Cecil Spaceport

Spaceport Development Area Plan

Prepared for:

SPACE FLORIDA

JAA

Prepared by:

Kimley»Horn
Expect More. Experience Better.

In collaboration with:

BRPH

December 16, 2021

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Executive Summary

Kimley-Horn and BRPH were selected by Space Florida to evaluate potential spaceport development options and prepare a conceptual development plan for a dedicated aerospace area at Cecil Spaceport. The proposed development area consists of approximately 320-acres on Cecil Airport property north of runway 27R and east of runway 18L. The evaluation consisted of the following three elements: 1) Identify aerospace systems that are active and in development that have the potential to operate at Cecil Spaceport, 2) Determine future infrastructure needed to support these operations, and 3) Evaluate site planning and land-use considerations for the spaceport development area. A preferred development concept was developed that was derived from three-concepts presented to Cecil Spaceport staff for their review and input.

Evaluation of Aerospace Systems

Cecil Spaceport currently maintains an active FAA (Federal Aviation Administration) license to operate a launch site for commercial Horizontal Takeoff and Horizontal Landing (HTHL) Reusable Launch Vehicles (RLVs). The license application includes support for both Concept X and Z vehicles; however, the license may be modified in the future to support a broader range of launch and reentry vehicles. In addition, future launch or reentry operators must also obtain the appropriate operator licenses or permits prior to commencing licensed activities at the spaceport. Cecil Spaceport has a 12,503 ft runway capable of supporting approximately 90%-95% of the horizontal launch, reentry, and support systems that are in development. In additional to horizontal launch operations, other compatible operations at Cecil Spaceport include high-altitude balloon operations, such as Space Perspective’s Neptune, and orbital reentry vehicle operations like Sierra Space’s Dream Chaser. Test operations such as rocket engine testing, fuel cell testing, aerospace research and development, and support operations such as manufacturing, payload processing, vehicle integration, mission control, and general administration were also evaluated. A high-level analysis of current market trends was conducted to provide a general understanding of the systems in development. This analysis is used to determine which systems have the potential to operate at the spaceport and the probability of market capture. The inferences made from this analysis provide a quasi-operational forecast to use in evaluating the infrastructure needs of the Spaceport Development Area.

Future Infrastructure Prioritization

To determine which infrastructure should be prioritized within the proposed development area, a poll was conducted during a stakeholder charrette. The results of this poll determined that stakeholders prioritized basic site preparation above all other developments. Basic site preparations include the construction of access roadways and utility connections within the site. It also determined that airside infrastructure should be protected along the western and southern boundary of the development area with landside development identified for the central and eastern portions of the development area.

Site-Planning and Land-Use Considerations

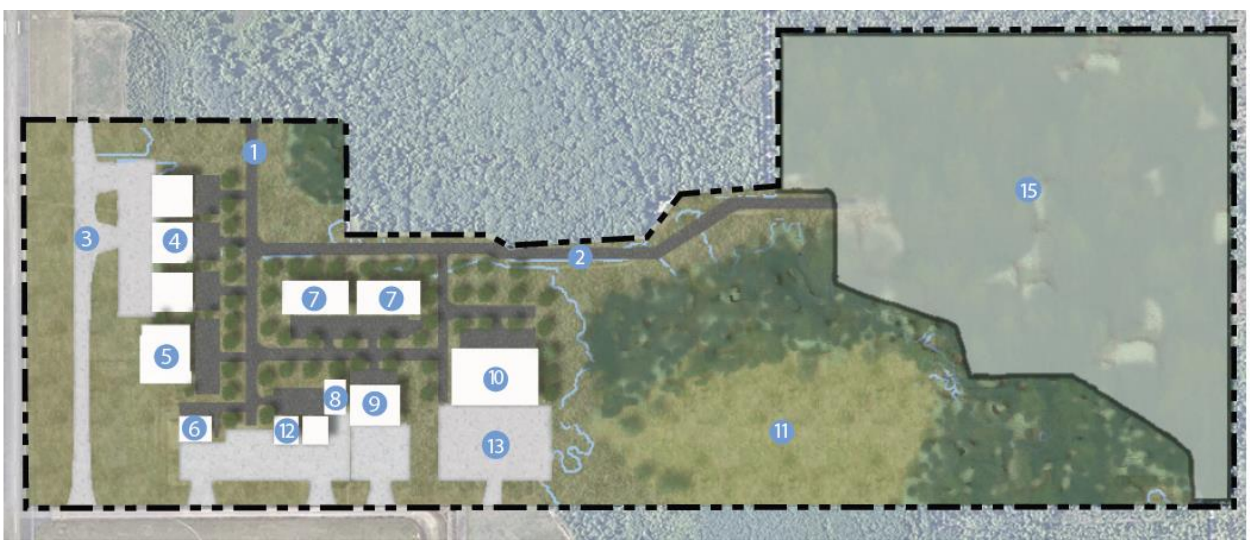
A variety of land-use considerations were accounted for while evaluating potential site layouts. These considerations include:

- Proposed 320-acre development area boundary;
- Flood hazards and wetlands;
- Part 77 imaginary surfaces;
- Explosive siting;
- Planned utility corridor; and
- Site access points.

The developable land within the proposed development area is primarily constrained by the 100-year floodplain present in the middle of the site. To minimize impacts and costs associated with mitigation of the floodplain, development within the floodplain boundary should be avoided.

Development Concepts

Three development concepts were prepared based on infrastructure priorities and land-use considerations. The concepts were reviewed with staff from Jacksonville Aviation Authority (JAA) and Cecil Spaceport to inform the preparation of a fourth (composite) concept that incorporated preferred elements of the first three concepts. A graphical representation is provided in the figure below.



1. Planned Roadway
2. Proposed Access Road
3. Planned Taxiway
4. Common Use Hangars
5. Aerospace Terminal
6. Existing Fabric Hangar
7. Multi-use / Office Buildings
8. Payload Processing Facility
9. Small Hangar
10. Medium Hangar
11. Large Hangar
12. Wetland
13. Airside Apron
14. Existing Runways
15. Future Phased Improvements

Recommended Next Steps

Kimley-Horn recommends that the following steps be completed for continued spaceport development:

1. Design and construct basic site infrastructure within the western sector of the Spaceport Development Area with a focus on primary roads and the utility connections throughout the site.
2. Protect the eastern sector of the development area for unspecified mixed-use development. Clear the area for expedited development and provide an access road and utility connections to the entrance of the development sector.
3. Design and construct airside infrastructure in proximity to existing taxiways along the southern side of the Spaceport Development Area.
4. Include the following elements into the Airport Master Plan Update:
    a. Spaceport Development Area.
    b. New parallel taxiway along Runway 18L.
    c. New temporary oxidizer loading area on southern end of Runway 36R.
    d. New oxidizer loading area southwest of Runway 36L.
    e. New rocket engine test area near existing hot cargo pad.

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Chapter 1 – Introduction and Background

1.1 Introduction

Cecil Airport is one of four airports belonging to the Jacksonville Aviation Authority (JAA) in Jacksonville, Florida. The authority acquired the airport from the U.S. Navy in 1999 and has maintained the facility ever since. In January 2010 JAA received a Launch Site Operator License (LSOL) from the Federal Aviation Administration (FAA) to operate a commercial horizontal launch facility, named Cecil Spaceport, at Cecil Airport. With this license, Cecil Spaceport became the first horizontal launch facility on the east coast of the United States.

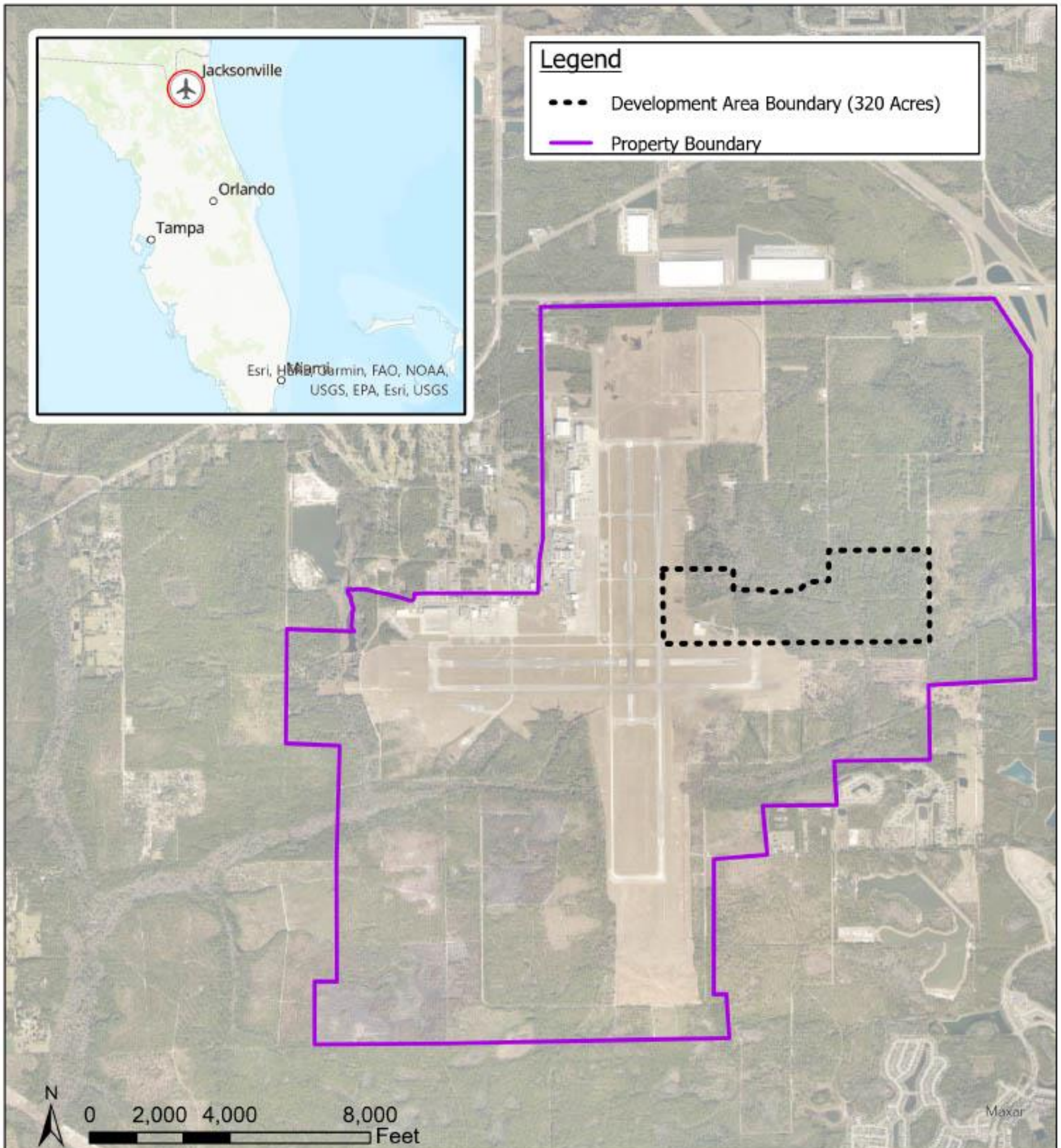
JAA is in the process of updating the Airport Master Plan for Cecil Airport (KVQQ) to include spaceport and aerospace development in addition to traditional aviation activities. JAA has proposed the creation of a Spaceport Development Area consisting of approximately 320-acres on airport property north of runway 27R and east of runway 18L (see Figure 1). The proposed development area includes existing spaceport infrastructure (such as the “Space Port Ramp”) identified in the current Airport Diagram (see Figure 2). The purpose of this planning study is to evaluate development options for the Spaceport Development Area and provide a plan for inclusion in the Airport Master Plan Update.

To support the preparation of a Spaceport Development Area Plan, the following goals and objectives were identified during the project kickoff meeting held at Cecil Spaceport on July 20, 2021:

- Assess current launch systems in use (or in development) and prepare a Quasi-Operational Forecast
- Identify core infrastructure requirements to support potential future development
- Evaluate land use considerations
- Prepare three conceptual plans for future infrastructure within the study area
- Provide a preferred alternative of conceptual plans along with project phasing

1.2 Spaceport Overview

Cecil Spaceport reserved approximately 320-Acres of land on the east side of the airfield designated as an Spaceport Development Area. The site currently houses a 60,000 SF apron, 18,200 SF fabric hangar, and 2,000 SF of office space (see Figure 3). In recent years, the site has been used to conduct static-rocket engine testing on the southeast corner of the apron where there is a temporary static hot-fire test stand in place. Additional spaceport infrastructure on the field includes the Dr. Norman Thagard Mission Control Center (MCC), a 1,831 SF facility at the base of the newly constructed Air Traffic Control Tower (ATCT) to be used for telemetry, guidance, and navigation support.



Cecil Spaceport Location Map

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Figure 1. Cecil Spaceport Location Map

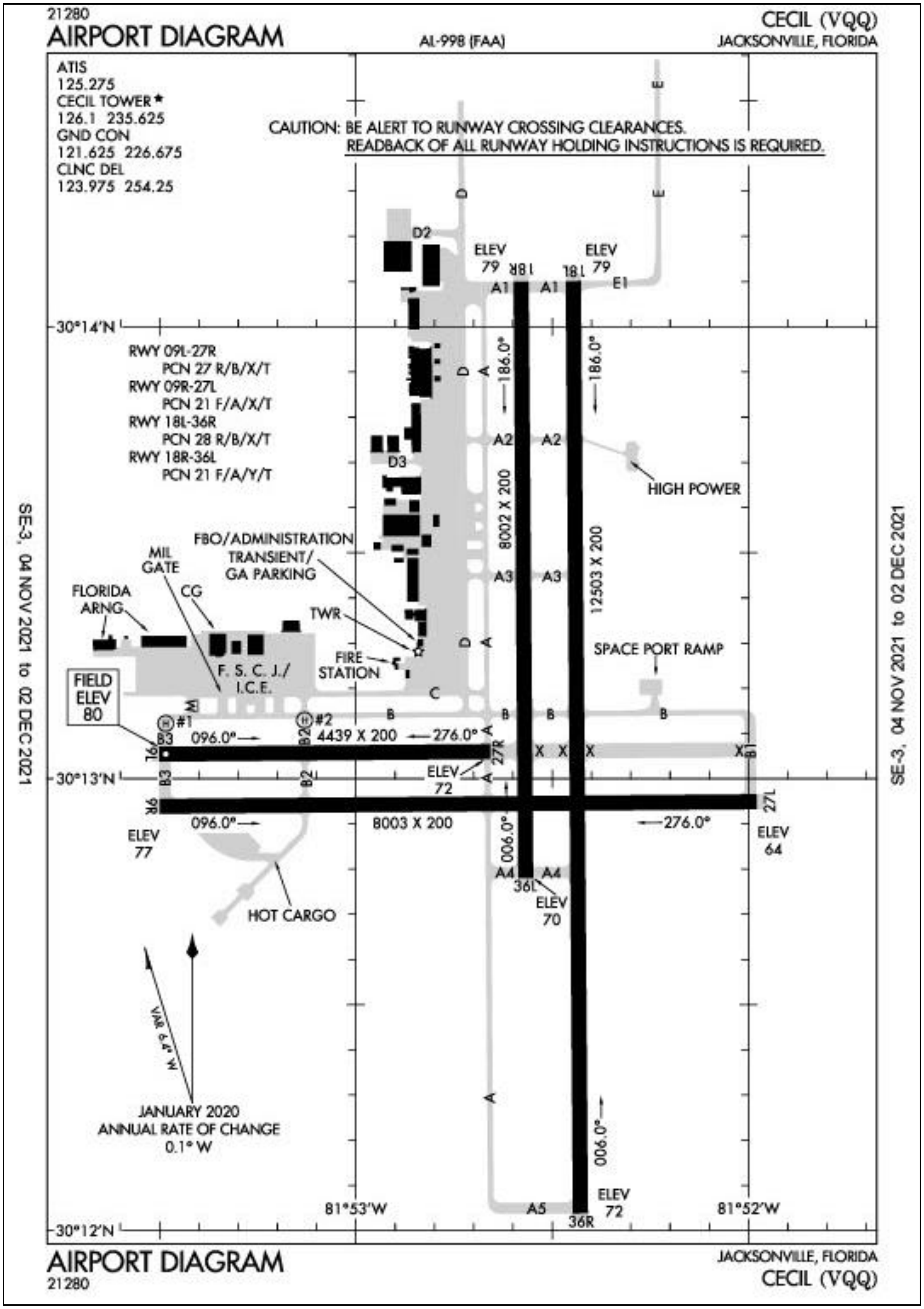

Figure 2. Airport Diagram

Current Spaceport Infrastructure

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Figure 3. Current Infrastructure at Cecil Spaceport

Chapter 2 – Operational Forecasting

The ultimate objective of Cecil Spaceport is to conduct commercially licensed horizontal launch and reentry operations. Horizontal Reusable Launch Vehicles (RLVs) are launch systems that can take off and land on conventional runways. The horizontal RLVs can either takeoff under jet power, like a conventional aircraft, or under rocket power and are generally categorized as either Concept X, Concept Y, or Concept Z type vehicles.

In addition to horizontal RLVs, other types of launch vehicles can utilize infrastructure at Cecil Spaceport, such as high-altitude balloons and winged reentry vehicles that are returning from orbit. Additional aerospace support is likely to occur as well. Such operations may include rocket engine testing, aerospace manufacturing, research and development, and Vertical Takeoff Vertical Landing (VTVL) testing.

One objective of this study was to identify current industry systems in use or in development that have the potential to operate at Cecil Spaceport. This chapter describes potential operators, their systems, and a timeline for potential operations to begin. At the end of this chapter is a quasi-operational forecast used to characterize the potential of aerospace systems to establish operations at Cecil Spaceport and the potential rate that operations could occur.

2.1 Systems Currently Active or in Development

For the purpose of this study, there were 40 systems that Kimley-Horn used to base market conditions from that are shown in Table 1. This is a high-level analysis of the current aerospace market that depicts multiple vehicle types and a variety of operations. Operational categories in this study include:

- Horizontal Takeoff and Horizontal Landing Vehicles (HTHL)
- Reentry Vehicles
- Supersonic Vehicles
- Support Vehicles
- High-Altitude Balloon Vehicles
- Tethered / Untethered Vertical Takeoff and Vertical Landing Vehicles (VTVL)

2.2 Quasi-Operational Forecast

A quasi-operational forecast was prepared for Cecil Spaceport to estimate preliminary operational rates and potential of various systems to operate at Cecil Spaceport within the near-term, mid-term, and long-term (see Table 2). Potential aerospace users were also identified within the table. Since Cecil Spaceport is one of three licensed air and space ports in Florida's spaceport network the potential exists for Cecil Spaceport to provide redundancy and contingency support for operations originating at other state spaceports.

Table 1. Estimated Development Status of Aerospace Systems

		HTHL Launch Concepts
Concept X	🟡	Bristol Ascender
	🟡	PD Aerospace Spaceplane
	🟡	Reaction Engines Skylon
	🟡	Sabre Development Vehicle
	🔴	Airbus Defense and Space Spaceplane
	⚫	Rocketplane XP
Concept Y	🟡	Dawn Aerospae MK-II Aurora
	🟡	Dawn Aerospae MK-III
	⚫	XCOR Lynx
Concept Z	🟢	Northrop Grumman Pegasus XL
	🟢	Virgin Orbit Launcher One
	🟢	Coleman Aerospace
	🟡	Aevum RAVNX
	🟡	Bristol Spacebus
	🟡	Briston Spacecab
	🟡	Firefly Gamma
	🟡	Generation Orbit X-60A
	🟡	Orbital Access 500R
	🟡	Stratolaunch Talon-A
	🟡	Virgin Galactic Spaceship Three
	🟡	Virgin Galactic Spaceship Two
	⚫	S3 Soar Spaceplane

	Reentry
🟢	Boeing X-37B
🟡	Sierra Space Dream Chaser
	Supersonic
🟡	Boom Supersonic Overture
🟡	Boom Supersonic XB-1
🟡	HyperMach SonicStar
🟡	Lockheed Martin X-59 QueSST
🟡	Reaction Engines Lapcat A2
🟡	Spike S-512
⚫	Aerion A5-2
	Support
🟢	Zero-G (727-200)
🟢	Super Guppy
🟢	F-104 Starfighter
	Balloon
🟡	Space Perspective Neptune
🟡	Worldview Stratollite
	VTVL
🟢	Blue Origin New Shepard
🟡	Masten Xodiac
🟡	New Frontier Aerospace
🟡	SpaceX Starship

🟢 = Operational
🟡 = In Development
🔴 = On Hold
⚫ = Cancelled

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Table 2. Quasi-Operational Forecast

	1 to 5 years		6 to 10 years		11 to 20 years	
	Probability	Operational Rate	Probability	Operational Rate	Probability	Operational Rate
Licensed Operations						
Concept X, Y, Z	🔴	🔴	🟡	🔴	🟡	🟡
Balloon	🟡	🔴	🟢	🟡	🟢	🟡
Reentry	🔴	🔴	🟡	🔴	🟡	🟡
Test Flights						
Concept X, Y, Z	🔴	🟡	🟡	🟡	🟡	🟡
Balloon	🟡	🔴	🔴	🔴	🟡	🔴
Reentry	🔴	🔴	🔴	🔴	🔴	🔴
Ground Test Operations						
Static-Fire Testing	🟡	🔴	🟡	🟡	🟢	🟢
VTVL Testing	🔴	🟡	🔴	🟢	🟡	🟢
Other Aerospace Users						
Supersonic	🔴	🔴	🟡	🟢	🟢	🟢
Hypersonic	🔴	🔴	🔴	🟡	🟡	🟡
Support	🔴	🔴	🟡	🟡	🟡	🟡
Potential Users	Virgin Orbit		Boom Supersonic			
	Aevum		Dawn Aerospace			
	Generation Orbit		New Frontier Aerospace			
	Sierra Space		Reaction Engines			
	Space Perspective		Spike Aerospace			
			StratoLaunch			

Probability:
- 🔴 = Low, Unlikely
- 🟡 = Medium, Likely
- 🟢 = High, Extremely Likely

Operational Rate:
- 🔴 = Low, 0-2 / Year
- 🟡 = Medium, 2-12 / Yea
- 🟢 = High, >12 / Year

2.3 – Future Infrastructure Requirements

During a virtual stakeholder planning charrette consisting of JAA staff, aerospace operators, and industry experts, infrastructure prioritization was identified as a significant goal of the meeting. A presentation was provided to the group identifying potential infrastructure projects and a survey was sent out to each participant with a predetermined list. The responses were averaged and normalized to provide the results shown in Figure 4.

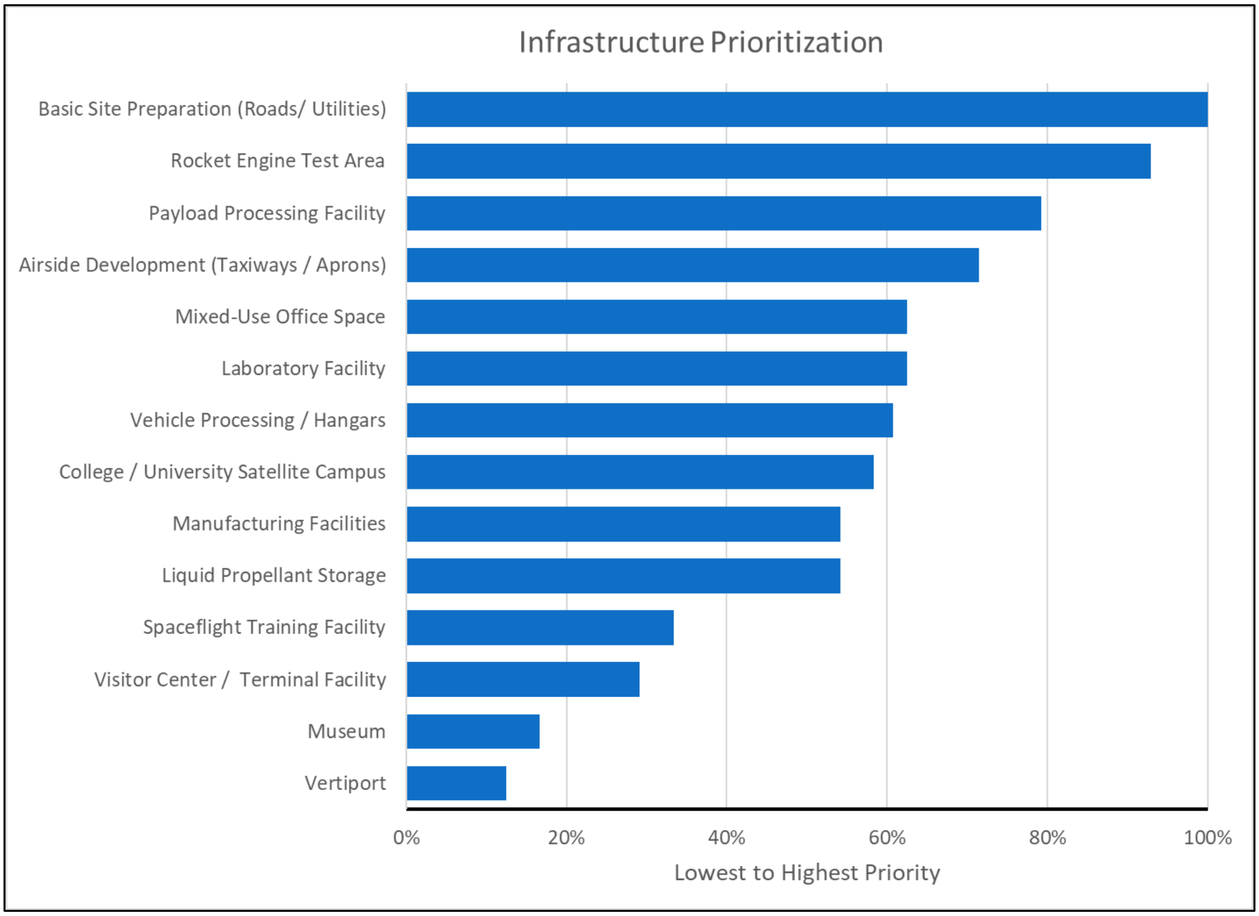


Figure 4. Infrastructure Priority Survey Results

The highest priority is basic site preparations such as roadways and utilities with the second highest priority being rocket engine testing infrastructure. Basic site preparations would allow for build-ready sites within the development area that would lessen the barrier to entry for potential users. Since test areas require designated safety distances the placement of the facility should minimize impacts to other operations and site users. A payload processing facility was prioritized to provide additional operational capabilities to the facility for a wide range of potential users. The last major priority identified by the group was airside development. Since there is limited land adjacent to current airside infrastructure, it is important to use the area efficiently. The high cost of airside infrastructure such as taxiways is also an important consideration in placement of airside hangars and aprons.

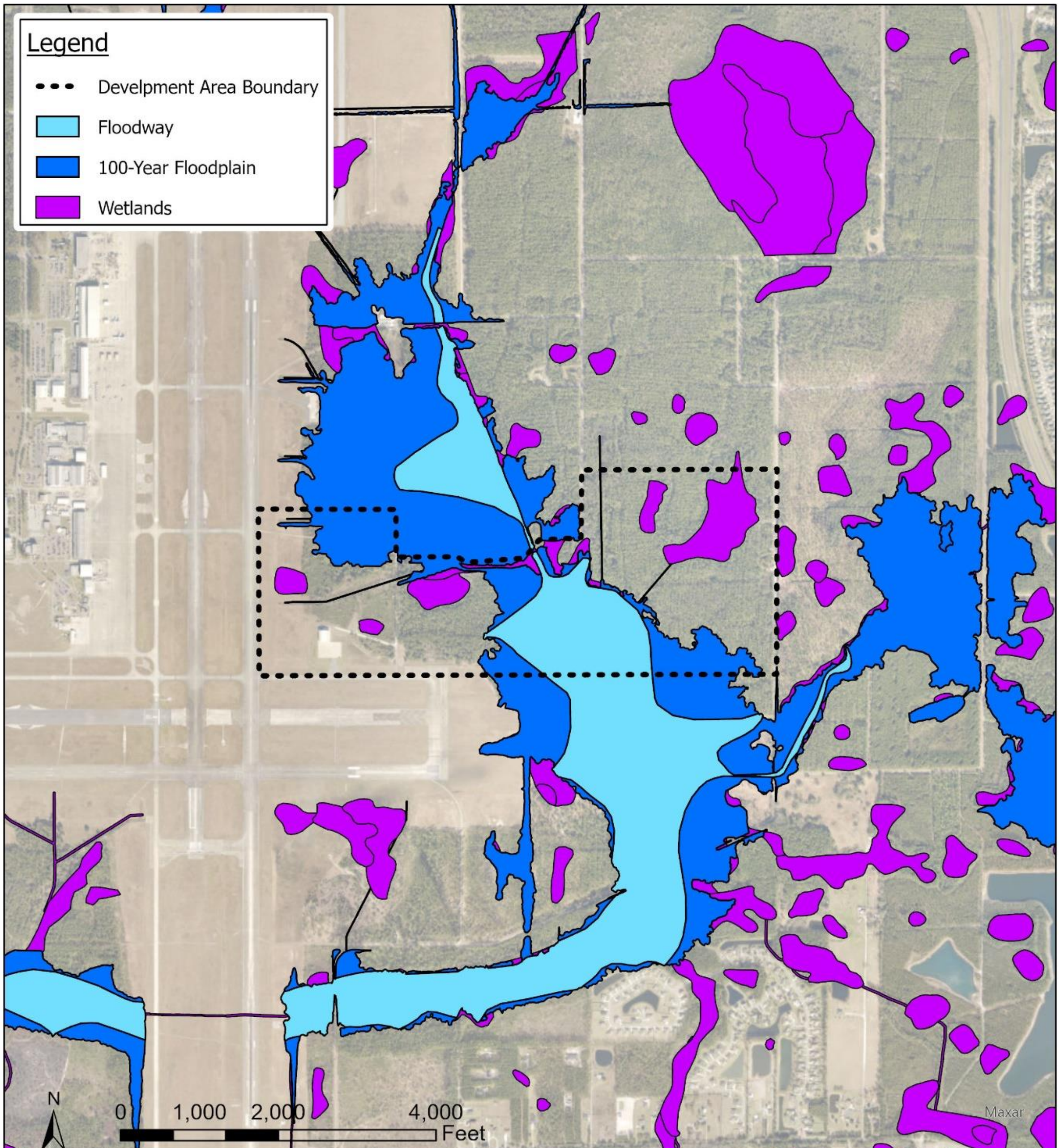
Chapter 3 – Land Use Considerations

3.1 Flood Hazards and Wetlands

Development within the proposed Spaceport Development Areas is limited by the significant amount of wetlands and flood hazards that cut through the center of the area. In discussions with Cecil Spaceport a plan was identified to determine which areas development should be limited, and which areas could be mitigated to support future development. JAA and airport staff proposed mitigating low and medium impact wetlands within the Spaceport Development Area and avoiding high-impact wetlands. These low and medium impact wetlands make up the majority of wetlands that would hinder development. Development for the area was primarily constrained by the 100-year floodplain present in the middle of the site. Due to impacts and cost associated with mitigation of the floodplain, development beyond the floodplain boundary should be avoided. A map showing flood hazards and wetlands is shown in Figure 5.

3.2 Part 77 Imaginary Surfaces

Under Title 14 of the Federal Code of Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace (Part 77), site planning should analyze the affects development may have on airspace at Cecil Spaceport. Part 77 establishes imaginary surfaces with relation to airports and each runway according to the type of approach available or planned. For a list of these imaginary surfaces and definitions, refer to 14 CFR Part 77.19. Due to the site's proximity to airside infrastructure, a preliminary analysis was performed to provide estimated building height limitations on site development within the Spaceport Development Area to avoid breaching of imaginary surfaces. Results of this preliminary analysis are shown in Figure 6. Infrastructure will be limited to a maximum height of approximately 150 ft, with lower limits imposed on future buildings closer to the airfield.



Flood Hazards and Wetlands

Figure 5. Flood Hazards and Wetlands in the Spaceport Development Area

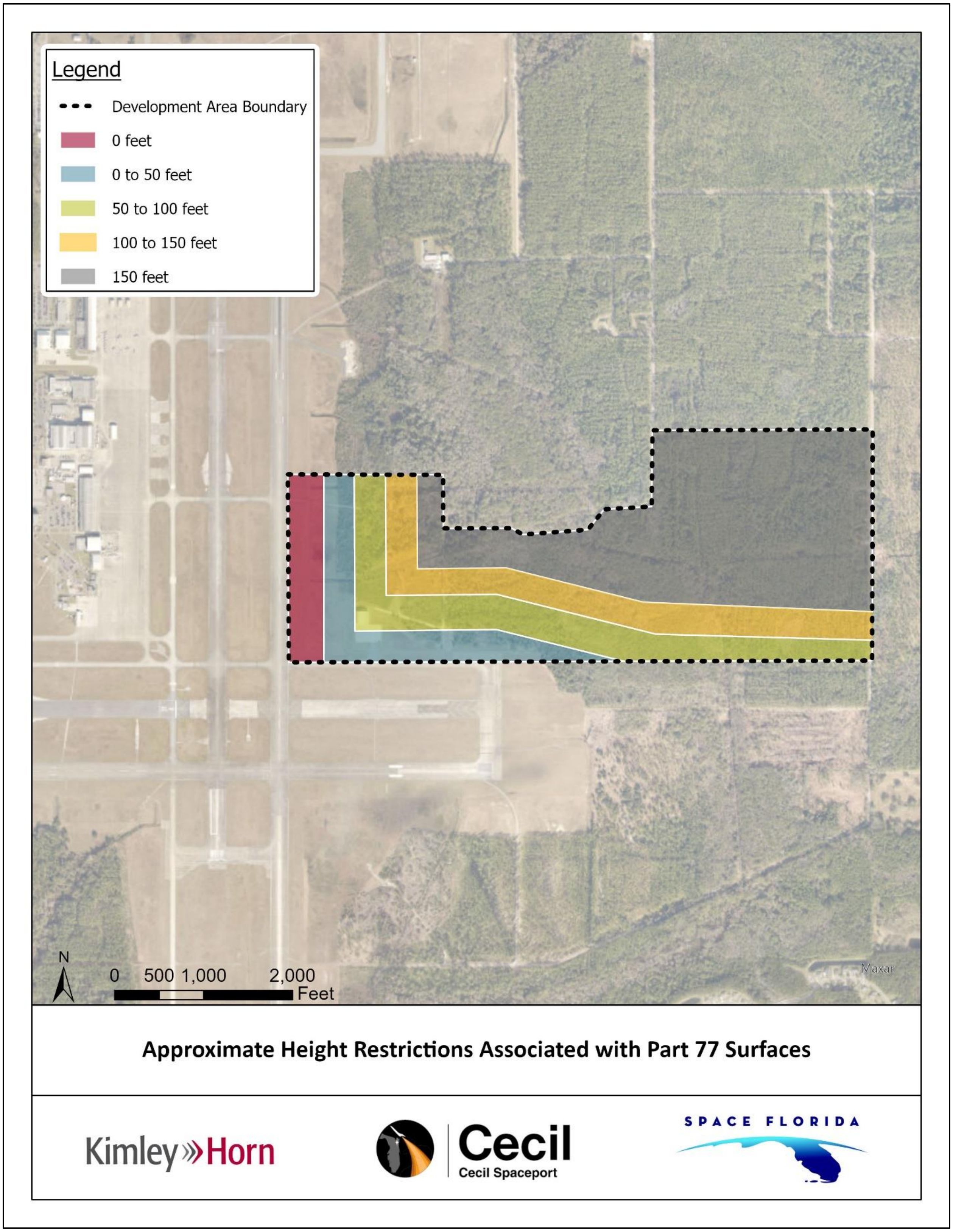


Figure 6. Part 77 Surfaces

3.3 Explosive Siting

Unlike traditional aircraft which use a mixture of fuel and air to produce thrust, launch vehicles use fuels and oxidizers (collectively known as propellants) to produce thrust. The propellants utilized to support launch operations generally have flammable or explosive properties and must be handled appropriately to ensure safe operations at the spaceport. An explosive site plan is one tool that is required by the FAA under 14 CFR Part 420, to identify the types and quantities of potential propellants. A scale map is required to show the separation distances derived from propellant types and quantities; these distances include:

- Public Area Distance (PAD)
- Public Traffic Route Distance (PTRD)
- Intraline Distance (ILD)

3.3.1 Definitions

The following items are defined in 14 CFR Part 420 as part of the explosive siting regulatory requirements or in the DoDM 6055.09-M, Volume 1.

- **Explosive Equivalent** – A measure of the blast effects from explosion of a given quantity of material expressed in terms of the weight of trinitrotoluene (TNT) that would produce the same blast effects when detonated.
- **Explosive Hazard Facility** – A facility or location at a spaceport where solid propellants, energetic liquids, or other explosives are stored or handled.
- **Hazard Division (HD) 1.1** – HD 1.1 is defined by the DoD as a substance that can cause mass explosion.
- **HD 1.3** – HD 1.3 is defined by the DoD as a substance that can cause mass fire, minor blast, or fragment.
- **Intraline Distance (ILD)** – The minimum distance permitted between any two explosive hazard facilities in the ownership, possession, or control of one spaceport customer.
- **Net Equivalent Weight (NEW)** – The total weight, expressed in pounds, of explosive material or explosive equivalency contained in an item.
- **Public Area Distance (PAD)** – The minimum distance permitted between a public area and an explosive hazard facility.
- **Public Traffic Route Distance (PTRD)** – The minimum distance permitted between a public highway or railroad line and an explosive hazard facility.

3.3.2 Rocket Engine Testing

One of the top priorities for the planning group was to define an area for rocket engine testing that would not hinder other development within the Spaceport Development Area. An existing rocket engine test site is located on the apron in front of the fabric hangar. Future rocket engine testing is proposed to occur on the southwest side of the airfield near the hot cargo pad (see Figure 8). This location will not impact the Spaceport Development Area, nor will it impact aeronautical operations at Cecil Spaceport.

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Figure 7. Generation Orbit Engine Testing at Cecil Spaceport (January 3, 2020)

3.3.3 Oxidizer Loading Area(s)

The current Oxidizer Loading Area (OLA) is located east of Runway 27R and would likely impact operations within the Spaceport Development Area due to explosive safety distances extending past the boundary. The current location also impacts aeronautical operations on Taxiway B. Four potential OLA options are provided in Figure 9 with Option B identified as the preferred location. Option B requires the construction of a new concrete pad and taxiway connector and is far enough away from airfield infrastructure to prevent impacts with other operations. Since Option D does not require a taxiway connector and the existing concrete could be utilized, it is recommended as a near-term solution prior to construction of Option B. The southern portion of Taxiway A would need to be closed for oxidizer loading operations at Option D.

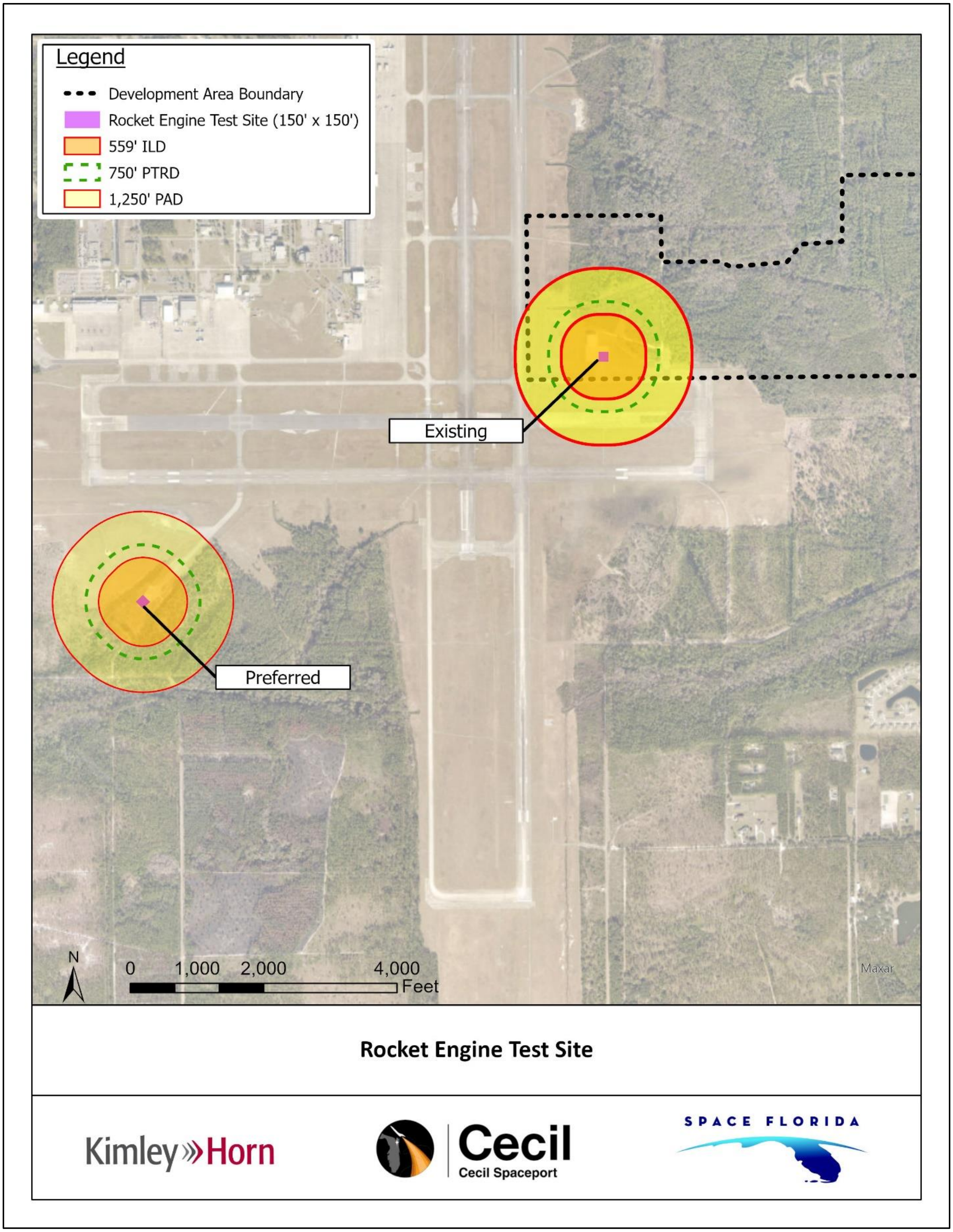
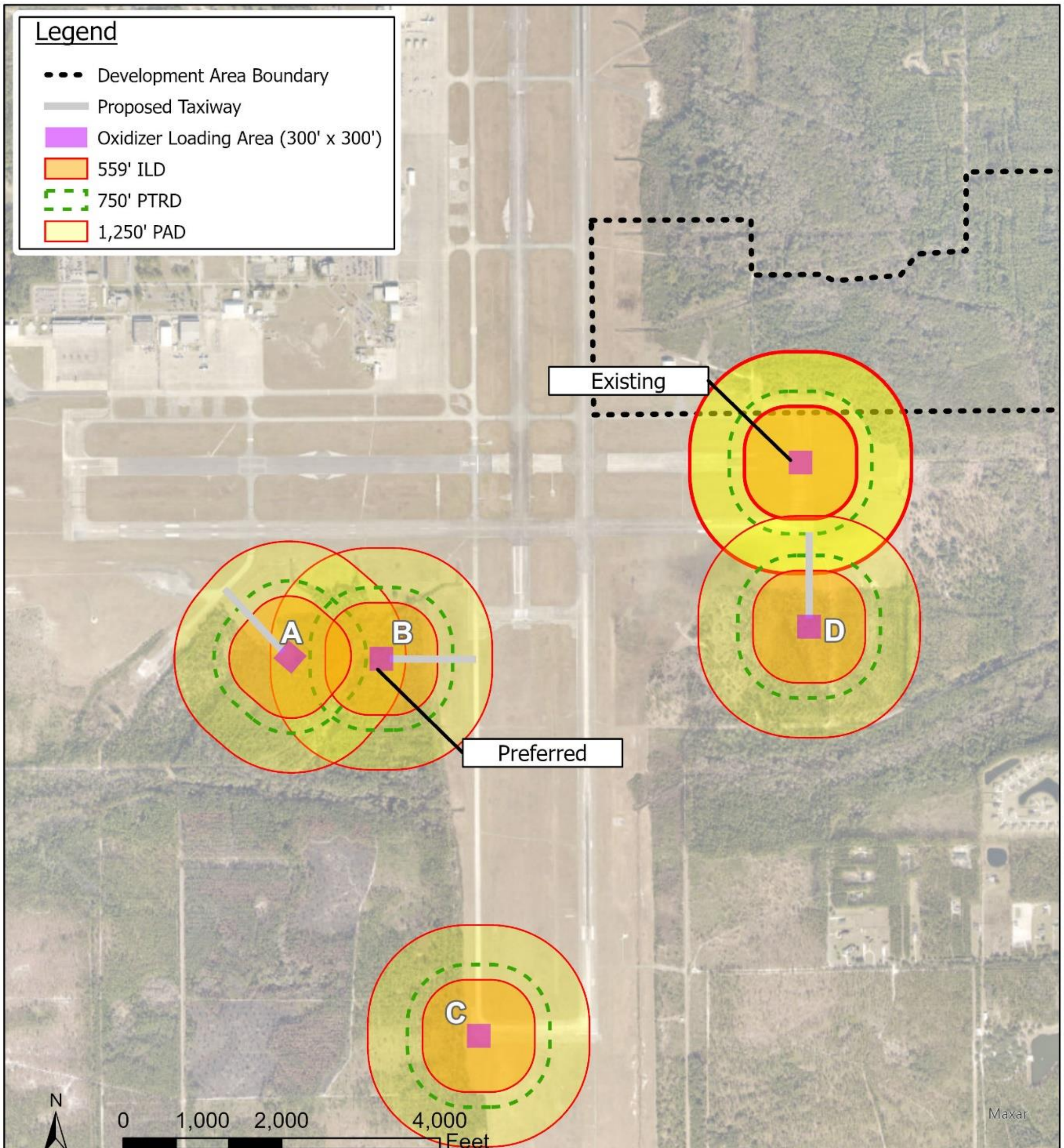


Figure 8. Proposed Test Site



Possible Oxidizer Loading Areas

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Figure 9. Oxidizer Loading Areas

3.4 Site Access

Site access to the Spaceport Development Area is an additional consideration. Some of the elements that were addressed during the initial review of the site include:

- Utility connection points and corridors;
- Ultimate right-of-way widths;
- Initial roadway widths to accommodate large/oversized vehicles;
- Future traffic flow;
- Access to airside infrastructure; and
- Closest major highway infrastructure.

Based on the potential for aerospace manufacturing, large vehicle processing, and the possible need for oversized shipping by ground, a 100 ft right-of-way is recommended to accommodate traffic and shipping needs. This would allow a four-lane roadway with a bike lane and sidewalks as the ultimate buildout. The roadway could be built in phases starting with two lane construction throughout the site and ultimately be widened to support 4 lanes. The 100 ft right-of-way should be planned for so that future roadway widening is protected. Figure 10 shows an example of a 100 ft right-of-way concept.

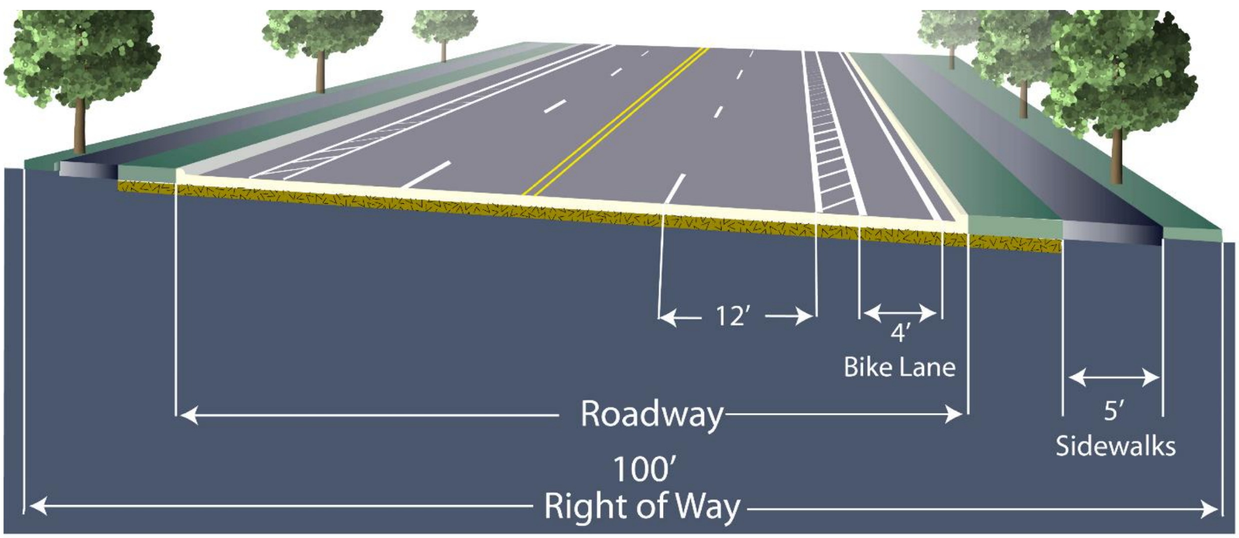

Figure 10. Typical 100 ft Right-of-Way

An access road and utility corridor to the Spaceport Development Area is already in development that connects the west side of the development area with Approach Road. State and local funding for the design and construction of the road was announced on November 4, 2021.

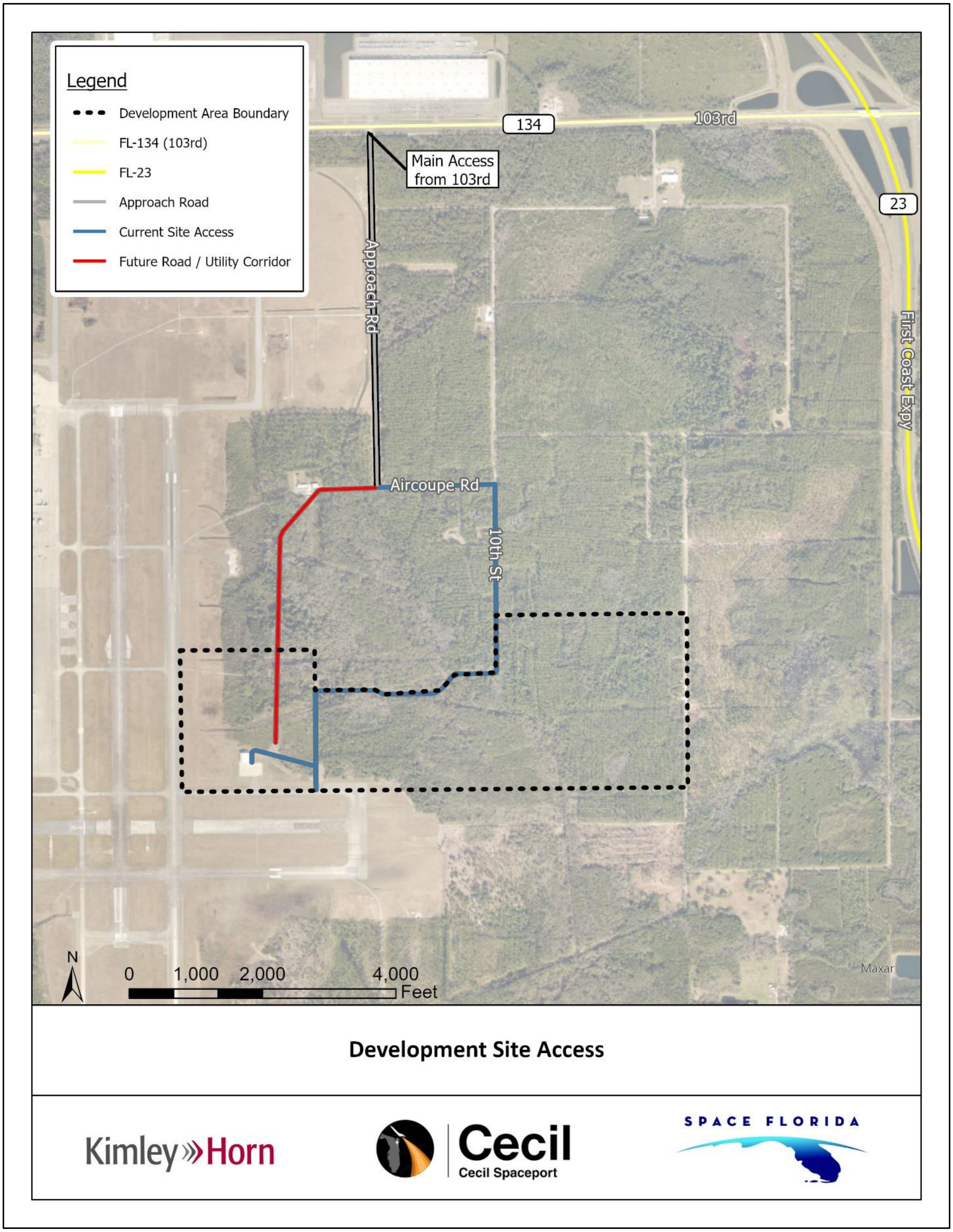

Figure 11. Existing and Future Site Access

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Chapter 4 – Development Alternatives

4.1 Development Concepts

4.1.1 Existing Conditions and Constraints

The existing conditions of the Spaceport Development Area are depicted in Figure 12**.** Current access roads, the fabric spaceport hangar, the spaceport apron, airfield pavement, and Earth Covered Magazines (ECMs) or "Bunkers" are shown.

Wetlands and flood hazards within the Spaceport Development Area are also shown in Figure 12. These are considered major drivers in the configurations developed for the following development concepts.

4.1.2 Development Concept 1

Concept 1 infrastructure development is depicted in Figure 13. This concept focuses on airside infrastructure and roadway development. Infrastructure improvements within this concept includes:

- The addition of a north/south taxiway on the west side capable of supporting a B747-800.
- A large apron on the west side, approximately 400 ft deep capable of support B747-800 operations along with two hangars that are approximately 68,000 SF each.
- An extension of the current spaceport apron and additional taxiway connectors to create a common use apron with two 20,000 SF hangars and a 16,800 SF payload processing facility (PPF).
- Two additional aprons located east of the current spaceport apron, approximately 300 ft deep, and respective taxiway connectors are suggested. The fist apron includes one 50,000 SF hangar, the second apron includes two 50,000 SF hangars.
- West side development consisting of three 80,000 SF landside buildings that can be used as office space or to support other tenant needs.
- East side development consisting of basic site preparation of approximately 110-acres that provides ultimate customization to prospective aerospace tenants looking to build a range of facilities.
- Roadway infrastructure will connect to the planned Spaceport Road from the north. Roads within the site are suggested to stay within the site boundary in this concept and connect east side and west side developments with minimal impact to the floodway.

4.1.3 Development Concept 2

Concept 2 infrastructure development is depicted in Figure 13. In this concept infrastructure was designed around a variation in roadways and airside configurations. Infrastructure improvements within this concept includes:

- As in Concept 1, the addition of a north/south taxiway and a 400 ft deep apron on the west side capable of supporting a B747-800.
- The west side hangars adjacent to the large apron increase to 100,000 SF each from 68,000 SF in Concept 1.
- The current spaceport apron is extended to become one large common use apron that includes three 56,000 SF hangars and a 16,800 SF PPF.
- West side development also includes one 60,000 SF and three 80,000 SF landside buildings that can be used as office space or other tenant needs.
- East side development stays the same as in Concept 1 and will include basic site preparation of approximately 110-acres that provides ultimate customization to prospective aerospace tenants looking to build a range of facilities.
- Roadway infrastructure will connect to the planned Spaceport Road coming from the north. The road that connects the west side development to the east side development runs straight through the northern part of the site partially outside of the boundary and connect east side and west side developments with minimal impact to the floodway. A loop road was added in the middle of the site as well.

4.1.4 Development Concept 3

Concept 3 infrastructure development is depicted in Figure 14. In this concept infrastructure was designed around a variation in roadway, landside, and airside configurations. Infrastructure improvements within this concept includes:

- West side development in this concept is scaled down to include a 200 ft deep apron with four 40,000 SF hangars. The north/south taxiway addition is still included in this concept.
- Extension of the current spaceport apron to the east with 56,000 SF, 30,000 SF, and 40,000 SF hangars adjacent to the apron.
- An additional apron east of the expanded apron that is 400 ft deep with a 68,000 SF hangar capable of supporting a B747-800.
- Roadway improvements similar to Concept 2 with the exception of a loop road.
- Landside infrastructure on the west side is increased and present on the north and south side of the east west roadway. Landside infrastructure includes six 80,000 SF buildings that can be used as office space or other tenant needs.
- East side development stays the same as in previous concepts and will include basic site preparation of approximately 110-acres that provides ultimate customization to prospective aerospace tenants looking to build a range of facilities.

4.1.5 Development Concept 4 (Preferred Alternative)

The preferred alternative is an integration of preferred elements from Concepts 1, 2, and 3 and is depicted in Figure 14. Site improvements in the preferred alternative includes:

- West side development similar to Concept 3 consisting of a north/south taxiway addition, a 200 ft deep apron, three out 40,000 SF hangars, and a 75,000 SF terminal facility.
- Airside development similar to Concept 1 adjacent to and east of the current spaceport apron with a apron extension and two additional 20,000 SF hangars and a 16,800 SF PPF.
- Two additional aprons east of the extended apron, one approximately 300 ft deep, and the other 400 ft deep with respective taxiway connectors. The fist apron includes one 50,000 SF hangar. The second apron includes sufficient space to construct a 135,000 SF hangar similar to one capable of supporting Stratolaunch’s carrier aircraft.
- A roadway configuration similar Concept 2 that is fully contained within the development boundary. The roadway will still connect the east site and west side developments with minimal impact to the floodway and incorporate a loop road through the middle of the west side development site.
- Landside development on the west side with two 60,000 SF buildings that can be used as office space or to support other tenant needs.
- East side development stays the same as in previous concepts and will include basic site preparation of approximately 110-acres that provides ultimate customization to prospective aerospace tenants looking to build a range of facilities.

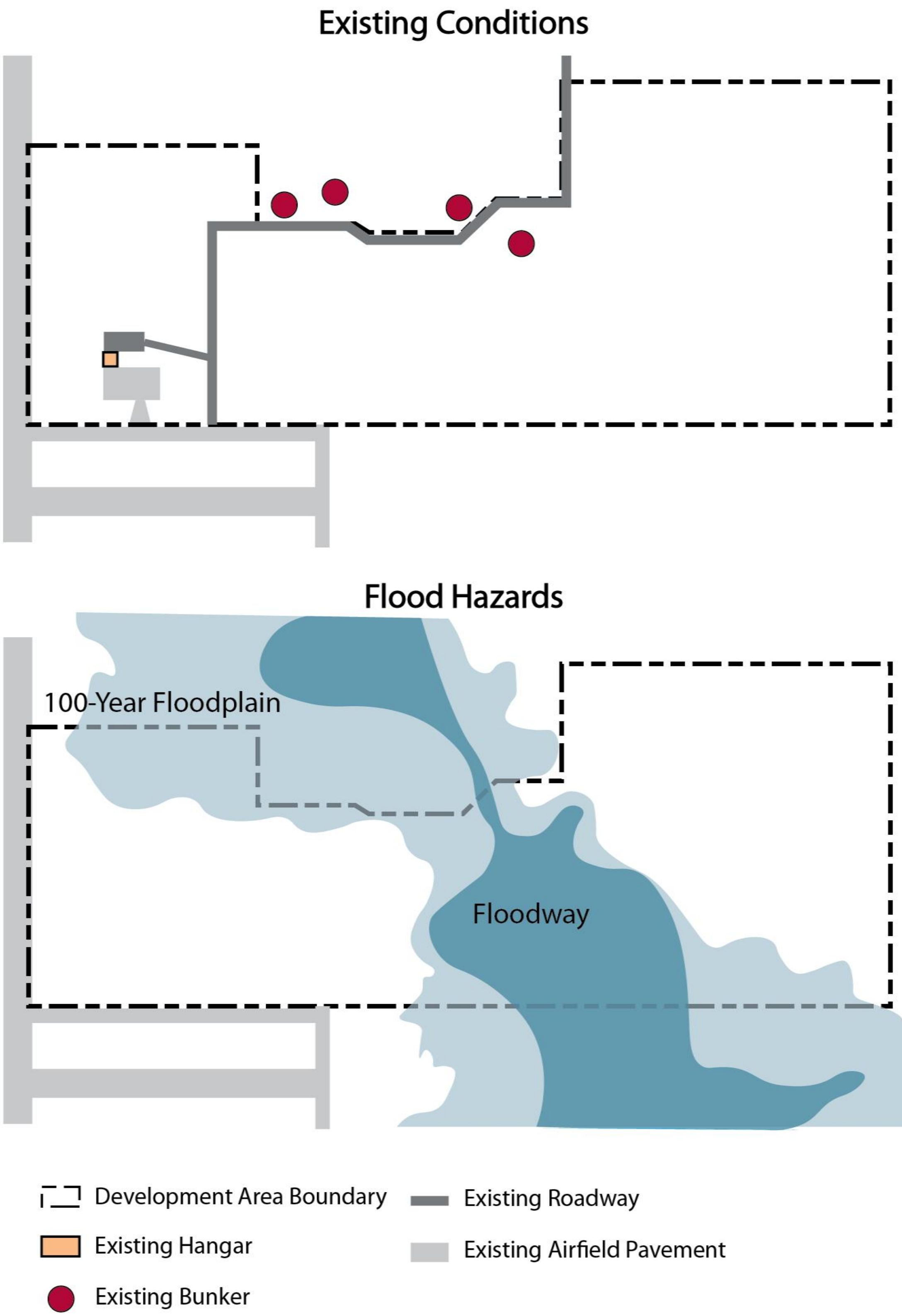

Figure 12. Existing Conditions and Flood Hazards

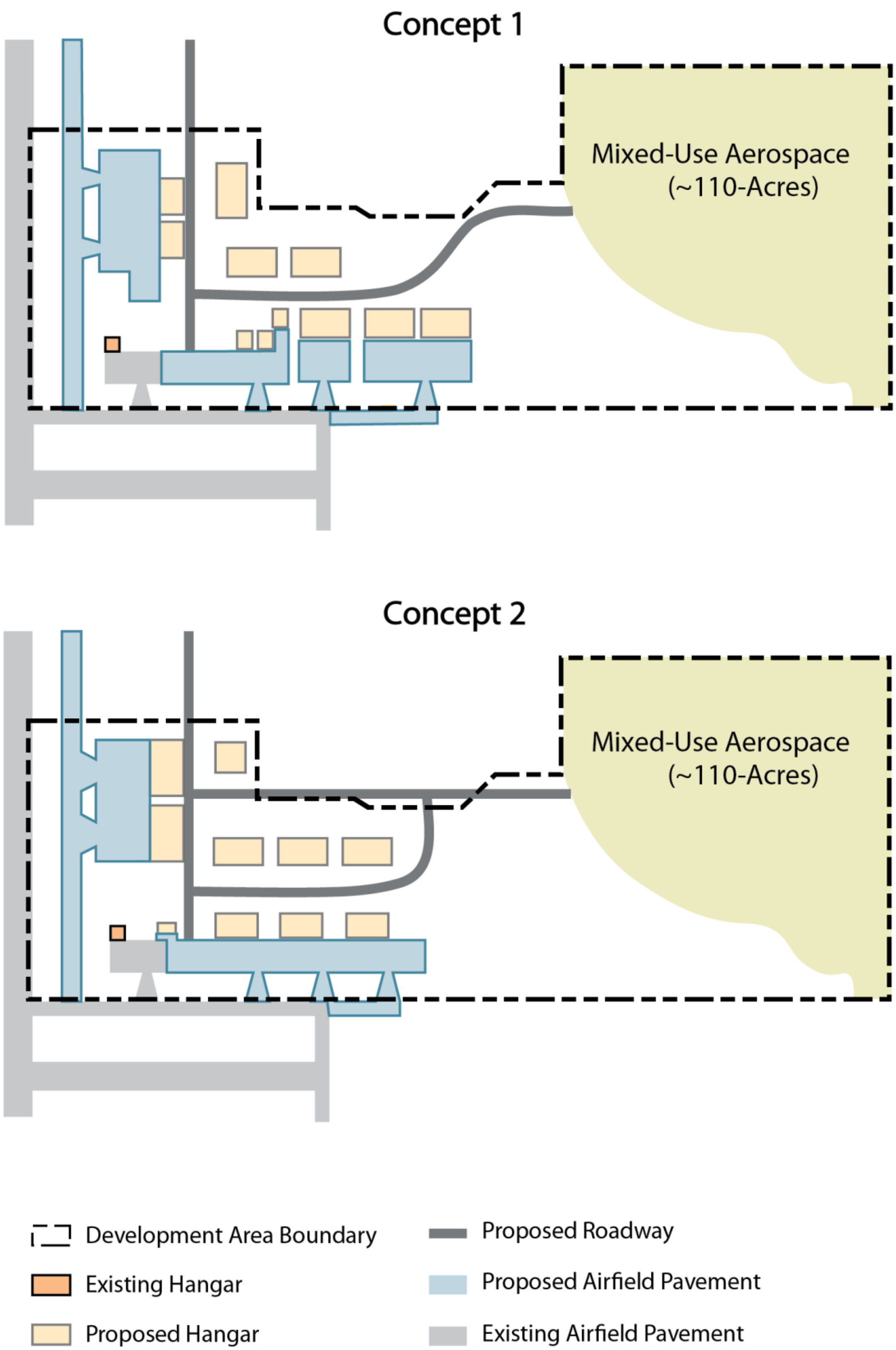

Figure 13. Concept 1 and Concept 2

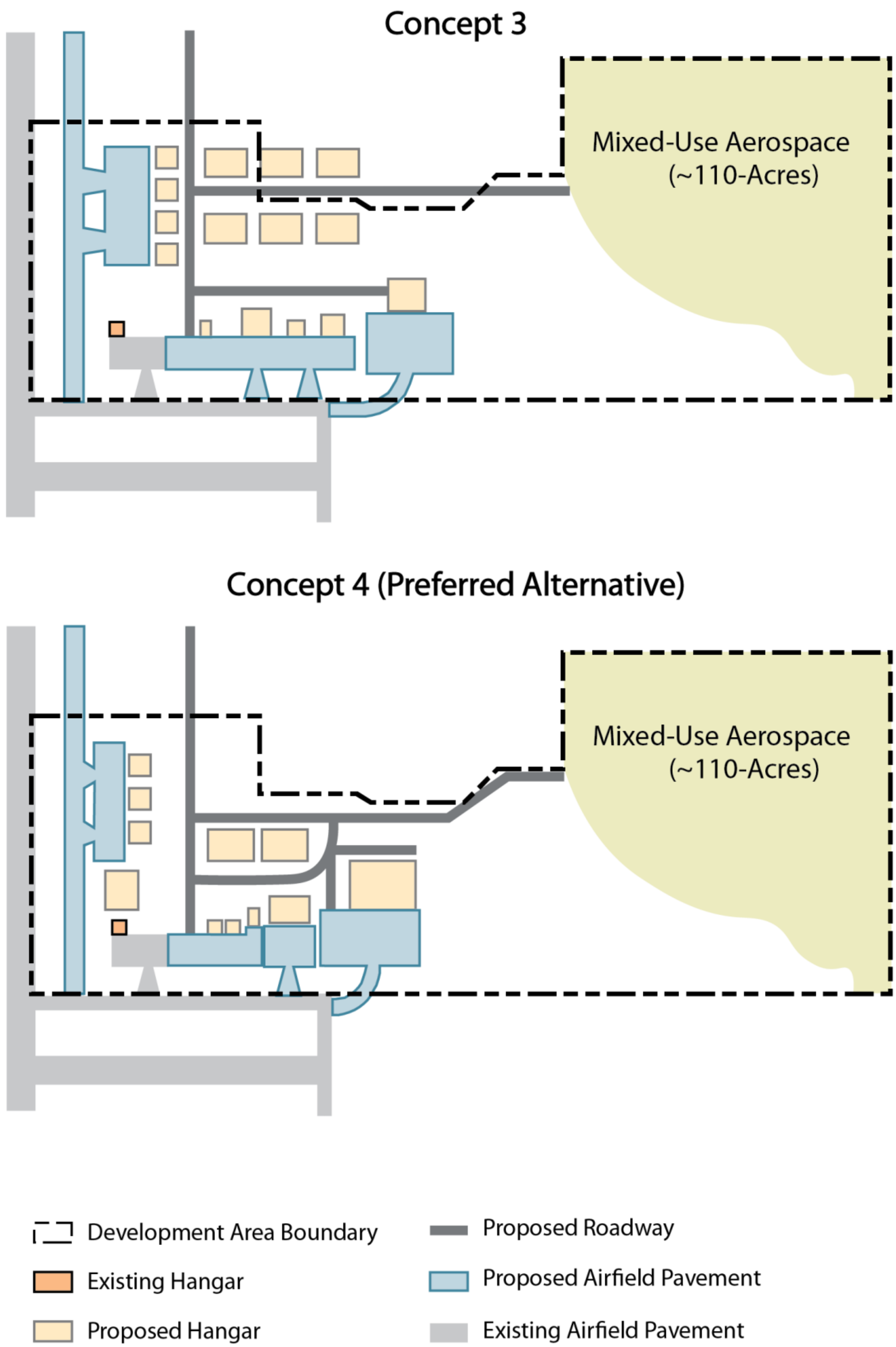

Figure 14. Concept 3 and Concept 4 (Preferred)

Chapter 5 – Recommendations and Next Steps

5.1 Proposed Development Layout

1. Planned Roadway
2. Proposed Access Road
3. Planned Taxiway
4. Common Use Hangars
5. Aerospace Terminal
6. Existing Fabric Hangar
7. Multi-use / Office Buildings
8. Payload Processing Facility
9. Small Hangar
10. Medium Hangar
11. Large Hangar
12. Wetland
13. Airside Apron
14. Existing Runways
15. Future Phased Improvements

Figure 15. Proposed Development Layout

5.2 Development Phasing

The proposed development phasing identifies steps Cecil Spaceport should consider to implement the recommended development alternative. These steps are divided into three phases: Phase I (Near-term), Phase II (Mid-term), and Phase III (Long-term).

5.2.1 Phase I (Near-Term: 2022-2026)

In the near-term it is recommended that the general site improvements and basic site preparation be completed which include:

- Completion of Spaceport Road and utility corridor.
- Development of site access road.
- Clearing grubbing and grading of the site.
- Relocation of the rocket engine test site.
- Relocation of the oxidizer loading area.
- Identification and implementation of fuel and oxidizer storage areas.

5.2.2 Phase II (Mid-Term: 2027-2031)

The mid-term site improvements are recommended to consist of infrastructure development that supports operational growth and aligns with operator needs based on the current market trends. The proposed improvements include:

- Design and construction for an extension of the existing spaceport apron with associated taxiway connectors.
- Design and construction of two small 20,000 SF hangars, and a 16,800 SF payload processing facility (PPF).
- Design and construction of a 300’ deep apron and medium 60,000 SF hangar with appropriate roadway connection and parking lot.
- Design and Construction of a 60,000 SF multi-use/office space building.

5.2.3 Phase II (Long-Term: 2032-2041)

The long-term improvements are recommended to provide additional infrastructure to increase operational capacity and support commercial spaceflight activity.

- Design and construction of a 76,000 SF aerospace terminal building.
- Design and construction of a common-use apron and three additional 40,000 SF hangars with appropriate roadway connections and parking lots.
- Design and construction of an additional 60,000 SF multi-use/office space building.
- Design and construction of a 400’ deep apron and large 135,000 SF hangar, if operational need exist.

5.3 Cost Estimating Support

To support the development of a cost estimate within the Airport Master Plan Update quantities and sizes of proposed infrastructure and facilities identified in Figure 15 are provided in Table 3. The quantities are available as an input into cost models prepared for the Airport Master Plan Update.

Table 3. Proposed Infrastructure Quantities

Infrastructure	Quantity / Size	Notes
2. Proposed Access Road	5,500 LF	2-lane asphalt
4. Common Use Hangars	40,000 SF each	Three (3) proposed hangars
5. Aerospace Terminal	76,000 SF	Approximate size
7. Multi-use / Office Space	60,000 SF each	Two (2) proposed buildings
8. Payload Processing Facility	16,800 SF	One facility with two high bays
9. Small Hangars	20,000 SF	Two (2) proposed hangars
10. Medium Hangar	60,000 SF	One (1) proposed hangar
11. Large Hangar	135,000 SF	Can support Stratolaunch
13. Airside Aprons	640,000 SF	Total combined apron area
15. Future Phased Improvements	110 Acres	Initial Site Preparation Only

Near-term site preparations for the western sector would be required before other development could occur. The western sector consists of approximately 130-acres of land of which approximately 90-acres is wooded and would need to be cleared.

5.4 Recommended Next Steps

Kimley-Horn recommends that the following steps be completed for continued spaceport development:

1. Design and construct basic site infrastructure within the western sector of the Spaceport Development Area with a focus on primary roads and the utility connections throughout the site.
2. Protect the eastern sector of the development area for unspecified mixed-use development. Clear the area for expedited development and provide an access road and utility connections to the entrance of the development sector.
3. Design and construct airside infrastructure in proximity to existing taxiways along the southern side of the Spaceport Development Area.
4. Include the following elements into the Airport Master Plan Update:
    a. Spaceport Development Area.
    b. New parallel taxiway along Runway 18L.
    c. New temporary oxidizer loading area on southern end of Runway 36R.
    d. New oxidizer loading area southwest of Runway 36L.
    e. New rocket engine test area near existing hot cargo pad.

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Appendix A: Acronyms

ATCT	Air Traffic Control Tower
CFR	Code of Federal Regulations
DoD	Department of Defense
DoDM	Department of Defense Manual
ECM	Earth Covered Magazine
FAA	Federal Aviation Administration
HD	Hazard Division
HTHL	Horizontal Takeoff Horizontal Launch
ILD	Intraline Distance
JAA	Jacksonville Aviation Authority
KVQQ	Cecil Airport Identifier
LF	Linear Foot
LSOL	Launch Site Operator License
MCC	Mission Control Center
NEW	Net Equivalent Weight
OLA	Oxidizer Loading Area
PAD	Public Area Distance
PPF	Payload Processing Facility
PTRD	Public Traffic Route Distance
RLV	Reusable Launch Vehicle
SF	Square Foot
TNT	Trinitrotoluene
VTVL	Vertical Takeoff Vertical Launch