

CHAPTER 4

AIRPORT ALTERNATIVES

In the previous chapter, the aviation facilities required to satisfy airside and landside demand through the long-term planning period of the master plan were identified. In addition, several Federal Aviation Administration (FAA) standards were discussed that apply to airfield design. The next step in the planning process is to evaluate reasonable ways these facilities can be provided while meeting design standards. The purpose of this chapter is to formulate and examine rational development alternatives that address the short-, intermediate-, and long-term planning horizon levels. Each alternative provides a different approach to meeting existing and future safety design standards and facility needs at Glendale Regional Airport (GEU).

Some airports become constrained due to limited availability of space, while others may be constrained due to adjacent land use development or geographical features. Careful consideration should be given to the layout of future facilities and impacts on potential airfield improvements at GEU. Proper planning at this time can ensure the long-term viability of the airport for aviation and economic growth.

The primary goal of this planning process is to develop a feasible plan for meeting the needs that result from the projected market demand over the next 20 years. The plan of action should be developed in a

manner that is consistent with the future goals and objectives of the City of Glendale and airport stakeholders, including users of the airport and the local community and region, all of which have a vested interest in the development and operation of GEU.

The goal is to develop an underlying rationale that supports the final recommended concept. Through this process, an evaluation of the highest and best uses of airport property will be made, while also weighing local development goals, efficiency, physical and environmental factors, capacity, and appropriate safety design standards.

The alternatives presented in this chapter have been formulated as potential means to meet the overall program objectives for the airport in a balanced manner. Through coordination with the City of Glendale, GEU management, Federal Aviation Administration (FAA), the planning advisory committee (PAC), and the public, an alternative (or combination of alternatives) will be refined and modified, as necessary, into a recommended development concept. The planning considerations and alternatives presented in this chapter can be considered a beginning point in the evolution of a recommended concept for the future of GEU; this concept will ultimately form the basis of the Airport Layout Plan (ALP).

NO-ACTION/NON-DEVELOPMENT ALTERNATIVES

Prior to the presentation of development alternatives for GEU, several non-development options should be taken into consideration. Non-development alternatives include a "no-build" or "do-nothing" alternative, development of a replacement airport at a new location, or closure of the existing airport and the transfer of services to another existing airport. This section presents a discussion of the primary non-development alternatives.

NO-BUILD/DO-NOTHING ALTERNATIVE

The City of Glendale is charged with managing the airport for the economic improvement of the community and region. In some cases, alternatives may include a no-action option; for GEU, this would effectively reduce the quality of services being provided to the public, affect the aviation facility's ability to meet FAA design standards, and affect the region's ability to support aviation needs. The ramifications of a no-action alternative expand into impacts on the economic well-being of the region. **An analysis of the economic benefit of the airport was completed in 2021, and it was found that GEU had a total annual economic impact of $54.8 million and supported more than 404 jobs**. If facilities are not maintained and improved so the airport can support general aviation operations, delays become unacceptable, or aircraft storage is not available, aviation activities and business may shift elsewhere. The no-action alternative is also inconsistent with the long-term goal of the FAA and Arizona Department of Transportation (ADOT) Aeronautics Group to enhance local and interstate commerce.

Furthermore, GEU has received nearly $30 million in state and federal grants since 2016. These grants represent a direct economic stimulus that has lasting positive economic impacts. The City of Glendale has a vested interest in maintaining and improving airport facilities for business and general aviation users. Without a commitment to the ongoing improvement of the airport, users of the airport will be constrained from taking full advantage of the airport's air transportation capabilities; therefore, a no-action alternative is not considered further in this master plan.

TRANSFER OF SERVICE/RELOCATE AIRPORT

This study will not consider the relocation of services to another airport or the development of a new airport site. The development of a new facility is a complex and expensive solution. A new site would require greater land area, duplication of investment in facilities, installation of supporting infrastructure that is already available at the existing site, and greater potential for negative impacts to natural, biological, and cultural resources.

As previously mentioned, the City of Glendale has accepted nearly $30 million in federal and state development grant funding over the past 10 years. Through grant assurances, the acceptance of these grants obligates the airport sponsor to maintain the airport as an airport. Closing the existing airport and transferring services to another existing airport would be considered a violation of the grant assurances and would require repayment of grants that are not yet fully depreciated. The investments made and the economic benefits received from the airport (both public and private) could not readily be shifted or regenerated to another airport without significant costs/losses. As such, this alternative is not considered practical, reasonable, or financially feasible.

NON-DEVELOPMENT ALTERNATIVES SUMMARY

The purpose of this master plan is to examine aviation needs at GEU over the course of the next 20 years; therefore, this master plan will examine the needs of the existing airport and present a program of needed capital improvement projects to cover the scope of the plan. The airport is a lucrative business, transportation utility, and economic asset for the region. It can accommodate existing and future demand and should be developed accordingly to support the interests of the residents and businesses that rely upon it. Ultimately, the final decision regarding development rests with the City of Glendale, ADOT, and the FAA on an individual project basis. GEU is a vibrant facility with abundant remaining growth potential; as such, the non-development alternatives will not be considered further in this planning process. The following analysis covers airside and landside development alternatives that consider an array of facility demands, including safety, capacity, access, and efficiency.

PLANNING OBJECTIVES

A set of basic planning objectives has been established to guide the alternatives development process. It is the goal of this master planning effort to produce a development plan for the airport that addresses the forecasted aviation demand and meets FAA design standards to the greatest degree possible. As the owner and operator of the airport, the City of Glendale provides overall guidance for its operation and development. It is of primary concern that GEU is marketed, developed, and operated for the betterment of the community and users of the airport. The following basic planning principles and objectives are utilized as general guidelines during this planning effort:

- Develop a safe, attractive, and efficient aviation facility in accordance with applicable federal, state, and local regulations
- Preserve and protect public and private investments in existing airport facilities

- Provide a means for the airport to grow as dictated by demand
- Establish a plan to ensure the long-term viability of the airport and promote compatible land uses surrounding the airport
- Develop a facility that is readily responsive to the changing needs of all aviation users
- Reflect and support the long-term planning efforts that currently apply to the region
- Develop a facility with a focus on achieving self-sufficiency in operational and developmental cost recovery.
- Ensure future development is environmentally compatible

REVIEW OF PREVIOUS AIRPORT PLANS

The previous master plan for GEU was completed in 2009, along with an ALP Update and Narrative completed in 2018. Recommendations from the more recent ALP Update and Narrative include the following:

- Implementation of declared distances on Runway 2-20 to mitigate non-standard runway safety area (RSA) for Runway Design Code (RDC) C-II-5000
- Installation of Engineered Materials Arresting Systems (EMAS) at each runway end to provide the maximum usable runway length
- Removal of Taxiway A5 to alleviate the FAA identified hot spot at midfield and mitigate direct access to Runway 2-20
- Angle reversals of Taxiways A4 and A6 to alleviate an FAA-identified hot spot at midfield
- Request of a Modification of Standard (MOS) for the non-standard separation between the runway and parallel taxiway (current 252-foot separation does not meet the 300-foot separation standard for C-II)
- Construction of a parallel taxiway on the east side of Runway 2-20 to support future east side facilities
- Expansive hangar development east of Runway 2-20

A separate planning study focused specifically on east side facility development was prepared for the airport in 2024. This will be discussed in greater detail later in the chapter.

The analysis presented in this chapter revisits the recommendations presented in previous planning studies. Since the completion of the last plan, the taxiway exit located at midfield (Taxiway A5) has been removed and Taxiways A4 and A6 have been reconstructed as proposed, and several new hangars have been constructed.

DEVELOPMENT ALTERNATIVES

Development alternatives are categorized into two functional areas: airside and landside. Airside considerations relate to elements such as runways, taxiways, navigational aids, lighting, and marking aids, and require the greatest commitment of land area to meet the physical layout of the airport, as well as the required airfield safety standards. The design of the airfield also defines minimum setback distances form the runway and object clearance standards. These criteria are defined first to ensure the fundamental needs of the airport are met. Landside considerations include hangars, aircraft parking aprons, and terminal services, as well as utilization of remaining property to provide revenue support for the airport and benefit the economic development and well-being of the regional area.

The remainder of this chapter describes various development alternatives for airside and landside facilities. Although each area is treated separately, ultimate planning will integrate the individual requirements so they can complement one another.

AIRSIDE

AIRSIDE CONSIDERATIONS

Table 4A presents the airside considerations that are specifically addressed in this analysis. Landside planning considerations are outlined later in this chapter. These issues are the result of the findings of the aviation demand forecasts and facility requirements evaluations, as well as input from the PAC, airport management, the City of Glendale, and the public. In addition to these considerations, the runway is planned to meet applicable runway design code (RDC) standards. Runway 2-20 is planned to meet RDC B-II-5000 standards in the existing condition and C-II-5000[1] standards in the future/ultimate condition.

TABLE 4A: Airside Planning Considerations

#	Non-Standard/Deficient Condition	Proposed Action(s) to be Evaluated
1	Runway 2-20 has applied declared distances and displaced thresholds to meet FAA design standards for RSA.	Review reasonable mitigation measures to reduce or eliminate the use of declared distances and displaced thresholds while meeting RSA and runway object free area (ROFA) standards.
2	Obstructions to the RSA/ROFA are present in the future/ultimate C-II condition, including existing obstructions that are partially mitigated through the use of declared distances, as well as new obstructions in the future/ultimate condition, including the segmented circle and primary wind cone.	Consider options to mitigate, remove, or relocate obstructions to existing, future, and ultimate safety areas.
3	Runway 2-20 is separated from Taxiway A by 252 feet. In the C-II condition, standards stipulate a centerline separation distance of 300 feet.	Consider relocation options for Taxiway A or Runway 2-20 to satisfy the 300-foot separation criteria for the future/ultimate C-II condition.

(Table continues)

[1] If an instrument approach procedure with visibility minimums below 1-mile but not lower than ¾-mile is implemented on either runway end, the future/ultimate RDC will be C-II-4000.

TABLE 4A (continued): Airside Planning Considerations

#	Non-Standard/Deficient Condition	Proposed Action(s) to be Evaluated
4	Hold position markings for Runway 2-20 are currently 200 feet from the runway centerline. In the C-II condition, standards stipulate a separation distance of 250 feet.	Relocation of hold position markings to meet the future/ultimate standard.
5	Direct access from an apron area to the runway is present via Taxiway A3/Taxilane R1.	Consider mitigation to include removal of taxiway/taxilane pavement or apron markings.
6	Runway capacity is anticipated to reach the 60 percent ASV threshold within the short-term planning horizon	Consider development options to increase airfield capacity, such as a parallel runway, parallel taxiway, etc.
7	The airport is constrained with limited airside growth potential currently, given the proximity of the New River Channel to the south and Glendale Avenue to the north.	Utilize New River Re-Channelization Analysis to determine options for future development south and east.
8	Both runways offer GPS-based instrument approach procedures with visibility minimums not lower than 1-mile. Analysis was completed to evaluate the potential for enhanced procedures/reduced minimums.	Preliminary analysis based on the U.S. Standard for Terminal Instrument Procedures (TERPS) criteria indicates that visibility minimums down to ¾-mile could be feasible for each runway, based on existing conditions on- and off-airport. Future planning will consider the potential for these types of approaches; however, additional evaluation based on the ultimate runway disposition will be necessary.

Source: Coffman Associates analysis

AIRSIDE ALTERNATIVES

Four airside alternatives have been prepared to address the items outlined in **Table 4A** along with additional improvements to support the airport throughout the planning period. The details of each alternative, including associated advantages and disadvantages, are described as follows.

Airside Alternative 1

Airside Alternative 1 is depicted on **Exhibit 4A** and considers a scenario in which the future/ultimate RSA for Runway 2-20 is fully contained on airport property and free from obstructions, without the use of displaced thresholds and declared distances. As shown on the exhibit, this would result in a significant reduction in runway length, with the runway shortened to 5,489 feet to provide a standard C-II RSA at each runway end (including relocation of the perimeter road and fencing).

As established in FAA Order 5200.8, this approach is only considered practicable when the existing runway length exceeds the length necessary to accommodate the existing or projected design aircraft. While the design aircraft (Challenger 300) requires approximately 5,225 feet of runway length to takeoff at 60 percent useful load, it requires greater than 5,700 feet when taking on higher useful loads. Moreover, the FAA recommends a length of 5,500 feet to accommodate 75 percent of the business jet fleet at 60 percent useful load at GEU. A separate publication, AC 150/5220-22A, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*, states the following: "The FAA does not require an airport sponsor to reduce the length of a runway or declare its length to be less than the actual pavement length to meet runway safety area standards if there is an operational impact to the airport."

LEGEND

- Airport Property Line
- A — Ultimate Taxiway Designation
- Perimeter Fence
- Ultimate Perimeter Fence
- AWOS Critical Area
- RSA
- ROFA
- ROFZ
- RPZ
- High Energy Area
- Uncontrolled RPZ
- Proposed Airfield Pavement
- Pavement to be Removed
- Ultimate PAPI-4

KEY

ADG - Airplane Design Group
ATCT - Airport Traffic Control Tower
AWOS - Automated Weather Observing System
PAPI - Precision Approach Path Indicator
RDC - Runway Design Code
ROFA - Runway Object Free Area
ROFZ - Runway Obstacle Free Zone
RPZ - Runway Protection Zone
RSA - Runway Safety Area
TLOFA - Taxilane Object Free Area

DRAFT - FOR DISCUSSION PURPOSES ONLY

Future/Ultimate RDC: C-II-5000*

*If 3/4-mile visibility minimums are implemented, the RDC would be C-II-4000

Remove Tie Downs

Proposed ATCT Site #1

Buildings in RPZ

1-mile RPZ

3/4-mile RPZ

1-mile RPZ

N Glen Harbor Blvd

W Glendale Ave

4.4 Acres

2.5 Acres

0.6 Acres

1.1 Acres

6.4 Acres

0.1 Acres

3.2 Acres

1.4 Acres

R1 R2 R3 R4

A1 A2 A3 A4 A5 A6

A

300'

Ultimate Runway 2-20 (5,489' x 100')

500'

Perimeter Road

New River Rd

New River

Relocate Fence/Perimeter Road Outside RSA

Relocate Segmented Circle and Lighted Wind Cone

Relocate Fence/Perimeter Road Outside ROFA

3/4-mile RPZ

Notes:

- At 5,489 feet, the runway falls short of the 5,500 feet needed to accommodate 75% of the business jet fleet at 60% useful load and would be limiting to some business jets.
- A Modification of Standard would be necessary for the ROFA due to fence/perimeter road obstructions near each runway end. Fencing on the north end is relocated around the ROFA and around the RSA on the south end.
- Taxiway A is relocated approximately 50 feet west to allow for a standard C-II runway-taxiway separation of 300 feet.
- Existing PAPI-2s are upgraded to PAPI-4 systems; REILs are maintained.
- Segmented circle and wind cone are relocated outside ROFA.
- Consideration has been given to GPS-based instrument approach procedures with 3/4-mile visibility minimums. If implemented, it would result in increased dimensions to the Part 77 primary surface and the RPZ of the runway end(s) with the lower minimums. Coordination with FAA would be necessary to determine if lower visibility minimums are feasible.

INSET

ADG II TLOFA

Relocated Taxilane R Centerline

55'

101.5'

R2 R3 A A4

Scale: 1"=200'

N

0 800

SCALE IN FEET

Aerial Source: Google Earth 06/2026

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In essence, reducing the length of Runway 2-20 to 5,489 feet to achieve a standard C-II RSA would introduce additional operational constraints and is not considered a feasible alternative. Accordingly, Airside Alternative 1 is presented primarily to illustrate to airport stakeholders the potential operational and facility impacts that would result if the runway was shortened to fully meet ultimate RSA design standards.

Aside from proposed actions to mitigate RSA deficiencies, the alternative includes several other features, as described below.

- Relocation of existing perimeter road and fencing in portions of the RSA and ROFA, as previously mentioned. The fence and road are proposed to be relocated around the RSA/ROFA on the north end, and around only the RSA on the south end, with a Modification of Standard (MOS) requested for the ROFA on the south end due to the presence of the New River channel and the challenges that installing fencing and a perimeter road in this area would present.

- Taxiway A is proposed to be reconstructed approximately 50 feet to the west, for a separation distance of 300 feet from the Runway 2-20 centerline, satisfying C-II FAA design standards. The taxiway will maintain a width of 35 feet, consistent with Taxiway Design Group (TDG) 2A. Existing taxiway pavement is planned to be removed. In this alternative, Taxilane R is proposed to be maintained, with the centerline marking relocated west to meet separation and object free area standards. This would necessitate the removal of tiedowns on the east side of the apron, as aircraft parked in these locations would obstruct the airplane design group (ADG) II taxilane object free area (TLOFA), which is 110 feet wide (55 feet on either side of the taxilane centerline). This would have a significant negative impact on local users who utilize these tiedowns, and this option is depicted primarily to illustrate to airport stakeholders the drawbacks associated with preserving Taxilane R.

- Construction of new threshold connectors (ultimate Taxiways A1 and A6), with removal of several existing taxiway connectors. A holding bay to serve aircraft departing on ultimate Runway 2 is also proposed; a holding bay serving ultimate Runway 20 is not feasible due to the relocation of the runway end and existing apron.

- Existing Taxilane R1 is planned to be removed to mitigate the direct access that it provides from the apron.

- The potential for enhanced instrument approach procedures (IAP) with lower visibility minimums is also considered. RPZs for both 1-mile and ¾-mile visibility minimums are depicted on the exhibit. On the south end, the RPZ associated with 1-mile visibility minimums extends beyond airport property and encompasses approximately 3.1 acres of uncontrolled land, while the larger RPZ for ¾-mile visibility minimums encompasses approximately 5.5 acres of uncontrolled land. On the north end, the RPZ associated with 1-mile visibility minimums is largely contained on airport property, with the exception of the portion that encompasses Glendale Avenue. If an IAP with ¾-mile visibility minimums were implemented on Runway 20, approximately 11.0 acres of land would not be controlled by the airport and would include a larger portion of Glendale Avenue and structures located both on- and off-airport.

- The existing PAPI-2 systems are planned to be upgraded to four-box (PAPI-4) systems in order to enhance pilot visual awareness and safety and which are recommended for runways serving a significant number of jet operations.

- The segmented circle and primary wind cone are proposed to be relocated outside of the ultimate ROFA, directly east of the existing location. Additionally, all supplemental wind cones would be relocated outside of the ultimate ROFA.

Airside Alternative 2

Airside Alternative 2 is depicted on **Exhibit 4B** and evaluates the potential impacts of reducing the length of Runway 2-20 in conjunction with the installation of EMAS at both runway ends to achieve the applicable RSA dimensional requirements within the existing site constraints. In addition to the proposed runway modifications and EMAS installations, this alternative incorporates several additional airside improvements to address existing facility conditions and support the airport's long-term operational needs.

- Runway 2-20 is proposed to be shortened to 6,740 feet, with EMAS installations beyond both runway ends to mitigate existing C-II RSA deficiencies to the greatest extent practicable. The FAA considers EMAS to be an acceptable alternative where it is not practicable to obtain a standard RSA. EMAS is composed of a crushable material designed to rapidly decelerate an aircraft during an excursion from the runway. While EMAS is acceptable substitute for RSA length, it does not diminish the RSA width standard. For planning purposes, the EMAS installations shown on **Exhibit 4B** have been conceptualized based on the future/ultimate critical aircraft, the Challenger 300; however, final EMAS dimensions and configurations will be determined in coordination with the selected EMAS manufacturer. For this alternative, the proposed dimensions include EMAS beds measuring 330 feet in length by 100 feet in width, with a 35-foot offset from the end of the runway pavement.

- In conjunction with the EMAS installations, 245-foot displaced thresholds are shown on each runway, with declared distances implemented to maximize available runway length. For both runway ends, the full runway length of 6,740 would apply for takeoff run available (TORA) and takeoff distance available (TODA), while the accelerate-stop distance available (ASDA) is reduced to 6,495 feet and the landing distance available (LDA) is reduced to 6,250 feet. These reductions account for the increased dimensions of the C-II RSA.

- Despite the proposed runway length modifications and EMAS installations, several non-standard conditions would remain, including existing perimeter road and fencing within portions of the RSA and ROFA. These obstructions are proposed to be relocated outside the RSA and ROFA, to the furthest extent practical, with an MOS proposed for the ROFA on the south end.

- Due to the displaced thresholds on each runway, approach and departure RPZs are depicted for both runway ends. Similar to the first alternative, RPZs associated with both 1-mile and ¾-mile visibility minimums are depicted on the exhibit. Under both visibility-minimum scenarios, portions of the respective RPZs extend beyond airport property and outside of airport control, with the ¾-mile RPZ associated with Runway 20 encompassing buildings and a larger portion of Glendale Avenue.

LEGEND

- Airport Property Line
- Taxiway Designation
- Ultimate Taxiway Designation
- Perimeter Fence
- Ultimate Perimeter Fence
- AWOS Critical Area
- RSA
- ROFA
- ROFZ
- RPZ
- High Energy Area
- Uncontrolled RPZ
- Proposed Airfield Pavement
- Proposed Road/Auto Parking
- Pavement to be Removed
- Ultimate PAPI-4

KEY

ASDA - Accelerate-Stop Distance Available
ATCT - Airport Traffic Control Tower
AWOS - Automated Weather Observing System
EMAS - Engineered Materials Arresting System
LDA - Landing Distance Available
PAPI - Precision Approach Path Indicator
RDC - Runway Design Code
ROFA - Runway Object Free Area
ROFZ - Runway Obstacle Free Zone
RPZ - Runway Protection Zone
RSA - Runway Safety Area
TODA - Takeoff Distance Available
TORA - Takeoff Run Available

DRAFT - FOR DISCUSSION PURPOSES ONLY

Future/Ultimate RDC: C-II-5000*

*If 3/4-mile visibility minimums are implemented, the RDC would be C-II-4000

Declared Distances	Runway 2	Runway 20
TORA	6,740'	6,740'
TODA	6,740'	6,740'
ASDA	6,495'	6,495'
LDA	6,250'	6,250'

Proposed ATCT Site #2
No-Taxi Island
Remove Tiedowns
No-Taxi Island
Buildings in RPZ
1-mile Approach RPZ
3/4-mile Approach RPZ
Departure RPZ
1-mile Approach RPZ
3/4-mile Approach RPZ
N Glen Harbor Blvd
W Glendale Ave
6.2 Acres
10 Acres
6.4 Acres
0.4 Acres
A1 A2 A3 A4 A5 A6 A7
320'
Ultimate Runway 2-20 (6,740' x 100')
2.8 Acres
500'
EMAS
Relocate Fence/Perimeter Road Outside RSA
New River
5.2 Acres
3.2 Acres
Perimeter Road
EMAS
Relocate Fence/Perimeter Road Outside ROFA
New River Rd
1.8 Acres
0.7 Acres
Departure RPZ
Relocate Segmented Circle and Lighted Wind Cone

Notes:

- EMAS is installed on each runway end to mitigate C-II RSA deficiencies. For planning purposes, 330' x 100' beds are depicted, based on the future/ultimate critical aircraft; actual bed lengths will be determined by the EMAS manufacturer.
- The runway length is reduced to 6,740' to accommodate the EMAS beds and increased dimensions of the C-II RSA. Displaced thresholds are located 245' from each runway end and declared distances are employed to maximize available runway length. While the overall runway length is shorter than the 7,150' available today, it is capable of accommodating 75% of the business jet fleet at 60% useful loads but will still be limiting to some business jet operators.
- Perimeter fencing is relocated around the ROFA on the north end of the runway and around the RSA on the south end; a Modification of Standard would be necessary for the ROFA which is obstructed by the perimeter fence on both the north and south ends of the runway.
- Taxiway A is relocated farther east to connect to the apron and provide 320' of separation between the runway and taxiway centerlines.
- Existing PAPI-2s are upgraded to PAPI-4 systems; REILs are maintained.
- Segmented circle and wind cone are relocated outside ROFA.
- Consideration has been given to GPS-based instrument approach procedures with 3/4-mile visibility minimums. If implemented, it would result in increased dimensions to the Part 77 primary surface and the RPZ of the runway end(s) with the lower minimums. Coordination with FAA would be necessary to determine if lower visibility minimums are feasible.

N
0 800
SCALE IN FEET

Aerial Source: Google Earth 06/2026

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- Taxiway A is proposed to be relocated approximately 70 feet west of its existing alignment, resulting in a separation distance of 320 feet from the Runway 2-20 centerline and meeting applicable C-II design standards. Taxiway A will maintain a width of 35 feet, consistent with the applicable TDG 2A design criteria, with existing taxiway pavement planned to be removed. In this location, the taxiway will adjoin the apron, necessitating the removal of Taxilane R. No-taxi islands are planned at the entrances to Taxiway A3, A4, A5, and A6 in order to mitigate direct access to Runway 2-20. Due to the introduction of a no-taxi island at the entrance to Taxiway A5, several tiedowns in the vicinity of the island are proposed to be removed.

- The existing PAPI-2 systems are planned to be upgraded to PAPI-4 systems.

- The segmented circle and primary wind cone are proposed to be relocated outside of the ultimate ROFA, directly east of the existing location. Additionally, all supplemental wind cones would be relocated outside of the ultimate ROFA.

Airside Alternative 3

Airside Alternative 3 is depicted on **Exhibit 4C** and examines the feasibility and associated impacts of relocating and extending Runway 2-20. These modifications are proposed to provide sufficient runway length to accommodate a wide array of aircraft, including large business jets, while achieving the applicable safety area dimensional standards to the greatest extent practicable. Features of this alternative include:

- Runway 2-20 is proposed to be extended to 7,200 feet and shifted east to provide the 300-foot runway centerline to parallel taxiway centerline separation required for C-II design standards. The runway is also proposed to be shifted south, with EMAS installations planned beyond both runway ends to provide a full, unobstructed C-II safety area while minimizing impacts to adjacent land uses and eliminating the need for displaced thresholds and declared distances. At the proposed length of 7,200 feet, Runway 2-20 will be capable of accommodating 100 percent of the business jet fleet at a 60 percent useful load.

  The proposed runway extension and relocation would result in several non-standard conditions relative to C-II design standards. This includes portions of the RSA and ROFA extending beyond the southern airport property boundary and, as with previous alternatives, existing perimeter road and fencing located within portions of the RSA and ROFA. Terrain and grading within the RSA would also be a factor on the south end of the runway as a result of the relocation/extension into the New River channel. To achieve compliance with the applicable C-II design standards, fee simple acquisition of approximately 2.2 acres of property within the RSA and ROFA would be necessary, along with property acquisition/control of land within the RPZ (to be discussed). The airport's perimeter road and fencing are proposed to be relocated outside of the ROFA on both the north and south ends.

  It must be noted that any alternative that would impact the New River will require significant analysis outside the framework of this master plan. This could include review by agencies such as

the Maricopa County Flood Control District, Federal Emergency Management Agency (FEMA), and the U.S. Army Corps of Engineers, among others. Previous planning studies concluded that construction in the area of the New River was not feasible due to flow impacts (upstream and downstream) and subsequent changes to nearby surface roads and utility lines. However, as part of an updated planning study, these options should be re-evaluated to determine if there is new potential for airfield expansion to the south.

- As with previous alternatives, RPZs based on both 1-mile and ¾-mile visibility minimums are shown. On the south end, the RPZ associated with the 1-mile visibility minimum encompasses approximately 24 acres of uncontrolled land, while an additional 16.8 acres would be uncontrolled if ¾-mile visibility minimums were implemented. Given the significant change to the runway environment, including the shift/extension to the south, this property is proposed to be acquired fee simple, if feasible, or controlled through an avigation easement, at a minimum. On the north side, much of the RPZ is located on airport-controlled property, but the RPZ is traversed by Glendale Avenue in both visibility minimum scenarios and contains buildings in the ¾-mile scenario.

- Taxiway A is proposed to remain in its existing location, with an extension to the south to accommodate the planned extension of Runway 2-20. A expansion to the holding bay serving Runway 2 is also proposed, while the holding bay serving Runway 20 is proposed for removal due to the runway shifting south.

- The existing PAPI-2 systems are planned to be upgraded to PAPI-4 systems in order to enhance pilot visual awareness and safety.

- The segmented circle and primary wind cone are proposed to be relocated outside of the ultimate ROFA, directly east of the existing location. Additionally, all supplemental wind cones would be relocated outside of the ultimate ROFA.

Airside Alternative 4

Airside Alternative 4 is illustrated on **Exhibit 4D**. Like the previous alternatives, an option for mitigating future/ultimate C-II safety area and runway-taxiway separation deficiencies is presented; however, Alternative 4 also evaluates the potential impacts associated with the development of a parallel runway. As discussed in Chapter Three, there are existing and projected airfield capacity constraints, and consideration should be given to capacity-enhancing projects, such as construction of a parallel runway.

- Primary Runway 2L-20R is proposed to be shifted approximately 550 feet to the south and maintained at its existing length of 7,150 feet. EMAS is again proposed at each runway end to provide a standard RSA and minimize impacts to adjacent land uses, without the need for displaced thresholds or declared distances. Like the previous alternative, the airport's perimeter road and fencing are proposed to be rerouted around the ROFA to ensure safety areas are free from obstructions. Earthwork within the RSA and ROFA would be necessary to mitigate nonconforming terrain and grading in the New River area. Property acquisition would also be necessary on the south end so the airport has full control over the RSA and ROFA, at a minimum.

LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- A — Taxiway Designation
- A — Ultimate Taxiway Designation
- Perimeter Fence
- Ultimate Perimeter Fence
- AWOS Critical Area
- RSA
- ROFA
- ROFZ
- RPZ
- High Energy Area
- Uncontrolled RPZ
- Property to be Acquired
- Proposed Airfield Pavement
- Pavement to be Removed
- Ultimate PAPI-4

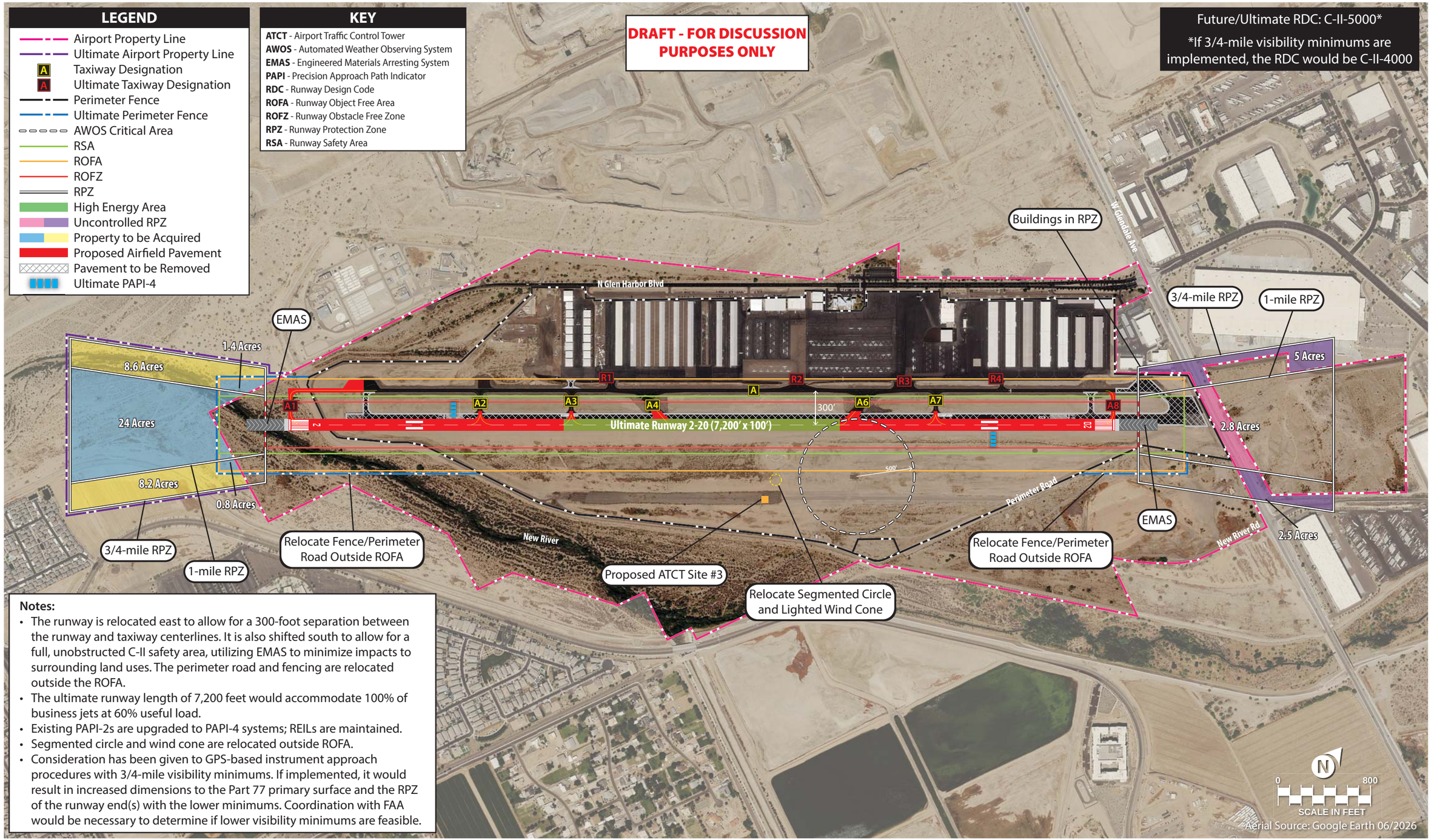
KEY

ATCT - Airport Traffic Control Tower
AWOS - Automated Weather Observing System
EMAS - Engineered Materials Arresting System
PAPI - Precision Approach Path Indicator
RDC - Runway Design Code
ROFA - Runway Object Free Area
ROFZ - Runway Obstacle Free Zone
RPZ - Runway Protection Zone
RSA - Runway Safety Area

DRAFT - FOR DISCUSSION PURPOSES ONLY

Future/Ultimate RDC: C-II-5000*

*If 3/4-mile visibility minimums are implemented, the RDC would be C-II-4000



Notes:

- The runway is relocated east to allow for a 300-foot separation between the runway and taxiway centerlines. It is also shifted south to allow for a full, unobstructed C-II safety area, utilizing EMAS to minimize impacts to surrounding land uses. The perimeter road and fencing are relocated outside the ROFA.
- The ultimate runway length of 7,200 feet would accommodate 100% of business jets at 60% useful load.
- Existing PAPI-2s are upgraded to PAPI-4 systems; REILs are maintained.
- Segmented circle and wind cone are relocated outside ROFA.
- Consideration has been given to GPS-based instrument approach procedures with 3/4-mile visibility minimums. If implemented, it would result in increased dimensions to the Part 77 primary surface and the RPZ of the runway end(s) with the lower minimums. Coordination with FAA would be necessary to determine if lower visibility minimums are feasible.

LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- A — Taxiway Designation
- A — Ultimate Taxiway Designation
- Perimeter Fence
- Ultimate Perimeter Fence
- AWOS Critical Area
- RSA
- ROFA
- ROFZ
- RPZ
- High Energy Area
- Uncontrolled RPZ
- Property to be Acquired
- Proposed Airfield Pavement
- Pavement to be Removed
- Ultimate PAPI-4
- Ultimate PAPI-2
- REILs

KEY

ATCT - Airport Traffic Control Tower
AWOS - Automated Weather Observing System
EMAS - Engineered Materials Arresting System
PAPI - Precision Approach Path Indicator
REIL - Runway End Identification Lighting
ROFA - Runway Object Free Area
ROFZ - Runway Obstacle Free Zone
RPZ - Runway Protection Zone
RSA - Runway Safety Area

DRAFT - FOR DISCUSSION PURPOSES ONLY

Future/Ultimate RDC for 1L-19R: C-II-5000*
Future/Ultimate RDC for 1R-19L: A-I(Small)-VIS

*If 3/4-mile visibility minimums are implemented, the RDC would be C-II-4000

Proposed ATCT Site #4

N Glen Harbor Blvd

W Glendale Ave

3/4-mile RPZ

1-mile RPZ

EMAS

1.4 Acres

8.6 Acres

23.5 Acres

7.7 Acres

0.1 Acres

6.3 Acres

0.4 Acres

2.8 Acres

2.5 Acres

R1 R2 R3

A A1 A2 A3 A4 A6 A7 A8 A9

300′

Ultimate Runway 2L-20R (7,150′ x 100′)

B1 B2 B

700′

500′

150′

Ultimate Runway 2R-20L (3,700′ x 60′)

New River

New River Rd

Relocate Fence/Perimeter Road Outside ROFA

Relocate Segmented Circle and Lighted Wind Cone

Relocate Fence/Perimeter Road Outside ROFA

Relocate Fence/Perimeter Road Outside ROFA

EMAS

Notes:

- Ultimate Runway 2L-20R is shifted south and utilizes EMAS to allow for an unobstructed RSA and to minimize impacts to surrounding land uses. A Modification of Standard would be necessary for the ROFA.
- The current length of 7,150 feet is maintained; however, earthwork and grading of the New River channel would be necessary to meet RSA design standards.
- Parallel Runway 2R-20L is constructed to enhance airfield capacity and segregate small aircraft from larger business jets.
- Taxiway A is relocated approximately 50 feet west to allow for a standard C-II runway-taxiway separation of 300 feet.
- Existing PAPI-2s are upgraded to PAPI-4 systems; REILs are maintained.
- Segmented circle and wind cone are relocated outside ROFA.
- Consideration has been given to GPS-based instrument approach procedures with 3/4-mile visibility minimums. If implemented, it would result in increased dimensions to the Part 77 primary surface and the RPZ of the runway end(s) with the lower minimums. Coordination with FAA would be necessary to determine if lower visibility minimums are feasible.

N

0 800

SCALE IN FEET

Aerial Source: Google Earth 06/2026

- Parallel Runway 2R-20L is proposed to be constructed 700 feet east of the existing primary runway to accommodate small general aviation (GA) aircraft and provide additional airfield capacity. The proposed runway is planned to meet A-I(Small) design standards, with a proposed runway length of 3,700 feet and a width of 60 feet. At this length, 95 percent of the small aircraft fleet can be accommodated. While property acquisition would not be necessary to accommodate parallel Runway 2R-20L, nonconforming terrain and existing perimeter fencing within portions of the RSA and ROFA would need to be addressed.

- Taxiway A is proposed to be reconstructed approximately 50 feet to the west, for a separation distance of 300 feet from the Runway 2L-20R centerline, satisfying C-II FAA design standards.

- The centerline marking associated with Taxilane R is proposed to be removed, and this taxilane will essentially become part of the apron.

- Ultimate parallel Taxiway B is proposed to serve Runway 2R-20L. The taxiway is located between the existing primary runway and the parallel runway to facilitate access and circulation. The taxiway is designed to meet ADG I and taxiway design group (TDG) 1A design standards, at a separation of 150 feet from the Runway 2R-20L centerline and at a width of 25 feet. Three runway entry/exit taxiway connectors are also proposed.

- The existing PAPI-2 systems on the primary runway are planned to be upgraded to PAPI-4 systems in order to enhance pilot visual awareness and safety. For proposed Runway 2R-20L, PAPI-2 systems are proposed to be installed for each runway end, providing visual glide slope guidance to pilots. Additionally, the runway is planned to be equipped with medium-intensity runway lighting (MIRL) and runway end identifier lights (REILs) at each runway end.

- The segmented circle and primary wind cone have been relocated outside of the ROFAs for both runways. The proposed location is west of the existing site, adjacent to the lift station along the perimeter road. Additionally, all supplemental wind cones have also been relocated outside of the ROFAs of both runways.

AIRSIDE ALTERNATIVES SUMMARY

Four airside development alternatives were evaluated to address existing and future airfield facility needs, improve compliance with applicable FAA design standards, and accommodate the airport's anticipated long-term operational requirements. Airside Alternative 1 evaluates shortening Runway 2-20 to 5,489 feet to achieve the C-II RSA dimensional requirements to the greatest extent practicable, while addressing existing displaced thresholds and declared distances; however, the proposed runway length would limit the airport's ability to accommodate existing and projected business jet activity. Airside Alternative 2 evaluates a less restrictive runway length reduction to 6,740 feet, supplemented by EMAS installations beyond both runway ends to mitigate existing RSA deficiencies while preserving the maximum amount of operational runway length. Airside Alternative 3 examines relocating and extending Runway 2-20 to 7,200 feet, providing the runway length necessary to accommodate 100 percent of the business jet fleet at a 60 percent useful load, while incorporating EMAS installations to address remaining

RSA constraints to the greatest extent practicable. Airside Alternative 4 evaluates the development of a new parallel runway system, including the relocation of the existing primary runway (Runway 2L-20R) and construction of a 3,700-foot parallel runway (Runway 2R-20L) designed primarily to accommodate small general aviation aircraft and provide additional airfield capacity.

Each alternative incorporates additional airfield modifications intended to improve overall operational efficiency and address existing design deficiencies. Proposed improvements generally include relocating or reconfiguring Taxiway A to achieve the applicable C-II runway-to-taxiway separation requirements, removing/relocating parallel Taxilane R, and modifying existing runway entry/exit taxiway connectors to accommodate the proposed runway configurations. Additional improvements common to the alternatives include upgrading existing PAPI-2 systems to PAPI-4 systems, and relocating the segmented circle and primary wind cone outside of ultimate safety areas. Airside Alternative 4 further includes the installation of PAPI-2 systems, MIRL, and REILs to support operations on the proposed parallel runway.

AIRPORT TRAFFIC CONTROL TOWER (ATCT) PRELIMINARY SITE ANALYSIS

GEU currently has an operational ATCT; however, there are portions of the apron and taxilanes on the south side of the field that are not visible to tower controllers. For this reason, preliminary analysis regarding potential relocation of the ATCT is included as part of this planning study. Potential sites for a replacement tower have been considered, as shown on **Exhibit 4E**; however, if a new tower is approved by the FAA, the FAA will determine the best site, which may be a different site from those considered in this master plan. The airport's responsibility is to provide an adequate site on airport property.

The FAA provides guidance on tower siting in FAA Order 6480.4C, *Airport Traffic Control Tower Siting Process*. The primary siting criteria are:

1. **Unobstructed view:** Visibility from the tower cab shall allow an unobstructed view of all controlled movement areas of the airport, including all runways, taxiways, and any other landing areas (such as heliports), and of air traffic in the vicinity of the airport. For any site considered, the FAA will utilize the Airport Facilities Terminal Integration Laboratory (AFTIL) simulation tool to conduct a dynamic visibility analysis, including evaluation of both moving and parked aircraft.

2. **Object discrimination:** Tower height and distance from critical airport locations shall support requirements for object visibility from the tower cab. The FAA will perform an object discrimination analysis to assess observers' probability of detection and recognition of an object on the airport surface.

3. **Line of sight (LOS) angle of incidence:** The FAA will perform this analysis to assess the angle at which the observers' view of a distant object intersects with the airport surface at an angle equal to or greater than 0.80 degrees.

4. **ATCT orientation:** The primary operational views shall face north. If this is not viable, they shall face east, west, or finally south, in that order of preference.

LEGEND

- Airport Property Line
- A — Taxiway Designation
- Perimeter Fence

KEY

ATCT - Airport Traffic Control Tower

N

0 800

SCALE IN FEET

Aerial Source: Google Earth 06/2026

Proposed ATCT Site #4
Proposed ATCT Site #2
Proposed ATCT Site #1
Proposed ATCT Site #3
N Glen Harbor Blvd
W Glendale Ave
R1 R2 R3 A R4 R5
A1 A2 A3 A4 A6 A7 A8 A9
Runway 2-20 (7,150 x 100')
Perimeter Road
Perimeter Road
New River
New River Rd
New River Rd
N Ball Park Blvd

ATCT Site #1

- East-facing
- 82' Observer Eye Height
- 925' from Runway Centerline

1"=300'

ATCT Site #2

- East-facing
- 153' Observer Eye Height
- 1,250' from Runway Centerline

1"=300'

ATCT Site #3

- West-facing
- 75' Observer Eye Height
- 700' from Runway Centerline

1"=300'

ATCT Site #4

- East-facing
- 76' Observer Eye Height
- 1,000' from Runway Centerline

1"=300'

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The potential tower sites shown on **Exhibit 4E** have been reviewed at a high level for future planning purposes, within the framework of FAA ATCT siting criteria[2]. Each site is based on the existing airfield condition and assumes a footprint of ¼-acre, with variable tower and cab heights. It should be clearly stated that these sites are preliminary in nature and are subject to change based on the ultimate tower design, runway disposition, and ultimate landside development.

- Proposed ATCT Site #1 is located approximately 1,050 feet north of the existing ATCT and 925 feet from the runway centerline and would result in an east-facing tower. In this location, preliminary analysis shows an ATCT should be constructed to meet an 82-foot-tall observer eye height, in order to satisfy the standards and requirements set forth in FAA Order 6480.4C, *Siting of Airport Traffic Control Towers (ATCT)*.

- Site #2 is located within the terminal building's overflow parking lot. The proposed location provides sufficient space to accommodate the facility and is planned for an east-facing orientation. Preliminary siting analysis indicates that an observer height of approximately 153 feet would be necessary to meet the applicable siting criteria and operational requirements outlined in FAA Order 6480.4C, *Siting of Airport Traffic Control Towers (ATCT)*.

- Site #3 considers a west-facing tower proposed at a midfield location along the east side of Runway 2-20. While this is not a preferred orientation, consideration of a tower located on the east side should not be dismissed as this area offers excellent visibility of the airfield and ample opportunity for development. Based on preliminary siting analyses, an observer eye height of approximately 75 feet is anticipated to satisfy the applicable line-of-sight criteria.

- Potential ATCT Site #4 is proposed within the parking lot of the existing ATCT facility. Based on the vicinity of the existing site, the proposed location provides sufficient area to accommodate the new facility while maintaining favorable visibility of the airfield and all operational areas. The new ATCT would retain an east-facing tower orientation. Preliminary siting analyses indicate that an approximate observer eye height of 76 feet is estimated to be needed.

LANDSIDE

Landside facilities encompass the infrastructure and support services necessary to accommodate aircraft parking and storage, passenger and pilot access, airport support functions, and revenue-generating activities. Effective landside planning emphasizes the efficient organization and strategic grouping of facilities with complementary functions to optimize airport operations, accessibility, and long-term development potential. Similar to community land use planning, airport landside development should be guided by a comprehensive assessment of existing and projected aviation activity, facility requirements, and available land resources. At GEU, existing landside facilities are concentrated primarily on the west side of the runway, where available space for future development is becoming increasingly

[2] This analysis utilized components of the operational requirements stated in FAA AC 6480.4b, specifically sections of 6480.4b Appendix D (Visibility Performance Analyses). The FAA Air Traffic Control Visibility Analysis Tool was utilized to determine minimum cab heights based on potential tower sites. Detailed Line of Sight (LOS) analysis was not conducted at this phase of the study.

constrained, with minimal developable space remaining. However, the approximately 120 acres of undeveloped land on the east side of the runway represent a significant opportunity to accommodate future landside facilities and support the airport's long-term development needs.

While the east side of the airport has been identified as an area with significant development potential, existing topographic conditions will be a key consideration in evaluating and formulating the landside alternatives. Portions of the approximately 120-acre site located east of Runway 2-20 are situated at elevations below the runway grade. In particular, approximately 40 acres within the northeastern portion of the site are characterized by low-lying terrain that would require substantial fill placement and associated site preparation to achieve the grading criteria necessary to accommodate aeronautical facilities in accordance with applicable FAA design standards. The magnitude of earthwork, associated development costs, and extended implementation timeline may limit the feasibility of utilizing this area for aeronautical development. Accordingly, consideration should be given to designating some or all of this area for non-aeronautical uses that could support the airport's long-term financial sustainability through revenue-generating development opportunities. The landside alternatives presented in this chapter will therefore evaluate opportunities to strategically delineate aeronautical and non-aeronautical uses based on existing topographic conditions, development feasibility, and the associated infrastructure requirements.

AVIATION ACTIVITY LEVELS

Aviation development areas should be categorized into high-, medium-, and low-activity areas based on the anticipated level of aeronautical activity and the intended use of each facility. High-activity areas should accommodate facilities that support a substantial volume of aircraft operations and provide essential aviation services. Typical high-activity uses include the airport terminal building and associated aircraft parking apron, which provide aircraft tiedown positions and circulation, as well as large conventional hangars supporting fixed base operator (FBO) operations, corporate aviation departments, and the storage of multiple aircraft. These areas are generally best situated along the flight line near the midfield portion of the airfield to facilitate efficient aircraft access to the runway system and other airfield facilities. Development within these areas should be supported by the necessary utility infrastructure to accommodate anticipated operational demands and facilitate future expansion.

Medium-activity areas represent the next tier of aviation development and are generally intended to accommodate smaller corporate aviation users, including facilities such as individual executive hangars for aircraft storage. These areas should be located outside the immediate flight line, while maintaining convenient and efficient access to the airfield for based aircraft, including corporate jets. Where site constraints or existing airport conditions necessitate locating medium-activity development along the flight line, these areas should be positioned away from the midfield portion of the airfield to minimize potential conflicts and congestion associated with transient aircraft operations and other high-activity uses. Supporting infrastructure should include adequate vehicular parking and access to essential utilities, such as water and sewer, to accommodate the operational needs of future development.

Low-activity areas are intended to accommodate the storage of smaller single- and multi-engine aircraft, primarily serving individual aircraft owners and small business operators. Typical development within

these areas includes individual aircraft storage facilities, such as linear box hangars and T-hangars. These areas should generally be situated in less prominent portions of the airport property, away from the areas designated for higher levels of aviation activity, to minimize potential conflicts with other airport operations. Utility requirements are typically limited to electrical service, as water and sewer infrastructure are generally not necessary for this type of development.

To maximize the airport's long-term development potential while maintaining compliance with applicable FAA design standards and safety requirements, it is essential to establish a comprehensive land use and facility development plan that promotes the orderly and efficient expansion of airport infrastructure. Typically, property adjacent to the runway system is reserved for aviation-related uses to accommodate future airfield improvements and supporting facilities, including taxiways, aircraft aprons, hangars, and other aviation-related development. This approach preserves the airport's operational flexibility, protects critical airfield areas, and ensures that future development is consistent with established airport planning objectives.

BUILDING RESTRICTION LINE (BRL)

An important consideration in evaluating future landside development opportunities is the Building Restriction Line (BRL), which establishes height limitations for structures based on the airport's applicable Part 77 surfaces. These limitations are intended to protect the airspace surrounding the runway environment by ensuring that proposed structures do not penetrate established imaginary surfaces. The primary surface is centered along the runway centerline, with its dimensions determined by the runway's usage and available instrument visibility minimums. At GEU, the primary surface currently extends 500 feet in width, centered on Runway 2-20. If an IAP with ¾-mile visibility minimums were implemented, the width of the primary surface would increase to 1,000 feet. Extending outward from the primary surface, the transitional surface rises at a slope of 7:1 (seven horizontal feet for every one vertical foot). The BRL delineates the boundary beyond which structures may become hazards or obstructions to the runway system, should their heights exceed the applicable Part 77 surface elevations at their respective locations; however, it functions as a guideline rather than a requirement. It is not uncommon for objects or structures to be located in front of the BRL; often they are equipped with obstruction lights to alert pilots to their location. Any proposed construction or building alteration on an airport must go through an FAA 7460-1 evaluation (airspace analysis) to determine if it is a hazard and what, if any, mitigative actions should be taken.

LANDSIDE CONSIDERATIONS

Landside planning considerations are summarized in **Table 4B**. Generally, the considerations reflect the needs of a growing general aviation airport that has strong hangar demand and growing itinerant traffic that demands greater apron capacity. Consideration is also given to reserving space for advanced air mobility (AAM), a new entrant to the aviation industry that is largely centered on the use of electric vertical takeoff and landing (eVTOL) aircraft.

TABLE 4B: Landside Planning Considerations

#	Landside Component	Existing Capacity	Consideration
1	Aircraft Storage Hangars	709,600 sf of existing capacity	Increase total capacity by 275,000 sf.
2	Aircraft Parking Apron	130,000 sy of apron/parking	Increase total capacity by 54,000 sy.
3	Aircraft Fuel Storage Facilities	3 x 20,000-gallon tanks (2 Jet A, 1 100LL); 1 x 3,600-gallon self-service facility (100LL)	Reserve space for future fuel storage facilities.
4	Advanced Air Mobility (AAM)	None	Reserve space for future vertiport and support facility development.

Source: Coffman Associates analysis

sf = square feet
sy = square yards

The following section describes a series of landside alternatives as they relate to the identified considerations. Variations of future hangar and apron developments are presented to help visualize what future facility developments could look like.

The alternatives presented are not the only reasonable options for development. In some cases, a portion of one alternative could be intermixed with another, and some development concepts could be replaced with others. The overall intent of this exercise is to outline basic development concepts to spur collaboration for a final recommended plan. The final recommended plan only serves as a guide for the airport to aid the City of Glendale in the strategic planning of airport property. Airport operators often change their plans to meet the needs of specific users. **The goal in analyzing landside development alternatives is to focus future development so airport property can be maximized and aviation activity can be protected**.

REVIEW OF GEU EASTSIDE DEVELOPMENT PLAN

In 2022, the City of Glendale commissioned the Eastside Development Plan study for GEU to establish a recommended development framework for aeronautical and potential non-aeronautical uses within an identified 120-acre parcel of airport property. The subject parcel is located entirely within the airport property boundary, east of the existing runway, south of Glendale Avenue, and west of the New River channel. The ALP currently on file identifies this area for future aeronautical development, including a parallel taxiway, aircraft apron areas, and various aircraft hangar development. The Eastside Development Plan was undertaken to further evaluate the development potential of this area and establish a conceptual land use and facility layout consistent with the airport's long-term development objectives. Preparation of the study also involved coordination with the City of Glendale, the FAA, and the Arizona Department of Transportation (ADOT) – Aeronautics Group, to ensure the study considered applicable airport planning, design, and land use compatibility requirements.

The study was completed through a phased planning process consisting of three primary phases. Phase I focused on documenting existing airport facilities, evaluating aviation demand and market conditions, and establishing the planning criteria necessary to guide future development. Based on the findings of this initial analysis, Phase II involved the preparation, evaluation, and comparison of four development alternatives. During Phase III, the development alternatives were further refined into a single

recommended development concept, supported by a capital improvement program (CIP), development phasing plan, and financial analysis. Collectively, these efforts established a comprehensive and coordinated development framework for the east side, providing the City of Glendale with a long-term planning tool to guide future aeronautical and potential non-aeronautical development in a manner consistent with the airport's anticipated needs and objectives.

The recommended development concept resulting from the Eastside Development Plan is depicted on **Exhibit 4F**. Major elements of the plan included:

- Construction of Parallel Taxiway B along the east side of Runway 2-20.
- Hangar development focused on executive box and conventional hangar types, resulting in approximately 489,450 sf of additional aircraft hangar storage.
- Additional apron capacity of approximately 107,500 sy of additional apron development.
- Relocation of the AWOS to accommodate planned development.
- Construction of a secondary fuel farm.
- Designation of approximately 40.9 acres of land for future non-aeronautical development. This includes 2.2 acres that were set aside for future aircraft rescue and firefighting (ARFF) facilities; however, plans prepared since the Eastside Development Plan have indicated that those facilities will be located on the opposite side of Glendale Avenue, if constructed.
- Construction of access roads and vehicle parking to accommodate the proposed hangar development.

The findings and recommended development concept established through the Eastside Development Plan study remain valid and should be considered along with the new landside alternatives prepared as part of this master plan.

LANDSIDE ALTERNATIVES

Four landside development alternatives have been prepared to evaluate potential development opportunities and establish a framework for accommodating the airport's long-term landside facility needs. These alternatives incorporate findings and technical analyses presented in previous chapters of this master plan, relevant airport studies previously conducted, and input received from airport management, stakeholders, and the public outreach process. The alternatives have also been developed in accordance with applicable FAA guidance, including AC 150/5300-13B, *Airport Design*, and other relevant FAA design standards.

Landside Alternative 1

Depicted on **Exhibit 4G**, Landside Alternative 1 considers the following:

- Parallel Taxiway B is proposed along the east side of Runway 2-20 to provide access to future landside facilities. The taxiway has a centerline-to-centerline separation of 300 feet to meet the

applicable FAA separation standard for a C-II runway and parallel taxiway. The taxiway is planned to accommodate ADG II aircraft and TDG 2A aircraft, resulting in a proposed taxiway width of 35 feet.

- Hangar development in this alternative is focused on optimizing developable property, while maintaining consideration for high-, medium-, and low-activity levels. Proposed hangars east of the runway and to the north are intended for the high-activity level and include conventional hangar development ranging in sizes from 15,000 square feet (sf) up to 75,000 sf.

  The hangar development on the south end of the east side area is intended for medium- and low-activity levels and include executive box hangars ranging in sizes from 6,400 sf up to 10,000 sf.

  Potential hangar development has also been depicted on the west side of Runway 2-20, south of the existing corporate hangars, where two new taxilanes are depicted to support future executive box hangars. Additionally, a singular T-hangar row is planned to be located between hangar rows Bravo and Delta, an area which currently consists of uncovered tiedowns.

  In total, this alternative offers approximately 572,450 sf of additional aircraft hangar storage.

- Approximately 63,300 sy of additional apron development east of Runway 2-20 is also proposed. This apron is primarily intended to accommodate aircraft operations associated with the high-activity level. However, given its anticipated function as the primary apron serving the east landside complex, it would provide operational flexibility to accommodate the full range of anticipated airport activity demand. For access to the runway system, the apron is proposed to include two taxilane connectors providing access to and from Taxiway B.

- With guidance from FAA Engineering Brief (EB) No. 105A, *Vertiport Design, Supplemental Guidance to AC 150/5390-2D, Heliport Design*, and Draft AC 150/5390-4, *Vertical Flight Aircraft Infrastructure Design*, facilities associated with AAM are planned south of the proposed access road on the east side. This development would include a vertiport; aircraft parking; a facility that could potentially be used for aircraft storage, terminal space, or office area; and vehicle parking. In this location, the vertiport would have a separation distance of approximately 1,300 feet from the Runway 2-20 centerline, satisfying both the 500-foot separation standard within EB No. 105A, and the 700-foot separation standard outlined in AC 150/5390-4. (Note: The area shown is intended only to demonstrate where this type of facility may be feasible within the overall airport development concept. Specific vertiport dimensions, aircraft operating areas, access requirements, staging needs, lighting, navigation, security, and separation from incompatible uses would be determined during future planning and design. Because AAM markets and design standards continue to evolve, the depicted configuration should be considered conceptual and subject to refinement during future planning, design, and environmental review.)

- Due to the proposed development east of Runway 2-20, the AWOS is planned to be relocated approximately 2,750 feet south of the existing location. The proposed location provides adequate space for accommodating the AWOS equipment and the 500-foot critical area, though sensors may need to be elevated or perimeter fencing relocated if the fencing results in sensor interference.

LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- A — Taxiway Designation
- Perimeter Fence
- Ultimate Perimeter Fence
- AWOS Critical Area
- Proposed Airfield Pavement
- Proposed Buildings
- Proposed Road/Auto Parking
- 20' BRL

KEY

AWOS - Automated Weather Observing System
BRL - Building Restriction Line

NON-AERONAUTICAL LAND USE RESERVE LEGEND

- ARFF Land Use
- Light Industrial Land Use
- Flex Land Use
- Gateway Commercial Land Use

W Glendale Ave

R1 R2 R3 R4 R5

A A2 A3 A4 A6 A7 A8 A9

Runway 1-19 (7,150' x 100')

300'

500'

New River

Perimeter Road

Conventional Hangars
100' x 150'

Conventional Hangars
200' x 120'

Conventional Hangars
100' x 150'

Relocate Segmented Circle and Lighted Wind Cone

Fuel Farm

Executive Box Hangars
80' x 80'

Executive Box Hangars
100' x 100'

Relocate AWOS and 500' critical area

Lift Station

Conventional Hangars
125' x 150'

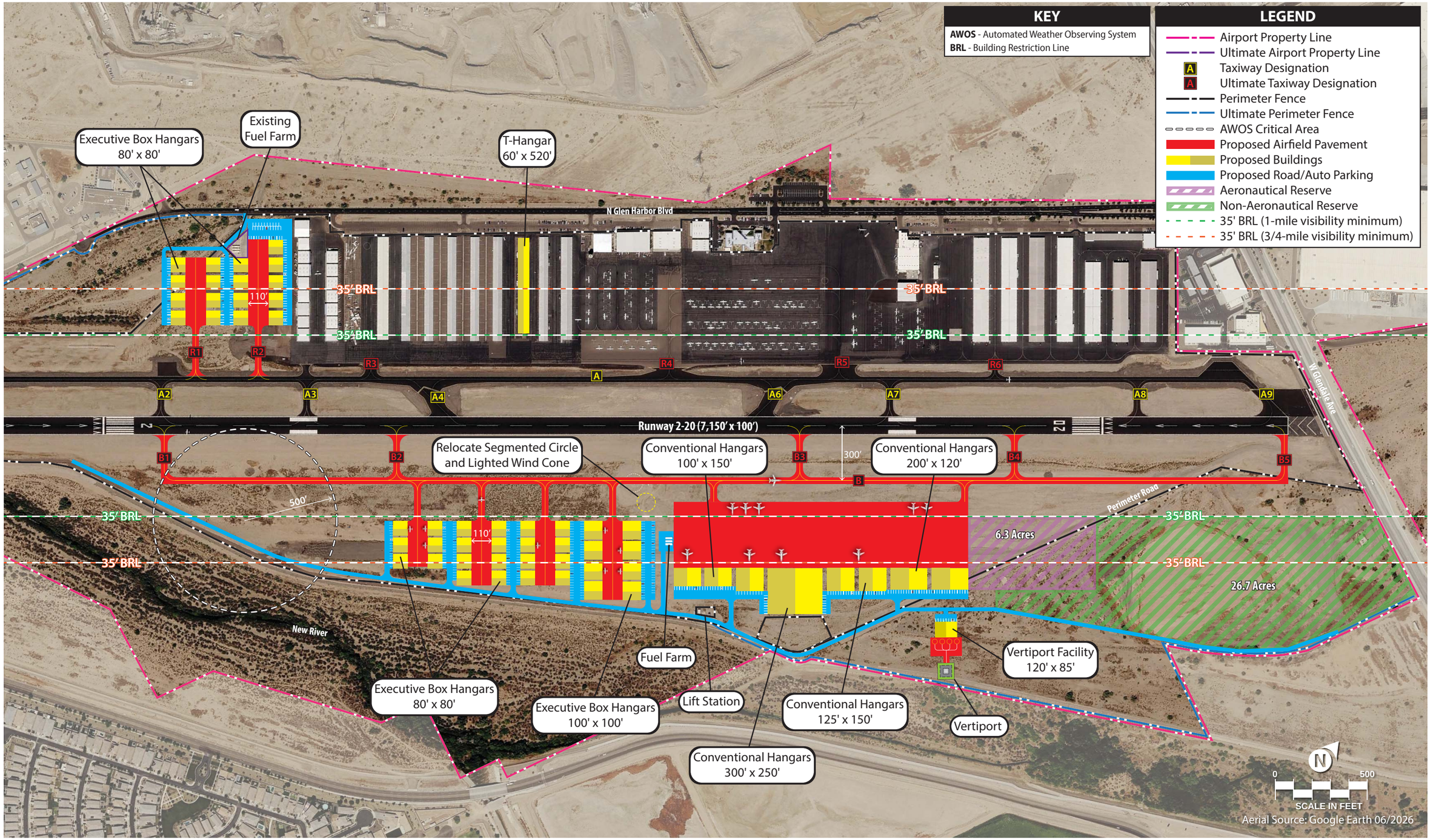
Conventional Hangars
300' x 250'

3.0 Acres
2.2 Acres
4.4 Acres
2.2 Acres
2.5 Acres
17.0 Acres
4.6 Acres
5.0 Acres

N

0 500
SCALE IN FEET

Aerial Source: Google Earth 06/2026


KEY
AWOS - Automated Weather Observing System
BRL - Building Restriction Line
LEGEND
Airport Property Line
Ultimate Airport Property Line
Taxiway Designation
Ultimate Taxiway Designation
Perimeter Fence
Ultimate Perimeter Fence
AWOS Critical Area
Proposed Airfield Pavement
Proposed Buildings
Proposed Road/Auto Parking
Aeronautical Reserve
Non-Aeronautical Reserve
35' BRL (1-mile visibility minimum)
35' BRL (3/4-mile visibility minimum)
Executive Box Hangars 80' x 80'
Existing Fuel Farm
T-Hangar 60' x 520'
N Glen Harbor Blvd
35' BRL
110'
R1
R2
R3
R4
R5
R6
A
A2
A3
A4
A6
A7
A8
A9
W Glendale Ave
Runway 2-20 (7,150' x 100')
B1
B2
B3
B4
B5
B
300'
Relocate Segmented Circle and Lighted Wind Cone
Conventional Hangars 100' x 150'
Conventional Hangars 200' x 120'
500'
Perimeter Road
6.3 Acres
26.7 Acres
New River
Fuel Farm
Executive Box Hangars 80' x 80'
Executive Box Hangars 100' x 100'
Lift Station
Conventional Hangars 125' x 150'
Vertiport
Vertiport Facility 120' x 85'
Conventional Hangars 300' x 250'
N
0
500
SCALE IN FEET
Aerial Source: Google Earth 06/2026

- The segmented circle and primary wind cone are proposed to be relocated approximately 115 feet east of its existing position in order to remain outside of the applicable runway and taxiway safety areas.

- A centralized fuel farm is proposed on the southern edge of the proposed apron area serving the east side complex. It is planned to consist of 100LL, Jet A, and/or UL (unleaded) fuel tanks; however, the final determination of fuel types, tank amount, and tank capacity should be based on projected usage.

- North of the proposed east side hangars, approximately 33 acres of land has been designated for future aeronautical and non-aeronautical development. As shown on the exhibit, the designated aeronautical development reserve encompasses approximately 6.3 acres and the non-aeronautical development reserve includes approximately 26.7 acres.

- New access roads and vehicle parking on both the east and west sides are included to accommodate the proposed hangar development. On the east side, the access road is designed as an extension of New River Road from Glendale Avenue, while the access road on the west side functions as an extension from Glen Harbor Boulevard.

- Building restriction lines are shown on each side of the runway based on a 35-foot building height. The existing 35-foot BRL (green/white dashed line) is based on the current instrument approach capability offered at GEU and is set back from the runway 495 feet. If an IAP with visibility minimums down to ¾-mile is implemented, the 35-foot BRL would be set back from the runway at a distance of 745 feet, as shown with the orange/white dashed line, due to the increased width of the primary surface (1,000 feet wide centered on the runway). In both scenarios, existing buildings are located in front of the BRL; however, none of these buildings exceed 35 feet in height and, therefore, do not penetrate the transitional surface. If lower minimums are implemented, existing and proposed structures may penetrate the transitional surface, with portions of existing hangars penetrating the primary surface. For long-term planning purposes, all proposed hangars are positioned to be clear of a 1,000-wide primary surface. Prior to construction, an airspace evaluation must be completed (Form 7460-1) to determine allowable heights.

Landside Alternative 2

Depicted on **Exhibit 4H**, Landside Alternative 2 considers several of the same features as the previous alternative, including construction of parallel Taxiway B, relocation of equipment, construction of access roads, and reserving space for future aeronautical and non-aeronautical development. Other features include:

- Hangar development on the east side to include a mix of conventional hangar, executive box, and T-hangar facilities. In total, approximately 275,200 sf of additional hangar capacity is proposed for the east side.

  Redevelopment of existing facilities is proposed west of Runway 2-20, between hangar rows Bravo and India. This area has been identified to accommodate future hangar demand in the form of six new T-hangar rows, offering a combined total of 187,200 sf of storage space.

- Construction of approximately 46,210 sy of additional apron pavement east of Runway 2-20, distributed between two distinct apron areas within the primary development area. The north apron is primarily intended to accommodate aircraft operations associated with the high-activity level category, while the south apron is primarily intended to support operations associated with the medium- and low-activity level categories. The south apron also incorporates marked parking positions for fixed wing aircraft, with 32 nested tiedown positions.

- AAM facilities are again proposed on the east side, on a site located approximately 1,050 feet from the Runway 2-20 centerline.

- Relocation of the AWOS to a site immediately south of existing landside facilities. While relocating the AWOS to this location provides the greatest potential for maximum development on the east side, it limits expansion of landside facilities on the west side.

- A centralized aircraft fuel storage facility and self-service fueling station are depicted along the southern edge of the proposed north apron (east side).

- Undeveloped areas east of Runway 2-20 have been identified and designated as development reserves to preserve flexibility for future land use opportunities. Approximately 8.0 acres have been designated as aeronautical development reserve south of proposed east side facilities, while approximately 33.8 acres to the north are reserved for future mixed use development, providing flexibility to accommodate either aeronautical or non-aeronautical development. An additional 22.5 acres south of the proposed airport access road has been designated for non-aeronautical development.

Landside Alternative 3

Depicted on **Exhibit 4J**, Landside Alternative 3 considers the following:

- Proposed east side hangar facilities intended to accommodate projected medium- and low-activity level operations with a mix of executive box hangars and T-hangar rows, with proposed box hangar capacities ranging from approximately 6,400 sf to 10,000 sf. Each T-hangar row is depicted at 24,000 sf.

  Opportunities for additional hangar development west of Runway 2-20 are also shown. This includes executive box hangars immediately south of the existing corporate hangars and a potential redevelopment area situated between hangar rows Bravo and India. This redevelopment area is intended to accommodate future hangar demand associated with the high-activity level category, such as an FBO.

  In total, this alternative offers approximately 275,400 sf of additional aircraft hangar storage.

- This alternative also includes approximately 41,400 sy of proposed apron development, split between three locations on the airfield. On the east side of Runway 2-20, the proposed north apron encompasses approximately 26,960 sy and incorporates potential tiedown facilities, with a

KEY

AWOS - Automated Weather Observing System
BRL - Building Restriction Line

LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Taxiway Designation
- Ultimate Taxiway Designation
- Perimeter Fence
- Ultimate Perimeter Fence
- AWOS Critical Area
- Proposed Airfield Pavement
- Proposed Buildings
- Proposed Road/Auto Parking
- Aeronautical Reserve
- Non-Aeronautical Reserve
- Mixed Use
- 35' BRL (1-mile visibility minimum)
- 35' BRL (3/4-mile visibility minimum)

T-Hangars
60' x 520'

Redevelopment Area

N Glen Harbor Blvd

35' BRL

500'

35' BRL

Relocate Segmented Circle
and Lighted Wind Cone

R1 R2 R3 R4 R5

A A2 A3 A4 A6 A7 A8 A9

Runway 2-20 (7,150' x 100')

B1 B2 B3 B4 B5 B6 B

Self-Service Fuel

300'

W. Glendale Ave

8.0 Acres

35' BRL

110'

35' BRL

Perimeter Road

35' BRL

35' BRL

33.8 Acres

New River Rd

New River

T-Hangars
60' x 400'

Executive Box Hangars
80' x 80'

Executive Box Hangars
100' x 100'

Fuel Farm

Lift Station

Vertiport Facility
120' x 85'

Vertiport

Conventional Hangars
200' x 120'

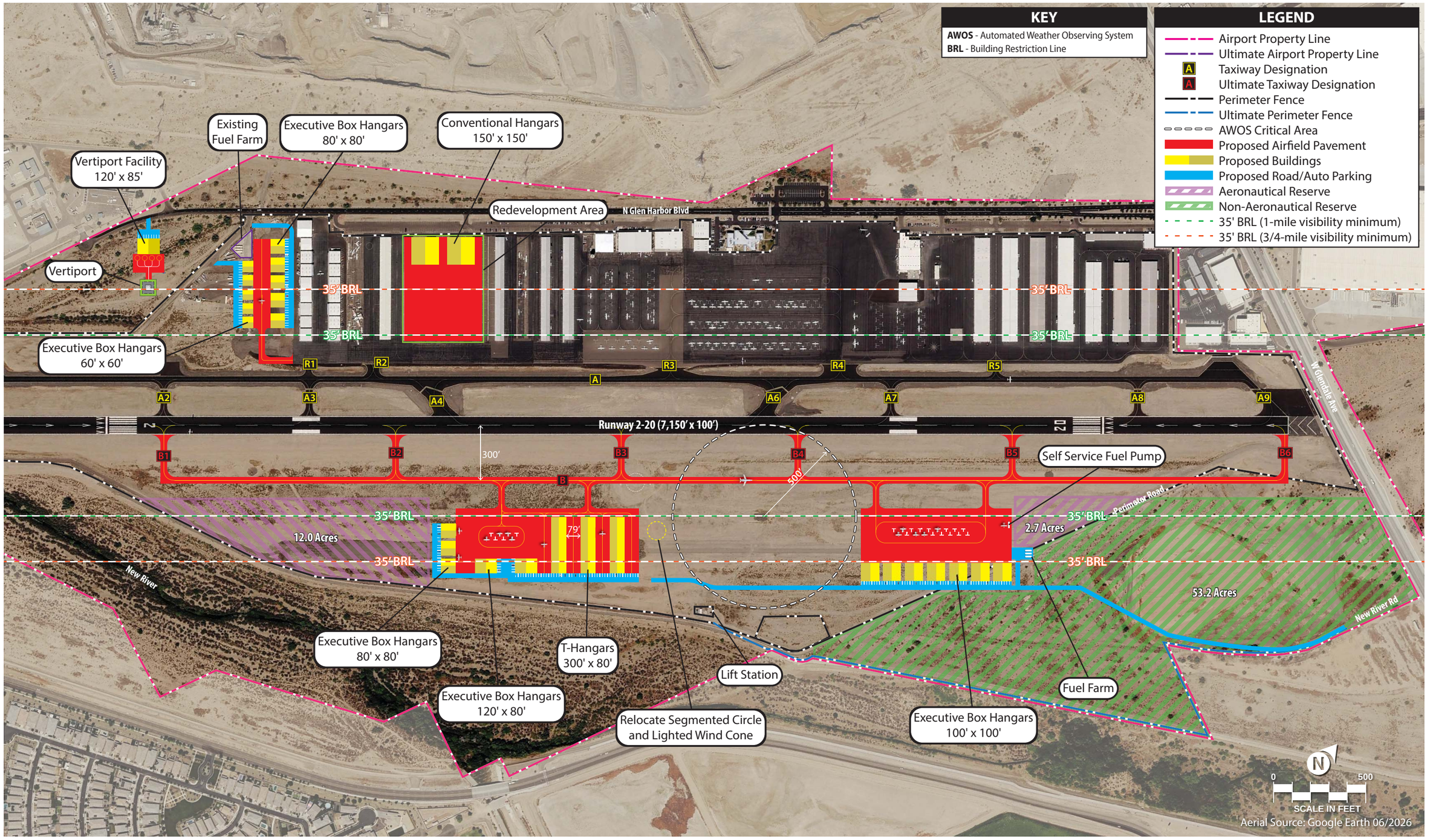
22.5 Acres

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SCALE IN FEET

Aerial Source: Google Earth 06/2026


KEY
AWOS - Automated Weather Observing System
BRL - Building Restriction Line
LEGEND
Airport Property Line
Ultimate Airport Property Line
Taxiway Designation
Ultimate Taxiway Designation
Perimeter Fence
Ultimate Perimeter Fence
AWOS Critical Area
Proposed Airfield Pavement
Proposed Buildings
Proposed Road/Auto Parking
Aeronautical Reserve
Non-Aeronautical Reserve
35' BRL (1-mile visibility minimum)
35' BRL (3/4-mile visibility minimum)
Existing Fuel Farm
Executive Box Hangars 80' x 80'
Conventional Hangars 150' x 150'
Vertiport Facility 120' x 85'
Redevelopment Area
N Glen Harbor Blvd
Vertiport
Executive Box Hangars 60' x 60'
35'BRL
R1
R2
R3
R4
R5
A
A2
A3
A4
A6
A7
A8
A9
W Glendale Ave
Runway 2-20 (7,150' x 100')
B1
B2
B3
B4
B5
B6
B
300'
500'
Self Service Fuel Pump
Perimeter Road
12.0 Acres
2.7 Acres
53.2 Acres
79'
New River
New River Rd
Executive Box Hangars 80' x 80'
T-Hangars 300' x 80'
Lift Station
Executive Box Hangars 120' x 80'
Relocate Segmented Circle and Lighted Wind Cone
Fuel Farm
Executive Box Hangars 100' x 100'
N
0
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SCALE IN FEET
Aerial Source: Google Earth 06/2026

row of 18 nested tiedown positions. The south apron encompasses approximately 14,440 sy and incorporates potential tiedown facilities with one row of eight nested tiedown positions. Both of these apron areas are intended to serve the medium- and low-activity levels. The third proposed apron area is located on the west side of the airport, in the area designated for redevelopment. This apron encompasses approximately 21,580 sy.

- AAM facilities are proposed on the southwest side of airport property with access from Glen Harbor Boulevard. In this location, the TLOF is approximately 750 feet from the Runway 2-20 centerline.

- The AWOS is proposed to remain in its existing location.

- The segmented circle and primary wind cone are proposed to be relocated east of their existing location, near the proposed AWOS site, remaining outside of the AWOS critical area. This location also keeps the segmented circle and primary wind cone outside of the ultimate runway and taxiway safety areas.

- Construction of secondary aircraft fuel storage/dispensing facilities on the east side of the airport, adjacent to the north apron.

- Designation of land use reserve areas which include approximately 14.7 acres set aside for future aeronautical development and 53.2 acres reserved for future non-aeronautical development opportunities.

Landside Alternative 4

Landside Alternative 4 is depicted on **Exhibit 4K**. This alternative accounts for the construction of a parallel runway on the east side of Runway 2-20, and considers the following:

- Full-length parallel Taxiway B is proposed to serve potential parallel Runway 2R-20L, while a partial-parallel taxiway (Taxiway C) would provide access from the runway to proposed landside facilities on the east side.

- As the proposed parallel runway dominates the developable area on the east side, there is less opportunity for hangar development in this area. However, several proposed hangars and associated apron pavement are shown, including an 18,000 sf conventional hangar and several executive box hangars for storage of smaller aircraft.

  A new potential configuration of proposed hangars is shown on the west side. Immediately south of the existing corporate hangars, conventional and executive box hangars are depicted. This includes five rows of executive box hangars, with access via two new taxilanes and a proposed apron. Conventional hangars are also proposed for this apron area. As with previous alternatives, redevelopment potential between hangar rows Bravo and India is also depicted. In this alternative, this area is proposed to be developed with four rows of executive box hangars. Finally, a T-hangar is shown where the uncovered tiedowns on row Charlie are located.

In total, this alternative offers approximately 388,000 sf of additional aircraft hangar storage.

- Approximately 17,470 sy of additional apron development to support the proposed hangar facilities located west of Runway 2-20 and east of the potential future parallel runway. The apron shown on the west side encompasses approximately 8,500 sy and is intended primarily to provide operational space for associated hangar development. The east side apron would provide approximately 8,640 sy and similarly provides apron capacity to support the proposed hangar facilities, as well 12 tiedown positions.

- A vertiport is depicted on the east side, opposite of the access road supporting proposed landside facilities. The TLOF is separated from the runway by approximately 1,450 feet.

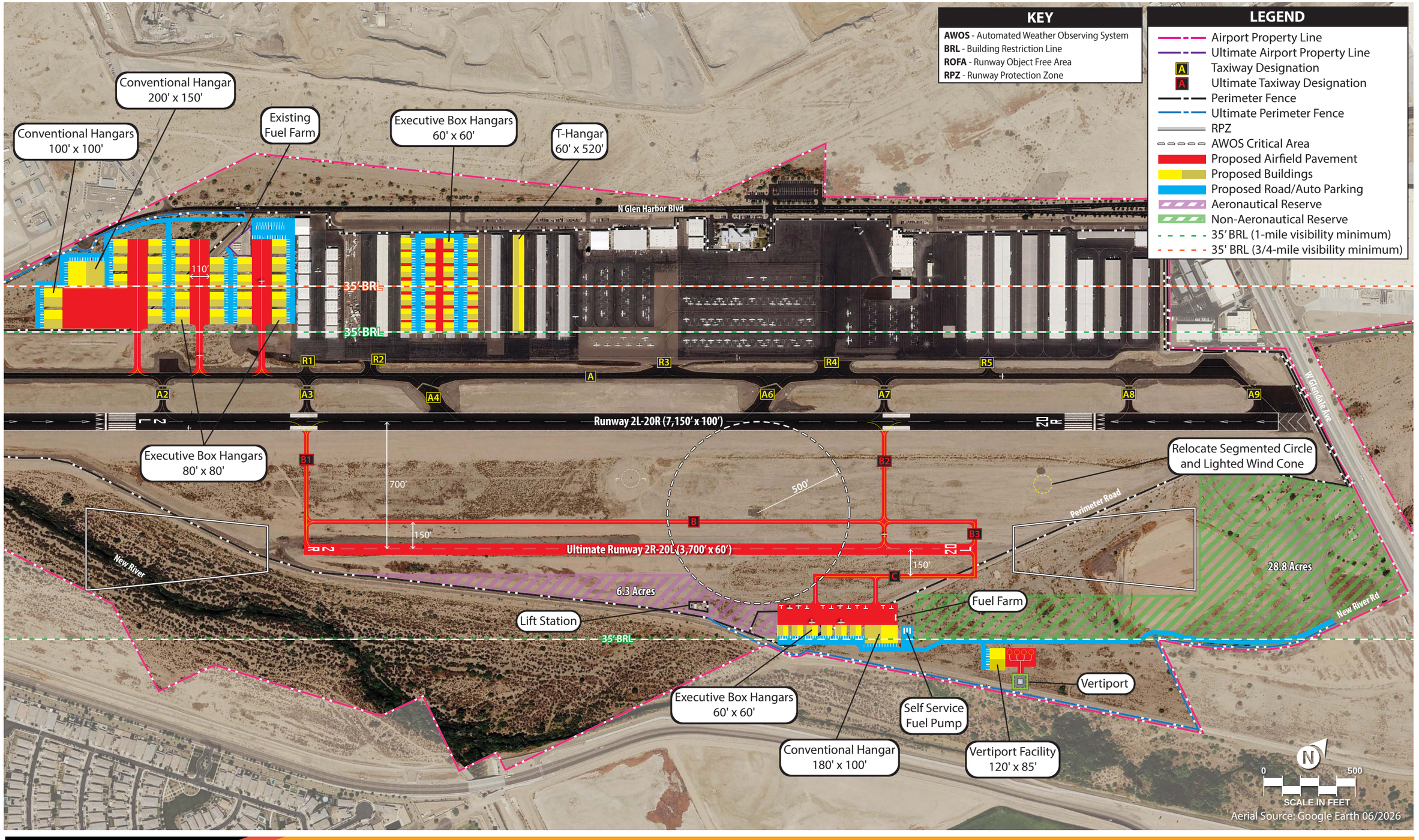
- To accommodate the proposed development east of Runway 2-20, the existing AWOS is relocated approximately 2,150 feet north of its current position.

- Approximately 28.8 acres in the northern portion of the east development area is designated as non-aeronautical reserve, providing opportunities for potential revenue-generating uses that do not require direct airfield access. An additional 6.3 acres, situated immediately south of the proposed apron and hangar facilities associated with the parallel runway, is designated as aeronautical development reserve.

LANDSIDE ALTERNATIVES SUMMARY

The four landside development alternatives evaluated for GEU provide varying approaches to accommodating projected aviation demand while maximizing the efficient utilization of available airport property. Landside Alternatives 1, 2, and 3 propose a new 35-foot-wide parallel Taxiway B along the east side of Runway 2-20, maintaining a 300-foot centerline separation to meet applicable FAA design criteria for a C-II runway and parallel taxiway configuration. Landside Alternative 4 incorporates a potential parallel runway east of the existing runway, requiring a revised taxiway configuration with appropriate separation distances from both runways. Each alternative provides opportunities for additional aircraft hangar development, with proposed storage capacity ranging from approximately 275,400 sf to572,450 sf. The alternatives vary in their distribution of conventional, executive box, and T-hangar facilities, as well as the extent to which existing airport property is utilized or redeveloped to accommodate the anticipated high-, medium-, and low-activity levels.

Additional apron development is incorporated into each alternative to accommodate projected aircraft parking and operational requirements throughout the planning period. Proposed apron development ranges from approximately 17,470 sy to 63,800 sy, with varying configurations of aircraft tiedown positions and apron areas intended to serve the different activity levels. Each alternative also considers the integration of AAM facilities, including a vertiport, aircraft parking, and associated landside infrastructure. Additional infrastructure improvements across the alternatives include implementation of centralized aircraft fueling facilities and new airport access roadways and vehicle parking facilities, along with relocation of equipment to support landside facility development, as necessary.


KEY
AWOS - Automated Weather Observing System
BRL - Building Restriction Line
ROFA - Runway Object Free Area
RPZ - Runway Protection Zone
LEGEND
Airport Property Line
Ultimate Airport Property Line
Taxiway Designation
Ultimate Taxiway Designation
Perimeter Fence
Ultimate Perimeter Fence
RPZ
AWOS Critical Area
Proposed Airfield Pavement
Proposed Buildings
Proposed Road/Auto Parking
Aeronautical Reserve
Non-Aeronautical Reserve
35' BRL (1-mile visibility minimum)
35' BRL (3/4-mile visibility minimum)
Conventional Hangar
200' x 150'
Conventional Hangars
100' x 100'
Existing
Fuel Farm
Executive Box Hangars
60' x 60'
T-Hangar
60' x 520'
N Glen Harbor Blvd
110'
35'-BRL
35'-BRL
R1
R2
R3
R4
R5
A
A2
A3
A4
A6
A7
A8
A9
W Glendale Ave
Runway 2L-20R (7,150' x 100')
Executive Box Hangars
80' x 80'
B1
B2
B
B3
C
700'
500'
150'
150'
Ultimate Runway 2R-20L (3,700' x 60')
Relocate Segmented Circle
and Lighted Wind Cone
Perimeter Road
New River
6.3 Acres
28.8 Acres
New River Rd
Lift Station
35'-BRL
Fuel Farm
Vertiport
Executive Box Hangars
60' x 60'
Self Service
Fuel Pump
Conventional Hangar
180' x 100'
Vertiport Facility
120' x 85'
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SCALE IN FEET
Aerial Source: Google Earth 06/2026

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Collectively, the four alternatives provide different opportunities to accommodate GEU's long-term landside facility requirements while balancing airfield operational considerations, development capacity, and future land use flexibility. Designated aeronautical, non-aeronautical, and mixed-use development reserves are incorporated to preserve opportunities for future expansion and potential revenue-generating uses. Ultimately, these landside alternatives provide a framework for evaluating the airport's future landside development needs, with consideration given to FAA design standards, operational efficiency, available property, infrastructure requirements, and the airport's ability to accommodate projected aviation demand throughout the planning period.

SUMMARY

The alternatives presented in this chapter establish a range of potential development strategies for addressing GEU's existing facility deficiencies and accommodating anticipated aviation demand throughout the planning period. The next step in the planning process is to identify a recommended development concept through continued coordination with the PAC, the FAA, the ADOT – Aeronautics Group, and the public. This process will consider the operational, financial, environmental, and implementation concerns of the proposed alternatives to establish a consolidated development plan that reflects the airport's long-term objectives. Following the identification of the recommended development concept, a 20-year capital improvement program (CIP) will be prepared to establish a prioritized schedule of projects based on anticipated aviation demand, facility requirements, and project necessity. Finally, a financial analysis will identify potential funding sources and evaluate the local funding requirements necessary to implement the recommended development concept.