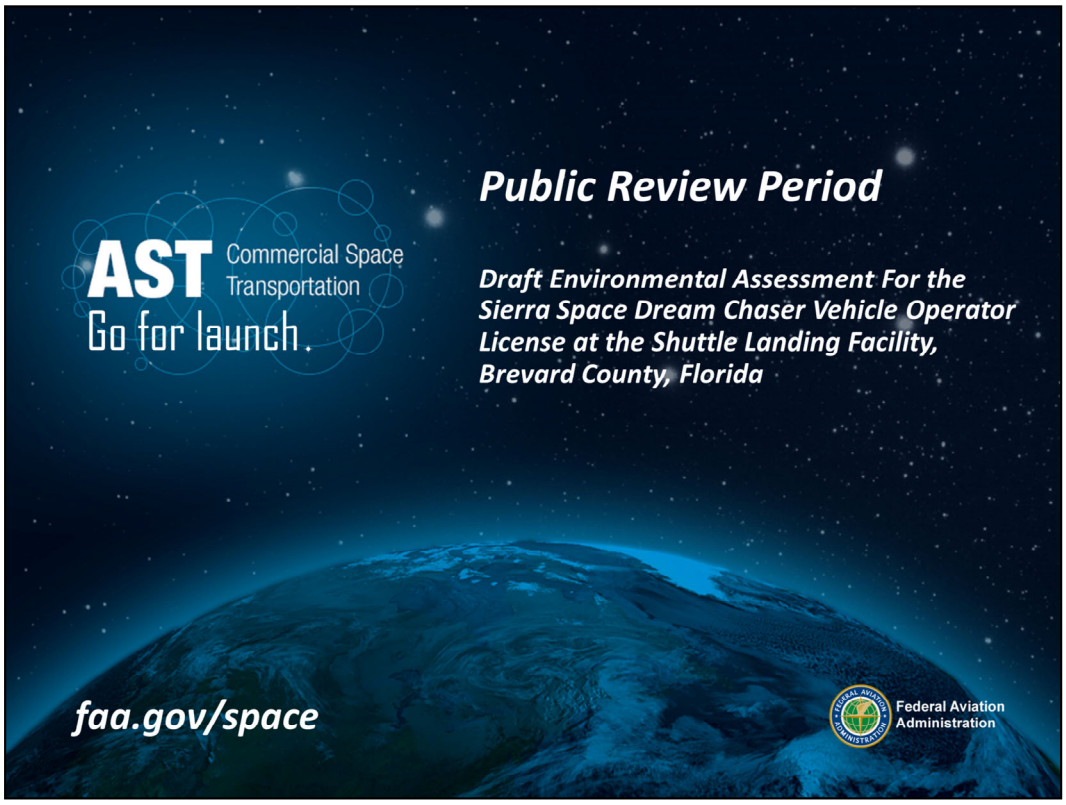

AST
Commercial Space Transportation
Go for launch.
Public Review Period
Draft Environmental Assessment For the Sierra Space Dream Chaser Vehicle Operator License at the Shuttle Landing Facility, Brevard County, Florida
faa.gov/space
Federal Aviation Administration

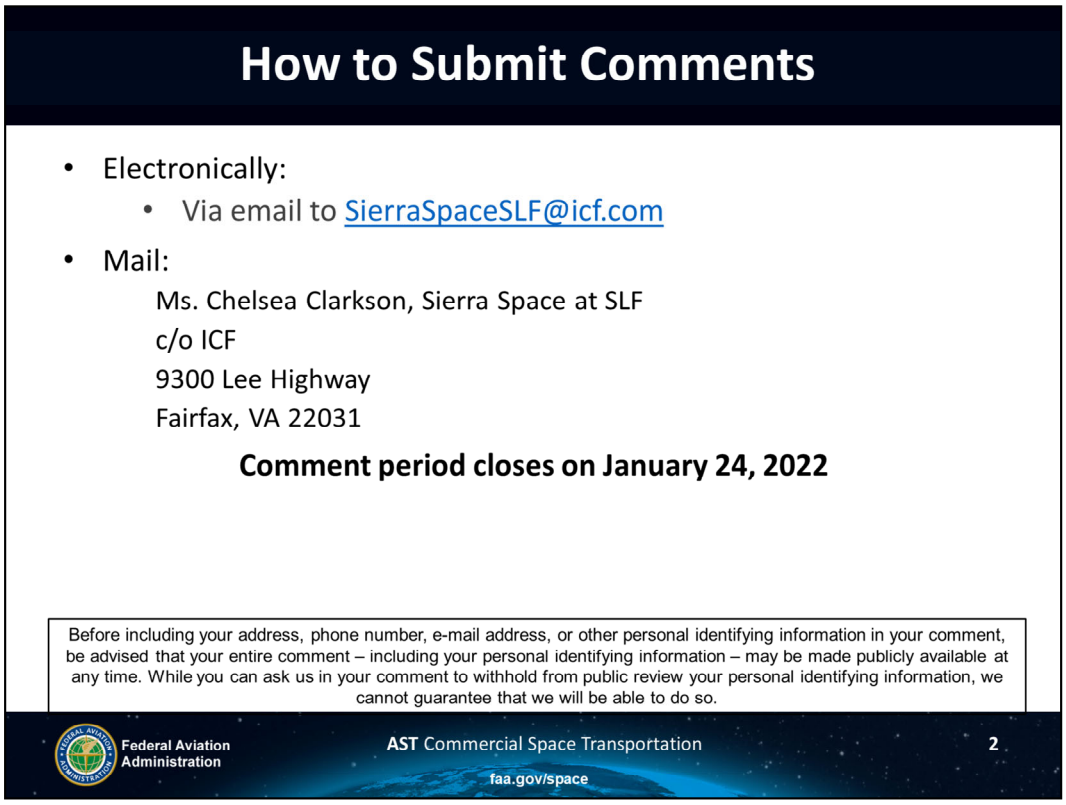
## Presentation Contents

- Submitting Comments
- Introduction to the Project
- FAA Licensing Process
- Project Overview
- Airspace Impacts
- Environmental Impacts
- EA and Stakeholder Engagement Schedule



The purpose of this presentation is to share information about the Draft Environmental Assessment For the Sierra Space Dream Chaser Vehicle Operator License at the Shuttle Landing Facility in Brevard County, Florida and to provide information on how to submit comments.

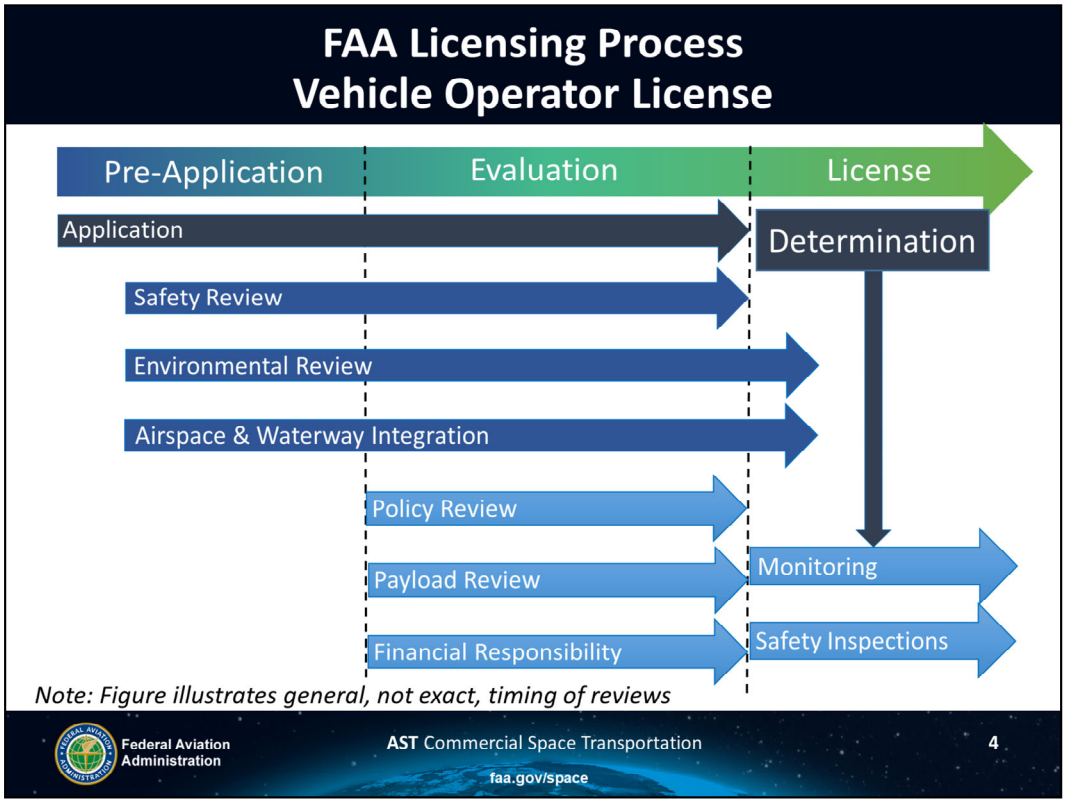
This presentation includes an introduction to the project, a description of the FAA licensing process, an overview of the proposed project, potential impacts to airspace and the environment, and the project schedule.




Please submit comments by the close of the public comment period on January 24, 2022. The FAA invites comments submitted electronically via email to the project inbox at SierraSpaceSLF@icf.com or mailed to Ms. Chelsea Clarkson, Sierra Space at SLF, c/o ICF, 9300 Lee Highway, Fairfax, VA 22031.

# Project Introduction

- The FAA is evaluating Sierra Space's proposed Dream Chaser reentry operations at the Shuttle Landing Facility (SLF)
- Vehicle reentry operations require a license from the FAA
- The FAA is analyzing the potential environmental impacts in an Environmental Assessment (EA) and is collecting comments on the Draft EA
- The Draft EA is posted to the FAA's website at: https://www.faa.gov/space/stakeholder_engagement/shuttle_landing_facility/




This slide shows the FAA's process for reviewing a vehicle operator license application. The process occurs over a period of months or years, depending on the applicant's proposed operation, and it begins with Pre-Application consultation.

Pre-Application Consultation - The FAA starts coordination with the applicant during the Pre-Application consultation process.

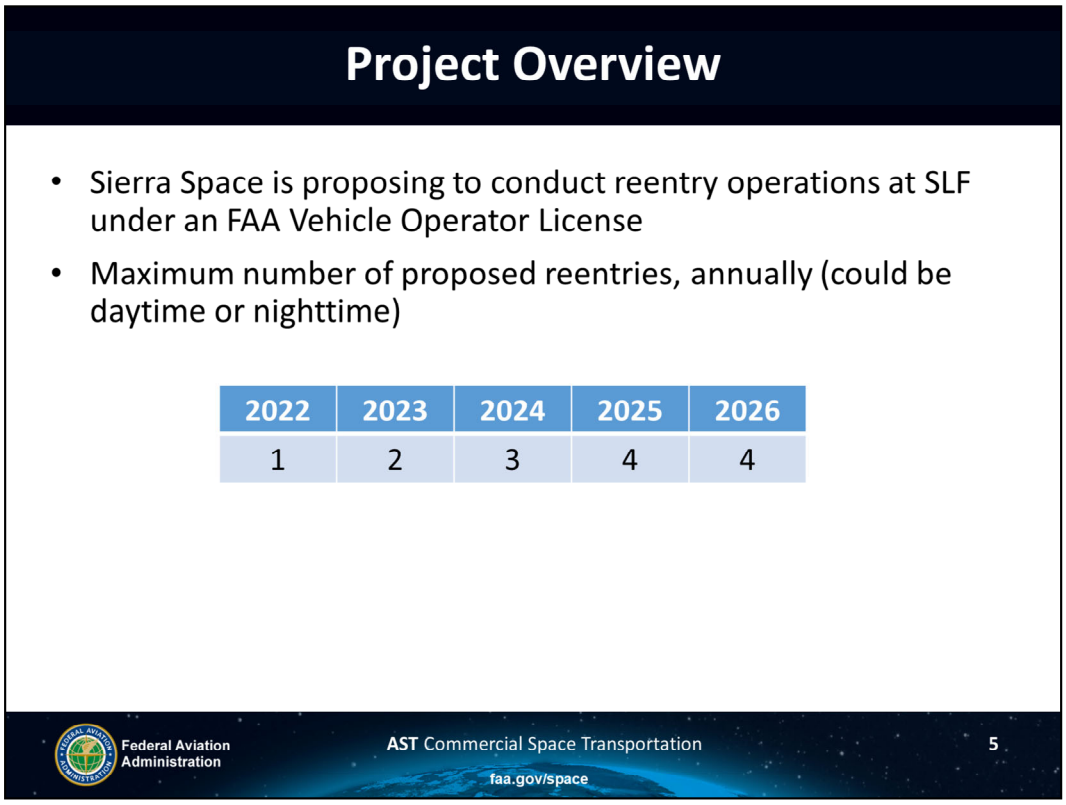
Evaluation - The formal evaluation period begins once the FAA accepts a license application. During this process, the FAA conducts reviews on safety, environmental, airspace and waterway integration, policy, payload, and financial aspects of the application. The environmental review will be discussed in more detail on the following slides.

License Determination - Upon completion of the evaluation, if the FAA makes a positive determination and grants a license, the next part of the process is an operational phase. During this time the FAA conducts

compliance monitoring and safety inspections of the operator's licensed activities.

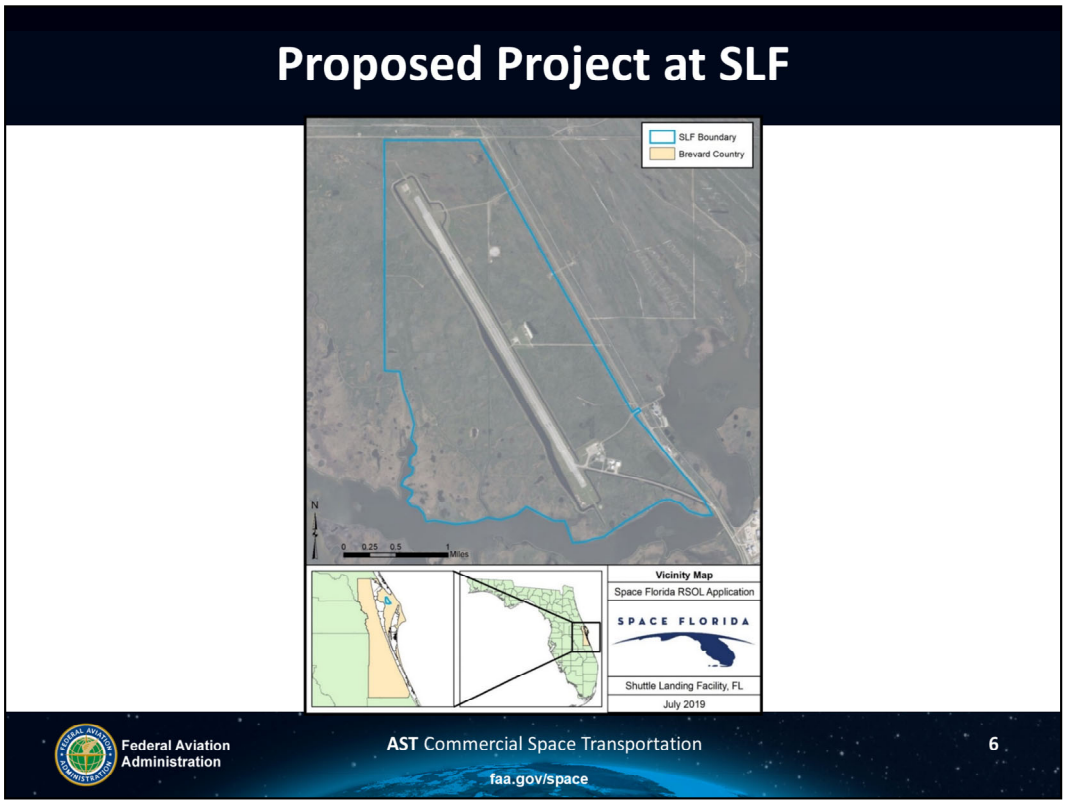
An authorization for a vehicle operator license is valid for five years from the issuance date. A licensee can renew the license by submitting an application to the FAA.

Sierra Space's application for the proposed operations at the SLF are currently in the pre-application phase of the licensing process with the FAA.




Sierra Space is proposing to conduct reentry operations using its Dream Chaser vehicle at the Shuttle Landing Facility, or SLF, under an FAA Vehicle Operator License.

Sierra Space is proposing up to one reentry operation in 2022, up to two operations in 2023, up to three operations in 2024, and up to four operations in 2025 and 2026. Each reentry could occur during daytime or nighttime, depending on the mission.




The image on this slide shows the reentry site boundary, circled in blue, around the SLF. The Dream Chaser would land on Runway 15/33 in an unpowered landing. Upon touch down, the vehicle would brake and come to a complete stop along the runway.

The map inset shows the location of the SLF in Brevard County, and the location of Brevard County within Florida.

## Dream Chaser Vehicle

- Runway-landing commercial Orbital Space Vehicle currently in development
- Uncrewed transportation from Low Earth Orbit (LEO)
- Non-toxic propulsion for orbital translations, attitude control, deorbit
- < 1.5g re-entry profile and >1000 mile total cross-range capability
- Designed to launch on a variety of launch vehicles
- Contract for Cargo Resupply Services 2 (CRS2) Program with National Aeronautics and Space Administration (NASA)

*Uncrewed Dream Chaser*

Federal Aviation Administration

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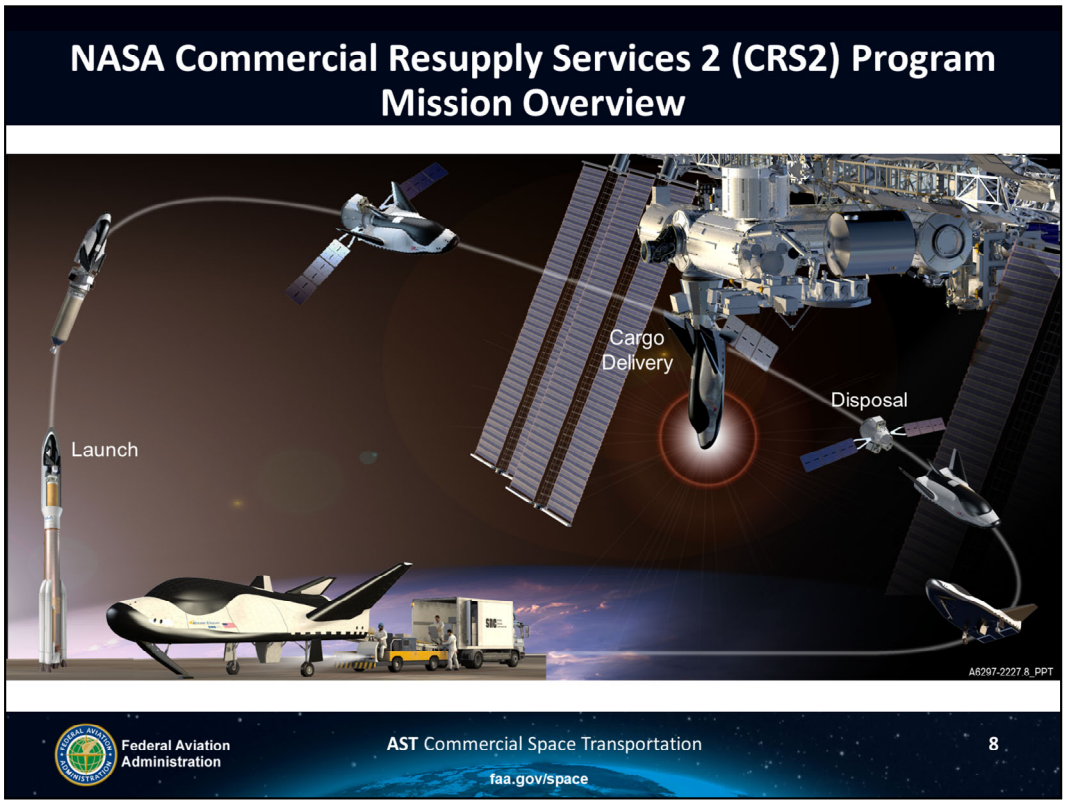
Sierra Space is developing the Dream Chaser, a reusable reentry vehicle capable of carrying payloads to and from low Earth orbit, including delivering supplies to the International Space Station under the Commercial Resupply Services 2 (CRS-2) contract with the National Aeronautics and Space Administration (NASA).

The Dream Chaser is currently the only runway-landing commercial orbital space vehicle in development. It would use non-toxic propulsion for, orbital translations, attitude control, and deorbit. It is designed to launch on a variety of launch vehicles and is on contract for the NASA Cargo Resupply Services 2 (CRS2) Program.



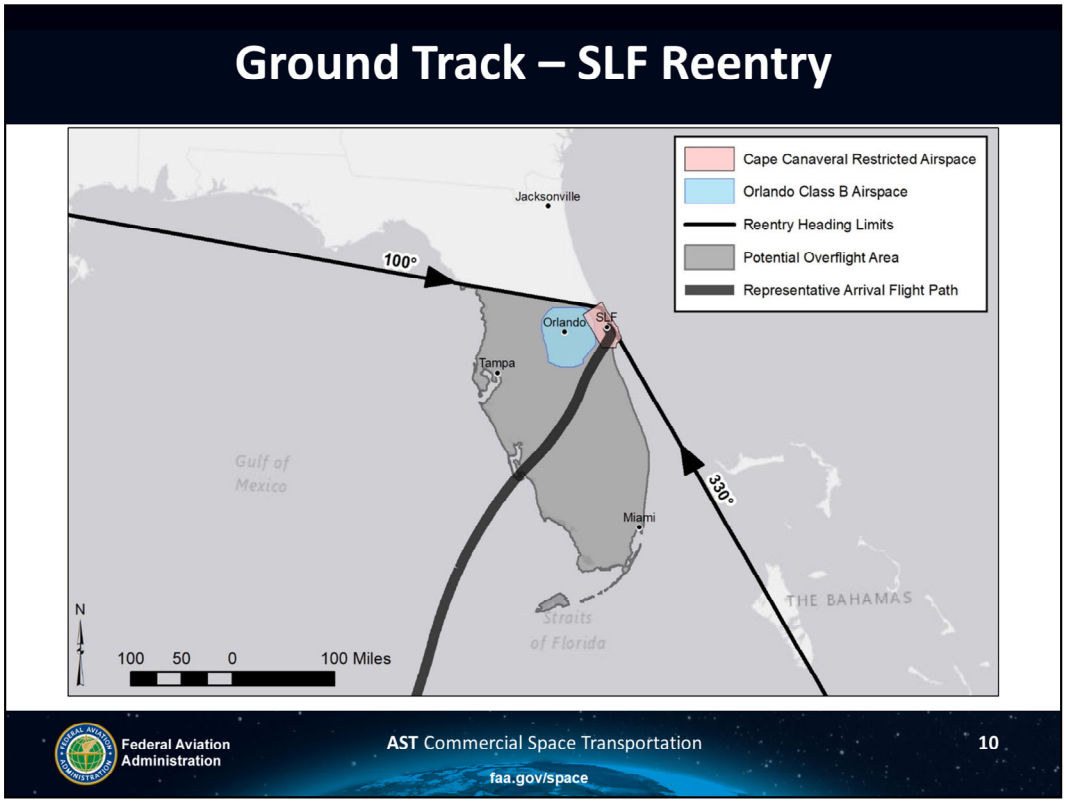

The image shows Sierra Space's proposed operations. The Dream Chaser vehicle would be carried as a payload on a vertically launched United Launch Alliance Vulcan rocket from Cape Canaveral in Florida. Sierra Space proposes that the Dream Chaser vehicle would deliver up to 5,500 kilograms of pressurized and unpressurized cargo to the International Space Station. Sierra Space would dispose of materials from the International Space Station over the broad open ocean via a Cargo Module that would separate from Dream Chaser and burn up safely in the Earth's atmosphere upon reentry. Any surviving debris would be intentionally placed in a remote part of the Pacific Ocean. The Dream Chaser vehicle would return to the runway where cargo would be offloaded.


Some key terms used when describing the reentry of Dream Chaser are defined on this chart. Reentries can either be on ascending or descending trajectories, as shown in the image. Ascending is when the relative motion of the ground track projected by the orbiting vehicle is moving in an upward direction relative to the landing site. Descending is a downward motion relative to the landing site. For the proposed reentry to SLF, Sierra Space is proposing ascending trajectories.

The distance between the ground track of the orbiting vehicle and the landing site, when perpendicular to the landing site, is referred to as cross range. Dream Chaser has a greater than 700 nautical mile cross range capability, meaning the vehicle does not have to be perfectly aligned to cross over the landing site to successfully perform a reentry and landing. This results in an increased number of reentry opportunities on a given mission.

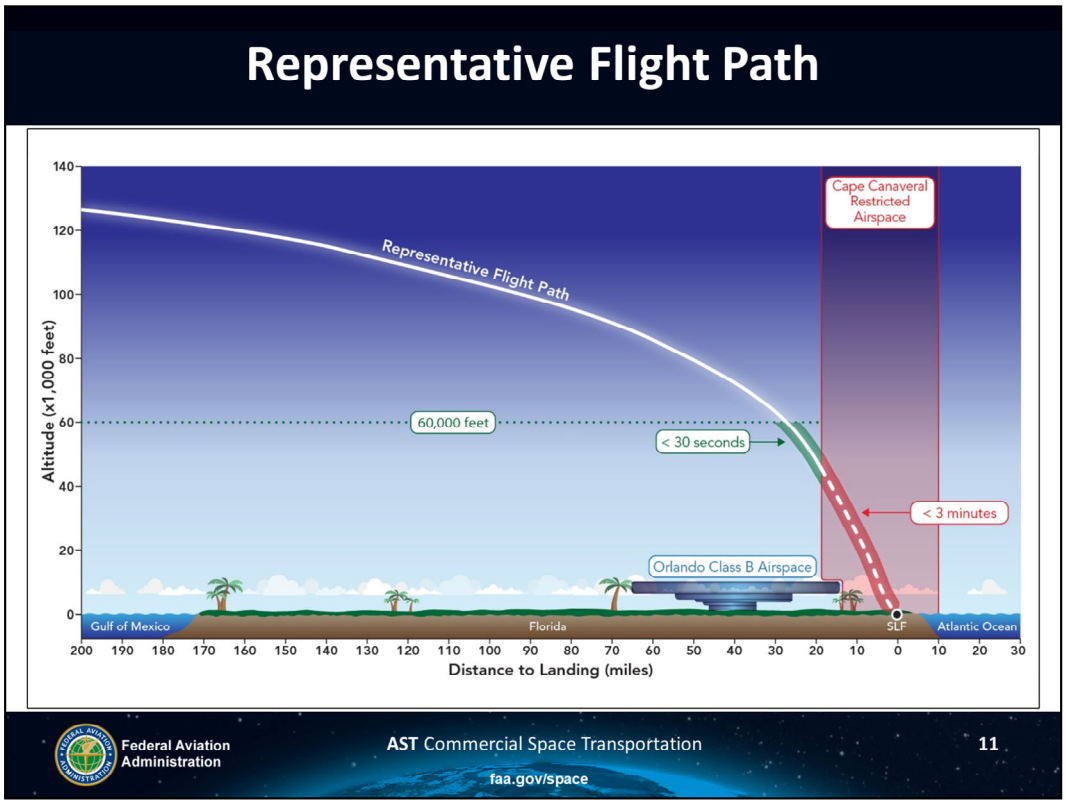
The Dream Chaser vehicle's reentry trajectories from orbit would be dependent on the specific mission being flown and would be defined prior

to reentry. During the reentry sequence, Dream Chaser would have set reentry windows, or timeframes, to begin descent into the Earth's atmosphere to meet the designated reentry trajectory. The Dream Chaser vehicle would remain in orbit until the specific reentry trajectory could be achieved or an alternate trajectory is called upon.



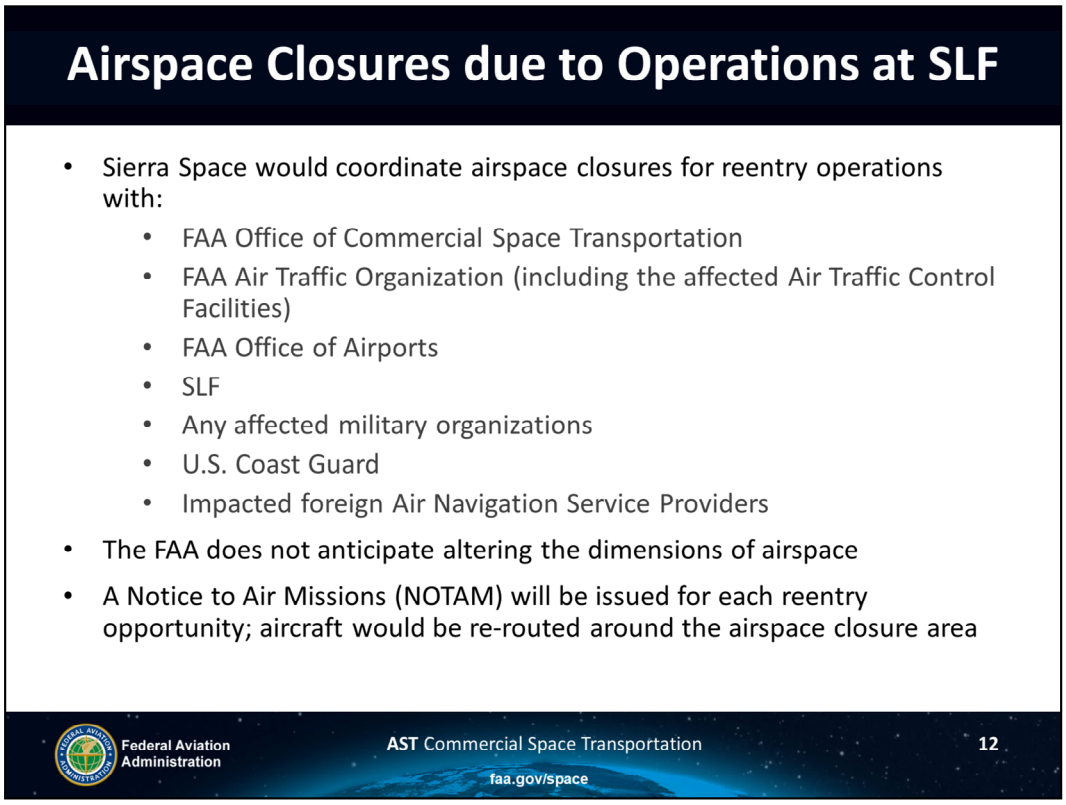

Dream Chaser would reenter from west/southwest on an ascending reentry trajectory before landing at the SLF. Ascending reentry trajectories would include high atmospheric overflight of Central American countries as well as overflight of the southern half of Florida, south of the 29° North latitude.

The image shows the range of potential reentry flight paths over Florida and includes the location of Cape Canaveral Restricted Airspace and Orlando Class B Airspace.




The reentry vehicle would descend below 60,000 feet altitude above mean sea level approximately 30-40 miles from the SLF prior to landing and would be operating below 60,000 mean sea level for less than 30 seconds before entering Cape Canaveral restricted airspace. The reentry vehicle would remain in the Cape Canaveral restricted airspace for the remainder of its reentry and landing at the SLF (for approximately 2.5 – 3 minutes before landing).

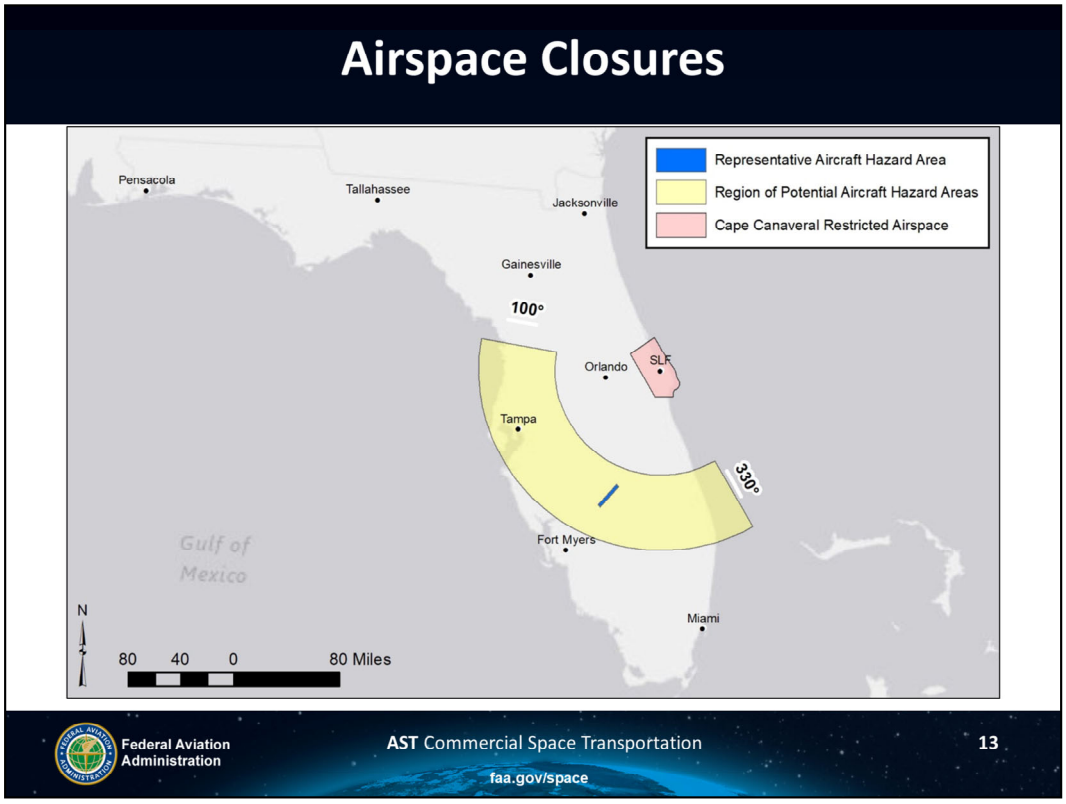
The reentry vehicle would not enter Orlando Class B Airspace.



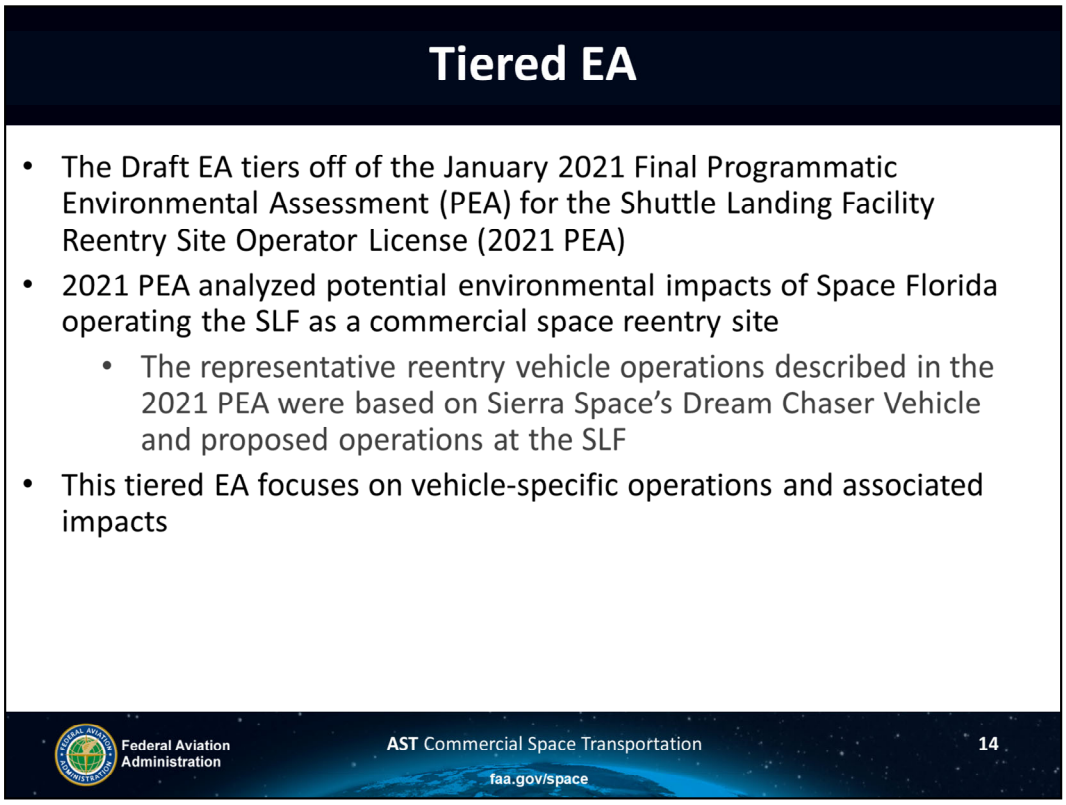

Sierra Space would coordinate airspace closures for each reentry operation with the FAA Air Traffic Organization, FAA Office of Airports, the SLF, any affected military organizations, including U.S. Coast Guard, and impacted foreign Air Navigation Service Providers. All notification and coordination procedures would be outlined in Letters Of Agreement. Operation activities coordination by the same parties would occur on a weekly and daily basis closer to the reentry and landing at the SLF.

The FAA does not anticipate altering the dimensions (shape and altitude) of the airspace. The FAA would issue Temporary Flight Restrictions via a Notice to Air Missions (NOTAM) for the reentry vehicle's operation in the controlled airspace or an Altitude Reservation from the Central Altitude Reservation Function as described in Sierra Space's LOA with FAA Air Traffic Organization. Airspace jurisdiction of the proposed Dream Chaser flight path is controlled primarily by the Miami Air Route Traffic Control Center. The extent of the airspace needed for each reentry would depend on the trajectory and associated aircraft hazard area, which would be determined in the flight safety analysis.

A nominal reentry to SLF is anticipated to require a NOTAM lasting 1 hour. Aircraft would be re-routed around the NOTAMed airspace closure. Aircraft traveling on existing routes and flight paths that are used daily are often routinely re-routed to account for weather and other temporary restrictions. Also, not all proposed reentry operations would affect the same aircraft routes or the same airports, and re-routing associated with the proposed reentry-related closures represents an extremely small fraction of the total amount of re-routing that occurs from all other reasons in a given year.

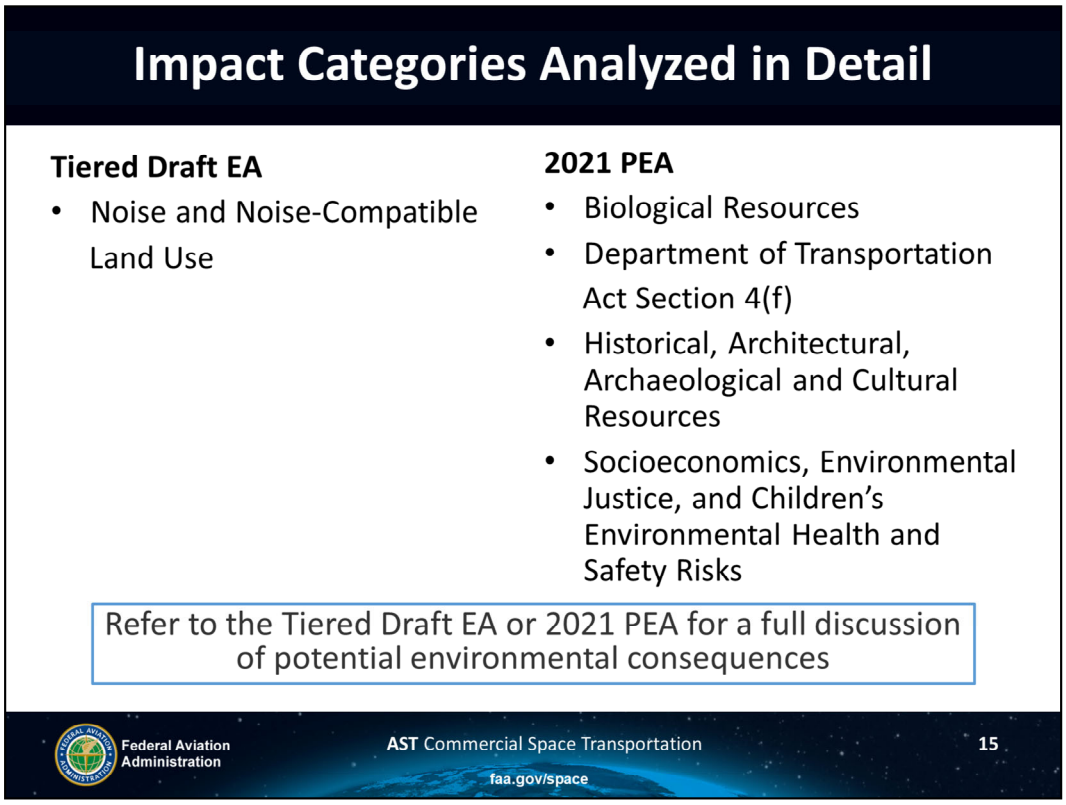



This image shows the representative Aircraft Hazard Areas generated for the ±700 nautical mile cross range aircraft hazard area and a potential NOTAM. Seasonal considerations (e.g., wind), or operational changes (e.g., changes in the payloads being carried back from orbit), could further result in slight alterations of the nominal deorbit opportunity trajectory to the SLF.



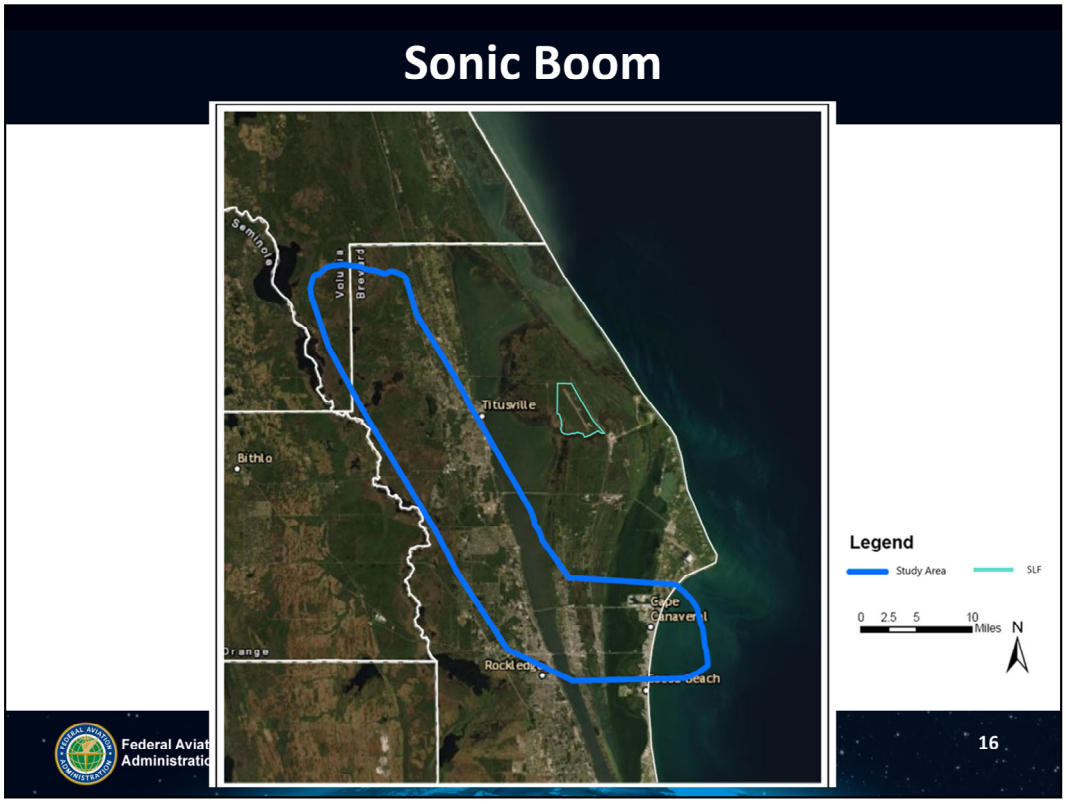

The FAA previously analyzed the potential environmental impacts of issuing a reentry site operator license to Space Florida for the operation of a commercial space reentry site at the SLF in a Programmatic EA (referred to as the 2021 PEA). The 2021 PEA evaluated the potential environmental impacts of operation of a commercial space reentry site at the SLF. The FAA determined that issuing a reentry site operator license would not significantly affect the quality of the human environment and issued a Finding of No Significant Impact (FONSI) for the 2021 PEA in January 2021. For the purposes of the reentry site operator license application and 2021 PEA, the Dream Chaser was used as a representative reentry vehicle for analyses.

Sierra Space's Vehicle Operator License was not analyzed in the 2021 PEA. To focus this Tiered EA on impacts specific to FAA's Proposed Action, valid and current information and analysis from the 2021 PEA is summarized and incorporated by reference for relevant portions of the affected environment section. This Tiered EA expands on the analysis provided in the 2021 PEA to include an analysis of the potential environmental impacts of the operational activities associated with licensing the Dream Chaser for reentry operations.



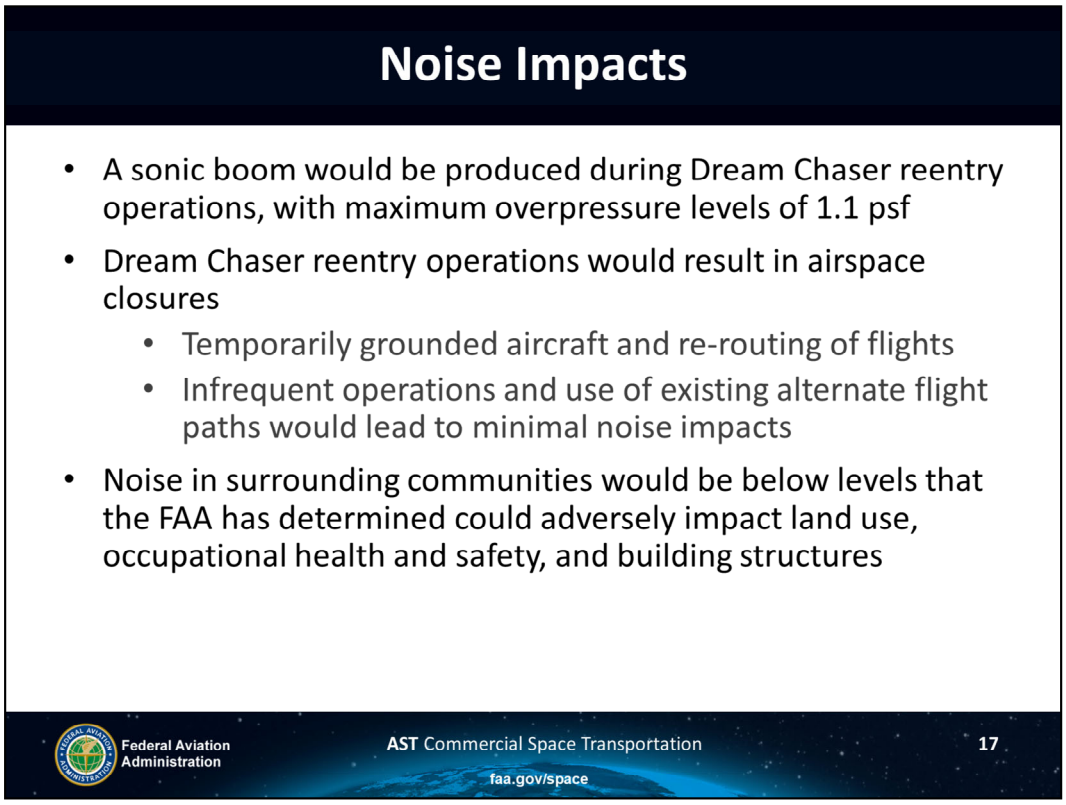

This Tiered Draft EA analyzed one impact category in detail, noise and noise-compatible land use.

All other environmental impact analyses are incorporated by reference from the 2021 PEA. The 2021 PEA can be downloaded from the FAA's website at: https://www.faa.gov/space/environmental/nepa_docs/slf_ea/media/SLF_Final_PEA_and_FONSI_508.pdf.




A sonic boom would be produced by the Dream Chaser upon reentry. This image shows the compiled footprint of the Dream Chaser's 1.0 pounds per square foot (psf) sonic boom overpressure for all potential reentry trajectories in the dark blue line. This sonic boom area covers portions of Brevard and Volusia counties. The maximum sonic boom overpressure that would be produced by reentry operations would be 1.1 psf. Sonic boom overpressure levels around 1 psf are similar in magnitude to a clap of thunder, which are commonly experienced by residents of the area. According to the National Weather Service, residents of Brevard County experience, on average, about 22,000 thunder events annually caused by lightning.

The environmental impacts of the sonic boom were analyzed in the 2021 PEA. Those impacts have been incorporated by reference into the Tiered Draft EA assessing Dream Chaser's specific reentry operations.




The 2021 PEA analyzed the impacts of the Dream Chaser sonic boom on noise and noise-compatible land use and found that there would be no significant impacts. The 2021 PEA analyzed the impacts of up to up to two nighttime reentries per year, but the Tiered EA considers up to four reentries per year that could occur during daytime or nighttime. However, the increased noise levels from up to two additional nighttime reentries per year was minor and did not exceed FAA significance thresholds.

As described earlier in the presentation, Dream Chaser reentry operations would result in airspace closures, which could temporarily ground aircraft or re-route flights on establish alternate flight paths. If aircraft were grounded, noise levels at the airport could temporarily increase as the planes sit idle. Also, depending on the altitude at which aircraft approach an airport, there could be temporary increases in noise levels in communities around the airports. However, aircraft would travel on existing en-routes and flight paths that are used on a daily basis to account for weather and other temporary restrictions. In addition, not all reentry missions would affect the same aircraft routes or the same airports, and re-routing associated with reentry-related closures would represent a small fraction of the total amount of re-routing that occurs from all other reasons in any given year. Any incremental increases in

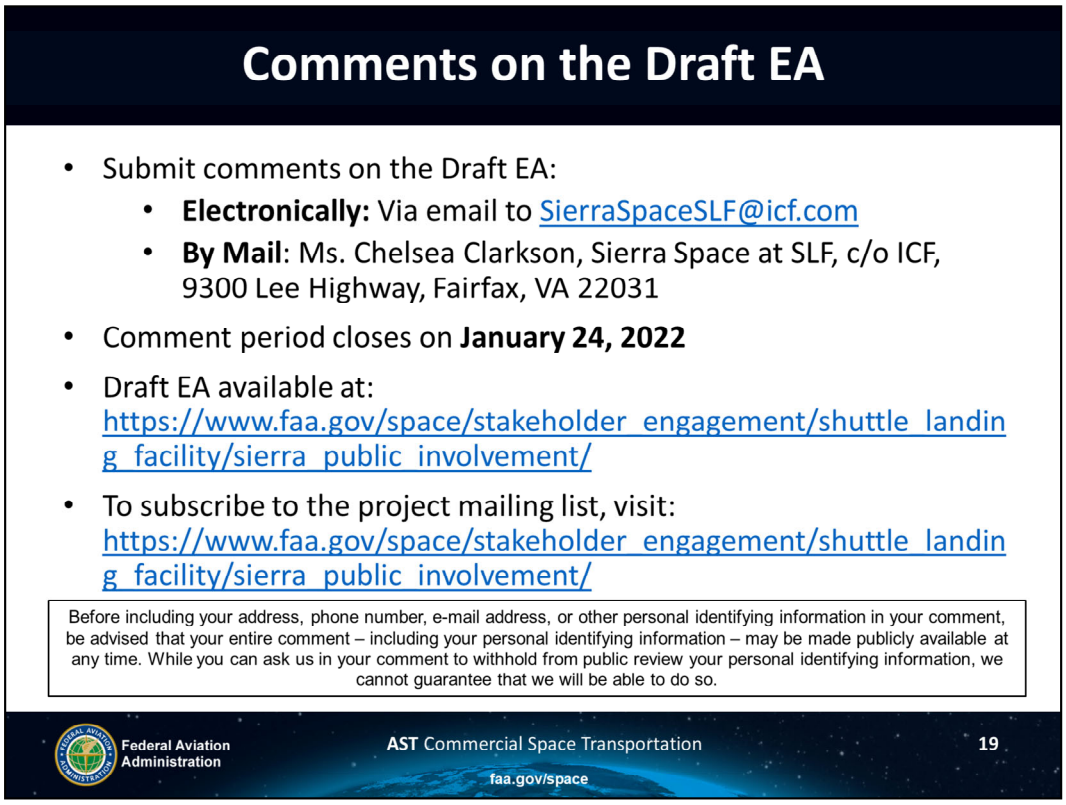
noise levels at individual airports would only last the duration of the airspace closure on a periodic basis and are not expected to meaningfully change existing day-night average sound levels at the affected airports and surrounding areas. Therefore, airspace closures due to reentry operations of the Dream Chaser at the SLF are not expected to result in significant noise impacts.

As a result, the FAA has determined that proposed Dream Chaser reentry operations would not significantly impact noise and noise-compatible land use.


The FAA carried out coordination with state and federal agencies throughout preparation of the Draft EA. The FAA has also initiated agency consultation with Federal and State resource agencies, such as the U.S. Fish and Wildlife Service and Florida Division of Historical Resources and Government-to-Government consultation with Native American Tribes.

We are currently in Step 4 of the EA schedule. The Draft EA was published on December 21, 2021. The public comment period closes on January 24, 2022.

The next step is for the FAA to publish the Final EA, which will incorporate public comments received on the Draft EA and will announce a finding on the proposed action—either a Finding of No Significant Impact, Mitigated Finding of No Significant Impact, or a Notice of Intent to prepare an Environmental Impact Statement because one or more impacts are significant and cannot be mitigated to levels below significance.




Comments on the Draft EA can be submitted either by email or mail to the addresses on the slide. We request that comments be submitted by Monday, January 24, 2022, to ensure that they are considered in the development of the Final EA. The FAA cannot guarantee that comments received after January 24, 2022, will be considered in the development of the Final EA.

Before including personal identifying information in your comment, be advised that your entire comment may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

The Draft EA is available on the FAA's website at the link provided on the slide. The FAA's website also includes a place to sign up for the project mailing list. Members of the mailing list will receive project updates, including notification of the FAA publishing the Final EA and the FAA's finding.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