Attachment B

Building a Thriving Space Enterprise on the Central Coast of California

Commercial Space Master Plan
Vandenberg Space Force Base
June 3, 2021

Space Launch Delta 30
Vandenberg Space Force Base

Preface

Leaders from the County of Santa Barbara, the State of California, Space Launch Delta 30, REACH, Cal Poly State University, and Deloitte have announced a commitment to develop a thriving space enterprise on the Central Coast of California. According to the memorandum of understanding, the parties are developing a master plan that identifies the required infrastructure, human capital development, governance and financing necessary to support the United States Space Force mission and position California as a global leader in the future of the commercial space industry.

The memorandum is a key part of a larger strategy for economic development in the Central Coast region, built in collaboration with the Governor's Regions Rise Together initiative, REACH and Deloitte.

The U.S. government, in its first National Space Strategy, identifies the space industry as a top priority and highlights dynamic partnerships between government and commercial partners as essential to our economic prosperity, national security and scientific knowledge.

The region boasts several attributes that make it an ideal location for commercial space operations, a sector that is likely to lead high-quality job growth over the coming decades. Vandenberg SFB already maintains active launch capabilities and favorable geography, and Cal Poly produces world-class engineering and science talent.

The commercial space activities centered on the base could support a larger industry, and parties envision a robust cluster of space-related activities taking root in the region, with sustained presence of companies across the ecosystem, from manufacturing and launch to maintenance and support, and enabling human spaceflight for the first time in California.

This document reflects the next part in a larger effort to reimagine and transform space within the State of California. We collectively invite you to learn more, reach out, and join us on this journey toward tomorrow.

County of Santa Barbara California — one COUNTY one FUTURE

CALIFORNIA Governor's Office of Business and Economic Development

Space Launch Delta 30
Vandenberg Space Force Base

REACH
Ideas + Action for a Thriving Central Coast

Learn by Doing — CAL POLY

Deloitte.

About the County of Santa Barbara
Santa Barbara County, California, officially the County of Santa Barbara, is located on the Central Coast of California. As of the 2010 census, the population was 423,895. The county seat is Santa Barbara, and the largest city is Santa Maria. Santa Barbara County comprises the Santa Maria-Santa Barbara CA Metropolitan Statistical Area. Mainstays of the county's economy include engineering, resource extraction (particularly petroleum extraction and diatomaceous earth mining), winemaking, agriculture, and education. The software development and tourism industries are important employers in the southern part of the county. For more information, visit countyofsb.org.

About GO-Biz
The Governor's Office of Business and Economic Development (GO-Biz) serves as the State of California's leader for job growth and economic development efforts. GO-Biz offers a range of services to business owners including: attraction, retention and expansion services, site selection, permit streamlining, clearing of regulatory hurdles, small business assistance, international trade development, assistance with state government, and much more. For more information, visit business.ca.gov.

About Vandenberg Space Force Base
Space Launch Delta 30, formerly known as the 30th Space Wing and Vandenberg's host unit, supports West Coast launch activities for the Department of the Air Force, Department of Defense, National Aeronautics and Space Administration, national programs and various private industry contractors. The Unit supports the processing and launch of a variety of expendable and reusable vehicles including Atlas V, Delta IV, Pegasus, Minotaur, Alpha, and Falcon. The Unit also supports Force Development and Evaluation of all intercontinental ballistic missiles, aeronautical program support, and one-off development testing programs supports, as well as Missile Defense Agency test and operations. For more information, visit vandenberg.spaceforce.mil.

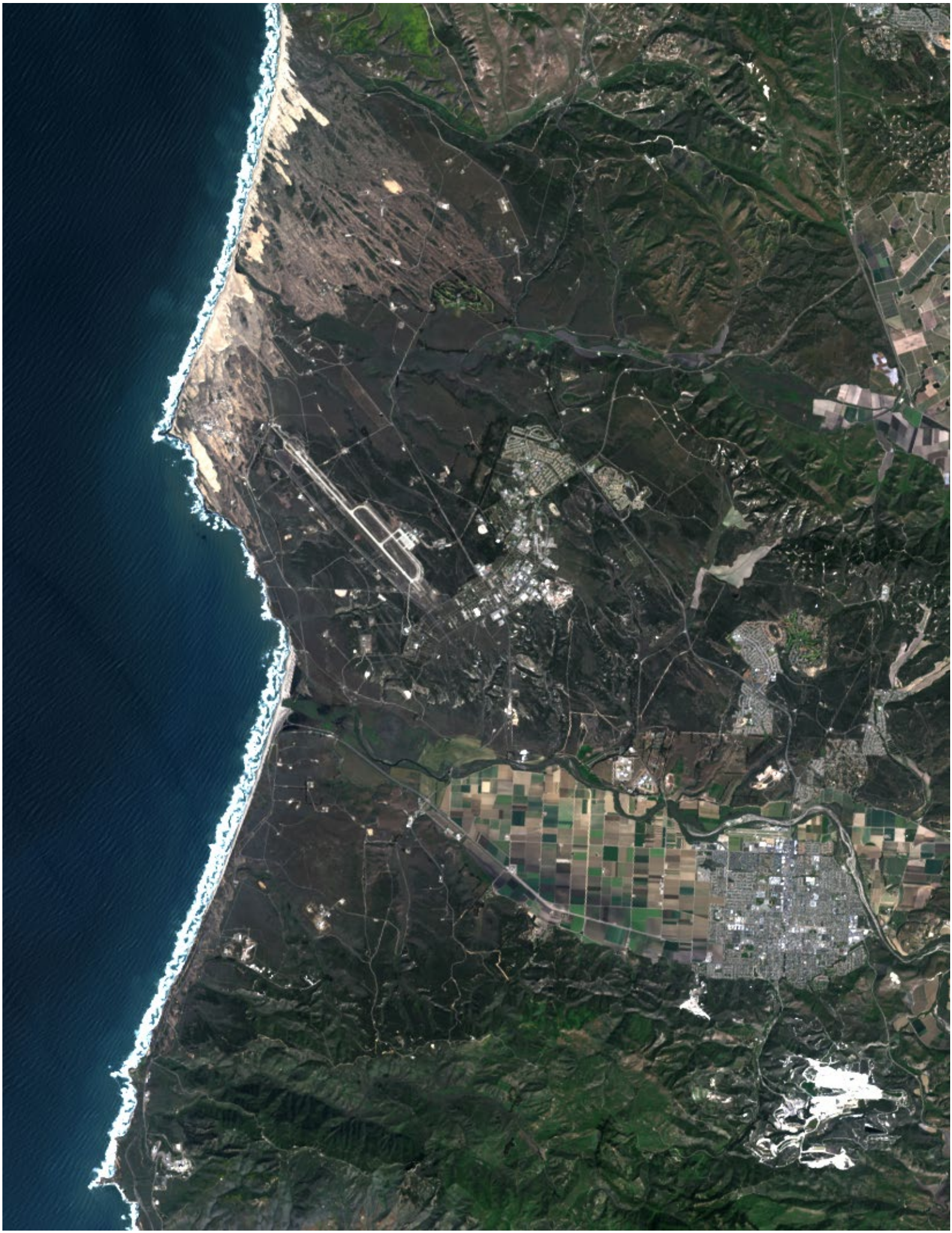
About REACH
REACH is an economic impact organization created to ensure the Central Coast of California is a place where current and future generations have the opportunity to thrive. With a mission to increase economic prosperity through big thinking, bold action and regional collaboration, REACH serves the Central Coast Region spanning San Luis Obispo and Santa Barbara Counties. For more information, visit reachcentralcoast.org.

About Cal Poly
Founded in 1901 and part of the renowned California State University system since 1960, Cal Poly is a nationally ranked, four-year, comprehensive polytechnic public university located in San Luis Obispo, California. Known for its "Learn by Doing" approach, small class sizes and open access to expert faculty, Cal Poly is a distinctive learning community whose 22,000 academically motivated students enjoy an unrivaled hands-on educational experience that prepares them to lead successful personal and professional lives. For more information, visit calpoly.edu.

About Deloitte
Deloitte provides industry-leading audit, consulting, tax and advisory services to many of the world's most admired brands, including nearly 90% of the Fortune 500® and more than 7,000 private companies. Our people work across the industry sectors that drive and shape today's marketplace — delivering measurable and lasting results that help reinforce public trust in our capital markets, inspire clients to see challenges as opportunities to transform and thrive, and help lead the way toward a stronger economy and a healthy society. Deloitte is proud to be part of the largest global professional services network serving our clients in the markets that are most important to them. Now celebrating 175 years of service, our network of member firms spans more than 150 countries and territories. Learn how Deloitte's more than 312,000 people worldwide make an impact that matters at www.deloitte.com.

Acknowledgments
This report, formulated under the Phase 1 scope of work, was funded by the County of Santa Barbara in support of the MOU agreement and the economic development goals for the region. Any opinions, findings, and conclusions or recommendations expressed within this document are those of the author(s) and do not necessarily reflect the views of the United States Space Force, United States Air Force, or the County of Santa Barbara.

This document is approved for public release and does not contain any confidential or technical data subject to restrictions.



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SECTION 1
EXECUTIVE SUMMARY

Looking Toward the Future

We firmly believe that the next decade will be transformative for U.S. commercial and defense space capabilities. California is positioned to double down on its leadership role as a space and aerospace innovator, which also serves to raise up California talent into future, high-tech jobs. The Central Coast is a strategic center of this innovation and prosperity, with broad and widespread impact statewide. It is through this lens that our team has come together to develop a master plan for commercial space industry expansion on the Central Coast and at Vandenberg Space Force Base, a key anchor of California's leadership in space.

About the Space Industry and Vandenberg Space Force Base

As of early 2021, the space economy boasts $414.75 billion (USD) in annual global spend. Looking forward, Goldman Sachs, Morgan Stanley, and Bank of America have estimated that the global space economy is headed toward a $1 trillion market size by 2030. The path toward a 3x growth in industry size is underpinned by advances in manufacturing technologies, a better understanding of market and mission gaps, and a massive influx of venture capital that has seen more than $186.7 billion of external capital invested into 1,480 companies in the industry since 2012, including $28.4B in 2020 alone[4]. This massive growth is generating high-paying job opportunities in STEM fields like engineering, software, design, analysis; as well as marketing, logistics, advanced manufacturing, and construction across the nation and on the Central Coast. The commercial space activity coincides with NASA's ambitions to commercialize low Earth orbit (LEO), to return to the Moon for the first time in almost 50 years and create a sustained presence for lunar operations, and to advance Earth science under the newly announced Earth System Observatory program. Not only could this industry activity represent a boon to Vandenberg Space Force Base (VSFB), many Earth science missions that have historically been launched from VSFB provide critical Earth observation data that supports environmental monitoring and climate change analysis – activities in direct alignment with the State of California and Central Coast communities' prioritization of sustainability and conservation.

As home to a major component of the U.S. Space Command and one of only a few of the established U.S. orbital launch sites, Vandenberg is ideally positioned as the West Coast hub for both commercial and military space operations.

The Central Coast Identity and Vision for Space Industry Expansion

The Central Coast region of California has a distinct and unique identity. The Central Coast and Santa Barbara County value open spaces, their agricultural roots, and a strong sense of stewardship for the environment that makes it a world-class place. The Central Coast is also noted for its top-notch innovators in high-tech industry, space in particular. Indeed, Santa Barbara County is a key center of gravity for the United States space industry with its close proximity to the Western Range at Vandenberg Space Force Base. VSFB is comprised of more than 99,000 acres along the coast of Santa Barbara County. The base and its people are an integral part of the community and economy. They are government civilians, contractors, and private companies who operate commercial space enterprise activities across the base, a true laboratory of collaboration and innovation. The region boasts several key assets in addition to Vandenberg Space Force Base: a robust university presence with two anchor institutions –the University of California-Santa Barbara and Cal Poly State University – an engaged community of leaders, consistent tourism, an agreeable

climate and clean environment, and a geography situated between the metropolitan hubs of San Francisco and Los Angeles.

At the time of this report, June 2021, the region has faced economic challenges and is now at a critical juncture in its growth trajectory. REACH, an economic development coalition focused on creating high-quality jobs throughout the Central Coast, is taking the lead to foster a prosperous economy and calling on regional leaders to embrace big thinking, bold action and regional collaboration in order to shape a vibrant economic future for the nearly three quarters of a million people within the region.

To catalyze such change, REACH is helping align federal, state, local, commercial, and academic stakeholders on a future vision for Vandenberg's commercial space activities to drive new economic growth, partnership opportunities, and social value for the Central Coast and State of California. A memorandum of understanding brings County of Santa Barbara, the State of California, Space Launch Delta 30, REACH, Cal Poly State University, and Deloitte to the table in pursuit of a shared vision for the future of space innovation and exploration on the Central Coast. These partners envision a robust cluster of space-related activities taking root in the region, with sustained presence of companies across the ecosystem, from manufacturing and launch to maintenance and support, and enabling human spaceflight for the first time in California.

The vision for this commercial space cluster comes together in this document, a Master Plan. This effort builds off the Phase 0 report released in August 2020, which established a vision for the future and the foundation for the research conducted in support of this report. This Master Plan establishes the current state of the commercial space industry on the Central Coast: market analysis, the regional space ecosystem and the vast asset inventory of VSFB and the region. It takes the current state and aspires to a future state vision of industry and job growth. The future state vision is operationalized by an action plan to achieve the future state with three goals: 1) Attract Space Industry Activities to the Central Coast, 2) Modernize and Invest in Infrastructure, and 3) Strengthen the Central Coast Space Identity.

We believe the Central Coast is in a unique position to capitalize on current industry trends and has an extraordinary opportunity to achieve new space industry milestones and promote inclusive economic development in the process. As we define and implement innovative economic development solutions through commercial space partnerships in the master plan, the region has the potential to create significant economic impact for its residents. By driving space cluster ecosystem development and private-sector investment, we can ensure that Vandenberg SFB and the surrounding region reach their potential as a thriving, competitive frontier in the 21st-Century space race.

We are pleased to deliver this first iteration of our master plan. The purpose of this plan is to define who we are as a community, the current state of affairs, our vision for the future, and the goals, objectives, investments, and other activities required to achieve our desired end state. Ultimately, this plan represents our optimism for the future of Vandenberg and the Central Coast space ecosystem, but we recognize through our recent planning efforts that there is still a lot of work to be done to move forward. We invite you to join us on this journey and collectively enable a vibrant Central Coast space ecosystem.

The 2030 Vision

To build a thriving space enterprise at Vandenberg SFB and across the Central Coast that delivers the capabilities, infrastructure, and workforce to support sustained access to space along with increased and responsible utilization of space-based capabilities and resources, and advances the quality of life and interests of the Central Coast communities. Our vision for the future aspires to grow launch activities, grow the mission at Vandenberg, and strengthen the region.

By 2030, we will create: the leading commercial launch site for commercial polar, highly elliptical, and other non-geosynchronous orbits; a center of excellence for supporting mission and development functions; and a technology hub for space applications inclusive of space domain awareness, remote sensing, and other research and development, testing, and evaluation priorities. We will create and incentivize the necessary conditions inclusive of infrastructure, workforce, and regulatory assistance to enable additional launch capabilities from small launch to human spaceflight, and to advance the capabilities of spaceflight and space operations to support climate change, conservation, sustainability, and mobility goals. By advancing space on the Central Coast, we will increase the accessibility and value of space to all within the Central Coast.

Who We Are

We are a diverse group of regional, industry, and development leaders who have joined together to advance the development of the Central Coast space ecosystem and create economic prosperity in the Central Coast region.

The Memorandum of Understanding

On August 5, 2020, leaders from the State of California, REACH, Space Launch Delta 30 (then the 30th Space Wing), Cal Poly State University and Deloitte announced a commitment through a memorandum of understanding (MOU) to develop a shared vision for a thriving spaceport at Vandenberg Space Force Base and the surrounding area. In early 2021, the County of Santa Barbara joined the MOU and collectively, this group, referred to in this document as the MOU group, has been working tirelessly to advance the development of the Central Coast space ecosystem.

According to the memorandum of understanding, the parties agreed to develop a master plan that identifies the required infrastructure, human capital development, governance and financing necessary to support the United States Space Force mission and position California as a global leader in the future of the commercial space industry. This document represents the next phase of those planning exercises and sets the vision and direction for enabling the vibrant future that we aspire to.

The memorandum and the group's efforts are a key part of a larger strategy for economic development in the Central Coast region, built in collaboration with the governor's Regions Rise Together initiative, REACH and Deloitte.

Areas of Cooperation

The MOU group intends to achieve the stated strategic objective through initiatives, consistent with Joint Ethics Regulation and all other applicable federal and state ethics regulations, focused on, but not limited to, the following areas of cooperation:

1. Collaboration to expand the opportunity for commercial space investment and commercial spaceport operations at VSFB by developing a robust VSFB Master Plan (MP) that incorporates private industry and public sector requirements.
2. Define the key enabling requirements, such as infrastructure, human capital, governance, and financing, necessary for commercial space investment, and identify partnership opportunities with the surrounding communities.
3. Connect and liaise with other state, local, and federal entities of government, private industry partners, and other interested parties to support the expansion of the commercial space industry at VSFB.
4. Support public and industry awareness through participation in events and forums related to the expansion of the commercial space industry.

Roles and Responsibilities

To advance the development of the Central Coast space ecosystem, the MOU group has committed to the following roles and responsibilities.

1. The participants will lead strategic development of the VSFB MP as outlined in the Statement of Work (SOW) between REACH and Deloitte, with technical input from GO-Biz and Space Launch Delta 30.
2. REACH, GO-Biz, and Deloitte commit to weekly project team meetings, including one-on-one site meetings as mutually agreed upon by the participants. Meetings will be held to align objectives and core priorities with the VSFB MP SOW and other priorities as mutually agreed upon and consistent with this MOU between the Participants.
3. REACH and Deloitte commit to focusing on economic resource expansion, partnership opportunities, and development of a vision/resourcing plan under Phase 1

of the VSFB MP SOW, as initiated with the REACH Board.

4. GO-Biz shall identify, and where possible, include entities of the State of California in the identification of potential financing opportunities for the development and/or deployment of the VSFB MP.

5. The participants will support public and industry outreach relating to the plan through appropriate events and forums, as mutually agreed upon by the participants and in a manner consistent with Joint Ethics Regulation and all other applicable federal and state ethics regulations.

Members of our team from the State of California GO-Biz, Space Launch Delta 30, REACH, Deloitte Consulting LLP, and Central Coast communities in front of SLC-6 at Vandenberg during the September 2019 Commercialization Greenhouse Lab.

Our Vision for the Future

To build a thriving space enterprise at Vandenberg SFB and in the surrounding Central Coast communities that delivers the capabilities, infrastructure, and workforce to support sustained access to space, increased and responsible utilization of space-based capabilities and resources, and advances the quality of life and interests of the Central Coast communities. Our vision for the future aspires to grow launch activities, grow the mission, and transform the region.

Our Goals

Attract Space Industry Activities to the Central Coast

We will strengthen the ecosystem by establishing a concierge entity to support attraction efforts, focus on attracting additional launch services providers and other space industry companies, and improve the regulatory and business environment.

Modernize and Invest in Infrastructure

We will modernize and invest in the improvement or development of on-base launch-supporting infrastructure, on-base transportation and logistics infrastructure, and off-base infrastructure such as a new mission development zone to support increased commercial activities.

Strengthen the Central Coast Space Identity

We will establish a clear, modern brand for the Central Coast space ecosystem, integrate space ecosystem development efforts with regional quality of life attributes, focus on workforce development and economic mobility, and inform regional housing and transportation development.

Requirements to Enable the Vision

- Targeted investment in supporting and enabling on-base infrastructure
- Creation of the mission development zone
- Targeted investment or improvements in regional infrastructure including those that support workforce transportation to/from other major hubs
- Utilization of incentivization “levers” to support the growth of the commercial space user base across the launch services and downstream segments of the value chain
- Support from key stakeholder groups at the federal, state, regional, and local levels
- Development of a skilled workforce by building a talent pipeline and/or relocating talent

End State Outcomes

- Increased the number of space industry related ecosystem businesses and the number of jobs located near the Central Coast
- Attracted new talent from higher education with skills suited to a technology driven workforce
- Established a reputation as a space technology innovation hub

SECTION 2
ASSESSMENT OF THE CURRENT STATE

Where We Are Today

Our vision for the future was created through broad engagement with industry, an in-depth analysis of the future trajectory for space technology, and extensive collaboration with the MOU group representing the various stakeholder groups across the Central Coast.

Approach

A current state assessment was undertaken to capture a holistic picture of Vandenberg's competitive positioning within the commercial space industry, as well as an understanding of how Vandenberg is positioned from a spaceport and aerospace cluster development standpoint against other existing and in-development spaceports. This resulted in a better understanding of VSFB's strengths, weaknesses, and opportunities. The components of the current state assessment are outlined as follows:

The Central Coast Space Ecosystem

The Central Coast space ecosystem was examined to understand the current state of Vandenberg SFB users, associated companies and organizations, supporting activities and entities, and other supporting stakeholders such as academic institutions conducting relevant research and development activities, providing relevant degree programs, and contributing to the Central Coast and space industry workforce.

Vandenberg SFB Asset Inventory

The current state of the Vandenberg SFB, inclusive of its existing launch and supporting assets were cataloged and assessed around existing launch infrastructure (space launch complexes), additional supporting mission infrastructure, and other supporting base infrastructure. Where gaps existed, we identified recommendations for infrastructure investment and modernization detailed in the action plan found in Section 3 of this document.

Industry Trends & Market Opportunities

Research was conducted on leading industry trends and market opportunities to gain a deeper understanding of Vandenberg SFB's competitive positioning for launch services operations, satellite applications, and associated research, development, testing, and evaluations (RDT&E) activities. This analysis helped identify where VSFB aligned with the current and emerging outlooks for industry trends, and where the MOU partnership could drive an increase of space-related industry missions on or near VSFB, industry attraction to the region, and workforce development within the region.

The following sections provide summary findings and relevant insights from the assessment categories. Collectively, these components provided an understanding of where we are today and informed our understanding of what needs to occur to capture more space industry activities and transform the region. This current state assessment is the basis upon which we derived our vision for the future and aspirations for growth that underpin our action plan inclusive of our goals and objectives.

The Central Coast Space Ecosystem

Centered around Vandenberg Space Force Base, the Central Coast space ecosystem extends throughout Santa Barbara and San Luis Obispo Counties and has extensive linkages to the larger aerospace and defense ecosystem in Southern California.

Introduction to Vandenberg-Central Coast Space Ecosystem

The current Vandenberg space ecosystem is defined by the assets, capabilities, users, stakeholders, and beneficiaries of the space activities located in and around the Vandenberg Space Force Base in Lompoc, CA. It is important to note that while this report often refers to Vandenberg in a colloquial sense, the efforts, recommendations, and proposed initiatives are focused on increasing commercial space activities within the Central Coast region of California. As such, the true ecosystem encompasses much more than just Vandenberg SFB.

Past Ecosystem Efforts

The current commercialization efforts are not the first time that various entities have come together for a transformative vision for the future of space on the Central Coast. In the mid-1980s significant planning and investment was undertaken by NASA and the U.S. Department of Defense to conduct Space Shuttle flights from Space Launch Complex 6 (SLC-6). As a result of the loss of the Challenger, plans to launch orbiters from Vandenberg were shelved.

In the late 1990s, the Central Coast region conducted a similar commercialization effort to create the California Space Authority and the associated California Spaceport, which also faced a number of challenges. An examination of the efforts in the 1990s and early 2000s identified three challenges that need to be addressed in today's efforts to increase the odds of success.

Commercial Competition

Our examination found that competition between launch service providers discouraged co-location and shared launch infrastructure, as rivals sought to avoid activities that benefited competitors.

Competition for Nonprofit Funding

Our examination found that nonprofit companies participating in the consortium competed for the same federal grants, including previously established entities and entities stood up after the inception of the consortium.

Political Pressures

Our examination found that with state funding came the expectation to focus on state technological priorities, resulting in a diluted focus on the space vision. Too much reliance on state funding meant that the California Space Authority did not sufficiently pursue other means of financial backing and thus met its end when it fell out of the state budget.

Current Vandenberg Ecosystem Stakeholders

To develop a holistic view of the Vandenberg space ecosystem stakeholders, we examined entities across the space technology value chain, as well as government and academic organizations that currently or could potentially play a key role in expanding out the Central Coast space ecosystem. The stakeholders were subsequently categorized as industry, academia, and government.

Industry

Startups and large corporations that use Vandenberg as part of their core business operations, such as support service providers, launchers, and satellite operators.

Academia

State and local universities that currently engage directly with Vandenberg either through collaborative partnerships or through on-base educational programs.

Government

Current U.S. federal government entities that use the assets & infrastructure at Vandenberg ranging from launch pads to testing to data sharing.

Across the three categories there are more than 50 currently identified stakeholders that directly interact with Vandenberg in a variety of roles and comprise the core of the ecosystem. Unsurprisingly, the majority of Vandenberg's external stakeholders are corporate companies, but a large number of stakeholders are also government entities (either civil or military). Additionally, most of Vandenberg's current stakeholders are local or regional to the base, but a few national and international entities have also historically engaged in activities related to on-base operations.

Stakeholder Roles and Ecosystem Engagement

Vandenberg's stakeholders engage with the base in a variety of ways. Most stakeholders are either customers or suppliers for satellite launch, but many others contribute to supporting services at the base or within the region. It is important to note that space activities conducted at the base have an economic impact on regional stakeholders and, as such, the stakeholders within the Vandenberg space ecosystem include those that directly and indirectly support space activities.

Ecosystem Key Findings and Opportunities

Across the three categories of stakeholders, we observe opportunities to attract additional ecosystem participation and potentially create additional space activities within the region.

Industry Opportunities

A key source of growth for Vandenberg is through private entities. We have identified companies across launch, satellite operations, and data & analytics to determine how the base can most effectively engage and attract these companies. To grow, we will focus on the recruitment and attraction of those space industry market entrants with >$1M in funding that align to the key growth areas for Vandenberg, including launch, satellite operations, and data & analytics (downstream applications).

Academia Opportunities

Vandenberg is neighbored by a multitude of highly ranked aerospace engineering universities and community colleges. VSFB currently has partnerships with a handful of institutions but could expand its reach to leverage facilities and create workforce development programs. To grow, we will focus on additional partnerships around satellite applications, testing and evaluation, and critical mission needs such as space domain awareness with regional, in-state, and other state and private universities with the highest-ranking aerospace engineering programs inclusive of universities and community colleges local to the region with aerospace engineering programs.

Government Opportunities

Many of Vandenberg's government stakeholders are civil entities and satellite launch customers. Vandenberg could expand its reach to agencies of allied countries and increase the variety of services offered to these entities beyond launch. To grow, we will focus on additional potential domestic and foreign government organizations that have historically demonstrated interest in Vandenberg or the mission operations and capabilities historically present at the base, subject to any limitations created by arms control regulations.

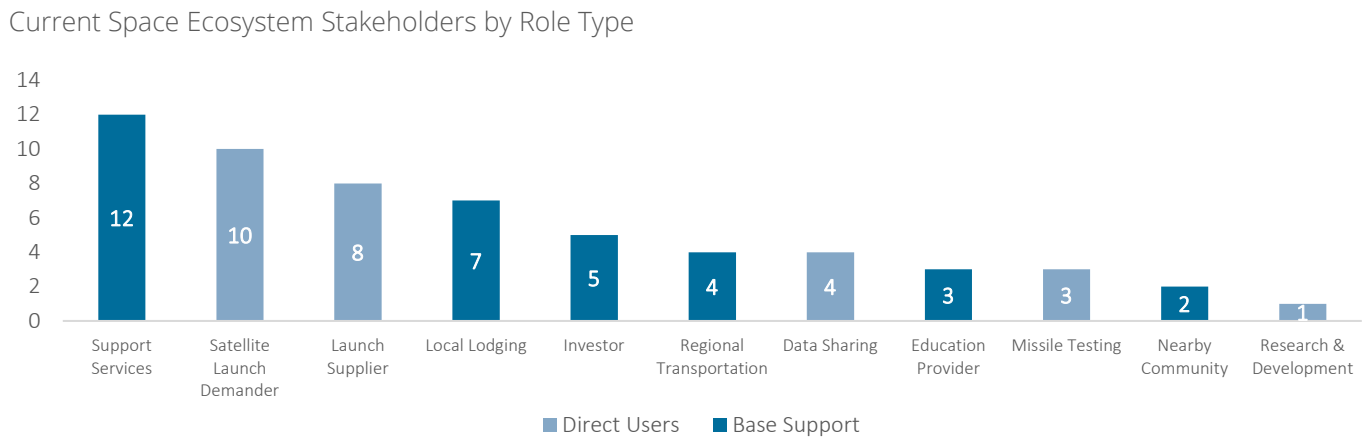
What Does this Mean for Vandenberg?

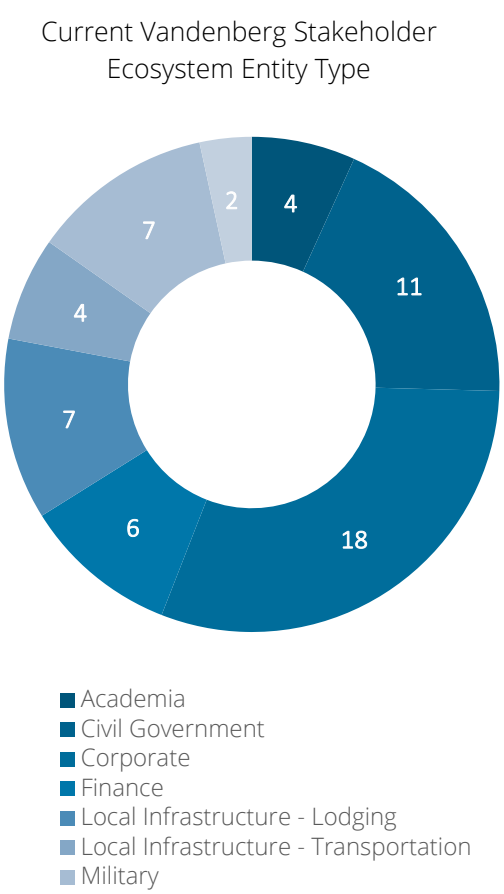
There has never been a better time to take advantage of the momentum of the commercial space industry and there is ample opportunity to capitalize on this momentum at Vandenberg Space Force base and within the Central Coast. We see ample opportunity to increase the number of businesses and the number of jobs located on the Central Coast, attract new talent from higher education with skills suited to a technology-driven workforce, and establish a reputation as an aerospace technology innovation hub as long as we tie our current ecosystem development efforts to the opportunities we are observing within the market.

These opportunities require a careful and deliberate approach to brand, mature, and grow the ecosystem in conjunction with the local communities and ecosystem stakeholders. Additionally, we need to ensure that we are constantly increasing the market attractiveness of Vandenberg by focusing on what factors we can influence and incentivize in support of our vision for the space ecosystem. An analysis of the comparative market attractiveness for Vandenberg is shown in Figure 3, highlighting areas for improvement and opportunities to create more favorable conditions for the region. The actions that we intend to undertake to increase Vandenberg's competitiveness are reflected in our goals and objectives detailed in this plan.

FIGURE 1

Identified Ecosystem Stakeholders and Roles





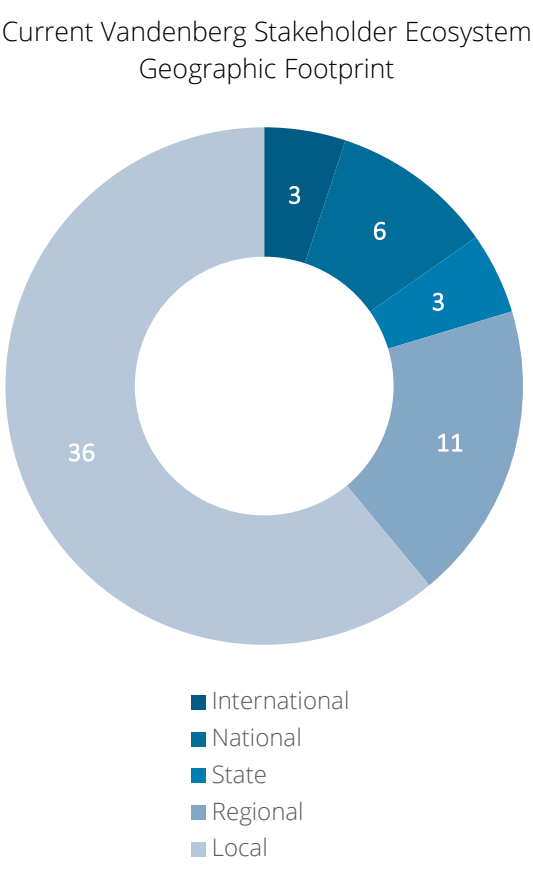
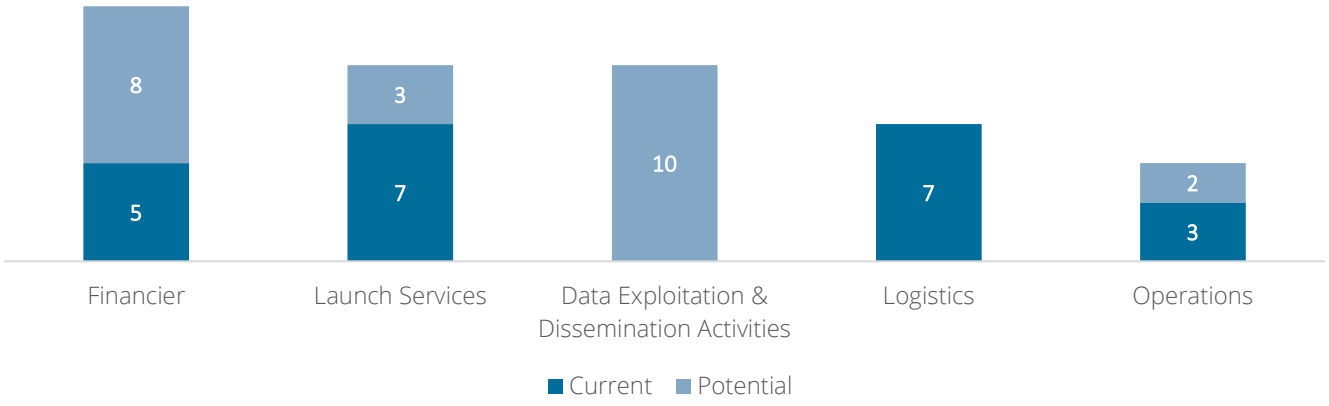


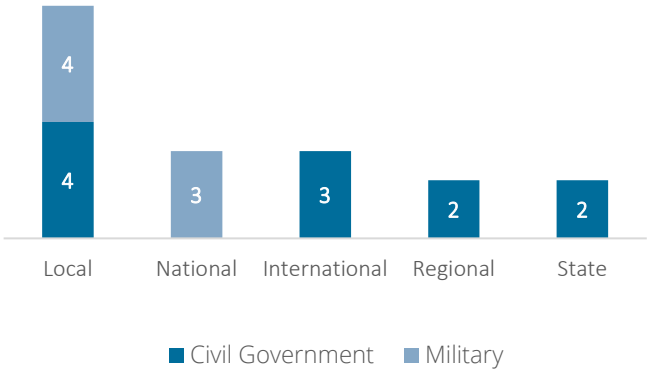
FIGURE 2

Identified Ecosystem Stakeholders by Category

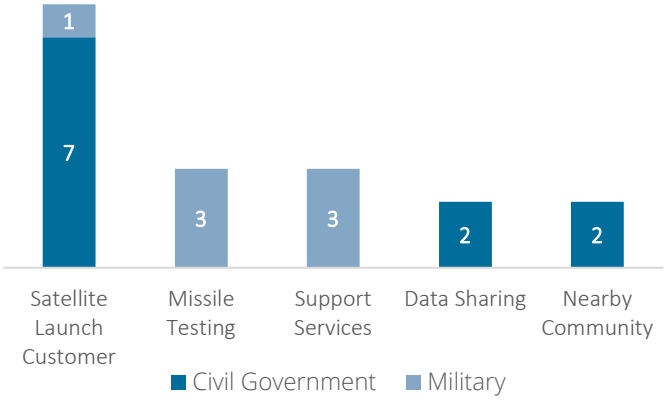
Commercial Space and Non-Space Private Industry Stakeholders



Geographic Footprint of VSFB Government Stakeholders



Roles of VSFB Government Stakeholders



Academic Institutions and Programs

16

Highly Ranked Universities and Community Colleges in The Region

48

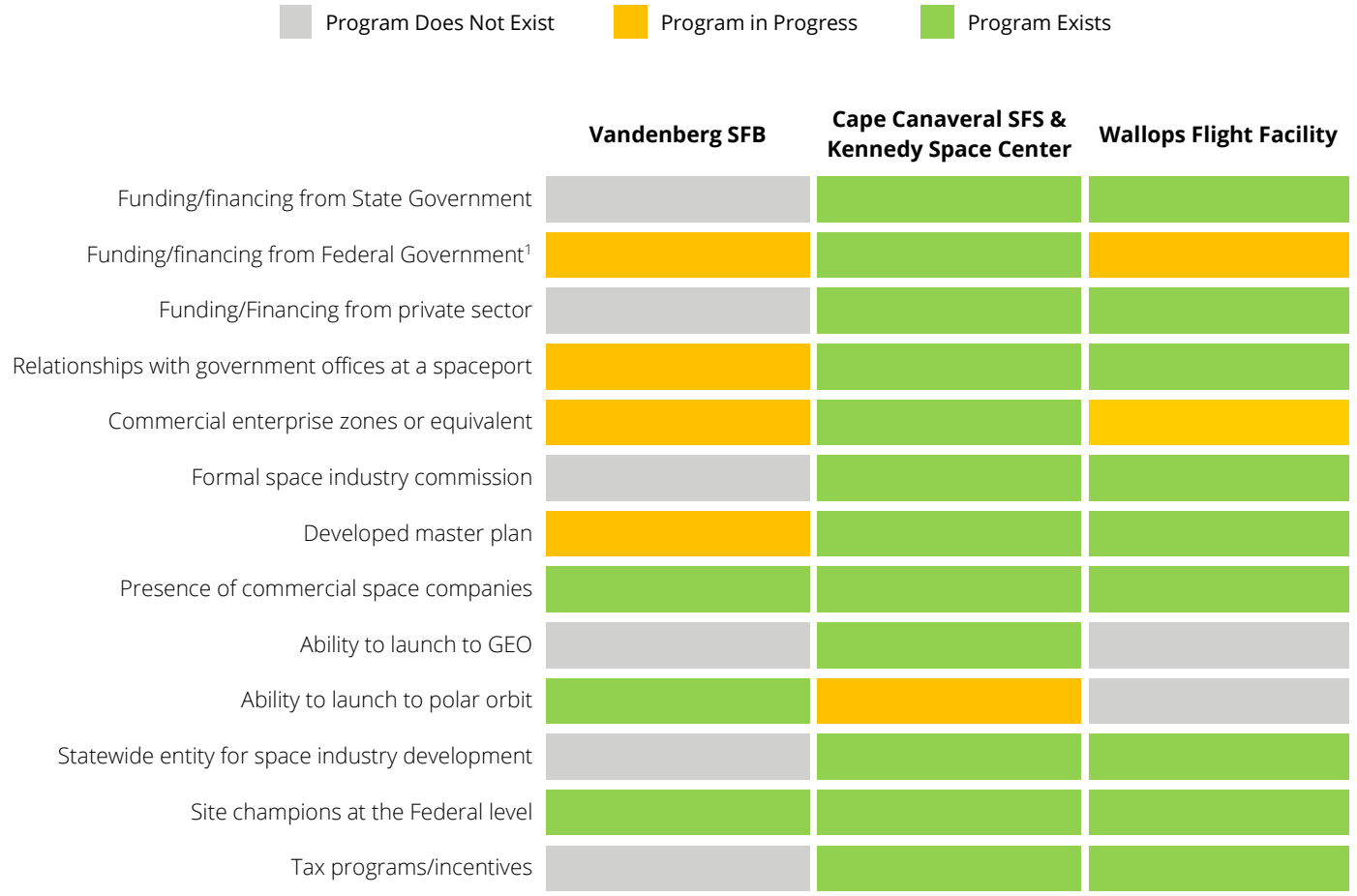
Aerospace Degree Programs in The Region

164

Aerospace Labs and Facilities in The Region

FIGURE 3

Market Attractiveness Matrix for Major U.S. Government-Operated Spaceports



[1]Accounting for indirect funding such as infrastructure improvements, military support time, base operations support, and other services provided by Space Launch Delta 30, VSFB would rank as green in this category.

Vandenberg SFB Assets

Vandenberg SFB is the third largest installation in the Department of the Air Force and home to a diverse set of assets and qualities that can support significantly increased space launch service providers and additional space industry activities.

Current Vandenberg SFB Assets

Vandenberg SFB is the third largest installation in the Department of the Air Force containing 99,604 acres of land and operating the 19th largest airfield runway in the world at 15,000 feet long. The installation provides a safe location for the testing of new and existing Department of Defense sanctioned programs, as well operational mission fulfillment of national objectives. The unique geographic location of Vandenberg makes this major range and test facility base a safe and ideal setting for confidence test launching intercontinental ballistic missiles (ICBMs), intermediate range ballistic missiles (IRBMs), and for placing satellite payloads into polar Earth orbit. The launch and range capabilities provide the architecture and infrastructure necessary for the placement of satellites into polar earth and highly elliptical orbits, while concurrently retaining the ability to confidently test the Minuteman III ICBM and other strategic priorities for the Nation.

Vandenberg SFB infrastructure primarily revolves around missile testing, space launch, space domain awareness. The base currently has 38 designated sites, inclusive of 15 operational launch and testing sites, 3 identified sites for future use, and 1 designated training site as well as ample expansion opportunities due to the large geographic footprint. The base also provides additional capabilities for on-base operations such as those enabled or supported by use of the base's runway. VSFB has a long history of supporting the commercialization of space launch from hosting commercial launches on the Atlas V launch vehicle to supporting early development for the Falcon 1 launch vehicle. Currently, the base is home to four active commercial launch providers, as of the issuance date of this document, and will soon host first launches from additional new launch services providers.

Vandenberg Geographical Layout

Vandenberg SFB is geographically split into northern and southern sections notionally referred to as North Vandenberg Space Force Base (NVSFB) or North Base, and South Vandenberg Space Force Base (SVSFB) or South Base.

North Base activities predominantly focus on ballistic missile testing inclusive of activities that support the U.S. Space Force Intercontinental Ballistic Missile (ICBM) fleet and the Ground Base Strategic Deterrent (GBSD) program. In recent years, commercial launch services providers have begun to evaluate and locate on North Base for space launch activities. Additionally, North Base is home to the Combined Space Operations Center (CSpOC) that provides Space Domain Awareness capabilities for the U.S. Space Force and allied nations, and space traffic management information for commercial space operators.

South Base activities predominantly focus on space launch activities and is home to the bulk of VSFB's space launch complexes and commercial launch services providers.

Vandenberg SFB Active and Historical Asset Inventory

Figures 4 through 13 outline the various assets present across North Base and South Base.

FIGURE 4

Vandenberg SFB Geographical Layout

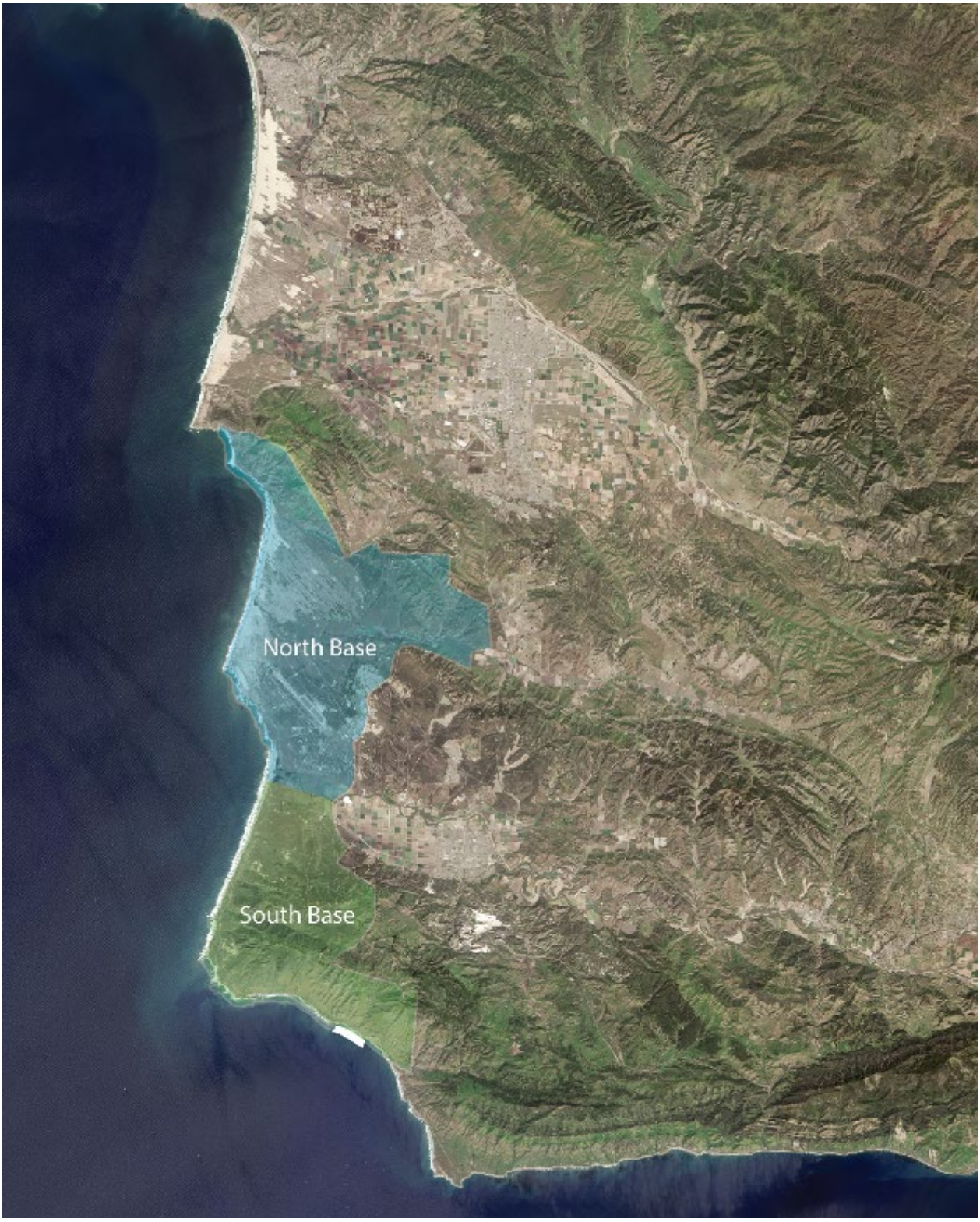


FIGURE 5

North Base Space Launch Complexes & Site

FIGURE 6

North Base Space Launch Complexes & Site

Asset Name	Asset Type	Current Status	User(s) or Operator(s)
Space Launch Complex 1E/W	Test Area	Abandoned	None
Space Launch Complex 2E/W	Launch Site	Inactive/Active	Firefly Aerospace
Launch Complex 576-E	Launch Site	Active	TBD

FIGURE 7

North Base Mission and Supporting Infrastructure

Asset Name	Asset Type	Current Status	User(s) or Operator(s)
Vandenberg Runway (KVBG)	Runway	Active	Multiple
	Overview: VFSB features a single 15,000ft (4,580m) runway on the North Base to that was previously lengthened to support end-of-mission landings by NASA's Space Shuttle fleet. Precision approach and path indicator (PAPI) lights were fitted on both sides of the runway. The runway is surfaced with concrete		
	Dimensions:	15,000 x 200 ft. / 4572 x 61 m	
	Surface:	Concrete, in good condition	
	Weight Bearing Capacity:	PCN 53 /R/B/W/T	
		Runway 12	**Runway 30**
	Latitude:	34-45.137462N	34-43.342938N
	Longitude:	120-36.089193W	120-34.028315W
	Elevation:	238.0 ft.	368.0 ft.
	Traffic pattern:	Left	Left
	Runway heading:	125 Magnetic, 137 True	305 Magnetic, 317 True
	Markings:	Precision, in good condition	Precision, in good condition
	Visual slope indicator:	4-light PAPI on left (3.00 degrees glide path)	4-light PAPI on left (3.00 degrees glide path)
	Approach lights:	ALSF2: standard 2,400-foot-high intensity approach lighting system with centerline sequenced flashers (category II or III)	ALSF2: standard 2,400-foot-high intensity approach lighting system with centerline sequenced flashers (category II or III)
	Touchdown point:	Yes, no lights	Yes, no lights
	Instrument approach:	ILS	ILS

FIGURE 8

North Base Space Launch and Space Mission Supporting Infrastructure

Asset Name	Asset Type	Current Status	User(s) or Operator(s)
Astrotech Space Operations	Spacecraft Fueling and Payload Processing	Active	Astrotech (Lockheed Martin)
	Overview: Located just south of the VSFB flight line, Astrotech Space Operations owns and operates processing facilities located on a 59-acre leased site on Vandenberg Space Force Base at the Western Range. The facilities provide approximately 40,000 square feet of customer work areas. There are three separate spacecraft processing areas, each with a dedicated control room and low bay. The Vandenberg facilities provide for non-hazardous and hazardous processing, hardware storage and customer office accommodations. The facility capacity can accommodate up to three missions simultaneously and supports up to five-meter class spacecraft and launch vehicle encapsulation hardware, capable of supporting all Western Range launch vehicle programs.		
	Size	Over 57,000 sq. ft. of processing facility space	
	Cleanliness	Certified cleanrooms	
	Security	Can handle classified operations	
	Fueling	Hypergolic fuel (mono-propellant and bi-propellant) compatible	

FIGURE 9

North Base Ballistic Test and Supporting Infrastructure

Asset Name	Asset Type	Current Status	User(s) or Operator(s)
395-A1:3	ICBM Test Site	Abandoned	None
395-B	ICBM Test Site	Abandoned	None
395-C	ICBM Test Site	Abandoned	None
395-D	ICBM Test Site	Abandoned	None
68-SLTF	ICBM Test Site	Abandoned	None
LCC-01	ICBM Test Site	Operational	U.S. Air Force
LE-08 (former 75-2-8)	IRBM Test Site	Abandoned	None
LF-02 (former 394-A1)	ICBM Test Site	Operational	U.S. Air Force
LF-03	ICBM Test Site	Operational	U.S. Air Force
LF-04	ICBM Test Site	Operational	U.S. Air Force
LF-08	ICBM Test Site	Training	U.S. Air Force
LF-09	ICBM Test Site	Operational	U.S. Air Force
LF-10	ICBM Test Site	Operational	U.S. Air Force
LF-21	ICBM Test Site	Operational	U.S. Air Force
LF-23	ICBM Test Site	Operational	U.S. Air Force
LF-24	ICBM Test Site	Operational	U.S. Air Force
LF-26	ICBM Test Site	Abandoned	None
Site A – 576 Alpha 1, 576 Alpha 2, 576 Alpha 3	ICBM Test Site	Abandoned	None
Site B – 576 Baker 1, 576 Baker 2, 576 Baker 3	ICBM Test Site	Abandoned	None
Site C – 576 Charlie	ICBM Test Site	Abandoned	None
Site D – 576 Delta	ICBM Test Site	Abandoned	None
Site F – 576 Foxtrot (also known as OSTF-1)	ICBM Test Site	Abandoned	None
Site G – 576 Golf (also known as OSTF-2)	ICBM Test Site	Abandoned	None
TP-01	ICBM Test Site	Operational	U.S. Air Force

FIGURE 10

South Base Space Launch Complexes and Sites

Asset Name	Asset Type	Current Status	User(s) or Operator(s)
Space Launch Complex 3-East	Launch Complex	Operational	United Launch Alliance
Space Launch Complex 3-West	Launch Complex	Abandoned	None
Space Launch Complex 4-East	Launch Complex	Operational	SpaceX
Space Launch Complex 4-West	Launch Complex	Abandoned	None
Landing Zone 4 (LZ-4) at SLC-4W	Launch Complex	Operational	SpaceX
Space Launch Complex 5	Launch Complex	Removed, pending future use	None
Space Launch Complex 6	Launch Complex	Operational	United Launch Alliance
Space Launch Complex 8	Launch Complex	Operational	TDB
Space Launch Complex 9	Launch Complex	Identified new launch site, pending future use	TBD
Space Launch Complex 10E/W	Launch Complex	Unavailable	Historical Site
SLC-11 (Building 330 Site)	Launch Complex	Identified new launch site, pending future use	TBD

FIGURE 11

South Base Space Launch Supporting Infrastructure

Asset Name	Asset Type	Current Status	User(s) or Operator(s)
Boat Dock	Transportation & Logistics	Active	United Launch Alliance
	Description: Vandenberg's sole boat dock, which is specifically designed to accept the *Rocket Ship*, operates in support of the Delta IV launch mission providing the sole means of receiving the Delta IV's large boosters. The boat dock provides an alternative to overland transportation for large launch system components that cannot be transported by road, rail, or plane. Currently, the boat dock is subject to weather and tide restrictions as it is not in a protected harbor.		
Gaseous Nitrogen (GN2) Plant	Commodities	Active	United Launch Alliance
	Description: Vandenberg's Defense Logistics Agency provided gaseous nitrogen supply storage facility. It provides daily GN2 for electrical component purges, environmental conditioning and system pressurizations. It is also used during day of launch as an insulator for composite structures from cryogenic temperature fuels, environmental conditioning and an inert environment during fuel tanking.		
South Vandenberg Power Plant (SVPP)	Utilities	Active	United Launch Alliance
	Description: Vandenberg's electrical power generating plant provides clean, reliable power for launch systems with the intention of removing end-of-line commercial power grid uncertainties. SVPP operates on natural gas and is capable of producing up to 15 megawatts of power.		

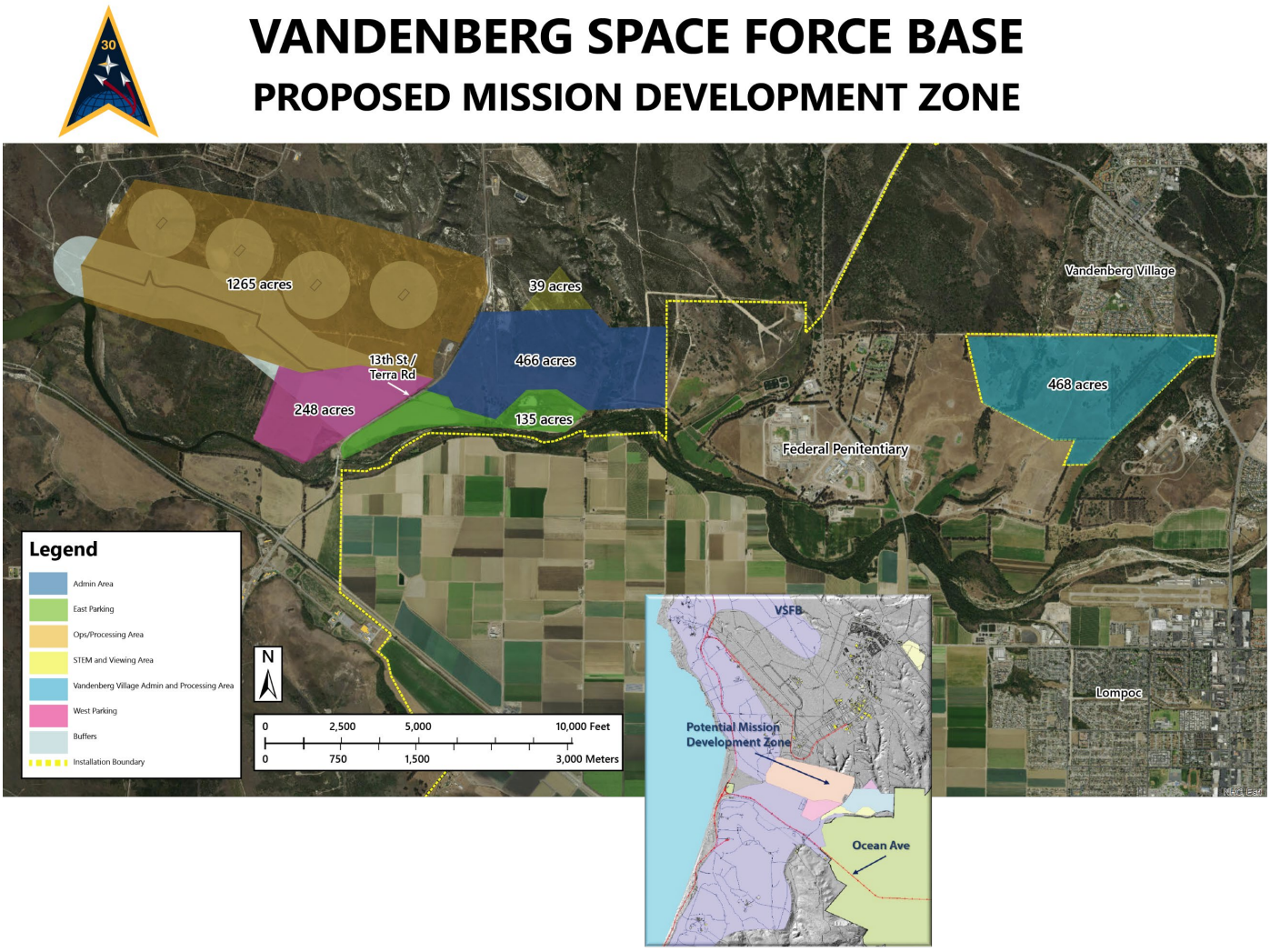
FIGURE 12

South Base Space Launch and Space Mission Supporting Infrastructure

Asset Name	Asset Type	Current Status	User(s) or Operator(s)
L3Harris Spaceport Systems	Satellite and Payload Processing	Active	L3Harris
	Overview: Located in proximity to SLC-6, the Integrated Processing Facility (IPF), has nearly 500,000 cubic feet of clean room space equipped to accommodate most spacecraft or payload processing needs. The facility includes a test cell with protection for sensitive radio frequency equipment as well as generous administrative workspace for visiting processing teams		
	Size	Over 12,500 sq feet for payload assembly, checkout, fueling and encapsulation	
	Cleanliness	Certified ISO 7 (Class 10K) cleanrooms	
	Explosives	Sited for 3K TNT equivalent	
	Security	Up to Top Secret with capability for ready escalation to compartmented levels	
	Fueling	Hypergolic fuel compatible	

FIGURE 13

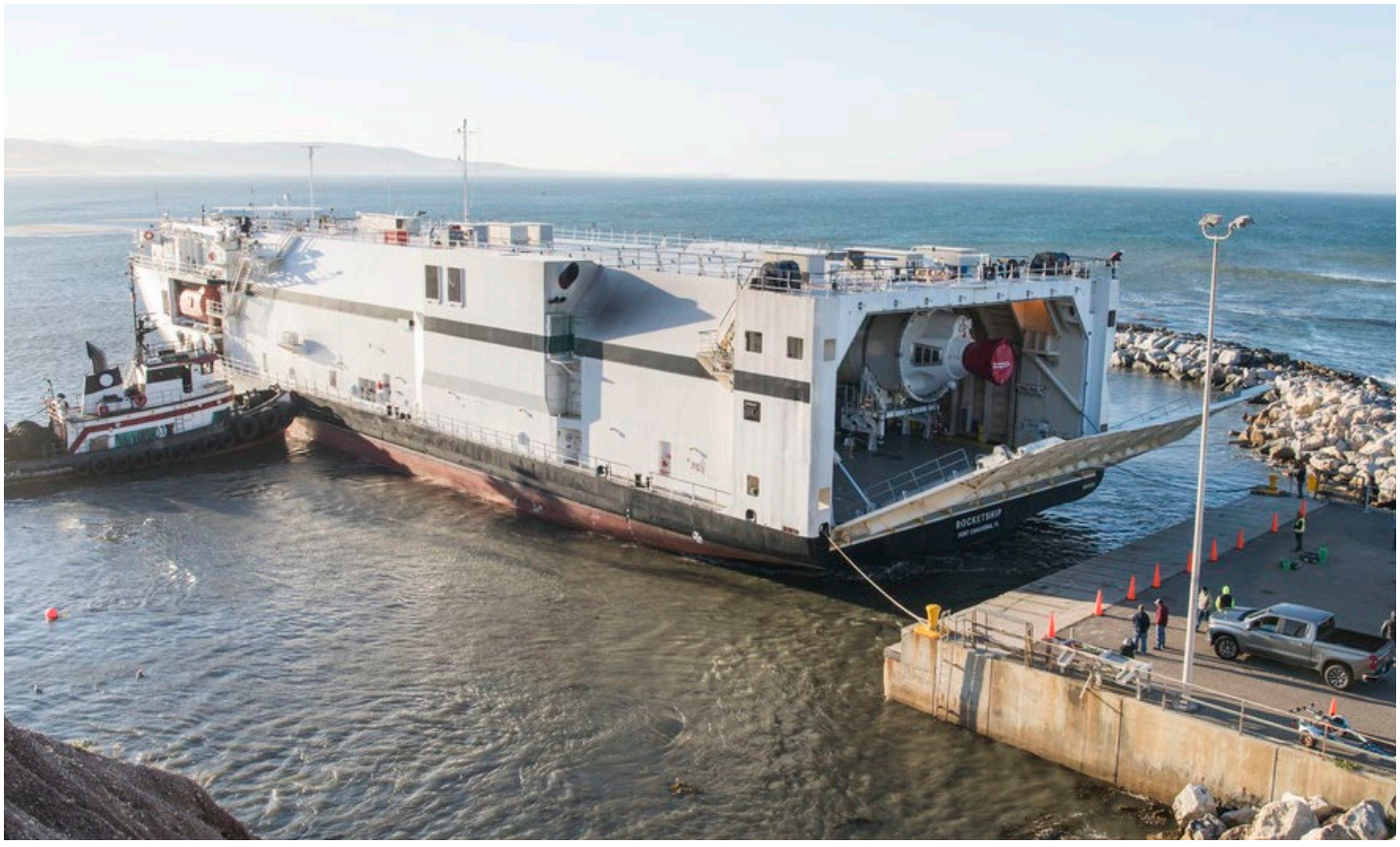
South Base Space Launch and Space Mission Supporting Infrastructure



The proposed Mission Development Zone represents potential development areas capable of supporting additional mission related activities and capabilities. The Mission Development Zone presents a significant opportunity to support and expand space industry activities within the region and opportunities for shared and common use infrastructure development in support of our goals. Please see Section 3, Goal 2 for additional details.

What Does this Mean for Vandenberg?

Vandenberg SFB is strategically located on the coast with ample land for targeted development and subsequent operations by space industry companies. The historical operations at the base have left it well positioned for the redevelopment of existing but inactive launch sites or the development of new greenfield sites on the South Base. Furthermore, the base has strategic assets such as a runway that is capable of landing the now-retired Space Shuttle and other large aircraft. However, we believe that demand for launch operations and associated industry activities has the potential to overwhelm the available sites and existing infrastructure as market demand for polar launch significantly increases. As such, we have identified a series of strategic infrastructure development initiatives, outlined in Section 3, to incentivize the attraction of space launch and downstream applications companies to the region. Additionally, the identified infrastructure focuses on increasing the ease of access to the base, supports the co-location of specific capabilities and activities, and creates the ability to support an increased regional workforce. Our infrastructure development recommendations are compatible with regional land-use and infrastructure development initiatives and reflects our desire to increase the business presence at Vandenberg while remaining good stewards to the surrounding communities. Furthermore, some of the identified infrastructure improvement projects are compatible with sustainable development practices such as LEED certification, responsible energy utilization, and preservation of open space.



The hatch opens on a United Launch Alliance barge, known as the *RocketShip*, revealing a Delta IV Heavy booster May 4, 2020, at Vandenberg Space Force Base

The Market and Opportunity

Market research suggests an opportunity to capitalize on the growing commercial space industry activities and attract additional commercial activity to Vandenberg.

Our Approach

To determine the market and the opportunity, we examined the intersection of multiple industry trends and dimensions and their respective outlooks from now until 2030. The dimensions included a holistic look at the space launch and space applications value chain, launch system types and emerging concepts of operations (CONOPS), and the various types of development initiatives that we could take at Vandenberg SFB from space launch complex development through targeted space cluster development. A representation of the framework is detailed in Figure 14 and the Phase 0 report, released in August 2020, provides a detailed analysis of these dimensions and their findings in the context of where and how to play within the market.

In early 2021 as we began to formulate this master plan, we leveraged these findings and another round of subsequent market analysis to inform our vision for the future and the 2030 outlook.

Industry Size & Context as of Today

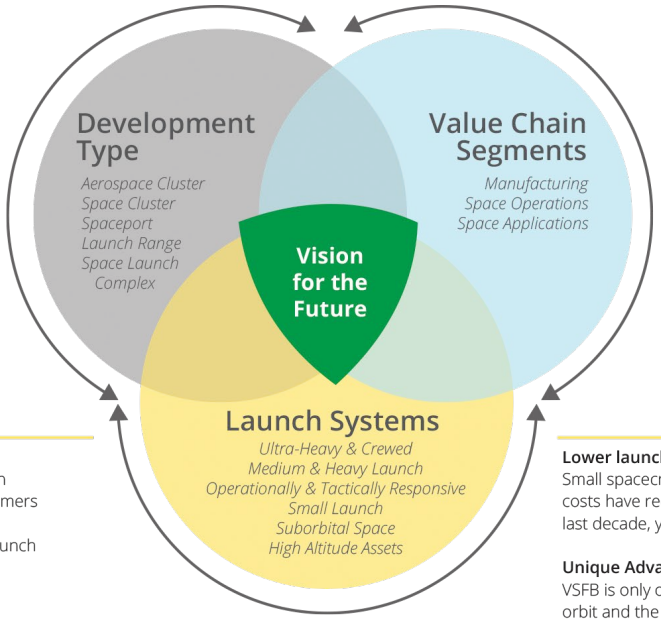
The space economy boasts $414.75 billion (USD) in annual global spending[2], which encompasses a complex ecosystem of governments, commercial companies, venture capital firms, accelerators, incubators, research organizations, and academic institutions.

The Future of the Global Space Economy & Recent Investment Trends

Goldman Sachs, Morgan Stanley, and Bank of America have estimated that the

FIGURE 14

The Intersectionality of Dimensions and Industry Trends in Determining the Future End State



Trends in Action

Traditional spaceports are modernizing
Long-standing spaceports are updating their infrastructure to support a more diverse profile of launch vehicles.

VSFB has strong U.S. Government ties
As the home to the U.S. Space Force Space Launch Delta 30 and components of the U.S. Space Command and the Missile Defense Agency, the base benefits from modernization and upgrade efforts including the *Range of the Future* program

Trends in Action

A History of Established Operations
VSFB currently operates eight active space launch complexes and has multiple private launch customers as customers. The base has multiple potential development sites to support additional space launch capacity at all classes of launch.

Trends in Action

Growing venture capital funding
VC funding in space over the last four years was greater than the previous 20 years combined, with growth distributed across the number of investments and the number of VCs investing.

Strong investment momentum
Since 2012, over $186.7B has been invested in space companies, including $28.4B in 2020 alone. A total of 1,480 companies have received investment to-date.

Lower launch costs
Small spacecraft, reusable rockets, and lower manufacturing costs have reduced launch costs by a factor of 20 over the last decade, yet structural challenges remain.

Unique Advantage
VSFB is only one of two US facilities that launches to polar orbit and the only one in the US capable of launching into high-mass polar and Molniya orbits.

global space economy is headed toward a $1 trillion market size between 2030 and 2045[3]. The path toward a 3x growth in industry size is underpinned by advances in manufacturing technologies, a better understanding of market and mission gaps, and a massive influx of venture capital that has seen more than $186.7 billion of external capital invested into 1,480 companies in the industry since 2012[4], including $28.4B in 2020 alone[5].

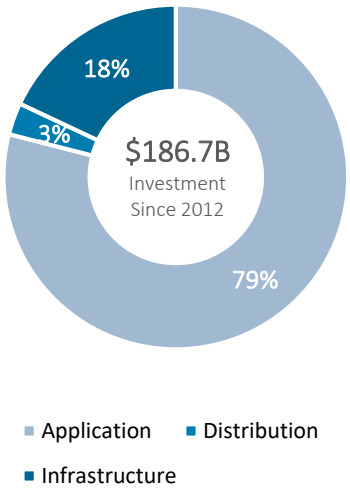
Venture capital investment in the space industry over the last four years was greater than the previous 20 years combined, with growth distributed across both the number of investments and the number of venture capital firms investing. 47% of new space venture investment, or approximately $88B, has been invested in companies based out of the United States[6]. While the investment trends are promising, and the rise of special purpose acquisition corporations (SPACs) have unlocked substantial market value and exit options, there remain concerns over the exit strategies for venture-backed launch companies, as the often missed technical and programmatic milestones create a ripple effect on the launch sites and satellite industry. Venture capitalists have not been afraid to back out of several promising ventures in the launch and enabling space operations segments. Furthermore, increased regulation of SPACs may reduce the attractiveness as an exit option for many venture-backed startups inclusive of those producing space technologies.

There is an increased focus on public-private partnerships and rapid prototyping efforts, such as those fostered through the Space Enterprise Consortium (SpEC) to support the warfighting mission. To increase space superiority for the warfighter, procurement times must decrease, initial operating capacity must occur faster, and the development of space technologies for the warfighter must be more closely aligned to the agile and iterative practices of other technology-heavy industries. Leading the way is the USSF Space and Missile Systems Center (SMC), soon to be transitioned to the Space Systems Command (SSC) and the newly created Space Development Agency.

Currently, the value chain segments continue to mature at an uneven pace due to funding, business, or market conditions – factors that may result in new structural barriers to commercial providers or consumers. A renewed push for agile development and rapid acquisition of commercial services from the military space segment, coupled with increased budgetary pressures and the lunar mandate on the civil side, should result in more opportunities for commercial space providers.

FIGURE 15

Recent Investment Trends in Space Technology Companies



The bulk of investment to-date in space technology companies has flowed to players in **Applications** (Positioning, Navigation, SSA, etc.) **and Infrastructure** (Launch, Satellite Manufacturing, etc.)

Summary of Launch Market Trends

The last decade has seen $186.7B in investment, of which almost $19.90B was invested across 283 rounds, making launch the recipient of the most venture capital of any space industry segment including satellites and satellite applications. To investors, the message is clear that launch is not only the key enabling factor for the future of space, but also that the industry has been traditionally underserved. As the industry is technically transforming, economic and market structural barriers are increasingly being addressed through new concepts of operations for launch including commercial ride-shares and multi-manifested payloads, as well as launch vehicle reusability.

The creation of new launch companies and duplicative launch concepts and solutions is outpacing the addressable and serviceable demand. With the number of current and planned launch services providers, the market would need exponentially more customers including primary mission customers, government or commercially hosted payloads, or rideshare missions. Of the 100+ launch companies pursuing this market segment, it is estimated that only a handful will survive.

FIGURE 16

Historical Launch Services Addressable Market

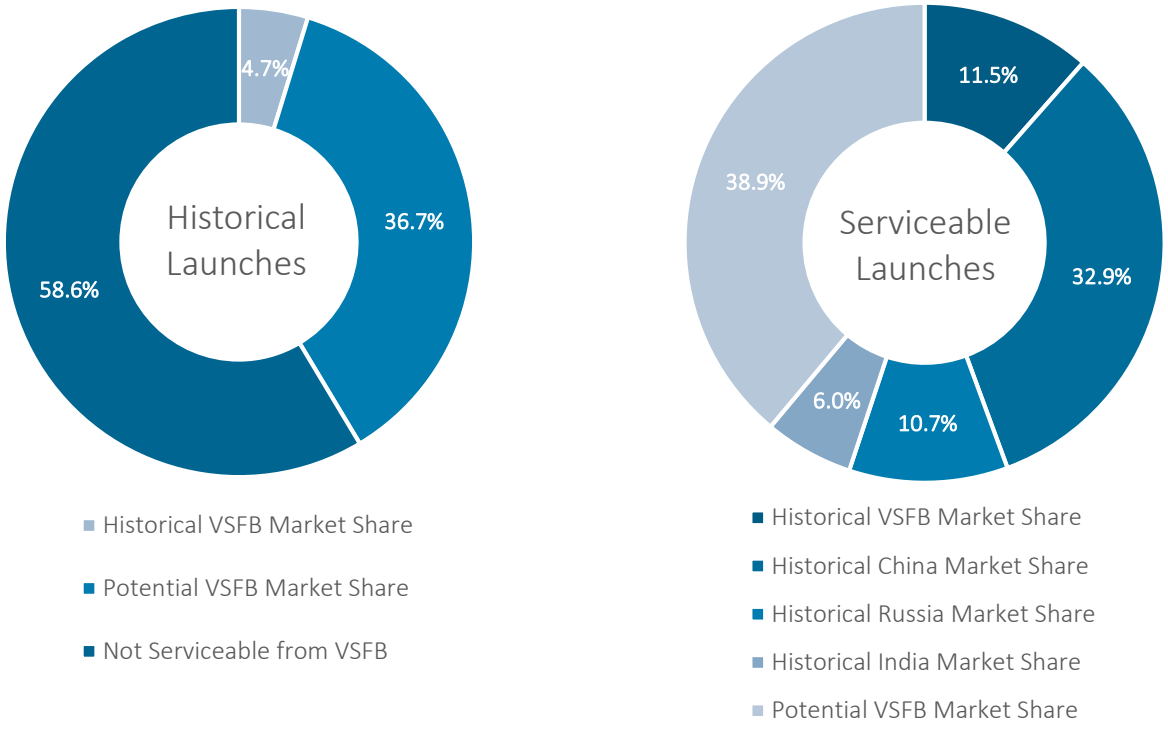
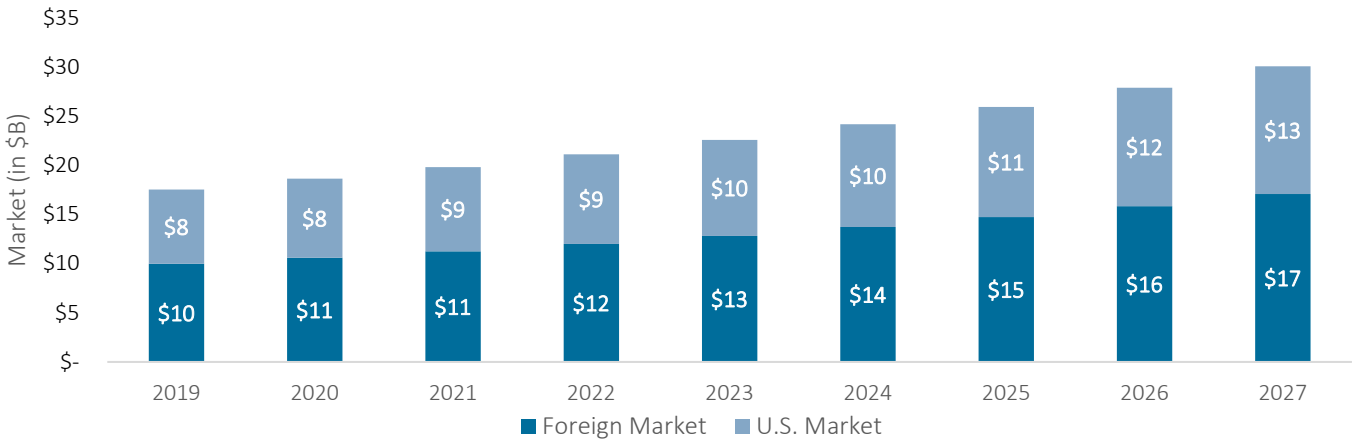


FIGURE 17

Global Launch Services Market Projections



The global launch market is predicted to reach up to **$30B USD** by the year 2027, with the United States capturing about **40%** of the market

Smaller spacecraft, reusable rockets, and lower manufacturing costs have reduced launch costs by a factor of 20 over the last decade, yet structural challenges remain. Despite required decreases in heavy launch vehicle costs due to new program development and the introduction of reusability, the cost of launch remains high enough to block the conversion of latent demand into addressable and serviceable demand.

However, despite a market outlook that does not warrant 100+ launchers, we do observe an on-the-horizon evolution in launch services and capabilities that aligns well with Vandenberg SFB's orbital launch capabilities. We see demand for launch services evolving in the following ways:

1. Demand for global polar launches is expected to increase significantly over the next decade in support of Earth science; intelligence, surveillance, and reconnaissance (ISR); and global satellite communications (SATCOM) applications;
2. An expansion of Operationally Responsive Space (ORS) enabled by small launchers;
3. The introduction of Tactically Responsive Space (TRS) enabled by horizontal and next generation launch concepts of operations (CONOPS);
4. An increase in space tourism flights to Low Earth Orbit (LEO) and an introduction to those in lunar orbits;
5. The use of small launch missions to additional orbits enabled by space tugs and next-generation transfer vehicles;
6. An overall increase in dedicated rideshare missions to LEO, MEO, GEO, SSO, lunar, and deep space destinations; and
7. Despite a renewed licensing ability to launch to polar orbits from Florida, the Eastern Range and their "Road to 48-60" annual launches is likely to stay constrained and congested.

As such, we recognize that:

1. After a significant lull in polar launches, VSFB is likely to see an uptick over the next 18-36 months;
2. Small launchers are increasingly utilizing or considering polar launch capabilities as part of their competitive market advantages;
3. TRS CONOPS are still mostly conceptual but, given the national security implications of TRS, it is likely that VSFB should attract interest from TRS operators;
4. A post-ISS environment is likely to see multiple, smaller "free-flyer" stations inclusive of polar orbiting stations that can support Earth science, manufacturing, and R&D applications; and
5. Smaller satellite missions enabled by space-tugs or transfer vehicles will likely have a wider range of viable launch sites due to the orbital transfer capabilities provided by these new vehicles.

Implications for Vandenberg

This outlook indicates that even without action, the number of annual launches should significantly increase in the medium-term. Additionally, it also demonstrates that a careful and targeted campaign to attract additional launch services providers to Vandenberg aligns well with the market outlook for increased demand for polar, highly elliptical, and non-geosynchronous launch. Our goal of attracting and retaining five to seven launch services providers across the various launch CONOPS demonstrates an achievable outcome given the number of in-development launch vehicles and allows us to focus on those launchers and capabilities that have sustainable market demand throughout the decade, thereby bringing activities, jobs, and economic mobility to the Central Coast. Simply put, there is no better place for the leading launch companies pursuing polar launch capabilities than Vandenberg and the time is now to capitalize on this opportunity.

Summary of Satellite Operations, Satellite Applications (Downstream Applications), and Supporting Activity Trends

Satellite applications, whether we realize it or not, are a part of our everyday lives. From the Global Position Systems (GPS) signals that power our map applications and associated location services to the remote sensing data that informs weather forecasting and the satellites that provide television and radio signals to our homes and cars, satellites have long provided critical capabilities and in-demand commercial services. The future looks no different and the last decade has seen a large-scale transformation in satellite design and operations that exponentially increased the amount of data and capabilities available to commercial, civil, and defense users. The proliferation of

remote sensing capabilities also directly supports the State of California's ambitions for climate change, wildlife management, fire prevention, sustainable agriculture, and the management of scarce resources such as water by providing timely, accessible data to all who need it. In the last decade, 910 companies have received $147.6B in venture investment to deliver services, capabilities, and data.

Every space company is a software company today, even if the primary product is satellite and spacecraft hardware. Increased space operations in LEO, MEO, GEO, and beyond will require more qualified operators, expertise, technical solutions, and overall capabilities centered around the operational side of spacecraft. On the horizon, we see an increased push for more software-defined and virtualized satellites along with a significant push toward the proliferation of hosted payloads (e.g. DARPA's Blackjack program). With over 40,000 satellites planned for launch in the next decade, the complexity of spacecraft and satellite operations will only increase and demand for operators and solutions will follow.

Simultaneously, the market is signaling a potential move toward holistic testing and evaluation capabilities inclusive of hardware and software testing for satellite and payloads systems that leverage simulation software and range-qualified hardware. Testing and evaluation software for space operations is beginning to show upside potential with an anticipation that these applications will be applicable across not only coupled value chain segments (i.e. logistics) but ancillary industries as well. Growth drivers for satellite and spacecraft testing and evaluation solutions include the increasing complexity of satellites and associated satellite constellations, space junk and other environmental factors, an increase in focus around cost-efficient and shorter-lifespan satellites and increasing sophistication of waveforms.

On and just beyond the horizon – between now and 2030 – the transformation of the small-sat revolution, as well as the introduction of new space systems and capabilities, will drive additional launch capabilities as well as new uses for space applications (downstream applications). We see satellites and downstream applications evolving in the following ways:

1. Cloud-enabled space systems and applications will increasingly drive data center, cloud, and satellite system integration for a variety of use cases;
2. Data centers and high-performance computing infrastructure are increasingly making their way to orbit in the form of next-generation high-throughput satellite systems, ISS-hosted commoditized services, and satellite-hosted cloud-like computing nodes;
3. Edge computing, software-defined networks, and internet of things (IoT) solutions are increasingly being examined to bring satellite remote sensing data and communications capabilities into non-traditional space users' enterprises such as Fortune 500 members;
4. Space domain awareness (SDA) capabilities, inclusive of those that support space traffic management, will be increasingly important for all manner of space operations from LEO to lunar orbits;
5. The ability to detect and monitor climate data as well as the ability to provide timely access to data from satellite remote sensing capabilities, will continue to play a central role in climate change and sustainability efforts; and
6. Demand for next-generation connectivity is driving a boom in projected satellites – 40,000+ known satellites scheduled, which is a 10x increase in the total number of satellites ever launched. Many of these satellites are scheduled to be launched over the next decade and will drive significantly higher launch tempos.

As such, we recognize that:

1. Cloud-enabled space systems and capabilities will increasingly require software, network, engineering, cloud, and computing infrastructure development, and a workforce that can be coupled beyond just on-base activities;
2. Space Policy Directive 3 mandates a transfer of SDA activities and oversight to the U.S. Department of Commerce Office of Space Commerce to ensure integration of data and activities to the commercial space operators;
3. The U.S. does not have a robust SDA research network/capability beyond the basic research level, resulting in a post for a more collaborative, applied-research focus consortium that is likely to take the form of a

University Affiliated Research Center (UARC); and

4. Climate change analysis and the ability of satellite-derived Earth science and remote sensing data will have a significant impact on the ecological, industrial, and population health within the State of California.

Implications for Vandenberg

As satellites look to become increasingly capability driven by software and a holistic testing and evaluation need emerges, satellite operators may wish to collocate around centers of excellence for satellite management. VSFB is unique in that it has an unparalleled asset with the Combined Space Operations Center (CSpOC) that is located on-base. The CSpOC not only produces unparalleled space domain awareness data, but it also produces operators that have direct experience in the satellite command and control (C2) environment. An uptick in operationally responsive space operations at VSFB may create opportunities for more commercial operators, software engineers, or mission planners – areas that VSFB could capitalize on.

VSFB and the CSpOC are already the established home for space domain awareness and now an Administration mandate to transition more activities to the commercial sector may create opportunities to lure companies and their workforce to the region in support of this data migration. Capitalizing off the success that the USSF/USAF has had with the TAP Lab in Boulder, CO, for remote sensing data, a mission development zone component could include a similar convening entity that brings together industry, government, and academia around the space domain awareness challenge – especially in light of the lack of applied SSA research being funded and conducted to date within the United States.

Furthermore, with the focus on systems engineering, software development, and application development, the space applications segment of the market represents an opportunity to further develop the regional workforce beyond the traditional engineering skillsets used in satellite and launch vehicle manufacturing. Additionally, this workforce complements degree programs at the region's leading academic institutions. However, the attraction of space applications and other associated data and services providers will require a coordinated effort and careful incentivization

Summary of Spaceport Development Trends

Currently most of the domestic spaceports, operational and planned, operate in a loosely coupled manner and most closely align themselves to a diversified operating model. While some activities, departments, sources of funds, and areas of responsibilities are coupled, most of the loose coupling comes from historical precedent or from shared authorities and similar missions.

When looking holistically across the current and planned spaceports in the United States, it becomes clear that both standardization and coordination remain low. The most closely coupled spaceports, from an operating model perspective are Cape Canaveral SFS and the Kennedy Space Center, given their geographical proximity and the domain authority of the Eastern Range and the Space Launch Delta 45.

We have also observed a strong amount of state- or county-level efforts to build smaller spaceports generally supported by the "if you build it, they will come" mindset – which has yet to pay off in a sustainable way at any new build (i.e. greenfield) or adaptive reuse (i.e. brownfield) spaceport as of 2020. While 2021 holds promise for a few spaceports, most notably Spaceport America, the last decade of spaceport development has highlighted a variety of challenges from market supply shocks through delays in the market entry of multiple launch providers that continue to stifle the development of spaceports across the United States[19]. A comparison of select spaceport development programs is shown in Figure 19.

While this is an exciting and transformative time for the industry, an increase in operational tempo at existing sites, such as Cape Canaveral and VSFB, as well as in-development sites in states such as Colorado, Georgia, Virginia, and Washington, has the potential to fragment both government and commercial efforts. The overdevelopment of spaceports could possibly hinder a

FIGURE 18

Global Spaceport Numbers

52 Global Launch Sites

16 U.S. Launch Sites

24 Relevant Global Launch Sites

FIGURE 19

Benchmarking Case Study Findings

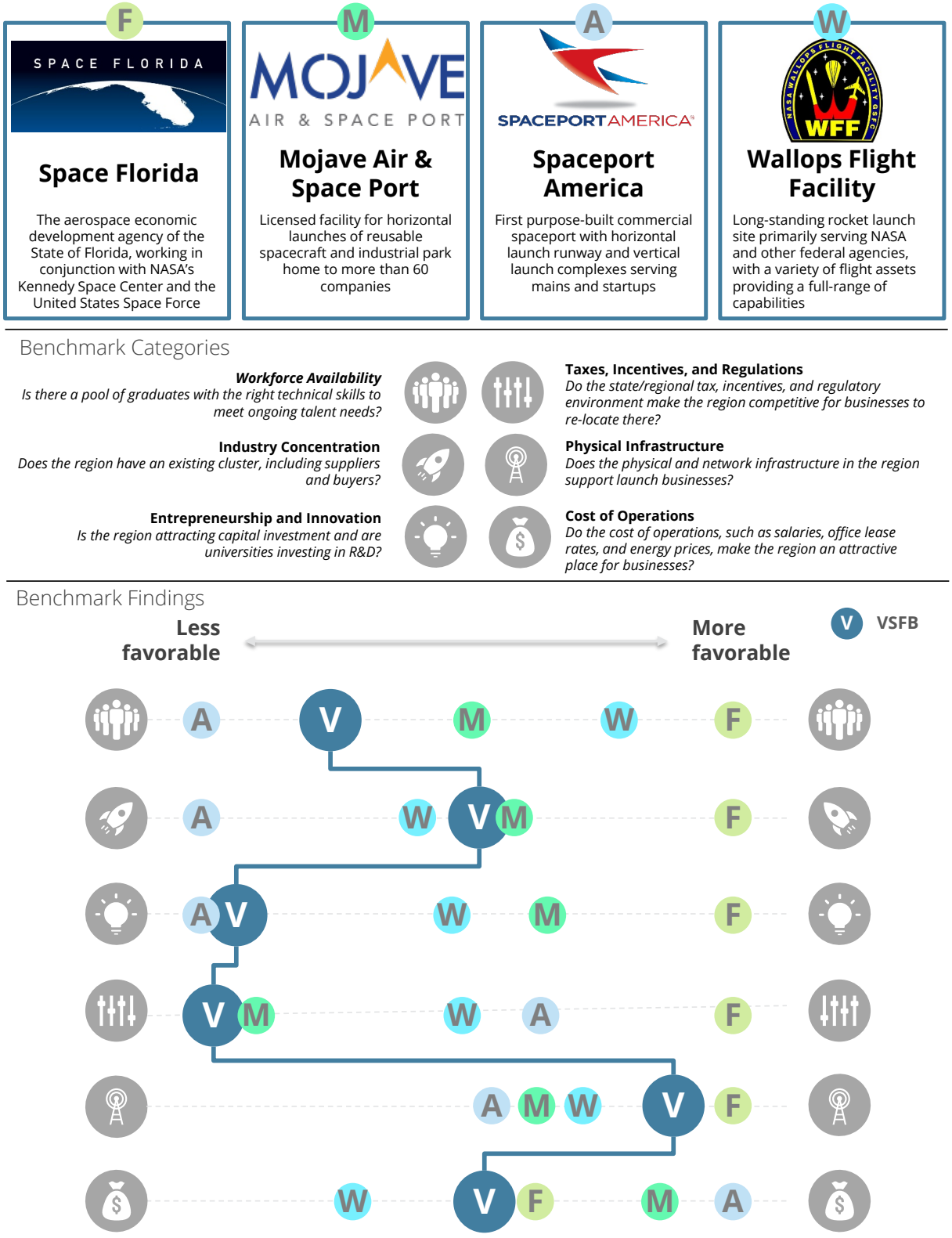
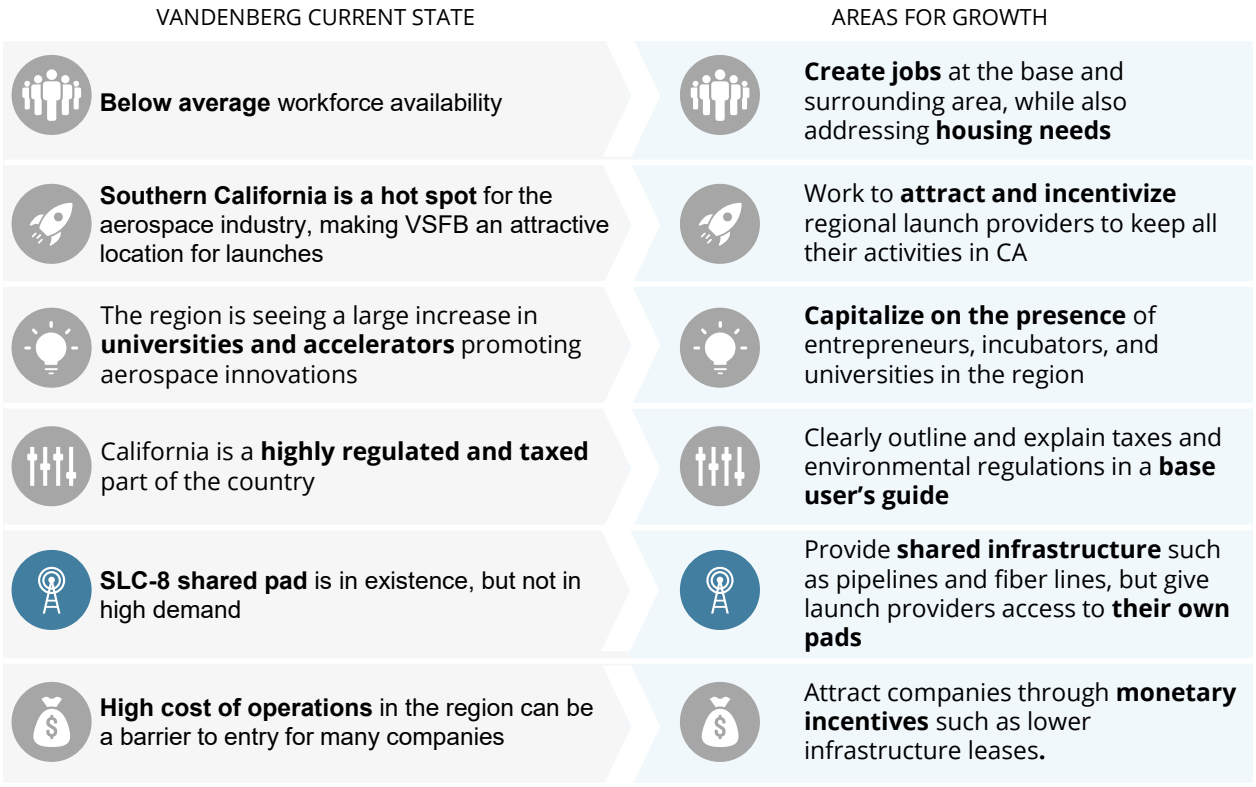


FIGURE 20

Benchmarking Current State Assessment and Recommendations



nationally coordinated space launch construct that ensures continued access to space in support of the national security mission and increases commercially available launch slots.

As such, we recognize that:

1. Launchers are reducing their desire and demand for shared launch infrastructure such as launchpads or space launch complexes;
2. Launch companies are increasingly vertically integrating for more control over launch processes in order to optimize margins and scale;
3. Launch companies have raised significant funding and need what money can't buy, which is faster launch planning;
4. The regulatory process including licensing, environmental, and site improvement regulations remains cumbersome and hindering.

Implications for Vandenberg

Speed is paramount to almost all other incentivization or attraction mechanisms as business processes and regulatory requirements often create the most roadblocks. To be clear, Vandenberg should not relax important regulatory requirements such as those dealing with safety and the environment. Safety and environmental protection are complementary and compatible with launch provider operations. However, the identification of the requirements and the communication of the processes and appropriate parties in an upfront manner would greatly ease the time burden of navigating multiple approval processes. The development of guides that clearly communicate regulatory and operational requirements as well as any associated business implications would be accelerating for launch providers looking to locate at Vandenberg.

As launch providers are seeking speed for time to first launch, the creation of shared launchpad infrastructure, such as shared launch complexes, are increasingly becoming less interesting. Instead, launch operators are looking for opportunities to control their own launch complexes and preferring shared infrastructure to be focused on enabling operations, not hosting operations, such as gas and fuel pipeline, utilities, and potentially shared supporting facilities such as flexible design, office, or integration spaces.

What Does this Mean for Vandenberg?

The MOU partnership is formulating its commercial growth strategy at an ideal time for the space technology market, as many launch and satellite operations players are reaching maturity and are seeking substantial, long-term partnerships. As such, we have three key findings for the Vandenberg Space Ecosystem.

The Window of Opportunity is Now

As launch & satellite operations startups enter maturity, they are increasingly seeking to arrange long-term partnerships that allow them to optimize their financial performance. Once solidified, these partnerships will be less likely to change without macro-level changes in market forces.

Vandenberg Has Room to Grow in Launch

As the range of payload sizes expands and new space launch market players seek to scale operations, Vandenberg has an opportunity to expand its percent share of its addressable market for polar orbit, highly elliptical orbit, and sun-synchronous satellite launches.

Launch isn't Vandenberg's Only Option

Much of the investment in space companies to date has focused on space-based applications. Given the region's broader goal of growing economic activity in the region, it can expand its focus beyond launch & missile testing and look toward opportunities in remote sensing and data and analytics toward opportunities such as those satellite applications that support weather forecasting, environment monitoring, and wildfire management.

Addressing the Areas for Growth

At the same time, our benchmark analysis and findings, detailed in Figures 19 and 20, demonstrate that we need take an active approach to addressing the identified areas for growth. The ability for us to incentivize space industry activities to locate on the Central Coast will be dependent upon addressing traditional factors such as workforce availability, monetary incentives, and housings needs while simultaneously improving the customer journey for space companies interfacing with the diverse stakeholder groups on the Central Coast. Our goals, objectives, and actions are directly aligned to these areas for growth providing direction and outcomes to address the findings detailed in Figure 20.

SECTION 3
OUR ACTION PLAN

Our Plan

Introduction to the Plan

Our action plan is the result of the in-depth industry engagement and analysis that we performed during Phases 0 and 1 of our planning projects. The action plan represents the path forward based on the extensive recommendations, findings, strengths, opportunities, and weaknesses that the MOU group cataloged and identified in 2020 and 2021. The MOU partnership spent the early part of 2021 working closely together to coalesce around Vandenberg's current environment, discuss and align on a vision for the future, and identify specific strategic initiatives that will enable successful realization of the vision.

Plan Development

We developed the plan by undertaking the following activities:

We Gathered Data from Industry and Stakeholders

In order to define our current state and to understand where opportunities exist, a user- and stakeholder-focused approach was taken to develop the Commercial Space Master Plan. Space launch provider, satellite operator, Space Launch Delta 30, and local business and government feedback, combined with an analysis of industry trends and the current environment, provided the MOU partnership with a deeper understanding of current internal and external drivers among the diverse industry and Central Coast stakeholder groups.

We Conducted a Current State Assessment

A current state assessment was undertaken to capture a holistic picture of Vandenberg's competitive positioning within the commercial space industry as well as an understanding of how Vandenberg is positioned from a spaceport and aerospace cluster development standpoint against other existing and in-development spaceports. This resulted in a better understanding of VSFB's strengths, weaknesses, and opportunities. A deeper dive into the current state assessment can be found in Section 2 of this plan. The purpose of the current state assessment is to inform the development of our Vision for the Future and the goals and objectives required to achieve that vision.

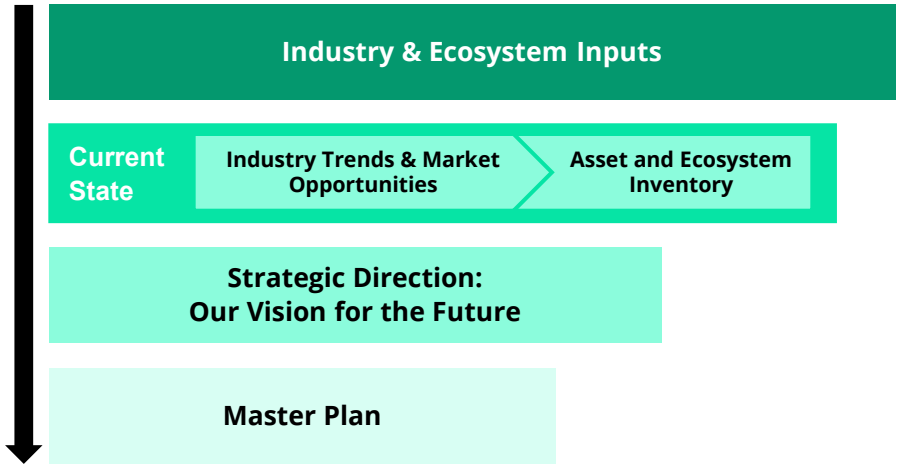
We Developed a Future State Vision

Our vision evolved from our stakeholder data gathering and our current state assessment and provides the strategic direction for our efforts to grow the Central Coast space ecosystem.

We firmly believe that a vibrant space ecosystem on the Central Coast is complementary to the goals and values of local communities, and our vision reflects our desire to grow the Central Coast space ecosystem, build a talented workforce, and improve the quality of life for all residents, establish and grow a space subcluster home to launch companies, downstream applications companies, and associated mission operations; supporting functions; and research, development, testing and evaluation (RDT&E) capabilities.

FIGURE 21

Our Master Planning Development Framework



Achieving this vision requires a synchronized and concerted effort by multiple parties, likely centered around a chartered entity functioning as a single point of contact to help guide and drive the expansion of the regional ecosystem and associated industry and technology ecosystem linkages. A carefully guided effort has the potential to grow new mission-related activities in the region such as those supporting National Airspace System (NAS) integration, space domain awareness, ground systems and ground enterprise modernization, and remote sensing applications. Additionally, these supporting functions could help increase the likelihood of deploying next generation space launch capabilities – those that support assured access to space – at Vandenberg.

We Developed Our Action Plan

Our future state vision led to the creation of a set of strategic goals and objectives that frame our intentions and provide guidance for our development efforts.

Simply put, to achieve our vision, we will:

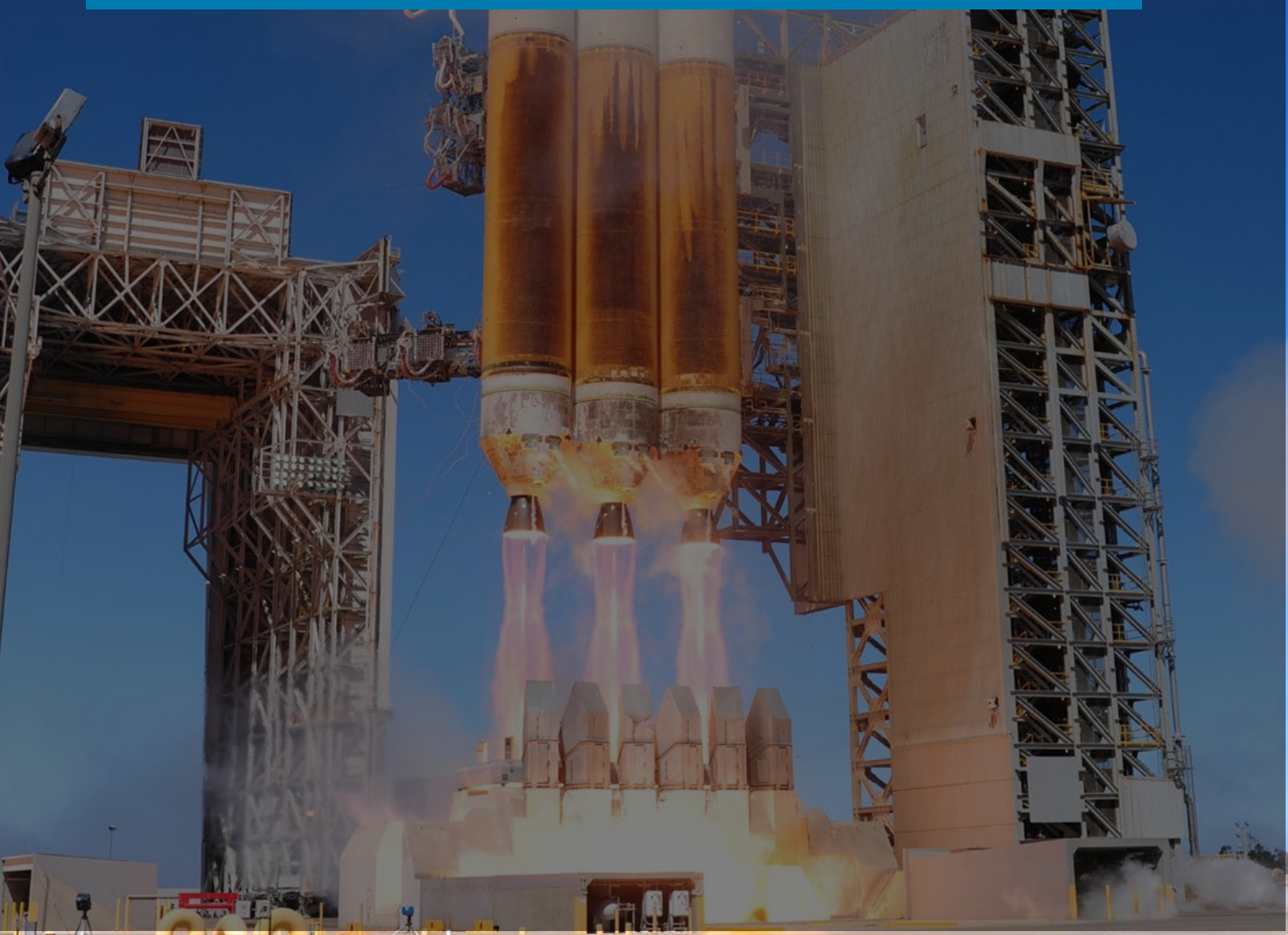
1. Attract Space Industry Activities to the Central Coast;
2. Modernize and Invest in Infrastructure; and
3. Strengthen the Central Coast Space Identity.

Collectively, these goals drive us and the Central Coast toward achieving our vision and thereby creating a vibrant space ecosystem on the Central Coast and enabling economic mobility for the region and its residents. The following sub-sections describes in detail our goals, objectives and the initiatives that implement our plan.

SpaceX launches Sentinel-6 satellite from VSFB on November 11, 2020. Photo: USSF / Airman 1st Class Hanah Abercrombie

Goal 1: Attract Space Industry Activities to the Central Coast

The current state assessment highlights growing demand for commercial polar launch and a desire by launch providers to significantly increase their launch cadence. Furthermore, with a large number of established and emerging launch providers, we recognize an opportunity to grow launch activities and downstream applications such as those supported by satellite operations at Vandenberg and across the region. To do this, we will focus on the attraction of additional industry activity and focus on strengthening the Central Coast space ecosystem.



GOAL 1 ATTRACT SPACE INDUSTRY ACTIVITIES TO THE CENTRAL COAST

The following objectives will enable us to successfully attract space industry activity across the entire value chain to the region by:

- Making it easier for space companies to engage with the diverse stakeholders across the entire ecosystem and the region
- Focusing on attracting multiple additional launch services providers that will have a sustainable presence in the region for the decade to come
- Attracting other space industry companies beyond launch providers inclusive of those that enable and support space launch operations and that align to State of California and regional priorities
- Improving the regulatory and business environment to make it easier and more attractive to locate operations and the associated workforce components on the Central Coast

Objective 1.1: Strengthen the Ecosystem by Establishing a Concierge Entity to Support Attraction and Development Efforts

Supporting Initiatives

1.1.1 Concierge Entity Design
Develop the business plan and operating model for a concierge function either through REACH, GO-Biz, or some other construct that can advance and accelerate the goals of the region and the recommendations of this development efforts.

1.1.2 Establish a Space Roundtable
Assess the use of a similar construct to the Arizona Space Business Roundtable (ASBR) for an engagement mechanism, likely in concert with the concierge function, to support industry and ecosystem engagement.

1.1.3 Strengthen Linkages with Venture Capital and Private Equity Groups
Develop a venture and accelerator engagement strategy to engage with VCs, angel investors, high-net-worth Individuals etc., to ensure that companies looking to come to the Central Coast and VSFB have appropriate access to potential capital sources.

Objective 1.2: Attract Additional Launch Services Providers

Supporting Initiatives

1.2.1 Support Faster Times from Site Identification to First Launch
Increase the attraction of Vandenberg by increasing the time from site identification to first launch through process improvement, identification of bottlenecks, and the communication of critical environmental regulations.

1.2.2 Support the Deployment of Operationally Responsive Space Capabilities at Vandenberg
Increase the attraction of Vandenberg for the location of ORS and similar assured access to space capabilities by launch services providers by focusing on on-base land-use and mission development zone design and supporting regional capabilities to support an increased and sustained workforce and local operations.

1.2.3 Support the Deployment of Tactically Responsive Space Capabilities at Vandenberg
Increase the attraction of Vandenberg for the location of TRS and similar assured access to space capabilities by launch services providers by focusing on continued technology horizon scanning, on-base land use and mission development zone design, and supporting regional capabilities to support an increased and sustained workforce and local operations, and coordination with the State of California's Governor's Military Council and other relevant entities to promote and attract TRS solutions and missions.

Objective 1.3: Attract Additional Space Industry Companies Beyond Launch Service Providers

Supporting Initiatives

1.3.1 Focus on the Attraction of Space Domain Awareness (SDA) and Space Traffic Management Companies (STM) and Activities to the Central Coast Region

Space domain awareness is a critical enabling capability for space launch and space operations as well as a key activity for the U.S. Space Force at Vandenberg SFB as part of the Combined Space Operations Center (CSpOC). Increase the attractiveness of co-location for SDA and STM through promotion of existing regional activities, the potential for access to a talented workforce for those who retire from the CSpOC at VSFB, and the ability of a carefully crafted mission development zone design to encourage knowledge transfer through co-location synergies.

1.3.2 Focus on the Attraction of Remote Sensing and Ground System Providers

Promote the alignment between remote sensing capabilities and key agricultural, environment, sustainability, conservation, forestry, and wildlife goals within the State of California and the region as well as access to a talented software engineering and analytics workforce from leading regional academic institutions.

Objective 1.4: Improve the Regulatory and Business Environment

Supporting Initiatives

1.4.1 Assess Tax Impacts and Implications in Support of Attraction Incentivization

Leverage space activity economic impact report to assess the impact of tax credits or other tax liability offsets..

1.4.2 Streamline Processes

Streamline processes and capabilities, potentially through the concierge function, to ensure that initial engagement of first operational activities is a smooth and mostly seamless process for commercial entities.

1.4.3 Liability & Indemnification Assessment

Produce an assessment of the limiting regulations and policies that would impact human spaceflight in California.

FIGURE 22

Integrated Action Plan (Goal 1)

Goal	Objective	Initiatives	Short-Term Actions
Goal 1: Attract Space Industry Activities to the Central Coast	Strengthen the Ecosystem by Establishing a Concierge Entity to Support Attraction and Development Efforts	Concierge Entity Design	• Develop the business plan and operating model for a concierge function either through REACH, GO-Biz, or some other construct that can advance and accelerate the goals of the region and the recommendations of this development efforts • Develop a venture and accelerator engagement strategy to engage with VCs, angel investors, high-net-worth Individuals, etc., to ensure that companies looking to come to the Central Coast and VSFB have appropriate access to potential capital sources
		Establish a Space Roundtable	• Assess the use of a similar construct to the Arizona Space Business Roundtable (ASBR) for an engagement mechanism, likely in concert with the concierge function, to support industry and ecosystem engagement
		Strengthen Linkages with Venture Capital and Private Equity Groups	• Streamline processes and capabilities, potentially through the concierge function, to ensure that initial engagement through first operational activities is a smooth and mostly seamless process for commercial entities
	Attract Additional Launch Services Providers	Support Faster Times from Site Identification to First Launch	• Produce "users guide" for space companies and activities in the Central Coast region
		Support the Deployment of Operationally Responsive Space Capabilities at Vandenberg	• Additional actions are currently in the process of being assessed as part of the ongoing planning efforts.
		Support the Deployment of Tactically Responsive Space Capabilities at Vandenberg	• Additional actions are currently in the process of being assessed as part of the ongoing planning efforts.
	Attract Additional Space Industry Companies Beyond Launch Service Providers	Focus on the Attraction of Space Domain Awareness (SDA) and Space Traffic Management Companies (STM) and Activities to the Central Coast Region	• Additional actions are currently in the process of being assessed as part of the ongoing planning efforts.
		Focus on the Attraction of Remote Sensing and Ground System Providers	• Additional actions are currently in the process of being assessed as part of the ongoing planning efforts.
	Improve the Regulatory and Business Environment	Assess Tax Impacts and Implications in Support of Attraction Incentivization	• Leverage space activity economic impact report to assess the impact of tax credits or other tax liability offsets
		Streamline Processes	• Streamline processes and capabilities, potentially through the concierge function, to ensure that initial engagement through first operational activities is a smooth and mostly seamless process for commercial entities • Produce "users guide" for space companies and activities in the Central Coast region
		Liability & Indemnification Assessment	• Produce an assessment of the limiting regulations and policies that would impact human spaceflight in California.

Goal 2: Modernize and Invest in Infrastructure

The current state assessment identified the current asset inventory available at VSFB today as well as requirements that would incentivize and enable additional space industry activity in the region. This goal and its objectives focus on the modernization of infrastructure, both on-base and throughout the region, required to achieve our future vision.

GOAL 2 MODERNIZE AND INVEST IN INFRASTRUCTURE

The following objectives will enable us to successfully maintain the current baseline of space industry activities, attract additional space industry activities, improve the usability of the base and its capabilities by commercial operators, and incentivize our desired outcomes for the region by:

- Improving on-base launch-supporting infrastructure inclusive of traditional utilities and launch-specific infrastructure
- Improving on-base transportation and logistics infrastructure that increases ease of use and ease of access for all base users
- Planning and developing a shared-use mission development zone at Vandenberg to attract anchor tenants and provide additional space for facilities and supporting functions for commercial space companies, academic research, or other U.S. government or non-traditional commercial entities

Objective 2.1: Improve On-Base Launch Supporting Infrastructure

Supporting Initiatives

2.1.1 Design and Build Supporting Launch Services Infrastructure
Build supporting shared-used launch services infrastructure that supports multiple launch providers such as GN2 pipelines, roads, sewer, and other utilities to new and additional launch sites on South VSFB. *See Figure 24 for additional details.*

2.1.2 Infrastructure Investment and Development Plan
For identified and prioritized infrastructure, produce cost-benefit analysis and continue to assess and refine the shared infrastructure plan. *See Figure 24 for additional details.*

Objective 2.2: Improve On-Base Transportation and Logistics Infrastructure

Supporting Initiatives

2.2.1 Design and Build Ease-of-Access Infrastructure
Build ease-of-access infrastructure that supports increased launch tempos and additional base uses inclusive of new gate access and North VSFB to South VSFB flyover bridge. *See Figure 24 for additional details.*

2.2.2 Design and Build Logistics Infrastructure
Build or improve logistics infrastructure to support increased launch tempos, new launch CONOPS, and increased base activities inclusive of items such as the boat dock and rail spurs. *See Figure 24 for additional details.*

Objective 2.3: Develop the Mission Development Zone

Supporting Initiatives

2.3.1 Anchor Tenant Recruitment
Assess ability to attract anchor tenancy and activities to the region that support "green" priorities including conservation, environmental impact, climate change, wildfire management, and more.

2.3.2 Develop a Mission Development Zone Design and Planning Guide
Produce mission development zone guide tied to Phase 0/1 findings and produce associated development cost analysis. Assess available land/facilities throughout the county as part of an alternative analysis.

2.3.3 Produce a SCIF Payload Processing or other Flex Development Facility Design as Part of the Mission Development Zone
Produce cost analysis and business case for a SCIF PPF or similar flex development space and assess placement within the mission development zone as part of the mission development zone design.

2.3.4 Produce a Space Technology Accelerator Design
Develop academic incubator and accelerator concepts, engagement mechanisms, and associated business case.

FIGURE 23

Integrated Action Plan (Goal 2)

Goal	Objective	Initiatives	Short-Term Actions
Goal 2: Modernize and Invest in Infrastructure	Improve On-Base Launch Supporting Infrastructure	Design and Build Supporting Launch Services Infrastructure	• For identified and prioritized infrastructure that supports launch services providers, produce cost-benefit analysis and continue to assess and refine the shared infrastructure plan
		Infrastructure Investment and Development Plan	• For identified and prioritized infrastructure, produce cost-benefit analysis and continue to assess and refine the shared infrastructure plan • Assess identified shared infrastructure development costs such as those for the SCIF PPF, commercial/entertainment viewing zone, etc.
	Improve On-Base Transportation and Logistics Infrastructure	Design and Build Ease-of-Access Infrastructure	• For identified and prioritized infrastructure that supports ease-of-access to the bas, produce cost-benefit analysis and continue to assess and refine the shared infrastructure plan
		Design and Build Logistics Infrastructure	• For identified and prioritized infrastructure that supports transportation and logistics activities, produce cost-benefit analysis and continue to assess and refine the shared infrastructure plan • Produce cost analysis for boat dock retrofit inclusive of a shared user business/operational model
	Develop the Mission Development Zone	Anchor Tenant Recruitment	• Assess ability to attract anchor tenancy and activities to the region that support "green" priorities including conservation, environmental impact, climate change, wildfire management, etc. • Develop academic incubator and accelerator concepts and engagement mechanism
		Develop a Mission Development Zone Design and Planning Guide	• Produce mission development zone guide tied to Phase 0/1 findings and produce associated development cost analysis. Assess available land/facilities throughout the county as part of an alternatives analysis • Assess identified shared infrastructure development costs such as those for the SCIF PPF, commercial/entertainment viewing zone, etc.
		Produce a SCIF Payload Processing or other Flex Development Facility Design as Part of the Mission Development Zone	• Produce cost analysis for SCIF PPF and assess placement within the Mission Development Zone as part of the Mission Development Zone design.
		Produce a Space Technology Accelerator Design	• Develop academic incubator and accelerator concepts and engagement mechanism

Identification of Additional Infrastructure Projects

In the context of today's capital market and investment environment for early-stage and emerging space flight companies, there is a renewed emphasis on single-user, critical component infrastructure due to the increase in available capital. This increased influx of capital is likely to result in desired shared infrastructure being focused on ease of use and ease of access versus common operational use infrastructure such as launch pads or space launch complexes. While this is a marked difference from the industry sentiment gathered during the Phase 0 report formulation in late 2019 and early 2020, it is likely that additional shared infrastructure, especially that found within a well-designed mission development zone, could enable new use cases and additional activity within the region.

We estimate that fulfilling our aspirations to grow launch services providers could require upwards of $200M in direct infrastructure construction or improvements to support the end state. The bulk of the estimated infrastructure is related to significantly increased launch service provider activity at the base by current and new launch services providers. This activity results in significant improvements to the existing and potential future space launch complexes and associated single-user infrastructure such as mission operations centers, storage capabilities, maintenance and hangar equivalents, and other supporting facilities. In support of those activities and efforts to grow the mission, we observe a significant desire to invest in common use or multiple user supporting infrastructure inclusive of bulk fueling facilities and associated pipelines, gate and base access enhancement, and revitalization/modernization of the VSFB runway in support of specific functions. Furthermore, while the industry consensus was split on what mission development zone uses would be most beneficial to a competitive group of users, opportunities to lease the mission development zone to launch providers, downstream application providers, incubators, or other key users could also result in significant infrastructure needs as collective facilities sizes could exceed 100,000 square feet. As part of the identified short-term actions, we recognize the need to further the design of the mission development zone and undertake additional planning and cost estimation to properly prioritize the infrastructure required to enable the vibrant future we aspire to achieve.

Figure 24 provides additional details for identified infrastructure projects.

FIGURE 24

Identified Common Use / Shared Supporting Infrastructure

Objective	Infrastructure, Improvement, or General Project Area
Objective 2.1 Improve On-Base Launch Supporting Infrastructure	A. **GN2 ASU and Pipeline:** Design and build a Gaseous Nitrogen (GN2) Air Separation Unit (ASU) associated storage area and pipeline on South VSFB to produce launch quality nitrogen.
	B. **Small Launch Vehicle Environmental Assessment/Launch & Landing Pads:** Develop a Small Launch Vehicle Programmatic EA to approve launch sites and launch rates at VSFB for small launch vehicles. Resulting EA will save small launch providers a potential 2-year effort and costs.
	C. **SLC-8 Modernization:** Transition SLC-8 into a government-facilitated launch pad for small LSPs launching government and commercial missions.
	D. **Improve and Extend Utilities to new South VSFB Sites:** Extend roads, sewer, utilities, and communications to new SVSFB "greenfield" sites southeast of SLC-6/Boathouse to provide space for small launch service providers.
	E. **Hydrazine Storage and Fuelling:** Assess the current hydrazine storage capacity and invest in improvements to support USG use of hydrazine in small launcher payloads in support of the ORS mission.
	F. **Revitalize VSFB Runway (KVBG 12/30):** Perform necessary updates to the main runway and any associated ILS/ALS/PAPI equipment as necessary to support commercial utilization by horizontal launch vehicles/carrier aircraft. Potentially extend staffing of the air strip to increase base accessibility.
	G. **Runway Safety Assessment:** Perform an EA and design study to assess human and installation safety requirements for horizontal launch operations operating out of KVBG.
	H. **Upgrade Telecommunication Infrastructure:** Lay new fiber optic cable to enhance network performance and speed.
	I. **Revitalize the North Side Well:** Rehabilitate and restore old well infrastructure to provide additional water source for the base and surrounding activities.
	J. **Dedicate Space and Facilities for Commodities Storage**: Set aside land for storage of flight-ready hardware and improve the roads/access options to reach storage areas.
Objective 2.2 Improve On-Base Transportation and Logistics Infrastructure	**K. South VSFB Gate Enhancement:** South VSFB entry gate enhancement to support a new vehicle security inspection station for LSPs. Potential plan to connect North VSFB to South VSFB via an overpass roadway and incorporate a second inspection station on South VSFB.
	L. Boat Dock Refurbishment and Upgrade: Perform updates to the boat dock and build supporting components such as a sea wall to support sustained utilization of the dock for offloading heavy and ultra-heavy launch vehicle components.
	M. Improve Rail Transit Times to/from the Base: Add additional transit options such as express trains from LAX/Union Station on the Amtrak/CALTRANS Pacific Surfliner partnership.
Objective 2.3 Develop the Mission Development Zone	**N. Mission Development Zone (LSPs):** Create a "commercial zone" on South VSFB enabling commercial LSPs to lease land for building required administrative, storage, launch control or processing facilities.
	O. Mission Development Zone (Non-LSPs): Consider mission development zone infrastructure and configurations to support non-LSPs such as those participating in the logistics and downstream applications segments.
	P. Mission Development Zone Perimeter Security Fence Modification: Mission development zone perimeter security system modification to place the new mission development zone outside of the controlled security area and enable public accessibility.
	Q. Mission Coworking Facilities Development Plan: Develop a plan to build and lease shared office space within the mission development zone to support LSPs and downstream applications providers in an unclassified setting.
	R. Create a Leasable SCIF Payload Processing Facility: For additional capacity for small and medium launch that is cost effective and can potentially support multiple users.

Goal 3: Strengthen the Central Coast Space Identity

Our current state assessment and our vision for the future highlight the significant opportunity we have to strengthen the region's economy through increased space industry activities. This goal and its objectives focus on job creation, workforce development and economic development that support industry needs while complementing the region's priorities and values.

GOAL 3 STRENGTHEN THE CENTRAL COAST SPACE IDENTITY

The following objectives will enable us to build a world-class cluster of space industry activities and successfully integrate these additional commercial space activities into the region in a manner that is complementary to the values, priorities, and identity of the Central Coast and its residents by:

- Establishing a clear, modern brand that demonstrates the value that space industry activities bring to the Central Coast and promotes the value for space industry activities locating on the Central Coast.
- Integrates industry development activities with regional quality of life in a way that provides complementary value to the Central Coast.
- Incentivizing space industry activities in the region that increase workforce development and economic mobility.

Objective 3.1: Establish a Clear, Modern Brand for the Central Coast Space Ecosystem

Supporting Initiatives

3.1.1 Establish a Cohesive Branding and Marketing Identity for the Central Coast Space Ecosystem
Create a clear, modern identity for the Central Coast space ecosystem that aligns our vision and ambitions for industry growth to the core tenets of the region such as conservation, environmental sustainability, tourism, wine, and open space.
See Integrated Action Plan (Action #6) for Linkages.

Objective 3.2: Integration of Space and Regional Quality of Life Attributes

3.2.1 Develop Initiatives to Increase Space Industry Activities in the Region Compatible with Science, Technology, Engineering, and Math (STEM) Educational Priorities for K-12
Assess the demand and required engagement mechanisms and infrastructure required to support increased STEM education priorities in the region.

3.2.2 Integrate Entertainment and Tourism Activities into the Space Industry Attraction Plans and Associated Development Initiatives
Assess the linkages between space, entertainment, and tourism to capitalize on expanded industry activities and regional entertainment, tourism, and open space assets.

3.2.3 Promote the Linkages between Space Industry Growth and Conservation Priorities
Produce educational and informational materials to describe and demonstrate how the growth of the space industry aligns and supports thoughtful growth that aligns with environmental goals and the region's identity.

Objective 3.3: Workforce Development and Economic Mobility

Supporting Initiatives

3.3.1 Incentivize Workforce Development and Economic Mobility throughout the Region
Promote greater linkages between current and future space companies with the region's leading academic institutions and their extensive aerospace degree programs to increase the recruitment of local talent and the sustainment of local space industry jobs.

Objective 3.4: Housing and Transportation

Supporting Initiatives

3.4.1 Plan for Future Community Needs

Support the needs of a growing high-tech workforce by producing sufficient housing and associated infrastructure, such as roads, renewable energy, water, and broadband internet. Leverage the results of 2021 planning efforts, such as Lompoc's Office of Local Defense Community Cooperation grant and the Environmental Protection Agency Building Blocks technical assistance to optimize community development planning and action.

3.4.2 Advocate for Transportation Infrastructure and Service

Prioritize and invest in reducing vehicle miles traveled, which can take the form of increased public transportation, improved roadways and sufficient housing for the workforce in close proximity to work centers.

FIGURE 25

Integrated Action Plan (Goal 3)

Goal	Objective	Initiatives	Short-Term Actions
Goal 3: Strengthen the Central Coast Space Identity	Establish a Clear, Modern Brand for the Central Coast Space Ecosystem	Establish a Clear, Modern Brand for the Central Coast Space Ecosystem	• Examine results from the space activity economic impact report in comparison with agriculture economic impacts to create a value proposition narrative and supporting materials • Establish a cohesive and compelling branding and marketing strategy with easily communicable value-added activities and goals
	Integration of Space and Regional Quality of Life Attributes	Develop Initiatives to Increase Space Industry Activities in the Region Compatible with Science, Technology, Engineering, and Math (STEM) Educational Priorities for K-12	• Additional actions are currently in the process of being assessed as part of the ongoing planning efforts.
		Integrate Entertainment and Tourism Activities into the Space Industry Attraction Plans and Associated Development Initiatives	• Additional actions are currently in the process of being assessed as part of the ongoing planning efforts.
		Promote the Linkages between Space Industry Growth and Conservation Priorities	• Additional actions are currently in the process of being assessed as part of the ongoing planning efforts.
		Incentivize Workforce Development and Economic Mobility throughout the Region	• Additional actions are currently in the process of being assessed as part of the ongoing planning efforts.
	Housing and Transportation	Plan for Future Community Needs	• Additional actions are currently in the process of being assessed as part of the ongoing planning efforts.
		Advocate for Transportation Infrastructure and Service	• Additional actions are currently in the process of being assessed as part of the ongoing planning efforts.

Next Steps

What Comes Next

We know that Vandenberg and the Central Coast communities have great potential to build a commercial space presence that will promote economic development and job creation in the region, position California as a global leader in the future of the commercial space industry, and advance the national security of the United States.

We continue to approach this challenge, collectively, with excitement for what we can build together and with a goal of enabling our vision and rising to meet our bold challenge. We will continue to expand and update our analysis across all the dimensions along with working closely with the Central Coast communities, the ever-expanding commercial space industry, academia, and everybody in between. We welcome engagement and participation from all potential stakeholders – academia, national labs, venture capitalists, students, states, commercial space companies, and more – as we strive to reach these goals.

An unarmed LGM-30G Minuteman III intercontinental ballistic missile launches during an operational test Feb. 20, 2016, at Vandenberg Space Force Base. Credit: USSF / Senior Airman Kyla Gifford

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Images

Page 4. *Vandenberg AFB LCDM Launch Site*. NASA Landsat Data Continuity Mission (LCDM). Credit: NASA
Page 4. Composite image that includes the original: *Vandenberg AFB LCDM Launch Site*. NASA Landsat Data Continuity Mission (LCDM). Credit: NASA
Page 58. *A United Launch Alliance Delta IV-Heavy rocket launched by team Vandenberg from Space Launch Complex-6*. Credit: U.S. Air Force photo by Joe Davila/Released

All other images contain the appropriate credit, where applicable, below the image.