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November 1, 2021

Ms. Stacey Zee
SpaceX PEA
c/o ICF
9300 Lee Highway
Fairfax, VA 22031

RE: Review Draft Programmatic Environmental Assessment for SpaceX Starship/Super Heavy Launch Vehicle at the SpaceX Boca Chica Launch Site, Cameron County, Texas

Dear Ms. Zee:

This letter is in response to the September 17, 2021 Notice of Availability and Request for Comment on the Draft Programmatic Environmental Assessment (PEA) for the SpaceX Starship/Super Heavy Launch Vehicle at the SpaceX Boca Chica Launch Site in Cameron County, Texas.

The Federal Aviation Administration (FAA) Office of Commercial Space Transportation has prepared a Draft PEA to evaluate the potential environmental impacts of activities associated with issuing an experimental permit and/or a vehicle operator license to SpaceX for Starship/Super Heavy launch operations at the Boca Chica Launch Site.

The proposed action that the FAA would license will require expanding the physical footprint of the Boca Chica Launch Site facilities for testing larger vehicles at a greater frequency than originally proposed for the site. The Texas Parks and Wildlife Department (TPWD) appreciates that the Draft PEA has incorporated many of the comments and revisions TPWD recommended during the review of the Administrative Draft PEA. In addition, it is important to note that TPWD and SpaceX entered into a Memorandum of Agreement in September 2021 to more collaboratively address impacts to State Park lands resulting from anomalies and other activities. Among other things, this agreement is helping to guide strategies for attenuating impacts to sensitive algal flats and loma habitats during retrieval activities, as well as trying to restore those habitats when impacts do occur.

Upon review of the Draft PEA, TPWD has concerns that the document's analysis is insufficient in certain areas in describing and evaluating all the potential impacts associated with the proposed action. As presented, the Draft PEA: continues to contain some information gaps including uncertainty in the scope, scale, and location of anticipated project components; lacks detailed analysis of impacts; and

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provides conclusions for which data from investigations, research projects, or best available science supporting those conclusions are not provided. Additionally, the Draft PEA states that the FAA has determined that the project may affect, and is likely to adversely affect, 10 federally listed species. In response to these concerns, TPWD provides and offers specific comments and recommendations on the attached TPWD comment and recommendation matrix.

TPWD appreciates the opportunity to provide input on the Draft PEA for the proposed action. If you have any questions regarding TPWD's review of the Draft PEA, please contact Wildlife Habitat Assessment Program Biologist Mr. Russell Hooten by email at russell.hooten@tpwd.texas.gov or by phone at (361) 825-3240. Thank you.

Sincerely,

Clayton Wolf
Chief Operating Officer

CW:RH:bdk

Attachment

cc: Mr. Carter Smith
Mr. John Silovsky
Mr. Robin Riechers
Mr. Rodney Franklin
Ms. Colette Barron Bradsby
Ms. Laura Zebehazy
Mr. Russell Hooten

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1	9	2.1, Table 2-1	Previously, Texas Parks and Wildlife Department (TPWD) provided comments regarding statements in the Administrative Draft Programmatic Environmental Assessment (PEA) which indicated that the additional 300 anomaly-response hours would be used at the discretion of TPWD, the U.S. Fish and Wildlife Service (USFWS), and Cameron County. TPWD commented that it had not agreed to be responsible for restricting access to the Boca Chica area to address issues caused by SpaceX. The text in the Draft PEA has been revised to clarify the role of TPWD in anomaly response closures; however, the text from the earlier Administrative Draft EA has been retained in Table 2-1 (i.e., stating that TPWD would be one of the entities determining when these hours would be used). TPWD recommends Table 2-1 be revised to be consistent with the text of the Draft PEA, clarifying TPWD's role in anomaly response closures.
2	14	2.1.3, Table 2-2	Please clarify why the number of Starship Suborbital Land Landings exceeds the number Starship Suborbital Launches described in Table 2-2.
3	14	2.1.3, Table 2-2	As stated in previous TPWD comments, Table 2-2, Proposed Annual Operations, continues to be unclear. For example, how many minutes, hours or days would the area be closed for 150 seconds of engine testing? TPWD recommends the table be simplified or removed.
4	14	2.1.3	The second paragraph on page 14 states that prior to a nighttime launch activity, bright spotlighting would be required for a "short duration (days)." TPWD recommends that the draft PEA more clearly define the timeframe, or number of days, associated with "short duration."
5	14	2.1.3	The draft PEA indicates that a Sound Detection and Ranging (SODAR) device sending out short sonic pulses would be located within SpaceX property, at least 500 feet from any SpaceX property line. With the property information that TPWD currently has, preliminary measurements indicate that there is no location within SpaceX property that is 500 feet away from all SpaceX boundaries. The proposed location should be shown on a map and the estimated decibels at the property boundary should be clearly noted. The draft PEA should also describe effects, if any, of sonic pulses on wildlife.
6	15	2.1.3.1	It states that tank tests could occur during the day or night. TPWD recommends that tank tests, as well as launches, should be limited to daytime hours only. TPWD property should not be accessed at night for any purposes including examination or clean-up of SpaceX debris from explosions, anomalies, or other activities, unless of an emergency or with approval from TPWD.
7	16	2.1.3.1	During other commenting opportunities, TPWD has expressed concern regarding the number of tank tests per month. TPWD recommended the draft PEA clearly indicate that the Boca Chica area would potentially be closed

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			to the public for some portion of at least 10 to 12 days per month to accommodate the predicted number of tests and anticipated anomalies and explosions. TPWD reiterates its original comment and recommends that the estimate of the total of number of potential closures and the associated closure time (length of closures, up to 800 hours per year) should be shown in a table in the draft PEA.
8	16	2.1.3.2	Regarding pre-flight operations, TPWD recommends that the draft PEA state how long State Highway (SH) 4 and access to public land would be closed for each static fire test. That is, if testing the Super Heavy is anticipated to be 135 seconds per year and testing the Starship is anticipated to be 150 seconds per year, how many closures and closure hours would be required to accomplish these testing activities?
9	16	2.1.3.2	According to the information provided, if a static fire engine test lasts for 5-15 seconds, then there would be between 9 and 27 tests for the Super Heavy vehicle per year and between 10 and 30 tests for the Starship vehicle per year. If these estimates are correct, the draft PEA should clearly describe how many static fire engine tests are being proposed for each vehicle and provide that information as it relates to closure of the area to public access.
10	17	2.1.3.4	The draft PEA states, "SpaceX is also still considering whether deluge water would discharge on the plume during a launch or test." Because the use of deluge water may result in environmental impacts including steam and/or a vapor cloud potentially causing changes to vegetation on TPWD property, TPWD should be consulted and included in discussions regarding discharging deluge water and any discharge activities should include measures to avoid, minimize, or mitigate harm to vegetation.
11	17	2.1.3.4	This section states, "If treatment or retention of stormwater or wastewater is required, SpaceX would retain the water in retention ponds adjacent to the launch mount." TPWD recommends retention of all stormwater and wastewater because surface discharge of stormwater or wastewater would necessarily be onto State-owned property which surrounds the launch site. Discharge of stormwater and/or wastewater could result in impacts ranging from erosion and loss of vegetation to contamination of soil and water with hazardous materials. In addition, a soil and water contaminants monitoring schedule should be developed and implemented to ensure that if contamination does occur it is detected early, quantified, and cleaned up.
12	19	2.1.3.5	The Federal Aviation Administration's (FAA) definition of operational closure should be revised to fit the circumstances under which closures occur. It should include planned closures which are not implemented by

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			SpaceX. Planned closures that are not implemented still result in restricting beach and public land access for adjacent landowners and managers, researchers, and the general public, as scheduling activities in the area is often based on the public closure notifications. These restrictions result in actual, measurable impacts. Planned closures, whether implemented or not, are a direct result of this proposed action and should be included in this environmental analysis. The FAA may not have a direct role in approving road and beach closures, but the FAA does have a direct role in reviewing and approving this complete action. All of the direct and indirect components of this action should be considered.
13	21	2.1.3.5	"SpaceX estimates the total number of closure hours for tank tests, wet dress rehearsals, static fire engine tests, and launches to be 500 hours per year for nominal operations." TPWD recommends that the total number of hours of closure for clean-up following anomalies should also be included in this section.
14	25	2.1.3.7	The draft PEA states that FAA expects the anomaly debris would be contained within an "FAA-approved hazard area." Because the map in Fig. 2-4 is not appropriately scaled to be used as a reference for the hazard area (i.e., the location of the hazard area is difficult to identify), TPWD recommends the map in Fig. 2-4 be revised, and a label clearly indicating the "FAA-approved hazard area" should be included on the map and a finer scale view of the "FAA-approved hazard area" should be incorporated.
15	25	2.1.3.7	The draft PEA states, "SpaceX estimates up to 300 anomaly-response hours would be needed for addressing impacts specifically from anomalies. These hours would not count towards the nominal operational closure hours ...." The PEA should make clear in all discussions regarding duration of area closures that SpaceX estimates the total number of closure hours to be 800 hours per year. (Comment #14).
16	26	2.1.4	For clarity, TPWD recommends including a bulleted or numbered list of the additional launch-related construction activities at the beginning of this section.
17	31	2.1.4.6	Stormwater runoff from building sites and parking areas should not discharge into surrounding tidal flats and lomas on TPWD property.
18	32	2.1.4.10	During other commenting opportunities, TPWD recommended that, "The Draft EA should describe the source of natural gas and how it would be brought to the site of the natural gas pretreatment system. Describe if the method of delivering natural gas to the site is or is not a connected action subject to the current environmental

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			review. The Draft EA should also describe to where and how liquefied methane would be transported. Please describe any additional facilities that would be required for transport and storage of liquefied methane and oxygen. Please describe the storage, handling, utilization, and/or disposal of byproducts resulting from the proposed natural gas pretreatment system." The FAA provided the requested information to TPWD but did not include it in the draft PEA. TPWD recommends the provided information be included in the final draft of the PEA.
19	37	3.2	Under the No Action Alternative, the draft PEA states that the intensity of impacts would be less than the impacts discussed in the 2014 EIS because the Starship prototype is a smaller launch vehicle and uses fewer engines than the Falcon Heavy. However, the 2014 EIS does not discuss impacts to public lands resulting from debris and debris removal associated with anomalies or other secondary activities which have developed as a consequence of the authorized activity. The actual impacts of the No Action Alternative are quantifiable and are still being incurred. TPWD recommends that these impacts be detailed for public review because they were not described in the 2014 EIS.
20	41	3.3.4.1	The draft PEA states, "While the 2014 EIS does not directly address or include the elements of the current Proposed Action, the scale of the construction activities (in both square footage and duration) is comparable to the construction activities proposed in 2014." TPWD recommends that this statement be eliminated from the PEA. Based on the following, TPWD believes the new proposed activities are significantly larger in size and will have greater environmental impacts including: 1. doubling the footprint of the launch area, 2. expanding the solar farm by 5 to 6 times, 3. adding multiple parking lots, 4. adding a liquid natural gas pretreatment system, 5. a liquefier, 6. a payload processing facility, 7. new utility trenching and pull-offs along SH 4, 8. a redundant launch pad and commodities, 9. adding a redundant landing pad,

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			10. two integration towers, 11. tank structural test stands, 12. a desalination plant, 13. numerous additional support buildings, and 14. a power plant.
21	43	3.3.4.2	This section of the draft PEA states, "Static fire engine tests are also of limited duration; engines are ignited for approximately 15–30 seconds for each test." However, Section 2.1.3.2 states, "During a static fire engine test, the launch vehicle engines are ignited for approximately 5-15 seconds and then shut down." TPWD recommends information regarding the length of the static fire engine tests be accurately and consistently reported in the PEA. This is particularly important as the length of static fire engine tests are used in estimating the duration of other operational activities.
22	48, 49	3.5.1, 3.5.3	Previously, TPWD commented that Section 3.5.1 defines *noise* as unwanted sound that interferes with normal activities and can cause annoyance. Section 3.5.3 characterizes the sound of the wind and the ocean as "noise." TPWD recommended this be reworded to remove the implication that the natural sounds of the wind and ocean are annoying and somehow commensurate with noise resulting from development and human activities on site. TPWD again recommends the final draft of the PEA be revised.
23	50	3.5.4	Section 3.5.4 of the draft PEA has sub-section 3.5.4.1 followed by sub-section 3.5.4.3; there is no sub-section 3.5.4.2. TPWD recommends numbering sub-sections consecutively to avoid the impression that a section may have been omitted.
24	51	3.5.4.3	The last paragraph of this section states, "As noted in Section 2.3.1, static fire engine tests are not planned to occur at night." However, that statement does not occur in Section 2.3.1 of the draft PEA. In fact, the opposite is stated. Footnote "a" of Table 2-2 and the text of Section 2.1.3 state, "For conservative purposes, the environmental review is assuming 20 percent of annual operations involving engine ignition (i.e., **static fire engine tests**, suborbital launches, and orbital launches) would occur at night."

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			TPWD recommends the draft PEA be revised to indicate that static fire engine test may occur at night. Additionally, TPWD recommends that the noise impact analysis consider nighttime conditions as well as daytime conditions.
25	52	3.5.4.4	The effects of noise on wildlife throughout TPWD property should also be included.
26	63	3.6.4	TPWD recommends that SpaceX maintain its previous commitment in the 2014 EIS to not launch at night. Potential impacts unique to nighttime launches (including impacts associated with responding to anomalies in sensitive habitats during nighttime) have not been fully evaluated. If launch or pre-launch operations are approved at night, detailed lighting plans for operations as well as emergencies should be included in the PEA and the Facility Design and Lighting Management Plan (FDLMP). The potential impacts of such launches on wildlife and habitat, including the potential impacts of responding to anomalies, must be thoroughly evaluated and potentially mitigated for.
27	63	3.6.4	TPWD reiterates its recommendation that nighttime lighting of the Vertical Launch Area (VLA) be discontinued, significantly limited, or modified to meet accepted standards for nighttime lighting and minimization of impacts to wildlife.
28	63	3.6.4	The draft PEA states, "All of SpaceX's lighting at the VLA would comply with SpaceX's Facility Design and Lighting Management Plan (FDLMP),...[that] is currently being revised. This plan includes measures that are intended to reduce nighttime lighting impacts in the surrounding areas and minimize sky glow." The existing FDLMP, prepared in 2019, has not been fully implemented to-date. Furthermore, the June 2021 Draft FDLMP does not "include measures that are intended to reduce nighttime lighting impacts in the surrounding areas and minimize sky glow." In fact, the FDLMP specifies mostly white LED lights and spotlights at heights of 10 feet to 50 feet from dusk to dawn throughout the launch, landing control area, and the VLA, inconsistent with TPWD recommendations.
29	63	3.6.4	TPWD requests that SpaceX include a Construction Lighting Plan in the FDLMP to minimize impacts from construction lights currently in use throughout the facility. The plan should describe a process for developing acceptable lighting layouts for construction requirements and an inspection and reporting process.
30	64	3.6.5	The mitigative measures described in the draft PEA are inconsistent with those described in the current draft FDLMP. The draft PEA states that low-pressure sodium lights would be used to the extent practical (which is preferred in certain applications involving wildlife) and makes no mention of white LED lights. However, the

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			FDLMP indicates that only white LED lights would be used in every application listed in the plan. TPWD recommends that low pressure sodium lights be preferentially used throughout the current and proposed project area and that white LED lights be used only in rare and isolated instances.
31	74	3.7.5	The 2015 Memorandum of Agreement (MOA) requires specific mitigative measures to be taken. Please provide a timeline for completion of the historic context report, vibration monitoring (also see below comment regarding section 3.8.3.2), replication of missing marker elements, interpretive signage, and the educational website. Additionally, an identifiable impact to an historic resource has occurred; at least one historic piling has already been damaged (i.e., via debris; see also comments regarding Sections 3.8.3.2 and 3.8.3.3). Please provide a plan and a timeline for mitigation of that loss.
32	83	3.8.3.2	TPWD still does not have enough information on how vibrations will affect the historic pilings, as the information received thus far (including the latest vibration monitoring reports received in November of 2019) has been lacking in key information. While FAA acknowledges the potential for damages, the degree of anticipated long-term damages (e.g., no damage vs. partial damage vs. total loss) needs to be analyzed and presented in a clear manner to allow informed decisions on mitigative measures. It is recommended that SpaceX reinitiate vibration monitoring as well as initiate other forms of analyses (if/as needed) with exact methodologies developed in consultation with the appropriate stakeholders.
33	84	3.8.3.3	This section states that the method of debris removal would be assessed on a case-by-case basis and would be coordinated with applicable landowners or public land-managing agencies. This section also states that SpaceX would continue to use an Alaskan freight sled to remove larger pieces on foot and that TPWD has approved this method to minimize impacts to resources. These statements are inaccurate. While TPWD or USFWS may have previously approved the use of an Alaskan freight sled, it should be noted that approvals are subject to change on a case-by-case basis. The September 2021 Memorandum of Agreement (MOA) between TPWD and SpaceX also stipulates the terms of access and retrieval processes to be followed by both parties in the event of an anomaly or other activites impacting TPWD property. This section also states that the FAA is considering whether a temporary presence of debris, debris-removal activities, and extended closure hours may result in a temporary interference with activities on public lands with

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			respect to Condition #3. TPWD requests that the FAA also consider Condition #4 concerning the full restoration of the land being used. TPWD recommends that when evaluating the full restoration of aquatic resources, temporal losses of aquatic resource functions and services should also be considered. For additional context, see comments related to algal flat restoration activities discussed on page 85 of the draft PEA (Comment #40).
34	85	3.8.3.3	The draft PEA states that efforts to restore any impacts to Section 4(f) properties would be conducted as quickly as possible in coordination with applicable landowners. In light of this statement, FAA should consider the restoration timeline of existing impacts to Boca Chica State Park or Brazos Island State Park resulting from activities authorized by FAA to date and secondary activities which have developed as a result of those authorized activities. The draft PEA states that both algal flats and lomas can recover naturally after disturbances, similar to those that would be expected from debris and removal activities associated with any anomalies. It also states that the public has regularly driven on and across Boca Chica State Park and other surrounding areas for decades without causing any permanent adverse impacts. These conclusions are not supported. TPWD has long recognized the adverse effects of vehicular tracks in sensitive loma, coastal prairie, algal/sand/mud flat habitats, which is what prompted an agreement with Space X to install bollard and cable fencing along SH 4. It was also a key underpinning behind the MOA between SpaceX and TPWD. A study at Padre Island National Seashore (Martin et al, 2008) found that off-road vehicle (ORV) tracks in tidal flats on the back side of North Padre Island have persisted for at least 38 years. As referenced in this 2008 study, Belnap (1995) estimated that algal crust recovery following ORV disturbance in desert regions can range from 35–65 years, and recovery from soil compaction can take hundreds of years. There is concern that the impacts resulting from debris and debris removal activities have been substantially understated in this document. Falling debris can create large collision impact craters and unauthorized debris removal activities have resulted in deep, wide, linear trenches excavated perpendicular to SH 4.

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			Because the microtopographical variability of functioning algal flats is measured in centimeters, it is unlikely that algal flats will recover naturally after such disturbances. Due to the larger size of the launch vehicle, larger number of engines, as well as the increased fuel capacity and thrust capacity, impacts from debris and debris removal resulting from a Super Heavy anomaly would likely be of greater scope and magnitude than that of a Starship anomaly. TPWD has no ability to influence the factors which affect the quantity or size of debris or the width and depth of impact craters left by debris that falls on public lands. Once debris lands on public lands, removal impacts cannot be avoided without leaving the debris in place. However, TPWD continues to coordinate with SpaceX and USFWS in an effort to minimize debris removal impacts, and SpaceX recently conducted a test using a low impact hovercraft to traverse over sensitive algal flats. Initial impressions of the test were promising. Unavoidable impacts should be mitigated, but the proposed algal flat restoration measures described in the draft PEA have not been successfully demonstrated in the Boca Chica region. While the grooming of tracks with hand tools, establishing the proper slope within the tidal range, and other conceptual restoration methods proposed by U.S. Department of Interior have merit, the two-year pilot project which aims to restore vehicular impacts at Padre Island National Seashore (as described in Martin et al 2008) has yet to be finalized or initiated. While this pilot project may help inform algal flat restoration efforts in the Laguna Madre System, and we are keenly interested in working with SpaceX and other parties to explore the viability of potential restoration actions, FAA should recognize that the results may or may not be directly relatable to Boca Chica due to site-specific differences in the substrates, hydrological regimes, and other environmental factors, as well as differences in the nature of the impacts (ORV tracks versus debris and debris removal associated with anomalies). Thus, TPWD is still not aware of any algal flat restoration projects with documented success in Texas. Any proposal to restore algal flats at this site would be considered experimental and the probability of success would be unknown. It is important to also note that the MOA between TPWD and SpaceX also includes terms regarding State Park restoration efforts which include an acknowledgement that restoration of the habitat types found on Boca Chica

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			State Park are untested and any restoration plans will need to include monitoring, adaptive management, and subsequent application of restoration methodologies that have been proven to be successful.
35	85	3.8.3.3	FAA states that "the likelihood of debris from an anomaly resulting in direct damage to either of the historic sites [including 41CF117.1] is remote." At least one piling has in fact already been directly damaged by debris. Damages are thus objectively demonstrable and should be considered certainly possible in the future given the nature of past debris fields.
36	92	3.9.4	Construction and operation activities (including anomaly/debris recovery events) have potential to: promote the development of secondary activities or services that would adversely affect the maintenance of natural systems supporting wildlife and fish habitat; reduce the affected wetland's ability to retain floodwaters or storm runoff; and alter hydrology needed to sustain the affected wetland system's values and functions or those of a wetland to which it is connected. Secondary activities which should be evaluated under this section should include anomalies, associated debris, and debris recovery activities as well as increased vehicular and foot traffic from spectators, space enthusiasts, SpaceX staff and contractors, etc. Hydrodynamic analyses or modeling should be conducted to assess drainage patterns and the potential effects of suspended solids and directed stormwater outfalls on sensitive habitats. TPWD requests bullets 2 and 3 on this page be considered by the FAA as a potential significant impact to wetland functions with regard to future SpaceX development plans and cumulative effects from construction and operation activities. Long-term monitoring of water quality, birds, and benthic assemblages should be conducted in the vicinity of the site to assess the direct, secondary, and cumulative effects of the proposed activities as well as secondary activities that develop as a result of authorizing the proposed activities.
37	93	3.9.4.1	Any retention ponds that may receive contaminated water should be lined to prevent percolation of contaminants into the groundwater. Retention ponds should be maintained and monitored when in use to prevent birds from landing in the pond. Additional monitoring should occur during cold-weather events when birds are likely to seek refuge.

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38	94	3.9.4.1	TPWD requests that the FAA re-evaluate the potential impacts to surface water in an area that, until SpaceX, was essentially undeveloped and undisturbed. Direct, secondary, and cumulative effects on sensitive habitat surrounding the project site should be quantified and tracked over time to evaluate changes in ecological function and value.
39	94	3.9.4.1	The draft PEA indicates that intentional and non-intentional landings (launch anomalies) in the Gulf of Mexico and any resulting recovery efforts would have only short-term impacts that would be mitigated by appropriate best or beneficial management practices (BMP). TPWD previously commented that these BMP should be described in the draft PEA and include references that verify that spilled material from vehicle components would result only in short-term water quality impacts . TPWD appreciates that the FAA's response to TPWD's preliminary comments included justifications for the conclusions reached in the draft PEA; however, appropriate BMP were not included. If potential impacts to surface waters are anticipated to be so insignificant in the event of a spill that BMP are not necessary, then the PEA should indicate that. Also, the justifications for the conclusion provided to TPWD should be included in the final draft of the PEA.
40	95	3.9.4.3	The draft PEA states that the U.S. Army Corps of Engineers is evaluating SpaceX's proposal and proposed mitigation to ensure wetland functions of permanently filled wetlands are adequately replaced. The draft PEA does not provide an adequately detailed description of the proposed compensatory mitigation project(s) that may be used to offset impacts to wetlands and special aquatic sites. TPWD recommends that the construction of the parking lot across from the VLA be removed from the proposed project plans as a means to avoid and minimize direct, indirect, and cumulative impacts to aquatic resources. The proposed parking lot would be located northwest of the VLA where prevailing southeast winds occur. Because of this location the parking lot would be a target for debris associated with anomalies, repair and re-construction of the parking lot is foreseeable as are the cumulative effects of parking lot repairs to the surrounding non-wetland and wetland habitats. The draft PEA does not adequately describe alternatives to the proposed parking lot, such as the use of mass transit vehicles to shuttle people or limiting parking spaces to the number which can be accommodated by the available uplands without filling aquatic habitats.

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			TPWD requests that alternative configurations and layouts of the proposed VLA be evaluated to demonstrate that the Proposed Action is avoiding and minimizing adverse impacts to wetlands to the extent practicable.
41	111	3.10.4.1	The draft PEA states that the permanent loss of upland and wetland habitat would be a small fraction of habitat available in the Lower Rio Grande Valley and that adverse cumulative effects are not anticipated. This is misleading. The significance of proposed impacts within the footprint of the Proposed Action should not be assessed by merely comparing proposed impacts to the available habitat in the region. FAA should note that the unique and rare suite of high functioning habitats at the project site (that are limited in geographic scope to the Matamoran Province of the Lower Rio Grande Valley) coincide with a suite of vulnerable species considered rare, threatened, or endangered by state and federal resource agencies. This circumstance has led to extensive conservation efforts by state, federal, and private partners within the region, and especially within the vicinity of the project site. Cumulative impacts pose a threat to existing fish and wildlife habitat where opportunities for development are available, including the pending construction of two liquefied natural gas (LNG) terminals and construction of the Valley Crossing Pipeline. Current site conditions indicate that direct, secondary, and cumulative impacts have already resulted from activities previously authorized by FAA and secondary activities that have developed as a consequence of those authorized activities. Therefore, there is potential for direct, secondary, and cumulative impacts to sensitive habitats within and outside the project site resulting from recurring SpaceX testing/launch activities and secondary activities such as anomalies/debris removal that need to be evaluated, avoided, minimized, and compensated.
42	112	3.10.4.1	The draft PEA states that human presence and vehicular traffic is already prevalent within the project area since Boca Chica Beach is a popular recreational area. While that may be true, this statement does not account for or distinguish between the very different intensity, volume, and kinds of human uses being compared. While TPWD is concerned that Boca Chica Beach may have lost some of its popularity due to unpredictable access, the FAA should consider the actual quantity of vehicular traffic that occurs as a result of the previously authorized

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			projects and the cumulative impacts associated with the traffic resulting from the construction and operation of the SpaceX production facility. It is not clear if the production facility staff and contractors are subject to road closures that are imposed on the general public and area landowners.
43	112	3.10.4.1	The fourth paragraph of this section includes a University of Texas-Rio Grande Valley (UTRGV) 2020 citation used to support a conclusion of non-significant effects on piping plover, red knot, and snowy plover activity from SpaceX construction and operation activities. However, the UTRGV study/report cited is not included in Appendix A. TPWD recommends the reference be included in Appendix A. TPWD also requests to be provided with a copy of this study for review and comment. Also, a recent Coastal Bend Bays and Estuaries Program report (2021) summarizing piping plover abundance at Boca Chica describes a population decline of greater than 50% between 2018 and 2021. The PEA should include this information and consider its data in analyzing project impacts.
44	112	3.10.4.1	The statement that nighttime lighting may harass or cause harm to only sea turtle nests that were missed by patrols/surveys (in-situ nests) on Boca Chica Beach is concerning to TPWD. The Kemp's Ridley sea turtle is a state-listed endangered species and patrol efforts by Sea Turtle Inc. do not justify the use of nighttime lighting during construction and operation activities. To avoid and minimize impacts to sea turtles, nighttime construction and operations should be limited to the period outside the sea turtle nesting season which is typically understood to be April through September.
45	113	3.10.4.1	Past anomalies demonstrate that debris lands on surrounding conservation lands, including sensitive aquatic habitats. Debris collision impacts and debris removal efforts can adversely affect critical elevations that support the maintenance of tidal flat hydrology that prohibits the encroachment of macrophytic vegetation; a process which converts algal flat special aquatic sites to emergent marsh wetlands. Debris and debris removal activities can also adversely affect ecologically important algal mats through algal mat compaction (caused by collision impacts as well as vehicular and foot traffic) and physical removal of algal mats (caused by collision impacts and removal methods which scrape the substrate). Removal of algal mats can lead to erosion which also adversely affects critical elevations.

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			Because such impacts have actually occurred on conservation lands located within the vicinity of the project, it would seem both logical and appropriate for FAA to base its evaluation of potential future anomalies on measurable effects that have yet to be restored.
46	114	3.10.4.2	The reference U.S. Air Force (USAF) 2014 cited to support non negative effects on marine species from sonic booms is not included in the references listed in Appendix A. TPWD requests the opportunity to review the cited study.
47	116	3.10.4.3	The draft PEA states that the permanent loss of upland and wetland habitat would be a small fraction of habitat available in the Lower Rio Grande Valley and that adverse cumulative effects are not anticipated. This is misleading. The significance of proposed impacts within the footprint of the Proposed Action should not be assessed by merely comparing proposed impacts to the available habitat in the region. FAA should also consider that the unique and rare suite of high functioning habitats at the project site (that are limited in geographic scope to the Matamoran Province of the Lower Rio Grande Valley) coincide with a suite of vulnerable species considered rare, threatened, or endangered by state and federal resource agencies. This circumstance has led to extensive conservation efforts by state, federal, and non-governmental entities within the vicinity of the project site. Cumulative impacts pose a threat to vulnerable species and their habitats. Current site conditions indicate that direct, secondary, and cumulative impacts have already resulted from activities previously authorized by FAA, secondary activities that have developed as a consequence of those authorized activities, as well as unconnected past, present, and reasonably foreseeable development projects.
48	116	3.10.4.3	The assessment of adverse effects on piping plover critical habitat should include potential direct, secondary, and cumulative effects outside the project boundary. Debris and debris removal activities resulting from anomalies may cause a significant adverse effect on piping plover critical habitat. TPWD recommends establishing annual wintering bird surveys conducted by a qualified biological monitor for the area surrounding the VLA to track the direct, secondary, and cumulative effects on the avian community and critical habitats from launch/testing activities, anomalies, and other secondary activities promoted by activities authorized by FAA.
49	117	3.10.5	With respect to the first construction measure listed, FAA should consider secondary effects to algal flats from increased or directed freshwater inputs from stormwater runoff. To avoid habitat conversions which would result

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			from the encroachment of emergent vegetation encouraged by stormwater runoff, stormwater runoff should not be directed into mud flat or algal flat habitats.
50	120	3.11.3	South Bay Coastal Preserve, a state designated coastal conservation area, may qualify as an eligible marine protected area located in south Texas. The citation, NOAA 2018, is not included in the list of references in Appendix A.
51	120	3.11.4	With respect to consistency with relevant state coastal zone management plan(s), Title 31, Section 501.29 of the Texas Administrative Code states that development by a person other than TPWD that requires the use or taking of any public land in state parks, wildlife management areas or preserves shall comply with Texas Parks and Wildlife Code Chapter 26. In this context, the Texas statutory definition of "use or taking" may differ from that considered by FAA for Section 4(f) properties. With respect to adverse impacts on the coastal environment that cannot be satisfactorily mitigated, please note that proposed algal flat restoration activities are conceptual and have not been tested in Texas or the Boca Chica area. Therefore, it is unclear if algal flat impacts (from rutting, trampling, falling debris, scraping, and noise) can be restored to achieve an equivalent level of aquatic resource function that occurred prior to the impact. Before any habitat can be successfully restored, the perturbations that caused the impacts must first be removed. At present, it is not clear when these perturbations will no longer result in additional impacts to areas in need of restoration. In the meantime, temporal losses of aquatic resource functions continue to accrue.
52	120	3.11.4	Bullet 5 listed on this page is a factor for the FAA to evaluate as a significant potential impact on coastal resources for establishing a significance threshold. The habitat located within and surrounding SpaceX's test and launch site consists of ecologically important coastal resources. Again, TPWD is not aware of any algal flat restoration or establishment projects with documented success in Texas. As such, algal flats are considered difficult to replace. A proposed pilot project is two years out from fully informing any restoration methods and it is unclear if satisfactory mitigation is achievable, although we remain committed to working with all parties to explore viable options.
53	121	3.12.3	The land surrounding the launch site is described as being primarily used for recreational purposes. While the Boca Chica area has long supported outdoor recreation, much of the land has been managed by state, federal, and private partners as conservation lands for its highly unique fish and wildlife resources and associated habitats. Boca Chica State Park and the Loma Ecological Preserve are leased by the USFWS and managed as part of the

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			Lower Rio Grande National Wildlife Refuge. South Bay Coastal Preserve is cooperatively managed by the Texas General Land Office and TPWD. TPWD recommends that the language in the PEA be updated to reflect the information provided here.
54	128	3.13.5	Concerning SpaceX reporting any release of hazardous material in the Gulf of Mexico through the U.S. Coast Guard (USCG) National Response Center, hazardous materials released into tidal waters would not only have a significant nexus to the Gulf of Mexico, but oftentimes result in adverse impacts to sensitive habitat. Therefore, any release of hazardous material into tidal waters should also be reported to both Texas General Land Office and USCG.
55	130	3.14	SpaceX proposes to construct and operate a 250 megawatt (MW) natural gas power plant to supply power for SpaceX operations at the Boca Chica Launch Site. In response to TPWD's comments on the Administrative Draft PEA, the FAA provided a response to TPWD that natural gas would be trucked to the pretreatment system (See Comment #21). However, the method of natural gas delivery and the feasibility of trucking enough natural gas to supply a power plant that would operate 24/7 was not described in the draft PEA. The PEA should describe in detail how natural gas will be conveyed to the pretreatment system and power plant and evaluate the potential impacts of the conveyance method(s) being considered.
56	17	Appendix D	Previously, TPWD provided comments regarding statements in the Administrative Draft PEA which indicated that the additional 300 anomaly-response hours would be used at the discretion of TPWD, the USFWS, and Cameron County. TPWD commented that it had not agreed to be responsible for restricting access to the Boca Chica area to address issues caused by SpaceX. The text in the draft PEA has been revised to clarify the role of TPWD during anomaly response closures; however, the text from the earlier Administrative Draft EA has been retained in Appendix D (i.e., stating that TPWD would be one of the entities determining when these hours would be used). TPWD recommends Appendix D be revised to be consistent with the text of the draft EA, clarifying TPWD's role during anomaly response closures.

References:

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