean sea level.

Neither monitoring equipment nor personnel at the three monitoring stations heard the sonic booms during the two test flights. Given that the flight tests were conducted at altitudes and distances from the shoreline similar to or less than those of the proposed RLVs, it is expected that sonic booms would not significantly impact shoreline areas.

**4.12.2.1.2 Impacts from Landing**

After expending the propellant and leaving the offshore Warning Area, Concept X and Z launch vehicles would glide back along the flight route for landing at Cecil Field. Only the Concept Z

carrier aircraft would return under jet power. Noise associated with gliding vehicles would be insignificant. Therefore, landing noise would consist of Concept Z carrier aircraft noise.

The jet noise contributions from the landing of the Concept Z carrier aircraft would be small compared to existing jet noise at Cecil Field; therefore, there would be no noise impacts associated with the landing of Concept X or Z vehicles that would exceed the applicable thresholds of significance.

#### **4.12.2.2 Conclusion**

Under the Proposed Action, there would be no significant increases in operations at Cecil Field and jet engine noise at Cecil Field and along the flight route to and from the offshore Warning Area would not significantly increase the impacts of jet engine noise.

Rocket engines would only be fired at an altitude of at least 30,000 feet above mean sea level, and they would only be fired within the offshore Warning Area, which is approximately 60 miles from the shoreline. Weighted sound pressure levels would range from 65 to 75 dBA for periods ranging from 175 to 180 seconds. These instantaneous sound levels would be lower and of shorter duration than the existing military aircraft activity in the offshore Warning Area, indicating that rocket engine noise under the Proposed Action would not significantly impact the area.

Previous studies at the Oklahoma Spaceport and the Kennedy Space Center Shuttle Landing Facility under similar conditions indicate that sonic booms would not significantly impact the shoreline and, therefore, would not significantly impact humans or wildlife on land. While the sonic booms would likely be heard at sea level within the offshore Warning Area, the estimated sonic boom peak overpressure and resulting CDNL would be lower than the 61 CDNL threshold that the FAA uses, so there would be no significant impacts to humans or wildlife located off shore. Therefore, there would be no significant noise impacts under the Proposed Action.

#### **4.12.3 No Action Alternative**

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no significant change in existing noise levels under this alternative.

### **4.13 Socioeconomics**

Extensive relocation of residents and community businesses, disruption of local traffic patterns, and substantial loss in community tax base are all examples of socioeconomic impacts that are considered significant.

Most socioeconomic impacts occur as a result of the use of aviation services. These impacts include expenditures by air passengers who visit the region (for example, at hotels, restaurants, and museums), general expenditures by the region's residents associated with their use of aviation services, and local firms with economic activities that depend on the airport.

This section addresses these potential impacts.

### **4.13.1 Proposed Action**

#### **4.13.1.1 Assessment**

Approximately 50 temporary onsite personnel (45 skilled and 5 unskilled) would be required to staff launch and landing operations (FAA, 2006). Skilled personnel would perform engineering tasks and would include vehicle technicians. Unskilled personnel would perform maintenance, upkeep, and security tasks for the proposed spaceport. These 50 personnel would be in addition to the existing employees required for normal Cecil Field flight operations. A sudden increase in the local population could cause stress on the local school system or the existing City of Jacksonville infrastructure. However, it is unlikely that 50 new employees would create a surge in the population large enough to adversely affect any part of the local or surrounding areas. Any impacts related to the new employees would likely be beneficial, with an increased tax base and a small boost in local sales of goods and services.

Spectators who travel to Cecil Field to watch RLV takeoffs and landings could cause a temporary increase in population. Because it is impossible to know exactly how many individuals would attend each event, a conservative estimate would be equal to the number of spectators who attend the launch of a commercial RLV from the Mojave Airport. During a June 2004 X Prize launch, the community of Mojave estimated that 11,000 spectators traveled to the Mojave Airport to view the launch (Boyle, 2004). The Mojave numbers represent a conservative estimate because actual spectator attendance could vary significantly based on a number of factors, including but not limited to the following:

- X Prize flights were highly publicized.
- Public attendance was actively sought.
- With many more flights spread out over time, the attendance of spectators would likely decrease.
- The Concept X and Concept Z vehicles would leave the Airport as jet aircraft; the actual launch of the rocket portions of flights associated with these vehicles would occur over the ocean.

Any temporary increase in population would impact the surrounding businesses and community. Spectators would need to use businesses such as gas stations and restaurants, and possibly hotels and surrounding public areas like parks for camping. Because the level of impact would depend on the exact number of spectators, it is impossible to know the level of impacts to the surrounding businesses and communities. However, it is unlikely that the impact would be negative. Cecil Field is close to a major city, Jacksonville. Jacksonville is a frequent host of large events, such as the Super Bowl, and it has sufficient infrastructure and services to accommodate periodic increases in transient populations. Therefore, the region could accommodate a fairly large increase in population for a short time.

#### **4.13.1.2 Conclusion**

There are no foreseeable significant socioeconomic impacts under the Proposed Action. Any socioeconomic impacts resulting from the Proposed Action would likely be viewed as positive.

### ***4.13.2 No Action Alternative***

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no socioeconomic impacts under this alternative.

## **4.14 Water Quality**

### ***4.14.1 Proposed Action***

#### **4.14.1.1 Assessment**

Preparation activities (fueling, propellant loading, and vehicle assembly) associated with Concept X and Z vehicles could result in inadvertent spills or releases of fuel, propellants, or materials that could impact surface water and groundwater.

Cecil Field policies and procedures for handling, disposing of, and cleaning up hazardous materials, chemicals, substances, and wastes are delineated in the Cecil Field Airport Certification Manual as part of their certification under 14 CFR Part 139. In addition, Cecil Field has a Storm Water Pollution Prevention Plan.

Jet fueling operations would occur at existing onsite fueling areas. If a spill of jet fuel occurs, the launch operator would be responsible for any necessary cleanup and remediation actions following a spill. Prior to a launch, the launch operator would have a Spill Prevention Control and Containment Plan in place. Therefore, in the event of a spill, the impact would be small.

#### **4.14.1.2 Conclusion**

While there could be inadvertent spills and releases of fuel, propellants, or materials during fueling, propellant loading, and vehicle assembly, Cecil Field has established appropriate policies and procedures for handling, disposing of, and cleaning up hazardous materials, including a Storm Water Pollution Prevention Plan. The launch operator would be required to follow these procedures as well as have their own Spill Prevention Control and Containment Plan. If there were a spill, the launch operator would be responsible for cleaning up and removing the contaminant. With appropriate policies and procedures in place, the Proposed Action would be likely to result in an insignificant impact to the water quality of Cecil Field and the surrounding area.

### ***4.14.2 No Action Alternative***

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no impacts to water quality under this alternative.

## **4.15 Wetlands**

### ***4.15.1 Proposed Action***

#### **4.15.1.1 Assessment**

JAA does not propose to build any new infrastructure and there would be no new discharges into wetlands as a result of the Proposed Action.

Jet fueling operations would occur at existing onsite fueling areas; away from known wetland areas. In addition, HTPB solid fuel, N<sub>2</sub>O, LOX, and kerosene (RP-1) would be loaded in designated areas on Cecil Field. If a fuel spill occurs, the launch operator would be responsible for any necessary cleanup and remediation actions and would have a Spill Prevention Control and Containment Plan in place.

Therefore, there would be no significant impacts to wetlands under the Proposed Action.

#### **4.15.1.2 Conclusion**

Because JAA would not build new infrastructure and spill prevention, containment, and control measures would be in place, there would be no significant impacts to wetlands under the Proposed Action.

### ***4.15.2 No Action Alternative***

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no significant impacts to wetlands under this alternative.

## **4.16 Wild and Scenic Rivers**

### ***4.16.1 Proposed Action***

#### **4.16.1.1 Assessment**

As stated in Section 3.16.2, there are no wild and scenic rivers in the area of potential effect for the Proposed Action; therefore, there would be no potential for impacts to such resources.

#### **4.16.1.2 Conclusion**

Because there are no wild and scenic rivers in the area of potential effect, there would be no impacts to such resources under the Proposed Action.

### ***4.16.2 No Action Alternative***

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no impact to wild and scenic rivers under this alternative.

## **4.17 Children’s Environmental Health and Safety Risks**

An evaluation of the health and safety of children must consider any activities, occurrences, or operations that have the potential to affect the well-being, safety, or health of children. Environmental health and safety risks include risks to health or safety that are attributable to products or substances a child is likely to come in contact with or ingest, such as air, food, drinking water, recreational waters, soil, or products children might use or be exposed to.

To determine the effects on children under the Proposed Action, this assessment considered Cecil Field’s proximity to schools and recreational areas and considered local demographics.

### **4.17.1 Proposed Action**

#### **4.17.1.1 Assessment**

As stated in Chapter 3.17.2, a slightly larger population of individuals under the ages of 5 and 18 reside in Duval County compared to the United States and the State of Florida as a whole. However, this percentage is not significant enough to indicate that the Proposed Action would have a disproportionate effect on children.

There is a slightly larger population of children under the age of 5 in Clay County compared to the United States as whole and compared to the rest of Florida. The population under the age of 18 is very close to the United States and Florida averages. Therefore, the Proposed Action would not result in disproportionate effects on children.

The school nearest to Cecil Field is the Jacksonville Christian Academy, approximately 1.4 miles northeast of the airfield. There is a recreation area on Airport property approximately 0.5 mile northeast of the Runway 9L threshold.

#### **4.17.1.2 Conclusion**

Sensitive receptors, such as schools, are located at a safe distance from launch activities. From this distance launch-related jet engine noise may be audible, but would not exceed noise levels from current operations. Additionally, some launch activities would occur while schools would be out of session (*i.e.*, Saturday), thus minimizing the noise-related impacts on children’s health. The assessment of impacts to the natural and man-made environment under the Proposed Action does not indicate that there would be significant impacts in any impact area. Therefore, there would be no significant impacts to children’s health and safety under the Proposed Action.

### **4.17.2 No Action Alternative**

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no impacts to children’s environmental health and safety under this alternative.

## **4.18 Environmental Justice**

This section provides a demographic analysis that identifies and addresses the potential for the Proposed Action to cause disproportionate and adverse effects on minority or low-income populations.

### ***4.18.1 Proposed Action***

#### **4.18.1.1 Assessment**

As reported in Section 3.18.2, the areas immediately surrounding Cecil Field have a smaller or similar percentage of individuals living below the poverty level and a smaller or similar percentage of minorities compared to Duval County, Clay County, the State of Florida, and the United States as a whole.

#### **4.18.1.2 Conclusion**

There is neither disproportionately large number of minorities nor disproportionately large number of people living below the poverty level in the area of potential effect. The Proposed Action would not result in the relocation of any residents and the assessment of impacts to the natural and man-made environment does not indicate that there would be significant impacts in any impact area. There is no evidence that the Proposed Action would disproportionately affect minority or low-income populations in the area of potential effect. Therefore, there would be no significant impacts to minority or low-income populations.

### ***4.18.2 No Action Alternative***

Under the No Action Alternative, the FAA would not issue a Launch Site Operator License to JAA and there would be no launches from Cecil Field. There would be no impacts to minority and low-income populations under this alternative.

## **4.19 Construction Impacts**

Impacts of construction activities include construction noise, dust, noise from heavy equipment traffic, disposal of construction debris, and air and water pollution. JAA does not anticipate building any new facilities to accommodate the launch of commercial space vehicles. Advisory Circular 150/5370-10B, Standards for Specifying Construction of Airports, must be incorporated into project specifications if JAA constructs any facilities at the Airport in the future. If the Proposed Action at Cecil Field would require any new construction, that would be subject to a separate environmental review.

### ***4.19.1 Proposed Action***

#### **4.19.1.1 Assessment**

For the foreseeable future, JAA does not intend to construct additional facilities to accommodate the proposed spaceport and its activities, and there would be no impacts from construction under the Proposed Action.

#### **4.19.1.2 Conclusion**

JAA does not anticipate building any new facilities to accommodate the proposed spaceport. Therefore, there would be no impacts from construction as a result of the Proposed Action.

#### **4.19.2 No Action Alternative**

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no launches from Cecil Field. There would be no construction impacts under this alternative.

### **4.20 Secondary (Induced) Impacts**

A proposed action could involve the potential for induced or secondary impacts on surrounding communities. Based on the assessment of impact areas, the only potential for induced impacts under the Proposed Action would be related to socioeconomics. Section 4.13 describes these secondary impacts.

#### **4.20.1 Proposed Action**

As stated in Section 4.13, the Proposed Action may result in a slight positive benefit to the socioeconomics of the region due to increased sales at local hotels, retail establishments, and restaurants.

#### **4.20.2 No Action Alternative**

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no launches from Cecil Field. There would be no secondary impacts under this alternative.

### **4.21 Airports/Airport Users**

This section describes potential impacts to Cecil Field and other airports and the users of those airports.

#### **4.21.1 Proposed Action**

##### **4.21.1.1 Assessment**

##### **4.21.1.1.1 Cecil Field**

Cecil Field is a general aviation airport that supports corporate aviation, air cargo, maintenance, repair, and overhaul, and National Guard and Reserve operations. Impacts to these operations under the Proposed Action would be minimal because the number of annual operations at the proposed spaceport would increase from 28 (14 launches and landings) in 2009 to a maximum 104 (52 launches and landings) operations in 2013. Assuming spaceport operations began in 2009, the Cecil Field 2008 Master Plan Update forecast indicates total operations at Cecil Field, exclusive of spaceport operations, would equal 106,246 in 2009. Therefore, the projected total

number of 28 spaceport operations under the Proposed Action would be equal to a 0.03-percent increase in total Cecil Field operations in 2009. The total number of Cecil Field operations projected for 2014 is 113,763. Note that the proposed license would expire in 2013. However, the total number of forecasted operations at Cecil Field was not calculated for 2013. Therefore, the projected total number of 104 spaceport operations (52 launches and landings) for 2013 was used to calculate the percent increase in operations at Cecil Field in 2014. Thus, the maximum number of 104 spaceport operations under the Proposed Action would equate to a 0.09-percent increase in the total 2014 operations at Cecil Field.

JAA would closely coordinate scheduled RLV launches with Cecil Field tenants and users. To support the needs of the tenants, Runways 9L-27R and 9R-27L would remain open and operational during all spaceport operations.

### **Pre-Launch Impacts**

Aircraft on the ground at Cecil Field would experience minimal interruptions during RLV pre-launch, launch, and recovery operations, as described below for each vehicle type.

#### ***Concept X***

The Concept X vehicle would roll out of its hangar and receive Jet-A fuel to top off the tanks. At this point there would be no oxidizer on board, so other aircraft operating on the ground at Cecil Field would be required to maintain only a 50-foot distance from the RLV.

When fueling is complete, the vehicle would taxi to the RP-1 fueling area (which could be as close as 25 feet away) and RP-1 fuel would be loaded. At this point other aircraft would still be required to maintain a 50-foot distance from the RLV.

Exhibit 4-9 shows the oxidizer loading area. The RLV would taxi north on Runway 18R-36L to the end of Runway 18L and would meet the LOX tanker truck and any required portable filtering and pumping equipment. Once the RLV taxis onto the runway, operations would no longer be allowed on Runway 18R-36L. However, operations on Runways 18L-36R, 9L-27R, and 9R-27L and all associated taxiways and aprons would be allowed until the RLV reaches the LOX truck at the end of Runway 18L. At that point, all operations on Runways 18L-36R and 18R-36L would cease and aircraft operations would be allowed only on Runways 9L-27R and 9R-27L and all associated taxiways and aprons.

At the end of Runway 18L, the LOX would be added to the vehicle. This would require all other aircraft to maintain a 1,250-foot distance from the RLV due to explosive siting requirements. The LOX truck and portable equipment would return to storage. Passengers would be loaded onto the vehicle and the vehicle would depart. The amount of time in which operations on Runways 18L-36R and 18R-36L would be restricted would be kept to a minimum, but would depend on the launch operator. However, Runways 9L-27R and 9R-27L would remain open and operational. In the event of inclement weather, the RLV would be de-fueled and removed from the runway, and the launch would be cancelled.



While the LOX tanker truck is in transit to and from the RLV, it would be required to maintain a 100-foot distance from all aircraft.

### ***Concept Z***

The Concept Z mated vehicle would roll out of its hangar with the HTPB solid fuel installed. The vehicle would receive Jet-A fuel in the ramp area to top off the tanks. At this point there would be no oxidizer on board, so other aircraft operating on the ground at Cecil Field would be required to maintain only a 50-foot distance from the RLV.

The vehicle would taxi north on Runway 18R-36L to the end of Runway 18L and would meet the N<sub>2</sub>O tanker truck and any required portable filtering and pumping equipment. Once the RLV taxis onto Runway 18R, no further operations would be allowed on Runway 18R-36L. However, operations on Runways 18L-36R (the Airport's primary runway), operations on Runways 9L-27R and 9R-27L and all associated taxiways and aprons would still be allowed until the RLV reached the N<sub>2</sub>O truck at the end of Runway 18L. At that point, all operations on Runways 18L-36R and 18R-36L would cease and aircraft operations would be allowed only on Runways 9L-27R and 9R-27L and all associated taxiways and aprons.

At the end of Runway 18L, the N<sub>2</sub>O would be added to the vehicle. This would require all other aircraft to maintain a 1,250-foot distance from the RLV. The N<sub>2</sub>O truck and portable equipment would return to storage. Passengers would be loaded onto the vehicle. The vehicle would depart. The amount of time in which operations on Runways 18L-36R and 18R-36L would be restricted would be kept to a minimum, but would depend on the launch operator. However, Runways 9L-27R and 9R-27L would remain open and operational. In the event of inclement weather, the RLV would be de-fueled and removed from the runway and the launch would be cancelled.

While the N<sub>2</sub>O tanker truck is in transit to and from the RLV, it would be required to maintain a 100-foot distance from all aircraft.

All pre-launch activities described would be in coordination with and with clearance from the Cecil Field Air Traffic Control Tower.

### **Launch Impacts**

Once the Cecil Field Air Traffic Control Tower clears the RLV for takeoff, the vehicle would depart the Cecil Field Class D airspace in the same manner as any other aircraft depart the Airport on an Instrument Flight Rules flight plan. As soon as the RLV departs the airfield, Cecil Field and the Cecil Field Class D airspace would resume normal operations.

### **RLV Recovery Impacts**

The RLV would return to the Cecil Field Class D airspace as a glider and be handed off to the Cecil Field Air Traffic Control Tower like any other aircraft. The vehicle would make an approach and landing to Runway 36R and would come to a full stop at the end of Runway 18L. At this time, operations on Runway 18L-36R would be suspended until spaceport personnel tow

the RLV from the runway. However, operations on all other Cecil Field runways, taxiways, and aprons not occupied by the RLV, associated towing equipment, and other required support equipment, would be permitted. Once the RLV is removed from the runway, the airfield would resume normal operations.

The time between the RLV's initial contact with the Cecil Field Air Traffic Control Tower on its return and the termination of the RLV's flight on its designated ramp area would depend on how quickly spaceport personnel would be able to reach the RLV with the required towing equipment. As this time would be minimal, impacts to normal operations at Cecil Field would be insignificant.

#### **4.21.1.1.2 Nearby Airports**

Normal spaceport operations would not be expected to significantly impact nearby airports because the flight route was carefully constructed to avoid the airspace of all publicly owned airports in the area. The only impacts to nearby airports expected as a result of spaceport operations would be those related to an RLV emergency landing. If an emergency landing was required, Air Traffic Control would treat the RLV in the air and on the ground the same as any other aircraft in distress.

Exhibit 2-13 shows all nearby airports that could be identified as potential emergency landing sites. These airports would not be required to alter normal operations during an RLV launch. Normal operations would only be interrupted if the RLV pilot in command declared an emergency and required assistance.

If the pilot in charge chose to land the RLV at a location other than Cecil Field as a result of a distress situation, the RLV would be maneuvered to land at an airport of the pilot's choice and in coordination with local Air Traffic Control. Upon landing, the RLV would likely be disabled and remain on the active runway until assistance could be rendered. After landing, all other aircraft would be required to maintain a 1,250-foot distance from the RLV because the vehicle might not have expended all its explosive materials.

Therefore, spaceport operations at Cecil Field would only impact nearby airports in the unlikely event of an emergency landing. As noted earlier, only proven (no experimental) vehicles would be permitted to launch from the proposed spaceport at Cecil Field, further reducing the likelihood that an emergency landing would be required.

#### **4.21.1.2 Conclusion**

The Proposed Action includes the following:

- A maximum of 52 RLV launches per year
- Continued operation of Runways 9L-27R and 9R-27L throughout the RLV launch period
- JAA operation of RLVs under a license at Cecil Field

- Similarities of operations within the airspace system to existing aircraft operations in and out of Cecil Field
- Design of the RLV flight route to avoid the airspace of all publicly owned airports

JAA would coordinate and schedule any proposed launch with the appropriate agencies to minimize potential impacts on nearby airports. If air traffic is grounded at nearby airports because of an RLV emergency landing, the impacts would be negligible due to the low frequency of launches and short duration of individual flights (that is, total flight time is expected to be approximately less than 1 hour).

Therefore, there should be no significant impacts to Cecil Field tenants and users or to nearby airports and airport users under the Proposed Action.

#### ***4.21.2 No Action Alternative***

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no impacts to Cecil Field or nearby airports under this alternative.

### **4.22 Airspace**

This section discusses the airspace above Cecil Field and between Cecil Field and the Atlantic Ocean. The airspace surrounding the Airport is designated as Class D airspace as part of the FAA-regulated national airspace system. This designation applies between the hours of 12:00 and 02:00 Zulu. A Class D airspace designation is established around airports with operating air traffic control towers. Pilots must establish and maintain radio contact with Air Traffic Control prior to and while operating in this airspace. Military operating areas in the vicinity include Live Oak to the west, Mayport to the northeast, and Palatka 2 to the south. There are several Victor Airways in the area predominantly running north and south between Cecil Field and the Atlantic Ocean. The RLVs are proposed to travel from the spaceport at Cecil Field to the Atlantic Ocean as jet powered aircraft. Only after the launch vehicle reaches the offshore Warning Area approximately 60 miles from shore would the rocket engines be ignited.

There have been extensive discussions between JAA and representatives of the FAA Jacksonville Air Route Traffic Control Center, FAA Air Traffic Control, FAA Command Center, FAA Airports District Office, and Fleet Area Control and Surveillance Facility Jacksonville, and the U.S. Coast Guard to establish routes and procedures that would allow the Concept X and Concept Z vehicles to operate in and out of the proposed spaceport at Cecil Field without adversely affecting the existing airspace conditions or the neighboring public-use airports.

#### ***4.22.1 Proposed Action***

##### **4.22.1.1 Assessment**

The Proposed Action defines specific routes by which the RLVs would depart Cecil Field as aircraft and would return to Cecil Field as gliders. The Concept Z carrier aircraft would return to Cecil Field as a jet-powered aircraft. These routes would be managed using dynamic “real-time”

management approach during the RLV departure and arrival phases of operations. Air Traffic Control would provide radar separation from the RLV and all other air traffic in lieu of simply blocking airspace. This would be accomplished in a manner similar to that for any other instrument-flight-rules (IFR) flight departing from or arriving at Cecil Field or requesting clearance through the altitudes outlined in the proposed flight routes.

In the offshore Warning Area, the vehicle would launch as a rocket and would return from the launch while within the offshore Warning Area. Once the Concept Z launch occurs, the carrier aircraft would return to Cecil Field as a typical aircraft and Air Traffic Control would treat it as a normal IFR flight and provide it typical separation from other aircraft.

From the offshore Warning Area on the arrival route into Cecil Field, where the vehicle would operate as a glider, the “moving-altitude-reservation” concept for an arrival route would be implemented, which would have the vehicle in specific blocks of airspace, each one progressively lower. The airspace behind the vehicle would open up to all traffic as the space in front of the vehicle would close to all traffic but the RLV. Using this concept, no block of airspace would be closed for more than approximately 10 minutes and most airspace traffic would not be affected in any way. The specific routes, altitudes, and the operational procedures for the arrival and departure routes are set forth in the Letter of Agreement between JAA, the Jacksonville Air Route Traffic Control Center, and the Fleet Area Control and Surveillance Facility Jacksonville (Jacksonville Air Traffic Control Center *et al.*, 2008). These arrival routes, departure routes, and altitudes were selected to reduce the potential of any impacts to the existing flight routes in the eastern corridor.

#### **4.22.1.2 Conclusion**

There would be close coordination with Air Traffic Control before and during RLV launches. A Letter of Agreement between JAA, the Jacksonville Air Route Traffic Control Center, and the Fleet Area Control and Surveillance Facility Jacksonville outlines this coordination and is a requirement of the Launch Site Operator License application. In addition to this close coordination, the Concept X and Z vehicles would be treated like a typical IFR flight between Cecil Field and the offshore Warning Area. Given these procedures and infrequent RLV launches from Cecil Field, there would be no significant impacts to surrounding airspace under the Proposed Action.

#### **4.22.2 No Action Alternative**

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no impacts to the airspace around Cecil Field, between Cecil Field and the offshore Warning Area, or within the offshore warning area under this alternative.

### **4.23 Transportation**

Transportation of the RLV vehicles, materials, and propellants could be accomplished via the local transportation roadway system. In addition, the potential increase in spectators to the launch events could increase traffic on these roadways.

This section addresses impacts to the roadways around Cecil Field.

#### **4.23.1 Proposed Action**

##### **4.23.1.1 Assessment**

Under the Proposed Action it is likely that the Concept Z carrier aircraft would be able to fly into Cecil Field prior to the launch preparation activities. It is probable that the Concept Z launch vehicle would arrive at Cecil Field via ground transport. It is also possible that both the Concept X and Concept Z vehicles could be transported to the proposed spaceport via motor carrier or truck. In this event, the vehicles would likely have been dismantled enough to allow them to fit into standard ground transport vehicles. State of Florida regulations allow ground transport vehicles to be up to 106 feet long; consisting of a truck trailer and up to two trailing units. The height should not exceed 13 feet, 6 inches, and the width should not exceed 102 inches. While the Federal gross vehicle weight limit is 80,000 pounds, the State of Florida will allow 110,000 pounds as long as the appropriate safety provisions, as contained in the regulations, are implemented. Under these conditions, cargo transport would be able to traverse the Interstate Highway System and State Roads 228 and 134, which access the Airport. Selected roads at the Airport that access the airside are also capable of carrying these dimensions and weights.

Cecil Field would adhere to all DOT regulations for handling, storing, labeling, and transporting jet fuel, propellants, and oxidizers associated with proposed spaceport operations. JAA has standard operating procedures for handling jet fuel and other hazardous materials. Standard operating procedures have also been developed for the transport, storage, labeling, and handling of the propellants and oxidizers as part of the Launch Site Operator License application. All propellant shipments would be escorted from the point of entry into Cecil Field to the designated staging or storage area. Emergency response personnel would be on standby during these shipments.

All liquid propellants would be shipped to Cecil Field in bulk tanker trucks, each with a capacity of approximately 4,000 gallons, which would also serve as temporary storage containers for these materials while they are at Cecil Field.

The propellant for the Concept Z launch vehicle consists of HTPB, which is a polymer of butadiene terminated at each end with a hydroxyl functional group. It is a solid propellant. The HTPB solid propellant would be manufactured and loaded into the Concept Z launch vehicle offsite and shipped to Cecil Field. The solid propellant is stable and non-reactive until combined with its oxidizer and ignited.

Oxidizers are mixed with the propellants and ignited to cause an explosion. The oxidizer for the Concept X vehicle is LOX; the oxidizer for the Concept Z vehicle is N<sub>2</sub>O. N<sub>2</sub>O is a chemical compound that at room temperature is a colorless non-flammable gas with a pleasant, slightly sweet odor and taste. It is commonly called “laughing gas” due to the euphoric effects of inhaling it. Similar to liquid propellants, oxidizers would be shipped to Cecil Field in bulk tanker trucks, each with a capacity of approximately 4,000 gallons, which would also serve as temporary storage containers for these materials while they are at Cecil Field. No propellants or

oxidizers would be stored at Cecil Field for extended periods; shipments would be brought in to support launches as needed.

As discussed in Section 4.15, there is the possibility that the novelty of space flights taking off from Cecil Field might bring out more than the usual numbers of spectators for the events. Since Cecil Field is close to Jacksonville, this is not considered to be a significant issue. Jacksonville is increasingly a frequent host of large events, such as the Super Bowl, and it has sufficient infrastructure and services to accommodate periodic increases in transient populations. Therefore, the region is equipped to handle temporary surges in traffic associated with commercial space vehicle launches.

#### **4.23.1.2 Conclusion**

The transportation network to, from, and on Cecil Field should not be disrupted, because RLV launches would be infrequent; shipments of RLVs and associated materials would comply with Federal and State of Florida highway standards; shipments of propellants, oxidizers, and jet fuel would comply with DOT requirements for handling, packaging, labeling, and transport; and standard operating procedures are in place and have been developed for the proposed spaceport. Larger than usual amounts of traffic associated with the launch events could be accommodated periodically. Therefore, there would be no significant impacts to local transportation under the Proposed Action.

#### **4.23.2 No Action Alternative**

Under the No Action Alternative, the FAA would not issue JAA a Launch Site Operator License and there would be no RLV launches from Cecil Field. There would be no impacts to local transportation systems under this alternative.

### **4.24 Cumulative Impacts**

Cumulative impacts are the incremental effects of the Proposed Action when added to other past, present, and reasonably foreseeable future actions regardless of which agency or person undertakes the action. This section addresses known actions that together with the Proposed Action could result in significant cumulative impacts to the Cecil Field area. The section addresses only air quality and socioeconomics, because those are the only two impact areas that could present a potential for cumulative impacts.

#### **4.24.1 Cumulative Socioeconomic Impacts**

##### **4.24.1.1 Assessment**

The cumulative socioeconomic impacts of past, present, and reasonably foreseeable projects and actions in the area surrounding Cecil Field and at Cecil Field should be minimal and positive. Measures have been taken at local, State, and Federal levels to create long-range development plans and to address project-specific issues and impacts as they arise.

The projects listed below are in the vicinity of Cecil Field and are projects unrelated to the Proposed Action that are expected to commence or be completed within the reasonably

foreseeable future. In addition, these projects are a part of larger comprehensive plans developed by or in coordination with the City of Jacksonville, JAA, the Florida Department of Transportation, and/or Clay County.

- Branan Field-Chaffee Expressway (State Road 23) – This would be a series of projects with the purpose of providing traffic relief on Blanding Boulevard (State Road 21), 103<sup>rd</sup> Street (State Road 134), Normandy Boulevard (State Road 228), and Chaffee Road and is considered an important planned roadway network for both Clay and Duval Counties.
- Bridgestone/Firestone North American Tire, LLC. Distribution Center – The Company recently purchased 63.3 acres in Cecil Commerce Center North to develop a 1-million-square-foot distribution center. Construction of the new facility is close to completion. The site will employ 250 people and represents a private capital investment of \$44 million.
- Florida Community College at Jacksonville – The community college recently broke ground on phase one of a new 44,000-square-foot center in Cecil Commerce Center North.

These projects will likely have a positive impact on the areas surrounding Cecil Field. The attraction of people to the area supports the regional economy in terms of tax base, jobs, and wages. The simultaneous creation of the proposed spaceport at Cecil Field would likely introduce additional traffic to the surrounding roadway systems. However, with the addition of new roadway systems, the likelihood of job creation, and no expected significant environmental impacts as a result of the spaceport, the Proposed Action would likely compliment the area's efforts to grow socially and economically.

#### **4.24.1.2 Conclusion**

The Branan Field-Chaffee Expressway, the Bridgestone/Firestone distribution center, and the new Florida Community College at Jacksonville are likely to result in a positive impact in the area around Cecil Field with the attraction of people to the area to support the economy. Additional traffic brought to the surrounding roadway system would likely be resolved with the additional roadway system.

#### **4.24.2 Cumulative Noise Impacts**

##### **4.24.2.1 Assessment**

In developing the 2008 Cecil Field Master Plan Update, JAA projected an increase in flights operating out of Cecil Field. The Cecil Field 2008 Master Plan Update forecast indicates total operations at Cecil Field, exclusive of spaceport operations, would equal 106,246 in 2009. Therefore, the projected total number of 28 spaceport operations (14 launches and landings) under the Proposed Action would be equal to a 0.03-percent increase in the total Cecil Field operations in 2009. The total number of Cecil Field operations projected for 2014 is 113,763. Note that the proposed license would expire in 2013. However, the total number of forecasted operations at Cecil Field was not calculated for 2013. Therefore, the projected total number of 104 spaceport operations (52 launches and landings) for 2013 was used to calculate the percent increase in operations at Cecil Field in 2014. Thus, the maximum number of 104 spaceport operations (52 launches and landings) under the Proposed Action would equate to a 0.09-percent

increase in total 2014 operations at Cecil Field. Half of the proposed annual spaceport operations would involve no jet engine noise because the proposed vehicles would return to Cecil Field as gliders. Furthermore, the volume of spaceport operations would be negligible and would not cause a significant noise impact (1.5 DNL increase [FAA Order 1050.1E, Change 1, Appendix A, Section 14.3]).

The estimated increased demand is not expected to require the construction of additional facilities at Cecil Field. JAA proposes to use existing facilities, such as Air Traffic Control and runways. If JAA pursued the construction of additional facilities, the FAA would conduct a separate environmental review.

#### **4.24.2.2 Conclusion**

The 2014 proposed operations would increase noise impacts at and near Cecil Field. However, the City of Jacksonville has established an Air Installation Compatible Use Zone under Ordinance 656, Part 10, which ensures development near Cecil Field would be compatible with airport operations. This ordinance would minimize the impacts to sensitive noise receptors. Additionally, noise created due to takeoff and landing operations would be temporary. With measures established to minimize noise impacts, and the increase in flight operations due to JAA's 2014 estimation, the Proposed Action would not result in a significant cumulative noise impact.

#### **4.24.3 Static Rocket Engine Testing**

##### **4.24.3.1 Assessment**

JAA might offer Cecil Field as a location to test static rocket engines in the future. Rocket engines would be tested using a mobile trailer tied down to the test area. During tests, the mobile trailer would be positioned on the south side of Runway 9R-27L at the jet engine test area. At present, this area has no specific use; however, it is occasionally used for police training purposes.

Rocket engines that might be tested at Cecil Field would be incorporated into vehicles that are experimentally launched at other facilities. The rocket engines could consist of Rocketdyne 88 and similar engines that use LOX and RP-1 as propellants. JAA estimates that a maximum of 16 tests would be conducted per year with each test lasting up to 100 seconds. The largest of these tests could require up to approximately 12,700 pounds of LOX and approximately 5,300 pounds of RP-1 per test. The smallest tests could require approximately 450 pounds of LOX and approximately 190 pounds of RP-1 per test. For purposes of this EA, it is assumed that static rocket testing at Cecil Field would involve the tests requiring the largest amounts of propellants as outlined above.

National Emission Standards for Hazardous Air Pollutants for Source Categories (40 CFR Part 63), Subpart P, National Emission Standards for Hazardous Air Pollutants for Engine Test Cells/Stands, establishes national emission standards for hazardous air pollutants for engine test cells/stands located at major sources of hazardous air pollutant emissions. Subpart P establishes requirements to demonstrate initial and continuous compliance with the emission restrictions contained in this standard. Subpart P defines engine test cells/stands to mean

any apparatus used for testing uninstalled stationary or uninstalled mobile (motive) engines. This includes rocket engines that are not installed in, or an integrated part of, the final product (launch vehicle). The owner/operator of an engine test cell/stand must determine applicability of the requirements as described in 40 CFR 63.1 and follow applicable notification instructions as described in 40 CFR 63.9.<sup>6</sup> Air emissions from the use of a rocket engine test cell to fire an engine are similar to the air emissions from launching the vehicle. The testing program for an engine typically requires frequent firings of the engine for short intervals, with a few longer firing intervals for the anticipated full duration of the rocket engine firing. The shorter firing intervals produce smaller amounts of air emissions; therefore, this analysis focuses on the full burn test scenario.

For the full burn test of a rocket engine, all rocket engine emissions are generated in a localized area, in contrast to a launch where the emissions would be spread over a larger area due to the motion of the vehicle. Conservative emissions were estimated for 16 tests per year of a LOX/kerosene-powered rocket engine with a maximum thrust of approximately 50,000 pounds force and total fuel usage of approximately 9 tons per test. Exhibit 4-10 lists the estimated annual emissions.

**Exhibit 4-10. Estimated Annual Emissions (kilograms<sup>a</sup>) in the Troposphere from Rocket Engine Testing<sup>b,c</sup>**

PM	NO <sub>x</sub>	SO <sub>x</sub>	VOCs	CO	CO <sub>2</sub>	H <sub>2</sub> O	H <sub>2</sub>
0	0	0	0	26,112	63,974	39,168	548

a. To convert kilograms to pounds, multiply 2.2046.

b. Source: KM Chng Environmental, Inc., 2008

c. PM = particulate matter; NO<sub>x</sub> = nitrogen oxides; SO<sub>x</sub> = sulfur oxides; VOCs = volatile organic compounds; CO = carbon monoxide; CO<sub>2</sub> = carbon dioxide; H<sub>2</sub>O = water; H<sub>2</sub> = hydrogen.

#### 4.24.3.2 Conclusion

The static rocket tests would increase emissions at ground-level. However, the tests would not produce tropospheric ozone precursors such as PM and NO<sub>x</sub>. Despite the emissions forecast in the conservative scenario represented in Exhibit 4-10, air quality would remain in attainment of Federal and State of Florida standards. Therefore, potential impacts of static engine testing would be negligible.

<sup>6</sup> The full text of the rule is available at the following Internet link:  
<http://www.tnrc.state.tx.us/permitting/airperm/opd/63/63hmpg.htm>

## **5. LIST OF PREPARERS**

### **5.1 Government Preparers**

Ms. Stacey M. Zee

Position: Environmental Protection Specialist, Federal Aviation Administration

Education: Master of Science, Environmental Policy, University of North Carolina, Chapel Hill, 2001

Bachelor of Science, Natural Resources Management, Cornell University, 1995

Experience: Ms. Zee has over 12 years in environmental health and policy and preparation of NEPA documents.

Mr. Daniel Czelusniak

Position: Environmental Protection Specialist, Federal Aviation Administration

Education: Juris Doctorate, Vermont Law School

Bachelor of Science, Environmental Management, University of Rhode Island

Experience: Mr. Czelusniak has more than 8 years of NEPA-related experience.

### **5.2 Contractor Preparers**

Ms. Mary Soderstrum

Position: Senior Aviation Consultant, Reynolds, Smith and Hills, Inc.

Education: Bachelor of Architecture, University of Kansas, 1976

Bachelor of Science in Environmental Design, University of Kansas, 1975

Experience: Ms. Soderstrum has more than 25 years of experience serving as project manager, planner, and architect in the development of environmental studies, airport master plans, and noise management and construction programs.

Mr. William C. Sandifer, A.A.E.

Position: Vice President & Southeast Region Leader, Reynolds, Smith and Hills, Inc.

Education: Juris Doctor, Michigan State University, 2000

Master of Business Administration, University of Michigan, 1993

Bachelor of Science, Aviation Management, Eastern Michigan University, 1987

Experience: Mr. Sandifer is a Vice President and Project Manager with more than 18 years of experience in the development of airport master plans, airport layout plans, and environmental studies.

Mr. Russ Owen

Position: Aviation Consultant, Reynolds, Smith and Hills, Inc.

Education: Master of Public Administration, Southern Illinois University, 2005

Bachelor of Science, Aviation Management, Southern Illinois University, 2001

Experience: Mr. Owen has more than 4 years of planning and operations experience in the development of airport master plans, airport layout plans, airport feasibility studies, terminal plans, intermodal plans, site selections, environmental assessments, air service/marketing analysis, airport operations, security operations, disadvantaged business enterprise plans, project budgeting and navigational GPS analysis projects.

Mr. Justin Ritter

Position: Aviation Consultant, Reynolds, Smith and Hills, Inc.

Education: Master of Business Administration, Aviation, Embry-Riddle Aeronautical University, 2005

Bachelor of Science, Aeronautical Science, Embry-Riddle Aeronautical University, 2003

Experience: Mr. Ritter has more than 3 years of experience in various airport planning projects that include Environmental Assessments, Master Plans, Airline Network/Market analysis and general document preparation.

Mr. Gordon L. Reynolds

Position: President, Air Traffic Consulting Service

Experience: Mr. Reynolds is an air traffic expert with more than 48 years of experience. Mr. Reynolds has an extensive background in air traffic, including working for the FAA, which included time as an air traffic control specialist. Mr. Reynolds now provides services to engineering firms, airport authorities, law firms, and other organizations that require coordination with the FAA and the FCC to accomplish their projects.

Mr. Timothy J. Lavelle

Position: Air Quality Consultant, KM CHNG Environmental, Inc.

Education: Master of Engineering, Civil Engineering, Texas A&M University, 1999

Bachelor of Science, Biology, Fairfield University 1990

Experience: Mr. Lavelle is a Consultant with almost 15 years of experience in air quality assessments for airport, rail and transit, other transportation modes, and infrastructure development projects.

Dr. Sybil M. Anderson

Position: Air Quality Consultant, KM CHNG Environmental, Inc.

Education: Ph.D., Physical Chemistry University of California, Los Angeles, 2000

Master of Science, Atmospheric Sciences, University of California, Los Angeles, 1995

Bachelor of Arts, Physics, Columbia University, 1988

Experience: Dr. Anderson is a consultant with 2 years of experience in air quality assessments for airport, rail and transit, other transportation modes, and infrastructure development projects. Previously, she spent 8 years both teaching and researching in the field of air pollution and climate change.

Mr. Tomas E. Ennis

Position: Consultant, KM CHNG Environmental Inc.

Education: Master of Science, Civil Engineering, Texas Tech University, 1995

Bachelor of Science, General Engineering, United States Naval Academy 1987

Experience: Mr. Ennis is a Consultant with almost 10 years of experience in environmental engineering pertaining to air quality permitting and assessments.

## **6. REFERENCES**

AirNav. 2007. Data on airport runway length and runway lighting. <http://www.airnav.com>. (accessed on December 29, 2006).

Andrews Space, Inc. Undated. Concept Z Vehicle Image. <http://www.andrews-space.com/> (accessed on January 19, 2009).

Boyle, Alan. 2004. Private Rocketship Breaks Space Barrier, History Making Pilot Copes with Serious Control Problem. MSNBC, Technology and Science. <http://www.msnbc.msn.com/id/5261571/> (accessed on January 20, 2009).

City of Jacksonville (City of Jacksonville, Florida). 1999. City of Jacksonville Comprehensive Plan, 2010. [http://www.coj.net/Departments/Planning+and+Development/Community+Planning/2010+Comprehensive+Plan+Evaluation+and+Appraisal+Report+\(EAR\)](http://www.coj.net/Departments/Planning+and+Development/Community+Planning/2010+Comprehensive+Plan+Evaluation+and+Appraisal+Report+(EAR)) (accessed on January 20, 2009).

City of Jacksonville (City of Jacksonville, Florida). 2005. JaxGIS. <http://maps.coj.net/jaxgis/> (accessed on April 9, 2009)

Clay County (Clay County, Florida). 1998. Planning and Zoning Department. Clay County Comprehensive Plan, 1995-2015.

Clay County (Clay County, Florida). 2003. Planning and Zoning Department. Branan Field Master Plan, Clay County Comprehensive Plan, 1995-2015.

Clay County (Clay County, Florida). 2009. Planning and Zoning Department. Public Schools in Clay County. May.

Comprehensive Health Services, Inc., and NASA (National Aeronautics and Space Administration). 2007. F104 Flight Test Noise Assessment at Kennedy Space Center, Florida. April 17.

DOT (U.S. Department of Transportation). 1997. Order 5610.2, Environmental Justice in Minority and Low-Income Populations. April 15.

DOT (U.S. Department of Transportation), FAA (Federal Aviation Administration), Office of Environment and Energy, and USAF (U.S. Air Force). 2005. Air Quality Procedures for Civilian Airports & Air Force Bases. Washington, DC. Report Number FAA-AEE-97-03 AL/EQ-TR-1996-0017. [http://www.faa.gov/regulations\\_policies/policy\\_guidance/envir\\_policy/airquality\\_handbook/](http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook/) (accessed on January 20, 2009).

DOT (U.S. Department of Transportation). 2007. Jacksonville Sectional Chart.

DOT (U.S. Department of Transportation) and RS&H. 2008. Cecil Field Flight Route Map.

England-Thims & Miller, Inc. 2006. Villages of Argyle Master Plan. April 7.

EPA (U.S. Environmental Protection Agency). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, EPA/ONAC 550/9-74-004. March.

EPA (U.S. Environmental Protection Agency) and FAA (Federal Aviation Administration). 1992. *Final Programmatic Environmental Statement for Commercial Reentry Vehicles*. May 28.

EPA (U.S. Environmental Protection Agency). 2008. AIRData: Access to Air Pollution Data Monitor Values Report. <http://www.epa.gov/air/data> (accessed on July 23, 2008).

EPA (U.S. Environmental Protection Agency). 2009a. 2008 Inventory of Greenhouse Gas Emissions and Sinks. <http://www.epa.gov/climatechange/emissions/downloads09/07ES.pdf> (accessed on April 9, 2009).

EPA (U.S. Environmental Protection Agency). 2009b. The Green Book Nonattainment Areas for Criteria Pollutants. <http://www.epa.gov/air/oaqps/greenbk/index/html> (accessed on April 9, 2009).

FAA (Federal Aviation Administration). 1996. *Final Environmental Assessment for the Kodiak Launch Complex*. June.

FAA (Federal Aviation Administration). 2001. *Final Programmatic Environmental Impact Statement for Licensing Launches*. May.

FAA (Federal Aviation Administration). 2002. *Final Environmental Assessment for the Launch Re-entry and Recovery Operation at the Kistler Launch Facility*. April.

FAA (Federal Aviation Administration). 2004. *Final Environmental Assessment for the East Kern Airport District Launch Site Operator License for the Mojave Airport*. February.

FAA (Federal Aviation Administration). 2005. *Final Programmatic Environmental Impact Statement for Horizontal Launch and Reentry of Reentry Vehicles*. December.

FAA (Federal Aviation Administration). 2006. *Final Environmental Assessment for the Oklahoma Spaceport*. May.

FAA (Federal Aviation Administration). 2007. Jacksonville/Cecil Field (VQQ) Airport Diagram.

FAA (Federal Aviation Administration). 2008. Instrument Flight Rules Enroute High Altitude Chart – L23/24; Instrument Flight Rules Enroute Low Altitude Chart – H7/8.

Finegold, L. S., C. S. Harris, and H. E. von Gierke. 1994. Community Annoyance and Sleep Disturbance: Updated Criteria for Assessing the Impacts of General Transportation Noise on People. *Noise Control Engineering Journal*, Vol. 42, No. 1. January-February.

Florida Geographic Data Library. Undated. <http://www.fgdl.org/> (accessed on April 9, 2009).

Florida Natural Areas Inventory. 2009. <http://data.labins.org/imf2/FREAC/FNAI.jsp?> (accessed April 9, 2009).

Franks, B. J, and G. G. Phelps. 1979. Estimated Drawdowns in the Floridan Aquifer due to Increased Withdraws, Duval County, Florida. U.S. Geological Survey, Tallahassee, Florida, Water Resources Division. July.

FWS (U.S. Fish and Wildlife Service). 2006. Florida Fish and Wildlife Conservation Commission, Listed Species in Duval and Clay Counties, Florida.

Galdwin, Douglas N., Duane A. Asherin, and Karen M. Mancini. 1988. Effects of Aircraft Noise and Sonic Booms on Fish and Wildlife Results of a Survey of U.S. Fish and Wildlife Service Endangered Species and Ecological Services Field Offices, Refuges, Hatcheries, and Research Centers. NERC 88/30. U.S. Fish and Wildlife Service, National Ecology Research Center, Fort Collins, CO. June.

Google (Google Earth Software). 2008a. Street Map Images, Cecil Field Location Map. [Earth.google.com/download-earth.html](http://Earth.google.com/download-earth.html) (assessed on January 19, 2009).

Google (Google Earth Software). 2008b. Aerial Images, Cecil Field Location Map. [Earth.google.com/download-earth.html](http://Earth.google.com/download-earth.html) (assessed on January 19, 2009).

JAA (Jacksonville Aviation Authority). 2008a. Draft Cecil Field Spaceport Launch Site Operator License Application. August.

JAA (Jacksonville Aviation Authority). 2008b. *2008 Cecil Field Master Plan Update*, Prepared by AVCON, Inc. May 2. [www.jaa.aero/pdf/VQQMP/VQQ-Master%20Plan.pdf](http://www.jaa.aero/pdf/VQQMP/VQQ-Master%20Plan.pdf).

Jacksonville Air Traffic Control Center, Jacksonville Approach Control, Fleet Area Control and Surveillance Facility Jacksonville, and JAA. 2008. Letter of Agreement.

KM Chng Environmental, Inc. 2008. Emissions Data.

National Research Council. 1981. National Academy of Sciences. Committee on Hearing, Bioacoustics, and Biomechanics. Assembly of Behavioral and Social Sciences (CHABA). 1981. Assessment of Community Noise Response to High-Energy Impulsive Sounds.

Navy (U.S. Department of the Navy), Southern Division Naval Facilities Command. 1988. Naval Air Station Cecil Field Master Plan.

Navy (U.S. Department of the Navy). 1998. *Final Environmental Impact Statement, Disposal and Reuse of Naval Air Station Cecil Field, Jacksonville, Florida*. October.

Northeast Florida Regional Development Partnership. 2005. Data on Duval County Major Employers.

Rocketplane7 Global, Inc. Undated. Concept X Vehicle Image. <http://www.rocketplaneglobal.com/index.html> (accessed January 19, 2009).

- Rocketplane7 Global, Inc. Undated. Concept X Vehicle Image.  
<http://www.rocketplaneglobal.com/index.html> (accessed January 19, 2009).
- U.S. Census Bureau. 2006a. State and County QuickFacts: United States of America.  
<http://quickfacts.census.gov/qfd/states/00000.html> (accessed on February 6, 2009).
- U.S. Census Bureau. 2006b. State and County QuickFacts: State of Florida.  
<http://quickfacts.census.gov/qfd/states/12000.html> (accessed on February 6, 2009).
- U.S. Census Bureau. 2006c. State and County QuickFacts: Clay County, Florida.  
<http://quickfacts.census.gov/qfd/states/12/12019.html> (accessed on February 6, 2009).
- U.S. Census Bureau. 2006d. State and County QuickFacts: Duval County, Florida.  
<http://quickfacts.census.gov/qfd/states/12/12031.html> (accessed on February 6, 2009).
- U.S. Census Bureau, Population Division. 2008a. Table 1: Annual Estimates of the Population for Counties of Florida: April 1, 2000 to July 1, 2007 (CO-EST2007-01-12). March 20.  
<http://www.census.gov/popest/counties/CO-EST2007-01.html> (accessed on February 6, 2009).
- U.S. Census Bureau, Population Division. 2008b. Table 2: Cumulative Estimates of Population Change for Counties of Florida and County Rankings: April 1, 2000 to July 1, 2007 (CO-EST2007-02-12). March 20. <http://www.census.gov/popest/counties/CO-EST2007-02.html> (accessed on February 6, 2009).
- U.S. Census Bureau. 2008c. 2005-2007 American Community Survey 3-Year Estimates.  
[http://factfinder.census.gov/home/saff/main.html?\\_lang=en](http://factfinder.census.gov/home/saff/main.html?_lang=en) (accessed February 6, 2009).

## 7. DISTRIBUTION LIST

### 7.1 Federal Agencies

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Washington, DC 20546

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Bureau of Land Management  
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263 13th Avenue South  
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North Florida Field Office  
6620 Southpoint Drive South, Suite 310  
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Environmental Policies Team Leader  
Department of Transportation  
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Washington, DC 20590-0001

Sterns, Cliff  
U.S. Congressman  
C.O. Sherrie Porter  
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Straw, William  
Regional Environmental Officer  
Federal Emergency Management Agency  
3003 Chamblee Tucker Road  
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Wright, Edward  
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Service  
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2614 NW 43rd Street  
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Region 4 NEPA Program Office  
61 Forsyth Street, SW  
Atlanta, GA 30303

U.S. Environmental Protection Agency  
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## **7.2 State Agencies**

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Florida Fish and Wildlife Conservation  
Commission  
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Tallahassee, FL 32399

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Florida Natural Areas Inventory  
1018 Thomasville Road  
Suite 200-C  
Tallahassee, FL 32308

Lampp, Gene  
District Aviation Specialist  
Florida Department of Transportation  
2198 Edison Ave.  
Jacksonville, FL 32204

Milligan, Lauren P.  
Office of Intergovernmental Programs  
State Clearinghouse  
Florida Department of Environmental  
Protection  
3900 Commonwealth Boulevard  
Tallahassee, FL 32399-3000

Odyssey, Allison  
Manager, Engineering and Safety  
Space Florida  
100 Spaceport Way  
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Pietsch, Linsley  
Spaceport Operations Assistant  
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SPFL M6-306, Room 9030  
Kennedy Space Center, FL 32899

Weaver, Richard  
Florida Department of Agriculture and  
Consumer Services  
Division of Plant Industry  
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Gainesville, FL 32614-7100

### 7.3 Local Agencies

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Director  
Jacksonville Office of Planning and  
Development  
Florida Theatre Building  
128 East Forsyth Street, Suite 700  
Jacksonville, FL 32202

Ridderman, Mary Beth  
City of Jacksonville  
Department of Housing and Neighborhoods  
214 N. Hogan Street  
Jacksonville, FL 32202

### 7.4 Organization

Sheffield, Jeff  
Director of Planning  
First Coast Metropolitan Planning  
Organization  
1022 Prudential Drive  
Jacksonville, FL 32207

### 7.5 Libraries

Jacksonville Public Library - Argyle Branch  
7973 Old Middleburg Road South  
Jacksonville, FL 32222

Jacksonville Public Library - Webb  
Wesconnett Regional  
6887 103rd Street  
Jacksonville, FL 32210

Jacksonville Public Library - West Regional  
1425 Chaffee Road South  
Jacksonville, FL 32221

Jacksonville Public Library – Main Branch  
303 N Laura Street  
Jacksonville, FL 32202

Green Cove Springs Library  
403 Ferris Street  
Green Cove Springs, FL 32043

### 7.6 Individuals

Bernaski, Larry  
Jacksonville, FL

Butler, James  
Jacksonville, FL

Chandler, Rusty  
Jacksonville, FL

Dosch, Del  
Jacksonville, FL

DR  
Jacksonville, FL

Griffin, Adele  
Jacksonville, FL

Griffith, Tiffany  
Jacksonville, FL

Hipps, Alberta  
Jacksonville, FL

Kozak, Mike  
Jacksonville, FL

Pauly, Ed  
Jacksonville, FL

Quesada, Tony  
Jacksonville, FL

Renninger, J. B.  
Orange Park, FL

Robbins, Jackie  
Jacksonville, FL

Simmons, Kevin  
Orange Park, FL

Underwood, McKinley  
Jacksonville, FL

Finotti, John  
Jacksonville, FL

Griffin, Michael  
Jacksonville, FL

Harris, L. R.  
Jacksonville, FL

Hunt, David  
Jacksonville, FL

Meenan, Kyle  
Jacksonville, FL

Porter, Sherrie  
Orange Park, FL

Raymond, Richard  
Middleburg, FL

Reynolds, Gordon  
Orange Park, FL

Stodola, Ann  
Green Cove Springs, FL

Tockwell, Stephen  
Jacksonville, FL

Webb, Tony  
Cape Canaveral, FL

**APPENDIX A**  
**CORRESPONDENCE**





P O Box 18018

Jacksonville, FL

3 2 2 2 9 - 0 0 1 8

[www.jaxairports.org](http://www.jaxairports.org)

October 20, 2006

Mr. Miles R. Miller  
Manager, FAA Jacksonville ARTC Center  
10 Aviation Ave  
Hilliard, FL 32046

Ms. Deborah Johannes  
Manager, FAA Jacksonville ATC Tower  
P.O. 18307  
Jacksonville, FL 32229

Capt. R.A. Buehn  
Commanding Officer, FACS FACJAX  
P.O. Box 40  
NAS Jacksonville, FL 32210-0040

Dear Madam and Sirs;

The Jacksonville Aviation Authority (JAA) is currently in the initial stages of completing the licensing process necessary for conducting commercial spaceport operations at Cecil Field Airport. Prior to receiving a Launch Site Operator's license from the Federal Aviation Administration (FAA) Office of Commercial Space Transportation, an Environmental Assessment (EA) of Cecil Field must be prepared.

An EA is being conducted by Reynolds, Smith and Hills, Inc. who has requested a meeting with the FAA air traffic control facilities and Fleet Area Control and Surveillance Facility Jacksonville whose airspace may be affected by operations conducted by Reusable Launch Vehicles (RLV) from Cecil Field Airport. The purpose of the meeting is to brief the attendees on the proposed RLV concept of operations and determine the impact of these operations on the National Airspace System.

The meeting is scheduled for 2 p.m. on November 8, 2006 at Cecil Field Airport in the Conference Room on the 2<sup>nd</sup> floor of the JAA/Signature Flight Services/RVA Building. Please contact Mary Soderstrum at (904) 256-2284 to provide the name(s) of your facility's representative(s).

Sincerely,

A handwritten signature in black ink, appearing to read "Todd Lindner CM".

Todd Lindner CM.  
Administrator Planning, Grants & Environmental Programs

cc: Chip Seymour, Senior Manager, Planning  
Mary Soderstrum, RS&H  
Peter Hooper, FAA Navy Liaison Office, NAS Jacksonville

*Jacksonville International Airport • Craig Airport • Herlong Airport • Cecil Field*



Architectural, Engineering, Planning and Environmental Services

**Reynolds, Smith and Hills, Inc.**

10748 Dearwood Park Boulevard South  
Jacksonville, Florida 32256-0597  
904•256•2500  
Fax 904•256•2501

FL Cert. Nos. AAC001886 • EB0005620 • LC2000210

November 22, 2006

Mr. Steve Kohler  
President  
Space Florida  
Building M6-306, Room 9030  
Kennedy Space Center, FL 32899

Dear Mr. Kohler:

Re: Cecil Field Spaceport Environmental Assessment

It is our understanding that you recently met with representatives of the Jacksonville Aviation Authority (JAA) concerning their efforts to obtain a launch site operators license for Cecil Field. As one of the first steps in that process, they have retained Reynolds, Smith and Hills (RS&H) to conduct an Environmental Assessment of Cecil Field and we are in the process of completing that study.

Mr. Todd Lindner of the JAA has requested that I send to you a copy of our Scope of Work, the meeting minutes of the meetings we have held to date, as well as a copy of the presentation that we recently made at the meeting held on November 8, 2006. As our work continues, you will continue to receive copies of the work that we distribute.

If at any time you should have questions or concerns, you may contact me directly at (904) 256-2284 or through either Mr. Lindner or Mr. Seymour of JAA.

Respectfully,

REYNOLDS, SMITH and HILLS, INC.

A handwritten signature in cursive script that reads 'Mary Soderstrum'. The signature is written in dark ink and is positioned above the typed name.

Mary Soderstrum, AIA, NCARB  
Project Manager

hs

Enclosures

CC: Mr. Todd Lindner, JAA, w/enclosures  
Mr. Chip Seymour, JAA, w/o enclosures  
file



Architectural, Engineering, Planning and Environmental Services

**Reynolds, Smith and Hills, Inc.**

10748 Deerwood Park Boulevard South  
Jacksonville, Florida 32256-0597  
904•256•2500  
Fax 904•256•2501

FL Cert. Nos. AAC001886 • EB0005620 • LCC000210

November 22, 2006

Mr. Patrick McCarthy  
Manager, Spaceport Operations  
Florida Space Authority  
100 Spaceport Way  
Cape Canaveral, Florida 32920-4003

Dear Mr. McCarthy:

Re: Cecil Field Spaceport Environmental Assessment

It is our understanding that you recently met with representatives of the Jacksonville Aviation Authority (JAA) concerning their efforts to obtain a launch site operators license for Cecil Field. As one of the first steps in that process, they have retained Reynolds, Smith and Hills (RS&H) to conduct an Environmental Assessment of Cecil Field and we are in the process of completing that study.

Mr. Todd Lindner of the JAA has requested that I send to you a copy of our Scope of Work, the meeting minutes of the meetings we have held to date, as well as a copy of the presentation that we recently made at the meeting held on November 8, 2006. As our work continues, you will continue to receive copies of the work that we distribute.

If at any time you should have questions or concerns, you may contact me directly at (904) 256-2284 or through either Mr. Lindner or Mr. Seymour of JAA.

Respectfully,

REYNOLDS, SMITH and HILLS, INC.

A handwritten signature in cursive script that reads 'Mary Soderstrum'. The signature is written in dark ink and is positioned above the typed name.

Mary Soderstrum, AIA, NCARB  
Project Manager

hs

Enclosures

CC: Mr. Todd Lindner, JAA, w/enclosures  
Mr. Chip Seymour, JAA, w/o enclosures  
file

**ENVIRONMENTAL RESOURCE MANAGEMENT DEPARTMENT**  
**Environmental Quality Division**



September 8, 2006

Mary Soderstrum, AIA  
Senior Aviation Consultant  
RS&H  
10748 Deerwood Park Blvd., South  
Jacksonville, FL 32256-0597

**RE: Environmental Assessment  
Spaceport Operators License  
Cecil Field**

Dear Ms. Soderstrum:

The Environmental Quality Division (EQD) of the City's Environmental Resource Management Department has received your correspondence of August 30, 2006 regarding the above referenced project.

Please be advised that EQD has jurisdiction in Duval County in the following areas:

- Air Quality
- Asbestos
- Noise
- Water Quality

Further, EQD has ambient data in the areas of:

- Air Quality
- Water Quality

Thus, EQD looks forward to working with you regarding the environmental impacts of a Spaceport at Cecil Field.

For additional information, I may be contacted directly at (904) 630-1212, ext 3133.

Respectfully,

  
 Robert Steven Pace, P.E.  
 Senior Environmental Engineer Manager  
 EQD

RSP/rdo

c: Ebenezer Gujjarlapudi, P.E., Interim Director



117 West Duval Street, Suite 225 Jacksonville, Florida 32202

Air Quality:	(904) 630-4900	Hazardous Materials:	(904) 630-3404	Fax:	(904) 630-3638
Groundwater:	(904) 630-4900	Water Quality:	(904) 630-3404	Web:	www.coj.net

*"Recipient of the 2001 Governor's Sterling Award"*



Jeb Bush  
Governor

# Department of Environmental Protection

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

Colleen M. Castille  
Secretary

November 9, 2006

Ms. Mary Soderstrum, AIA, NCARB  
Planning Services Group Leader  
Reynolds, Smith and Hills, Inc.  
10748 Deerwood Park Blvd. South  
Jacksonville, FL 32256-0597

RE: Federal Aviation Administration – Scoping Notice for Environmental Assessment –  
Spaceport Operators License, Cecil Field Airport – Jacksonville, Duval County, Florida.  
SAI # FL200611092901C

Dear Ms. Soderstrum:

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

Based on the information contained in the notice and negligible project impacts (i.e., no new construction activities are proposed), the state has determined that the proposed federal action is consistent with the Florida Coastal Management Program.

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

Sincerely,

Sally B. Mann, Director  
Office of Intergovernmental Programs

SBM/lm

"More Protection, Less Process."

Printed on recycled paper.



Architectural, Engineering, Planning and Environmental Services

Reynolds, Smith and Hills, Inc.  
10748 Deerwood Park Boulevard South  
Jacksonville, Florida 32256-0597  
904•256•2500  
Fax: 904•256•2501

FL Cert. Nos. AAC001886 • EB0005620 • LCC000210

August 30, 2006

Ms. Lauren Milligan, Coordinator  
State Clearinghouse  
Florida Department of Environmental Protection  
3900 Commonwealth Blvd. Mail Station 47  
Tallahassee, FL 32399-3000

Dear Ms. Milligan:

**RE: Environmental Assessment – Spaceport Operators License  
Cecil Field, Jacksonville, Florida  
Request for Information**

The Jacksonville Airport Authority (JAA) proposes to operate a commercial spaceport and horizontal launch facility at Cecil Field in Jacksonville, Florida, shown in Attachment A. The Federal Aviation Administration (FAA) Office for Commercial Transport (AST) has the responsibility to regulate the commercial space transportation industry to ensure compliance with international obligations of the United States and to protect the public health and safety, safety of property, national security, and foreign policy interest of the United States. In fulfilling this responsibility AST issues launch licenses for commercial launches of orbital rockets and suborbital sounding rockets. AST also licenses the operations of non-federal launch sites, or Spaceports.

Historically, launch operations conducted by commercial launch companies have been based at Federal launch ranges operated by the Department of Defense (DOD) or NASA. To enable and encourage the development and use of launch sites that are not operated or collocated with and not supported by a Federal launch range, the AST established regulations for launches and reentries occurring from non-Federal launch sites. In order to fulfill AST's responsibility to protect the public health and safety of the United States, these regulations also provide licensing and safety requirements to protect the public from the risks associated with launch and reentry activities at licensed sites.

Licensing of launch and reentry activities, (i.e., conducting launches and reentries, operating launch/reentry sites, or some combination), is considered a Federal Action. Consequently, AST is responsible for analyzing the

Ms. Lauren Milligan  
August 30, 2006  
Page 2

environmental impacts associated with proposed commercial launch facilities. Prior to the issuance of a license to operate a spaceport, the AST requires preparation of an Environmental Assessment (EA), pursuant to FAA Order 5050.4B, with input from various local, state and federal agencies. Reynolds, Smith and Hills, Inc, has been selected by JAA to prepare the EA.

The purpose of this letter is to seek initial input from various agencies that may have information concerning potential environmental impacts associated with the issuance of a spaceport operator's license. If your office and/or other state agencies have any environmental information relating to the impact categories listed in Attachment B, please provide this information to the undersigned at the address indicated above, for consideration and possible inclusion in the EA. I have also included with this letter an additional fifteen (15) copies for distribution to other state agencies.

Thank you in advance for your assistance with the preparation of this EA, and please feel free to contact me at 904.256.2284, or my e-mail address [mary.soderstrum@rsandh.com](mailto:mary.soderstrum@rsandh.com), if you have any questions or comments.

Very truly yours,

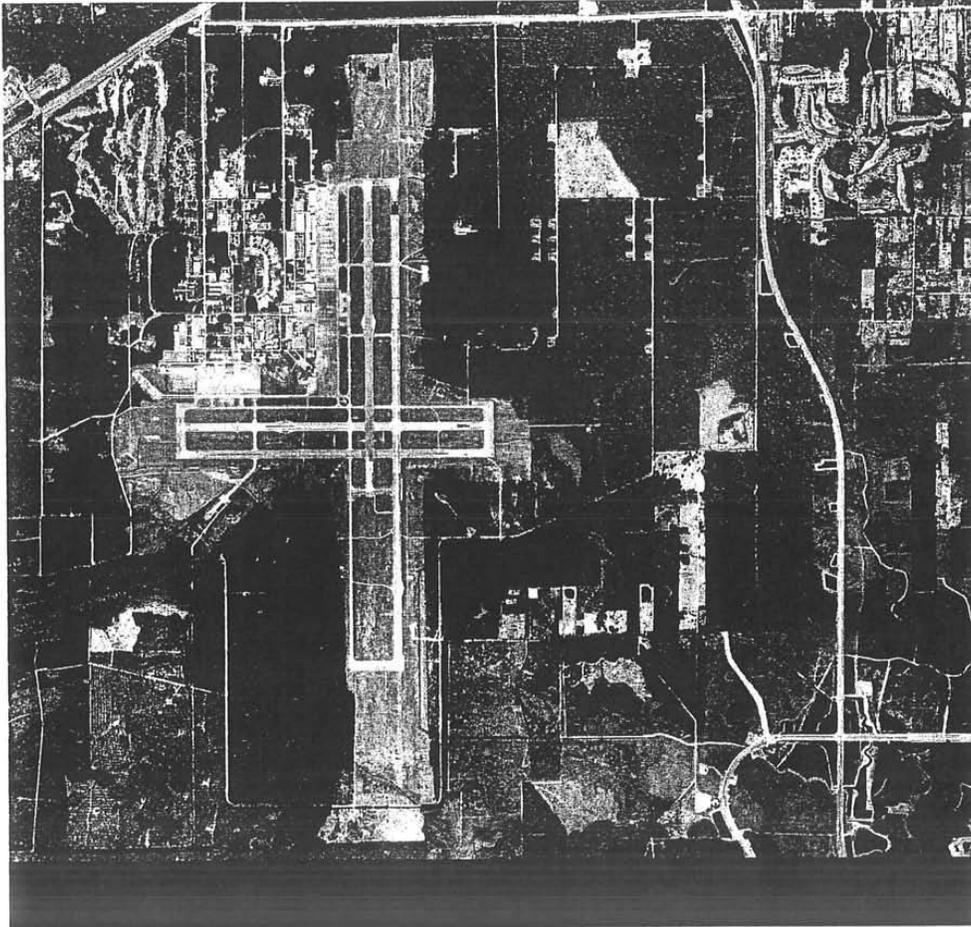
REYNOLDS, SMITH AND HILLS, INC.

Mary Soderstrum, AIA, NCARB  
Senior Aviation Consultant  
Planning Services Group Leader

cc: JAA  
File

Ms. Lauren Milligan  
August 30, 2006  
Page 3

**ATTACHMENT A**  
**Cecil Field Airport**  
**Aerial**



**ATTACHMENT B**

**Cecil Field Airport  
Jacksonville, Florida  
Environmental Assessment  
Spaceport License**

The environmental impact categories to be evaluated in the EA are described in Federal Aviation Administration (FAA) Order 5050.4B, and include the following:

1. Air Quality
2. Coastal Resources
3. Compatible Land Use
4. Construction Impacts
5. Department of Transportation Section 4(f) Lands
6. Farmlands
7. Fish, Wildlife and Plants
8. Floodplains
9. Historical, Architectural, Archeological and Cultural Resources
10. Light Emission and Visual Impacts
11. Natural Resources and Energy Supply
12. Noise
13. Secondary (Induced ) Impacts
14. Socioeconomic Impacts, Environmental Justice and Children's  
Environmental Health and Safety risks
15. Water Quality
16. Wetlands
17. Wild and Scenic Rivers
18. Other Considerations
  - a. Airspace impacts associated with the launch and recovery of space vehicles.
  - b. Local transportation impacts associated with the transport of the proposed vehicle.

**CECIL FIELD SPACEPORT ENVIRONMENTAL ASSESSMENT**

**AGENCY COORDINATION LIST**

Ms. Lauren Milligan, Coordinator  
State Clearinghouse  
Florida Department of Environmental Protection  
3900 Commonwealth Blvd. Mail Station 47  
Tallahassee, FL 32399-3000

**Note:** The State Clearinghouse will coordinate with all state and local environmental agencies, such as applicable water management districts, Department of Community Affairs, FDEP, etc.

Ms. Bonnie L. Baskin, Environmental Program Specialist  
Federal Aviation Administration  
Orlando Airports District Office  
5950 Hazeltine National Drive, Suite 400  
Orlando, FL 32822-5024

Mr. Ebenezer Gujjarlapudi, P.E., Chief  
Environmental and Resource Management  
City of Jacksonville  
117 West Duval Street, Suite 225  
Jacksonville, FL 32202

Ms. Ann Stodola  
Senior Environmental Planner  
Clay County  
P.O. Box 367  
477 Houston Street  
Green Cove Springs, FL 32043

Mr. David Hankla, Field Supervisor  
U.S. Fish and Wildlife Service  
North Florida Field Office  
6620 Southpoint Drive South, Suite 310  
Jacksonville, FL 32216-0958

Mr. Kirk Cordell  
Cultural Resources Stewardship Manager  
U.S. Department of the Interior  
National Park Service  
100 Alabama Street, S.W.  
Atlanta, GA 30303

Mr. Norm Heintz, Regional NEPA Coordinator  
U.S. Department of Agriculture Forestry Service  
Southern Regional Office  
1720 Peachtree Street, Suite 760S  
Atlanta, GA 30309

Mr. Bruce Dawson, Field Manager  
U.S. Department of the Interior  
Bureau of Land Management  
Eastern States Office  
411 Briarwood Drive, Suite 404  
Jackson, MS 39206

Mr. David Keys, NEPA Coordinator  
U.S. Department of Commerce  
NOAA National Marine Fisheries Service  
263 13<sup>th</sup> Ave. South  
Saint Petersburg, FL 33701

Mr. Osvaldo Collazo  
U.S. Army Corps of Engineers  
Jacksonville District  
P.O. Box 4970  
Jacksonville, FL 32232-0019

Ms. Charlotte Wheeler, Senior Environmental Employee  
U.S. Environmental Protection Agency  
Sam Nunn Atlanta Federal Center  
61 Forsyth Street, S.W.  
Atlanta, GA 30303

Mr. William Straw, Regional Environmental Officer  
Federal Emergency Management Agency  
3003 Chamblee Tucker Road  
Atlanta, GA 30341

U.S. Department of Agriculture  
Natural Resource Conservation Service  
DeLand Service Center  
1342 South Woodland Blvd., Suite A  
DeLand, FL 32720-7747

Northeast Florida Regional Planning Council  
6850 Belfort Oaks Place  
Jacksonville, FL 32216

**Soderstrum, Mary**

---

**From:** TLindner@jaa.aero  
**Sent:** Tuesday, September 23, 2008 3:42 PM  
**To:** Soderstrum, Mary  
**Subject:** Fw: Cecil Spaceport and Branan Field Mitigation Park

----- Forwarded by Todd Lindner/JAA on 09/23/2008 03:42 PM -----

Cecil Spaceport and Branan Field Mitigation Park

Pollock, Matthew

to:  
Randal.Maday

09/23/2008 03:35 PM

Cc:  
TLindner, "Allen, Mike", "Brooks, Mike", "Garcia, Rolando", "Johns, Scott"

Mr. Maday,

My name is Matt Pollock and I am representing the Florida Fish and Wildlife Conservation Commission (FWC) in discussions with the Jacksonville Aviation Authority (JAA) regarding their proposed Cecil Field Spaceport Launch Site.

Specifically, I have been in contact with Mr. Todd Lindner, since their proposed launch site lies immediately adjacent to Branan Field, which our agency manages as a mitigation park. Mr. Lindner has explained their intent and made me aware of the proposed Spaceport's requisite Inhabited Building Distance (IBD), that overlaps slightly onto our managed lands. I have sent you this email to advise that I am aware of the proposed project and to communicate our agency's stance on how we would like to proceed in the future when a launch may be scheduled. Mr. Lindner has advised that you require confirmation from us that we have been in discussions about the project and are seeking resolution as to how we proceed from this point forward since the IBD falls partly within property we manage.

I understand in talking with Mr. Lindner, there would be, perhaps, as many as five launches scheduled the first year. During the second year, this total may rise to ten or so, and then continue to grow in future years.

Our agency, at this point, would prefer to take an informal approach to agreement on this matter and handle this first or second year on a launch-by-launch basis, rather than enter into a more formalized agreement.

Additionally, it is our preference to keep those lands within Branan Field lying outside of the IBD open during launches, particularly when the frequency of launches has grown through the years. The mitigation park is only accessible by foot and visited primarily by local citizens. This should be easy to control during spaceport launch operations. However, both the JAA and FWC acknowledge that as launches become a regular activity, a more formalized agreement (ie. MOU, MOA) between both parties will become necessary in order to avoid confusion and miscommunication.

In closing, we believe that we can work cooperatively to seek resolution to this matter, at least initially, without a legal document. As long as we have sufficient prior notice, we can work this out on a launch-by-launch basis for now. When launch frequency elevates, we will seek agreement with a more formal document to alleviate potential for confusion and miscommunication. Please let me know if you require further information regarding this matter.

Thanks,  
Matthew T. Pollock  
Regional Wildlife Management Biologist  
P.O. Box 177  
Olstee, FL 32072  
386-758-0525

---

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\*\*Please note that under Florida's very broad public records law, e-mail communication to and from the Jacksonville Aviation Authority is subject to public disclosure. \*\*

**APPENDIX B**

**CECIL FIELD AIRPORT TENANTS**



## **APPENDIX B**

### **CECIL FIELD AIRPORT TENANTS**

- AeroGroup, Inc., has assembled a staff of top aviation professionals and an available inventory of subsonic and supersonic tactical fighter aircraft that are performing such tasks as combat training, electronic warfare training, in-flight refueling training, and research, development, training, and evaluation at Cecil Field Airport.
- Signature Flight Support is the fixed-base operator at the Airport. Signature provides aviation fuel, aircraft parking, hangars, oxygen service, pilot services, and limited catering. Signature moved into the completed terminal in October 2004. Signature also uses the hush house (Building 818, shown in Exhibit 2-5) for storage of aircraft and other materials.
- Boeing Company opened its Aerospace Support Center-Cecil at the Airport in 1999. At present, Boeing leases four hangars (Buildings 67, 825, 1820, and 1845) out of which it has performed maintenance and modifications to F-18 Hornet, KC-10, C-17, and T-45 aircraft. These four hangars have a total area of approximately 270,000 square feet. Boeing also leases some ramp space in front of these hangars.
- Embry-Riddle Aeronautical University operates a satellite training center from Building 1846.
- Flightstar provides maintenance, repair, and overhaul services in Hangar 815. The company has performed these services on B727, B737, DC9, and MD80 aircraft.
- A helicopter unit of the Florida National Guard is based at the Airport. This unit stores multiple Apache helicopters in their leased Hangar 860, which has an area of approximately 84,000 square feet. This unit will switch to Chinook helicopters in the near future. The unit uses Building 858 for training rooms and offices.
- Florida Community College operates a satellite center dedicated to the aviation sector (the Aviation Center of Excellence). Students can focus on aviation management or aircraft maintenance and flight training. The College leases Hangar 14 from JAA. The College also has additional classrooms in a building on Lake Fretwell Street. Florida Community College will relocate its operations from Hangar 14 in mid-2009 to a new hangar under construction. Following this relocation, Hangar 14 will be designated the storage and assembly facility for proposed spaceport operations.
- Jet Turbine Services, Inc., provides support services for Boeing operations, specifically on aircraft jet engines, from Building 313. This 56,100-square-foot facility does not have direct access to the apron.
- Logistics Services International provides maintenance, repair, and overhaul services from Hangar 824. The company also provides training services to the aerospace and security industries from a facility in the Cecil Commerce Center.

- Robinson VanVuren & Associates is responsible for providing air traffic control services as part of the FAA Contract Tower Program. Robinson VanVuren operates from the Air Traffic Control Tower, which is near the intersection of the inboard runways in Building 82. This is considered a Level 1 Tower, which includes airports with low activity levels. The Air Traffic Control Center operates daily from 7 a.m. to 9 p.m.
- Titan System Corporation offers communications and informational system services, with a focus on national defense issues, from Building 887.
- United States Customs and Border Protection shares Hangar 14 with Florida Community College, and typically houses six P-3 Orion aircraft in this facility.
- The United States Coast Guard operates a fleet of Agusta helicopters from Hangar 13. This hangar has dimensions of approximately 210 feet by 225 feet.
- Building 1846 houses an onsite Aircraft Rescue and Firefighting unit. This is a joint-use operation with the City of Jacksonville. Firefighters stationed at this facility are trained to respond to aircraft incidents. The unit has three aircraft rescue and firefighting vehicles and the more traditional vehicles used to fight fires in structural units.
- The Naval Air Depot is a maintenance facility for the Navy's newest fighter jets. The Depot is housed in Building 1845.
- Building 83 serves as the electrical vault. It houses multiple regulators for the various lighting, signage, and navigational aids (equipment located on the airfield). It also houses a generator to provide power to these circuits for a limited time, as needed.
- AirKaman operates the fuel farm, which is north of the Terminal (Building 82). At present, there are three above-ground storage tanks at the site.

## **APPENDIX C**

### **PUBLIC COMMENTS AND FAA RESPONSES**



## **APPENDIX C**

### **PUBLIC COMMENTS AND FAA RESPONSES**

This appendix is divided into two sections. Section C.1, Written Comment Documents, provides FAA responses to submitted written public comments. Section C.2 provides FAA responses to public comments provided during the public meeting held on May 14, 2009, in Jacksonville, Florida.

#### **C.1 Written Comment Documents**

In accordance with NEPA requirements and Council on Environmental Quality implementing regulations at 40 CFR 1500-1508, the FAA initiated a public review and comment period for the Draft EA for Jacksonville Aviation Authority Launch Site Operator License at Cecil Field, Florida. The FAA received one written comment document during the Draft EA comment period (April 20 through May 20, 2009). The FAA has addressed comments from that document in the Final EA where appropriate.

The FAA has reproduced the full text of the comment document in this appendix. Specific comments within the comment document are identified to allow for specific responses, which follow the comment document.

**BOARD OF COUNTY COMMISSIONERS**

Fritz A. Behring  
County Manager  
  
www.claycountygov.com



**CLAY COUNTY**

Planning & Zoning Division  
Department of Development Services  
P. O. Box 367, 477 Houston Street  
Green Cove Springs, FL 32043-0367  
Telephone: (904) GCS 529-6301  
OP (904) 269-6301  
Fax: (904)278-3706  
email: planning@co.clay.fl.us

May 18, 2009

Michael McElligott  
FAA Cecil Field EA  
c/o ICF International  
9300 Lee Highway  
Fairfax, VA 22031

Dear Mr. McElligott,

I have reviewed the Draft EA for Jacksonville Aviation Authority Launch Site Operator License at Cecil Field, Florida. I am attaching some additional information on schools, parks, and land uses in Clay County that is not shown in the Draft EA. First is a map showing public schools that are in operation, under construction, and planned for construction during the 5-year time span of the proposed Launch Site Operator License.

L1-001

The second map shows Clay County parks and other public recreation and conservation land. Municipal parks are not included, but there are none within 5 miles of the existing Cecil Field runways. There are some Clay County parks within 5 miles of the existing runways, and others are located under the proposed RLV flight route. The portion of former Cecil Field NAS within Clay County is now County property, Veterans Park. The Draft EA states that there will be no need to restrict public access during launches to any property beyond the boundary of the airport except the Florida Fish and Wildlife Conservation Commission property Branan Field Mitigation Park. Please keep the County informed if there is any change to the plan such that access to properties in Clay County would need to be restricted.

L1-002

Finally, I have attached a copy of the site plan and development phasing schedule for the Villages of Argyle Development of Regional Impact which shows greater detail of the planned development of this area than is shown on the overall Clay County Future Land Use Map. While a more recent Future Land Use Map than what is shown in the Draft EA is available, the allowed land uses in the 5-mile area surrounding Cecil Field are still the same.

L1-003

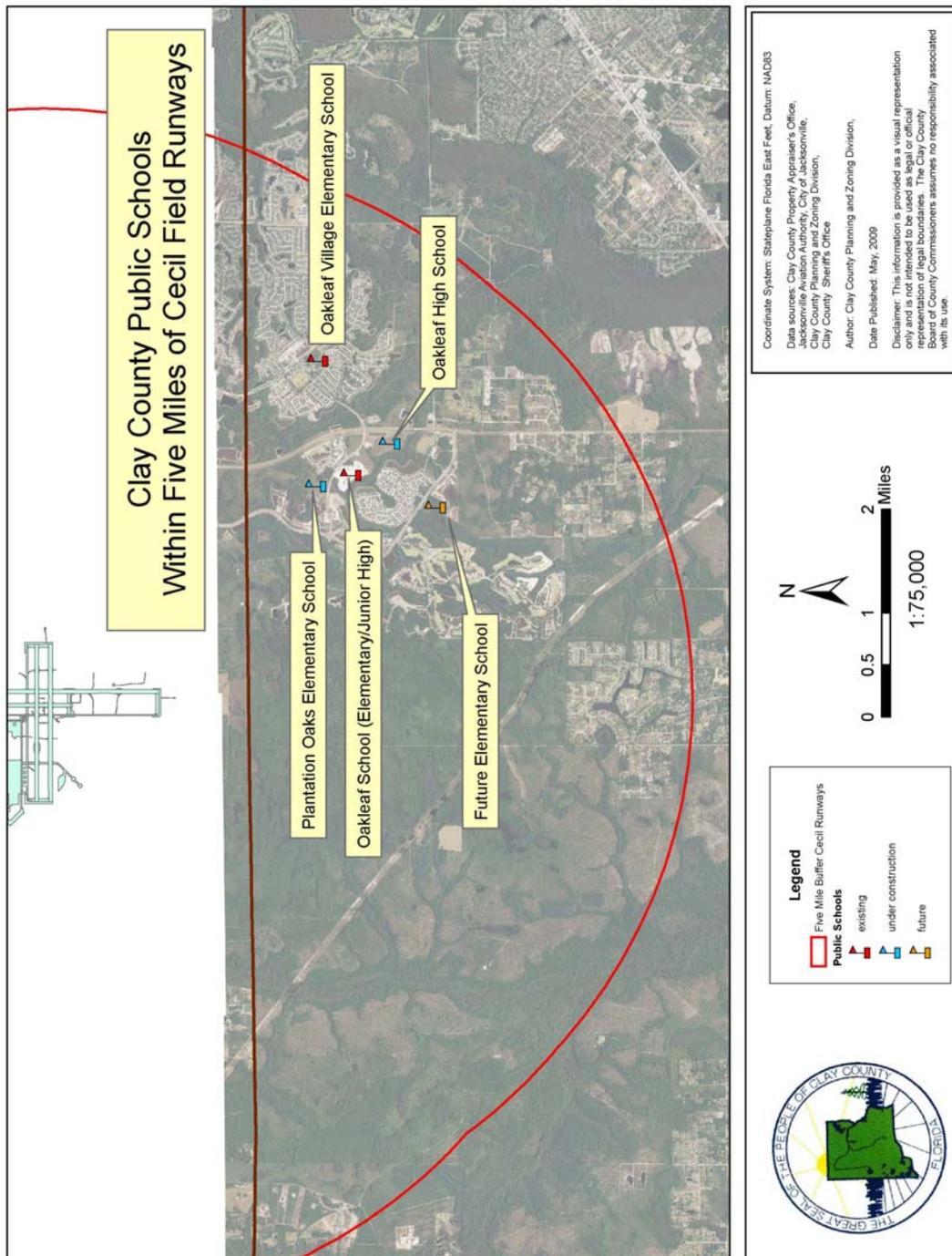
If you have any questions about any of this information please let me know. Electronic geographic data files can be provided for schools and parks.

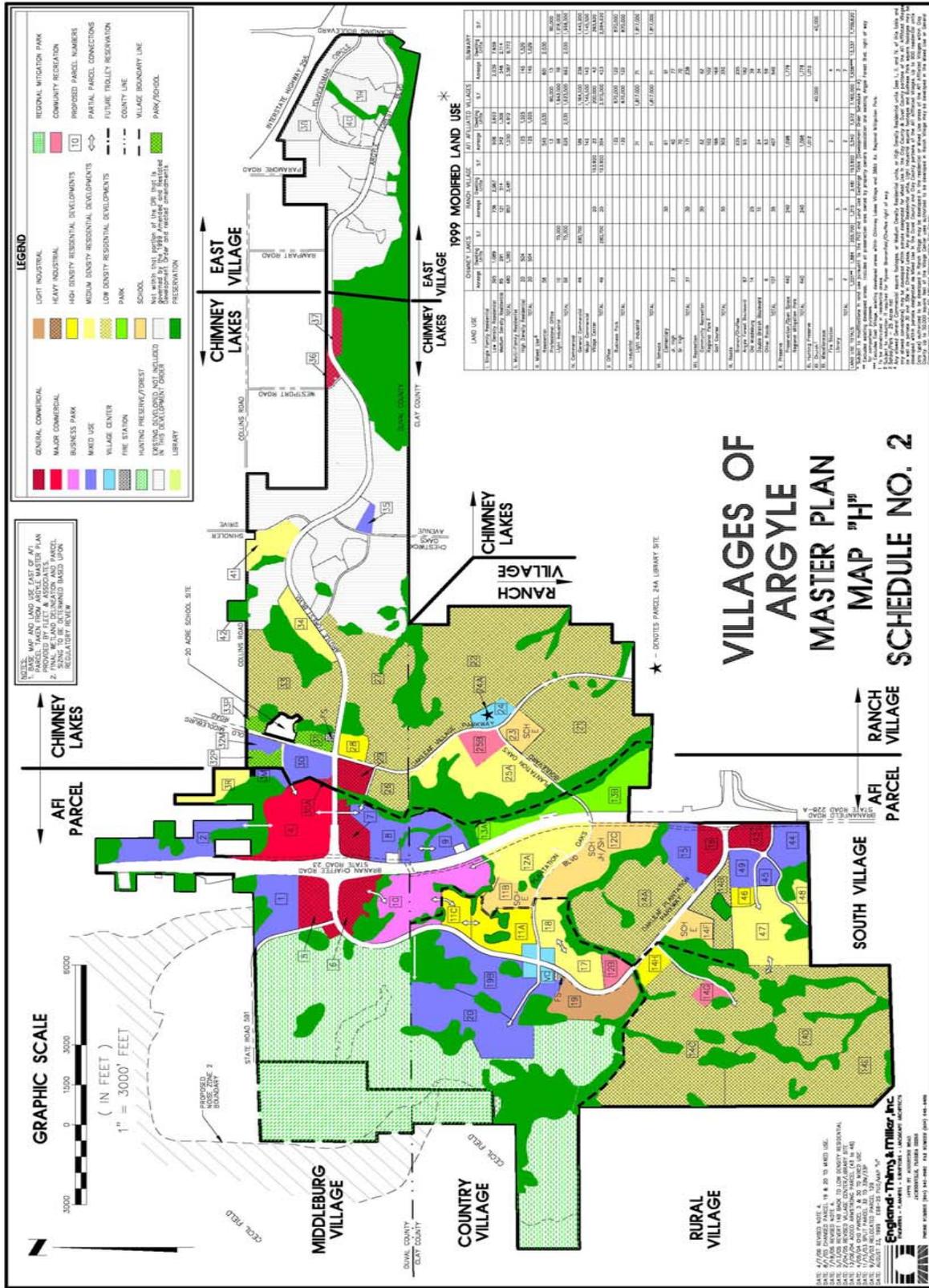
Sincerely,

Ann Stodola  
Senior Planner

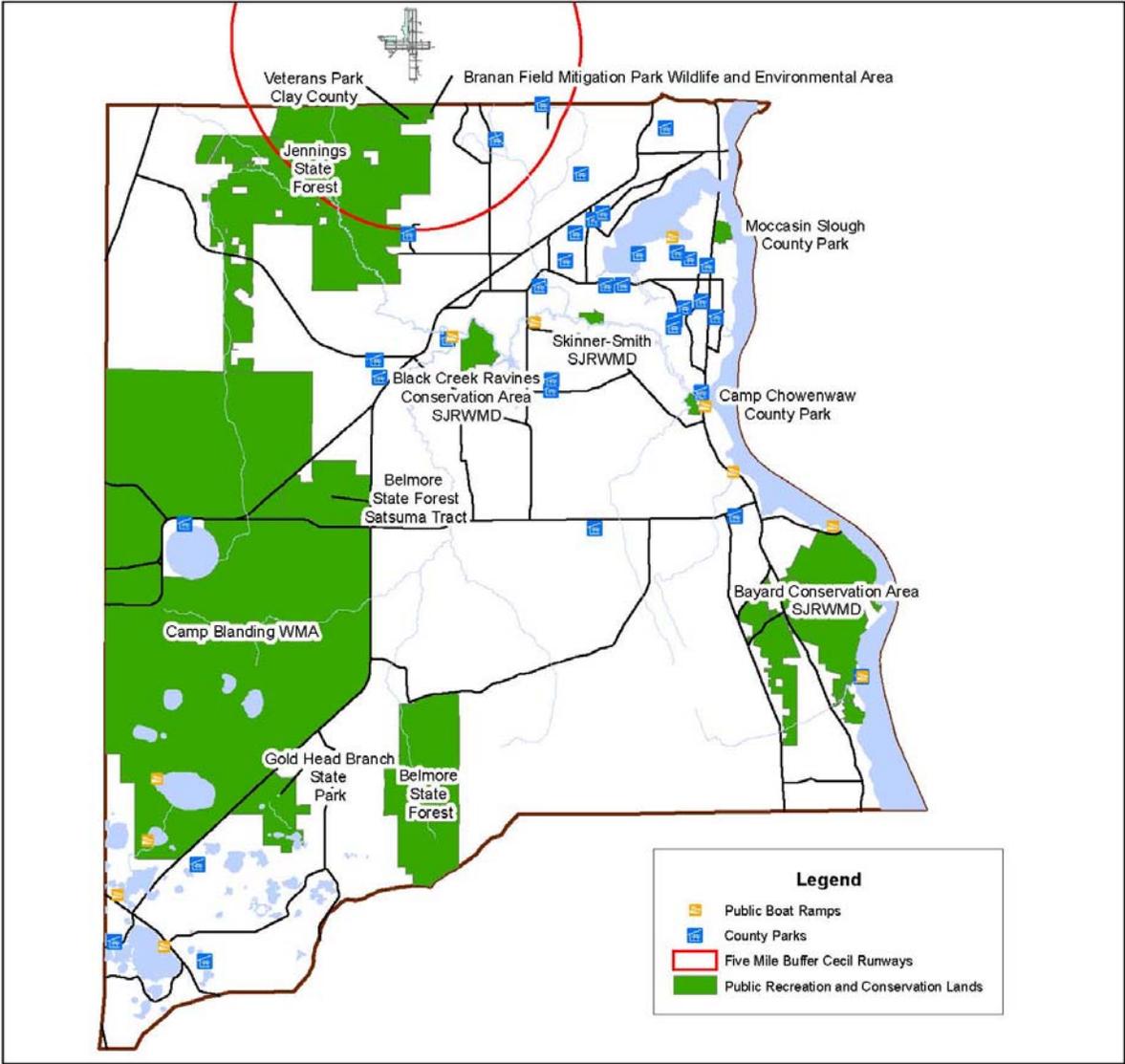
C. Sung-Man Kim, Chief Planner  
Mike Kloehn, Director of Planning and Zoning  
Chuck Iley, Director of Development Services  
Phil Hans, Clay County School District

Wendell D. Davis - District 1 • Douglas P. Conkey - District 2 • Travis Cummings - District 3  
T. Chereese Stewart - District 4 • Ronnie E. Robinson - District 5  
GCS (904) 284-6300 • KH (352) 473-3711 • KL (904) 533-2111 • OP/MBG (904) 269-6300 • Suncom: 827-1300





# Clay County Parks and Public Recreation/Conservation Lands





**Prepared In Reference to  
Draft EA for JAA Launch Site  
Operator License at Cecil Field**

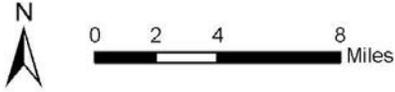
Coordinate System: Stateplane Florida East Feet, Datum: NAD83

Data sources: Clay County Property Appraiser's Office, Jacksonville Aviation Authority, City of Jacksonville, Clay County Planning and Zoning Division, Clay County Sheriff's Office

Author: Clay County Planning and Zoning Division,

Date Published: May, 2009

Disclaimer: This information is provided as a visual representation only and is not intended to be used as legal or official representation of legal boundaries. The Clay County Board of County Commissioners assumes no responsibility associated with its use.



**FAA Responses to Comments in Letter L1:**

L1-001

The FAA has added the map provided as Exhibit 3-20. Based on our assessment, the existing and planned schools in Clay County are a safe distance from launch activities. Therefore, the FAA would not expect significant impacts.

L1-002

The FAA has added a reference to Veterans Park to the text in Section 3.4.2. The FAA would not expect any impacts to the park or restrictions during launch activities.

L1-003

The FAA has added information related to the development of the Villages of Argyle to Section 3.3.2.3. This section describes the proximity of the development to Cecil Field. The FAA has added the map provided as Exhibit 3-7.

## **C.2 Oral Comments**

The FAA held a public hearing during the public review and comment period for the Draft EA for the Jacksonville Aviation Authority Launch Site Operator License at Cecil Field, Florida. The public hearing was held on May 14, 2009, at the Cecil Commerce Center, 13561 Lake Newman Street, Jacksonville, Florida, from 6:00 pm to 9:00 pm. A court reporter recorded the public hearing and provided a certified transcript dated May 18, 2009.

The FAA received two comments during the public hearing, as shown in the transcript on the following pages. The FAA responses to these comments appear after the transcript. This appendix includes only the transcript title page (page 1), the certificate page (page 18) and the pages that record comments (pages 14 through 17). Transcript pages not included record introductory remarks and background information about the proposed project and the NEPA process.

CECIL SPACEPORT PUBLIC MEETING  
TO SOLICIT COMMENTS ON THE DRAFT EA  
THURSDAY, MAY 14, 2009  
COMMENCING AT 6:28 p.m.  
AT THE  
CECIL CONFERENCE CENTER  
13561 LAKE NEWMAN STREET  
JACKSONVILLE, FLORIDA  
ANDERSON REPORTING SERVICES, INC.  
(904) 358-0112

**Anderson Reporting Services, Inc.**

Page 1 of 18

1 comment form is available at the registration  
2 table. It can be turned in tonight or  
3 submitted via e-mail, fax or regular mail.

4 If you have any questions about tonight's  
5 presentation, FAA and Jacksonville Aviation  
6 personnel are here and will be available to  
7 clarify information after public comments.

8 At this point, we're going to take a few  
9 minutes to set up for the public statements.

10 If you would like to make a comment and  
11 you haven't already signed up -- a few people  
12 have -- within the next couple minutes, head  
13 back to the registration table, fill out one of  
14 the forms, and then we'll call you up and you  
15 can provide your comment.

16 Thank you.

17 (Recess from 6:42 p.m. until 6:44 p.m.)

18 MR. CZELUSNIAK: We're ready to call up  
19 the first commenter. It's Tony Webb.

20 If you'd come up, pronounce your name and  
21 your organization for the record, we'd  
22 appreciate that.

23 MR. WEBB: I'm Tony Webb. I'm the  
24 founder of a company called eSpaceTickets.com.  
25 ESpaceTickets began in the year 2000 on

T1

**Anderson Reporting Services, Inc.**

1 the purpose to enable an everyday person the  
2 opportunity to participate in space tourism  
3 without being a multibillionaire or an  
4 astronaut. It was based on the suggestion of  
5 Astronaut Buzz Aldrin that such -- this work  
6 should be made available to the everyday  
7 person.

8 Now, many people will probably say that  
9 Cecil Field Spaceport will only be used for the  
10 wealthy to be able to make their suborbital  
11 space flights, and we intend to be able to  
12 prove to the nation and to the world that Cecil  
13 Field Spaceport will be for the everyday  
14 person.

15 We are launching our project, which has  
16 been in development for the past nine years, as  
17 a community-based project whereby the everyday  
18 person will have an opportunity.

19 It will be launched at the International  
20 Space Development Conference at the end of the  
21 this month in Orlando.

22 Anyway, I want to congratulate the team  
23 at JAA for the outstanding job they have done.  
24 I truly want to see Cecil Field Spaceport  
25 become what it is. It will be studied in

T1

**Anderson Reporting Services, Inc.**

1 schools across the nations, and it's something  
2 that will bring great economic benefits to the  
3 community of Jacksonville and will definitely  
4 place Jacksonville on the map.

5 There are communities around the nation  
6 and throughout the world, especially in Dubai,  
7 they, too, want to have a spaceport; and it  
8 will put Jacksonville at the level of Dubai,  
9 and that's very impressive.

10 Then, you bring in the scenario that  
11 Spaceport America and New Mexico and Florida  
12 will have their spaceport, and that's something  
13 to be very, very proud about.

14 And I truly hope that the FAA will grant  
15 the launch license.

16 Thank you.

17 MR. CZELUSNIAK: Allison Odyssey.

18 MS. ODYSSEY: Hey, Allison Odyssey from  
19 Space Florida.

20 Space Florida is a statewide aerospace  
21 economic development agency. We're located  
22 primarily down at The Cape, but we look for  
23 opportunities all over the state.

24 And I'm here to say that we are 100  
25 percent behind Cecil Field. We're very proud

T2

Anderson Reporting Services, Inc.

1 of the effort. We know how much hard work and  
2 dedication went into it, and we want to tell  
3 you that we're behind you 100 percent. In  
4 moving forward, we want to do as much as we can  
5 to help facilitate your operations, your  
6 marketing, everything.

7 And I'm actually very, very glad to be  
8 here, and this is great. This is very great.

9 So good luck, Guys.

10 MR. CZELUSNIAK: One more individual,  
11 Sherri Porter.

12 MS. PORTER: Oh, I didn't sign up for  
13 that. I'm sorry.

14 MR. CZELUSNIAK: Okay. Does anyone else  
15 want to provide a comment, on or off, at the  
16 podium?

17 Well, we're going to stick around for  
18 about another 30 minutes to answer any of your  
19 questions. And this concludes the comment  
20 period.

21 So thank you.

22 (The proceedings concluded at 6:48 p.m.)  
23  
24  
25

T2

**Anderson Reporting Services, Inc.**

C E R T I F I C A T E

I, Kristin Fryman, a Court Reporter and Notary Public in and for the State of Florida, do hereby certify that the public hearing taken at 13561 Lake Newman Street, Jacksonville, Duval County, Florida, on the above-mentioned date; that I was authorized to and did report in stenotype the hearing in said cause, and the foregoing transcript, pages numbered 1 through 17, inclusive, constitutes a true and correct computer-aided transcription of my stenotype notes of the said hearing.

DATED this 18th day of May, 2009.

Kristin Fryman

Court Reporter

ANDERSON REPORTING SERVICES, INC.

(904) 358-0112

**Anderson Reporting Services, Inc.**

## **FAA Responses to Comments in Transcript**

T1

Thank you for your comment.

T2

Thank you for your comment.

