Chapter Four

Airport Alternatives

In the previous chapter, airside and landside facilities required to satisfy aviation demand through the long-range planning period were identified. The next step in the planning process is to evaluate reasonable ways these facilities can be provided. Numerous combinations of design alternatives are possible, but the alternatives presented here are those with the perceived greatest potential for implementation.

Any development proposed for a master plan evolves from an analysis of projected needs for a set period of time. Though the facility requirements were determined by utilizing industry-accepted statistical methodologies, unforeseen future events could impact the timing of the needs identified. The master planning process attempts to develop a viable concept for meeting the needs generated by projected demands for the next 20 years; however, no plan of action should be developed that may be inconsistent with the future goals and objectives of Apple Valley Airport (APV).

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 APV that addresses forecast aviation demand. As the owner and operator, San Bernardino County provides overall guidance for the operation and development of the airport. It is of primary concern that APV is marketed, developed, and operated for the betterment of the region and its users. The following basic planning objectives have been defined.

- Maintain a safe, attractive, and efficient aviation facility, in accordance with applicable federal, state, and local regulations.
- Develop a facility that is responsive to the current and long-term needs of all current and potential aviation users.

- Reflect and support the long-term planning efforts currently applicable to the region.
- Develop a facility with a focus on self-sufficiency in both operational and developmental cost recovery.
- Ensure that future development is environmentally compatible.
- Preserve and protect public and private investments in existing airport facilities.
- Promote economic development for the Apple Valley region.

The airside considerations relate to those airfield/airspace elements that contribute to the safe and efficient transition of aircraft and passengers from air transportation to the landside facilities at an airport. These include the established design standard for the airport, the instrument approach capability, the capacity of the airfield, the length and strength of the runways, the navigational aids, and the layout of the taxiways and aprons. Each of these elements was introduced in previous chapters, and various facility needs were established.

The landside considerations relate to those facilities that provide support to the aviation functions of an airport. These include terminal services, hangars, and fueling. The previous chapter introduced these elements and identified specific needs, based on the forecast future aviation demand. The goal now is to identify alternatives for locating these facilities.

Each functional area (airside and landside) interrelates and affects the development potential of the others. Alternatives related to the runway/taxiway system are examined first, and then potential landside facility layouts are considered. Finally, a preferred alternative is presented.

Not all airside or landside elements will require a detailed alternatives analysis. The alternatives analysis is reserved for presenting viable solutions to specific problems or challenges. An explanatory narrative is provided for those airside or landside elements for which only one solution is reasonable, or no alternative is necessary. **Exhibit 4A** summarizes the primary planning considerations for the airside and landside alternatives.

NON-DEVELOPMENT ALTERNATIVE

The non-development alternative essentially considers making no new capital investments at APV. Limited maintenance and upkeep would continue so that APV remains safe for aviation activity and continues to meet its grant assurances. No new hangars or apron area would be planned to be built by the airport sponsor; however, hangar construction by a private entity would not be prohibited. The result of the non-development alternative is that APV would be unable to meet the current and forecast demand for aviation services in the area.

The primary reason an airport might choose a non-development alternative is to ultimately not be bound by the grant assurances associated with the acceptance of airport development grants. Grant assurances are part of the grant package contract to which the airport sponsor commits when accepting a development grant from the Federal Aviation Administration (FAA). As such, airport sponsors are bound

Key Planning Issues

Airfield Considerations

- Plan for a transition from B-II design standards to C-II design standards for Runway 18-36.
- Decouple the RSAs for the runways.
- Examine runway extension options for Runway 18-36 to bring the total length to 8,800 feet.
- Examine runway extension options for Runway 8-26 to bring the total length to 4,600 feet.
- Redesign connecting taxiways to meet current FAA standards (90-degree intersections).
- Protection of runway approaches.
- Examine the feasibility of opening Runway 8-26 to nighttime operations.

Landside Considerations

- Identify future hangar development areas and identify the proper mix of hangar types needed.
- Consider a route for a perimeter service road.
- Consider apron expansion.
- Vehicle parking lot expansion.
- Location for a new rotating beacon.
- Additional fuel storage capacity.

to maintain the useful life of the facilities developed or equipment acquired for an airport development project. Useful life is defined in FAA Order 5100.38D, *Airport Improvement Handbook*, Table 3-8, and varies from a minimum of three years to in perpetuity from the date of acceptance of a grant offer of FAA funds for a project. Many pavement infrastructure projects have a useful life of 20 years. There is no limit on the duration of the terms, conditions, and assurances with respect to real property acquired with federal funds.

The initial property parcel of 417 acres was acquired by the county in 1969 with assistance from a federal grant. Since that time, an additional 362 acres of land have been acquired, no part of which was federally funded. The airport currently encompasses 779 acres.

Under a non-development alternative, the most likely scenario would involve the airport letting development grant assurances run out, but the airport may still be bound by assurances tied to federally purchased land. The city would still have to maintain the airport in a safe manner, likely without future FAA financial participation.

As outlined in Table 1A in Chapter One, the airport has received over $2.4 million in development grants since 2002. These grants represent a direct economic stimulus that has lasting positive economic impacts. The non-development alternative means that the airport would forgo future grants for airport development, which would have a negative economic impact that would become more noticeable over time.

San Bernardino County has a vested interest in maintaining and improving airport facilities for both recreational and business aviation users. Business aviation is a rapidly growing segment of activity at the airport. Without a commitment to ongoing improvement of APV, users will be constrained from taking full advantage of the airport's air transportation capabilities.

The unavoidable consequence of the non-development alternative is that the capability of APV would diminish over time. Its ability to serve the general aviation and business aviation markets would deteriorate, which would lead to fewer people using APV and would ultimately negatively impact the local economy. Safety concerns would arise, especially if routine maintenance were deferred, and the liability for damage to aircraft or accidents would increase. The long-term consequences of the non-development alternative would reduce the quality of the existing facilities over time, producing undesirable results.

The non-development alternative does not align with the goals and objectives of the airport; therefore, the non-development alternative is not carried forward in this master planning effort.

AIRSIDE ALTERNATIVES

Generally, airside issues relate to those airport elements that contribute to the safe and efficient transition of aircraft and passengers from air transportation to the landside facilities at an airport. These elements include runways, taxiways, aprons, hold bays, instrument approaches, and navigational aids. Each of these elements was introduced in previous chapters. This section will examine several airside issues specific to APV and will present several alternatives. **Exhibit 4A** presents a summary of the major airside considerations.

AIRFIELD DESIGN STANDARD TRANSITION

The design standards for a runway and airport are based on the determination of the current and future critical aircraft. The critical aircraft is defined as the aircraft model, or family of aircraft with similar characteristics, that accounts for at least 500 annual operations at an airport. In Chapter Two – Forecasts, it was demonstrated that the current critical aircraft is classified as B-II-2A, which is best represented by a turboprop, such as the King Air 300. The future critical aircraft is classified as C-II-2A, which is best represented by a large business jet, such as the Cessna Citation Sovereign 680. There is a significant difference between the design standards for these two critical aircraft, as previously presented in Table 3C and summarized in **Table 4A**. The timing of this transition is not in the control of the airport; it happens when there are 500 or more annual operations by aircraft in aircraft approach category (AAC) C and larger.

TABLE 4A | Runway Design Standards

AIRPORT DATA	Runway 18-36 (Existing)	Runway 18-36 (Future)	Runway 8-26 (Existing/Future)
Critical Aircraft	B-II-2A	C-II-2A	B-I-1B
Runway Design Code	B-II-4000	C-II-2400	B-I-VIS
Visibility Minimums	⅞-Mile (Rwy 18)	¾-Mile (Rwy 18)	Visual
Runway Width	75 **(150)**	100 **(150)**	60
RUNWAY DESIGN STANDARDS			
Runway Safety Area (RSA)			
Width x Length Beyond End	150 x 300	500 x 1,000	120 x 240
Runway Object Free Area (ROFA)			
Width x Length Beyond End	500 x 300	800 x 1,000	400 x 240
Runway Protection Zone (RPZ)			
Length x Inner Width x Outer Width	1,700 x 1,000 x 1,510 (18) 1,000 x 500 x 700 (36)	1,700 x 1,000 x 1,510 (18) 1,700 x 500 x 1,010 (36)	1,000 x 500 x 700
RPZ Area (Acres)	48.978 (18)/ 13.77 (36)	48.978 (18)/ 29.465 (36)	13.77

Note: All dimensions in feet unless otherwise noted.
BOLD = current width on Runway 18-36

For Runway 18-36, the runway safety area (RSA) width expands from 150 feet to 500 feet and the length beyond the runway ends changes from 300 feet to 1,000 feet. The ROFA expands from 500 feet in width to 800 feet in width and its length changes from 300 feet to 1,000 feet beyond the runway ends. The airfield layout is able to accommodate these changes to the RSA and ROFA. The RSA and the ROFA will extend through Runway 8-26, which is acceptable as long as the grading and other features of the RSA and ROFA meet the standard. It should be noted that RSAs can overlap if the runways physically cross each other.

In both the current condition and the planned future condition, the RSAs for both runways meet the definition of "overlapping RSAs," meaning that the RSAs overlap but the runways do not converge. FAA guidance in AC 150/5300-13A, *Airport Design*, indicates that "overlapping RSAs introduce safety risks and potential operational limitations." The standard for rectifying the overlapping RSA condition is outlined as follows:

- Configure runway ends, taxiways, and holding positions to allow taxiing and holding aircraft to remain clear of all RSAs.
- Configure runway ends to facilitate holding positions that allow holding aircraft to be perpendicular to the runway centerline.
- For existing overlapping RSA conditions, prioritize solutions that will fully meet the design standard of completely removing the overlapping condition.

The runway protection zones (RPZs) are the trapezoidal areas beyond the runway ends that are for the protection of people and property on the ground in the area leading to the runway end. RPZs should be cleared in such a manner that people would not congregate in that area. Currently, all the RPZs are on airport property, except the RPZ for Runway 18. Small portions of this RPZ (8.1 acres) at the edges are off airport property. This RPZ still meets the design standard; however, the airport should consider ultimately acquiring the RPZ land that is not owned by the airport. In the future, the RPZ can change in size based on two scenarios:

- The natural transition to an RDC of C-II; or
- Any planned change in the instrument approach visibility minimums.

Runway 18 is planned to have visibility minimums of not lower than ¾-mile. The RPZ size with the planned visibility minimums is the same as the RPZ with the current ⅞-mile visibility minimums, so there is no change to the RPZ for Runway 18, even with a change in the critical aircraft. For Runway 36, the RPZ becomes larger with the transition to C-II, extending 1,700 feet rather than the current 1,000 feet. The visibility minimums for Runway 36 are planned to remain 1-mile or greater (currently visual). No changes are planned to the RPZs serving Runway 8-26.

Exhibit 3C previously showed the non-standard conditions that currently exist. Later in this chapter, the airport alternatives will show methods to mitigate the non-standard conditions.

PREVIOUS AIRPORT PLANNING CONCEPTS

The current FAA approved airport layout plan (ALP) for APV originated from the 2006 master plan and identified the 2006 and 2026 critical aircraft as C-II. The ALP maintained both runways at their current length (which is the same as today). Following that study, FAA design standards changed significantly, and the county undertook a master plan update in 2012. Due to changing priorities at the time, the ALP from the 2012 master plan was never submitted to FAA for approval. The 2012 plan included a shift of the runway to decouple the RSAs and an extension of Runway 18-36 to a total length of 6,900 feet. It also applied C-II design standards in the long-term concept. **Exhibit 4B** shows both the 2006 approved ALP and the draft 2012 ALP.

Elements of both ALPs may be carried over to this master planning effort, if those elements still meet current FAA design standards and represent the best option.

SURVEY MONUMENTS

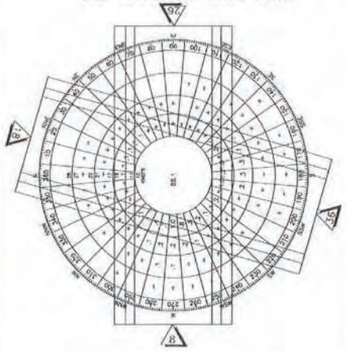
M1	STAINLESS STEEL ROD IN SLEEVE STAMPED "APV A 2002"
M2	HORIZONTAL CONTROL DISK SET IN CONCRETE STAMPED "APV B 2002"
M3	HORIZONTAL CONTROL DISK SET IN CONCRETE STAMPED "APV C 2002"
M4	STATION MARK STANDARD DISK SET IN CONCRETE STAMPED "NAVAJO 1985"

RUNWAY DATA

	RUNWAY 18/36 EXISTING	RUNWAY 18/36 FUTURE	RUNWAY 8/26 EXISTING	RUNWAY 8/26 FUTURE
APPROACH VISIBILITY MINIMUMS	1-MILE/VISUAL	1-MILE/1-MILE	VISUAL/VISUAL	VISUAL/VISUAL
FAR PART 77 APPROACH SLOPE	34:1(NP)/20:1	34:1(NP)/34:1(NP)	20:1(V)/20:1(V)	SAME
RUNWAY WIDTH X LENGTH	150' X 6,498'	SAME	60' X 4,059'	SAME
RUNWAY PAVEMENT TYPE	ASPHALT	SAME	ASPHALT	SAME
TAXIWAY PAVEMENT TYPE	ASPHALT	SAME	ASPHALT	SAME
PAVEMENT STRENGTH (in 1000 LBS.)	20s, 90D, 75S3T	SAME	40s, 60D, 100S3T	SAME
RUNWAY LIGHTING	MIRL	SAME	MIRL	SAME
EFFECTIVE RUNWAY GRADIENT %	1.48	SAME	0.29	SAME
MAXIMUM GRADE WITHIN RUNWAY LENGTH %	1.48 (ESTIMATED)	SAME	0.29 (ESTIMATED)	SAME
RUNWAY USE - OF - SITE	CRITERIA MET	SAME	CRITERIA MET	SAME
RUNWAY MARKING	NP/PI	NPI/PIN	N/A	SAME
VISUAL APPROACH AIDS	VASI 4L/VASI 4R	PAPI-4L/4R/VASI-8L/8R	PAPI 21/PAPI 3L	PAPI-3L/8L/VASI-3L/8L
INSTRUMENT APPROACH AIDS	GPS/NONE	GPS/GPS	NONE	SAME
AIRPORT REFERENCE CODE	C-II	SAME	B-I	SAME
CRITICAL AIRCRAFT	RNC AR 990/ERJ 35/45	SAME	CESSNA 421	SAME
WINGSPAN	64.5'	SAME	41.7'	SAME
APPROACH SPEED	133 kts	SAME	96 kts	SAME
MAX T/O WEIGHT	<60,000 lbs	SAME	7450 lbs	SAME
RUNWAY SAFETY AREA (RSA) WIDTH	500'/500'	SAME	120'/120'	SAME
RSA LENGTH BEYOND STOP END	1000'/1000'	SAME	240'/240'	SAME
RUNWAY OBJECT FREE AREA (OFA) WIDTH	800'/800'	SAME	500'/500'	SAME
OFA LENGTH BEYOND STOP END	1000'/1000'	SAME	240'/240'	SAME
OBSTACLE FREE ZONE (OFZ) WIDTH	400'/400'	SAME	400'/400'	SAME
OFZ LENGTH BEYOND STOP END	200'/200'	SAME	200'/200'	SAME
RUNWAY CENTERLINE TO HOLD LINE	250'	SAME	125'	SAME
RUNWAY END COORDINATES NGS 405 01/03 (NAD 83)	LAT. N 34°35'13.17" LON. W 117°10'57.16"	SAME SAME	LAT. N 34°34'10.41" LON. W 117°11'36.56"	SAME SAME
	LAT. N 34°34'13.42" LON. W 117°11'18.68"	SAME SAME	LAT. N 34°34'10.82" LON. W 117°10'49.42"	SAME SAME
RUNWAY ELEVATIONS END	3,061.7'/2,973.9'	SAME	2,957.7'/2,975.8'	SAME
NGS 405 01/03 (NAVD 88) HIGH POINT	3,061.7'	SAME	2,975.8'	SAME
LOW POINT	2,973.9'	SAME	2,957.7'	SAME
TOUCHDOWN ZONE ELEVATION	3,061.7'/3018.1'	SAME	2966.9'/2975.8'	SAME

NOTES:
1. This drawing reflects current planning standards applicable to Apple Valley Airport. This drawing is not intended to be used for construction documentation or navigation.
2. Aerial photography provided by Air Photo Services, Inc. dated 10-12-02.
3. All coordinate data is NAD83/NAVD88.

ALL WEATHER WIND ROSE



All Weather Wind Coverage Summary

Wind Coverage Provided Under All Weather Conditions	10.5-Knot	13-Knot	16-Knot
Runway 18/36	94.99%	96.93%	98.87%
Runway 8/26	93.67%	95.89%	98.59%
Combined	99.91%	99.94%	99.96%

Source: National Ocean and Atmosphere Administration, National Climatic Data Center Station 72382 George AFB, California. Period of Record 1962-1991 and Updated at (Area) Total number of observations 82,303

GRAPHIC SCALE IN FEET

IFR WIND ROSE

IFR WIND COVERAGE SUMMARY

Wind Coverage Provided Under All Weather Conditions	10.5-Knot	13-Knot	16-Knot
Runway 18	84.08%	83.88%	87.28%
Runway 36	78.51%	80.54%	83.02%
Runway 18/36	88.42%	91.48%	95.25%
Runway 8	75.55%	76.83%	78.41%
Runway 26	91.06%	92.46%	94.12%
Runway 8/26	95.56%	97.16%	99.03%
Combined	99.67%	99.77%	99.82%

Source: National Oceanic and Atmospheric Administration, National Climatic Data Center Station 72382 Georgi AFB, California. Period of Record 1952-1991 and Updated at (Area) "Lacking of less than 5,844 (i.e. not equal to or greater than 250 for calm or variability less than three miles, but equal to or greater than one half mile. Total number of observations 82,303

FAA APPROVAL STAMP

Approved conditionally JUN 22 2006
Subject to comments contained in our letter dated: 6/22/06
FEDERAL AVIATION ADMINISTRATION
Western-Pacific Region
By _____
Supervisor, Standards Section

SIGNATURES

APPLE VALLEY AIRPORT
AIRPORT LAYOUT PLAN

SUBMITTED BY: _____ DATE 6/30/06
APPROVED BY: DIRECTOR OF AIRPORTS DATE

_____ 5/30/06
APPROVED BY: AIRPORT COMMISSION DATE

_____ 6/9/06
APPROVED BY: CHAIRMAN, SAN BERNARDINO BOARD OF SUPERVISORS DATE

BUILDING LEGEND

NO.	DESCRIPTION	TOP ELEVATION *
1	TERMINAL	2988'
2	AIRPORT MAINTENANCE BUILDING	2988'
3	FBO HANGAR	3001'
3A	FBO HANGAR	2992'
4	T-HANGAR	2992'
5	T-HANGAR	3000'
6	T-HANGAR	2998'
6A	PORT-A-PORT	3006'
6B	PORT-A-PORT	3004'
6C	PORT-A-PORT	3001'
7	FBO HANGAR	3025'
7A	PORT-A-PORT	3011'
7B	PORT-A-PORT	3013'
7C	PORT-A-PORT	3015'
7D	PORT-A-PORT	3017'
7E	PORT-A-PORT	3018'
7F	PORT-A-PORT	3020'
8	HANGAR	3036'
F	FUEL STORAGE AREA	

* ESTIMATED AMSL

AIRPORT DATA

	EXISTING	FUTURE
AIRPORT ELEVATION (AMSL) NGS 405 (NAVD 88)	3,061.7'	SAME
AIRPORT REFERENCE POINT (ARP) NGS 405 (NAD 83)	LAT. 34°34'13.42" LON. 117°11'18.68"	SAME
AIRPORT REFERENCE CODE	C-II	SAME
NPIAS CATEGORY	GA	SAME
MEAN MAX. TEMPERATURE (HOTTEST MONTH)	97.9° JULY	SAME
TAXIWAY LIGHTING	NONE	SAME
TAXIWAY MARKING	C/L	SAME
AIRPORT & TERMINAL NAVAIDS	GPS	SAME

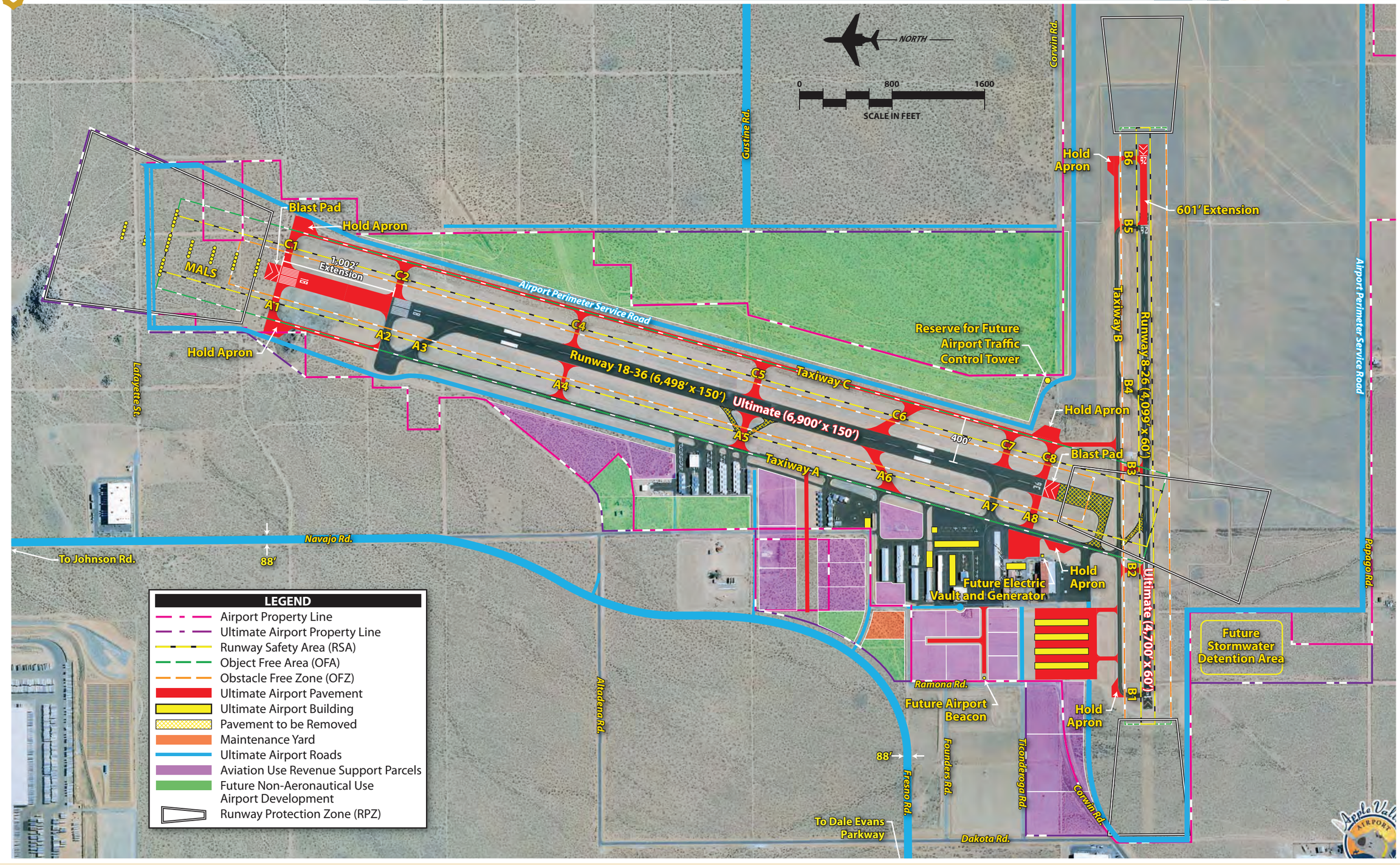
LAYOUT PLAN LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AIRPORT SECURITY FENCE	X	XX
AIRPORT BUILDINGS		
AIRFIELD PAVEMENT		
PAVED ROADS		
RUNWAY PROTECTION ZONE		SAME
BUILDING RESTRICTION LINE	BRL	SAME
OBSTACLE FREE ZONE	OFZ	SAME
RUNWAY SAFETY AREA	RSA (S)	SAME
RUNWAY OBJECT FREE AREA	ROFA (S)	SAME
AIRPORT REFERENCE POINT (ARP)		SAME
AIRPORT BEACON		SAME
LIGHTED WIND CONE & SEGMENTED CIRCLE		SAME
WIND CONE		SAME
PRECISION APPROACH PATH INDICATOR (PAPI)	PAPI 3	FUTURE PAPI 3
VISUAL APPROACH SLOPE INDICATOR (VAS)	VASI 3	SAME
RUNWAY END IDENTIFIER LIGHTS (REIL)	NONE	EX
TAXIWAY HOLDLINE & SIGN		SAME
SECTION CORNER		SAME

REVISIONS

NO.	DESCRIPTION	DATE
1	Original Airport Layout Plan by P & D Aviation, Orange, CA	12/92

The preparation of this plan was financed in part through a planning grant from the Federal Aviation Administration as provided under Section 505 of the Airport and Airway Improvement Act of 1982, as amended. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this plan by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public laws.


NORTH
0
800
1600
SCALE IN FEET
Gustine Rd.
Corwin Rd.
Airport Perimeter Service Road
Blast Pad
Hold Apron
C1
1,002' Extension
MALS
A1
A2
A3
A4
A5
A6
A7
A8
C2
C4
C5
C6
C7
C8
Runway 18-36 (6,498' x 150')
Ultimate (6,900' x 150')
400'
Taxiway A
Taxiway C
Reserve for Future Airport Traffic Control Tower
Hold Apron
Taxiway B
B6
B5
B4
B3
B2
B1
601' Extension
Runway 8-26 (4,099' x 60')
Blast Pad
Future Electric Vault and Generator
Ultimate (4,700' x 60')
Future Stormwater Detention Area
Future Airport Beacon
Ramona Rd.
Navajo Rd.
To Johnson Rd.
88'
Lafayette St.
Altadena Rd.
Founders Rd.
Ticonderoga Rd.
Fresno Rd.
Corwin Rd.
Papago Rd.
To Dale Evans Parkway
Dakota Rd.
LEGEND
Airport Property Line
Ultimate Airport Property Line
Runway Safety Area (RSA)
Object Free Area (OFA)
Obstacle Free Zone (OFZ)
Ultimate Airport Pavement
Ultimate Airport Building
Pavement to be Removed
Maintenance Yard
Ultimate Airport Roads
Aviation Use Revenue Support Parcels
Future Non-Aeronautical Use Airport Development
Runway Protection Zone (RPZ)

AIRSIDE ALTERNATIVE 1: B-II STANDARDS – SHIFT 360 FEET

The first airfield alternative considers a short-term solution to decoupling the runways. This alternative maintains the runway system with the current B-II design code. At a minimum, the RSAs for both runways should not overlap. The RSA surrounding Runway 18-36 extends into the RSA for Runway 8-26 by 70 feet; however, if an opportunity exists, the various runway safety areas – including the runway object free area (ROFA) and the runway obstacle free zone (OFZ), as well as the taxiway object free area (TOFA) – should also avoid conflicting with the safety areas of the other runway. To this end, Runway 18-36 is shown to be shifted to the north 360 feet. The runway is extended an additional two feet to bring the total runway length to 6,500 feet. At this length, the ROFA for Runway 18-36 is outside the TOFA for Taxiway B and the two runways can operate completely independently. **Exhibit 4C** shows this alternative.

The connecting taxiways to Runway 18-36 are redesigned. Existing Taxiway A2, the angled taxiway near the Runway 18 end, is planned to be removed, as the FAA preferred geometry is for connecting taxiways to be at 90-degree angles. Existing Taxiway A4, which is actually two angled taxiway exits, is planned to be replaced with a single taxiway exit at a 90-degree angle.

This alternative should be considered a short-term solution to decoupling the runways. It does not take into consideration the anticipated transition to a larger critical aircraft in category C-II. Subsequent alternatives presented here show options to accommodate that transition.

AIRSIDE ALTERNATIVE 2: B-II STANDARDS – 6,800-FOOT RUNWAY

The next alternative considered is also a short-term option that maintains the existing B-II runway design standards. This alternative not only considers shifting the runway 360 feet to decouple the runways, but also includes a 302-foot runway extension. This would bring the total runway length to 6,800 feet, which is the maximum length to accommodate the B-II critical aircraft, as outlined in Chapter Three – Facility Requirements. Like Alternative 1, the connecting taxiways are reconfigured to meet current FAA design standards. This alternative is depicted on **Exhibit 4D**.

AIRSIDE ALTERNATIVE 3: C-II STANDARDS – 8,800-FOOT RUNWAY – NORTH EXTENSION

The next two runway alternatives consider the potential transition to C-II design standards. As noted, the C-II runway design standards apply to an RSA that is 500 feet wide and extends 1,000 feet beyond the runway ends. This is more restrictive than the B-II RSA, which is 150 feet wide and extends 300 feet beyond the runway ends.

To make sure the RSA does not cross the TOFA for Taxiway B, the end of Runway 18-36 is shifted to the north 1,100 feet and extended on the north end by 3,402 feet, bringing the total runway length to 8,800 feet. This is the recommended runway length to accommodate 100 percent of business jets at 60 percent useful load, as outlined in Chapter Three. The taxiway connectors are reconfigured to a 90-degree intersection, as preferred by FAA guidance. **Exhibit 4E** depicts this alternative.

AIRSIDE ALTERNATIVE 4: C-II STANDARDS – 8,800-FOOT RUNWAY – SPLIT EXTENSION

Like Alternative 3, this alternative considers applying C-II design standards in anticipation of increased traffic by large business jets. A total runway length of 8,800 feet is planned; however, the additional runway length is split between both ends. On the Runway 36 end, the runway is extended 1,002 feet to the south, which creates an intersecting runway environment. This is acceptable and resolves the coupled RSA situation. The north end of the runway is then extended by 1,300 feet. **Exhibit 4F** shows this alternative.

The RPZ on the Runway 36 end would extend beyond airport property. Approximately 11.6 acres of RPZ land would be off airport property; this area includes a house and an adjacent salvage yard business. This property would need to be acquired so the airport can have direct control of the land uses within the RPZ.

RUNWAY 8-26 ANALYSIS

Runway 8-26 serves as a needed crosswind runway as documented in Chapter Three – Facility Requirements. This runway was constructed by the airport sponsor in 2001 and has historically been maintained through local funding. Runway 8-26 meets FAA design standards and criteria for a crosswind runway; therefore, it should be characterized by FAA as eligible for FAA funding.

The previous runway length analysis indicated that Runway 8-26, at 4,100 feet in length, is shorter than FAA guidance recommends. Utilizing FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, it was determined that a length of 4,600 feet is optimal. A 500-foot extension is considered for Runway 8-26 on the east end of the runway. The west end was considered but extending west would place the RPZ over Corwin Road, thus introducing incompatible land uses to the RPZ. While not strictly prohibited, where possible, planning should attempt to meet FAA design recommendations, therefore the extension is planned on the east end of the runway, where the RPZ has compatible land uses. **Figure 4-1** shows the 500-foot extension on the east end of Runway 8-26.

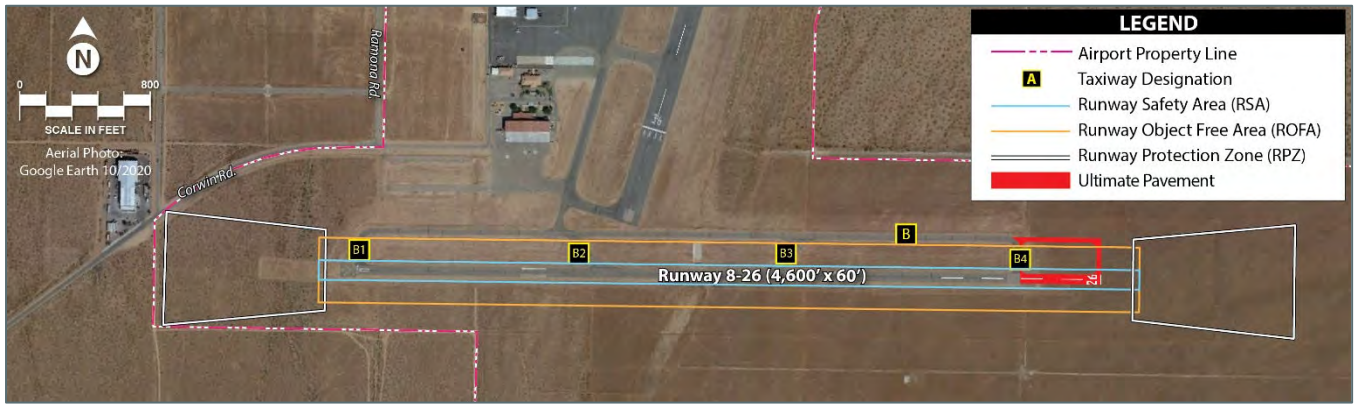
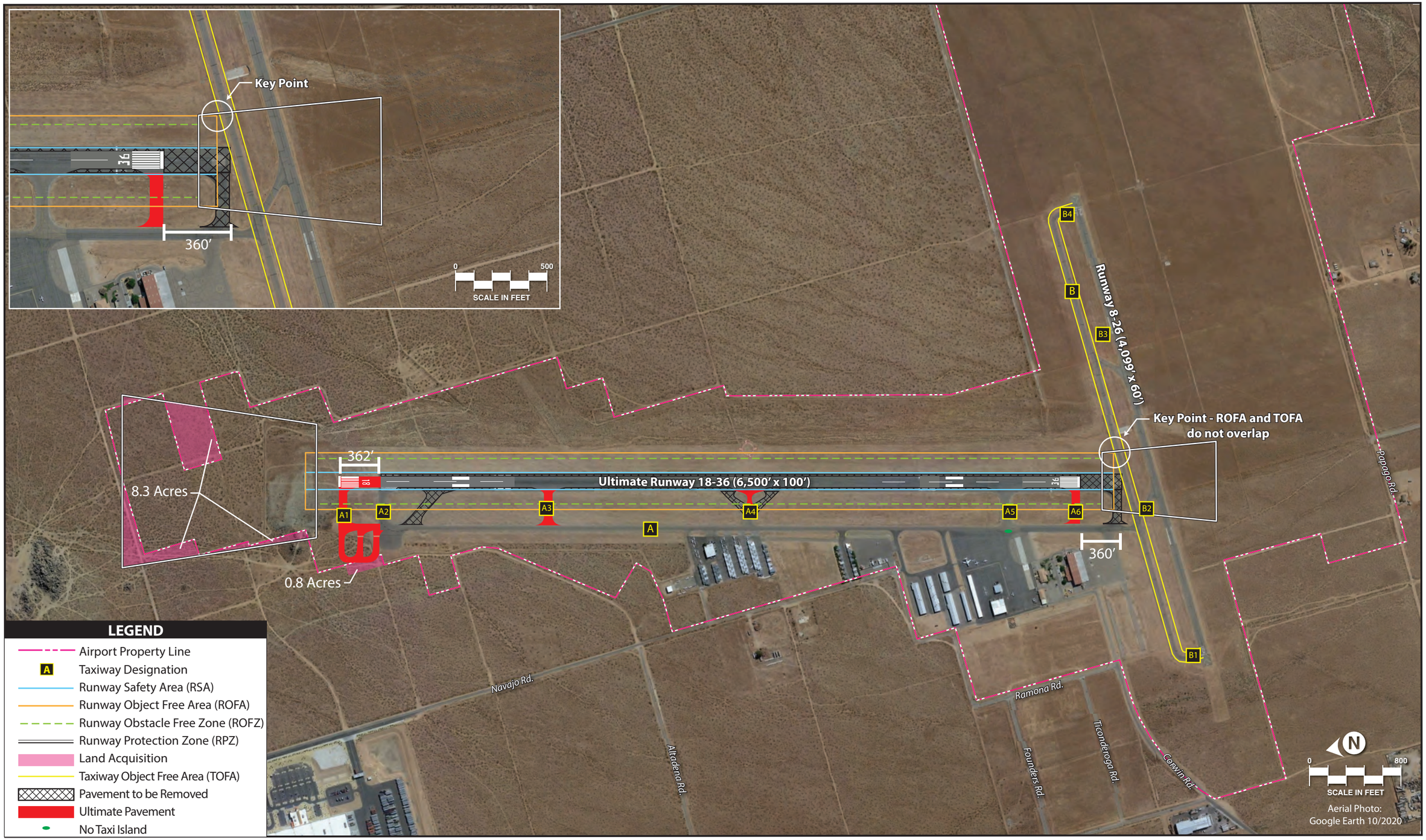
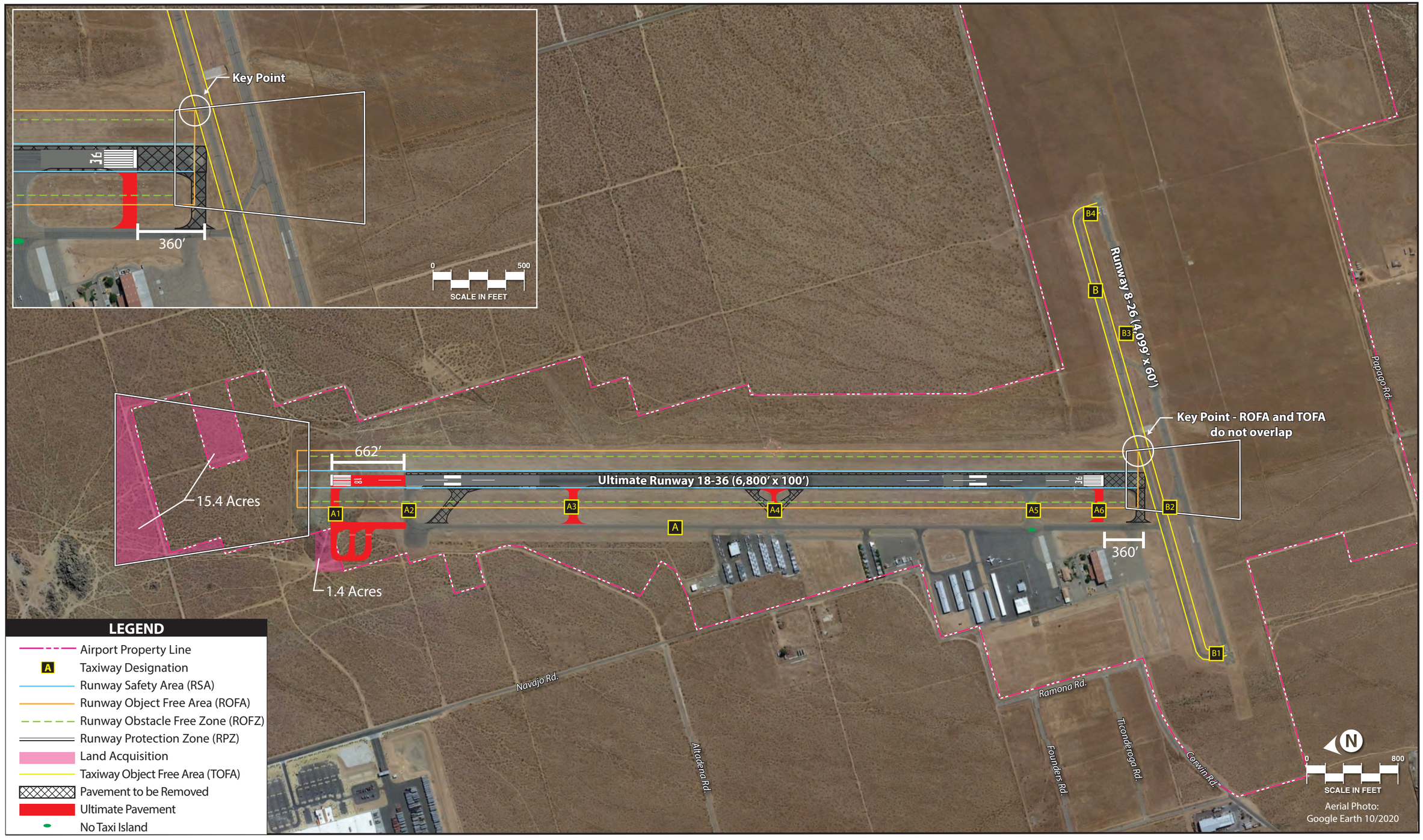


Figure 4-1: 500-foot Extension of Runway 8-26

Currently, Runway 8-26 does not have edge lighting and is not open for nighttime operations. A goal of this master plan is to re-examine this prohibition. There are significant hills to the east and west of the extended Runway 8-26 centerline. However, none of the hills penetrate the Federal Aviation Regulations (FAR) Part 77 protective surfaces surrounding the airport as shown in **Figure 4-2**. The Part 77 Approach and Horizontal surfaces extend 5,000 feet from the runway. The hills to the east are 1.36 miles (7,200


Key Point
36
360′
0
500
SCALE IN FEET
B4
B
B3
Runway 8-26 (4,099′ x 60′)
Key Point - ROFA and TOFA
do not overlap
Papago Rd.
362′
18
Ultimate Runway 18-36 (6,500′ x 100′)
36
A1
A2
A3
A4
A5
A6
A
B2
360′
8.3 Acres
0.8 Acres
B1
Navajo Rd.
Altadena Rd.
Ramona Rd.
Ticonderoga Rd.
Founders Rd.
Corwin Rd.
N
0
800
SCALE IN FEET
Aerial Photo:
Google Earth 10/2020
LEGEND
Airport Property Line
Taxiway Designation
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Runway Protection Zone (RPZ)
Land Acquisition
Taxiway Object Free Area (TOFA)
Pavement to be Removed
Ultimate Pavement
No Taxi Island


Key Point
360′
0
500
SCALE IN FEET
Runway 8-26 (4,099′ x 60′)
B4
B
B3
Key Point - ROFA and TOFA
do not overlap
Poppigo Rd.
662′
15.4 Acres
Ultimate Runway 18-36 (6,800′ x 100′)
A1
A2
A3
A4
A5
A6
A
B2
B1
360′
1.4 Acres
Navajo Rd.
Altadena Rd.
Ramona Rd.
Founders Rd.
Ticonderoga Rd.
Corwin Rd.
N
0
800
SCALE IN FEET
Aerial Photo:
Google Earth 10/2020
LEGEND
Airport Property Line
Taxiway Designation
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Runway Protection Zone (RPZ)
Land Acquisition
Taxiway Object Free Area (TOFA)
Pavement to be Removed
Ultimate Pavement
No Taxi Island

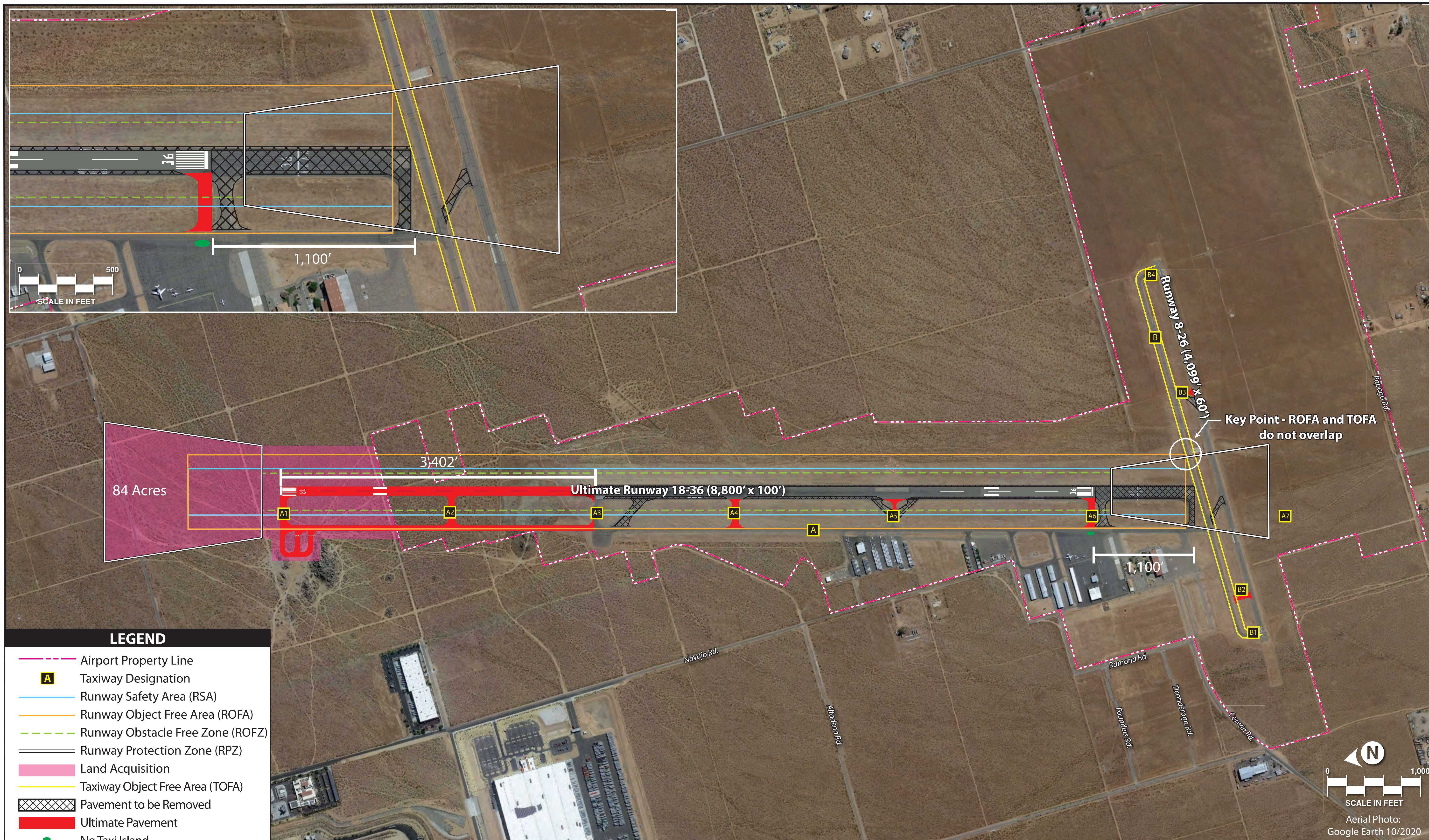


Exhibit 4E
ALTERNATIVE 3: ARC C-II 8,800' RUNWAY


12 Acres
1,002'
0
500
SCALE IN FEET
32 Acres
1,300'
Ultimate Runway 18-36 (8,800' x 100')
Runway 8-26 (4,099' x 60')
12 Acres
3.5 Acres
1,002'
B4
B
B3
B2
B1
A1
A2
A3
A5
A6
A7
A
Papago Rd.
Navajo Rd.
Alvarado Rd.
Ramona Rd.
Founders Rd.
Ticonderoga Rd.
Cowan Rd.
LEGEND
Airport Property Line
Taxiway Designation
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Runway Protection Zone (RPZ)
Land Acquisition
Ultimate Pavement
No Taxiway Island
N
0
1,000
SCALE IN FEET
Aerial Photo:
Google Earth 10/2020

feet) from the Runway 26 end and 1.52 miles (8,000 feet) west of the Runway 8 end. The nearest hills to the west are also approximately 800 feet south of the extended runway centerline. The Part 77 surfaces do not reach the hills and are clear of obstructions.

Because there are no immediate safety concerns with respect to the FAR Part 77 surfaces surrounding Runway 8-26, the runway can support nighttime operations. Additional airspace analysis by the FAA would be required to confirm this conclusion.

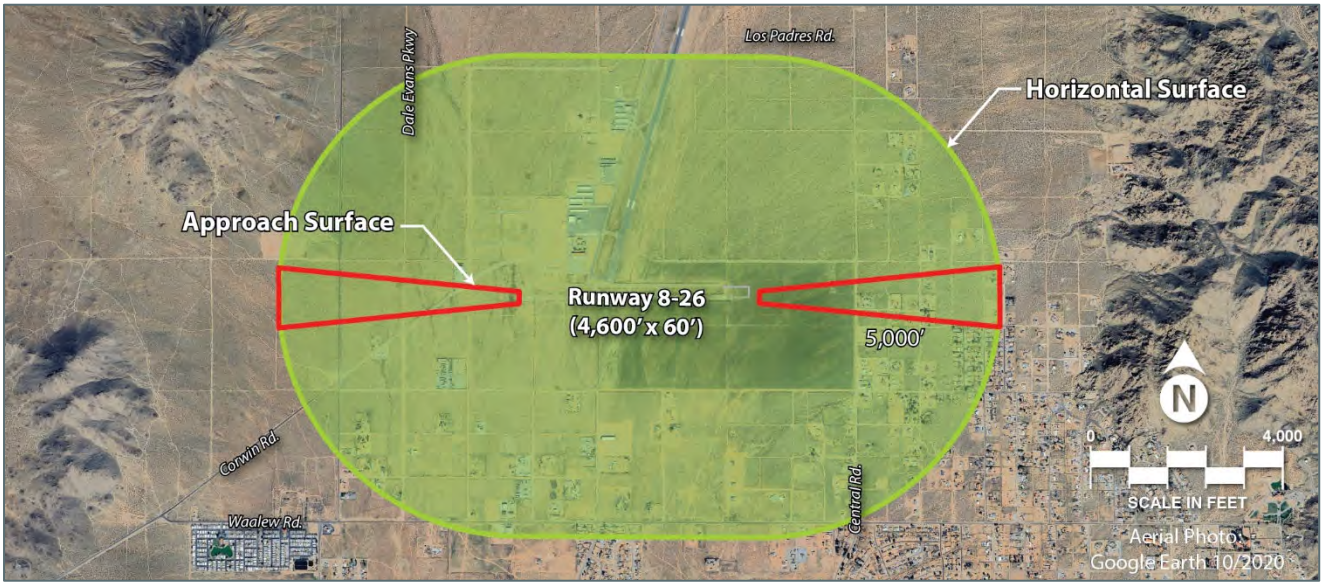


Figure 4-2: Runway 8-26 FAR Part 77 Airspace Analysis

AIRSIDE SUMMARY

The airside alternatives are focused on three primary elements:

1. Decoupling the safety areas of the two runways;
2. Extending the runway to meet the needs of the future critical aircraft, which is best represented by large business jets; and
3. Taxiway geometry improvements to meet current FAA guidelines.

There are two methods to decouple the runways. The first is to shift Runway 18-36 to the north so that the RSAs of both runways do not intersect. The second method is to extend the runway south, creating intersecting runways.

The ideal future runway length is 8,800 feet, which would meet the needs of 100 percent of the business jet fleet (60,000 pounds and less) at 60 percent useful load. The alternatives show that a total length of 8,800 feet can be achieved through a combination of shifting and extending the runway. A 500-foot extension is also considered on the east end of Runway 8-26.

Current FAA design standards for connecting taxiways were applied in the alternatives. The primary feature of the new taxiway geometry is to provide 90-degree intersections with runways so that pilots have full peripheral views of the runway prior to entering the runway environment.

The first airside alternatives presented show B-II design standards, which are the current applicable design standards. The forecasts of aviation demand showed that potential increases in business jet activity would lead to a transition to C-II design standards, which are more restrictive.

LANDSIDE ALTERNATIVES

Landside planning issues (summarized on **Exhibit 4A**) will focus on facility-locating strategies that follow a philosophy of separating activity levels. To maximize airport efficiency, it is important to locate facilities that are intended to serve similar functions close together. For example, larger hangars supporting airport businesses should be centrally located, while smaller box hangars and T-hangars should be set farther to the sides. Allowing new facilities to be constructed haphazardly on the next available spot at an airport may preclude the highest and best use of limited and valuable airport land. It is also important to plan for facilities that airport users desire and to group those facilities together, whether they are T-hangars, box hangars, or larger conventional hangars.

The orderly development of the airport terminal area (the areas parallel to the runway and along the flight line) can be the most critical, and probably the most difficult, development to control on the airport. A development approach of "taking the path of least resistance" can have a significant effect on the long-term viability of an airport. Allowing development without regard to a functional plan can result in a haphazard array of buildings and small ramp areas, which will eventually preclude the most efficient use of valuable space along the flight line.

Activity in development areas should be divided into three categories at an airport. The high activity area should be planned and developed as the area providing aviation services on the airport. An example of a high activity area is the aircraft parking apron, which provides outside storage and circulation of aircraft. Large conventional hangars that house fixed base operators (FBOs) or other airport businesses, or those used for bulk aircraft storage, would be considered high activity uses. A conventional hangar structure in the high activity area should be a minimum of 6,400 square feet (80 feet by 80 feet). If space is available, it is common to plan these hangars for up to 200 feet by 200 feet. The best location for high activity areas is along the flight line near midfield, for ease of access to all areas of the airfield.

The medium activity category defines the next level of airport use and primarily includes corporate aircraft operators that may desire their own box or conventional hangar storage on the airport. A hangar in the medium activity use area should be at least 50 feet by 50 feet, or a minimum of 2,500 square feet. The best location for medium activity use is off the immediate flight line, but with ready access to the runway/taxiway system. Typically, these areas will be adjacent to the high activity areas. Parking and utilities, such as water and sewer, should also be provided in this area.

The low activity use category defines the area for storage of smaller single- and twin-engine aircraft. Low activity users are personal or small business aircraft owners who prefer individual space in T-hangars or small box hangars. Low activity areas should be in less conspicuous areas or toward the ends of the flight line. This use category will require electricity but may not need water or sewer utilities.

At APV, all services and facilities are located on the west side of Runway 18-36. There are several undeveloped areas on the west side that can be used for new aeronautical development.

The aircraft storage requirements analyzed in Chapter Three indicated a need for 149,500 square feet of hangar space. The mix of hangar options may include T-hangars, executive box hangars, and/or larger conventional hangars. The most popular aircraft storage option is currently clear span executive box hangars. Airport businesses prefer larger conventional hangars, which can have a dual purpose that includes aircraft storage. T-hangars are still popular, especially for recreational pilots. Planning for a mix of hangar types is prudent.

An emerging trend in hangar construction is for airport sponsors to offer long-term land leases so that developers can build their own hangars to suit their specific needs. To facilitate this private development, airports will designate certain parcels for this type of development. The airport sponsor will often make certain improvements, such as extending access roads or utilities near the land lease parcel to make the parcel more attractive to the developer.

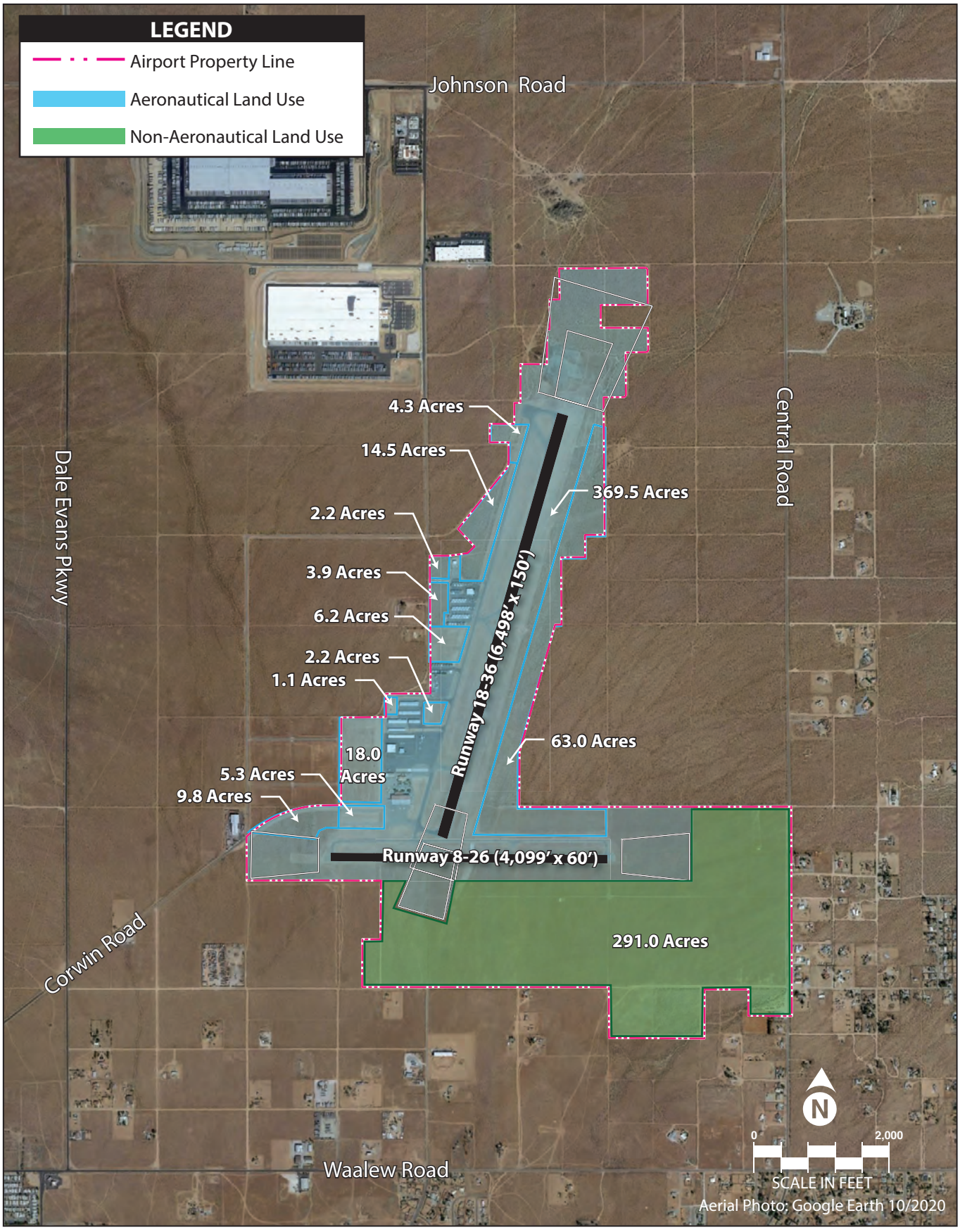
The following landside development alternatives consider these factors so that the airport is able to maximize its aeronautical land, while meeting demand in a fiscally responsible manner.

PRELIMINARY AIRPORT LAND USE CLASSIFICATION

Any airport that is included in the National Plan of Integrated Airport Systems (NPIAS) is eligible for federal development funding. As such, airport land is to be reserved for aeronautical purposes, first and foremost. Under certain circumstances, airport lands can be used for non-aeronautical revenue support purposes, if that land is more than what is projected to be needed for aeronautical purposes for the foreseeable future (at least 20-years). Prior to developing landside development alternatives, it is helpful to initially classify airport land and then focus future aeronautical development plans in the areas that are reserved for aeronautical development.

A general rule of thumb is to reserve all land parallel to a runway for aeronautical development. This is the land that is most desirable because it has ready access to the runway/taxiway system. Land that is set back farther from the runway/taxiway system may be considered for compatible non-aeronautical development, if it can be shown that the land will not be needed for aeronautical purposes. Typically, at least 700 feet from the runway centerline should be reserved for aeronautical development, which will allow for parallel taxiways, aircraft apron, hangars, vehicle parking, and an access road.

Exhibit 4G shows a preliminary land use plan for APV to help guide landside planning alternatives. All the land on the west side of Runway 18-36 should be considered for aeronautical development. This is where existing facilities are located and where utilities are most readily available. Land beyond the ends of the runways is reserved for aeronautical purposes, such as safety areas and protection zones. Land to the east of Runway 18-36 is also reserved for future aeronautical development; however, it should be noted that existing undeveloped land on the west side can easily accommodate the 20-year growth projection.



Source: Town of Apple Valley General Plan.

The land area south and east of Runway 8-26 that is not required for runway protection encompasses approximately 290 acres. This land is identified for non-aeronautical revenue support purposes. It is not anticipated that this land will be needed for aeronautical purposes; however, some flexibility is required if Runway 18-36 is extended to the south to decouple the runway safety areas. Ultimately, once a final recommended concept is determined that will be reflected on the ALP, a revised land use plan will be included in the ALP set. That land use plan is not regulatory and remains a recommendation that will require FAA review if non-aeronautical development is ever considered.

The aeronautical land is further subdivided into logical parcels. The undeveloped aeronautical parcels on the west side total 67.5 acres and the undeveloped aeronautical land on the east side totals 63.0 acres; therefore, a total of 130.5 acres of aeronautical land is available for development. The areas that are already developed, including roads and parking, encompass 369.5 acres. The total airport land is 790 acres.

LANDSIDE ALTERNATIVE 1

Landside Alternative 1, as shown on **Exhibit 4H**, depicts a potential future hangar layout, which includes a mix of hangar types to accommodate various aviation demand segments. This hangar layout provides T-hangars, box hangars, and larger conventional hangars, including the following:

- T-Hangars: 58,200 square feet/46 units
- Box Hangars: 57,600 square feet/23 units
- Conventional Hangars: 203,600 square feet/68 units
- Land-Lease Parcels: 5 parcels/0.41 acres

This layout also includes a potential expansion of the terminal building and vehicle parking lot. While the analysis did not indicate a need for additional terminal space, there is space if the airport wishes to expand. In this scenario, the existing airport beacon is relocated to an undeveloped area to facilitate the parking lot expansion. This area is shown as a potential site for a replacement building to house airport maintenance equipment.

LANDSIDE ALTERNATIVE 2

Landside Alternative 2 is presented on **Exhibit 4J**. This layout also shows a variety of hangar types.

This layout provides for the following:

- T-Hangars: 161,700 square feet/129 units
- Box Hangars: 142,700 square feet/56 units
- Conventional Hangars: 106,000 square feet/35 units
- Land-Lease Parcels: N/A

This alternative assumes that the current airport maintenance equipment building is adequate through the planning period or would be replaced farther to the north.

LANDSIDE ALTERNATIVE 3

The third landside alternative is presented on **Exhibit 4K**. This alternative focuses on parceling the aeronautical land and making it available for individual land leases. Those who accept long-term leases can then build aeronautical hangars to suit their individual needs. A single T-hangar structure with 23 units is included in this alternative.

This layout provides for the following:

- T-Hangars: 32,400 square feet/23 units
- Box Hangars: see parcels
- Conventional Hangars: see parcels
- Land-Lease Parcels: 16 parcels/15.84 acres

LANDSIDE ALTERNATIVES SUMMARY

Apple Valley Airport encompasses approximately 790 acres of property. It has more than 67.5 acres of undeveloped land on the west side of Runway 18-36 and 63 acres on the east side. The Facility Requirements chapter of this master plan indicated a need for an additional 129,500 square feet of hangar space to accommodate projected growth in based aircraft and operations.

Three different landside development alternatives were presented. Each landside development alternative showed exclusively west side development, and each showed far more development potential than what is forecast to be needed over the next 20 years. This gives airport management flexibility in future development and provides a long-term vision for development. With this vision, airport management can direct future development to appropriate locations so development potential is not inadvertently truncated. For example, there is an 18-acre undeveloped parcel to the immediate west of the terminal building. A pass-through for a taxilane should be preserved so this parcel can ultimately be fully developed.

Landside development can be much more fluid than planned airside development. The depiction of a certain hangar type on an exhibit – or even on the ALP – does not restrict the development to that specific hangar size. Developer needs may indicate something different; however, the major elements that allow maximization of undeveloped land should be preserved, such as the taxilane to the 18-acre parcel or the preservation of taxilane object free areas.

VERTIPORT/HELIPORT CONSIDERATION

Helicopter activity at an airport does not require a dedicated heliport. Heliports are landing and departure surfaces with imaginary surfaces that are intended to enhance the safety of vertical takeoffs and landings. When no dedicated helicopter operational area is identified, helicopters are free to use safe methods to approach and depart from their intended destinations. A helicopter operator will sometimes approach a runway end and then hover taxi to their destination.


LEGEND
Airport Property Line
A Taxiway Designation
Ultimate Building
Ultimate Pavement
Ultimate Roads/Parking
Aviation Use Revenue Support Parcel
Airport Support/Airport Maintenance
Runway 18-36 (6,498' x 150')
36
Runway 8-26 (4,099' x 60')
A
A4
A5
A6
B
B2
B1
8-Unit T-Hangars
200' x 50'
200' x 50'
200' x 50'
Parking Lot Expansion
Terminal Expansion
1.4 Acres
0.5 Acres
0.9 Acres
0.6 Acres
0.7 Acres
Add Fuel Capacity
1.1 Acres
Relocated Airport Beacon
Navajo Rd.
Corwin Rd.
120' x 120'
80' x 80'
140' x 100'
150' x 150'
60' x 470'
N
0
300
SCALE IN FEET
Aerial Photo: Google Earth 10/2020


LEGEND
Airport Property Line
A Taxiway Designation
Ultimate Building
Ultimate Pavement
Ultimate Roads/Parking
Aviation Use Revenue Support Parcel
Runway 18-36 (6,498' x 150')
36
Runway 8-26 (4,099' x 60')
A4
A5
A6
B
B2
B1
A
6-Unit T-Hangars
230' x 50'
230' x 50'
230' x 50'
200' x 50'
200' x 50'
110'
12-Unit T-Hangars
50' x 50'
Box Hangars
79'
Add
Fuel Capacity
190' x 50'
190' x 50'
Navajo Rd.
Relocated
Airport Beacon
Corwin Rd.
100' x 100'
60' x 300'
110'
60' x 470'
60' x 470'
75'
120' x 150'
120' x 150'
80' x 80'
80' x 80'
240' x 50'
240' x 50'
240' x 50'
240' x 50'
240' x 50'
10-Unit T-Hangars
N
0
300
SCALE IN FEET
Aerial Photo: Google Earth 10/2020


LEGEND
Airport Property Line
Taxiway Designation
Ultimate Building
Ultimate Pavement
Ultimate Roads/Parking
Aviation Use Parcel
Runway 18-36 (6,498' x 150')
36
18
A4
A
A5
A6
B
B2
B1
Runway 8-26 (4,099' x 60')
5.7 Acres
2.3 Acres
Add Fuel Capacity
1.1 Acres
Navajo Rd.
Corwin Rd.
.41 Acres
.76 Acres
110'
60' x 540'
0
300
SCALE IN FEET
Aerial Photo: Google Earth 10/2020

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New vertical takeoff and landing aircraft are nearing FAA certificate approval to operate in the National Airspace System. These are most often referred to as advanced air mobility (AAM) or urban air mobility (UAM) aircraft, but also include small drones. This air transportation system concept integrates new, transformational aircraft designs and flight technologies into existing and modified airspace operations. Ultimately, these new aircraft will be unmanned. Most of the prototypes being developed are powered by batteries. The largest prototype can currently transport up to six passengers.

The FAA is currently analyzing new planning design standards to accommodate the new types of electric vertical takeoff and landing (eVTOL) aircraft. As of this writing (2025), FAA Advisory Circular 150/5390-2D, *Heliport Design*, is the primary guidance available and it covers planning for both helicopters and AAM/UAM operations.

The basic layout of a heliport consists of a touchdown and liftoff (TLOF) area contained within a final approach and takeoff (FATO) area, surrounded by a safety area. A heliport also has a heliport protection zone (HPZ), which serves the same function as the runway protection zone for a runway. The HPZ extends from the edge of the FATO at a slope of 8:1 for 280 feet. The FATO, TLOF, and safety area are square imaginary surfaces that surround the landing area, the dimensions of which are based on the rotor diameter of the most demanding helicopter that utilizes the heliport. In addition, a heliport has an approach/departure surface and a transitional surface, which are a continuation of the HPZ to a total distance of 4,000 feet.

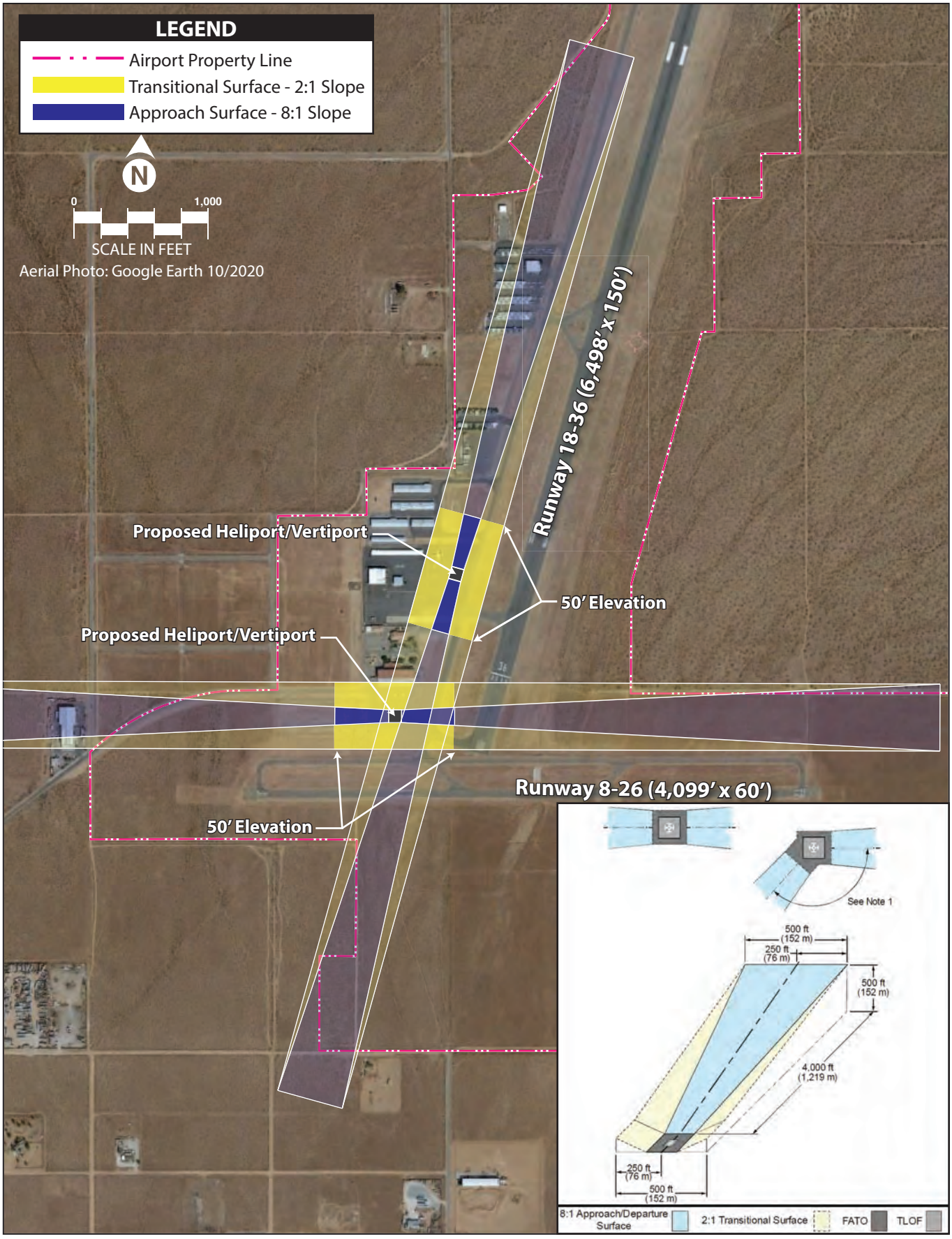
Exhibit 4L shows the general specifications of a heliport/vertiport. The optimal location for a heliport is near the desired origin and/or destination of the potential users. There is no requirement or operational threshold to establish a heliport. Two potential locations are noted on the exhibit. The exhibit shows the approach surfaces to the landing area out to a distance for which the clear plane is at 50 feet in elevation. The approach surfaces extend for a distance of 4,000 feet at a slope of 8:1 and are clear of obstructions.

ALTERNATIVES SUMMARY

This chapter presents development alternatives for both the airside and landside. Each alternative addresses issues identified in the Chapter Three – Facility Requirements, future demand (as presented in Chapter Two – Forecasts), or an overall long-term vision for the airport. The alternatives also address the possibility of the airport transitioning to a larger critical aircraft, which requires more restrictive design standards and a longer primary runway length.

On the airside, the primary focus is on decoupling the runway safety areas of the two runways. The alternatives suggest two options: shift Runway 18-36 to the north, or shift it to the south, thus extending it through Runway 8-26. Either option would meet the decoupling objective.

The airside alternative also addresses the future need for a longer runway, which would be triggered by documentation of 500 or more operations by larger business jets. Ultimately, a runway length of 8,800 feet is recommended.


LEGEND
Airport Property Line
Transitional Surface - 2:1 Slope
Approach Surface - 8:1 Slope
N
0
1,000
SCALE IN FEET
Aerial Photo: Google Earth 10/2020
Runway 18-36 (6,498' x 150')
Proposed Heliport/Vertiport
50' Elevation
Proposed Heliport/Vertiport
50' Elevation
Runway 8-26 (4,099' x 60')
See Note 1
500 ft (152 m)
250 ft (76 m)
500 ft (152 m)
4,000 ft (1,219 m)
250 ft (76 m)
500 ft (152 m)
8:1 Approach/Departure Surface
2:1 Transitional Surface
FATO
TLOF

On the landside, approximately 149,500 square feet of new aircraft hangar space is projected to be needed over the next 20 years. Three hangar development alternatives were presented, each of which exceeds the objective; thus, the landside alternatives can be considered a long-term vision for development of the airport and an opportunity for current and future airport management to protect the development vision for the airport.

The next step in the master plan process is to arrive at a recommended development concept. The participation of the PAC and the public will be an important consideration. Additional consultation with the FAA may also be required. Once a consolidated development plan is identified, a 20-year capital improvement program with a list of prioritized projects tied to aviation demand and/or necessity will be presented. Finally, a financial analysis will be presented to identify potential funding sources and to show airport management what local funds may be necessary to implement the plan.