8. AIRSIDE ALTERNATIVES

This Alternatives chapter documents a variety of proposed development scenarios to accomplish the recommended airside and general aviation improvements identified in Chapter 6 - *Facility Requirements*. It evaluates the scenarios against several evaluation factors to determine if the recommended improvements enhance the safety and efficiency of St. George Regional Airport and meet future demand while minimizing environmental and community impacts. The evaluation factors used to compare development options were selected based on specific considerations associated with the Airport.

This chapter details airside alternatives, while the next chapter (Chapter 9 – *Landside & Terminal Area Alternatives*) will address landside alternatives including roadways, parking lots, and the passenger terminal area. The result of both airside and landside alternatives is the Preferred Development Alternative, which is detailed at the end of each chapter.

I. DEVELOPMENT CONSIDERATIONS

The following development constraints were identified as part of this review:

Infrastructure

The immediate area surrounding the Airport is zoned to be developed as Airport supporting business or as industrial facilities. There are also single-family residential zones in the vicinity of the Airport. Utah State Route 7, also known as Southern Parkway, provides access to the Airport and connects to Interstate-15, a major highway connecting the St. George region to Las Vegas and Salt Lake City, among others.

Terrain

The topography in the vicinity of the Airport is widely varied with flat plains, dry river valleys, and rapidly rising canyons. The land owned by the city of St. George to the east of the Airport and west of Southern Parkway is almost entirely flat and suitable for development. The terrain west of the Airport is much less flat however some areas may be graded for development. Terrain at each runway end has been graded to provide space for a standard-length safety area. The Runway 1 end, being lower in elevation, includes a wash basin beyond the safety area, and the Runway 19 end drops off immediately after the approach lights.

Environmental

Southwestern Utah is known for its state and national parks including Zion National Park, Dixie National Forest, Quail Creek State Park and Reservoir, Sand Hollow State Park, and Beaver Dam State Park, among others.

According to the NWI, the U.S. Fish and Wildlife Service's Wetland Mapper, no wetlands exist on or adjacent to the Airport, however several riverines intersect the Airport. It was determined that the southern riverine is considered a protected water of the U.S. and falls under the USACE's jurisdiction. Future projects that my impact the riverines should be coordinated with the USACE to determine permit requirements.

Future development that may change existing storm flows should consider potential impacts to the nearby Virgin River, which has portions in the vicinity designated as a Wild and Scenic River by the NRI.

Permitting

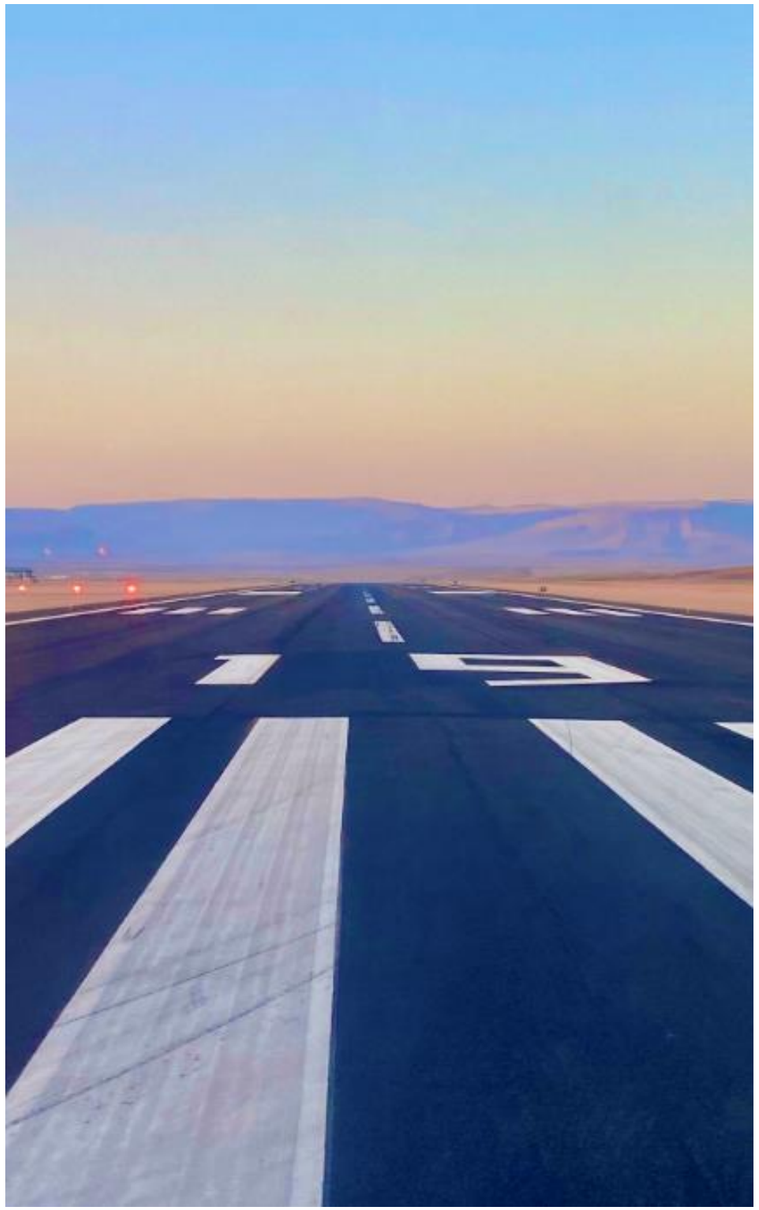
The Airport holds and maintains a NPDES permit through the State of Utah's Department of Environmental Quality, Division of Water Quality. The latest permit was issued in 2016 and will expire on the last day of 2022.

The Airport has prepared a SPCC plan dated September 26, 2012. A review of the Plan is required every five years and should be amended to include changes in the facility design, construction, operation, or maintenance that materially affects the Airport's potential for discharge.

All construction projects that occur at the Airport must prepare and submit with their general permits to the State of Utah, a SWPPP. These are typically prepared and obtained by the general contractors.

Historic and Cultural Resources

A Class III cultural resources survey was completed for the entire airport property and identified four archaeological sites, one isolated linear feature, and one isolated occurrence. The survey concluded that all identified sites are not eligible for nomination to the NRHP. The Class III survey should be used for future coordination between the FAA and the Utah SHPO prior to the start of federally funded development projects.



II. AIRSIDE ALTERNATIVES

As identified in Chapter 2 - *Inventory*, airside facilities consist of airfield pavement and equipment in place to support the movement of aircraft such as taxiing, takeoff, and landing. The airside alternatives consider improvements to airside facilities, such as runways and taxiways, that may be implemented through the 20-year planning period. Alternatives are based on the recommendations and requirements discussed in Chapter 6 - *Facility Requirements* and are developed in order to fulfill those requirements. Each alternative is evaluated, based on the criteria identified below, in order to recommend the best alternative for the needs of the Airport.

Evaluation Criteria

A set of evaluation criteria was developed to provide an equal and consistent assessment of each alternative. These criteria pose questions regarding how each of the alternatives address identified issues, such as: aviation user needs (facility requirements) and operational efficiency, environmental impacts, FAA standards, costs, and long-term flexibility/expansion. These evaluation criteria are as follows:

Facility Requirements

Does the alternative meet the existing and future needs of the Airport and is the alternative feasible for implementation? What affect does this alternative have from an operational standpoint?

Environmental Impact

Qualitative assessment of the potential environmental consequences associated with implementation of the alternative. Important social, economic, and environmental effects of the alternative will be identified and described. Potential mitigation measures, as appropriate, will be identified. Chapter 3 - *Environmental Overview*, provides a detailed review of environmental considerations for the Airport.

FAA Standards

Does the alternative meet the design standards of FAA AC 150/5300-13A, *Airport Design*, and CFR Part 77 surfaces to the maximum extent feasible?

Constructability

Does the alternative require extensive construction work such as major grading, tunneling, etc.? Does the alternative have reasonable development costs in comparison to other alternatives that achieve the same goal?

Future Flexibility

To what extent does this alternative leave flexibility for change and future surrounding development? Does the alternative provide the ability for future development to support the Airport in a constructive way?

These evaluation factors have been given a scoring value in **Table 8-1** below:

Table 8-1: Airside Alternatives Evaluation Criteria

Criteria	0	1	2	3
Facility Requirements	None	Some	Most	All
Environmental Impact	High	Moderate	Minor	None
FAA Standards	None	Some	Most	All
Development Costs	High	Medium	Low	None
Development Flexibility	Poor	Fair	Good	Excellent

Source: McFarland Johnson analysis, 2021.

Alternatives will be compared using both a qualitative and quantitative comparison and given a value based on the alternative's ability to meet the requirements of the evaluation factor. Selection of a recommended alternative is based on the alternative meeting demand needs, enhancing operations and safety, while minimizing environmental and community effects, and providing future flexibility.

Summary of Airside Facility Requirements

Chapter 6 - *Facility Requirements* identified and quantified several airside improvements that should be addressed at the Airport over the 20-year planning period. A summary of airside facility requirements is presented in **Table 8-2**.

Table 8-2: Summary of Airside Facility Requirements

Facility Requirement	Airfield Location
Extend TWY B to full-parallel	Taxiway B
Reposition direct-access TWYs	Terminal Apron to TWY A3
Construct additional exit TWYs	Taxiway A and B
Enhance TWY shoulders	All taxiways

Source: McFarland Johnson analysis, 2021.

Alternatives

Each airside alternative addresses the direct access from Runway 1-19 to the Terminal Apron via Taxiway A3 as well as direct access from the East Apron to Taxiway A2 and extends Taxiway B to the Runway 1 end to become a full-parallel taxiway with a centerline-to-centerline separation of approximately 400 feet.

Both alternatives propose that pavement be removed from areas with direct access from the East Apron to Taxiway A2. This would require aircraft to turn before reaching the East Apron or onto Taxiway A2 and eventually Runway 1-19.

No-Build Airside Alternative

This alternative proposes no changes to the existing layout of airside facilities. All other alternatives will be compared against the No-Build Airside Alternative. The No-Build Airside Alternative was assessed against the five evaluation factors as shown below:

Facility Requirements

This alternative does not meet the Airport's airside facility requirements. This evaluation factor was given a value of **None (0)** as it does not meet any of the recommended facility requirements.

Environmental Impact

This alternative does not propose any additional construction, and as such, there are no environmental consequences. This evaluation factor was given the highest value **None (3)** since the alternative has no additional environmental and/or natural resource impacts.

FAA Standards

This alternative does not address FAA standards as identified in FAA AC 150/5300-13A and/or 14 CFR Part 77. This evaluation factor was given a value of **None (0)** as it does not address FAA standards.

Constructability

There are no design or construction costs associated with this alternative and it is therefore given a value of **None (3)**.

Future Flexibility

This alternative would leave potential for future flexibility however it does not provide for maximum operational flexibility and is given a value of **Good (2)**.

The overall value of the No-Build Airside Alternative is **8** out of an available 15 points.

Airside Alternative 1

This alternative proposes an island be constructed/painted in the vicinity of Taxiway A and the Terminal Apron, in order to require aircraft to turn before accessing Taxiway A3. The Taxiway B extension proposes three entrance/exit taxiways on the west side of Runway 1-19 at the same runway location as the existing entrance/exit taxiways for Taxiway A. Airside Alternative 1 is shown in **Figure 8-1**.

Facility Requirements

This alternative meets the Airport's airside facility requirements of extending Taxiway B, repositioning direct-access taxiways, and enhancing taxiway shoulders. Although there are new taxiway exits, there are no new exits on the east side of Runway 1-19. Therefore, this evaluation factor was given a value of **Most (2)** as it meets most recommended facility requirements.

Environmental Impact

This alternative proposes construction with minor environmental impacts, which include dirt removal/fill. This evaluation factor was given a value of **Minor (2)** since the alternative has minor environmental and/or natural resource impacts.

FAA Standards

This alternative addresses FAA standards as identified in FAA AC 150/5300-13A and/or 14 CFR Part 77. This evaluation factor was given a value of **All (3)** as it addresses all FAA standards.

Constructability

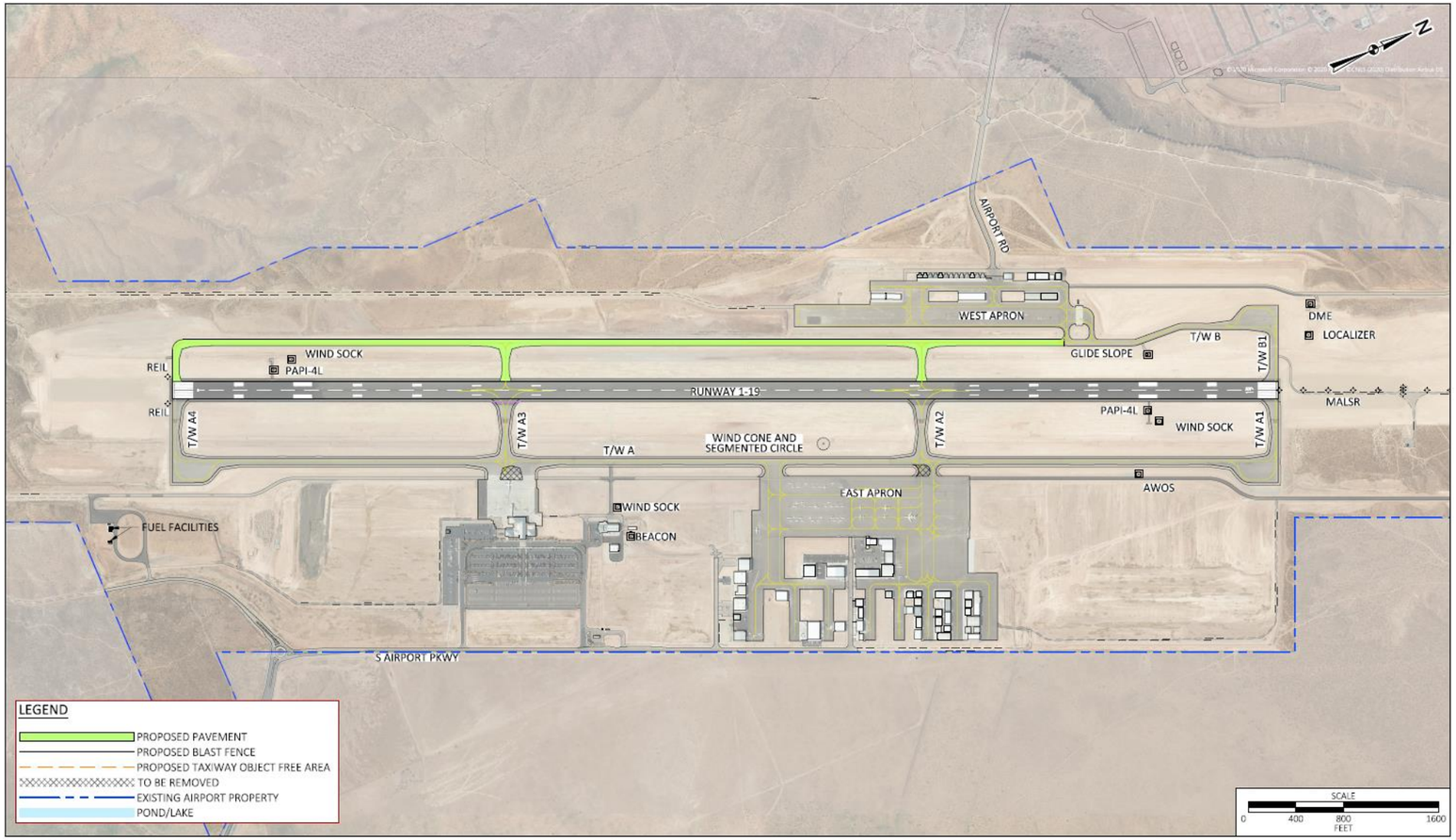
There are design and construction costs associated with this alternative. This includes pavement removal, dirt removal/fill, and new pavement installation. This evaluation factor was given a value of **Low (2)**.

Future Flexibility

This alternative would leave potential for new aviation development on the west side of the Airport and is given a value of **Excellent (3)**.

The overall value of Airside Alternative 1 is **12** out of an available 15 points.

Figure 8-1: Airside Alternative 1



Source: McFarland Johnson, 2021.

Airside Alternative 2

This alternative proposes the existing Taxiway A3 be removed and replaced with two taxiways on either side of the Terminal Apron in order to remove direct access. The Taxiway B extension proposes three entrance/exit taxiways on the west side of Runway 1-19: two at the same runway location as Taxiway A4 and Taxiway A2, and two at the same runway location as the proposed taxiways on the east side. Airside Alternative 2 is shown in **Figure 8-2**.

Facility Requirements

This alternative meets the Airport's airside facility requirements of extending Taxiway B, repositioning direct-access taxiways, constructing additional taxiway exits, and enhancing taxiway shoulders. This evaluation factor was given a value of **All (3)** as it meets all recommended facility requirements.

Environmental Impact

This alternative proposes construction with minor environmental impacts, which include dirt removal/fill. This evaluation factor was given a value of **Minor (2)** since the alternative has minor environmental and/or natural resource impacts.

FAA Standards

This alternative addresses FAA standards as identified in FAA AC 150/5300-13A and/or 14 CFR Part 77. This evaluation factor was given a value of **All (3)** as it addresses all FAA standards.

Constructability

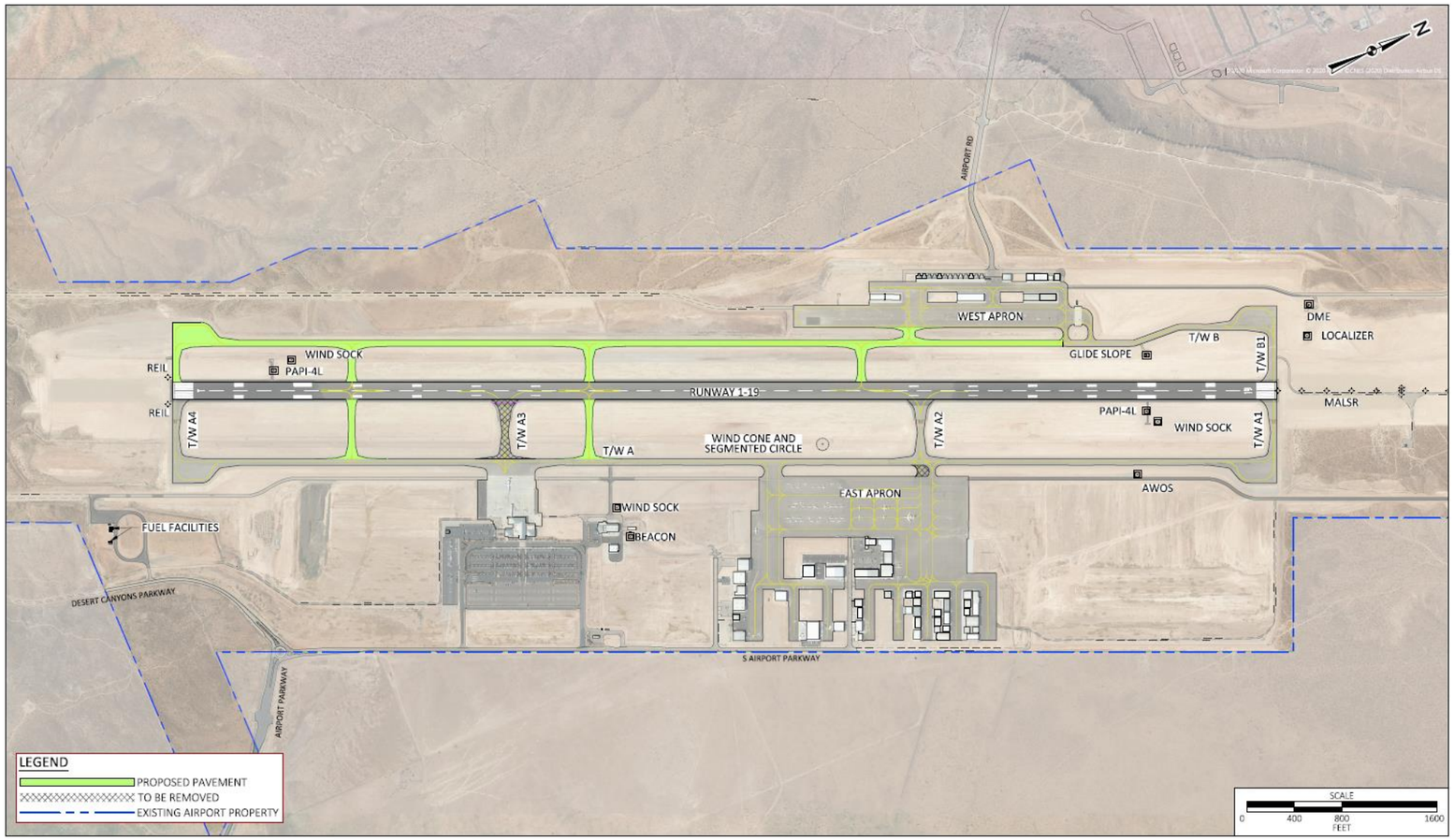
There are design and construction costs associated with this alternative. This includes pavement removal, dirt removal/fill, and new pavement installation. This evaluation factor was given a value of **Low (2)**.

Future Flexibility

This alternative would leave potential for new aviation development on the west side of the Airport and is given a value of **Excellent (3)**.

The overall value of Airside Alternative 2 is **13** out of an available 15 points.

Figure 8-2: Airside Alternative 2



Source: McFarland Johnson, 2021.

III. GENERAL AVIATION ALTERNATIVES

As identified in Chapter 2 - *Inventory*, general aviation facilities consist of apron areas and hangars in order for based and transient aircraft to be parked and/or stored. The general aviation alternatives consider improvements to general aviation facilities, such as aprons and hangars, that may be implemented through the 20-year planning period. Alternatives are based on the recommendations and requirements discussed in Chapter 6 - *Facility Requirements* and are developed in order to fulfill those requirements. Each alternative is evaluated, based on the criteria identified below, in order to recommend the best alternative for the needs of the Airport.

Evaluation Criteria

A set of evaluation criteria was developed to provide an equal and consistent assessment of each alternative. These criteria pose questions regarding how alternatives address land use compatibility, environmental and cultural effects, potential for expansion, operational efficiency, and revenue generating capability.

Land Use Compatibility

Is the alternative compatible with on- and off-airport patterns of land use? The criterion will evaluate such things as access to the airside movement areas, access to the local road network, and the degree to which the alternative is compatible with activities occurring in surrounding areas.

Environmental Impact

Important social, economic, and environmental effects of the alternative will be identified and described. Potential mitigation measures, as appropriate, will be identified. Federal and State regulatory requirements will be described. Possible environmental and airport sustainability benefits will also be identified.

Potential for Expansion

Is the alternative flexible and dynamic in the sense that it has the ability to accommodate both planned and unanticipated future changes in demand? This criterion recognizes the fact that location decisions made today will influence future airport development for many years to come. Planning shall consider future development needs beyond the facility requirements of the current period.

Operational Efficiency

Will this alternative contribute to the development of a smoothly functioning airport with efficient movement of aircraft? This criterion will consider whether the alternative makes the best and most efficient use of airport facilities and infrastructure.

Revenue Generation Capability

Does the alternative take a strategic business and capital-based approach that allows or creates opportunities for airport management to increase revenue generation and/or diversify revenue sources thereby improving the overall competitiveness and cost effectiveness of the Airport?

These evaluation factors have been given a scoring value in **Table 8-3** below:

Table 8-3: General Aviation Alternatives Evaluation Criteria

Criteria	0	1	2	3
Land Use Compatibility	Poor	Fair	Good	Excellent
Environmental Impact	High	Moderate	Minor	None
Potential for Expansion	Poor	Fair	Good	Excellent
Operational Efficiency	Poor	Fair	Good	Excellent
Revenue Generation	Poor	Fair	Good	Excellent

Source: McFarland Johnson analysis, 2021.

Summary of General Aviation Facility Requirements

Chapter 6 - *Facility Requirements* identified and quantified several general aviation improvements that should be addressed at the Airport over the 20-year planning period. A summary of general aviation facility requirements is presented in **Table 8-4**.

Table 8-4: Summary of GA Facility Requirements

Facility	Existing	Ultimate	Recommendation
Apron	~45,000 SY parking space ~200,000 SY maneuvering and staging space	Up to ~80,000 SY parking space ~400,000 SY maneuvering and staging space	Expand up to ~230,000 SY (~35,000 SY parking space + ~195,000 SY maneuvering and staging space)
Hangars	15 small-box, 51 medium-large hangars	Up to 107,800 square feet of additional hangar space	Construct 20-29 small-box hangars for ADG I and II aircraft and 23-33 conventional hangars for ADG III and III aircraft

Source: McFarland Johnson analysis, 2021.

Alternatives

General aviation alternatives address future development that will affect general aviation capacity on the airfield. These alternatives take into account existing apron space and hangars for each ADG, as well as other general aviation services, such as FBOs.

Each of the proposed alternatives features plans for a new FBO at the southeast side of the Airport, north of the fuel farm. The FBO will include a large apron area, multiple hangars and service facilities, and a parking lot. Each alternative also features a proposed area for air cargo, including a large apron area, and a cargo processing building. This area will also include a separate area for six ADG-III hangars and general aviation apron space. Each alternative includes the construction of hangars at the East and West Apron at the remaining areas that have yet to be developed. On the East Apron, there are 30 small-medium hangar lots and seven large hangar lots that may be developed. On the West Apron, there are two large hangars lots that may be developed.

No-Build Alternative

This alternative proposes no changes to the existing layout of general aviation landside facilities. All other alternatives will be compared against the No-Build General Aviation Alternative. The No-Build General Aviation Alternative was assessed against the five evaluation factors as shown below:

Land Use Compatibility

This alternative does not propose any changes to land use, and therefore will be compatible with existing land uses. This evaluation factor was given a value of **Excellent (3)**.

Environmental Impact

This alternative does not propose any additional construction, and as such, there are no environmental consequences. This evaluation factor was given a value of **None (3)**.

Potential for Expansion

Since this alternative does not propose any expansion, there is no expansion potential that can be assessed by this criteria. This evaluation factor was given a value of **Poor (0)**.

Operational Efficiency

This alternative does not address nor affect future operational efficiency and was given a value of **Poor (0)**.

Revenue Generation Capability

This alternative does not provide additional areas for revenue generation, and therefore was given a value of **Poor (0)**.

The overall value of the No-Build Airside Alternative is **6** out of an available 15 points.

General Aviation Alternative 1

This alternative features expanded ADG-I parking to the north of the East Ramp, allowing for ADG-II and ADG-III parking to be placed at the existing East Ramp, allowing for direct access to the FBO and large hangar facilities. The East Ramp expansion will also allow for an additional six hangar bays, identical to the existing hangar bays, each with 12 lots available for hangar development. The north end of the expansion will include approximately 14 large hangar lots, first extending toward the east and then back south. This expansion will be spaced to allow for taxilane object free area requirements to be met. In order to access the expansion, an extension of South Airport Parkway is proposed to continue north before turning east at the north end, and end at a parking lot extending south towards the proposed ADG-I parking area. This roadway expansion will include multiple parking locations, with some spots located adjacent to the proposed large hangars. A general aviation services building is also proposed to the west of the parking lot, north of the aircraft parking area. General Aviation Alternative 1 is shown in **Figure 8-3**.

Land Use Compatibility

This alternative includes aviation-related development on Airport property and was given a value of **Excellent (3)**.

Environmental Impact

This alternative proposes construction on Airport property with minor environmental impacts, and as such, was given a value of **Minor (2)**.

Potential for Expansion

This alternative allows for expansion of general aviation services on both the east and west sides of the Airport, and therefore was given a value of **Excellent (3)**.

Operational Efficiency

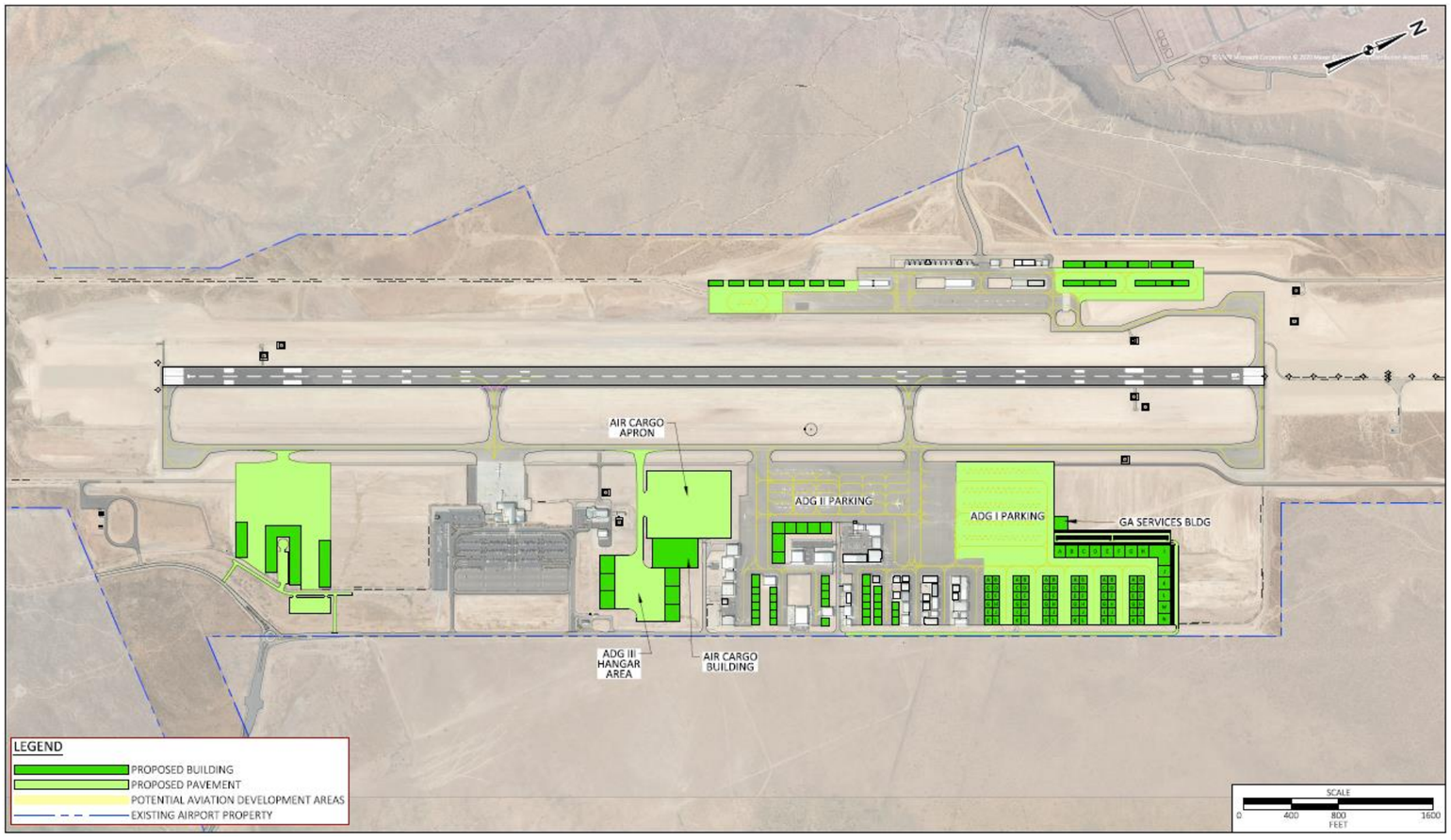
This alternative allows for greater operational efficiency through the planning period and was given a value of **Excellent (3)**.

Revenue Generation Capability

This alternative allows for greater revenue generation capability through additional hangars available for lease and additional locations for Airport businesses (new FBO). This evaluation factor was given a value of **Excellent (3)**.

The overall value of the No-Build Airside Alternative is **14** out of an available 15 points.

Figure 8-3: General Aviation Alternative 1



Source: McFarland Johnson, 2021.

General Aviation Alternative 2

This alternative is almost identical to General Aviation Alternative 2, but with a different approach to the expansion of the East Apron. This alternative proposes an expansion of the East Apron, including five additional hangar bays and an identical inner facilities area as the existing East Apron. The East Apron will include parking for ADG-I aircraft.

Each hangar bay includes 12 lots available for hangar development. The inner facilities area includes approximately 15 spots for large hangars, surrounding parking facilities, and accessible through a roadway that connects to South Airport Parkway.

General Aviation Alternative 2 is shown in **0**.

Land Use Compatibility

This alternative includes aviation-related development on Airport property and was given a value of **Excellent (3)**.

Environmental Impact

This alternative proposes construction on Airport property with minor environmental impacts. Since impacts will be greater than General Aviation Alternative 1, with additional expanded apron pavement on the East Apron, this evaluation criteria was given a value of **Moderate (1)**.

Potential for Expansion

This alternative allows for expansion of general aviation services on both the east and west sides of the Airport. However, development is more limited on the East Apron than in General Aviation Alternative 1, and therefore was given a value of **Good (2)**.

Operational Efficiency

This alternative allows for greater operational efficiency through the planning period and was given a value of **Excellent (3)**.

Revenue Generation Capability

This alternative allows for greater revenue generation capability through additional hangars available for lease and additional locations for Airport businesses (new FBO). This evaluation factor was given a value of **Excellent (3)**.

The overall value of the No-Build Airside Alternative is **12** out of an available 15 points.

Figure 8-4: General Aviation Alternative 2

Source: McFarland Johnson, 2021.

Preferred Development Alternative

From the analyses of both Airside Alternative and General Aviation Alternatives, it is clear that there is a preferred alternative for each. The evaluation criteria aided in the decision to identify which of the proposed alternatives were the best for development of the Airport through the planning period. A summary of the results is shown in **Table 8-5** below.

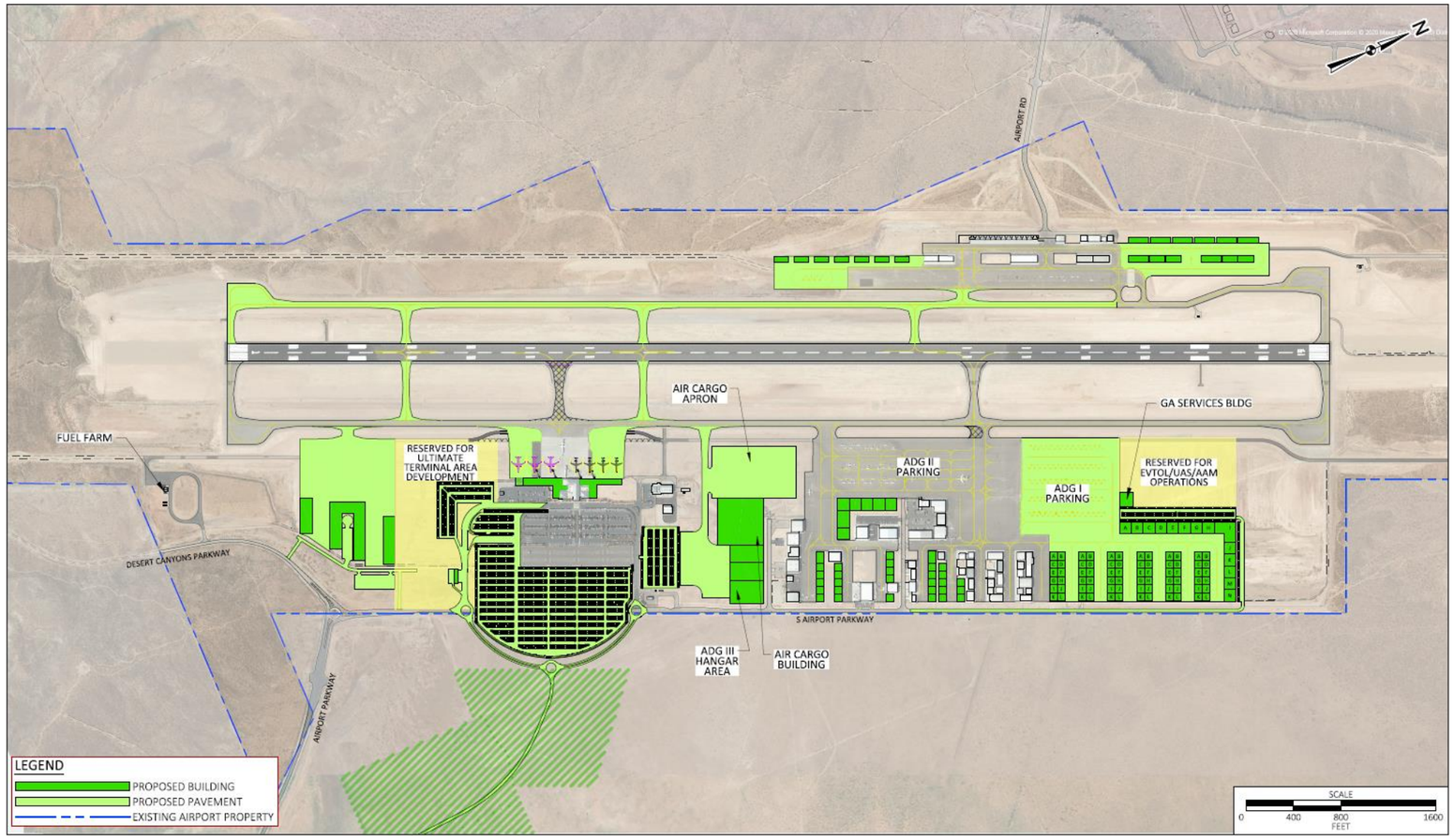
Table 8-5: Alternatives Analysis Summary

Alternative	Outcome
Airside Alternatives	
No-Build Airside Alternative	8
Airside Alternative 1	12
Airside Alternative 2	13
General Aviation Alternatives	
No-Build General Aviation Alternative	6
General Aviation Alternative 1	14
General Aviation Alternative 2	12

Source: McFarland Johnson analysis, 2021.

It is clear from the summary table that there is a clear outcome for which of the Airside and General Aviation Alternatives will be part of the Preferred Development Alternative. Airside Alternative 2 and General Aviation Alternative 1 each won their respective categories of alternatives, and therefore will be added to the Preferred Development Alternative, as depicted in **0**.

Figure 8-5: Preferred Development Alternative



Source: McFarland Johnson, 2021.