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STAFF REPORT: REGULAR CALENDAR

Application No.:	**CD-0010-22**
Applicant:	**Department of the Air Force, U.S. Space Force**
Location:	Vandenberg Space Force Base, Santa Barbara County
Project Description:	Construct a new commercial space launch facility at the former site of Space Launch Complex 5 on Vandenberg Space Force Base and carry out up to 48 rocket launches and 48 static fire engine tests per year.
Staff Recommendation:	Concurrence

SUMMARY OF STAFF RECOMMENDATION

The Department of the Air Force (DAF) has submitted a consistency determination for the construction and operation of a new commercial space launch facility by the Phantom Space Corporation (Phantom) at the former site of Space Launch Complex 5 (SLC-5) on Vandenberg Space Force Base (VSFB), located in northern Santa Barbara County. The proposed project involves construction of two 1,500 square foot concrete launch pads and associated infrastructure as well as implementation of a space launch

program with a maximum frequency of 48 rocket launches and 48 static fire engine tests annually.

The proposed project has the potential to result in a variety of effects to California coastal resources, including through the release of debris into the ocean and disturbance of environmentally sensitive habitat areas (ESHA) near the proposed launch complex due to elevated sound levels and night lighting.

With respect to marine debris, the proposed project includes two sources: weather balloons and the "first stage" and "fairings" sections of the rockets. Up to six weather balloons would be released prior to each launch to measure upper atmosphere conditions and would then fall to the ocean below in state or federal waters. Due to the height it would fall from and large ocean area it may land in, it would not be feasible to recover each weather balloon and associated 1.5-pound instrument array. DAF has therefore committed to ensure that Phantom provide a monetary donation to UC Davis' California Lost Fishing Gear Recovery Project to offset this source of marine debris through the recovery of lost and abandoned fishing nets and other gear.

Each rocket launch would also involve the release of the rocket's first stage in the upper atmosphere. This section of the rocket would weigh between 2,600 and 7,200 pounds, is made primarily of aluminum, and would land and sink in the international waters off the coast of Baja California, Mexico. This material is also expected to be unrecoverable. Although it would be released into the ocean far from shore outside of the coastal zone and is unlikely to be buoyant enough to move into the coastal zone or affect coastal resources, Commission staff has encouraged DAF to take steps to recover the first stage or offset its release into the ocean by collecting and removing other types of marine debris. DAF has not committed to taking any such steps, however, and has stated that the release of this material into the ocean would not have an adverse effect on coastal resources.

With respect to ESHA impacts, the proposed project would result "spillover" effects to sensitive wildlife[1] habitat adjacent to the site, primarily through elevated sound levels from launches. However, DAF has conducted extensive monitoring across VSFB to understand wildlife responses to launch activity and has found that no adverse impacts have occurred and that significant wildlife populations continue to be present despite periodic launch events and elevated sound levels. However, the proposed project would increase the frequency of launches on VSFB and raises questions about how representative past monitoring results will be to future conditions. To demonstrate that adverse impacts to sensitive wildlife and habitats continue to be absent and that the increased launch frequency remains compatible with the continued use of adjacent ESHA, DAF will implement an enhanced monitoring program focused on the sensitive species and habitats most likely to be found in the project area, California reg-legged frog, western snowy plover (snowy plover), marine mammal haul-out areas, and two

[1] Wildlife species include: California red-legged frogs, western snowy plover, pallid bat, and western red bat.

species of bat designated by the California Department of Fish and Wildlife as state Species of Special Concern. The proposed monitoring programs were developed in coordination with the U.S. Fish and Wildlife Service, National Marine Fisheries Service and bat biologists with national and international expertise.

With regard to commercial and recreational fishing, the proposed project has the potential to affect fish activities through notices to mariners advising closures off the coast of VSFB. DAF and Phantom have coordinated with the Port San Luis Commercial Fishing Association to identify timing for launches that would be least impactful to the fishing fleet, and Phantom has committed to submitting a Fisheries Communication and Coordination Plan to the Executive Director for review and feedback to ensure ongoing appropriate communications about scheduled launches with the fishing fleet.

Finally the proposed project is one of many projects proposing increased launch frequency at VSFB. The average launch frequency at VSFB has been 4.4 launches annually over the past five years, although VSFB has contracted to conduct up to 92 space launches annually. In addition to the 48 launches annually proposed under this project, SpaceX was recently approved to increase their launch frequency to 36 launches annually (ND-0009-23) and the proposed Blue Origin project includes up to eight launches annually. To address concerns about overall launch frequency and impacts at VSFB, DAF has committed to coming back to the Executive Director in five years, before the full launch frequency starts, to report on the findings of their environmental monitoring.

With implementation of these commitments and the additional coastal resource protection measures described in the report below and included in **Exhibit 1**, the staff recommends that the Commission **concur** with DAF consistency determination (No. CD-0010-22) and find the proposed project consistent to the maximum extent practicable with the enforceable policies of the California Coastal Management Program. The motion to concur is on **page 5**.

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APPENDICES

EXHIBITS

I. FEDERAL AGENCY'S CONSISTENCY DETERMINATION

Space Launch Delta 30 of the Department of the Air Force, United States Space Force (DAF), has determined that the project is consistent to the maximum extent practicable with the California Coastal Management Program (CCMP).

II. MOTION AND RESOLUTION

Motion:

> I move that the Commission concur with Consistency Determination CD-0010-22 on the grounds that the project described therein would be fully consistent, and thus consistent to the maximum extent practicable, with the enforceable policies of the CCMP.

Staff Recommendation:

Staff recommends a YES vote on the forgoing motion. Passage of this motion will result in a concurrence with the determination of consistency, and adoption of the following resolution and findings. An affirmative vote of a majority of the Commissioners present is required to pass the motion.

Resolution:

> The Commission hereby concurs with Consistency Determination CD-0010-22 on the grounds that the project is fully consistent, and thus consistent to the maximum extent practicable, with the enforceable policies of the CCMP.

III. APPLICABLE LEGAL AUTHORITIES

A. STANDARD OF REVIEW

The proposed space launch complex would not be a government facility and would be constructed and operated solely by a private entity, the Phantom Space Corporation (Phantom), on a portion of Vandenberg Space Force Base that would be leased to Phantom by the Department of the Air Force (DAF). DAF nevertheless has determined that the proposed project is a "federal agency activity," as defined in the Coastal Zone Management Act's federal consistency regulations and has therefore prepared a consistency determination for the Commission's review. The federal consistency regulations at 15 C.F.R. Section 930.31(a) state that:

> The term "Federal agency activity" means any functions performed by or on behalf of a Federal agency in the exercise of its statutory responsibilities. The term "Federal agency activity" includes a range of activities where a Federal agency makes a proposal for action initiating an activity or series of activities when coastal effects are reasonably foreseeable, e.g., a Federal agency's proposal to physically alter coastal

> resources, a plan that is used to direct future agency actions, a proposed rulemaking that alters uses of the coastal zone. "Federal agency activity" does not include the issuance of a federal license or permit to an applicant or person (see subparts D and E of this part) or the granting of federal assistance to an applicant agency (see subpart F of this part).

Commission staff questioned this interpretation and the Commission's review of a consistency determination for the project by DAF rather than a coastal development permit application or consistency certification by Phantom since those are the standard mechanisms by which the Commission reviews activities proposed by private entities within the coastal zone and/or affecting any coastal use or resource. In response, DAF stated that "All activities taking place on federally owned [Department of Defense] land, including those that utilize private entities, are done so in a manner exercising our statutory responsibilities." Although the Commission has a long history of reviewing and authorizing development activities carried out by private entities on federally owned land, including Vandenberg Space Force Base, through the coastal development permit application or consistency certification processes, DAF maintains that the proposed project is different due to the unique partnership arrangement it has with commercial space launch companies like Phantom. In short, because the federal government no longer carries out space launch activities, DAF relies on private companies such as Phantom to send government payloads to space and to be available to support DAF needs and priorities. Accordingly, while the project would be built, maintained and operated by a private company to serve its business objectives and would only occasionally launch materials at the behest of DAF, it would also help meet the needs of the federal government. Based on this mixed purpose and at the request of DAF, Commission staff agreed to bring forward the proposed project for the Commission's consideration as a consistency determination from DAF. However, future projects will continue to be considered on a case-by-case basis and different review approaches will be used when appropriate.

The federal Coastal Zone Management Act (CZMA), 16 U.S.C. §§ 1451-1464, requires that federal agency activities affecting coastal resources be "carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs." *Id*. at § 1456(c)(1)(A). The implementing regulations for the CZMA (federal consistency regulations), at 15 C.F.R. Section 930.32(a)(1), define the phrase "consistent to the maximum extent practicable" to mean:

> … fully consistent with the enforceable policies of management programs unless full consistency is prohibited by existing law applicable to the federal agency.

This standard allows a federal activity that is not fully consistent with California's Coastal Management Program (CCMP) to proceed, if full compliance with the CCMP would be "prohibited by existing law." In its November 2023 consistency determination, DAF did not argue that full consistency was prohibited by existing law or provide any

documentation to support a maximum extent practicable argument. Therefore, there is no basis to conclude that existing law applicable to the federal agency prohibits full consistency. Since DAF has raised no issue of practicability, as so defined, the standard before the Commission is full consistency with the enforceable policies of the CCMP, which are the policies of Chapter 3 of the Coastal Act (Cal. Pub. Res. Code §§ 30200-30265.5).

However, the Commission has the ability under the federal consistency regulations to re-open this consistency determination should the proposed federal activity have effects on any coastal use or resources substantially different from those originally described in DAF's consistency determination. Should this scenario occur, the Commission's finding that the project is "fully consistent" with the enforceable policies of the CCMP could be re-examined in light of new circumstances.

B. FEDERAL LANDS EXCLUDED FROM THE COASTAL ZONE

Under the federal CZMA, the Commission is authorized to review federal agency activities and actions that occur within or outside of California's coastal zone and that affect any land or water use or natural resource of the coastal zone. However, the CZMA defines "coastal zone" to exclude certain land under the ownership and sole control of the federal government.[2] Thus, in cases such as this where a proposed project that is being reviewed under the Commission's federal consistency authority is to be located on federal land (i.e., on VSFB), the Commission's review is limited to evaluating whether the activities will result in effects that extend outside of the federal property and will "spill over" into the coastal zone. For example, public safety zones implemented during rocket launches such as those proposed in the current project would extend outside of VSFB and could result in the closure of public beaches and campgrounds, including those at Jalama Beach County Park. This would affect public beach access and recreation within the coastal zone even though the space launch complex would be located on the federal land of VSFB. In addition, the loss and disturbance of sensitive habitats and wildlife species, such as snowy plover and California red-legged frogs, on VSFB can imperil the survival and health of those same habitats and species outside of VSFB. As such, the Commission has the authority to review federal agency activities on federal property like VSFB, albeit in a somewhat different manner than the Commission's typical review of development activities under the California Coastal Act.

IV. FINDINGS AND DECLARATIONS

A. BACKGROUND AND PROJECT LOCATION

Vandenberg Space Force Base (VSFB) is located in Santa Barbara County, west of the City of Lompoc and encompasses an area of 99,100 acres. VSFB was originally used

[2] Coastal Zone Management Act § 304(1) excludes from the coastal zone "all lands held in trust by or whose uses are subject solely to the discretion of the federal government."

by the U.S. Army and was transferred to the U.S. Air Force (DAF) in 1957.[3] DAF selected VSFB as a site for what would eventually become the Western Range[4] because of the isolated location, ability for year-round operations, and because the base could support space and rocket launches with flight paths that did not extend over large civilian populations.[5] VSFB retains these characteristics today and it is one of very few federal facilities that supports space launch activities.[6] Throughout the 1950s, VSFB was used extensively for testing various missile systems and also for the launch of the first polar orbiting satellite, Discoverer 1, in 1959. Space exploration then became the primary focus for activities at VSFB.[7] The Commission has reviewed consistency and negative determinations from the Department of the Air Force for various space programs at VSFB since the early 1980s, including the Space Shuttle Program (CD-21-82), multiple rocket launching programs (Atlas, Titan, etc.), and, more recently, launch activities carried out by the commercial Space Exploration Company, SpaceX (ND-103-03, ND-088-05, ND-055-10, ND-0035-14 and ND-0009-23). In 2021, the 2,000th launch from VSFB was completed.

Current and Proposed Launch Programs

VSFB's existing space launch programs occur over seven space launch complexes and involve five different space launch companies, including Space X, United Launch Alliance (ULA) and Firefly Aerospace. In total, DAF's existing contracts allow for up to 92 total space launches annually by all companies operating on VSFB. A review of Commission records shows that over the past 29 years, the Commission has concurred with launch programs totaling up to 64 potential launches annually, as shown in the table below. However, such high numbers of space launches have never occurred, as explained further below.

DAF has additionally developed eight missile launch sites and expects to launch up to 23 missiles annually. The Commission has previously concurred with up to 30 ballistic missile launches in CD-06-99. A map of the proposed project location on VSFB and a map of all missile and space launch complexes on VSFB is available in **Exhibit 2 and Exhibit 3**. The launch sites on VSFB are arranged from north to south, close to the coast. Tables of contracted and proposed/under Commission review annual space launches and expected annual missile launches are provided below. A narrative summary of each launch program, its location, and operations is available in **Exhibit 2**.

[3] https://www.vandenberg.spaceforce.mil/About-Us/History/
[4] The Western Range is the area over which rockets are fired for testing and tracking. The Western Range extends from the West Coast of the United States to 90 degrees east longitude in the Indian Ocean, where it meets the Eastern Range.
[5] https://www.vandenberghousing.com/history
[6] Nearly all of the space launches in the U.S. are carried out at VSFB and Cape Canaveral in Florida.
[7] https://militarybases.com/california/vandenberg/

Table 1: Current Annual Launches on VSFB

Launch Complex Name	Launch Vehicle Name	Maximum Contracted Number of Launches	CCC Application No.	Number of Launches in CCC Concurrence	Launch Vehicle Category*	Maximum Launch Vehicle Height
TP-01	Minotaur	6	n/a	--	Small	78 feet
SLC-2W	Firefly Alpha	11	CC-30-96**	10	Medium	95 feet
576-E	ABL RS1	12	ND-0020-21	12	Small	88 feet
SLC-3E	ULA Vulcan Centaur	6	ND-0027-20	6	Medium	220 feet
SLC-4E and SLC-4W	Falcon 9	36***	ND-0009-23***	36 launches from SLC-4E*** 6 landings at SLC 4-W	Medium	230 feet
SLC-8 (multi-user pad)	Minotaur	15	n/a	--	Small	55-79 feet
Total Launches:		*92*	*Total Number of Launches across all programs concurred with by the CCC (does not include landings):*	*64*		

** Categories are based on payload capacity. Small vehicles carry less than 4,400 lb., medium vehicles carry between 4,400 lb. and 44,000 lb., and heavy vehicles carry between 44,000 and 110,000 lb.*

*** These Commission concurrences were for earlier launch programs or missile programs at these space launch complexes on VSFB. For more details, please see Exhibit 2.*

**** This launch program is currently being reassessed by the Commission.*

Table 2: Proposed Annual Launches on VSFB under Commission Review

Launch Complex Name	Launch Vehicle Name	Maximum Permitted Number of Launches	CCC Application No.	Launch Vehicle Category	Maximum Launch Vehicle Height
SLC-9	Blue Origin New Glenn	8	CD-0010-21	Heavy	360 feet
SLC-5	Phantom Daytona-E and Laguna-E	48	CD-0010-22 (subject of this report)	Small	79 feet
Total Proposed Launches:		*56*			

Table 3: Expected Annual Missile Launches on VSFB

Missile Name	Maximum permitted number of Launches
MDA	12
Minuteman III	5
GBSD	6
Total Missiles	*23*

Although DAF contracts and Commission authorizations cover a large number of launch activities, there is a significant discrepancy between those numbers and the actual number of launches that occurs annually at VSFB. From 2017 through 2021, VSFB supported an average of 4.4 rocket launches per year, with a maximum of 7 launches in both 2017 and 2018. These numbers are similar to those considered by the Commission during its last comprehensive evaluation of base-wide launch operations; carried out in 1998 as part of Consistency Determination No. CD-049-98. At that time, the Commission reviewed scheduled launches from 1998 through 2002 and noted that an average of eight launches and maximum of 14 launches would occur per year. The current number of annual launches is a small percent of the maximum number of launches DAF has indicated are available under contract with the various launch providers. Many of the commercial launch providers operating at VSFB are newer “start-up” companies working to establish new space launch programs and have proposed what are generally considered to be optimistic or aspirational targets for annual launch frequencies. These frequencies typically assume that research and development efforts will proceed smoothly and without significant delay and that adequate investment capital will be provided. These aspirational launch frequencies are used in NEPA and CZMA review; however, the realities and challenges of funding and developing a complicated

aeronautics and space program from scratch – and securing sufficient customers to implement it - means that the proposed launch frequencies have never previously been met. Therefore Commission staff's review efforts in the past have focused primarily on the actual number of launches being carried out and adherence to adverse impact avoidance and minimization measures (such as those discussed in the Public Access and Recreation Section of this report) and less on the aspirational or maximum numbers of launches proposed. In recent years, however, some private companies such as SpaceX, have begun to approach their launch frequency goals and have expressed increased interest in performing additional commercial space launches at VSFB.

Although it remains incomplete pending the submittal of additional information, DAF submitted a consistency determination (CD-0010-21) in 2021 for a proposal from Blue Origin to construct a new space launch complex and carry out associated operations for up to 8 launches of medium-heavy-lift class rockets. Additionally, the existing SpaceX launch program at VSFB recently increased the annual number of launches of its space vehicles from 6 to 36 annually at SLC-4E, which was reported to the Commission at its June 2023 hearing as negative determination no. ND-0009-23.[8] The proposed Phantom project, as described below, would slowly build up to 48 launches annually and would increase the number of contracted launches by 52 percent. In addition, DAF has indicated that a consistency determination is being prepared for submittal in the coming months to expand SpaceX operations to an additional existing launch complex and to increase its annual number of space launches to 100 per year. Further, DAF is in the initial stages of a planning process for a project referred to as "Spaceport of the Future" that would involve the construction and operation of several new launch complexes and other support facilities and infrastructure throughout VSFB as well as further increases in space launches. Additional information and details about the scope and timeline for this large-scale effort to significantly expand VSFB's facilities and operations are expected to be available next year. In combination with the proposed project, these future projects have the potential to dramatically increase the total number of space launches from VSFB and expand them from the current level of approximately one per month to a future level of two or more per week.

Project Location

The proposed project would be located on VSFB at the former site of Space Launch Complex-5 (SLC-5). Maps of the SLC-5 site location within VSFB, and the proposed project development areas are available in **Exhibit 3** and **Exhibit 4**, respectively. Portions of the site were previously developed and used by the National Aeronautics and Space Administration (NASA) to launch Scout space vehicles. When the Scout program ended in 1994, all facilities at SLC-5 were deactivated and then demolished between 2009 and 2012. Buildings were removed and the concrete pad used for launches was covered by new fill soil. A map showing the extent of historical

[8] This program is currently being reassessed by the Commission.

development at SLC-5, compared to the proposed development area is available in **Exhibit 5**.

Project History

A staff report was previously prepared for the proposed Phantom project and was scheduled for the Commission's June 2023 hearing. Consideration of the proposed project was postponed at the request of DAF. On November 9, 2023, DAF submitted a revised consistency determination to the Commission for consideration. Changes have been made to the proposed project in the revised consistency determination, including changing the alignment of a proposed fire break to avoid an area supporting a vegetation alliance identified as vulnerable by the California Native Plant Society's Manual of California Vegetation. The exhibits and analysis below reflect the project described in the revised consistency determination.

B. PROJECT DESCRIPTION

Within VSFB, Phantom Space Corporation (Phantom) proposes to construct two 1,500 square foot concrete launch pads, associated infrastructure, and a 7,500 square foot horizontal integration facility at the former site of the SLC-5 launch complex. This new launch complex would be constructed and operated by Phantom for its Daytona-E and Laguna-E launch programs. The project would also include installing utilities such as electrical and communication lines, firebreaks, and improvements to fire access roads. Utilities would be installed along existing roadways and utility corridors.

Rocket and payload (e.g. satellite) assembly would be conducted at the existing Phantom factory in Tucson, Arizona. Once assembled, the rockets would be shipped via commercial truck transport to VSFB. Payloads would be shipped from several locations including Arizona, Florida, Colorado, and elsewhere in California. Final assembly of the rocket and payload would occur at the proposed space launch complex within the horizontal integration facility. The flight-ready rocket would then be transported within the site to one of two proposed launch pads at the complex and prepared for vertical tests or launch. Vertical tests would be performed a few days prior to each launch to show that the engine is performing as expected when fired at full thrust. Phantom proposes to perform up to 48 launches annually in addition to up to 48 vertical or static fire tests. Static fire tests involve ignition of the rocket engine in a controlled manner to determine proper functioning prior to a launch attempt.

The maximum number of launch and static fire tests carried out each year under the proposed project would gradually increase over the course of six years, as shown below in Table 4.

Table 4: Projected Phantom Launches and Tests by Calendar Year

Operational Year	Number of Launches (max.)	Number of Static Fire Tests (max.)
1	1	1
2	2	2
3	5	5
4	12	12
5	24	24
6	48	48

The purpose of the proposed project is to provide low-cost access to satellite technology by mass manufacturing launch vehicles, satellites, and space propulsion systems. DAF states that:

> The purpose of the Proposed Action is to address lack of accessible U.S. enterprise access to space and to fulfill requirements of commercial and governmental entities in the small satellite orbital and suborbital market. Phantom's mission is to provide low-cost access to satellite technology by mass manufacturing launch vehicles, satellites, and space propulsion systems. Over the past several years, the Department of Defense (DOD) and intelligence community have shifted from the use of U.S. government-developed rockets to nearly exclusive reliance upon the commercial space transportation industry for reliable, affordable, and agile access to space for national security missions. This new model has proven valuable and the shift to commercial launch service providers for national security missions is now DOD's standard practice.

Additional details about Phantom's proposed launch pad and other facility construction, utility and road improvements, construction phasing, and launch schedules can be found in **Appendix A**.

C. Other Agency Approvals and Consultations

United States Fish and Wildlife Service

DAF has completed a formal consultation with the U.S. Fish and Wildlife Service (USFWS) for federally listed species protected under the federal Endangered Species Act that may be affected by the proposed project. The biological opinion issued by the USFWS, dated April 24, 2023, found that the proposed project "may affect but is not likely to adversely affect" marbled murrelet, southern sea otter, California condor, unarmored threespine stickleback and tidewater goby. The USFWS further found that

the proposed project would not likely jeopardize the continued existence of California red-legged frogs or snowy plovers. The USFWS made these determinations due to the protection and mitigation measures that DAF has agreed to implement. These protection and mitigation measures are available in **Appendix A**.

National Marine Fisheries Service

DAF has consulted with the National Marine Fisheries Service (NMFS) regarding rocket and missile launches and aircraft operations at VSFB under the Marine Mammal Protection Act and received a Letter of Authorization (LOA) from NMFS in 2019. The LOA is provided in **Appendix A**. The LOA is valid for five years and allows for up to 110 rocket launches annually across all launch facilities at VSFB. DAF indicates in its consistency determination that the proposed project falls within the scope of the activities covered by the LOA.

According to the consistency determination and the draft environmental assessment prepared for the proposed project, DAF also conducted informal consultation with NMFS for potential adverse impacts to marine species listed under the Endangered Species Act such as certain whales and sea turtles. On May 4, 2022, NMFS concurred with DAF that the proposed project "is not likely to adversely affect the NMFS ESA-listed species and/or designated critical habitat."

Federal Aviation Administration

The Federal Aviation Administration (FAA) has a role in licensing commercial space launch operations and approving airspace closures for launch operations. Phantom submitted a launch license application to the FAA in April 2023 and the FAA will consider the application after DAF completes its NEPA process.

Tribal Outreach and Consultation

DAF performed tribal consultation in 2022 with the Santa Ynez Band of Chumash Indians (Santa Ynez Band) under Section 106 of the National Historic Preservation Act. No ground disturbance is expected at any archaeological sites and DAF has indicated to the Commission that the Santa Ynez Band of Chumash requested the presence of a tribal monitor only during ground disturbance in and near known archaeological sites.

Consistent with the Commission's Tribal Consultation policy, Commission staff received a list of Tribes with potential cultural connections to the project area from the Native American Heritage Commission and completed outreach to those Tribes in January of 2023. Consultation invitations were mailed to the Barbareño/Ventureño Band of Mission Indians, the Chumash Council of Bakersfield, the Coastal Band of the Chumash Nation, the Northern Chumash Tribal Council, the San Luis Obispo County Chumash Council, and the Santa Ynez Band of Chumash Indians. The Commission received a response from the Northern Chumash Tribal Council requesting consultation. The Commission held a consultation meeting with Northern Chumash Tribal Council representatives on May 25, 2023. Further discussion of this tribal consultation and potential project effects on cultural resources is available in the Cultural Resources section of this report below.

D. ENVIRONMENTALLY SENSITIVE HABITAT AREAS

Coastal Act Section 30240(b) states:

> Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

Coastal Act Section 30107.5 defines environmentally sensitive area:

> "Environmentally sensitive area" means any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.

Environmentally Sensitive Habitat Areas or ESHA are areas where plant communities or species are rare or especially valuable and easily disturbed or degraded by human activities. There are several types of ESHA adjacent to the project site including: Lemonade Berry Scrub, riparian habitat in Honda Creek, and western snowy plover nesting habitat. Section 30240(b) requires development adjacent to ESHA be sited and designed to prevent impacts that would significantly degrade ESHA habitat and be compatible with continued use of ESHA habitat. The proposed project has the potential to adversely affect ESHA adjacent to the project site in two ways: through the use of artificial night lighting at the complex that would extend into adjacent habitat areas, and due to the elevated levels of noise produced by the proposed launches and static fire tests at the launch complex.

DAF states in its consistency determination that the proposed project is consistent with Section 30240. DAF has sited and configured the proposed project to avoid and minimize adverse impacts to rare or especially valuable species and habitats adjacent to the project site and has also proposed monitoring and reporting to help determine if unexpected adverse impacts occur.

Types of Environmentally Sensitive Habitat Areas

The proposed project would be sited entirely within the former footprint of a space launch complex, SLC-5, that was in use for several decades and then decommissioned and removed from 2009 to 2012. As shown in **Exhibit 6**, the vegetation and fire management area that would surround the new proposed facility would be adjacent to a vegetation community identified as Lemonade Berry Scrub. Lemonade Berry Scrub is a rare vegetation community that the Commission has previously identified as ESHA.

As described in the background section above, DAF submitted a revised consistency determination for this project in November 2023 that changed the alignment of the vegetation and fire management area from an earlier proposal. The change in alignment meant that the area identified as Lemonade Berry Scrub is now outside of the area that would be periodically cleared of vegetation for the proposed fire break.

In addition to the area of Lemonade Berry Scrub directly adjacent to the proposed vegetation and fuel management area, the launch complex is also located above and approximately 250 feet north of Honda Canyon at its closest point. Within Honda Canyon is Honda Creek and riparian habitat that supports sensitive wildlife. Areas known to support nesting by snowy plovers are also near the proposed launch complex (approximately 3.5 miles to the northwest) and within the zone that would experience elevated sound levels during launch activities and static fire engine testing.

Lemonade Berry Scrub

Lemonade Berry (*Rhus integrifolia*) is an aromatic evergreen shrub found within the coastal zone and very close to the coast from Santa Barbara County down through Baja California. Lemonade Berry Scrub is a vegetation alliance dominated by lemonade berry and comprised of coastal scrub species, such as California sagebrush (*Artemisia californica),* Coyote bush *(Baccharis pilularis),* Mediterranean broom (*Genista linifolia*), Laurel sumac (*Malosma laurina),* or orange bush monkey flower *(Diplacus aurantiacus).* Lemonade Berry Scrub has been identified with a Global (G) and State (S) rarity ranking of 3 in the Manual of California Vegetation (Manual). Global and State level 3 communities and species are identified are identified in the Manual as vulnerable which denotes, “a moderate risk of extinction due to a restricted range, relatively few populations (often <80), recent and widespread declines, or other factors.” These rarity rankings are developed considering the range, extent, area of occupancy, number of occurrences and the number of high-quality occurrences of a vegetation alliance.[9] In the specific case of Lemonade Berry Scrub, a ranking of G3/S3 means that is it considered vulnerable both worldwide and statewide, with an estimated 21 to 100 total occurrences.

In addition to its rarity, Lemonade Berry Scrub is vertically diverse habitat type, which makes it suitable for roosting, nesting, denning, and foraging for native animals. Its canopy is around 10 feet in height, and it has both an understory layer of numerous native shrubs and an herbaceous layer on the ground of various native species of grasses and forbs. This vegetation alliance is also considered to be particularly vulnerable and sensitive to disturbance from vegetation removal and development because its seeds are not viable over long time periods, and it has low recruitment (reproduction). Additionally, the composition of this vegetation alliance is changing due to increasing cover of invasive plants, such as fountain grasses. As such, the Commission’s staff ecologist has determined that this habitat type adjacent to the project area meets the definition of ESHA under Coastal Act Section 30107.5. Lemonade Berry Scrub species are also part of Coastal Sage Scrub and Chaparral communities in the coastal zone, and occurrences of Lemonade Berry are found south

[9] CDFW defines natural communities, animals, and plants with a global or state ranking of 1, 2, or 3 as rare and the CCC typically finds these to be ESHA. CCC also typically considers plant and animal species listed by the federal and state endangered species acts (ESA and CESA, respectively) and/or identified under other special status categories (e.g., California Species of Special Concern) and/or identified by the California Native Plant Society (CNPS) as ‘1B’ and ‘2’ plant species as constituting ESHA.

of VSFB along the Gaviota Coast in Santa Barbara County.[10] Lemonade Berry Scrub relies on animals for seed dispersal; the stand of Lemonade Berry Scrub on VSFB provides a significant source of seeds for dispersal into the coastal zone and creates a higher potential for this vulnerable habitat type to establish itself and persist in the coastal zone.

Honda Creek Riparian Habitat

California red-legged frog

The Commission's staff ecologist has determined that the riparian habitat in Honda Creek meets the definition of ESHA because it provides breeding habitat, forage and refuge for California red-legged frogs, a species listed as threatened under the federal Endangered Species Act and by the California Department of Fish and Wildlife as a Species of Special Concern. A habitat assessment and population status report on California red-legged frogs, provided as part of the consistency determination, found that Honda Creek supports a high number of adult frogs compared to many other areas of frog habitat on VSFB, such as San Antonio Terrace or ABRES-A Lake. Honda Creek also serves as a refugia and provides consistent breeding habitat for frogs during extended drought conditions.

The rarity of California red-legged frogs is widely recognized and has resulted in its state and federal special species designations. California red-legged frogs are sensitive to disturbance and their habitat could be easily disturbed or degraded from development including direct habitat loss due to stream alteration, loss of aquatic habitat, and indirect effects of expanding urbanization affecting their dispersal and migration into new habitats, as noted in the USFWS Biological Opinion. California red-legged frogs are found outside of VSFB in the coastal zone in streams along the coast and transverse ranges of California. The nearby Los Padres National Forest is known to provide habitat for California Red-legged frogs and the USFWS identified them as being prevalent along the coast of Santa Barbara County (USFWS 2022). The populations on VSFB add to the genetic diversity and population of frogs outside of the base, particularly because California red-legged frogs are known to make long-distance overland migrations to suitable breeding habitat elsewhere. These long-distance migrations may be up to 1.75 miles in wet environments and the USFWS notes that coastal California red-legged frog populations in Santa Barbara county and to the north show genetic connectivity. This indicates that there is migration and gene flow between California red-legged frog populations on VSFB and those in the coastal zone outside of federal property (USFWS 2023). The loss of the frog population from VSFB would reduce genetic diversity and gene flow between frog populations, which could affect the overall population of California red-legged frog in the coastal zone outside of the base. For rare species, maintaining genetic diversity is particularly critical in the face of climate change due to the variety of environmental stressors it can bring and the need for adaptation and new traits that will enable survival.

[10] https://calscape.org/Rhus-integrifolia-(Lemonade-Berry)?srchcr=sc6466a34ca91d7

Pallid Bat and Western Red Bat

The pallid bat and western red bat are also known to be present within the riparian habitat of Honda Creek. These bat species have been designated by the California Department of Fish and Wildlife (CDFW) as Species of Special Concern. Bats play a special role in the ecosystem due to their high metabolic needs and extensive feeding on insects. In general, CDFW designates certain animals as "Species of Special Concern" when they:

- Occur in small, isolated populations or in fragmented habitat, and are threatened by further isolation and population reduction;
- Show marked population declines; or
- Depend on a habitat that has shown substantial historical or recent declines in size and/or quality or integrity, among other factors (CDFW 2023).

CDFW identified pallid bats as a Species of Special Concern because they have experienced a marked population decline in recent years in California. Pallid bats are not tolerant of suburban or urban development, and habitat conversion has led to their decline (CDFW 1998). CDFW identified Western red bats as a Species of Special Concern because they face increased predation from species associated with human development (jays and opossums), and their primary habitat in riparian corridors is under consistent threat of conversion to other land uses, specifically agriculture (CDFW 1998). CDFW's findings show that the habitat of both bat species is easily disturbed or degraded by development, leading to population declines. Both pallid bats and western red bats are more common globally than within California. They each have a rarity ranking of G4/S3, meaning that their populations are apparently secure and at low risk for extinction globally, but within California they are vulnerable and at moderate risk for extinction due to a restricted range, relatively few populations or recent and widespread declines. Populations of these species and bat populations in general are at risk for significant declines in California, as white-nose syndrome has been found on the west coast in recent years. This illness is believed to be caused by a fungal infection that bats are particularly susceptible to and frequently results in high mortality rates and the catastrophic loss of entire bat colonies (CDFW 2023). The special role of these bat species in the ecosystem and their vulnerability to population declines supports identification of their roosting habitat as ESHA.

Acoustic data collection carried out by DAF biologists within Honda Creek have identified the presence of multiple bat species, including pallid bat and western red bat. Although formal surveys for roosting areas have not been conducted, the riparian habitat and geology of Honda Canyon provides characteristic roosting habitat and bats are expected to engage in roosting behavior there. As shown in **Exhibit 7**, the California Natural Diversity Database includes records of Western red bat and pallid bat in Honda Canyon.

These bat species occur both on VSFB and outside of VSFB in the coastal zone of Northern Santa Barbara County, as shown in **Exhibit 7**. Adverse impacts to the

populations on VSFB would have spillover effects to outside areas, including within the coastal zone, by reducing overall carrying capacity[11] and genetic diversity of western red bats and pallid bats in Santa Barbara County.

Western Snowy Plover Nesting Habitat

Surveys carried out by Point Blue Conservation Science, an independent avian research organization, for DAF and provided to Commission staff as part of the consistency determination have documented snowy plover nesting habitat on the beach approximately 3.5 miles northwest of the proposed project site within VSFB (USFWS 2023). The rarity and vulnerability of snowy plovers is well established, with the species being listed as threatened under the federal Endangered Species Act since 1993. The recovery objective west coast-wide for snowy plover is 3,000 birds, and the current estimate falls over 20% below that at 2,371 birds. The USFWS notes that threats to snowy plover and their habitat include "habitat loss and degradation attributed to human disturbance, urban development, introduced beachgrass, and expanding predator populations," indicating that snowy plover nesting habitat is easily degraded by human activities and developments (USFWS 2023). The USFWS additionally identified that active efforts to improve habitat at breeding beaches have improved snowy plover population numbers (USFWS 2023). Therefore, snowy plover habitat has been identified as ESHA by the Commission.

Snowy plovers are present throughout the coastal zone in California, both north and south of VSFB. In the winter, snowy plovers migrate to non-nesting beaches to forage (USFWS 2023). The populations of snowy plover nesting and reproducing on VSFB therefore disperse to other beaches throughout the state in the winter and may use beaches in the coastal zone for nesting the following year. Thus, nesting habitat on VSFB contributes to snowy plover population growth within the coastal zone. Impacts to snowy plover nesting habitat on VSFB would affect snowy plovers in the coastal zone due to species movement during the winter season and reduced population viability.

Preventing the degradation of this nesting habitat is important for the continued population growth and recovery of snowy plover. VSFB contributes to the largest sub-population of snowy plovers from San Luis Obispo County through Ventura County. The population target established by the USFWS for snowy plover in San Luis Obispo, Santa Barbara, and Ventura Counties is 1,200 breeding adults. In 2022, the USFWS found that the population remains well below this target at 804 breeding adults (USFWS 2023). This comparatively large population is critical to maintain and grow for long-term success of the species across the west coast.

[11] Carrying capacity is the maximum number of animals that can be supported by a given area or habitat.

Potential Impacts to ESHA

Vegetation and Fire Management

The proposed project would involve rocket launches and result in the discharge of waves of high temperatures, combustion and open flame at and around the launch pad area that would be constructed. To minimize the number and size of areas exposed to fire during launches and reduce the extent of required vegetation management around the proposed space launch complex, the site would be configured to include a "flame bucket" that would direct flames into a limited portion of the site. Even with this configuration, DAF states that vegetation removal is necessary to ensure that launch operations do not spark wildfires, and the vegetation and fire management area would involve removing vegetation down to bare ground. As discussed above, the alignment of the vegetation and fire management area is adjacent to a roughly 4-acre stand of Lemonade Berry Scrub but would not involve any direct removal of Lemonade Berry Scrub. DAF has committed to implement environmental protection measures during the vegetation removal at the project site and facilities construction, including:

- Staging will occur from paved or existing roadways, and if this is not possible, from patches of non-native vegetation.
- Any seeds will be cleaned from construction equipment to prevent invasive species establishment.
- Standard erosion control measures will occur during grading, including the use of silt fences, and hydroseeding where temporary disturbances occur with a native hydroseed mix.
- A qualified biological monitor will inspect any equipment, trenches or holes left overnight and the work area, prior to the start of work for special-status species. The biological monitor will relocate any found special status species to comparable habitat outside of the work area.
- Construction activities would not occur until 24 hours after a precipitation event greater than 0.2 inch.

A full list of environmental protection measures is included in **Appendix A**. The alignment of the vegetation management area and fuel break would protect the Lemonade Berry Scrub from disturbance and would enable it to remain a source of seeds for this habitat in the Coastal Zone. Additionally, the environmental protection measures, particularly staging from roadways and ensuring seeds are cleaned off of equipment, would help to prevent invasive species from establishing in the Lemonade Berry Scrub. Therefore, the proposed alignment of the vegetation and fire management area, with the proposed environmental protection measures, will be compatible with the continued existence and use of Lemonade Berry Scrub adjacent to the vegetation and fire management area.

Engine Noise

The proposed project has the potential to cause adverse impacts to wildlife use of riparian habitat in Honda Creek and snowy plover nesting habitat in nearby shoreline areas through exposure to elevated sound levels during static fire tests and launches. Launch noise would be expected to last for around 1 minute and static fire noise would be expected to last for 30 seconds. Maps of nearby wildlife occurrences, including California red-legged frogs, pallid bat, western red bat, and snowy plover along with expected sound levels from launch and engine testing activities are available in **Exhibit 7**. Phantom proposes to eventually conduct up to 48 static fire tests and 48 launches annually, leading to a total of 96 proposed events with elevated sound levels. This would result in a total of approximately 72 minutes of elevated sound divided between 96 events spread throughout the year. During these events, the maximum decibel (dB) levels found in the riparian area of Honda Creek, where bats are present, would be expected to reach between a maximum 130 and 140 dB, based on modeling carried out by DAF. The areas of Honda Creek that contain California red-legged frogs would receive up to 130 dB. The snowy plover nesting habitat would receive lower sound levels between 100 and 110 dB. The extent to which these sound levels could significantly degrade wildlife habitat would be dependent on each species' individual sensitivity.

Bats

The bat species found in Honda Canyon are very sensitive to sound, as they use echolocation to navigate around obstacles and hunt in the dark. A 2016 report from Caltrans notes:

> In bats, damage to high frequency hearing cells would likely result in impaired echolocation. Damage to the lower frequency hearing cells would likely result in impaired capacity for passive listening. Either effect could potentially be life threatening. Failure to accurately assess the locations of trees, branches, and other obstacles in their flight path could result in fatal collisions or debilitating injury. Failure to accurately detect and determine the precise location and movement patterns of prey (both aerial and ground) would likely result in significantly diminished capture success. Similarly, failure to detect the approach of a predator could be fatal. Because bats simply do not have the luxury of extended recovery time, even temporary shifts in hearing abilities have the potential to result in negative effects on affected individuals.

DAF's integrated resources management plan states that studies on the hearing sensitivity of bat species show that they have excellent hearing in the higher frequency ranges (above 20 kHz) but are insensitive to lower frequencies where launch noise has most of its energy (e.g., highest decibel measurements). This may reduce potential impacts to bats and to continued use of their habitat, but as noted in the Caltrans report

cited above, damage to lower frequency hearing cells in bats would still affect their passive listening abilities.

Consultations between Commission staff and staff of the California Department of Fish and Wildlife (CDFW) during the course of this project's review have indicated that birds and bats can experience permanent hearing loss at continuous sound exposure above 110 dB. CDFW staff recommend that continuous sounds be kept below the temporary threshold shift or temporary hearing loss threshold of 93 dB and that impulse noise should not exceed 110 dB at any point in operations measured at bat roosting locations. Bat habitat in Honda Canyon is expected to receive engine noise exceeding these thresholds, as described above. However, there is very little research on rocket engine noise and its impact on bats. Existing studies on the impacts of other types of noise on bats may not be very representative of bat response to rocket engine noise. This is because engine noise exposure is very intermittent, with long periods of quiet between launches or static fire tests, and very short periods of elevated sounds (e.g. one minute or less).

With Phantom's proposed launch schedule, bat habitat in Honda Creek would receive engine noise from launches and static fire tests for a total of one minute and 30 seconds during the first year of operations. During the second year, bat habitat would receive engine noise for a total of up to three minutes. Even at full launch cadence in year six, bat habitat would receive less than a minute and thirty seconds of engine noise across the over 10,000 minutes that pass in a week, meaning that no sound would be generated for the vast majority of the time. Finally, DAF actively monitors bat diversity and distribution on VSFB, and has found that bat species use wetland, riparian, and forest habitats, despite launch activities on-base (Heady and Frick 2013). DAF's Integrated Natural Resources Management Plan states that:

> Studies have shown that the effect of intermittent noise from aircraft overflights on small terrestrial mammal demography is likely to be small and difficult to detect, if it occurs at all (McClenaghan and Bowles 1995). Studies on the hearing sensitivity of a variety of bats (Dalland 1965; MacDonald 1984; Popper and Fay 1995) have shown that they have excellent hearing in the higher frequency ranges (above 20 kilohertz [kHz]) but are very insensitive to lower frequencies where launch noise has most of its energy. Therefore, impacts on these mammals are expected to be minimal to nonexistent.

Due to the intermittent nature of engine noise, the very short duration of engine noise relative to periods of quiet, and DAF's existing monitoring demonstrating that bats have used habitat on VSFB despite engine noise and launches, significant degradation of bat habitat in Honda Canyon is unlikely, despite exceeding CDFW's sound exposure level recommendations for other types of projects.

Although prior monitoring has not demonstrated adverse impacts to or degradation of bat habitat on VSFB, an average of only 4.4 rocket launches per year occurred during

the course of that monitoring (2017-2021). In contrast, Phantom would carry out a greater frequency of launch activities, approximately doubling each year before reaching a maximum of 48 launches and 48 static fire tests after six years. To confirm that elevated sound levels from this increased launch frequency will not be incompatible with the continued use of bat habitat, DAF has committed to conducting acoustic monitoring within the noise footprint of the launches, as shown in **Exhibit 7**, to determine the extent to which bat species are present in Honda Canyon and to record and assess their call rates before and after rocket launches. This monitoring program would augment DAF's existing bat monitoring programs on VSFB under its Integrated Natural Resources Management Plan. DAF has also committed to providing the Executive Director with annual written reports on the data and results of its biological monitoring.

In addition to providing annual reports, DAF has also committed to reporting back to the Executive Director five years into the project's operation, when Phantom is expecting to conduct 24 launches and 24 static fire tests annually. The 5-year report would provide information on how the overall launch increases are affecting the environment and would synthesize the information developed in the prior annual reports. The timing of the 5-year report would also enable DAF and the Commission to learn if unexpected adverse impacts are occurring prior to Phantom starting its full launch schedule, which would allow for adaptive management actions to be taken.

If this monitoring demonstrates that launch activity results in significant degradation of bat habitat in Honda Canyon, as measured by bat call rates before and after launches, DAF would work with the Executive Director to determine the additional measures necessary to minimize the likelihood of further impacts to bat habitat. These measures would include offsets by providing additional habitat or improving existing habitat for the species for which effects were documented. These actions could include providing additional shelter by installing bat boxes, retrofitting existing infrastructure to make suitable for bat roosting, and/or improvement of native riparian habitat. In such a situation, DAF would also share information with the Executive Director to help determine if the activity is being conducted or is having an effect on any coastal us or resource substantially different than originally described and, as a result, is no longer consistent with the enforceable policies of the CCMP.

With the information provided by DAF on the potential effects of engine noise on bat habitat in Honda Canyon, the absence of data demonstrating adverse over the past roughly 20 years of monitoring bat populations at VSFB, the monitoring that would continue to be carried out as part of the proposed project, and DAF's commitment to working the Executive Director to address any unexpected impacts on bat habitat, the Commission finds that the proposed project would not significantly degrade bat habitat in Honda Canyon.

California red-legged frogs
All life stages of California red-legged frogs can detect noise and vibrations (DAF 2023) and are assumed to be able to perceive the engine noise produced by rockets. The proposed project thus has the potential to adversely affect California red-legged frog habitat in Honda Creek approximately 500 feet from the proposed launch complex. DAF states:

> Engine noise would likely trigger a startle response in California red-legged frog, causing them to flee to water or attempt to hide in place. It is likely that any reaction would be dependent on the sensitivity of the individual, the behavior in which it is engaged when it experiences the noise, and the sound level (e.g., higher stimuli would be more likely to trigger a response). Regardless, the reaction is expected to be the same – the frog's behavior would be disrupted, and it may flee to cover in a similar reaction to that of a frog reacting to a predator. As a result, there could be a temporary disruption of California red-legged frog behaviors including foraging, calling, and mating (during the breeding season). However, frogs tend to return to normal behavior quickly after being disturbed.

DAF also provided estimates of the number of California red-legged frogs that are expected to be present within each noise level contour of the areas affected by launch noise.

Table 5: California Red-legged frog life stage estimates within each noise level contour from the Phantom project

Sound Level (unweighted dB Lmax)	**Adult**	**Metamorph**	**Larvae**	**Egg Mass**
100	19	2	90	13
110	12	1	50	13
120	2	0	0	3
130	0	0	0	0

There are no known studies on the impacts of launch sound on the hearing capabilities of California red-legged frogs, however Simmons et al. (2014) found hearing damage to American bullfrogs, which are in the same family as California red-legged frogs, when they were exposed to sounds greater than 150 dB. After hearing damage, the bullfrogs showed full functional recovery of their hearing within 3 to 4 days. California red-legged frogs likely have similar hearing structures and a similar resilience to sounds below 150 dB as well as an ability to recover from hearing damage. In its review of potential project impacts to California red-legged frogs, the USFWS states that, "the Service does not

anticipate physiological effects to California red-legged frog's inner ears at this time due to the short duration and lower noise levels of the project's anticipated noise disturbance events." However, the USFWS did find that operational noise may impact frog behavior, including calling frequency, and lead to increased risk of predation due to a "freeze" response to excessive sound. Despite anticipating some local negative effects, the USFWS found overall that:

> Using the available information and considering minimization measures, including potential mitigation ensuring no net loss, we expect adverse effects to the recovery of California red-legged frogs on VSFB would be low. Therefore, we conclude that the proposed action would not appreciably reduce the likelihood of recovery of the California red-legged frog on VSFB, in the Northern Transverse Ranges and Tehachapi Mountains Recovery Unit, or rangewide.
>
> …
>
> After reviewing the current status of the California red-legged frog, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the California red-legged frog.

As discussed above, DAF has conducted long-term monitoring on VSFB to assess wildlife populations, including California red-legged frogs, and their response to launch activities. DAF has consistently found that launch activities have not decreased California red-legged frog populations or led to the abandonment of habitat areas and have only produced temporary observable changes in behavior. To further demonstrate that an increased frequency in elevated sound levels from launches will not be incompatible with the continued use of frog habitat near the proposed project site, DAF has committed to monitoring and mitigation as part of its Biological Opinion with the USFWS.

In the Biological Opinion, DAF committed to placing passive bioacoustic recorders in Honda Creek and conducting California red-legged frog surveys there as well. This monitoring program will be designed to track habitat occupancy, breeding behaviors (calling), and breeding success (egg mass and tadpole density). If habitat occupancy, calling frequency, or tadpole densities decline from baseline by 15% or more over two years, and the decline cannot be confidently attributed to other natural or human caused factors such as drought or wildfire, DAF will mitigate for impacts to California red-legged frog breeding habitat. To offset any impacts found, DAF will create new California red-legged frog breeding habitat at the San Antonio Creek Oxbow Restoration Area, an established wetland site on VSFB that is located outside of areas currently affected by launch noise and artificial lighting. A detailed description of this commitment is available in the Biological Opinion excerpt in **Appendix A.**

As discussed above, DAF has also committed to providing the Executive Director with written annual reports on the findings of its monitoring efforts as well as a comprehensive 5-year report on how the Phantom project is or is not adversely affecting its surrounding environment. If this monitoring demonstrates that launch activity results in significant degradation of California red-legged frog habitat in Honda Creek, as measured by habitat occupancy and breeding success, DAF would work with the USFWS and Executive Director to determine the measures necessary to minimize the likelihood of further degradation to California red-legged frog habitat, including habitat enhancements and restoration. In such a situation, DAF would also share information with the Executive Director to help determine if the activity is being conducted or is having an effect on any coastal use or resource substantially different than originally described in the CD and, as a result, is no longer consistent with the enforceable policies of the CCMP.

With the information provided by DAF on the potential effects of engine noise on California red-legged frog habitat in Honda Canyon, the absence of data demonstrating adverse effects from launch activities, the monitoring that would continue to be carried out as part of the proposed project, and DAF's commitment to working the Executive Director to address any unexpected impacts on California red-legged frog habitat, the Commission finds that the proposed project would not significantly degrade California red-legged frog habitat in Honda Creek.

Western Snowy Plover

As mentioned above, snowy plover nesting habitat is farther away from the proposed project site and would therefore be exposed to lower sound levels. Additionally, the high levels of ambient sound in beach areas due to ocean and wave noise is anticipated to mask all but the highest sound levels generated during launches. DAF has conducted monitoring of snowy plover nests during numerous launches at VSFB. In its consistency determination, DAF states:

> Direct observations of wintering birds were made during a Titan IV and Falcon 9 launch from SLC-4E (SRS Technologies, Inc. 2006b; Robinette and Ball 2013). The Titan IV launches resulted in sound levels of 130 dBA Lmax. SNPL [snowy plover] did not exhibit any adverse reactions to these launches (SRS Technologies, Inc. 2006b; Robinette and Ball 2013) with the exception of one observation. During the launch of a Titan II from SLC-4W in 1998, monitoring of SNPL found the nest located closest to the launch facility had one of three eggs broken after the launch (Applegate and Schultz 1998). The cause of the damaged egg was not determined.
>
> More recently on 12 June 2019, SNPL response was documented during a SpaceX Falcon 9 launch and first stage recovery at SLC-4. The return flight of the first stage to VSFB produced a 3.36 psf sonic boom and landing engine noise of 138 dB Lmax and 130 dB SEL, as measured on South Surf Beach. SNPL response to the noise impacts was documented

> via pre- and post-launch monitoring and video recording during the launch event. Incubating SNPL captured on video were observed to startle and either jump or hunker down in response to the sonic boom. One SNPL egg showed signs of potential damage. This egg was part of a three-egg clutch in which the other two eggs successfully hatched. It is not uncommon for one or more eggs from a successful nest to not hatch. Failure of the egg to hatch could not be conclusively tied to the launch event (Robinette and Rice 2019).

The USFWS has also reviewed the potential for launch noise to impact snowy plover, and states, “Considering past monitoring results, we do not expect the proposed project’s individual launch and static fire events to result in short term observable effects, such as birds flushing from the nest. However, non-observable effects, such as increased heart rate or increased stress hormone levels could routinely occur. Consequently, the proposed project has the potential to contribute to long-term adverse effect that result from routine intermittent acute noise disturbance.”

However, with DAF’s proposal to monitor and mitigate for any impacts at the local level to achieve no net loss of the species, the USFWS ultimately concluded that:

> After reviewing the current status of the western snowy plover, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the western snowy plover.

As discussed above, DAF has conducted long-term monitoring on VSFB to assess wildlife populations, including snowy plover, and their response to launch activities. DAF monitoring to date has consistently found that launch activities have not decreased snowy plover populations and have only produced temporary observable changes in behavior. To further demonstrate that an increased frequency in elevated sound levels from launches will not be incompatible with the continued use of snowy plover nesting habitat, DAF has committed to monitoring and mitigation as part of its Biological Opinion with the USFWS.

In the Biological Opinion, DAF committed to augmenting the existing snowy plover monitoring program on VSFB, which records habitat use, nesting efforts, nest fates, fledgling survival, and population size through each breeding season, with geospatial analysis of snowy plover nesting and the noise environment. Sound meters will be deployed immediately inland of South Surf Beach and a control site to characterize the noise environment during the breeding season within the noise footprint of Phantom launches. Geospatial analysis will be performed annually as Phantom’s launch frequency increases to assess whether patterns of nesting activity, nest fates, or fledgling success are negatively impacted by noise from Phantom operations. If the geospatial analysis shows that a statistically significant decline in breeding effort or nest success over two consecutive years, and this decline cannot confidently be attributed to

other natural or human caused factors, DAF will offset this impact by increasing predator removal efforts on VSFB to include the non-breeding season, particularly focusing on raven removal adjacent to VSFB beaches with a goal of achieving no net loss of the species. A more detailed description of this commitment is available in the Biological Opinion in **Appendix A**.

As discussed above, DAF has also committed to providing written annual reports to the Executive Director on the findings of its monitoring efforts and a comprehensive 5-year report on how the Phantom project is or is not impacting its surrounding environment. If this monitoring demonstrates that launch activity results in a statistically significant decline of snowy plover breeding effort or nesting success, as measured by nesting activity, nest fates and/or fledgling success, DAF would work with the USFWS and Executive Director to determine the measures necessary to minimize the likelihood of further degradation to snowy plover nesting habitat, including predator control, as described above. In such a situation, DAF would also share information with the Executive Director to help determine if the activity is being conducted or is having an effect on any coastal use or resource substantially different than originally described in the CD and, as a result, is no longer consistent with the enforceable policies of the CCMP.

With the information provided by DAF on the potential effects of engine noise on snowy plover nesting habitat, the absence of data demonstrating adverse effects from launch activities, the monitoring that would continue to be carried out as part of the proposed project, and DAF's commitment to working the Executive Director to address any unexpected impacts on snowy plover habitat, the Commission finds that the proposed project would not significantly degrade snowy plover nesting habitat.

Engine Noise and Cumulative Impacts

Engine noise occurs at and near launch facilities across VSFB. Engine noise from launches and static fire tests may incrementally contribute to cumulative effects to coastal resources. The addition of the proposed number of launches in the Phantom project to the currently contracted launches at VSFB would cause a 52 percent increase in the number of contracted launches within six years (assuming no other increases in launch operations by other operators occur). The cumulative effects of engine noise from space launch activity are influenced by the geographic distance between launch sites, the timing of launches, the size and engine noise intensity created by different launch vehicles, and the actual number of launches that take place (as noted above, the number of actual launches has traditionally been ten percent or less of the authorized number).

Launch activities are spread out across the geography of VSFB. The geographic distance between launch facilities reduces the frequency of intense impacts on any one population of wildlife near a particular launch facility but also spreads less intense impacts across a larger geographic space. With construction and operation of the proposed project, the highest number of contracted launches would be launched from

the areas of SLC-5, the site of the proposed Phantom project, and SLC-4E, the site of launches for the SpaceX Falcon 9 program, which is currently contracted for 36 launches annually. Both of these sites are shown in **Exhibit 2** and are located in the southern portion of VSFB. The habitats considered here would be affected by engine noise from several launch facilities. The USFWS found, in its biological opinion, that habitat in Honda Creek would be exposed to elevated sound levels of at least 100 dB from SpaceX Falcon 9 (SLC-4), Minotaur (SLC-8), ULA Vulcan (SLC-3E), Blue Origin New Glenn (SLC-9)[12], Relativity Terran 1 (SLC-11)[13], and Phantom Daytona-E (SLC-8). The USFWS found:

> If all these programs, including the proposed project, achieve full launch tempo by 2028, a combined total of up to 157 launch disturbance events of at least 100 dB Lmax would impact Honda Creek each year as a result of launch and static fire.

Similarly, the USFWS found that snowy plover habitat on Surf Beach would experience noise levels of at least 100 dB from SpaceX Falcon 9 (SLC-4), ULA Vulcan (SLC-3E), Blue Origin New Glenn (SLC-9)[12], and Relativity Terran 1 (SLC-11). The USFWS found:

> The proposed project in combination with other planned and permitted launch programs would produce a total of 154 noise disturbance events of at least 100 dB annually that would impact South Surf Beach.

Not all space launch vehicles create the same amount of engine noise, however. Table 6 below provides a summary of the engine noise produced at the launch pad by different space launch programs at VSFB.

[12] Blue Origin New Glenn is under regulatory review and has not been constructed.
[13] Relativity has discontinued their request to use SLC-11 for the Terran R program. Relativity has not completed any launches at VSFB to date, nor have they submitted any other requests to use VSFB for their launch program.

Table 6: Maximum Engine Noise produced at the Launch pad from space launch vehicles at VSFB

Space Launch Vehicle	Maximum Engine Noise at the Launch Pad During Launch (dB)	Space Vehicle Height
Minotaur	unknown	63 feet
Firefly Alpha	150 dB	95 feet
ABL RS1	120 dB	88 feet
New Glenn (proposed)	115 dB	360 feet
Vulcan Centaur	120 dB	200 feet
Falcon 9	150 dB	178 feet
Laguna-E (proposed)	144 dB	78.7 feet
Daytona-E (proposed)	130 dB	54.4 feet
Delta IV	85 dBA (A-weighted)	236 feet

In total, VSFB has contracted for up to six launches of heavy space launch vehicles, 53 launches of medium space launch vehicles, and 33 launches of small space launch vehicles annually. If approved, the proposed Phantom project would increase the contracted number of small space launch vehicles to 81. Additionally, up to 23 missiles are launched from the north portion of VSFB annually. These missiles are smaller, and do not produce the same level of engine noise as space launch vehicles.

As mentioned in the background section, the significant discrepancy between contracted launches and actual launches at VSFB influences the cumulative effects of VSFB's launch programs. From 2017-2021, an average of 4.7 percent of the total number of contracted launches were carried out at VSFB. This means that although NEPA review and DAF agreements allow a high number of launches, the actual number of launches and their resulting sound effects are significantly lower. DAF has stated that the discrepancy between permitted launches and actual launches is due to the availability and need for each specific rocket. Rockets often require updates or become unavailable for extended periods of time. Authorization for launches beyond what is required allows for DAF to shift government contracts and payloads to another rocket or provider, when necessary. Additionally, DAF states:

> There is variability in need for payloads to be delivered into orbit - the higher number of launches available at each site increases the flexibility of our national defense program. We also need to be primed and ready should there be an attack on our satellites/resources in orbit. We need to ensure there are enough resources available to get additional satellites

> into orbit to support our warfighters and defend our nation should the need arise.

Given the current situation, DAF believes that the discrepancy between allowable launches and actual launches will continue. Ultimately, DAF has determined that the Western Range[4] can support a maximum number of 110 space launches, and a maximum number of 15 missile launches annually. These limitations are due to personnel and range safety considerations, and the maximum number of launches remains below the potential total contracted number of launches, should all proposed space launch projects move forward.

DAF's long-standing monitoring of sensitive species and their responses to space launch vehicle engine noise has only documented temporary observable changes in wildlife behavior as a result of launch activities and has not shown changes in habitat occupancy or population numbers. The proposed monitoring provided as part of the Phantom project would include monitoring of California red-legged frog habitat, snowy plover nesting sites and bat habitat for adverse impacts from launch activities. Although the focus of this monitoring would be on the Phantom project, the monitoring design would also capture adverse impacts to these species and their habitats from other launch activities at VSFB. If negative effects are observed and cannot be confidently attributed to other human-caused or natural causes, DAF will proceed with mitigation or habitat enhancement, as described above. Additionally, DAF will work with the Executive Director to determine the measures necessary to minimize the likelihood of further degradation to sensitive habitats. Additionally, the USFWS considered the impacts of multiple launch programs when working with DAF to design monitoring for federally listed species and developing its Biological Opinion and concluded that the proposed project, both individually and cumulatively in combination with other existing activities, is not expected to interfere with the recovery goals for California red-legged frog or western snowy plover.

Lighting

Artificial night lighting also has the potential to negatively impact California red-legged frogs and their use of habitat areas such as those located near the proposed project site. In studies on wood frogs, experimental exposure to artificial light at night was found to make them more vulnerable to other stressors such as parasites and pollution (DAF 2023). Another study focused on common toads found that artificial lighting reduced activity in male toads by half during the breeding season and changed their energy metabolism, which has the potential to adversely affect reproduction and overall fitness (DAF 2023). The effects of artificial lighting on frogs are inconsistent and vary by species and life stage; however available research indicates a risk to California red-legged frog breeding habitat from the proposed project.

To address this risk, DAF has committed to minimizing the use of artificial lighting during the hours of darkness at the Phantom facility. DAF states, "The lights would be designed with the minimum lumens needed to meet operational and security

requirements and would be shielded to minimize stray light from entering Honda Canyon." Artificial lighting would only be used for necessary safety or performance of launch operations at night. The proposed launch complex would be used infrequently, especially during the first four years of project operations, further minimizing the use of night lighting at the project site. Modeling of the preliminary lighting plan, as shown in **Exhibit 8**, shows that lighting levels of 1-foot candle would not extend beyond the proposed facility.

As stated above, the USFWS reviewed the potential impacts of the Phantom project, including site lighting and excess sound to California red-legged frogs. The USFWS found that, with the commitments provided by DAF, the proposed Phantom project was not likely to jeopardize the recovery of California red-legged frogs.

With the available information from DAF's monitoring programs and the commitments provided by DAF for minimized site lighting, enhanced future monitoring and reporting prior to the full launch schedule, the proposed project is designed to prevent adverse impacts that would significantly degrade California red-legged frog habitat and will be compatible with the continued use of Honda Creek by California red-legged frogs.

Conclusion

As described above, DAF has sited, configured and designed the proposed project to avoid, minimize, and offset adverse effects on adjacent ESHA, by:

- Designing and shielding artificial lighting to limit potential spillover to riparian habitat at Honda Creek; and by
- Committing to implementing a set of monitoring and management programs for special-status wildlife and their habitats.

With these efforts and commitments, the Commission finds that the proposed project is consistent with Section 30240(b) of the Coastal Act.

E. WATER QUALITY AND MARINE RESOURCES

Coastal Act Section 30230 states:

> Marine resources shall be maintained, enhanced, and, where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance.

Coastal Act Section 30231 states:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through…controlling runoff, preventing depletion of ground water supplies and substantial interference with surface waterflow, [and] maintaining natural vegetation buffer areas that protect riparian habitats*.

The proposed project has the potential to negatively affect water quality in Honda Creek and the Pacific Ocean due to construction activities, the use of deluge water during launch events, and ocean release of the rockets' first stage. The proposed project has the potential to contribute to the depletion of groundwater supplies and interfere with surface water flow due to its water supply needs. The proposed project also has the potential to adversely affect marine resources due to inputs of marine debris. Finally, the proposed project also has the potential to adversely impact marine mammals, including in areas of special biological significance such as breeding and haul-out sites, due to launch noise.

Water Quality

Stormwater Runoff

Constructing the Phantom project at the former SLC-5 launch site would disturb soils, remove vegetation, increase impermeable surfaces and result in greater stormwater runoff from the site to coastal waters, including portions of Honda Creek that flow into the Pacific Ocean. Section 30231 of the Coastal Act requires that the quality of coastal waters and streams be maintained through controlling runoff. DAF has committed to controlling stormwater runoff and erosion during construction and operations through stormwater management measures, including:

- Installing hydroseed and erosion control measures on areas where temporary disturbances occur, and any areas that would be prone to erosion to protect sediment impacts to Honda Creek.
- Vegetation removal on the steep slopes on the east side of the site will be avoided to the extent practicable, unless necessary for fire safety.
- Securing the site from potential erosion resulting from rain and wind events including through preserving existing vegetation, to the extent feasible.
- Improvements to dirt roads would follow standard recommended practices to avoid and minimize erosion potential.

A full list of stormwater protection measures proposed to be implemented as part of the project is available in **Appendix A**. Implementation of these measures would protect and maintain the quality of coastal waters and streams from stormwater runoff consistent with the requirements of Coastal Act Section 30231.

Deluge Water

Operation of the proposed space launch complex would include the use of deluge water during launches. The proposed launch pads at the new launch complex would have launch stools, where the rocket would be placed, and underneath the launch stool would be a flame bucket and flame deflector system. The flame bucket would be filled with an estimated 6,500 to 8,000 gallons of deluge water per launch. The deluge water would absorb vibration and heat from the rocket during the launch. Immediately downstream of the flame deflector, a concrete deluge containment basin would be constructed that would collect deluge water runoff. The design of the deflector would direct exhaust away from Honda Canyon as well. The deluge water has the potential to

become contaminated with hydrocarbons during launches and could adversely impact the quality of coastal waters if it is discharged into Honda Creek and flows to the ocean approximately 0.75 miles downstream of the project site.

DAF has stated that it will require Phantom to test the water in the deluge water retention basin for hydrocarbon contamination after each launch and also after storm events. This would include the use of a certified laboratory for the water quality testing. If the testing indicates that the water is of appropriate quality, it would be sent to the Industrial Wastewater Treatment Ponds on VSFB or discharged into the stormwater management area indicated in **Exhibit 4**. Water discharged into this area would be expected to infiltrate directly into the ground. DAF has also stated that it will require Phantom to obtain a General Waiver for Specific Types of Discharges from the Regional Water Quality Control Board or other appropriate discharge permit prior to discharging any water out of the deluge water retention basin. Implementation of these measures would protect and maintain the quality of coastal waters and streams.

Water Supply

Operation of the proposed space launch complex would require a water line extension to be installed from the VSFB water supply line. Water use at the Phantom site would include water for personnel and operational activities as well as deluge water for the launches, as discussed above. At the full proposed cadence of up to 48 launches per year, the annual amount of deluge water needed for Phantom operations would range between 100,800 to 480,000 gallons. In addition, up to 72,000 gallons annually would be required to support the personnel and operational activities at the proposed launch complex. The total maximum expected water supply need for the Phantom project is up to 552,000 gallons annually, which is roughly the equivalent water use of three American households annually.

Section 30231 of the Coastal Act states that proposed projects should prevent depletion of groundwater supplies and prevent substantial interference with surface water flow. The water supply for VSFB includes four wells in the San Antonio Creek Valley Groundwater Basin. Any water line to the proposed launch complex would draw water from these wells. According to the 2022 Annual Report for the San Antonio Basin Groundwater Sustainability Agency (SAGSA),[14] VSFB used up to 2,600 acre-feet of water in 2022. The majority of water users of the groundwater basin are agricultural. SAGSA found that the cumulative levels of groundwater storage in the San Antonio Creek Valley Groundwater Basin have decreased by 147,700 acre-feet between 2015 and 2022. Overall, San Antonio Basin Groundwater Sustainability Agency states:

> Current basin conditions, comparison of current and historical groundwater elevation contour maps, and the basin historical water budget presented in the [Groundwater Sustainability Plan], indicate

[14] Available online at: https://sanantoniobasingsa.org/wp-content/uploads/SACVB_2022-Annual-Report_FINAL-03-17-23.pdf

> groundwater pumping in excess of the sustainable yield has created challenging conditions for sustainable management.

However, DAF has indicated in its consistency determination that the proposed project would not increase DAF pumping or water use from the San Antonio Creek Valley Groundwater Basin. This is due to both the low water needs of the project, estimated to be approximately 0.06% of total base-wide water use, and the current maintenance requirements for water lines on the south portion of the base. In its consistency determination, DAF states:

> Water is treated and transported to south Base users through a supply line which requires routine maintenance, partly due to relatively few users on this part of VSFB. As a critical part of that maintenance, VSFB flushes the supply line periodically to maintain water quality by removing sediment, mineralization, and discolored water. This practice also improves the carrying capacity of the lines and helps identify any failing pipes or connections. SLD 30 currently flushes the water supply line on south VSFB annually…American Water, the contractor managing and maintaining VSFB's water lines, determined that the proposed water usage at SLC-5 would be entirely offset by the compensatory reduction in the volume of water discharged to grade and therefore have no effect on water extraction from the San Antonio Creek Groundwater Basin.

In essence, DAF has concluded that the increase in water use from the proposed project would be fully offset by the reduced need for flushing the water lines and discharging water to grade. Therefore, the proposed project would not be expected to result in additional pumping or contribute to the depletion of groundwater supplies.

Ocean Release of Rocket First Stage

Components of Phantom's rockets, specifically the first stage, are proposed to be discharged into the ocean offshore of Baja California, Mexico, as part of normal operations. After a successful launch, the first and second stages of the Laguna-E and Daytona-E rockets would separate during the main engine cut off flight phase. After separation, the first stage would fall back to earth and land in the ocean in international waters offshore of Baja California, Mexico. A map of the projected splashdown area for the first stage is provided in **Exhibit 9**.

The first stage may contain a limited amount of unused fuel when it reaches the ocean. A further discussion of the physical components of the first stage is included in the marine debris section below. In its consistency determination, DAF has stated that the first stage would contain no more than "a de minimis amount of fuel" and has defined this quantity as being less than 1% of the fuel needed for the launch. For the Daytona-E and Laguna-E space vehicles, this means up to 18 gallons and 40 gallons of fuel may remain in the first stage upon impact with the ocean, respectively. DAF also states in its consistency determination that the types of fuel that would be used for these space vehicles, RP-1 or Jet-A, have high volatility and evaporate quickly when exposed to the

air, with over 90% of the mass of fuel remaining expected to evaporate within the first seven minutes and 99% of the mass remaining expected to evaporate within the first hour. Since this type of fuel is lighter than water, it would stay on top of the water's surface and spread into a very thin layer. This thin layer would create more surface area for evaporation and the total fuel amount would be expected to completely evaporate by the end of two days.

In its consistency determination, DAF notes that cleanup of a spill of a small amount of very light fuel, like RP-1 or Jet-A fuel, is usually not possible given the rate of its evaporation. Due to the amount and characteristics of the fuel left in the first stage at impact, and the location in international waters offshore of Mexico where the first stage would land, the Commission finds that the de minimis amount of fuel is not expected to adversely affect the quality of waters with the potential to enter California's coastal zone.

Conclusion
With the proposed stormwater protection measures in place, the testing of and appropriate discharge of deluge water, the lack of adverse impacts to available water supply, and the low volume and rapid dispersal of fuel within rocket stages released into the ocean, the Commission finds the proposed project will protect the quality of coastal waters and therefore is fully consistent with the water quality and water supply protection policies of the CCMP.

Marine Resources

The proposed project also has the potential to adversely affect marine biological resources, through inputs of marine debris to the ocean and through exposure of marine mammals and their critical habitats (rookeries, haul out areas, etc.) to engine noise and sonic booms from launches. There are two main sources of marine debris from the proposed project: pre-launch weather balloons and the physical components of the first stage. These are both discussed further below.

As mentioned above and shown in **Exhibit 7**, launches produce engine noise that may adversely affect marine biological resources. The expected engine noise during launches would affect the area between the Santa Ynez River and Sudden Ranch on VSFB. Static fire engine tests would be conducted within several days prior to each launch. During static fire testing, when the rocket is in a vertical position on the pad, the engine noise would be focused on the coast between SLC-4 and SLC-5 and would be contained entirely within VSFB, as shown in **Exhibit 7**. **Exhibit 7** also provides maps displaying the modeled noise footprint with sea otter density and marine mammal haul out locations. The launches also are expected to cause sonic booms in the ocean south and west of the Northern Channel Islands. The expected location and strength of sonic booms produced during launches is shown in **Exhibit 10**. Both engine noise and sonic boom impacts are discussed further in the findings below.

Marine Debris

Several elements of the proposed project would result in the release of marine debris. These include the release and eventual abandonment into the ocean of weather balloons, mishaps during a launch that leads to some or all of the rocket falling into the ocean, and the intentional abandonment into the ocean of the rocket first stage and fairings. Prior to launches, Phantom would release up to six weather balloons to better understand upper atmosphere wind conditions. Attached to the latex weather balloon would be a plastic device to measure atmospheric data and transmit it by radio to a ground receiver. The device is roughly the size of a shoe box and is powered by a 9-volt battery. Upon reaching an altitude of 12-19 miles above sea-level and providing the necessary data, a mechanism would be remotely triggered, and the balloon would be torn open and destroyed. Although Phantom and DAF would attempt to recover these materials, the likelihood of such recovery is small due to the extreme height at which the balloon destruction would be triggered, the trajectory of its descent and the potential for it to sink or become lost in the ocean. If the balloon and associated materials are not recovered, they would likely land in the ocean and become marine debris. Additionally, launches could contribute to marine debris if a mishap occurs, the rocket fails to launch successfully, and instead lands in ocean waters. These marine debris inputs could, depending on where they land, negatively affect areas of special biological significance, such as Channel Islands National Park, Channel Islands National Marine Sanctuary, and state-designated marine protected areas. To address these potential adverse impacts, DAF has committed to ensuring that Phantom provide contributions to the California Lost Fishing Gear Recovery Project to offset the release of unrecoverable debris in state and federal waters.

U.C. Davis' California Lost Fishing Gear Recovery Project has removed lost or discarded commercial fishing gear from California waters since 2005. Its work now focuses on gear removal from the waters of Southern California, ensuring that gear recovery is occurring close to the areas that would be affected by the proposed project. Lost fishing gear such as nets, traps and lines is hazardous to wildlife including seabirds, fish, turtles, sea otters, whales and other marine animals. The entanglement hazards posed by lost fishing gear to wildlife are similar to the entanglement hazards from the weather balloon. Lost fishing gear, specifically traps, typically have a buoy attached to several dozen feet of nylon line; similarly, the weather balloon, which is relatively buoyant, is attached with lightweight lines to heavier scientific instruments. Thus, weather balloons would be expected to pose similar entanglement risks to marine wildlife as lost fishing gear, and lost gear recovery would effectively offset adverse impacts associated with weather balloons.

On an annual basis, the amount of material potentially released into the ocean would be recorded and, for every one pound of such material, Phantom would make a compensatory donation of $10.00 to the California Lost Fishing Gear Recovery Project. The administrators of that program have confirmed this contribution would be sufficient to recover approximately one pound of lost fishing gear. This commitment is consistent

with the approach used by other launch programs on VSFB for their marine debris impacts, including the SpaceX and Stratolaunch programs.

The first stages and fairings[15] of Phantom's proposed space vehicles are expendable. This means that after a successful launch, the first stages and fairings are designed to detach from the rest of the rocket and fall back to the ocean, far offshore in international waters. DAF expects the fairings and first stages from Phantom's proposed launches to land downrange from VSFB in international waters off the coast of Mexico.

The Daytona-E's first stage would weigh approximately 2,656 pounds, and the Laguna-E's first stage would weigh approximately 7,900 pounds. Both would be primarily made up of aluminum but may also include composite materials. Upon re-entry to the atmosphere and impact with the ocean surface, the first stage would break apart into smaller pieces. At the proposed launch frequency of 48 per year, the total amount of first stage material proposed to be discarded into international waters offshore of Mexico would be a maximum of 379,200 pounds annually. DAF states in its consistency determination that these pieces of the first stage are expected to sink to the seafloor and remain in international waters. As such, DAF does not expect these materials to move into California's coastal zone or have effects that would spill over into the coastal zone. Consistent with the Commission's efforts to address activities that contribute to marine debris and the discharge of waste into the ocean, however, staff have encouraged DAF to take steps to recover the first stage or offset its release into the ocean by collecting and removing other materials. DAF has not committed to taking any such steps, however, and has stated that they would exceed its legal requirements.

Engine Noise

Engine noise impacts would range from 100 dB to 120 dB in the air over the coast and ocean during static fire tests and launches. The loudest expected engine noise would come from a Laguna-E launch. In-air engine noise of 100 dB or above would cover an area from Sudden Ranch to approximately 2 miles south of the Santa Ynez River mouth on VSFB. Maps showing the modeled engine noise are included in **Exhibit 7**. Static fire tests would not be as loud as launches and the area that would be experiencing engine noise at 100 dB or above would range from Point Arguello to the coastline just northwest of SLC-4. A map of modeled static fire engine noise is also included in **Exhibit 7**. The engine noise estimates provided here are for in-air sound, and it is worth noting that a significant amount of energy (loudness) of sound is lost when transmitting between the air-water interface, therefore underwater sound is expected to be much lower during launches.

Marine mammals are sensitive to sound and are used as indicator species to understand noise impacts on the marine environment. Marine mammals that may be present in the nearshore environment, particularly those that spend time above the water line, include southern sea otters, sea lions, and seals. To the human ear, 120 dB

[15] Fairings are designed to protect satellites and spacecraft on their way to orbit, minimizing shock and vibration, and supporting a wide variety of payloads.

would be as loud as a jet taking off and 110 dB would be as loud as amplified music at a concert. However, marine mammal hearing differs from human hearing in the frequencies they are receptive to and their sensitivity to loud sounds. To help evaluate potential adverse impacts to marine mammal hearing from elevated sound, Southall et al (2019) identifies threshold levels for various marine mammal species beyond which temporary threshold shifts (i.e. temporary hearing loss) would be expected to occur. Although elevated, the sounds anticipated to be produced by the proposed project would fall below these threshold levels. To confirm this, VSFB has conducted extensive monitoring of marine mammal responses to launch activities and has found that launch activities have not had any observable long-term consequences for marine mammal populations or their use of habitat at and around VSFB. Specifically, DAF states in its consistency determination:

> *Extensive launch monitoring has been conducted for sea otters on both north and south VSFB, with pre- and post-launch counts and observations conducted at rafting sites immediately south of Purisima Point for numerous Delta II launches from SLC-2 and one Taurus launch from Launch Facility-576E and at the rafting sites near Sudden Flats for two Delta IV launches from SLC-6. No abnormal behavior, mortality, or injury of effects on the population has ever been documented for sea otter because of launch-related disturbance (SRS Technologies, Inc. 2006a, 2006b, 2006c, 2006d, 2006e, 2006f, 2006g; MSRS 2007a, 15 2007b, 2007c, 2008a, 2008b). More recently, for the SpaceX Falcon 9 SAOCOM launch and landing…sea otters were monitored during pre- and post-launch surveys on south VSFB (MSRS 2018b). The sonic boom received at the otter monitoring location was estimated at 0.71 psf and the maximum landing engine noise at this location was estimated at 99.5 dB Lmax. Count totals of both pups and adults were similar before and after the launch and there was no discernable impact on otters on south VSFB*.

Similarly, DAF has also monitored seals and sea lions at VSFB haul-out locations during launches over the past twenty years and determined that a portion of the hauled-out animals present react (e.g., enter the water or dive under the water) to loud sounds, but that these behavior changes are temporary and have not negatively affected the numbers of seals and sea lions that make use of the shoreline at VSFB. In its consistency determination, DAF reported, “Numbers of hauled out pinnipeds [seals and sea lions] typically return to normal within 24 hours or less after a launch event.” Like sea otters, pinnipeds entering or diving under the water during launch noise will significantly reduce their exposure to elevated levels of sound due to the sound dampening effects between the air-water interface (DAF 2023).

In both its consistency determination and as part of its consultation with the National Marine Fisheries Service, DAF has committed to monitoring pinnipeds during all launches at VSFB, including those launches proposed by Phantom. Between January 1

and June 30, pinniped monitoring at south VSFB haul out locations would occur at least 72 hours prior to a launch event and would continue at least 48 hours after each event. As stated by DAF in its consistency determination, if this monitoring demonstrates that launch activity results in injury or mortality to marine mammals, DAF would immediately cease launch activities and report the incident to NMFS.[16] DAF further states in its consistency determination that launch activities would not resume until NMFS is able to review the associated data and circumstances and work with DAF to determine the additional measures necessary to minimize the likelihood of further impacts to marine mammals. In such a situation, DAF would also notify the Executive Director and share relevant information to help determine if the activity is being conducted or is having an effect on any coastal use or resource substantially different than originally described in the consistency determination and, as a result, is no longer consistent with the enforceable policies of the CCMP.

With the information provided by DAF on the potential effects of engine noise on nearshore marine mammals, the absence of data demonstrating adverse impacts during similar launches over the past roughly 20 years of monitoring marine mammal populations along the shoreline of VSFB, the monitoring that would continue to be carried out as part of the proposed project, and DAF's commitment to working with NMFS and the Executive Director to address any unexpected impacts on marine mammals, the Commission finds that the proposed project would not adversely affect the biological productivity of coastal waters or adversely affect marine species or areas of special biological significance.

Sonic Booms

In addition to the engine noise, the launches proposed by Phantom would create sonic booms with pressure waves of up to 1.5 pounds per square foot. It should be noted that the strongest potential sonic boom would come from a Daytona-E launch vehicle, not the Laguna-E launch vehicle, which creates the loudest engine noise impacts. Due to the proposed launch trajectories and timing of rocket acceleration, the sonic booms from the proposed project would occur both south and west of San Miguel Island and Santa Rosa Island, which are part of Channel Islands National Park and within the Channel Islands National Marine Sanctuary. **Exhibit 10** provides maps of the predicted sonic boom footprint of the Daytona-E and Laguna-E space vehicles. To many species of wildlife, sonic booms would sound like thunder, and most of the sonic boom strength from both space vehicles is modeled by DAF to be one pound per square foot of peak overpressure.

The closest a sonic boom would occur to Channel Island National Park would be approximately eight miles and the distance between the sonic boom and marine mammal haul out locations there would reduce the sound exposure to marine mammals that are hauled out on the beach. Additionally, the loss of energy between the air-water

[16] The DAF currently has a Letter Of Authorization (LOA) from NMFS authorizing incidental take of marine mammals under the Marine Mammal Protection Act. The LOA only authorizes harassment, not injury or mortality.

interface would protect submerged marine mammals, sea turtles, and other wildlife from sonic boom-related sounds in the Channel Islands National Marine Sanctuary and state-designated marine protected areas.

In addition, NMFS has reviewed rocket launches at VSFB and through its LOA, requires DAF to avoid launches which are predicted to produce a sonic boom over the Northern Channel Islands during the harbor seal pupping season from March through June, whenever possible. Additionally, NMFS requires increased monitoring when sonic booms are expected to exceed 2.0 pounds per square foot over the Northern Channel Islands. However, none of the proposed launches would exceed this threshold. With the information by DAF on the potential effects of sonic boom sounds and launch noise on offshore marine mammals, and DAF's commitment to working with NMFS and the Executive Director to address any unexpected impacts on marine mammals, the Commission finds that the sonic booms produced by the proposed project would not adversely affect the biological productivity of coastal waters.

Conclusion

In conclusion, with the evidence presented by DAF, including the commitment to continue monitoring and address any unexpected impacts to marine mammals, the Commission agrees with DAF's conclusion that the proposed project will maintain the biological productivity and quality of coastal waters and will appropriately protect marine resources. Additionally, with the commitment to compensate for marine debris inputs into state and federal waters, and with the evidence presented regarding the lack of significant effects from potential elevated sound, the Commission finds that the proposed project will protect areas and species of special biological significance and is consistent with Coastal Act Sections 30230 and 30231.

F. OIL SPILLS

Coastal Act Section 30232 states:

> *Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.*

The proposed project has the potential to result in the accidental release of petroleum products in two ways: potential fuel spills from construction equipment and spills from rocket fuel storage. Due to the location of the proposed space launch complex adjacent to and uphill from Honda Creek, a coastal steam that drains to the ocean, a significant spill during construction or operation of the launch complex has the potential to extend outside of VSFB and into coastal waters of the Pacific Ocean. In order for a project to be found consistent with Section 30232 of the CCMP, two tests must be satisfied. The first test requires DAF to demonstrate that they have provided for protection against spills of petroleum products or hazardous substances, and the second test requires that

DAF provide “effective containment and cleanup facilities and procedures” for any spills that may occur.

Potential Fuel Spills from Construction Equipment

During construction of the proposed facilities, accidental spills of petroleum products may occur through leaks in fuel tanks of construction equipment, leaks from fuel trucks for refueling construction equipment or accidents during refueling operations. The largest potential fuel tank on site during construction activities would be a fuel truck with a capacity of 5,500 gallons., The largest possible spill would therefore be 5,500 gallons.

To address the first test of Section 30232, DAF has committed in its consistency determination to implement spill prevention actions and procedures during construction, including:

- Ensuring all equipment will be properly maintained and free of leaks during construction activities. All necessary repairs to equipment will be performed in pre-designated, controlled, paved areas to minimize risks from accidental spillage or release.
- Fueling equipment will only occur in pre-designated staging areas on existing roadways or non-native vegetation. The staging areas are not within environmentally sensitive habitat or water bodies.
- Vehicles and equipment will only be washed within staging areas. High pressure washing of undercarriages and wheel wells will be prohibited at the project site.

To address the second test, DAF has committed in its consistency determination to implement spill response procedures during construction, including:

- Requiring that spill containment materials be placed around the construction equipment and fuel truck before refueling. Stationary equipment would be outfitted with drip pans and hydrocarbon absorbent pads.
- Requiring that Phantom maintain spill response equipment and supplies at the site during construction and operation for immediate response and cleanup of any fuel spills. The amount of response supplies determined to be “adequate” is based on guidance provided by VSFB’s installation-wide Spill Prevention, Control, and Countermeasures (SPCC) Plan.
- Requiring Phantom to ensure employees and contractor staff are trained in proper prevention and cleanup procedures.
- Requiring Phantom to submit a SPCC Plan to the Santa Barbara County Certified Unified Programs Agency for approval. This plan would be required to be consistent with the criteria included in VSFB’s installation wide SPCC plan. Some of the elements required in Phantom’s SPCC plan include:
    - Procedures for designating responsible owners or operators who are accountable for the management and oversight of oil storage tanks and containers and oil-filled equipment.

- General annual spill prevention and response training requirements for shop-level personnel and for personnel designated to act as responsible owners or operators.
- Procedures for performing inspections and reporting results.
- Guidelines and training for using and maintaining spill response equipment.
- Procedures for storing, handling, and managing oil on the construction site.

In addition to these requirements, DAF has stated, in a letter to Commission staff dated May 22, 2023, that under 40 CFR 112, the SPCC would include elements that the Commission considers critical for these plans, including: an oil spill risk and worst-case scenario spill assessment that includes oil spill trajectories and identification of the coastal resources at risk from oil spill impacts, response capability analysis of the equipment, personnel, and strategies (both on-site and under contract) capable of responding to a worst-case spill, including alternative response technologies, oil spill preparedness training and drills, and evidence of financial responsibility demonstrating capability to pay for costs and damages from a worst-case spill.

Possible Spills from Rocket Fuel Storage

During project operations, Phantom would establish a fuel storage area for RP-1 or Jet-A, which are kerosene-based fuels for the Daytona-E and Laguna-E rockets. RP-1 or Jet-A would be stored in portable tanks. At each launch pad, up to two 5,500-gallon tanks would be used for fuel storage. These tanks would be connected to a fuel transfer manifold, which would include a 275 gallon-per-minute pump, isolation valves, and a 4-inch line from the storage area to the launch pad for fueling rockets. A leak in any of these systems has the potential to spill petroleum products at the site. The largest possible spill, if all four tanks were to be damaged and spill at once, would be 22,000 gallons or 523 barrels of fuel. In the event of a catastrophic failure with no containment or control measures, this would be enough fuel to travel from the proposed project site to Honda Creek and then to the ocean and beaches of the coastal zone outside of VSFB.

As a standard procedure on VSFB, DAF requires monthly and annual inspections and reporting for all fuel storage containers larger than 55 gallons. This would be applicable to the Phantom project. A separate inspection frequency and protocol is also required for containers less than 55 gallons. DAF also requires integrity testing for all above-ground storage tanks on a monthly basis.

Notwithstanding the measures that DAF would implement to prevent a spill from occurring, onsite secondary containment is also proposed to be constructed as part of the launch complex facility. This containment would be designed to be capable of holding the entire capacity of the single largest container as well as sufficient volume to hold precipitation from a 24-hour, 25-year storm, if the secondary containment area is uncovered. In the case of VSFB, this is an additional 3.5-4 inches of precipitation. As mentioned above, DAF would also require Phantom to maintain adequate spill response

supplies at the site during operations. Finally, Phantom is required under 40 CFR 112 to develop an SPCC plan, described above, which complies with both state and federal law and includes elements that the Commission considers critical for oil spill prevention, control, and response. The detailed criteria the plan is required to meet is included in VSFB's installation wide SPCC Plan. The Commission finds these measures are adequate to respond to an accidental spill and preclude fuel from reaching Honda Creek and the coastal zone.

In conclusion, with the inspections, reporting, secondary containment, spill preparedness, and cleanup procedures discussed in these findings and the preparation of a site specific SPCC Plan, the Commission finds that the proposed project is consistent with Coastal Act Section 30232.

G. CULTURAL RESOURCES

Coastal Act Section 30244 states:

> Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.

As discussed in the consistency determination it prepared for the project, DAF has investigated whether the proposed project, including the new proposed development at the former site of SLC-5, would adversely impact archaeological resources as identified by the State Historic Preservation Officer (SHPO). DAF identified four archaeological sites within the general area of the proposed project. However, of the four sites, only one is eligible for the National Register of Historic Places.[17] The remaining three sites were ineligible because they were either destroyed and capped with concrete during the construction of SLC-5 for the NASA scout facility or are not within the proposed construction footprint for the Phantom project. When the NASA Scout launch facilities at SLC-5 were being demolished, the concrete pad was retained and covered with an overburden of several feet of clean fill soil. Phantom proposes to build on top of this clean fill and is therefore not expected to unearth or disturb any archaeological sites during site construction.

Of the archaeological sites considered, only one is eligible for the National Register of Historic Places. This site is also the only one located where it has the potential to be affected by the project; it is bisected by Honda Canyon Road. However, the portion of Honda Canyon Road within the delineated boundaries of this site would not require improvements, and the proposed activities within the site would be limited to removal of vegetation from the existing paved road segment. No ground disturbance is proposed.

[17] The SHPO reviews nominations to the national register of historic places, and a location or resource being eligible for the national register of historic places means that DAF would need to assess the impacts of their project on that resource under NEPA.

Further, DAF proposes to protect this site during vegetation removal activities by installing exclusionary fencing along both sides of Honda Canyon Road where it crosses the archaeological site. The SHPO received notice about the site and the protection measures proposed by DAF and, on May 17, 2022, concurred with DAF's determination that the proposed project would not have an adverse effect on cultural resources.

DAF also consulted with the Santa Ynez Band of Chumash Indians as part of its Section 106 process. DAF has stated to Commission staff that the Santa Ynez Band of Chumash Indians agreed with DAF's evaluation regarding the lack of potential effects to cultural resources with implementation of the proposed protective measures and concluded that tribal monitors would be necessary only if ground disturbance occurred near a known prehistoric site. As part of its review process, Commission staff also reached out to the Santa Ynez Band of Chumash Indians and several other Tribes with potential cultural connection to the project area, as indicated by the list provided to Commission staff by the Native American Heritage Commission. The Santa Ynez Band of Chumash Indians did not request additional coordination or consultation with Commission staff beyond what had already been carried out by DAF.

Commission staff, however, did receive a request for additional information and consultation from the Northern Chumash Tribal Council (NCTC). Commission staff scheduled a consultation with the NCTC and met with their representatives on May 25, 2023. During consultation, the NCTC stated that if the fill at the project site is demonstrated to be free of cultural resources, and no native soils are disturbed during construction activities, tribal cultural monitors would not be necessary. DAF confirmed that the fill material at the project site was tested and would not potentially include cultural resources and Commission staff provided this information to NCTC. The NCTC also discussed the need for early consultation with DAF on all projects at VSFB. The Commission supports the need for DAF to provide adequate outreach and to NCTC and other tribes with cultural connections to this area. Commission staff would facilitate those conversations and information sharing for future projects through implementation of the Commission's Tribal Consultation Policy.

In conclusion, with the protective measures proposed by DAF and the absence of proposed ground disturbing activities in areas that may support cultural resources, the Commission agrees with DAF and the concurrence of the SHPO that the project would not adversely impact archaeological or paleontological resources. The Commission therefore finds that the project is consistent with Section 30244.

H. COASTAL ACCESS & RECREATION

Coastal Act Section 30210 states:

> In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent

> with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.

Coastal Act Section 30211 states:

> D*evelopment shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.*

Coastal Act Section 30214 states, in relevant part:

> *(a) The public access policies of this article shall be implemented in a manner that takes into account the need to regulate the time, place, and manner of public access depending on the facts and circumstances in each case . . .*

The closest beaches to the proposed project site with public access include Jalama Beach County Park (Jalama), Surf Beach, and Ocean Beach Park. These are some of the only publicly accessible beaches within the 64-mile stretch of northern Santa Barbara County between Point Sal and Gaviota State Beach. Due to its location and the southerly direction of proposed launches, launches at the project site would not result in public coastal access or recreation restrictions at Surf Beach or Ocean Beach Park. Proposed launches would have the potential to adversely impact public coastal access and recreation at Jalama, however.

Jalama Beach is an important public recreational resource because of its upland and water oriented recreational values and scenic resources. It is popular for surfing and wind surfing and used by people from all over the state. The Commission's California Coastal Resource Guide also describes this area as a popular fishing spot: "An offshore reef protects the nearshore waters from turbulent wave action, creating a popular sport fishing... spot." In addition, Jalama Beach County Park provides some of the only overnight beach camping sites within northern Santa Barbara County and is heavily used throughout the year. The sandy beach and estuary along Jalama Creek provide ample opportunity for the public to bird watch, walk, and passively enjoy coastal resources. The scenic resources of Jalama Beach provide a unique place to enjoy coastal recreational resources as well due to its remote location and the absence of visible development such as homes, buildings and lights in surrounding areas.

Because Jalama Beach provides unique recreational opportunities and is one of the few places along the northern Santa Barbara County coast that provides for public coastal access, potential adverse impacts on the recreational use of the beach from the proposed project are particularly significant. This is additionally the case because existing space launch activities at VSFB already result in temporary restrictions on public coastal access and recreation at Jalama. These restrictions are put in place by DAF and the Federal Aviation Administration for public safety reasons. If an accident occurs or DAF or a space launch company must destroy a rocket during take-off, debris could crash onto Jalama Beach and its campground, presenting a significant danger to

the public. As such, access to these areas is often restricted for several hours in advance of a planned launch event, Jalama Rd. is closed to entry and members of the public are evacuated and required to drive approximately 30 minutes away to Highway 1 until the launch is complete and the 14-mile long Jalama Rd. is reopened. In addition, campground reservation holders are notified up to one week in advance by Santa Barbara County (the operator of the campground) of the potential need for evacuation during their stay. Based on information provided by Santa Barbara County staff, such notifications often result in cancellations and reduce the number of people camping by up to 60 percent, particularly when evacuations would occur late at night or during early morning hours. Additionally, Santa Barbara County staff noted that 20 percent of reservations were canceled after notifying reservation holders of a launch that did not require any evacuation.

As the Commission noted back in 1998 in its findings for Consistency Determination No. CD-049-98,

> In the past, the Commission has had significant concerns about public beach closures in this area. The Commission has generally agreed that beach closures are necessary part of the space launching activities at Vandenberg and the Commission has generally supported these space launching activities. However, in evaluating these activities, the Commission usually requires some mitigation for the beach closures. This mitigation is usually a limitation on the number of launches annually and other measures designed to reduce the significance of the impact. These other measures have included commitments to avoid weekend launches, especially holiday weekends, and minimizing the number of launches occurring during the peak recreation season (usually May through September). Additionally, although not required in the past, the Commission believes that there is some value for the applicant to provide to the Commission annual reports on the beach closures resulting from its launch activities.

While the Commission ultimately concurred with CD-049-98, it did so with the understanding that (1) the space launch program under consideration was proposed to replace an existing program and would therefore not increase the total number of annual launches from the base or associated coastal access restrictions; (2) DAF expected a base-wide total of eight launches per year with a maximum of 14 launches; and (3) as noted in the Commission's findings,

> …the Air Force has modified its consistency determination to include mitigation measures that would limit or reduce the significance of the beach access impacts. Specifically, the Air Force has agreed to consider access impacts among those issues it will evaluate in determining launch schedule. For example, the Air Force will attempt to avoid holiday

> weekends and minimize the number of launches during the summer months. Additionally, the Air Force will monitor beach closures and provide an annual report to the Commission. The monitoring will provide data on the number of launches that included beach closures, the location of the closure, and the duration of each closure.

Commission and DAF staff have been unable to locate the monitoring data or annual reports described above so has instead relied on data compiled by Santa Barbara County Parks and Recreation Department staff regarding public coastal access and recreation restrictions implemented at Jalama Beach.

In prior reviews of coastal and recreational access impacts from space launch activities at VSFB, including the one cited above, adverse impacts to public coastal access and recreation have been described in terms of "beach closures." As noted above, in its concurrence with the U.S. Air Force's Consistency Determination No. CD-049-98, the Commission found that with the addition of minimization measures, an average of eight and maximum of 14 launches per year and associated temporary beach closures would be consistent with the coastal access and recreation policies of the CCMP.

Although this numeric limit was established in 1998 and prior to the authorization of a wide range of new space launch programs with significantly higher stated levels of launch activity – as further detailed in the background section of this report above – DAF adhered to it consistently through 2021. However, the number of launches from VSFB has steadily increased over the past two years and has now exceeded the limit of 14 launches per year maximum. In addition, Commission staff have learned that adverse impacts to public coastal access and recreation associated with space launch activities, particularly at Jalama, take a variety of forms and cannot simply be categorized as "beach closures."

For example, in order to provide transparency and help minimize the levels of frustration directed towards County staff, campsite reservation holders are notified between one and seven days in advance of a scheduled launch that Jalama Beach may be closed during their stay, necessitating an evacuation for several hours. Similar notices are also provided through the County's reservations website to those attempting to book a campsite during the time of a scheduled launch. These notifications result in cancellations and limit bookings, both of which reduce public coastal access and recreation. More severe adverse impacts occur as a result of the closure of the 14-mile long Jalama Rd. several hours in advance of a scheduled launch and the full closure and evacuation of the beach and campground. Full beach closures and evacuations result in significant adverse impacts to coastal access and recreation as they last three to four hours and require travel at least 30 minutes away to Highway 1. One-hundred-ten sites are available for camping reservations at Jalama and with a maximum occupancy of eight people per site, the full overnight capacity of the campground is nearly 900. This number is exceeded during the day due to day-use visitors such as surfers, fishers and beach goers.

The potential need for an evacuation at Jalama would not occur with every launch, however. In its consistency determination, DAF states that the decision to evacuate is based on a risk analysis using a standard approach developed by the Federal Aviation Administration. For each launch, DAF's Range Safety Program considers the number of people within an "impact limit line" and conducts pre-launch debris risk assessments to determine high risk areas. The population size that determines the need for an evacuation from Jalama is typically 500 people. In other words, if 500 or more people are present, an evacuation and closure is triggered. If this number is close to being exceeded, a road closure may be triggered to limit the ingress of additional people and to avoid a full closure and evacuation of the beach and park. Risk assessments carried out by DAF are also informed by launch angle (azimuth), weather forecasts and upper atmospheric wind conditions predicted for the day of the launch. It is also worth noting that because evacuations can take several hours to implement, they are carried out well in advance of a scheduled launch. On occasion, launches are delayed, cancelled or rescheduled, which can result in multiple closures and evacuations for a single launch event.

In the case of the proposed Phantom project, DAF states that the proposed launches are very unlikely to cause adverse impacts to public coastal access and recreation at Jalama. The launch angle anticipated to be used for Phantom rockets would not be anticipated to necessitate closures to the park, as the potential debris field would generally be far enough away from the park to allow it to remain open during launches. Under a conservative, worst-case scenario, DAF assumes that there may be up to two launch events per year that may necessitate consideration of evacuations at Jalama, and resulting in public access impacts. However, it is unclear if scheduled launches by Phantom would generate potential evacuation notifications to campground reservation holders or those seeking to secure reservations. DAF has affirmatively committed to working to ensure that rocket launches from the proposed Phantom space launch complex would minimally affect coastal access and recreation and Jalama Beach, including by committing to manage all space launch activities in order to remain below a "cap" of 12 beach closures or evacuations per year. DAF has already made significant progress towards minimizing the effects of base-wide operations on coastal access and recreation, including through a re-assessment of the safety protocols for Surf Beach and Ocean Park in Lompoc that now allows these shoreline areas to remain open during launch events. Similar efforts are being pursued for Jalama Beach as well and DAF is additionally working to renew an expired Memorandum of Agreement with Santa Barbara County that may result in additional public access and recreation protections and benefits.

With DAF's commitment to pursue these efforts and to remain under the numeric "cap," as well as the low likelihood of Phantom launches resulting in coastal access and recreation restrictions, the proposed project would be consistent with Coastal Act Sections 30210, 30211, and 30214 and their requirement to maximize public access in

a manner that accounts for the need to restrict access based on site-specific constraints.

I. COMMERCIAL AND RECREATIONAL FISHING

Coastal Act Section 30234.5 states:

> The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.

The proposed project has the potential to impact commercial and recreational fishing activities off the coast of VSFB. Coastal Act Section 30234.5 requires that the commercial and recreational importance of fishing be recognized and protected.

A map of the range of Phantom's potential launch angles overlaying CDFW fishing blocks is available in **Exhibit 11**. Only a small subset of the blocks overlaid by the range of Phantom's potential launch angles would be affected by each individual launch, and only for a short period of time.

The area directly to the west of VSFB is included in Vandenberg State Marine Reserve, which does not permit any take or fishing of any living, geological, or cultural marine resource. However, the range of potential launch angles covers areas of ocean that are fished. In its consistency determination, DAF states:

> Fishing in these blocks varies and is largely conducted by vessels from the Santa Barbara Harbor, which represents 94% of the fishing in these blocks. However, fishermen from the Port San Luis and Morro Bay Harbor also fish these waters, primarily within 3 nautical miles of the shoreline and north of Point Conception…

DAF found that commercial fishing identified in these fishing blocks is "limited compared to other areas but is valuable for select species." Coastal pelagic species, marine state managed invertebrates, and groundfish dominated the landings by weight and value. In its consistency determination, DAF states:

> The top 10 species from the selected blocks represent 95% of the landings by pounds…This reveals market squid, red sea urchin, and California spiny lobster dominate the fishing and represent over two-thirds the selected blocks' landed value. Vermilion rockfish, shortspine thornyhead, brown rock crab, and red rock crab contribute substantially to state totals in these species but are much lower total value.

Launches from the proposed project would result in the US Coast Guard issuing a notice to mariners that defines a public ship avoidance area for launch events. These notices are typically unpatrolled warning areas and not hard closures. To ensure public safety, these notices to mariners are issued for no more than 4 hours on the primary launch day, with one back-up day. At the bare minimum, these warnings are issued for each launch duration with the addition of 30 minutes to account for any possible falling

debris. The vehicle (vessel) hazard area identified in the notice to mariners is typically described as a corridor of 5 to 15 nautical miles on either side of the flight path to a point offshore where the risk to vessels is below safety thresholds. The size of the vessel hazard area varies based on several factors including the launch flight trajectory and simulations of variations of the trajectory, expected seasonal winds, launch vehicle reliability, launch vehicle break-up modeling in case of an anomaly, anticipated vessel traffic, and other factors. While newer space vehicles, like the Daytona-E and Laguna-E, have larger vessel hazard areas, they launch less frequently. As the proposed Phantom project increases its launch cadence, the proven reliability of its space vehicles is anticipated to allow the space covered by the vessel hazard area to shrink.

DAF and Phantom, in consultation with fishing association leaders, identified communication beyond the notices to mariners as key to successfully avoiding and minimizing adverse impacts to fisheries from launch activities. In its consistency determination, DAF states:

> Initial discussions with the chair of the Port San Luis Commercial Fishermen's Association have already identified measures that will be implemented to avoid and minimize disruptions to fishing offshore of VSFB. Phantom will provide the chairmen of local fisherman's associations with an email that includes a printable flyer showing the date and time of the launch window(s), the VHA [vehicle hazard area], and how long the VHA will be in effect. Although this duplicates the information presented in the [notice to mariners], discussion with the chair of the Port San Luis Commercial Fishermen's Association indicated that directly communicating the area and physically posting it on an announcement board used by the fishermen would be the most effective way of enabling the fishermen to plan around launch activities, if necessary.

Coordination with the fishing fleet is also proposed to be adjusted seasonally, as needed for when different fisheries are operating in the area. Through coordination with the Port San Luis Commercial Fishermen's Association, DAF learned that fishermen using the areas in the blocks that may be impacted by launches typically fish in the morning in nearshore (<3 nautical miles) shallow reef habitat. Therefore, DAF has committed to ensuring that Phantom avoid timing its launches for the morning hours and ensure that launch times are clearly communicated with the fleet to avoid impacts to commercial and recreational fisheries.

Finally, in its consistency determination, DAF states:

> Within 90-days of completing the NEPA-process for SLC-5, Phantom, with support and collaboration from SLD-30, will develop a Phantom Space Fisheries Communications and Coordination Plan that will outline the planning and execution steps to avoid and minimize impacts of Phantom launches to the commercial and recreational fishing communities. This will

> be made available to the fishing communities and California Coastal Commission for transparency, feedback, and insight. Phantom will prepare an annual report outlining the communications completed, launches conducted, successes/challenges encountered, and takeaways (e.g., best practices and recommended actions) learned.

In conclusion, because the proposed launches can be timed for hours of the day when commercial fishing and recreational fishing is not likely to be taking place, and due to DAF and Phantom's commitment to enhanced coordination with the fishing fleet to further avoid and minimize impacts, the Commission finds that the proposed project would protect the commercial and recreational importance of fishing. Therefore, the proposed project is consistent with Section 30234.5.

J. AIR QUALITY

Coastal Act Section 30253 states:

> New development shall do all of the following:
>
> (c) Be consistent with requirements imposed by an air pollution control district or the State Air Resources Board as to each particular development.

The proposed project has the potential to produce air pollution emissions through construction of the proposed project facilities and through launch activities. Coastal Act Section 30253 requires that the proposed project be consistent with the requirements imposed by the Santa Barbara County Air Pollution Control District. Construction activities for the Phantom project include both emissions from construction equipment and from the use of up to two generators during construction. As part of its draft Environmental Assessment, DAF calculated the expected operational air emissions of the proposed project and found that all annual air emissions fell below the screening threshold for the Santa Barbara County Air Pollution Control District. Table 8 below shows the expected annual emissions for air pollutants per year.

Table 8: Estimated Annual Air Pollutant Emissions from Operation of the Phantom Space Project

	Estimated Emissions (Tons)						
Year	CO	NO_x	VOC*	SO_x	$PM_{2.5}$	PM_{10}	Pb
2023	1.313	0.883	0.194	0.136	0.154	0.154	0.00
2024	2.711	1.979	0.462	0.362	0.394	0.394	0.00
2025	9.014	8.407	2.022	1.670	1.792	1.793	0.00
2026	7.943	0.017	0.002	0.000	0.001	0.001	0.00
2027	35.524	0.416	0.058	0.002	0.012	0.016	0.00
2028	71.047	0.831	0.116	0.003	0.024	0.031	0.00
Annual Screening Threshold	100	100	100	100	100	100	100
Below Threshold for all years?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* At the time of analysis, ROC emissions factors were not available for the activities analyzed in this table. VOC emissions factors were instead used as a surrogate and reported in this table.

Notes: Values report as 0.000 are less than 0.0005 units; Screening Thresholds are 100 tons per year for all emissions reported.
CO = Carbon Monoxide; NOx = Nitrogen Oxides; VOC = Volatile Organic Carbons; SO_x = Sulfur Oxides; $PM_{2.5}$ = Particulate Matter less than 2.5 Microns in Diameter; PM_{10} = Particulate Matter less than 10 Microns in Diameter; Pb = Lead

Although the project falls below the PM_{10} screening threshold, the Santa Barbara County Air Pollution Control District requires that all discretionary construction activities adhere to standard dust control measures, because Santa Barbara County exceeds the state standard for PM_{10}. DAF proposes to implement dust control measures consistent with the County's requirements. These measures include, but are not limited to:

- Water shall be applied at least twice daily to dirt roads, graded areas, and dirt stockpiles created during construction and demolition activities.
- On-site vehicle speed limits shall be limited.
- Stockpiles of soil or other fine loose material shall be stabilized by watering or another appropriate method.
- Earth moving shall comply with Santa Barbara County Air Pollution Control District's Rule 345, control of fugitive dust from construction and demolition activities.

A full list of the conservation and environmental protection measures VSFB would adhere to, including dust control measures is provided in **Appendix A**.

Similarly, the project is expected to release greenhouse gas emissions through construction and launch activities. The expected annual greenhouse gas emissions are provided in Table 9 below:

Table 9: Estimated Annual Greenhouse Gas Emissions

Year	Metric Tons	Significance Threshold	Below Threshold?
2023	118.56	25,000	Yes
2024	238.49	25,000	Yes
2025	925.48	25,000	Yes
2026	92.01	25,000	Yes
2027	433.31	25,000	Yes
2028	862.72	25,000	Yes

Overall, the proposed project is not expected to exceed the annual CO_2e threshold or the annual threshold for criteria pollutants.

With implementation of the dust control measures described in **Appendix A**, DAF would be consistent with the requirements imposed by an air pollution control district and thus the project would be consistent with Section 30253(c).