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Via email to: SpaceXBocaChica@icf.com

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

Dear Ms. Zee:

I submit the following comments to the Federal Aviation Administration (“FAA”) in response to the “Draft Programmatic Environmental Assessment for the Starship/Super Heavy Launch Vehicle Program at the SpaceX Boca Chica Launch Site in Cameron County, Texas (2021)(“DPEA”).

The existing and proposed rocket testing, launch, and landing facilities will adversely impact nationally significant wetlands and mudflats, as the existing and proposed facilities are just outside of the nearby Lower Rio Grande Valley National Wildlife Refuge (“Refuge”) and Brazos Island State Park Boca Chica State Park and Brazos Island State Park (“Parks”). The SpaceX activities are incompatible with and directly threaten the integrity of the Refuge and Parks due to a wide range of direct and indirect adverse impacts to listed and unlisted species and nationally significant shorebird and waterbird habitats. Also, the significant SpaceX closures forced on the Parks and Refuge result in violations of Section 4(f).

The DPEA raises particular concerns regarding compliance with the requirements of the National Environmental Policy Act (“NEPA”). The DPEA fails to disclose the direct, indirect, and cumulative impacts of the proposal as required by NEPA. Critical issues are addressed in a conclusory manner without adequate references to support the claim or are not addressed at all. Most fundamentally, the FAA’s action to approve SpaceX constructing a major industrial facility to test, launch, and retrieve one of the world’s biggest rockets next to nationally significant shorebird habitats clearly would be a major federal action significantly affecting the human environment. The FAA should prepare an environmental impact statement (“EIS”) if it intends to proceed with issuing any additional launch approval to SpaceX.

I focus my comments on the threatened Piping Plover (*Charadrius melodus*) and other shorebirds or colonial waterbirds and briefly address other issues. My comments are based on field research on nonbreeding Piping Plovers that I started in 2002, including visits to the Refuge

to conduct research three different winters and another fall. I am a co-author of 5 different peer reviewed published articles on nonbreeding Piping Plovers and I also have worked with breeding shorebirds and colonial waterbirds.

1. The Alternatives Analysis is Unduly Narrow

The FAA continues to display inappropriate deference to SpaceX and adopts an alternatives analysis that is unduly narrow. This undue deference is not new. As I noted in a previous comment to the FAA, the FAA alternatives analysis in the 2014 EIS was drafted in a manner that inappropriately favored selection of the Boca Chica Site. (FAA: 2014 at 2-26 – 2-31).

In the DPEA, the FAA devotes about a page and a half to the alternatives that were considered but eliminated from further consideration. DPEA at 34-35. The DPEA states that “SpaceX determined that the action alternatives must meet the following criteria:” DPEA at 34. The FAA, not SpaceX, should determine the suitable criteria for the selection of alternatives.

The DPEA lists 5 factors. One is particularly telling. The FAA notes:

“Proximity to SpaceX’s Starship/Super Heavy Manufacturing and Production Facilities – To minimize delay during the program development and operational phases, Starship/Super Heavy test and launch operations must be located near Starship/Super Heavy manufacturing and production facilities” DPEA at 35 (bold in original).

This factor makes a mockery of NEPA’s alternatives analysis requirement by ensuring that there are no other suitable alternatives to Boca Chica. The FAA should require an analysis that takes a hard look at other alternatives including existing launch facilities that are far more suitable than a 44 acre inholding surrounded by a National Wildlife Refuge and Parks.

2. Impacts on the Piping Plover

I am particularly concerned about the FAA’s lack of acknowledgement in the DPEA and Biological Assessment (“BA”) of the significant importance of the Boca Chica area¹ to the threatened Piping Plover and the FAA’s inaccurate review of the impacts of the rocket activities on the Piping Plover.

A. Importance of Boca Chica to the Piping Plover

The FAA’s inadequate review of the importance of the Boca Chica area to piping plovers is long standing. The 2014 EIS has one page (2014:3-75) that briefly discusses general information about the Piping Plover and just three sentences on surveys at Boca Chica Beach, “Boca Chica Flats” and South Bay. One page is a map of the (2014: 3-76) of the Piping Plover Critical Habitat. In addition, there is less than a page in total of discussion (2014: 4-61 – 4-62) in the

¹ As used in this letter, “Boca Chica area” includes the Boca Chica beach as well as the flats that are south and north of Highway 4.

Environmental Consequences section. One significant claim of the FAA deserves to be highlighted: “Based on recent migratory and wintering surveys for piping plovers conducted within the Lower Laguna Madre region in south Texas, the piping plover is not known to use the areas within the ROI in large numbers (Zdravkovic and Durkin 2010)” (2014: 4-62). “ROI” is defined as “Region of Influence” (2014: xii).

In previous comments submitted within the last year, I raised significant concerns about problems with the 2014 EIS discussion of impacts on the piping plover. The 2014 EIS purported to rely on the conclusions of Zdravkovic but did not even accurately cite the conclusions of Zdravkovic and Durkin (2011), who note: “South Bay also supported significant concentrations of Piping Plovers, with 59 birds during migratory surveys and 30 during winter surveys” (2011: 12). Table 1 lists migrating Piping Plover survey results including 59 at “South Bay”, 2 at “Boca Chica, Gulf Beach”, 5 at “Boca Chica Flats”, and 23 at “Mouth of the Rio Grande” (2011: 13). Table 2 lists wintering Piping Plover survey results including 30 at “South Bay”, 0 at “Boca Chica, Gulf Beach”, 11 at “Boca Chica Flats”, and 0 at “Mouth of the Rio Grande”. Zdravkovic and Durkin stated that there were “significant concentrations” of Piping Plovers at South Bay while the 2014 EIS claimed they found that the Piping Plover is “not known to use the areas within the ROI in large numbers.” The 2014 EIS clearly misrepresents the findings of Zdravkovic and Durkin. In addition, the FEIS downplays, in the Environmental Consequences analysis (2014: 4-62), other Piping Plover survey results which found much higher numbers of Piping Plovers in the area (2014 EIS at 3-75).

Based on surveys that I and others have done, the Boca Chica/South Bay/flats south of HWY 4 area historically is one of the most important areas in the world for wintering Piping Plovers. During a February 23, 2009 survey for Environment Canada, I observed 239 Piping Plovers using the flats of the South Bay area (Maddock 2010). For Piping Plovers, that is an extremely large number. Most of those Piping Plovers that were counted that day were visible in one area while they were feeding during one continuous scan of the spotting scope. In addition, due to running out of time to complete the survey that day, I was not able to cover all visible available habitat to the south; it is likely Piping Plovers were missed during my count. It also should be noted that those birds were seen in an area that is less than two miles long. Contrary to the claims of the FAA EIS, the South Bay/Boca Chica Beach/Flats south of Highway 4 area has extraordinary value for wintering Piping Plovers.

I am not the only one to observe large numbers of Piping Plovers in this area. During 3 nonbreeding seasons, Zonick (2000) studied Piping Plovers along the Texas Gulf Coast at 18 sites including two sites at South Bay. At the South Bay East study site, for abundance, he found a mean of 22.6 Piping Plovers and a maximum of 254 Piping Plovers. It is unclear why FAA would not have included the Zonick data in its analysis.

Based on the Piping Plover surveys I have done at South Bay and elsewhere in Texas, as well as the studies of others in Texas and elsewhere, it can be very difficult to obtain an accurate number for Piping Plovers at a particular site, especially if a limited number of surveys are done or the person doing the survey is not experienced. While Piping Plovers have very high fidelity to a wintering site (Gratto-Trevor et al. 2011), the Plovers can move frequently between the habitats

at the site (Cohen et al. 2008). A range of factors can influence habitat use including water level and human disturbance. In the South Bay area, I observed Piping Plovers fly between the Gulf beach and interior flats and also between the interior flats north and south of Highway 4. It may appear to be easy to drive along the Boca Chica beach counting Piping Plovers. However, because of the large expanse of habitat and the challenging substrate, the interior flats north and south of Highway 4 are one of the most difficult spots to survey accurately of the hundreds of sites that I have surveyed for wintering Piping Plovers. It is not surprising that a single day count of part of the area could provide a result that is not accurate for the area because of significant detection difficulties for this challenging area.

Despite the data and other information I have provided to the FAA in previous comments about SpaceX, the DPEA and BA still contain many of the same errors as the original 2014 EIS. For example, the BA notes:

“Based on recent migratory and wintering surveys for piping plovers conducted within the Lower Laguna Madre region in south Texas, the piping plover is not known to use areas within the action area in large numbers (Zdravkovic and Durkin 2011).”

BA at 64. I pointed out to the FAA how the 2014 EIS misrepresented Zdravkovic and Durkin (2011), yet the FAA commits the same error yet again in the BA, which is concerning. In addition, the DPEA ignores the data from Maddock (2010) and Zonick (2000), data that give a more accurate picture of the importance of the area to piping plovers.

I recently obtained a copy of Newstead and Hill (2021), which examines the Piping Plover population abundance, trend, and survival at Boca Chica from 2018-2021. I understand this analysis has been provided to the FAA. This analysis further underscores the importance of the Boca Chica area to wintering piping plovers and raises serious concerns about the current status of the plovers wintering at Boca Chica.

B. Human Disturbance Associated with the Rocket Activities

After the Piping Plover was listed federally under the provisions of the ESA, there was an increased understanding of how human disturbance could adversely affect productivity which in turn influenced if the population was increasing or decreasing. Across the breeding range, in areas with high disturbance, there were efforts to manage that disturbance in many ways by installing symbolic fencing around nesting areas to keep humans away from nests and chicks, limiting or prohibiting dogs, not allowing feral cat colonies to be located near nesting areas, restricting or prohibiting recreational off-road vehicle use, prohibiting fireworks displays near nesting areas, as discussed in the Piping Plover (*Charadrius melodus*) Atlantic Coast Population Revised Recovery Plan (USFWS 1996) and other conservation documents issued by the USFWS.

The BA repeatedly makes statements regarding disturbance that minimize the impacts of the proposed rocket activities to piping plovers without providing appropriate supporting documentation:

“The small amount of critical habitat that would be affected by the Proposed Action would not affect the recovery of the species. There is other habitat nearby that the piping plover could use.” BA at 64.

The FAA does not indicate what “habitat nearby” means, nor does the FAA provide any data to support the claim that piping plover “could use” other “habitat nearby.” Gratto-Trevor et al. (2011) showed high fidelity of Piping Plovers to their wintering site, and Gibson et al. 2018, quoted below at length, discuss how piping plovers at high disturbance sites have lower annual survival rates, and that while “site fidelity was slightly lower in disturbed areas relative to less disturbed areas, fidelity to their non-breeding grounds was high”.

“Noise associated with the engines and pre-launch operations may cause individuals to disperse from the area prior to being affected by the heat plume.” BA at 65.

No data are presented to support this claim for piping plovers.

“In addition, human presence and vehicular traffic is already prevalent within the project area since Boca Chica Beach is a popular recreational area.” BA at 65.

As someone who actually did Piping Plover surveys at Boca Chica beach and the interior flats south and north of HWY 4, I can say that while I have observed low or moderate human disturbance levels at Boca Chica beach, I have not seen even low human disturbance during the surveys I did of the interior flats south or north of HWY 4. People are not ordinarily walking around out in the mud flats as sinking deep in mud is neither easy nor particularly fun. Disturbance levels associated with observed rocket cleanup activities are much higher than what occurred prior to SpaceX, as shown by the photographs of cleanup activities that I will be submitting to the record.

“Noise from launch operations would extend into piping plover habitat and most likely temporarily displace piping plovers. However, these impacts would be short term as noise levels associated with testing and launch operations would last a few minutes.” BA 65.

No data are provided to support the conclusion that any displacement of piping plovers would be “temporary.” As noted above, the Newstead and Hill (2021) analysis suggests the FAA’s claims on this critical issue are inaccurate.

Based on a previous ESA section 7 consultation between the USFWS and National Aeronautics and Space Administration for proposed launches at the Wallops Flight Facility, Virginia, and potential effects to piping plovers, the USFWS concluded that launches were not likely to jeopardize the continued existence of the piping plover (NASA 2005).

BA at 64. This conclusion fails to acknowledge that the USFWS had a concern that take would occur of piping plovers as a result of launch activities. This is a significant omission that once again raises concerns about the integrity of the analysis.

Over the last 15 years, there has been a growing understanding by agencies, scientists, and resource managers of the risks posed by human disturbance to nonbreeding Piping Plovers and an increased effort to address the adverse impacts caused by such disturbance. In a study of Piping Plovers wintering on Atlantic Coast beaches, Gibson et al. (2018) note:

“Our study provides evidence that anthropogenic disturbance is negatively associated with body condition, non-breeding demographic rates (e.g., local population growth rates), and annual demographic processes (e.g., survival) for piping plovers. During the non-breeding season, the southeastern Atlantic Coast hosts > 50% (relative to postbreeding abundance) of critically endangered Great Lakes breeding population of piping plovers, with > 30% occurring within our study system (Gratto-Trevor et al. 2012). Thus, anthropogenic disturbance in this system may disproportionately influence the population trajectory or sustainability of the Great Lakes piping plover population. Although site fidelity was slightly lower in disturbed areas relative to less disturbed areas, fidelity to their non-breeding grounds was high, and largely similar to estimates of breeding site fidelity (Cohen et al. 2006; Cohen and Gratto-Trevor 2011; Catlin et al. 2015). Therefore, management objectives based on the expectation that piping plovers will move to better non-breeding habitats if their current habitat is disturbed will not be successful, despite the apparent benefits to survival of moving. However, management actions that identify and limit anthropogenic access to critical foraging or roosting areas during the nonbreeding season may increase functionally available habitat, and potentially improve body condition and survival rates of non-breeding piping plovers. Annual survival rates at certain wintering sites were extremely low for piping plovers ($S < 0.50$) relative to published estimates of true survival ($S = 0.71-0.76$; LeDee et al. 2010; Cohen et al. 2006; Catlin et al. 2015). Additionally, because new individuals consistently recruit into these low survivability sites, these areas apparently remain attractive sinks to piping plovers. Thus, conservation actions may be required to reduce the impact of these sink habitats on overall population dynamics. Finally, the associations among non-breeding conditions, body condition, and demography highlight the importance of non-breeding habitats on annual population dynamics of a migratory species. Conservation strategies focused solely on breeding season dynamics for migratory species are potentially not accounting for some of the mechanisms influencing individual demographic rates and, ultimately, population trajectory.”

Gibson et al. considered pedestrians, dogs, and vehicles as potential sources of disturbance, so it is not exactly comparable to launching, landing, and blowing up rockets. What type of disturbances actually are worse for the Piping Plover however, remains to be answered, despite the original EIS being released in 2014. In addition, the Gibson et al. study is important as it provided evidence that human disturbance is associated with body condition and survival rates for non-breeding Piping Plovers. It also is very important for the observation that low survivability sites may continue to have recruitment of piping plovers and remain population sinks. Thus, if there were take of Piping Plovers due to SpaceX activities, such take could go undetected based just on surveys for overall numbers.

C. Inadequate Piping Plover monitoring effort

The SpaceX funded Piping Plover monitoring effort is not adequate to identify and address impacts associated with SpaceX activities on the threatened Piping Plover. The current monitoring methods cannot answer all the relevant questions that need to be addressed. These flaws are compounded by arbitrary and increasing access restrictions that make it almost impossible to carry out adequate field research activities.

I have reviewed the Pre-Construction Species Monitoring Survey report (Hicks et al. 2015) as well as two later reports by Hicks et al. (2017, 2020) and have multiple serious concerns about the methodology and implementation of the monitoring effort:

1. “Each survey, covered a specified route, took place over 1-2 days, and was separated by ca. 8 days to avoid autocorrelation.” (Hicks et al. 2015 at 1). The report also states “[a]ctual survey routes tracked the water’s edge, while avoiding damage to algal flats.” (At 2). In the context of existing habitat conditions at South Bay Route and the Las Palomas survey routes where the water’s edge quickly can move over a mile in response to wind driven water levels over the flats, I do not understand how these statements are consistent. I have seen the area of standing water over a mile to the north of HWY 4 and other times a mile to the south against the HWY 4 and the nearby upland vegetation line, depending on the wind direction, wind intensity, and amount of time the was blowing. Either a survey route was followed, or it was not. As discussed below, this issue influences the detection levels of Piping Plovers using the area.
2. The area of South Bay where I saw the largest number of Piping Plovers during my February 23, 2009, Piping Plover survey (Maddock 2010) is not included in the monitoring transects or even close to a monitoring transect. This raises concerns about the adequacy of the survey transect locations to accurately represent Piping Plover use of the area.
3. The “Las Palomas” and South Bay survey routes “were surveyed by all-terrain-vehicle (ATV), given the large areas and inaccessibility of the area by truck.” Hicks et al. 2015 at 2. It is unclear from the report from the biologists if ATV use may have resulted in disturbance that flushed Piping Plovers and affected the number of Piping Plovers that was observed.
4. It is unclear if practical limitations on ATV use - to keep the ATV from getting stuck in muddy substrate in South Bay and Las Palomas - allowed the observer to get close enough to detect Piping Plovers in the area. I used an ATV for only one survey on the South Bay flats and I kept having to leave the ATV in drier areas and walk, sometimes hundreds of yards from the ATV, through the sinky muddy areas to get safely close enough to the feeding Piping Plovers for accurate observation with a spotting scope. After that one experience I didn’t use an ATV again at South Bay. The possibility of increased total coverage distance on the ATV was outweighed by concerns about much lower detectability levels for Piping Plovers in the area.

5. The report notes that “[g]iven our optics, we were usually able to identify target species within a 150m radius of the actual route traveled and thus a significant portion of each 500m[squared]quadrat was sampled with our protocol.” Hicks et al. 2015 at 4. Depending on the type of habitat the Piping Plovers are using in South Bay, that statement may not be accurate. During one survey of South Bay that I walked, I observed a flock of Piping Plovers resting between the curled-up pieces of desiccated (dry) algal mat. These Piping Plovers were almost invisible even with the high-power Swarovski spotting scope that I use: only the tops of the heads of a few birds were visible. And unless Piping Plovers resting under similar conditions were disturbed by the ATV, the birds probably would not be visible at 75m and it is highly unlikely they would be observed at 150 meters unless the observer was highly skilled, knew exactly where to look, took the time to look carefully, and carefully approached the resting Piping Plovers to get a more accurate count.
6. The report notes that the observer looked for banded Piping Plovers and recorded band information. Early Piping Plover banding efforts used unique or non-unique combinations of a color flag, metal band, and color bands or split or triple split bands. More recently, most banders (other than the Great Lakes and SUNY) have gone to using a flag on the upper leg (tibia) with an alphanumeric code, with some of those banders also using color bands and some not using any bands on the lower legs (tarsus). The coded flags are much more difficult and often take more time to read accurately, and even old-style flags/band combinations are difficult to read accurately on wintering Piping Plovers at more than about 40-45 yards. The level of detection of banded Piping Plovers and accurate observation of the bands/codes will be influenced by how far the observer is away from the bird. 50 to 150 meter observation distances are clearly not adequate to detect and read most Piping Plover flags/color bands under field conditions.
7. “These preliminary surveys yielded observations of banded Piping Plovers and Red Knots within the impact area (Figs 2-3) that were excluded from the main statistical analysis presented in the Results, but are nonetheless noteworthy.” At 4. It would have been much more helpful to have an analysis that includes counting of unbanded Piping Plovers, banded Piping Plovers (with color flags/bands recorded), and Piping Plovers that could not be fully scanned for color bands. Such an approach would have allowed a more accurate estimate of the population of Piping Plovers of the area using modeling efforts.
8. The survey transects received dramatically different levels of monitoring efforts, with interior flats survey routes north (South Bay and Boca Chica routes) and south of HWY 4 (Las Palomas Route) being subject to much lower levels of observer effort than the survey route out on Boca Chica beach. In the 2016-2017 surveys, the beach survey route was surveyed 20 times between December 2, 2016 and June 7, 2017. Over the same period, the Boca Chica-South Bay and Las Palomas survey routes each were surveyed 7 times. (2017: at 3, 2). In the 2017 surveys, which were conducted between July 17, 2017 and September 25, 2018, the beach was surveyed 20 times and the Las Palomas, South Bay, and Boca Chica routes each were surveyed 3 times (2018 at 3, 2). In 2020, between August 1 and November 25, 10 surveys were conducted on the beach, 4 surveys were

conducted on the Las Palomas route (south of HWY 4), and only 1 survey was conducted on the Boca Chica and South Bay routes (Berg et al. 2020).

9. The USFWS, in a comment letter to FAA, notes:

“Although monitoring sites established in the general area may be of great learning experience for undergraduate studies at the University of Texas at Brownsville, the pre-construction and operational monitoring must follow peer reviewed protocols. Protocols and monitoring should be developed and monitoring conducted by experts within the field, as findings of the baseline monitoring will lead to adaptive management decisions by the Service, SpaceX, and FAA.

During the original consultation, SpaceX agreed to hire two biologists. These biologists would be Refuge- hired employees, located at the Refuge, and would monitor and collect data outlined in the BO for the life of the project. The University of Texas at Brownsville was asked to do pre-construction baseline studies until the biologists could be hired. The hiring of the biologist has not occurred, because FAA states it was an agreement between the Refuge and SpaceX, not FAA. Additional biological monitoring needs are necessary to collect vegetation data associated with larger rocket engines and different fuel type associated with tests, launches and releases of any kind. We recommend FAA reconsider funding the biologists as SpaceX proposed.”

(FAA 2020a, Attachment 1, Service #5). As I have noted above, based on my extensive experience conducting wintering Piping Plover surveys, the South Bay area is a particularly challenging area to conduct such surveys. The use of undergraduates to conduct monitoring efforts is not commensurate with the complexity of the area and the importance of accurate monitoring efforts to addressing SpaceX impacts.

10. Under the monitoring conducted by Hicks et al., there was no banding of Piping Plovers in the project area; no use of radio-telemetry transmitters to track Piping Plover movements inside or outside of the project area; and no use of a control area which would allow comparisons to the study area. Using these methods before and after the initiation of rocket activities would have cost more money than the limited monitoring effort that was performed. However, these methods would have allowed more accurate analyses of apparent number, survival, detectability, and disturbance issues that are related to better understanding the impacts of rocket activities.

I am not questioning the integrity or effort of the biologists who have done the monitoring studies. Rather, I am questioning whether SpaceX has given the biologists who are conducting the monitoring effort sufficient funds, adequate access, and enough time to allow them to properly and accurately address the impacts of SpaceX on Piping Plovers and other shorebirds. If SpaceX provides inadequate funding, we should not be surprised that the existing monitoring activities do not adequately address the significant issues raised by the rocket activities.

Despite the concerns I have raised, I would note that Hicks et al., based on their surveys, observe that Piping Plovers have “congregated in three areas of special significance” and all of those areas are near SpaceX facilities:

“In Fig 1.6 we mapped results from all surveys between 2015-2020, which indicates that larger congregations of target species are congregated in three areas of special significance, given their proximity to the launch site, as well as the control and building sites: 1) the mudflats located immediately north of the Launch Site is a site of high density of wintering Piping Plovers and spring-breeding Snowy Plovers; 2) south of the launch site is also an area of high density of Piping Plovers and Snowy Plovers; and 3) the area of mudflats north of the Control Site is an area of high density Red Knots, Piping Plovers and Snowy Plovers (Fig. 1.6).”

(Hicks et al. 2020: 8). At least two of these three areas are relatively close to the launch site and within the area that could be adversely impacted by the launch activities; depending on the distance of the debris field, it is possible that the third area also may be impacted, given the report of a piece of debris from SN11 falling five miles from the launch site.

D. Inadequate review of direct, indirect, and cumulative impacts of SpaceX rocket activities

To date, there has been an inadequate environmental review of the adverse environmental impacts from SpaceX’s activities involved in constructing, moving, launching, flying, and landing rockets and the impacts associated with cleaning up rocket crashes and explosions from the Boca Chica rocket facility. There is a multi-decade history that undoubtably establishes that launching rockets into space is an inherently dangerous activity. Yet, FAA’s 2014 EIS, only spends a few pages discussing the possibility of rocket explosions and the adverse environmental impact of such explosions. The FAA, while it notes that a launch failure may occur, dismisses the possibility of a crash as “unlikely” 5 different times (2014 EIS at 2-15, 4-41, 4-57, 4-73, 481).

In contrast, the actual activities of SpaceX at Boca Chica demonstrate a unique ability to have spectacular launch failures. It is noteworthy that 8 of the recent launches or tests have resulted in the destruction of the rocket. Wikipedia (2021). Of particular concern, are the four most recent massive uncontrolled explosions that have taken place.

The wide area covered by debris from failed launches raises significant concerns about adverse environmental impacts. The explosion of SN 11 on March 30, 2021, which occurred at altitude and not on the launch pad, merits particular attention, as large amounts of debris uncontrollably fell outside of SpaceX property on to public conservation lands, including high value, ecologically sensitive habitats that are used by the Piping Plover, Wilson’s Plover, and Snowy Plover.

A video available on-line at YouTube shows numerous debris pieces from SN11 scattered in the VLA area, including some massive pieces of the rocket, as well as pieces scattered to the north of

the VLA (RGV Aerial Photography 2021a). Another post, accompanied with an aerial photograph, states that the “furthest piece of Starship SN11 (visible) made it as far as ~ 817m (red box) at SpaceX South Texas Launch Site” RGV Aerial Photography 2021b). In addition, according to a report, a piece of explosion debris from SN11 was recovered five miles away from the launch facility. “One bystander found a piece of the charred rocket about five miles outside the Boca Chica facility. ‘Found this...tank insulation? #SN11 It came from the sky, is warm, and smells like fuel of some sort,’ reads a post shared to Twitter with a photo of them holding part of the fallen rocket” (Liberatore 2021).

In the context of the South Bay area, significant adverse impacts from SpaceX activities may include:

The FAA stated in the 2014 EIS that “Launch activities would have minimal impacts to vegetation from potential fire. Fires are unlikely since launch activities would occur over concrete pads with no surrounding vegetation” (FAA 2014: 4-65). In 2019, the FAA noted in an Addendum to the Written Re-evaluation that:

“During a small hop test in July 2019, a brush fire occurred near the launch pad. The fire was an unexpected incident and the SpaceX operations team notified the Brownsville Fire Department to assist with the incident. Given the pre-established safety zone for the hop test, there were no public safety concerns. The 2014 EIS characterized the potential for wildfires as low, but did state fires could occur from an explosion on the pad or an unplanned anomaly. SpaceX has implemented fire mitigation measures to reduce the risk of another wildfire. These mitigation measures are described in SpaceX’s draft *Fire Mitigation and Response Plan* (Fire Plan; August 2019; attached).”

(FAA 2019b: 1). The DPEA notes “Changes to terrestrial habitat structure might occur from fire in small areas adjacent to the launch mount and landing pad. Vegetative land cover in these areas is classified as barren or grasslands, both of which would recover quickly post-fire. “ DPEA at 112.

However, the ecological impacts to the Refuge and Parks of fires from rocket explosions and the procedure to address fires from explosions are much more complex than what the FAA has disclosed in its review documents. As USFWS has noted in public comments submitted to the FAA:

“On July 25, 2019, a burn occurred after a rocket test. It occurred at approximately 11:30 pm and burned about 10 to 15 acres of Boca Chica State Park, a property owned by TPWD but managed by the Service. The Refuge was not notified until the next day and by that time, the fire was smoldering and flared up and had burned approximately 130 to 135 acres more. Fire engines had gone off road and had gotten stuck causing damage to refuge lands. On August 2019, 6.2 acres were burned and debris was scattered on Refuge lands. Firefighters were not allowed to enter the area for three hours because of the type of fuel that was used.”

(FAA 2020a: Service #4). First, note that firefighters were not allowed to enter the area for three hours “because of the type of fuel that was used.” The USFWS comment raises very significant concerns about toxic contamination of Refuge and Park lands including wetlands and mudflats. Why is SpaceX allowed to use *any* hazardous chemicals that would result in discharges to and contamination of high value Refuge or Park lands?

Second, what risks do such toxic contaminants pose to shorebirds and waterbirds? Snowy Plovers, Wilson’s Plovers, and Piping Plovers feed on invertebrates that are found on or just under the surface of the mud flats, algal mat flats and wetlands surrounding the VLA. If contamination poses a risk to humans, what is SpaceX going to do to protect the area’s wildlife and how are they actually going to clean up contamination?

Third, the fire engines “got stuck causing damage to refuge lands.” At first, it is hard to believe someone actually would take a fire engine (or fire engines, plural?) into an area and get stuck, especially the wetlands/mudflat areas around the VLA which are commonly known to be very soft and hazardous to vehicles. But this actually raises a serious question about how SpaceX realistically can respond to fires, given that SpaceX has knowingly chosen to launch rockets into an area that is surrounded by thousands of acres of publicly owned or managed high value mudflats, algal mat flats, and wetlands. As discussed below, 2021 demonstrated that SpaceX rockets are going to explode and crash. If SpaceX can’t launch their rockets in a manner that doesn’t damage Refuge and Park lands, SpaceX shouldn’t be allowed to launch rockets at Boca Chica.

The 2014 EIS states that “Operation of the vertical launch area and control center would not result in impacts to tidal sand flats or mud flats” (FAA 2014: 4-11). I previously submitted detailed comments where I noted the FAA’s statement is inaccurate, based on adverse impacts to Refuge or Park lands from rocket launch explosions. SpaceX is launching massive rockets to very high altitudes from the Boca Chica facility. If rocket debris land in the Refuge or Parks, the debris may land in locations where it is very difficult to clean up and remove the debris without causing additional environmental damage. In many areas, a person can’t just drive a truck out to pick up the debris.

Perhaps sensing the clear inadequacies of the EIS considering more recent on the ground SpaceX experiences cleaning up rocket debris from crashes, the FAA gives slightly more attention to this issue in the DPEA. However, the discussion still has significant errors or omissions. The FAA claims, in discussing “anomalies,” – the destruction of the rocket – that:

“Anomalies would not result in a permanent incorporation of Section 4(f) properties. A Starship/Super Heavy anomaly could result in an explosion on the launch pad, which would spread debris. Debris would be expected to be contained within the flight hazard area established for the mission. In the event of an anomaly, a limited number of SpaceX staff would enter the debris field and conduct an initial evaluation. Following the initial evaluation of the area, SpaceX would coordinate with applicable landowners or public land-managing agencies (e.g., TPWD and TGLO) prior to cleanup, in order to minimize damage to sensitive resources in accordance with SpaceX’s Anomaly Response Plan. 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. SpaceX would consult TPWD and/or USFWS prior to any activity that may impact sensitive wildlife habitat. SpaceX would enter Section 4(f) properties on foot as much as possible and coordinate the use of vehicles with applicable landowners or land-managing agencies to minimize impacts. SpaceX would perform an initial assessment of the debris to geotag and pick up debris by hand. Once the parking lot is constructed, SpaceX would not allow employees to park along SH 4 near the VLA. SpaceX would attempt to remove all debris by hand and carry out on foot. If SpaceX could not remove debris by hand, SpaceX would coordinate the use of equipment or vehicles with applicable landowners or public land-managing agencies. SpaceX would not use motorized vehicles on the mud flats and would stay within established paths. SpaceX would continue to use an Alaskan freight sled to remove larger pieces on foot. TPWD has approved this method to minimize impacts to resources.”

As discussed below, these claims are inconsistent with SpaceX’s documented cleanup activities as well as what is known about impacts to listed species and algal mats. For example, the DPEA states above that vehicles “would not use motorized vehicles on the mud flats” yet as documented in pictures of and emails regarding cleanup activities and fire prevention activities that is exactly what SpaceX has done.

FAA further claims in the DPEA:

Occupancy of the Section 4(f) properties would be short term, and there would be no permanent or residual effects to the properties lasting beyond the occupancy. Both algal flats and lomas typical of the surrounding area can recover naturally after disturbances similar to those that would be expected from debris and removal activities associated with any anomalies. For example, the public has regularly driven on and across Boca Chica State Park and other surrounding areas for decades, without causing any permanent adverse impacts.... Restoration with respect to algal flats may include grooming of tracks with the use of hand tools and ambient soils to prevent further impacts, removing fill, establishing the proper slope within the tidal range, and inoculating the soils with a mixture of the dominant algal species following methods proposed by the U.S. Department of Interior (U.S. Department of the Interior 2021, Lee and Lee 2000, Suzuki 2004).

For the FAA to compare the impacts of driving on an algal mat flat to driving on a sand beach is a ridiculous comparison to anyone who is familiar with the sensitivity of algal mats (and also ignores extensive data about the adverse impacts of beach driving), and the FAA does not provide data to support the claim that natural disturbances are similar to the removal of thousands of pounds of rocket debris using dozens of people and off-road vehicles. Likewise, I request that the FAA specifically provide a detailed list to date all “restoration” efforts that SpaceX has implemented to restore the functions and values of algal mat flats that were damaged by “restoration” activities and the measurements that demonstrate the actual success of such

activities. A few SpaceX employees going around with a shovel to try to fill in a few holes where debris landed is not adequate to address the widespread damage that occurred to the algal mats.

Of particular concern is that the DPEA does not acknowledge the unproven nature and limitations that the DOI acknowledged about algal mat restoration in the report cited by the FAA in the paragraph above. The DOI notes:

The project proponents acknowledge, however, that restoration of wind-tidal flats has not previously been attempted within Padre Island National Seashore, and restoration of wind-tidal flats in the surrounding area has never been attempted. A literature search revealed that very few restoration projects of wind-tidal flats have been conducted in the United States, Canada, and Japan. Those projects that were undertaken focused on man-made habitats, rather than natural habitats. Though **there are no established or standard methods to restore this type of wetland**, NPS has considerable knowledge and tools that have been used for similar restoration

DOI at 6 (bold added). A surprise is the first example offered by DOI in the next sentence is a beach “restoration” project at Cape Hatteras National Seashore. I live on Hatteras Island and am familiar with the beaches here due to the piping plover surveys I have done here, and I am very surprised to see that project on a high energy sandy beach is considered helpful to a project involving a very different habitat type: a low energy wind tidal algal mat mud flat. Yet again, however, the DPEA makes a critical point purporting to show how SpaceX will address known impacts – this time about restoring algal mat flats – and fails to acknowledge that at least one of the cited sources mentions the experimental, unproven nature of the restoration proposal.

Much of the South Bay area near the launch area as well as the area south of Hwy 4 is a muddy substrate that is so sinky that it is not possible in certain areas or under certain conditions for an ATV, UTV, an automobile or truck even using four-wheel drive to travel across that substrate without getting deeply stuck in the mud. Anyone with experience operating a vehicle in coastal Texas knows the risks of traveling in these habitats. Yet SpaceX employees apparently have not learned about the habitats in which they have chosen to work. A satellite image released by the USFWS in response to a FOIA request shows, at 26.003382 -97.158092, the gps location for “SpaceX stuck Vehicles”. The file date on the saved file is “4-21-2019” which is five years since the 2014 EIS was issued. In a comment letter from USFWS to the FAA in response to the draft written re-evaluation, the USFWS noted “On April 22, 2019, SpaceX employees went off-road and got a golf cart stuck in the tidal flats on Refuge land. They attempted to remove the golf cart and in doing so got an additional truck and forklift stuck in the same area. The Refuge was not immediately contacted. Damage accrued to sensitive mudflats which provide shorebird habitat.” FAA 2020a, quoting USFWS Comment). It is extraordinary that SpaceX would allow vehicles to travel out into these locations. Such activities demonstrate at best a basic lack of understanding of the ecology and geology of the area and at worst a complete disregard for the environmental values of the area.

Issues regarding adequacy of debris and chemical contamination response are complicated considerably by the fact that depending on the location and a range of factors such as wind

direction, wind speed, amount of time that the winds may be higher, and water levels and flows in the Rio Grande, the flats north and south of the VLA can be dry or slightly wet one day with no standing surface water and under several inches or more of water the next day. It is hard enough to recover debris if it is a moist mudflat. What happens if there is 6' of water on the flat. How will the contaminants be remediated if they seep into the mudflats or algal mat flats? I did field work for Virginia Tech, which was a contractor for USFWS in the National Damage Resource Assessment Process, assessing the impacts of the Deepwater Horizon oil spill on Piping Plovers, so I have seen the considerable difficulties associated with the cleanup activities. What may sound like a good "plan" in theory can face considerable difficulties when it comes time to execute the plan in the field.

Issues regarding damage from the cleanup of exploded SpaceX rockets are not hypothetical. In a March 9, 2020, email from the USFWS to SpaceX, released in response to a FOIA request, the USFWS noted:

"Would it be possible to meet you at Boca Chica this Thursday sometime to take a look at the debris removal from the refuge/Boca Chica State Park, from the February 28, 2020 10pm explosion?"

I would like to assess the level of impact to the vegetation and alkaline flats resulting from dragging the debris to the road.

When we met on-site (Monday, March 2, 2020 at 10:30am), we viewed the 3 pieces of metal debris, and recommended that the 2 smaller pieces (closest to the road), be dragged out carefully over the vegetation, and that the largest piece be cut into pieces and removed by helicopter, as was originally recommended by you, Randy. On Friday, March 6, 2020 at about 4:15pm I received a call from you stating the helicopter option was not going to be feasible due to high winds, uncertainty of debris weight, and because additional refuge lands would be needed for the helicopter to take off/land from, and because bird nesting has already begun, this would likely cause an unacceptable level of disturbance. So, during this call, I gave you permission to proceed with using a winch truck or cable to drag the pieces of debris from within the refuge. I viewed this 'cheaper' 'faster' option as beneficial to both Space-X and the refuge because of the unneeded attention the debris was causing. The rationale was to expedite the removal, before bird nesting occurred in the vicinity of the debris.

Now that there have been 2 explosions, with debris both times in pretty much the same area, I want to meet with you and discuss remedies for the damage to vegetation and ruts created in the alkaline flats. I would also like to see the refuge cable fence damaged during the removal process repaired."

(Email from Bryan Winton, USFWS, to Randy Rees, SpaceX and others, March 9, 2020). Likewise, in 2021, the USFWS noted:

"SpaceX rocket debris falling onto the Refuge has damaged the sensitive wind tidal flats. And, the vehicles or machinery used to retrieve rocket debris have created ruts and caused other damage that interrupts water sheet flow across these flats... Anomalies resulting in explosions on November 20, 2019, February 28, 2020, and December 9, 2020

resulted in debris scattered onto refuge managed lands. Retrieval methods damaged the sensitive alkaline flat and refuge cable fencing installed to protect the area from disturbance.

(USFWS 2021: 2). The cited USFWS documents provide evidence not only of the damage caused by SpaceX activities but also the difficulty associated with cleaning up the mess and the additional damage caused by cleanup activities. What happens when SpaceX launches a rocket and the debris lands at a greater distance where a winch truck or cable are not able to be used? What happens when SpaceX launches a much larger rocket, and it crashes? The 2014 EIS does not acknowledge such damage. And the subsequent FAA Reevaluations also do not adequately address these environmental impacts. In response to the USFWS comments, FAA only states:

“FAA Response: We appreciate these comments. The FAA and SpaceX look forward to discussing a damage assessment protocol with you. SpaceX is open to working with you to establish compensation for Refuge damages caused by SpaceX anomalies. Please reach out to Matt Thompson of SpaceX at Matthew.Thompson@spacex.com.

This response is inadequate from the standpoint of the environmental review processes that are required under federal law.

I am particularly concerned that any vehicles that are used to recover crash debris or that travel into the flats near South Bay or the flats south of Highway 4 without an understanding of the area could travel over and damage ecologically significant algal mat flats. This type of habitat is very valuable to feeding Piping Plovers; is very easily damaged by ORV activity; and takes years if not decades to recover. For this reason, the Department of the Interior, National Park Service, Padre Island National Seashore does not allow any recreational vehicle use on the bay side mud flats and algal mats at the Laguna Madre side of the barrier island. How will the USFWS protect valuable algal mat substrates if a huge rocket explodes during launch or landing and a large amount of rocket debris is scattered across algal flats habitats? It isn't possible to operate a vehicle on algal mat flats without impacting the algal mat, and the DPEA does not adequately address this critical issue. Damage to the algal mats clearly is incompatible with the purposes for which the Refuge and Parks were founded. As SpaceX cannot prevent such damage from occurring when cleanup activities occur in these habitats, this significant, foreseeable impact should be reason to deny the launch license.

3. Impacts of hurricanes on SpaceX rocket activities

A photograph of the VLA with a nearby fence suggests the area appears to have been elevated to approximately the height of the surrounding fence, possibly around 6 to 8 feet above ground level. This facility is only about 3/10th to 4/10th of a mile away from the Gulf of Mexico, and while there are dunes, the facility is almost directly open to the path of storm surge waters due to the HWY 4 access to the Gulf beach. In addition, there are multiple industrial buildings associated with SpaceX activities in Boca Chica Village.

The Gulf of Mexico is known for high levels of hurricane activity. Unfortunately, hurricanes in the Gulf can result in a 10 to 20 foot storm surge and associated waves that destroy almost all human built structures that are in the path. Larson (1999) provides a detailed account of the Galveston hurricane of 1900. In one neighborhood, the tide was 15.2' deep during the storm and "still rising" (Larson 1999: 189). From my work doing nonbreeding Piping Plover surveys, I regrettably have come face to face with the horrendous impacts hurricanes can cause, having seen the impacts from multiple storms including Hurricane Ike on the Bolivar Peninsula, TX, which destroyed most of the homes in the town of Gilchrest, TX. Ike was a Category 2 storm when it hit, not a Category 4 or 5. Almost all people who have lived through such hurricanes say that they "can't believe" how horrible the devastation is, and they "never thought it would happen" to them.

From the picture of the launch pad area, it appears a 15 to 20 foot storm surge would destroy the launch pad and associated facilities. Such a storm surge is foreseeable if a major hurricane hit the Boca Chica area. NOAA has released National Storm Surge Hazard Maps which depict storm surge inundation and risk for Category 1-5 hurricanes. National Storm Surge Hazard Maps – Version 2, at <https://www.nhc.noaa.gov/nationalsurge/> (accessed April 3, 2021). The Corps, FAA, and USFWS should very carefully review the NOAA inundation level maps for the VLA and the buildings in the Boca Chica area from a Category 3, 4, and 5 hurricanes. It is important to note that the SLOSH model used by NOAA "Does not model the impacts from waves" and "There may be waves on top of the surge." NOAA, "Storm Surge Frequently Asked Questions," <https://www.nhc.noaa.gov/surge/faq.php> (Accessed April 3, 2021). Thus, there would be additional wave impacts in addition to the surge impacts that have to be considered in addressing hurricane damage levels. Based on both historical information and computer modeling by NOAA, it is foreseeable that the storm surge from a major hurricane could severely damage or destroy the VLA and associated SpaceX industrial and buildings in Boca Chica Village. The CWA and NEPA permit process should fully evaluate the storm surge and wind impacts from various strength hurricanes to the SpaceX facilities; any hazardous or toxic wastes as well as non-toxic debris that would be discharged from storm surge or high winds associated with hurricane landfall; and any steps that would be necessary to conduct cleanup activities from the damage caused by a hurricane.

4. Impacts of erosion and sea level rise on rocket activities

I live on a barrier island off the mainland of North Carolina. An area about two miles from my house has lost over 1,000 feet of ocean beach to erosion in the last 130 years. Over the years I have done winter Piping Plover surveys and returned to sites in subsequent winters, I have seen high erosion levels in many other areas. In addition, erosion levels are increasing in areas due to sea level rise. Even if the VLA somehow manages to stay above the rising sea level, HWY 4, the road to the SpaceX launch facility, will be subject to overwash and inundation much sooner due to its low elevation. The SpaceX Boca Chica facilities remind me of another area on the Gulf where I did Piping Plover surveys, specifically the areas of Grand Isle and the area near Port Fourchon, LA. A long, elevated bridge that cost of millions of dollars had to be constructed to replace the low elevation LA 1 road which was becoming increasingly unusable from flooding

events. LA 1 reminds me of HWY 4 near Boca Chica Village, where I have seen water a few feet from the roadway on days with a hard north wind. Likewise, beach renourishment projects costing millions of dollars had to be constructed to protect properties and infrastructure in those areas in LA that I am mentioning. For both the road and the beach renourishment projects in LA, taxpayer funding was used. In the future, what activities will have to be taken to protect the SpaceX facilities? How will those activities affect Piping Plover habitats, which rely on dynamic coastal forces to maintain habitat characteristics? Will there be efforts to stabilize the area around the SpaceX VLA and control area using seawalls, rip rap, or beach renourishment? At Wallops Island, Virginia, which also is a rocket launch site, NASA has undertaken shoreline “restoration” and beach renourishment activities that include the reconstruction of a beach, berm, and dune that will help to absorb and dissipate wave energy before it nears NASA infrastructure, and a rock seawall embedded within the dune that will protect against the most severe energy (USFWS 2016). I am very concerned that SpaceX is embarking on a path that eventually will result in huge sums of taxpayer money having to be spent to protect a private industrial facility that never should have been built in such a very high risk coastal location.

5. Impacts of rocket activities on public access to the Parks and Refuge and violations of Section 4(f).

The FAA has gone from purportedly authorizing 180 hours per year of road/refuge closures discussed in the EIS, to 300 hours per year as discussed in a Project Revaluation, and now is proposing 800 hours per year (500 for nominal operation plus 300 for “anomalies”) DPEA at 19-25. It is extraordinary that a private corporation with a 50 acre inholding can force state parks and a National Wildlife Refuge to close, not only to the general public, but also even to U.S. government officials who work on and manage the refuge for the U.S. Fish and Wildlife Service.

My previous comments noted how SpaceX has not followed the procedure to issue and implement closure orders.

These concerns include: The Cameron County Commissioners Court first is supposed to issue a closure order then SpaceX closes the area. However, there are reports of SpaceX or local law enforcement closed the area before the time authorized in the Cameron County closure authorization. On Thursday, March 11, 2021, “Police/security began turning people away at 10:48 a.m. today (despite the closure notice saying it wouldn’t begin until 12:00 p.m.). The beach has been closed since 10:48 a.m. Whether you say it reopened after that, and is now closing again, it was effectively closed since 10:48 a.m” (Newstead 2021).

In response, the Texas General Land Office forwarded the email to the Cameron County Commissioners Court. An attorney with the Court responded:

“As we have discussed in the past, the road closure cannot begin until the time period specified by the Judge’s Order. Based on the wording of the complaint, it appears as if it might have either been our deputies or SpaceX personnel, though I tend to believe it was SpaceX personnel.

If it was our deputies, please inform them of the order and not to do this again in the future, even if they are directed to by SpaceX. And if SpaceX pushes back, please have them contact me so I can explain to them the criminal implications of obstructing a highway without legal authority. I have discussed this issue at great length with the DA's office and anticipate the prosecutors will be ready to take any appropriate action if necessary."

Email from Daniel Lopez to Luis Mendieta and others, March 12, 2021. The existence of these problems in March, 2021, suggests that SpaceX does not take the closure procedures seriously.

Second there are significant concerns regarding the manner in which closures are calculated. The DPEA states:

For purposes of the PEA, the FAA defines an operational closure as follows:
A closure begins when local law enforcement, under the direction of an order from the Cameron County Commissioners Court, shuts down SH 4 and Boca Chica Beach for a tank test, wet dress rehearsal, static fire engine test, or launch. A closure ends when the operation is completed and local law enforcement opens SH 4 and Boca Chica Beach. The FAA does not have a direct role in approving road and beach closures. Therefore, closures that are planned but not implemented (e.g., Cameron County revokes the closure) do not meet the FAA's definition of a closure for this PEA. For an operation requiring a closure, SpaceX would coordinate with Cameron County under the authority granted in the 2013 Memorandum of Agreement between the TGLO and Cameron County (TGLO 2013). (DPEA at 19-20).

The major problem with FAA's interpretation is that it underestimates the effect on the public of the announced closures so that the actual number of closure hours appears to be much lower than how the public acts under real world conditions. When the Cameron County Commissioners Court issues a time for a closure, that is the time the public follows. No one is going to take the time to drive to Boca Chica Beach when they know a particular time for a closure has been announced – say 12:00 p.m. to 8:00 p.m. – when there has been a formal closure announcement. Effectively, for the public, the area has been closed for that 8 hour period of time, even if SpaceX delays the closure of the area or does not go forward with the launch.

It is important to emphasize that I am not raising concerns about only a few minutes of difference in the total closure amounts. There is a major discrepancy between USFWS and SpaceX closure hour calculations. As noted by the USFWS, "In 2019, the USFWS recorded over 1,000 closure hours and SpaceX reported a total of 158 hours" (USFWS 2021: 2). Letter from Manuel "Sonny" Perez III Complex Refuge Manager, South Texas Refuge Complex, and Charles Ardizzzone, Project Leader, Texas Coastal Ecological Services Office, USFWS, to Daniel P. Murray, Manager, Safety Division, Federal Aviation Administration (January 22, 2021).

The FAA has a duty under NEPA to address the closure procedures and measurements. But for the FAA launch authorization, these closures would not occur. The FAA cannot continue to accept unsubstantiated or inaccurate SpaceX claims about closure amounts.

6. To Comply with NEPA, the Corps must prepare an Environmental Impact Statement to analyze the environmental impacts of SpaceX's activities.

The National Environmental Policy Act (NEPA) is "designed to prevent agencies from acting on incomplete information and to 'ensure that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast.'" *Sierra Club v. U.S. Army Corps of Engineers*, 295 F.3d 1209, 1214 (11th Cir. 2002) (quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989)) (internal quotation marks omitted). NEPA obligates the Corps to prepare an Environmental Impact Statement if "any significant environmental impacts might result" from the issuance of a permit. *Sierra Club v. Peterson*, 717 F.2d 1409, 1415 (D.C. Cir. 1983); 42 U.S.C. § 4332(2)(C). To evaluate whether a potential impact is "significant," the Corps should analyze both the context in which the proposed action would take place and the intensity of its impact. 42 U.S.C. § 4332(2)(C). "Considering context is critical because the significance of an action can vary based on the setting and surrounding circumstances." *Am. Rivers v. Fed. Energy Regulatory Commission*, 895 F.3d 32, 49 (D.C. Cir. 2018).

"Intensity" concerns "the severity of impact." 40 C.F.R. § 1508.27(b). NEPA regulations prescribe several factors that can make a proposed project significant from an intensity standpoint, including the following:

- "Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, ... wetlands... or ecologically critical areas;"
- "The degree to which the effects on the quality of the human environment are likely to be highly controversial;"
- "The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks;"
- "The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration;"
- "Whether the action is related to other actions with individually insignificant but cumulatively significant impacts;"
- "Whether the action will violate other environmental statutes;"
- "The degree to which the action may ...cause loss or destruction of significant scientific, cultural, or historical resources;" and
- "The degree to which the action may adversely affect an endangered or threatened species or its [critical] habitat."

40 C.F.R. § 1508.27. In assessing the context and intensity of a proposed action, the Corps must consider all related actions together. In other words, "[l]arge projects may not be artificially segmented into smaller ones for the purpose of avoiding NEPA or minimizing the appearance of adverse environmental impact." *Colony Fed. Sav. & Loan Ass'n v. Harris*, 482 F. Supp. 296, 302 (W.D. Pa. 1980). As the regulations state, "[s]ignificance cannot be avoided by terming an action temporary or breaking it down into small component parts." 40 C.F.R. § 1508.27(b)(7).

As discussed above in extensive detail, SpaceX's proposed activity meets every one of these criteria, due to significant adverse impacts to a range of listed and sensitive species, public Refuge and Park lands, habitats of national importance, and recreational access limitations

associated with increasing SpaceX closures. The FAA must prepare an EIS that evaluates the entire SpaceX project at Boca Chica.

7. Conclusion

The Boca Chica area is a nationally significant shorebird habitat. The construction and operation of a massive industrial facility to assemble and launch one of the world's largest rockets into space is fundamentally incompatible with one of the most incredible shorebird wintering areas in the United States. The FAA should not grant a permit for the SpaceX Starship/Superheavy launch vehicle program at Boca Chica.

Sincerely,

Sidney B. Maddock

Copy: Brian Winton, USFWS (by email)

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