

**Tiered Environmental Assessment for
SpaceX Starship/Super Heavy
Vehicle Increased Cadence**

AT THE BOCA CHICA LAUNCH SITE IN CAMERON COUNTY, TEXAS



Welcome to the Public Meeting

Tiered Environmental Assessment for SpaceX Starship/Super Heavy Vehicle Increased Cadence

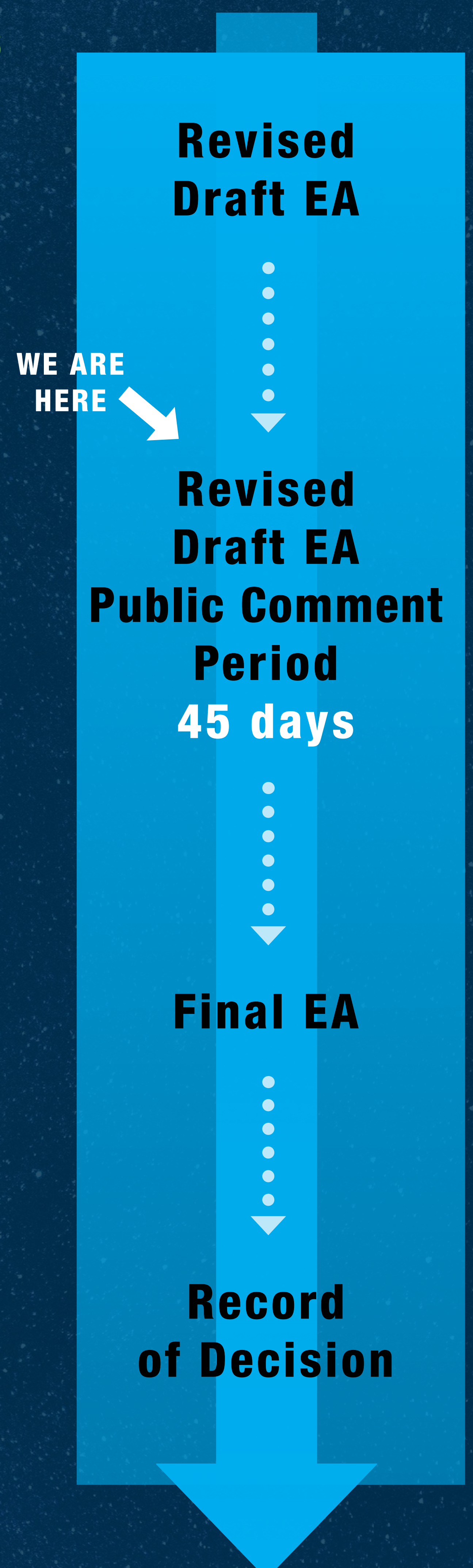
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What is the National Environmental Policy Act?

- **The National Environmental Policy Act (NEPA)** is a procedural statute that requires Federal agencies to consider the potential environmental impacts of proposed actions subject to Federal control or responsibility before a decision is made.
- **The Federal Aviation Administration (FAA)** considers the issuance or modification of a license to be a major federal action under NEPA.
- **FAA decisions to license commercial space operations and to close airspace** are proposed actions subject to NEPA.
- **Before making a decision regarding a license, the FAA must consider:**
 - A range of reasonable alternatives
 - Potential environmental or health consequences
 - Tribal, government agency, and public input
- **What is the role of the FAA and other agencies in this Revised Draft Environmental Assessment (EA) ?**
 - The FAA is the lead agency overseeing the development of the Revised Draft EA
 - **Cooperating Agencies include:**
 - National Park Service
 - U.S. Fish and Wildlife Service
 - U.S. Coast Guard
 - National Aeronautics and Space Administration

EA MILESTONES



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What is the Proposed Action?

The FAA is evaluating SpaceX's proposal to increase the number of launches and landings per year (cadence) of the Starship/Super Heavy launch vehicle at its Boca Chica Launch Site in Cameron County, Texas. The Revised Draft EA analyzes:

- **Up to 25 annual Starship/Super Heavy orbital launches, including:**

- Up to 25 annual landings of Starship (Second stage)
- Up to 25 annual landings of Super Heavy (First stage)

The Revised Draft EA also analyzes vehicle upgrades.

- **All launches considered in this Revised Draft EA would:**

- Originate from the Boca Chica Launch Site in Texas. Landings could occur at this site, on a floating platform or expended in the Gulf of Mexico, in the Pacific Ocean (near Hawaii) or in the southeast Pacific, or in the Indian Ocean.
- Super Heavy landings could occur at the Boca Chica Launch Site, on a floating platform or disposed in the Gulf of Mexico.
- Starship landings could occur at the Boca Chica Launch Site, or in the Indian Ocean, the Pacific Ocean (near Hawaii), in the northeast Pacific Ocean, or in the Southeast Pacific Ocean.

What is the No Action Alternative?

Under the No Action Alternative, the FAA would not modify SpaceX's license to allow for an increased launch and landing cadence.

- **Under the No Action Alternative, as supported by their current license, VOL 23-129 Rev.4, SpaceX could:**

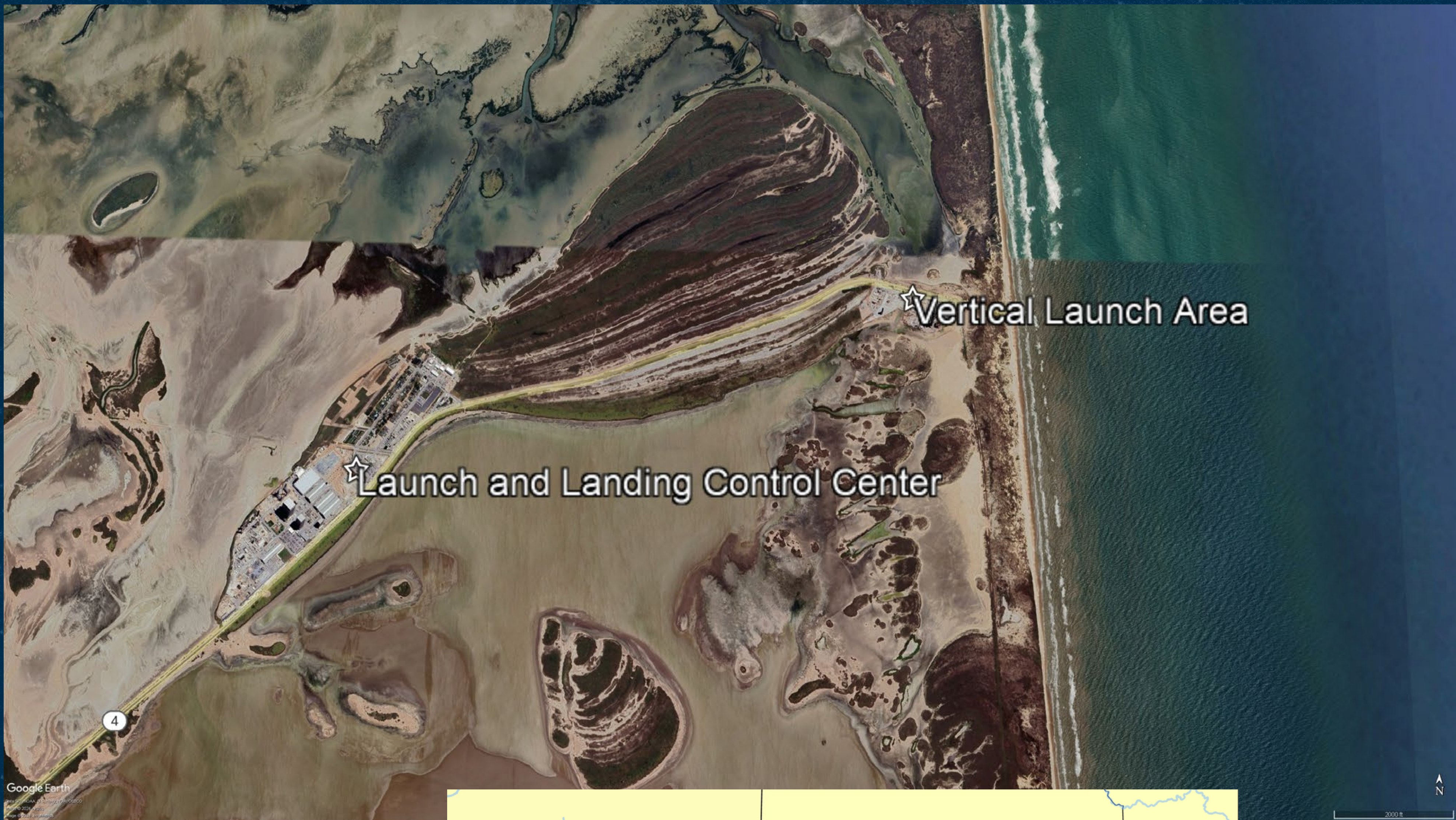
- Conduct up to 5 annual Starship launches
- Conduct up to 5 annual Super Heavy launches (with Starship attached as the second stage vehicle)
- Conduct up to 5 annual Starship landings
- Conduct up to 10 total Starship landings in the Indian Ocean
- Conduct up to 5 annual Super Heavy landings

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Where is the Project Location?



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What is the Project History and Background?

This Revised Draft EA is tiered from the 2022 Final PEA.

Documents related to this Revised Draft EA include:

- **May 2014 Environmental Impact Statement (EIS)**
 - Analyzed the launch of Falcon 9, Falcon Heavy, and other reusable suborbital launch vehicles from Boca Chica.
- **June 2022 PEA, Mitigated Finding of No Significant Impact (FONSI), and Record of Decision (ROD)**
 - Analyzed the construction of launch-related infrastructure and operations including up to 5 annual Starship launches, up to 5 annual Super Heavy launches, up to 10 annual Starship landings, and up to 5 annual Super Heavy landings.
- **April 2023 Written Re-Evaluation**
 - Evaluated additional information concerning ocean landings and launch pad detonation suppression systems.
- **November 2023 Written Re-Evaluation**
 - Evaluated additional information concerning the operation of the deluge system,¹ the addition of a forward heat shield on the Super Heavy booster, and the expansion of the area of potential effects for cultural resources.
- **March 2024 EA and FONSI/ROD**
 - Evaluated the potential environmental impacts of proposed Starship landings in the Indian Ocean.
- **October 2024 Written Re-Evaluation**
 - Analyzed proposed updates to the forward heat shield interstage, sonic boom coverage, use of the deluge system during return to launch site landings, and use of U.S. Coast Guard safety zones.

¹A deluge system is a system spraying large quantities of water on the launch pad for fire suppression purposes.

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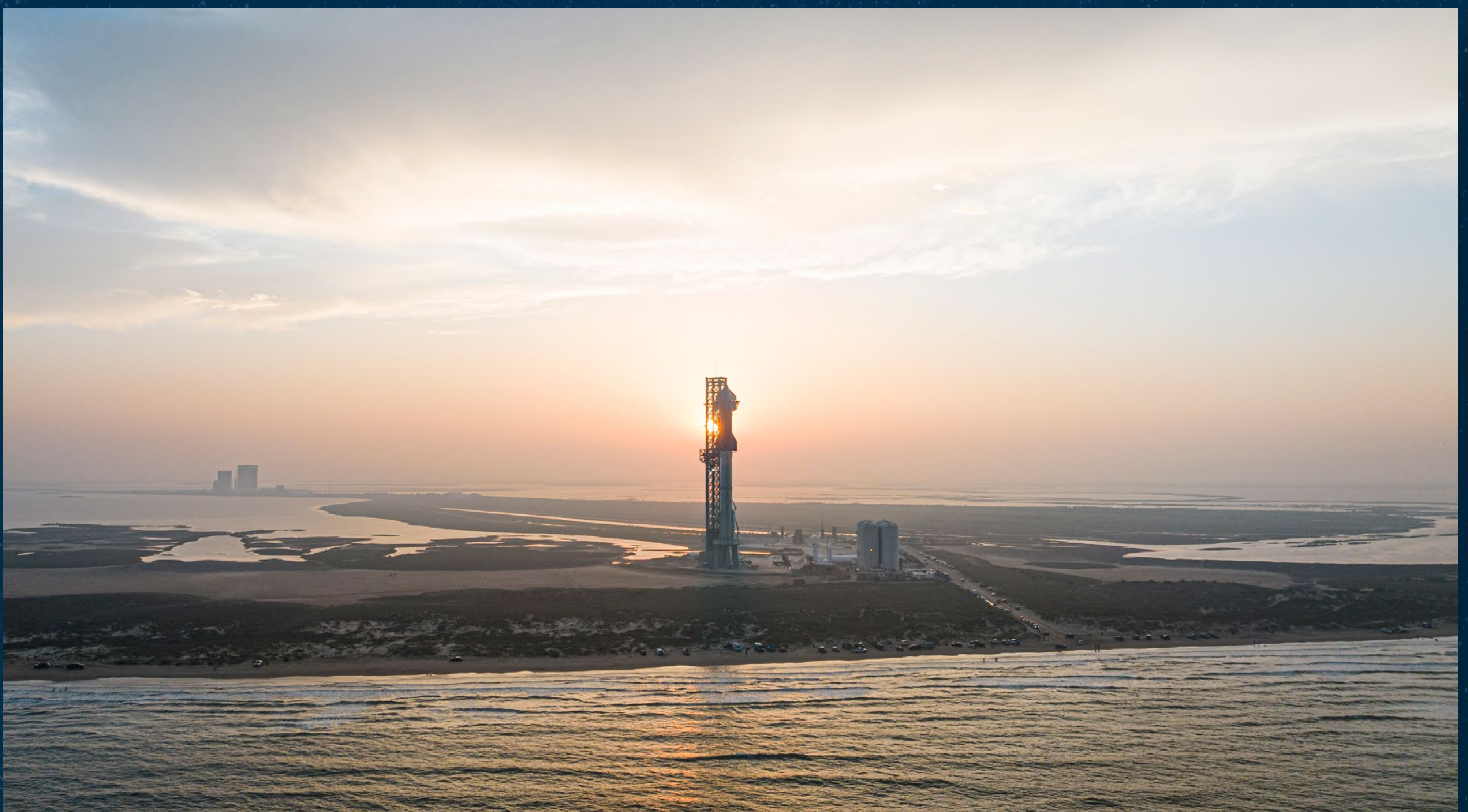


What is the New Information in the Revised Draft EA?

- **The day-night launch cadence was revised in order to reduce noise impacts of Super Heavy landings at the launch site.**

A March 13, 2024 Administrative Order (AO) issued by the U.S. Environmental Protection Agency (EPA) and an August 2, 2024 investigation report by the Texas Commission on Environmental Quality (TCEQ), found that prior deluge water discharges were not appropriately permitted and thus violated the Clean Water Act. These reports prompted the cancellation of the August public meetings.

SpaceX submitted an individual Texas Pollutant Discharge Elimination System (TPDES) permit application on July 1, 2024, and entered into agreements with TCEQ and EPA to resolve the alleged violations.



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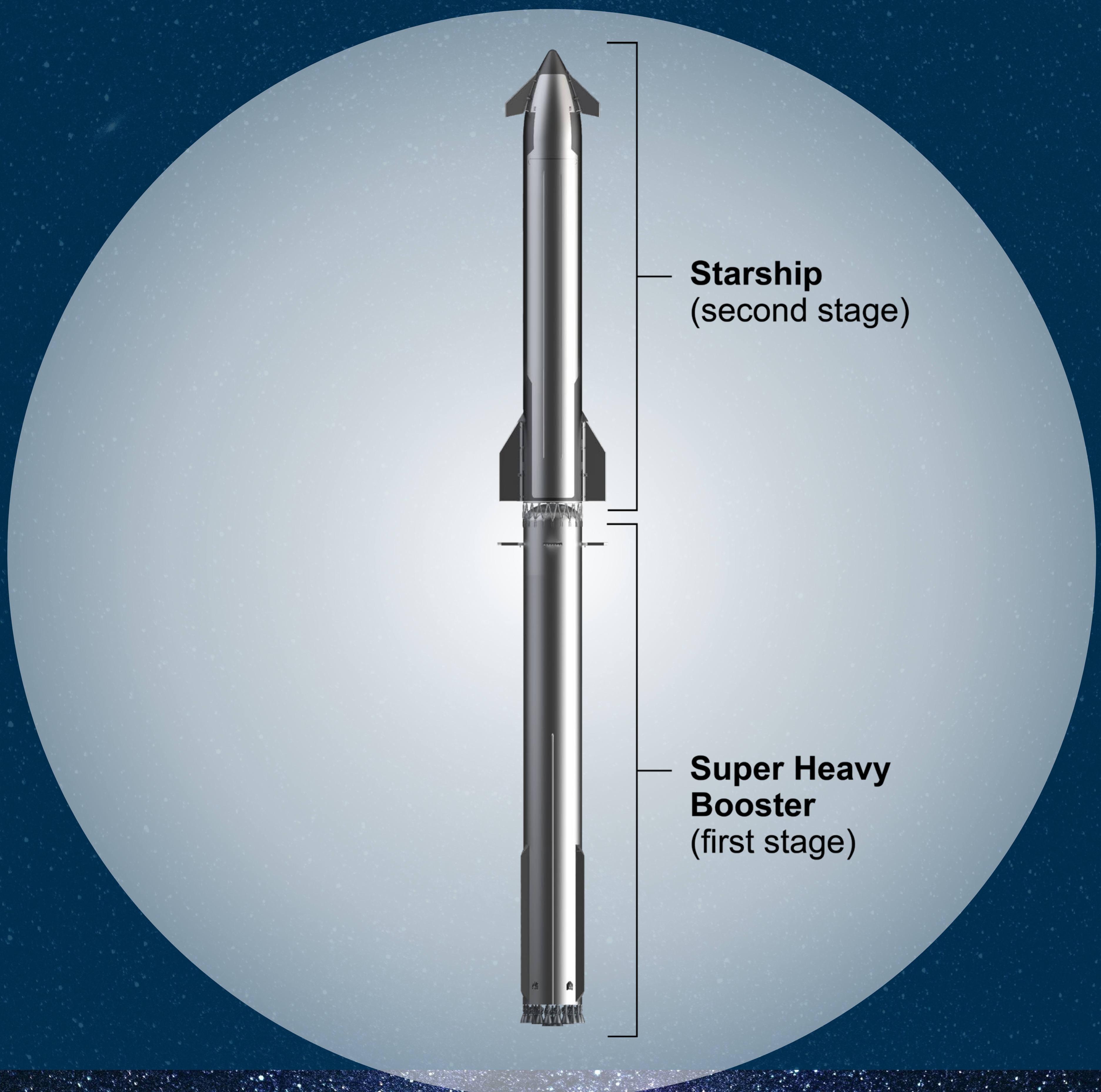
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What are the Major Components of the Starship/Super Heavy Launch Vehicle?

The Starship/Super Heavy Launch Vehicle has the following components:

- **Starship: 9 Raptor engines**
- **Super Heavy: 35 Raptor engines**
- **Powered by liquid oxygen (LOX) and liquid methane**
- **Intended to be fully reusable for multi missions**



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What is the FAA Licensing Process?

The action includes the following roles:

■ FAA’s Involvement

- The FAA is the lead agency on the Revised Draft EA
- The FAA is the licensing authority

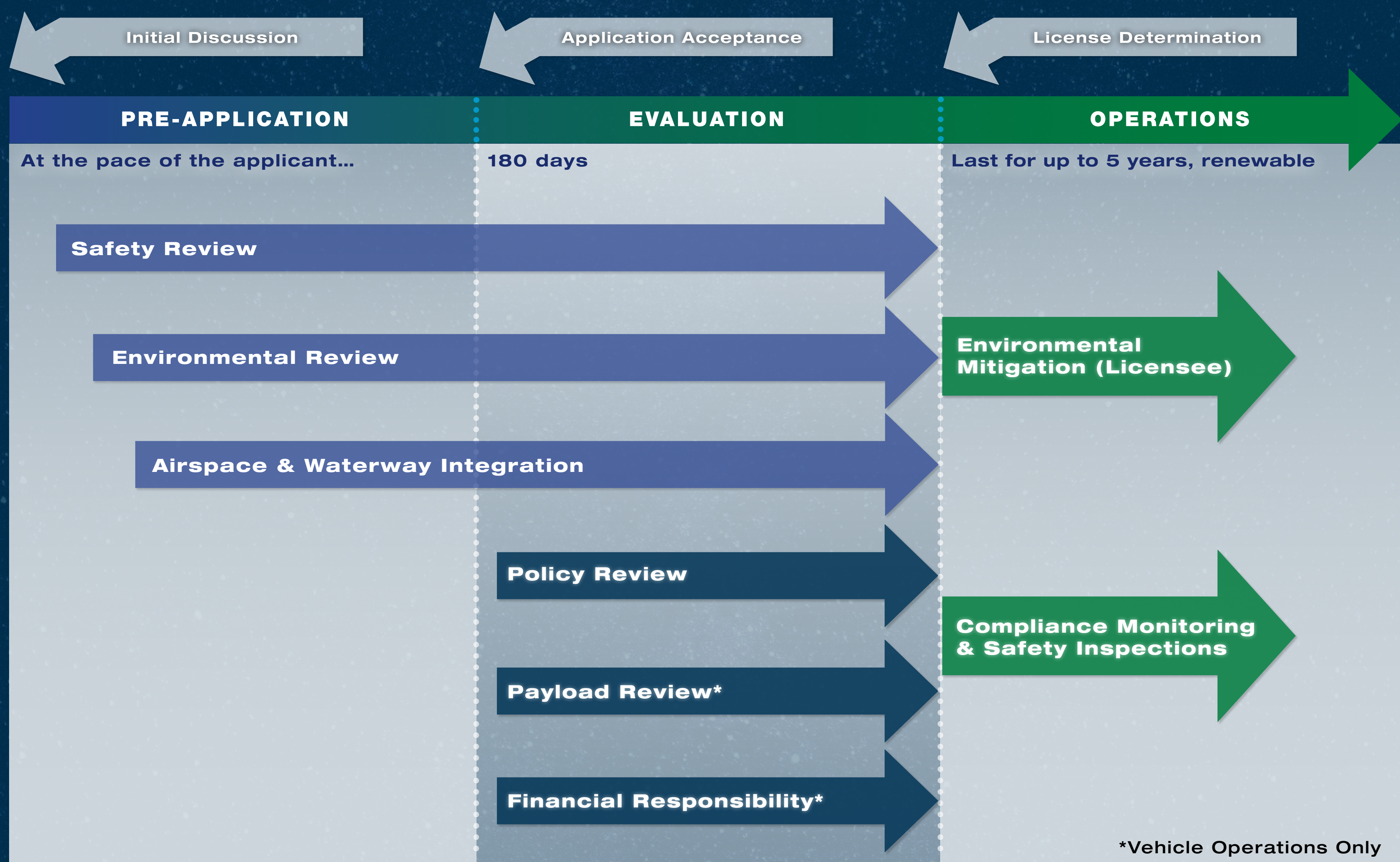
■ FAA’s Federal Action

- Issue a license modification to SpaceX for Starship/Super Heavy operations at the Boca Chica Launch Site
- Approve airspace closures

■ License Determination

- The FAA conducts policy, location, safety, and environmental reviews
- The Revised Draft EA fulfills the environmental review portion of the license evaluation and determination
- The environmental review must be complete before the FAA makes a decision on the license
- Any environmental mitigation requirement will become a term and condition of the license
- Successful completion of the environmental review does not guarantee the FAA will issue a license
- The FAA will perform safety inspections during the licensed operations

FAA LICENSING PROCESS



Note: Figure illustrates general, not exact, timing of reviews.

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What are the Environmental Impacts?

The FAA analyzed the potential impacts to 14 categories¹ of environmental resources during the NEPA process. The FAA concluded that the proposal would not have significant impacts on the following resources. Mitigation and monitoring efforts as described in the 2022 PEA continue to be implemented.

■ Air Quality

- The Proposed Action would not result in significant increase in emissions from increased launch cadence.
- Emissions would not cause criteria pollutants to exceed Ambient Air Quality standards.

■ Climate

- The Proposed Action would account for less than 0.0003% of worldwide greenhouse gas (GHG) emissions and approximately 0.012% of Texas GHG emissions, on an annual basis.
- No significant impacts to climate change.

■ Coastal Resources

- The Proposed Action would not result in coastal construction or seafloor disturbance.
- No vehicle landings or recovery operations in intertidal areas, sea marshes, estuaries, or coral reefs.

■ Cultural Resources

- SpaceX will continue to implement mitigation commitments established in 2022 PEA and Programmatic Agreement.

■ Hazardous Materials

- The Proposed Action would not result in significant hazardous materials, solid waste, and pollution prevention impacts.

¹Farmland was initially considered but dismissed from detailed analysis as it would not be affected by the Proposed Action.

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What are the Environmental Impacts? (cont.)

■ **Land Use**

- The Proposed Action would not change compatibility with zoning ordinances or land use plans.
- The Proposed Action would not change licensed access restrictions.

■ **Natural Resources and Energy Supply**

- The Proposed Action would not result in significant impacts on natural resources or energy supply.

■ **Socioeconomics, Environmental Justice, and Children's Health**

- Communities with environmental justice concerns would not experience disproportionate adverse effects from any components of the Proposed Action.

■ **Visual**

- The Proposed Action would result in 2 additional nighttime launches compared to the 2022 PEA.
- SpaceX has decreased the amount of lighting on a per launch basis.

■ **Water (Wetlands, Floodplains, Surface Waters, Groundwater, Ocean Waters)**

- Under the Proposed Action, SpaceX would continue to adhere to mitigation measures to reduce the potential for adverse impacts to water resources.

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What are the Environmental Impacts? (cont.)

■ Biological Resources

- The FAA has determined that the Proposed Action would not result in significant terrestrial habitat and wildlife or marine resource impacts as SpaceX would continue to implement mitigation measures.
- The FAA is conducting formal consultation with U.S. Fish and Wildlife Service to determine whether the Proposed Action may affect and is likely to adversely affect Endangered Species Act (ESA)-listed species and critical habitat, as well as with National Marine Fisheries Service to determine whether the Proposed Action would not adversely affect ESA-listed marine species or designated critical habitat.

■ Department of Transportation Section 4(f) Resources

- Protected Section 4(f) resources include public parks, recreation areas, wildlife or waterfowl refuges of national, state or local significance, and land of a historic site of national, state, or local significance.
- The FAA is evaluating the Proposed Action for potential significant impacts to 4(f) resources, including constructive use¹ caused by sonic booms from Super Heavy landings at the site.
- Noise from launches assessed in the 2022 PEA would expand by approximately 2 miles under the Proposed Action but would continue to create only short-term and intermittent effects.
- The duration and location of access restrictions would not change beyond those described in the 2022 PEA.

¹Constructive use occurs when the impacts of a project on a Section 4(f) property are so severe that the activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired.

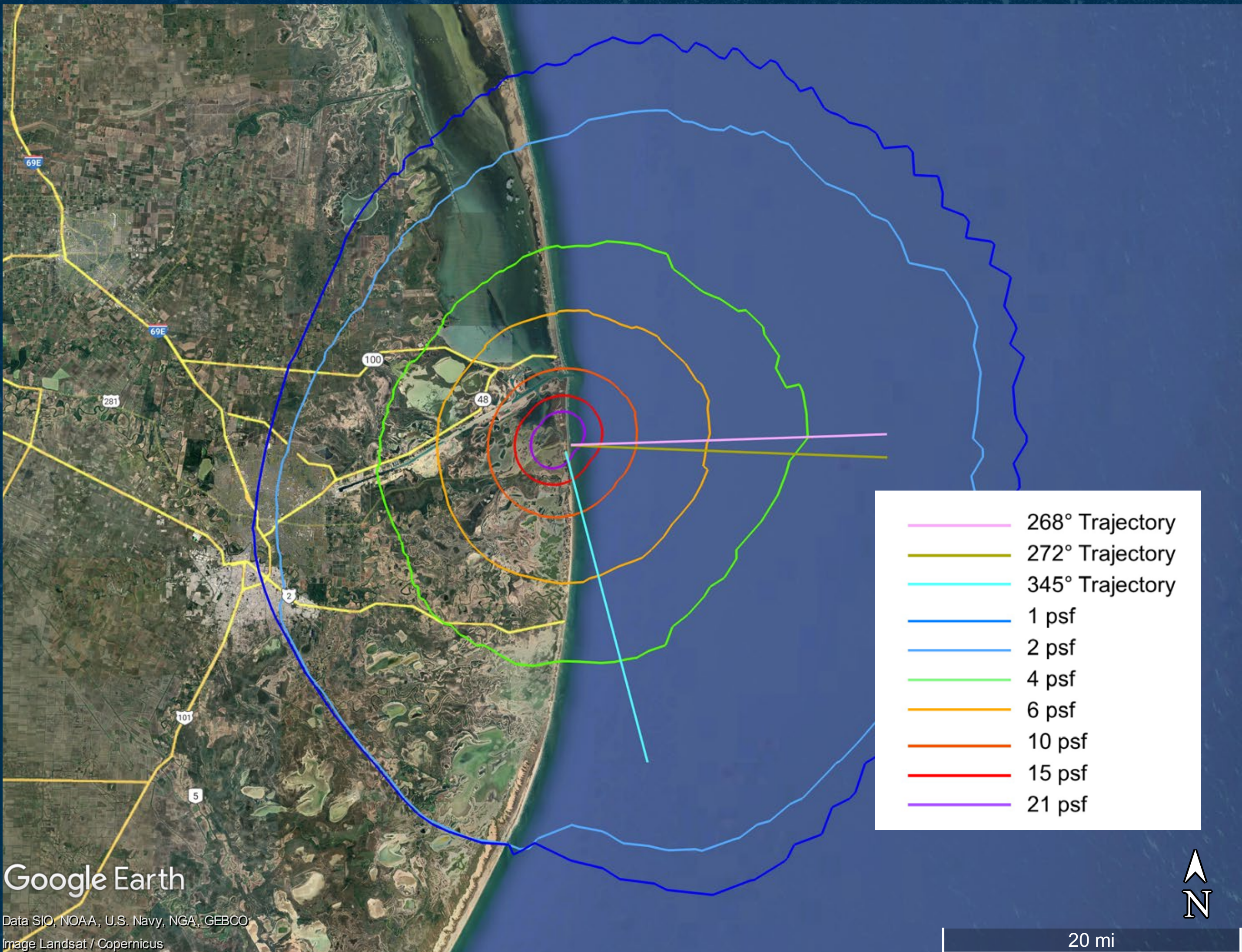
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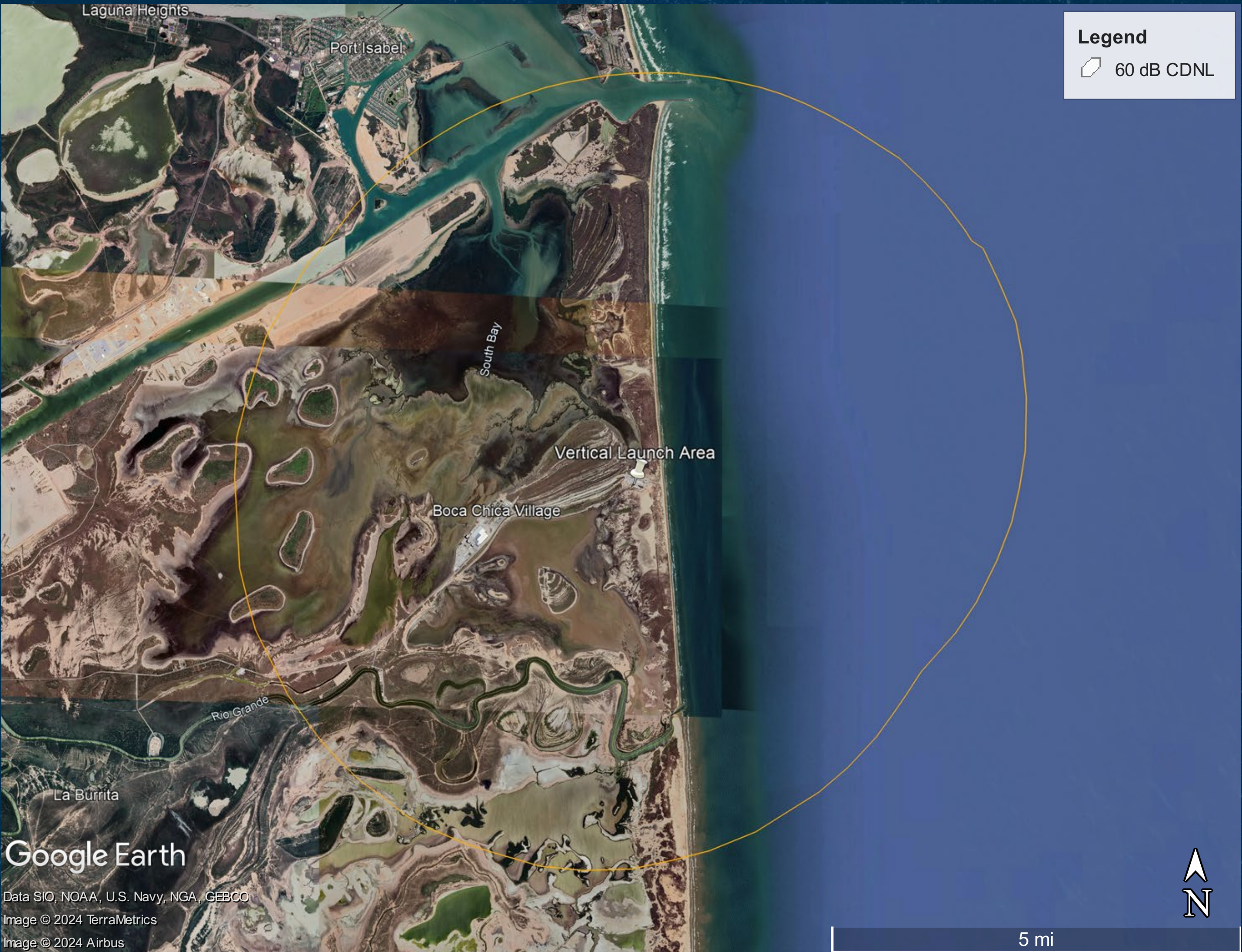
What are the Environmental Impacts? (cont.)

What are the Noise and Noise-Compatible Land Use Effects?



SUPER HEAVY SONIC BOOM LEVELS FOR REENTRY/LANDING AT BOCA CHICA, TEXAS

The maximum overpressure for sonic boom events is reported in psf (pound per square foot).



CUMULATIVE DAY-NIGHT AVERAGE SOUND LEVELS FOR THE PROPOSED ACTION AT BOCA CHICA, TEXAS

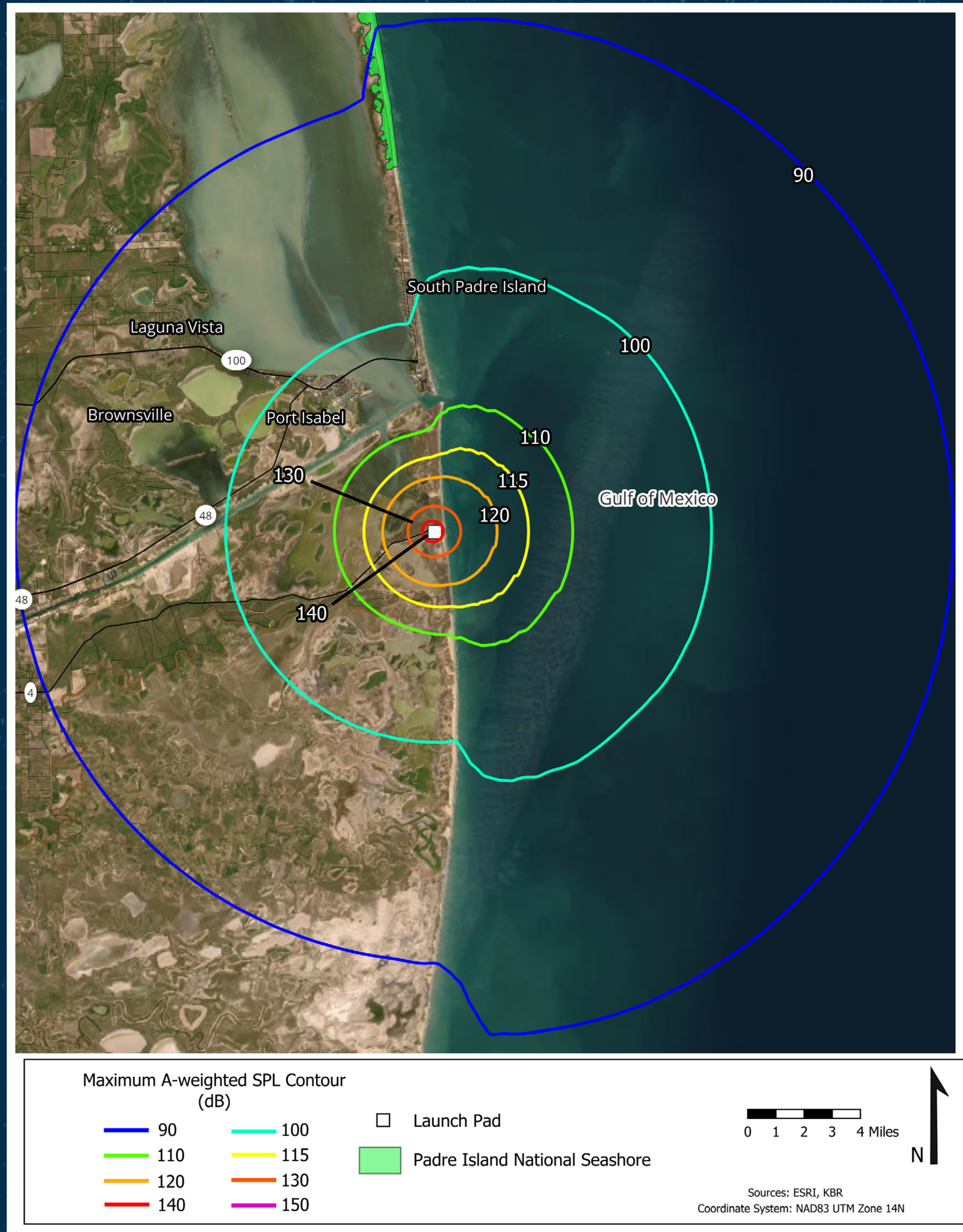
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What are the Environmental Impacts? (cont.)

What are the Noise and Noise-Compatible Land Use Effects?



L_{Amax} represents the highest A-weighted decibel measure of the sound level at any given time during the event. A-weighting approximates the natural range and sensitivity of human hearing.

**STARSHIP ORBITAL
LAUNCH FROM STARBASE:
MAXIMUM A-WEIGHTED
SOUND LEVELS**