Section 7 Initiation Letter to the USFWS



U.S. Department of Transportation Federal Aviation Administration

October 21, 2021

Office of Commercial Space Transportation

800 Independence Ave., SW. Washington, DC 20591

Ms. Annie Dziergowski Chief, Project Review and Consultation U.S. Fish and Wildlife Service, North Florida Ecological Services Office 7915 Baymeadows Way, Suite 200 Jacksonville, FL 32256-7517 Submitted to: jaxregs@fws.gov

RE: Endangered Species Act Consultation for Proposed Sierra Space Corporation Reentry Operations at the Shuttle Landing Facility, Cape Canaveral Spaceport, Brevard County, Florida

Dear Ms. Dziergowski,

The FAA is initiating Endangered Species Act (ESA) Section 7 consultation and soliciting concurrence with our assessment and determination of the potential effects on ESA-listed species for Sierra Space Corporation's (Sierra Space) proposed commercial space reentry operations at the Shuttle Landing Facility (SLF). Sierra Space is applying to the FAA for a Vehicle Operator License that would allow Sierra Space to conduct reentries with its Dream Chaser vehicle at the SLF in Brevard County, Florida.

In 2020, the FAA consulted with USFWS on Space Florida's application to operate the SLF as a commercial space reentry site. The potential impacts to ESA-listed species for issuing Space Florida a Reentry Site Operator License were evaluated using Sierra Space's Dream Chaser as a representative vehicle and it proposed reentry operations. As a result, the potential impacts to ESA-listed species for issuing Sierra Space a Vehicle Operator License are expected to be the same.

For background on previous ESA consultations related to commercial space operations at the SLF, see **Attachment 1**. For a description of Sierra Space's proposed reentry operations, see **Attachment 2**. The action area, ESA-listed species and critical habitat, potential effects to the listed species and critical habitat, and the FAA's effect determination for Sierra Space's proposed operation, described in **Attachment 3**, are consistent with those that were the subject of the 2020 Section 7 consultation.

The FAA anticipates that Sierra Space's proposed reentry operations **may affect**, **but would not be likely to adversely affect**, all ESA-listed wildlife species in the action area. The FAA seeks your concurrence on our effects determination and welcomes any additional comments. Thank you for your assistance in this matter. Please provide your response to Ms. Chelsea Clarkson of my staff at chelsea.clarkson@faa.gov.

Sincerely,

JAMES R Digitally signed by JAMES R REPCHECK REPCHECK Date: 2021.10.21 10:29:01 -04'00'

Randy Repcheck Manager, Safety Authorization Division

Enclosures:

Attachment 1 – Background Attachment 2 - Project Description Attachment 3 – Action Area, ESA-Listed Species and Critical Habitat, and Effects Determination

ATTACHMENT 1 – BACKGROUND

In 2018, the FAA prepared the *Final Environmental Assessment for the Shuttle Landing Facility Launch Site Operator License* (2018 EA) to evaluate the potential environmental impacts of Space Florida's proposal to operate the SLF as a launch site for horizontally launched and landed reusable vehicles. The FAA issued a Finding of No Significant Impact (FONSI) based on the 2018 EA on November 2, 2018 and issued a Launch Site Operator License (License Number: LSO 18-018) to Space Florida to operate a launch site at the SLF.

The FAA conducted ESA Section 7 consultation with the USFWS in 2017 for the FAA's action of issuing Space Florida a Launch Site Operator License (FWS Log No. 04EF1000-2018-I-771). The FAA determined that operation of the SLF as a launch site and associated construction would have no effect on ESA-listed species except the eastern indigo snake (*Dymarchon corais couperi*). The FAA determined the action proposed in 2017 may affect, but would not adversely affect, the eastern indigo snake. The USFWS concurred with this determination.

In 2021, the FAA prepared the *Final Programmatic Environmental Assessment (PEA) for the Shuttle Landing Facility Reentry Site Operator License* (2021 PEA) to evaluate the potential environmental impacts of Space Florida's proposal to operate the SLF as a commercial space reentry site. The 2021 PEA used Sierra Space's Dream Chaser vehicle as the representative vehicle for operations (the space systems group within Sierra Nevada Corporation became called Sierra Space Corporation, its own company, on June 1, 2021). The FAA issued a FONSI based on the 2021 PEA on January 12, 2021 and issued a Reentry Site Operator License (License Number: LRSO 18-018) to Space Florida to operate a reentry site at the SLF.

The FAA conducted ESA Section 7 consultation with the USFWS in 2020 for the FAA's action of issuing a Reentry Site Operator License to Space Florida (FWS Log No. 20-I-0690). The FAA determined that reentry operations may affect, but were not likely to adversely affect, ESA-listed wildlife species in the action area. The USFWS concurred with this determination.

The FAA is currently preparing an Environmental Assessment that tiers from the 2021 PEA to analyze Sierra Space's specific proposed reentry operations (Tiered EA). The 2021 PEA assessed up to six annual reentry operations from 2021 to 2025. Space Florida's Reentry Site Operator License expires in 2025, at which time Space Florida can apply to renew the license. Sierra Space is applying for a vehicle operator license for the time period of 2022 – 2026. No reentry operations were conducted at the SLF in 2021 and therefore no impact occurred in 2021 as analyzed under the 2021 PEA. Therefore, environmental conditions are not expected to be significantly different than those previously analyzed in the 2021 PEA. There are no other changes in Sierra Space's proposed reentry operations between the 2021 PEA and the Tiered EA that would affect biological resources.

ATTACHMENT 2 – PROJECT DESCRIPTION

The FAA's Proposed Action is to issue a Vehicle Operator License to Sierra Space Corporation to conduct reentry operations with its Dream Chaser vehicle at the SLF, which is managed by Space Florida and located at the Cape Canaveral Spaceport (see **Figure 1**).



Figure 1. Project Location

Table 1 summarizes the Dream Chaser parameters that will be evaluated in the Tiered EA. Figure 2shows the Dream Chaser vehicle, as well as a notional mission profile in support of a NationalAeronautics and Space Administration mission to resupply the International Space Station that ends in ahorizontal reentry.

Characteristic	Data
Vehicle Length	30 feet
Wingspan	27 feet
Gross Vehicle Weight	24,600 pounds
Landing Gear Configuration	Nose skid and two rear wheels
Runway Length Required for Landing	10,000 feet
Cross-Range Capability	± 700 nautical miles
Propellants ¹	Hydrogen peroxide (H ₂ O ₂) and kerosene (RP-1)
Return Payload Capacity	1,850 kilograms

Table 1. Dream Chaser Vehicle Parameters

¹ Dream Chaser propellants are used by a reaction control system (RCS) for orbital maneuvers, deorbit burn, and high-altitude control during reentry. The system is not used near or on the ground. Source: SNC, 2019.



Figure 2. Dream Chaser Vehicle and Mission Profile



Source: Sierra Space, 2021

Sierra Space is proposing a maximum of 4 reentries annually, for a total of up to 14 reentries over the five-year license period (see **Table 2**).

2022	2023	2024	2025	2026
1	2	3	4	4

Table 2. Estimated Annual Number of Reentries

The Dream Chaser would reenter the atmosphere from the west/southwest and overfly the Gulf of Mexico or Caribbean Sea, based on a mission dependent trajectory before landing at the SLF. Dream Chaser reentry operations at the SLF would not require any closures of non-involved Kennedy Space Center (KSC) property or public use areas (e.g., Merritt Island National Wildlife Refuge, Canaveral National Seashore).

The Dream Chaser would enter controlled airspace (60,000 feet above mean sea level) approximately 30–40 miles prior to landing (for less than 30 seconds) and would enter restricted airspace approximately 25–30 miles (for approximately 2.5 – 3 minutes) prior to landing at the SLF. The vehicle would generate a sonic boom during reentry. No construction activities are proposed as part of the proposed project.

ATTACHMENT 3 – ACTION AREA, ESA-LISTED SPECIES AND CRITICAL HABITAT, AND DETERMINATION OF EFFECTS

Action Area

The action area is defined as all areas directly or indirectly affected by the federal action. The action area for Sierra Space's proposed reentry operations based on the footprint of the Dream Chaser's sonic boom noise contour and includes those areas of the Earth's surface that would experience a sonic boom of 1.0 pound per square foot (psf) or greater. This approximately 280-square mile area encompasses portions of Brevard and Volusia counties (see **Figure 3**).



Figure 3. Action Area

ESA-Listed Species and Critical Habitat

The FAA used the USFWS's Information for Planning and Consultation online system to generate a species list and identify critical habitat for the project. **Table 3** shows ESA-listed species and critical habitat within the action area. Designated critical habitat for the West Indian manatee (*Trichechus manatus latirostris*) is present within the action area.

In 1977, the USFWS designated multiple waterways and parts of coastal Florida, from Jacksonville south to Miami and west around the peninsula to Tampa Bay, as critical habitat for manatees (42 FR 47840). The waters around KSC and Cape Canaveral Air Force Station (CCAFS) are critical habitat for the manatee. The Upper Banana River is an area of particular emphasis for cautious boat operations.

Category	Species Common Name	Species Scientific Name	Status
Mammals	West Indian manatee	Trichechus manatus latirostris	E
IVIdIIIIIdis	Southeastern beach mouse	Peromyscus polionotus nineiventris	Т
	Audubon's crested caracara	Polyborus plancus audubinii	Т
	Eastern black rail	Laterallus jamaicensis ssp. jamaicensis	PT
	Everglade snail kite	Rostrhamus sociabilis plumbeus	E
Dinda	Florida scrub-jay	Aphelocoma coeruluscens	Т
BILOS	Piping plover	Charadrius melodus	Т
	Wood stork	Mycteria americana	E
	Red knot	Calidris canutus rufa	Т
	Red-cockaded woodpecker	Picoides borealis	E
	Atlantic salt marsh snake	Nerodia clarkii (fasciata)taeniata	Т
	Eastern indigo snake	Dymarchon corais couperi	Т
	Gopher tortoise	Gopherus polyphemus	С
Reptiles	Green sea turtle	Chelonia mydas	Т
	Hawksbill sea turtle	Eremochelys imbricata	E
	Leatherback sea turtle	Dermochelys coriacea	E
	Loggerhead sea turtle	Caretta	Т
	Carter's mustard	Warea carteri	E
	Lewton's polygala	Polygala lewtonii	E
Plants	Okeechobee gourd	Cucurbita okeechobeensis	E
	Rugel's pawpaw	Deeringhthamnus rugelii	E

Table 3. ESA-Listed Species for the Action Area

C = candidate; E = endangered; PT = proposed threatened; T = threatened Source: USFWS 2019.

Potential Effects to ESA-listed Species and Critical Habitat

The Proposed Action would have no effect on the West Indian manatee's critical habitat because the action does not involve any activities within or near the critical habitat. Similarly, the Proposed Action would have no effect on ESA-listed plants in the action area because the action does involve activities with the potential to affect these plants.

Reentry operations have the potential to affect ESA-listed species in the action area, mainly from noise, including sonic booms. Animal species differ greatly in their responses to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary. Primary effects are

direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking is defined as the inability of an individual to hear important environmental signals that may arise from mates, predators, or prey. There is some potential that noise could disrupt a species' ability to communicate or could interfere with behavioral patterns (Manci et al. 1988). Although the effects are likely temporal, sonic booms may cause masking of auditory signals within exposed faunal communities. Animals rely on hearing to avoid predators, obtain food, and communicate with, and attract, other members of their species. Sonic booms may mask or interfere with these functions.

Secondary effects may include non-auditory effects such as stress and hypertension; behavioral modifications; interference with mating or reproduction; and impaired ability to obtain adequate food, cover, or water. Tertiary effects are the direct result of primary and secondary effects, and include population decline and habitat loss. Most of the effects of noise are mild enough that they may never be detectable as variables of change in population size or population growth against the background of normal variation (Bowles 1995). Other environmental variables (e.g., predators, weather, changing prey base, ground-based disturbance) also influence secondary and tertiary effects, and confound the ability to identify the ultimate factor in limiting productivity of a certain nest, area, or region. Overall, the literature suggests that species differ in their response to various types, durations, and sources of noise (Manci et al. 1988; Bowles 1995).

Many scientific studies have investigated the effects of sonic booms on wildlife, and some have focused on wildlife "flight" due to noise. Natural factors which affect reaction include season, group size, age and sex composition, on-going activity, motivational state, reproductive condition, terrain, weather, and temperament (Bowles 1995). Individual animal response to a given noise event or series of events also can vary widely due to a variety of factors, including time of day, physical condition of the animal, physical environment, the experience of the individual animal with noises, and whether or not other physical stressors (e.g., drought) are present (Manci et al. 1988). Consequently, it is difficult to generalize animal responses to noise disturbances across species.

One result of the Manci et al. (1988) literature review was the conclusion that, while behavioral observation studies were relatively limited, a general behavioral reaction in animals from exposure to aircraft noise is the "startle response." The intensity and duration of the startle response appears to be dependent on which species is exposed, whether there is a group or an individual, and whether there have been some previous exposures. Responses range from flight, trampling, stampeding, jumping, or running, to movement of the head in the apparent direction of the noise source. Manci et al. (1988) reported that the literature indicated that avian species may be more sensitive to aircraft noise than mammals.

The following discussion presents a summary of some of the more relevant studies addressing the potential impacts to wildlife from sonic booms.

Teer and Truett (1973) tested quail eggs subjected to sonic booms at 2, 4, and 5.5 pounds per square foot (psf) and found no adverse effects. Heinemann and LeBrocq (1965) exposed chicken eggs to sonic booms at 3–18 psf and found no adverse effects. In a mathematical analysis of the response of avian eggs to sonic boom overpressures, Ting et al. (2002) determined that it would take a sonic boom of 250 psf to crack an egg. Bowles (1995) states that it is physically impossible for a sonic boom to crack an egg because one cannot generate sufficient sound pressure in air to crack eggs.

Teer and Truett (1973) examined reproductive success in mourning doves, mockingbirds, northern cardinals, and lark sparrows when exposed to sonic booms of 1 psf or greater and found no adverse effects. Awbrey and Bowles (1990) in a review of the literature on the effects of aircraft noise and sonic booms on raptors found that the available evidence shows very marginal effects on reproductive

success. Ellis et al. (1991) examined the effects of sonic booms (actual and simulated) on nesting peregrine falcons, prairie falcons, and six other raptor species. While some individuals did respond by leaving the nest, the response was temporary and overall there were no adverse effects on nesting. Lynch and Speake (1978) studied the effects of both real and simulated sonic booms on the nesting and brooding of eastern wild turkey in Alabama. Hens at four nest sites were subjected to between 8 and 11 combined real and simulated sonic booms. All tests elicited similar responses, including quick lifting of the head and apparent alertness for between 10 and 20 seconds. No apparent nest failure occurred as a result of the sonic booms.

The literature suggests that common animal responses to noise include the startle response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

The entirety of the sonic boom footprint would be approximately 1 psf or less, which is less than a clap of thunder. Previous ESA consultation between the U.S. Air Force and USFWS in the vicinity of SLF have concluded that sonic booms would not adversely affect ESA-listed species.

Based on the lack of observed adverse effects to wildlife in the studies mentioned above and the lack of known adverse effects to ESA-listed over decades of launch operations at KSC and CCAFS, the FAA expects that sonic booms associated with the Proposed Action *may affect, but would be not likely to adversely affect*, ESA-listed wildlife species in the action area.

Section 106 and Tribal Government-to-Government Consultation Letter Example



U.S. Department of Transportation

Federal Aviation Administration **Commercial Space Transportation**

800 Independence Ave., SW. Washington, DC 20591

October 21, 2021

Wenonah G. Haire, Tribal Historic Preservation Officer Catawba Indian Nation 1536 Tom Steven Road, Rock Hill, SC, 29730

RE: Invitation for Government-to-Government Tribal Consultation for Section 106 review of Proposed Sierra Space Corporation Reentry Operations at the Shuttle Landing Facility at Cape Canaveral Spaceport in Brevard County, Florida

The Federal Aviation Administration (FAA) is initiating Section 106 consultation on Sierra Space Corporation's (Sierra Space) proposed commercial space reentry operations at the Shuttle Landing Facility (SLF). Sierra Space is applying to the FAA for a Vehicle Operator License that would allow Sierra Space to conduct reentries with its Dream Chaser vehicle at the SLF in Brevard County, Florida. FAA issuance of a Vehicle Operator License is considered a federal undertaking under the regulations of the Advisory Council for Historic Preservation (36 Code of Federal Regulations [CFR] § 800.16(y)) for Section 106 of the National Historic Preservation Act.

The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA) and the FAA will prepare a Tiered Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

Sierra Space's proposed operations are described in **Attachment 1** and a map of the proposed Area of Potential Affects is included in **Attachment 2**.

The FAA has identified your tribe as potentially having an interest in the project area. Pursuant to Executive Order 13175 *Consultation and Coordination with Indian Tribal Governments*, FAA Order 1210.20 *American Indian and Alaska Native Tribal Consultation Policy and Procedures*, and 36 CFR § 800.2(c)(2)(B)(ii), the FAA is seeking input on properties of cultural or religious significance that may be affected by the undertaking, and inviting you to participate in government-to-government consultation in the Section 106 consultation process.

Please contact Ms. Chelsea Clarkson of my staff at (202) 286-5447 or chelsea.clarkson@faa.gov within 30 days of the receipt of this letter to confirm your intent to participate in this Section 106 consultation.

Sincerely,

Digitally signed by JAMES R JAMES R REPCHECK REPCHECK Date: 2021.10.21 10:38:17 -04'00'

Randy Repcheck Manager, Safety Authorization Division

Enclosures: Attachment 1 – Project Description Attachment 2 – Area of Potential Effects (APE)

ATTACHMENT 1 - PROJECT DESCRIPTION

Background

In 2018, the FAA prepared the *Final Environmental Assessment for the Shuttle Landing Facility Launch Site Operator License* (2018 EA) to evaluate the potential environmental impacts of Space Florida's proposal to operate the SLF as a launch site for horizontally launched and landed reusable vehicles. The FAA issued a Finding of No Significant Impact (FONSI) based on the 2018 EA on November 2, 2018 and issued a Launch Site Operator License (License Number: LSO 18-018) to Space Florida to operate a launch site at the SLF.

In 2021, the FAA prepared the *Final Programmatic Environmental Assessment (PEA) for the Shuttle Landing Facility Reentry Site Operator License* (2021 PEA) to evaluate the potential environmental impacts of Space Florida's proposal to operate the SLF as a commercial space reentry site. The 2021 PEA used Sierra Space's Dream Chaser vehicle as the representative vehicle for operations (the space systems group within Sierra Nevada Corporation became called Sierra Space Corporation, its own company, on June 1, 2021). The FAA issued a FONSI based on the 2021 PEA on January 12, 2021 and issued a Reentry Site Operator License (License Number: LRSO 18-018) to Space Florida to operate a reentry site at the SLF.

The consulted with your tribe in 2020 for Space Florida's proposal to operate the SLF as a commercial space reentry site.

The FAA is currently preparing an Environmental Assessment that tiers from the 2021 PEA to analyze Sierra Space's specific proposed reentry operations (Tiered EA). The 2021 PEA assessed up to six annual reentry operations from 2021 to 2025. Space Florida's Reentry Site Operator License expires in 2025, at which time Space Florida can apply to renew the license. Sierra Space is applying for a vehicle operator license for the time period of 2022 – 2026. No reentry operations were conducted at the SLF in 2021 and therefore no impact occurred in 2021 as analyzed under the 2021 PEA. Therefore, environmental conditions are not expected to be significantly different than those previously analyzed in the 2021 PEA. There are no other changes in Sierra Space's proposed reentry operations between the 2021 PEA and the Tiered EA that would affect historic properties.

Project Activities

The FAA's Proposed Action is to issue a Vehicle Operator License to Sierra Space Corporation to conduct reentry operations with its Dream Chaser vehicle at the SLF, which is managed by Space Florida and located at the Cape Canaveral Spaceport (see **Figure 1**).



Table 1 summarizes the Dream Chaser vehicle parameters. **Figure 2** shows the Dream Chaser vehicle, as well as a notional mission profile in support of a National Aeronautics and Space Administration mission to resupply the International Space Station that ends in a horizontal reentry.

Table 1. Drear	n Chaser	Vehicle	Parameters
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Characteristic	Data
Vehicle Length	30 feet
Wingspan	27 feet
Gross Vehicle Weight	24,600 pounds
Landing Gear Configuration	Nose skid and two rear wheels
Runway Length Required for Landing	10,000 feet
Cross-Range Capability	± 700 nautical miles
Propellants ¹	Hydrogen peroxide (H ₂ O ₂) and kerosene (RP-1)
Return Payload Capacity	1,850 kilograms

¹ Dream Chaser propellants are used by a reaction control system (RCS) for orbital maneuvers, deorbit burn, and high-altitude control during reentry. The system is not used near or on the ground. Source: SNC, 2019.



Figure 2. Dream Chaser Vehicle and Mission Profile

Source: Sierra Space, 2021

Sierra Space is proposing a maximum of 4 reentries annually, for a total of up to 14 reentries over the five-year license period (see **Table 2**).

Table 2. Estimated Annual Number of Reentities				
2022	2023	2024	2025	2026
1	2	3	4	4

The Dream Chaser would reenter the atmosphere from the west/southwest and overfly the Gulf of Mexico or Caribbean Sea, based on a mission dependent trajectory before landing at the SLF. Dream Chaser reentry operations at the SLF would not require any closures of non-involved Kennedy Space Center property or public use areas (e.g., Merritt Island National Wildlife Refuge, Canaveral National Seashore).

The Dream Chaser would enter controlled airspace (60,000 feet above mean sea level) approximately 30–40 miles prior to landing (for less than 30 seconds) and would enter restricted airspace approximately 25–30 miles (for approximately 2.5 – 3 minutes) prior to landing at the SLF. The vehicle

would generate a sonic boom during reentry. No construction activities are proposed as part of the proposed project.

ATTACHMENT 2 - AREA OF POTENTIAL EFFECTS (APE)

The FAA has defined an APE in consideration of both potential direct and indirect effects associated with proposed reentry operations.

The proposed APE encompasses about 280 square miles and includes portions of Brevard and Volusia counties. The APE also extends over a portion of the Atlantic Ocean. This APE is based on the footprint of the Dream Chaser's sonic boom noise contour and includes those areas of the Earth's surface that would experience a sonic boom of 1.0 pound per square foot or greater (Figure 3).





SLF Section 106 Initiation Letter to the State Historic Preservation Officer



U.S. Department of Transportation

Federal Aviation Administration

October 21, 2021

Office of Commercial Space Transportation

800 Independence Ave., SW Washington, DC 20591

Dr. Timothy Parsons State Historic Preservation Officer Florida Division of Historical Resources R.A. Gray Building 500 South Bronough Street Tallahassee, Florida 32399-0250

RE: National Historic Preservation Act Section 106 Consultation for Proposed Sierra Space Corporation Reentry Operations at the Shuttle Landing Facility, Cape Canaveral Spaceport, Brevard County, Florida

Dear Dr. Parsons,

The FAA is initiating Section 106 consultation and soliciting concurrence on the proposed Area of Potential Effects (APE) and the FAA's Finding of No Adverse Effect for Sierra Space Corporation's (Sierra Space) proposed commercial space reentry operations at the Shuttle Landing Facility (SLF). Sierra Space is applying to the FAA for a Vehicle Operator License that would allow Sierra Space to conduct reentries with its Dream Chaser vehicle at the SLF in Brevard County, Florida. FAA issuance of a Vehicle Operator License is considered a federal undertaking under the regulations of the Advisory Council for Historic Preservation (36 Code of Federal Regulations [CFR] § 800.16(y)) for Section 106 of the National Historic Preservation Act. The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA) and the FAA has initiated preparation of a Supplemental Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

In 2020, the FAA consulted with the Florida Division of Historical Resources on Space Florida's application to operate the SLF as a commercial space reentry site. The potential impacts to historic properties for issuing Space Florida a Reentry Site Operator License were evaluated using Sierra Space's Dream Chaser as a representative vehicle and it proposed reentry operations. As a result, the potential impacts to historic properties for issuing Sierra Space a Vehicle Operator License are expected to be the same.

For background on previous Section 106 consultations related to commercial space operations at the SLF, see **Attachment 1**. For a description of Sierra Space's proposed reentry operations, see **Attachment 2**. The proposed APE, described in **Attachment 3**, is consistent with that which was the subject of the 2020 Section 7 consultation. The list of historic resources in the APE is described below and in **Attachment 4**. The FAA's proposed Finding of Effect is included below.

The FAA is inviting the following tribes to participate in this consultation: Catawba Indian Nation, Chitimacha Tribe of Louisiana, Coushatta Tribe of Louisiana, Eastern Band of Cherokee Indians, Jena Band of Choctaw Indians, Miccosukee Tribe of Indians of Florida, Muscogee (Creek) Nation, Poarch Band of Creek Indians, and Seminole Tribe of Florida.

Historic Resources in the APE

Historic, architectural, and cultural resources are sites recorded by the Florida Division of Historical Resources as Florida historical markers or resources that are in or eligible for listing in the National Register of Historic Places (NRHP). **Attachment 4** lists the NHRP-eligible sites in the APE.

The proposed undertaking does not include ground-disturbing activities; therefore, archaeological resources are not considered.

Preliminary Finding of Effects

12 historic properties were identified in the project APE (Attachment 4).

No ground disturbing activities would occur in the APE. Operation of the concept reentry vehicles would increase flight activity at the SLF. The Proposed Action would not result air quality or visual (light or viewshed) impacts, but the descent of reentry vehicles would generate a sonic boom. The Proposed Action would result in up to one sonic boom in 2022, up to two sonic booms in 2023, up to three sonic booms in 2024, and up to four sonic booms in 2025 and 2026.

Potential impacts to historic resources were assessed by determining any potential direct and indirect impacts from noise and vibration that could potentially:

- Destroy or damage a historic property;
- Alter the character of the property's use, or physical features within the setting if the

setting contributes to the property's qualification for the NRHP;

• Introduce visual, audible, or atmospheric features that would diminish the integrity of the property's historic features, if the setting contributes to the property's NRHP-eligibility; and/or Cause neglect of the property resulting in the property's deterioration or destruction.

Overpressure caused by extreme sonic booms has been associated with the potential for structural damage, specifically for brittle materials such as glass and plaster. The probability of a window breaking when exposed to a sonic boom with a 1.0 psf overpressure ranges from one in a billion to one in a million, depending on the condition of the glass, while the threshold for damage from overpressure on well-maintained structures is greater than 2 psf (BRRC, 2019¹). The results of the sonic boom analysis indicated that the maximum overpressure associated with operation of the Proposed Action would be 1.1 psf, below the 2 psf threshold.

The potential for sonic boom impacts is also evaluated in relation to human annoyance and hearing conservation. The modeled maximum of 1.1 psf translates to an equivalent CDNL² of 41.2 dBC. Noise caused by the proposed reentry vehicle operations would be less than the significance threshold of CDNL 60 dBC for impulsive noise sources (equivalent to DNL 65 dBA).³ The intensity of sonic booms associated with operation of the Proposed Action would be similar to thunder in intensity. It is estimated that, on average, each resident in the APE experiences the overpressure from a thunderstorm greater than 2.09 psf more than 20 times a year. Users of the historic properties located within the APE therefore likely experience similar levels of thunderstorm activity and noise impacts.

¹ BRRC. (2019). Shuttle Landing Facility Reentry Site Licensing Sonic Boom Analysis.

² CDNL is the C-weighted Day-Night Level (DNL). C-weighting is preferred over A-weighting for impulsive noise sources with large low-frequency content such as sonic booms.

³ Areas exposed to DNL 65 dBA or lower are compatible with all land uses.

Based on the results of the studies and an assessment of effects to historic properties, the FAA has determined that this undertaking will have No Adverse Effect on historic properties. Please review this finding and the enclosed documentation, in accordance with 36 CFR § 800.5 and provide either your concurrence or non-concurrence.

Conclusion

The FAA requests your concurrence on the determination of the APE and the FAA's Finding of No Adverse Effect within 30 days. If you have any questions or need additional information on the project, please contact Ms. Chelsea Clarkson of my staff at (202) 286-5447 or chelsea.clarkson@faa.gov. Thank you in advance for your input on this project.

Sincerely,

Digitally signed by JAMES R JAMES R REPCHECK REPCHECK Date: 2021.10.21 10:56:52 -04'00'

Randy Repcheck Manager, Safety Authorization Division

Enclosures:

Attachment 1 – Background Attachment 2 - Project Description Attachment 3 – Area of Potential Effects Attachment 4 – Historic Resources in the Area of Potential Effects

ATTACHMENT 1 – BACKGROUND

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The FAA consulted with your office in 2020 for the FAA's action of issuing a Reentry Site Operator License to Space Florida. The FAA determined that the proposed project would have no effect on historic properties. Your office concurred with this determination.

The FAA is currently preparing an Environmental Assessment that tiers from the 2021 PEA to analyze Sierra Space's specific proposed reentry operations (Tiered EA). The 2021 PEA assessed up to six annual reentry operations from 2021 to 2025. Space Florida's Reentry Site Operator License expires in 2025, at which time Space Florida can apply to renew the license. Sierra Space is applying for a vehicle operator license for the time period of 2022 – 2026. No reentry operations were conducted at the SLF in 2021 and therefore no impact occurred in 2021 as analyzed under the 2021 PEA. Therefore, environmental conditions are not expected to be significantly different than those previously analyzed in the 2021 PEA. There are no other changes in Sierra Space's proposed reentry operations between the 2021 PEA and the Tiered EA that would affect historic properties.

ATTACHMENT 2 – PROJECT DESCRIPTION

The FAA's Proposed Action is to issue a Vehicle Operator License to Sierra Space Corporation to conduct reentry operations with its Dream Chaser vehicle at the SLF, which is managed by Space Florida and located at the Cape Canaveral Spaceport (see **Figure 1**).





Table 1 summarizes the Dream Chaser vehicle parameters. **Figure 2** shows the Dream Chaser vehicle, as well as a notional mission profile in support of a National Aeronautics and Space Administration mission to resupply the International Space Station that ends in a horizontal reentry.

Characteristic	Data
Vehicle Length	30 feet
Wingspan	27 feet
Gross Vehicle Weight	24,600 pounds
Landing Gear Configuration	Nose skid and two rear wheels
Runway Length Required for Landing	10,000 feet
Cross-Range Capability	± 700 nautical miles
Propellants ¹	Hydrogen peroxide (H ₂ O ₂) and kerosene (RP-1)
Return Payload Capacity	1,850 kilograms

¹ Dream Chaser propellants are used by a reaction control system (RCS) for orbital maneuvers, deorbit burn, and high-altitude control during reentry. The system is not used near or on the ground. Source: SNC, 2019.



Figure 2. Dream Chaser Vehicle and Mission Profile



Source: Sierra Space, 2021

Sierra Space is proposing a maximum of 4 reentries annually, for a total of up to 14 reentries over the five-year license period (see **Table 2**).

2022	2023	2024	2025	2026
1	2	3	4	4

Table 2. Estimated Annual Number of Reentries

The Dream Chaser would reenter the atmosphere from the west/southwest and overfly the Gulf of Mexico or Caribbean Sea, based on a mission dependent trajectory before landing at the SLF. Dream Chaser reentry operations at the SLF would not require any closures of non-involved Kennedy Space Center property or public use areas (e.g., Merritt Island National Wildlife Refuge, Canaveral National Seashore).

The Dream Chaser would enter controlled airspace (60,000 feet above mean sea level) approximately 30–40 miles prior to landing (for less than 30 seconds) and would enter restricted airspace approximately 25–30 miles (for approximately 2.5 – 3 minutes) prior to landing at the SLF. The vehicle would generate a sonic boom during reentry. No construction activities are proposed as part of the proposed project.

ATTACHMENT 3 – AREA OF POTENTIAL EFFECTS

In accordance with 36 CFR § 800.4(a)(1), an APE needs to be established for the proposed undertaking in consultation with your office. The FAA has defined an APE in consideration of both potential direct and indirect effects associated with proposed reentry operations. The proposed APE encompasses about 280 square miles and includes portions of Brevard and Volusia counties. The APE also extends over a portion of the Atlantic Ocean. This APE is based on the footprint of the reentry vehicle's sonic boom noise contour and includes those areas of the Earth's surface that would experience a sonic boom of 1.0 pound per square foot or greater (**Figure 3**).



Figure 3 - Area of Potential Effects

ATTACHMENT 4 – HISTORIC RESOURCES IN THE AREA OF POTENTIAL EFFECTS

Resource Name	Resource Type
Aladdin Theater	Listed in NRHP
Barton Ave Residential District	Listed in NRHP
Cape Canaveral Air Force Station	Listed in NRHP
City Point Community Church	Listed in NRHP
Cocoa Junior High	Eligible for NRHP
Cocoa Post Office	Eligible for NRHP
Dr. George E Hill House	Listed in NRHP
J.R. Field, Homestead	Listed in NRHP
La Grange Church and Cemetery	Listed in NRHP
Porcher House	Listed in NRHP
Rockledge Drive Residential District	Listed in NRHP
Valencia Subdivision Residential Historic	Listed in NRHP