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. There are numerous combinations of design alternatives, but the alternatives presented here are those with the perceived greatest potential for implementation.

Any development proposed for a master plan is evolved 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 the Treasure Valley Executive Airport at Caldwell (EUL).

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 EUL that addresses forecast aviation demand. As owner and operator, the City of Caldwell provides overall guidance for the operation and development of the Airport. It is of primary concern that EUL is marketed, developed, and operated for the betterment of the region and its users. The following basic planning objectives have been defined:

- To maintain a safe, attractive, and efficient aviation facility in accordance with applicable federal, state, and local regulations.
- To develop a facility that is responsive to the current and long-term needs of all current and potential aviation users.
- To be reflective and supportive of the long-term planning efforts currently applicable to the region.

- To develop a facility with a focus on self-sufficiency in both operational and developmental cost recovery.
- To ensure that future development is environmentally compatible.
- To preserve and protect public and private investments in existing Airport facilities.
- To promote economic development for the City of Caldwell and the 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. This includes the established design standard for the airport, the instrument approach capability, the capacity of the airfield, the length and strength of the runways, 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 providing support to the aviation function of an airport. This includes 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/taxiways system are examined first, with a preferred alternative presented, 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. For those airside or landside elements where only one solution is reasonable or where no alternative is necessary, an explanatory narrative is provided. **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 EUL. Limited maintenance and upkeep would continue so that EUL 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, this would not and could not include the prohibition of hangar construction by a private entity. The obvious result of the non-development alternative is that EUL 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 the airport sponsor commits to when accepting a development grant from the Federal Aviation Administration (FAA). As such, airport sponsors are bound to maintain the useful life of the facilities developed or equipment acquired for an airport development project.

Airside Planning Considerations

- Plan for transition to Airport Reference Code C-II including more restrictive runway safety area (RSA), runway object free area (ROFA), and runway protection zones (RPZ).
- Analyze potential to extend the runway to an ultimate length of 6,700 feet.
- Plan for instrument approaches with lower visibility minimums.
- Consider helicopter helipad location.
- Plan for full length north side parallel taxiway.
- Plan for appropriately sized hold aprons.
- Plan to remove or mitigate incompatible land uses in the RPZs.
- Plan taxiways to uniform width of 35 feet (Taxiway Design Group 2).
- Consider taxiway geometry changes to reduce possible runway incursions.
- Plan for supplemental windsocks near runway ends.
- Consider adding runway end identification lighting to each runway end.

Landside Planning Considerations

- Maximize available property for aviation facility development.
- Identify potential land acquisition needed for future airside and landside development.
- Identify potential locations for an airport traffic control tower.
- Present north side hangar development alternatives that consider the new location of the Canyon Hill Lateral.
- Plan appropriate separation distances between facilities.
- Consider potential locations for aircraft apron, fuel storage, and a fire station.
- Plan for the addition of at least 244,000 square feet of new hangar space.
- Provide for a mix of hangar types in suitable locations.
- Plan for at least an additional 26,400 square yards of aircraft apron space.
- Identify location for aircraft wash rack.
- Identify location for north side fuel farm.
- Plan for full perimeter fencing.

Useful life is defined in FAA Order 5100.38D, *Airport Improvement Handbook*, Table 3-8, which varies from a minimum of three years to in perpetuity from the date of acceptance of a grant offer of federal (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 bulk of EUL property was acquired through grants from the FAA Airport Improvement Program (AIP) and its predecessors. Currently, the airport encompasses approximately 545 acres, of which approximately 509 acres were acquired with federal assistance.

Under a non-development alternative, the most likely scenario would involve the airport letting development grant assurances run out, but the airport would 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 1B in Chapter One, the Airport has received nearly $5.2 million in development grants since 2010. 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 which, over time, would become more noticeable.

The City of Caldwell 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 EUL, 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 EUL would diminish over time. Its ability to serve the general aviation and business aviation markets would deteriorate. This would lead to fewer people using EUL 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 be to 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 Airport or the City and is, therefore, not carried forward in this master planning effort.

PRELIMINARY AIRPORT LAND USE PLAN

The objective of airport land use planning is to coordinate future uses of the airport property in a manner that is both functional with the design of the airport and compatible with the airport environs. There are two primary considerations for on-airport land use planning. The first is to secure those areas essential to the safe and efficient operation of the airport. The second is to determine compatible land uses for the balance of the property which would be most economically advantageous to the airport and the region it serves.

Prior to presenting development alternatives, it is important to have a basic understanding of the land use guidelines. With this understanding, facilities can be located to ensure the highest and best use of airport property. There are also certain design standards that affect facility location options. For example, future structures should be planned so they do not compromise safe and efficient aircraft operations.

Any property, when described as part of an airport in an agreement with the United States or defined by an airport layout plan (ALP) or listed in the Exhibit "A" property map, is considered to be "dedicated" or obligated property for airport purposes. The primary purpose of airport property is for aeronautical use. Land on the ALP designated for aeronautical use may not be used for non-aeronautical purposes, in most cases, without FAA approval.

If it has been determined that obligated land on an airport is no longer needed for aviation because it exceeds the forecasted need or is inaccessible by aircraft, the property may be considered for compatible non-aeronautical use. The revenue from this use can provide supplemental funds to the airport with the goal of making the airport as self-sustaining as possible.

By categorizing the entirety of airport property, airport management can plan and direct any development proposals to the appropriate locations. There are four primary land use categories on an airport: airfield operations, aviation development, airport reserve, and non-aviation revenue support. Often, these categories are further subdivided to provide a better understanding of current or intended uses of airport property. **Exhibit 4B** presents preliminary land use classifications for the Airport to guide the alternatives analysis. Once a long-term plan for the Airport is established in subsequent chapters, a formal land use plan will be developed and included in the ALP set.

AIRFIELD OPERATIONS

Airfield operations is that portion of airport property that encompasses the major airside elements, such as the runways, taxiways, runway safety area (RSA), runway object free area (ROFA), runway obstacle free zone (OFZ), runway protection zone (RPZ) (on airport property), taxiway safety area, taxiway object free area (TOFA), and navigational aid critical areas. Airfield operations are intended for the safe and efficient movement of aircraft to and from the airfield. This land use designation includes the various object clearing areas, and only elements necessary for aircraft navigation can be located here.

For planning purposes, the airfield operations area has been extended to the end of the property line to accommodate any planned future extension of the runway.

AVIATION DEVELOPMENT

The aviation development land use category includes those areas that should be reserved for development that require access to the airfield operations area, such as aircraft hangars and aviation businesses. Generally, lands adjacent to the runway should be reserved for future aviation development to such a depth that it allows for future taxiways, taxilanes, aprons, hangars, and access roads. This land use category will also include airport support elements that may not require taxiway access, such as drainage infrastructure.

NON-AVIATION REVENUE SUPPORT

With FAA approval, portions of the airport property may be used for non-aviation revenue support purposes. Typically, it is preferable that development in these areas will complement airport activities to some degree, but that is not required. However, it is required that any non-aviation facilities be compatible with airport operations, so development such as houses would be excluded. Examples of potential uses include research facilities, laboratories, manufacturing and processing facilities, warehouses, and other facilities compatible with an airport environment.

Designating airport land for non-aviation uses is available only to those airports that have enough land to accommodate future aviation development. Land that is inaccessible by aircraft is often considered for a revenue-supporting role. Any airport land considered for non-aviation development must be formally released from obligation as aviation land by the FAA.

At EUL, there are several parcels that are physically disconnected from the Airport by surface roads. These will likely never be needed for aviation purposes. Some of the disconnected lands are in line with the approach to Runway 12. While these lands could support compatible non-aviation development, they should be reserved for airport purposes to protect the airspace leading to the runway. When and if there is development pressure for these portions of Airport property, additional airspace analysis will need to be undertaken.

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. This includes 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 EUL and present several alternatives. **Exhibit 4A** presented 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 that aircraft model or family of aircraft with similar characteristics that account 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-1B, which is best represented by small business jets, such as the Cessna 560XL. The future critical aircraft is classified as C-II-2, which is best represented by a large business jet, such as the Cessna Citation X+. There is a significant difference between the design standards for these two critical aircraft, as previously presented in Table 3G and summarized in **Table 4A**.

Smeed Parkway
E Linden St.
Canyon Hill Lateral
B
Runway 12-30 (5,500' x 100')
E A F G J N
D C C H K A L M
Highline Canal
E Ustick Rd.
Aviation Way
Notus Canal
30
Interstate 84
Apache Dr.
Bannock Dr.

N
0 800
SCALE IN FEET
Photo: Google Earth 07/2018

LEGEND

- Airport Property Line
- Airfield Operations
- Aviation Development
- Non-aviation Revenue Support

Exhibit 4B
PRELIMINARY LAND USE PLAN

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TABLE 4A | Runway Design Standards
Treasure Valley Executive Airport

AIRPORT DATA	Runway 12-30 (Existing)	Runway 12-30 (Ultimate)	
Airport Design Aircraft	B-II-1B	C-II-2	
Runway Design Code	B-II-5000	C-II-2400	
Visibility Minimums	1-Mile	¾-Mile (Rwy 12)	½-mile (Rwy 30)
Runway Width	75'	100'	
RUNWAY DESIGN STANDARDS			
Runway Safety Area (RSA)			
Width x Length Beyond End	150' x 300'	500' x 1,000'	
Runway Object Free Area (ROFA)			
Width x Length Beyond End	500' x 300'	800' x 1,000'	
Runway Protection Zone (RPZ)			
Length x Inner Width x Outer Width	1,000' x 500' x 700'	1,700' x 1,000' x 1,510' (Rwy 12)	2,500' x 1x000' x 1,750' (Rwy 30)
Area (Acres)	13.77	48.98	78.91

Source: FAA AC 150/5300-13A, Airport Design

For the runway safety area (RSA), the width expands from 150 feet to 500 feet and the length beyond the runway ends changes from 300 feet to 1,000 feet. When this transition happens, the RSA beyond the Runway 12 end will extend across Linden Street. Note that 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. At this point, the Airport would have a non-standard RSA. Therefore, it is necessary to have a plan in place to provide the standard RSA if, in fact, there is a realistic possibility that the critical aircraft will change to those in ACC "C." On the Runway 30 end, the 1,000-foot-long AAC "C" RSA would meet standard as it would be short of Ustick Road.

Since the runway object free area (ROFA) encompasses the RSA, the ROFA will also be penetrated by Linden Street if the Airport transitions to AAC "C." On the Runway 30 end, the 1,000-foot-long ROFA would extend slightly across Ustick Road.

The runway protection zone size also changes when the Airport transitions from AAC "B" to "C." Currently, the RPZs are 500 feet on the inner width, 700 feet on the outer width, and 1,000 feet long. Without any change to the visibility minimums and only a change from AAC "B" to "C", the RPZ size changes to 500 feet on the inner width, 1,010 feet on the outer width, and 1,700 feet long. The existing AAC "B" RPZ encompasses 13.77 acres and the AAC "C" RPZ is 29.47 acres in size. This change in RPZ size would introduce new portions of both roadways to the larger RPZs. Public roads are an incompatible land use in the RPZ.

As noted in Chapter Three – Facility Requirements, the FAA published clarifying guidance related to RPZs in 2012. In essence, that guidance does not apply to incompatible land uses that existed prior to publication, including the existing roads. However, if there is a change to the RPZ (typically by a runway project like an extension or lower visibility minimums), then the Airport must explore all reasonable methods to provide compatible land uses within the new or changed RPZ. If it is not feasible to meet the land use compatibility standard for new or changed RPZs, then a special, more detailed, alternatives analysis must be undertaken and presented to FAA Headquarters.

Exhibit 3C previously showed the non-standard conditions that exist currently or that emerge when the Airport transitions to the "C" classification.

PREVIOUS AIRPORT MASTER PLAN CONCEPT

Exhibit 4C shows the future layout concept from the 2010 Master Plan, which was the basis of the Airport Layout Plan. This plan met FAA design standards at the time; however, with the updated guidance, several elements that were once acceptable now require additional review. Specifically, the Runway 30 RPZ would change in size and location and new portions of Ustick Road would pass through it. On the Runway 12 end, the new RPZ serving the runway extension would extend over incompatible land uses, including Interstate 84. At the time of project implementation, the RPZ alternatives analysis would be required.

The previous plan also projected a potential transition from AAC "B" to AAC "C" and identified the potential need for a total runway length of 6,800 feet. Utilizing more accurate runway length analysis tools, this master plan refines the ultimate runway length need to 6,700 feet. The previous plan placed a 1,500-foot extension on the Runway 12 end, while shortening the runway by 200 feet on the Runway 30 end (to meet ROFA standards). Linden Street would be closed to allow for the runway extension. Certain parcels would be acquired for the RSA, ROFA, and RPZ.

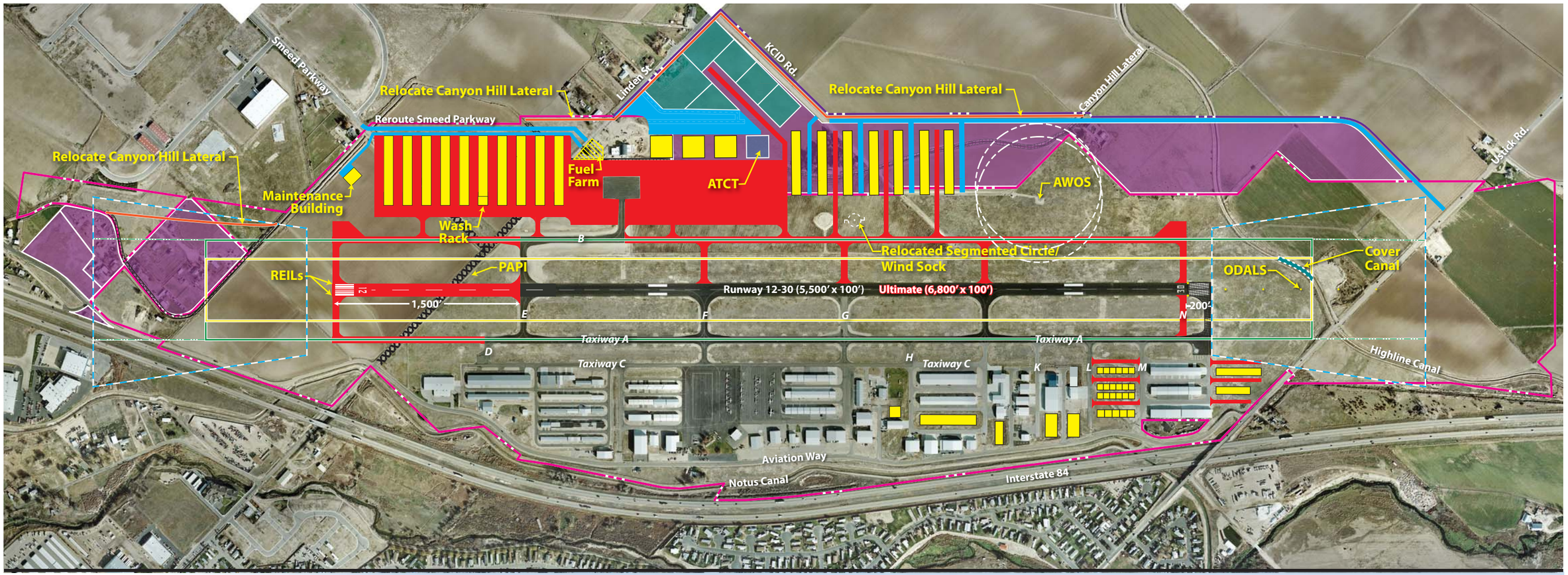
On the landside, the previous plan provided for various infill hangars on the south side of the runway. The north side included a buildout scenario on both sides of the terminal building. To the northwest was planned a series of T-hangars. On the southeast side of the terminal building was planned a corporate and commercial aviation development. The Canyon Hill Lateral was proposed to be relocated to facilitate this development (which has since occurred). Additional adjacent property on the north side of the Airport was also identified for acquisition to facilitate further aviation development.

Portions of the previous master plan concept are still viable for inclusion in this plan and will be considered along with new alternatives.

ROAD CLOSURE CONSIDERATIONS

The analysis previously presented indicated that the Airport should plan for an ultimate runway length of up to 6,700 feet. Due to the constraints of Linden Street and Ustick Road on both ends of the runway, one of these roads would have to be closed or re-routed to accommodate the longer runway.

The City of Caldwell adopted a comprehensive plan in February 2020. The comprehensive plan includes a transportation element and the current functional street classification system, which provides an indication of the traffic volume, speed limits, and design standards for that section of roadway. **Table 4B** summarizes the functional street classification system for the City of Caldwell.



LEGEND

- Airport Property Line
- Ultimate Property Line
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Extended ROFA
- Land to be Acquired
- Ultimate Airfield Pavement
- Ultimate Airfield Building
- Ultimate Roads / Parking
- Aviation Access Parcels
- Runway Protection Zone (RPZ)

NORTH

0 800 1600

SCALE IN FEET

Photo Date: November 16, 2009

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TABLE 4B | Functional Street Classification
City of Caldwell

Street	Function	Typical Lanes	Typical Daily Volume	Example in Caldwell
Principal Arterial	• Longer trips and carry state-wide or interstate traffic. • Heavily traveled and high speeds. • High design standard. • Access control to adjacent land uses.	4-5	10,000+	Ustick Road
Minor Arterial	• Link cities for intrastate or inter-county connections. • Medium to high speeds with minimum interference.	2-4	2,500-10,000	Linden Street
Collector	• Serve short, more local trips. • Collect local residential trips and channel to arterials. • Provide street grid in core areas.	2	500-5,000	Aviation Way
Industrial	• Designed for slower speeds in industrial areas. • Allows for adequate turning movements. • Serves a high volume of truck traffic.	2	Varies	Challenger Way
Local	• Direct access to homes. • Provides access to higher order streets. • Designed for low volume.	2	Under 1,000	Residential Streets

Source: 2040 Caldwell Comprehensive Plan (Adopted February 3, 2020)

Ustick Road is a principal arterial which is a higher classification than Linden, which is a minor arterial. Ustick Road extends from Caldwell all the way to Boise. Ustick Road is a higher priority to maintain because of its functional classification.

Linden Road between Aviation Way and Smeed Parkway has been previously identified for closure in various area transportation plans and in the previous airport master plans. Improvements to other roads that would ultimately carry Linden Street traffic have been on-going over the years, including Smeed Parkway and Skyway Drive.

Of the two constraining roads, it would be better to close Linden Street, as it would have less impact to local traffic patterns. Therefore, extension of the runway to the northwest would include closure of Linden Street, while extension of the runway to the southeast would instead include re-location (or tunneling) of Ustick Road.

AIRSIDE ALTERNATIVE 1: BASELINE 6,700' RUNWAY - WEST EXTENSION

The first airside alternative, shown on **Exhibit 4D**, considers extending the runway to 6,700 feet with the extension being added on the Runway 12 end. An extension of 1,400 feet is added to the Runway 12 end and the Runway 30 end is shifted 200 feet to the northwest to remove the future ROFA from Ustick Road.

This airside alternative is similar to the recommended concept from the previous master plan. The runway extension is 100 feet shorter than before due to advances in runway length modeling that showed that 6,700 feet is a more accurate ultimate runway length for EUL.

Linden Street would be closed in this alternative. Traffic heading east on Linden would be routed north of Aviation Way, then east on Skyway Drive, then back to Linden Street via Smeed Parkway. Closing Linden between Aviation Way and Smeed Parkway has long been in the plans for the Airport and the city.

The RSA and ROFA on the Runway 12 end will extend over private property, including one home and several outbuildings. This property, at a minimum, would have to be acquired. Both would also extend across the Canyon Hill Lateral. The canal in this location would have to be covered or relocated outside the RSA. The property, home, and outbuildings would have to be acquired and the area graded to standard. On the Runway 30 end, the Highline Canal would cross a corner of the RSA, creating a non-standard RSA condition. This canal would have to be re-routed or covered (bridged) to meet the RSA standard.

This alternative shows the three different size RPZs that would serve each runway end, depending on the instrument approach visibility minimum. On the Runway 12 end, each of the RPZs would encompass some incompatible land uses, including residential property, roads, and Interstate 84. The RPZ associated with ½-mile visibility minimums will additionally cross over commercial buildings. On the Runway 30 end, each of the three RPZ sizes would introduce more of Ustick Road as an incompatible land use to the RPZ.

Table 4C outlines the primary impacts for this alternative by runway end. Only the future RSA penetrations would require mitigation as part of the implement. Where feasible, the other issues should be mitigated and if mitigation is not feasible, then the condition should be improved to the greatest degree feasible. Then, consensus with FAA would have to be sought and it would have to be shown that the plan presented is the best and most compatible plan.

TABLE 4C | Potential Impacts of Airside Alternative 1
Treasure Valley Executive Airport

ID	Issue	Potential Solution
RUNWAY 12 END		
1	Runway Extension, RSA, ROFA cross Linden St.	Close or tunnel Linden St.
2	RSA and ROFA extend to private property and homes	Acquire property and homes
3	Homes, roads, and other incompatible land uses in the RPZ	Acquire property, homes, roads
4	RPZ crosses Interstate 84	Relocating or tunneling I-84 seems unreasonable
5	½-mile RPZ crosses several commercial office buildings	Acquire and raze buildings seems unreasonable
6	Crown Street, Tackett Ln. and other roads in any RPZ	Acquire property, homes, close roads
7	Challenger Way in ¾-mile RPZ	Close Challenger Way
RUNWAY 30 END		
8	Highline Canal penetrates RSA	Cap or relocate Highline Canal
9	Ustick Road in RPZ	Close, reroute, or tunnel Ustick Road

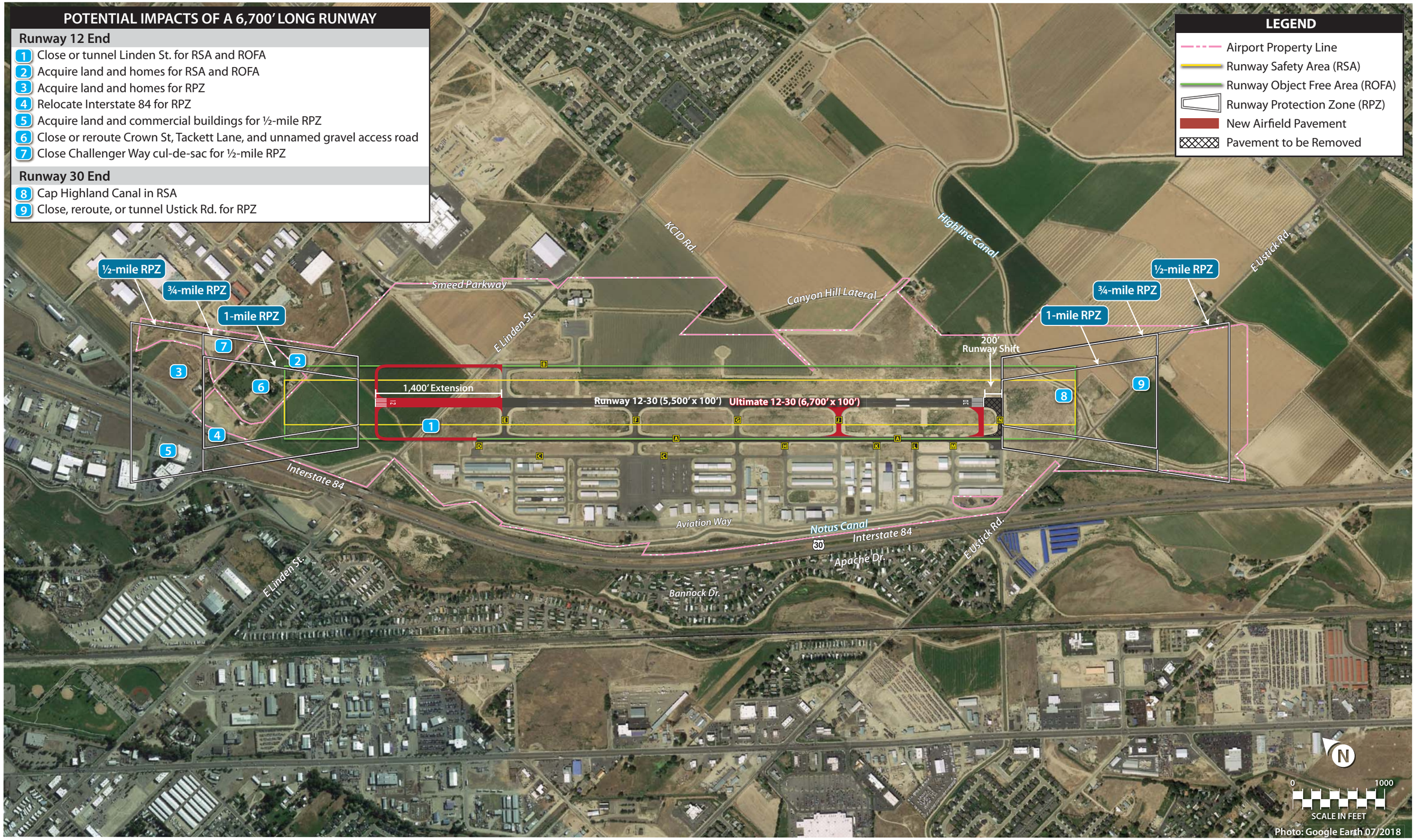
POTENTIAL IMPACTS OF A 6,700′ LONG RUNWAY

Runway 12 End

1. Close or tunnel Linden St. for RSA and ROFA
2. Acquire land and homes for RSA and ROFA
3. Acquire land and homes for RPZ
4. Relocate Interstate 84 for RPZ
5. Acquire land and commercial buildings for ½-mile RPZ
6. Close or reroute Crown St, Tackett Lane, and unnamed gravel access road
7. Close Challenger Way cul-de-sac for ½-mile RPZ

Runway 30 End

8. Cap Highland Canal in RSA
9. Close, reroute, or tunnel Ustick Rd. for RPZ



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AIRSIDE ALTERNATIVE 2: 6,700' RUNWAY - EAST EXTENSION

The next airside alternative considered on **Exhibit 4E** would provide a 6,700-foot runway with the extension placed on the Runway 30 end. This alternative will keep Linden Street open by shifting the runway end to the east approximately 900 feet to keep the ROFA east of Linden Street. Therefore, the extension on the Runway 30 end will be 2,100 feet.

The extension will cross Ustick Road, requiring the road to be closed, re-routed, or tunneled. The option to close Ustick Road was previously discussed and it was determined that, as a principal arterial road, it should not be closed. Re-routing Ustick Road under this scenario would be very difficult because it would have to be re-routed around the RPZ, a length of nearly a mile and a half. For this alternative, the tunneling option is depicted.

The RPZ shown on the Runway 30 end is for ½-mile visibility minimums. This RPZ would cross five homes on Laster Lane, which would have to be acquired. On the Runway 12 end, a 1-mile RPZ is planned.

AIRSIDE ALTERNATIVE 3: MAXIMUM B-II RUNWAY - 700' EXTENSION EAST

The next two airside alternatives consider runway improvements that may be justified even if the Airport has not transitioned to ARC C-II yet. As noted in the forecasting chapter, the total number of documented operations by aircraft in AAC C or larger has consistently been under 100. Therefore, it may be sometime before the Airport reaches the 500 operations threshold for classification as a C-II facility.

The maximum runway length associated with aircraft in the B classification is 6,200 feet. **Exhibit 4F** shows the extension of the runway by 700 feet to the east. The RSA and ROFA would remain on the west side of Ustick Road. The Highline Canal would have to be re-routed or bridged. The Runway 12 end would remain as it is today.

This exhibit shows the option of re-routing Ustick Road to provide for compatible land uses within the RPZ. Two options for re-routing Ustick Road, based on the instrument approach visibility minimums, are presented.

AIRSIDE ALTERNATIVE 4: MAXIMUM B-II RUNWAY - 700' EXTENSION EAST

Exhibit 4G shows extending the runway by 700 feet to the west with B-II safety standards applied. The total runway length would be 6,200 feet, meeting the maximum needed to fully accommodate the B-II fleet of general aviation aircraft. Linden Street would have to be closed to accommodate this extension of the runway.

All three possible RPZ sizes are shown to help understand the potential impacts to RPZ land use compatibility. Visibility minimums lower than 1-mile would introduce new incompatible land uses. Such a scenario may require additional analysis to determine if the incompatible land uses can be removed or mitigated.

AIRSIDE PREFERRED PLAN

The Treasure Valley Executive Airport has a very nice complement of airside facilities, including the runway/taxiway system. The primary consideration on the airside is the need to plan for a longer runway. Previous analysis indicated that, in the future, the recommended runway length is 6,700 feet. This length would accommodate all business jets in the existing general aviation fleet, including large aircraft such as the Gulfstream series of jets.

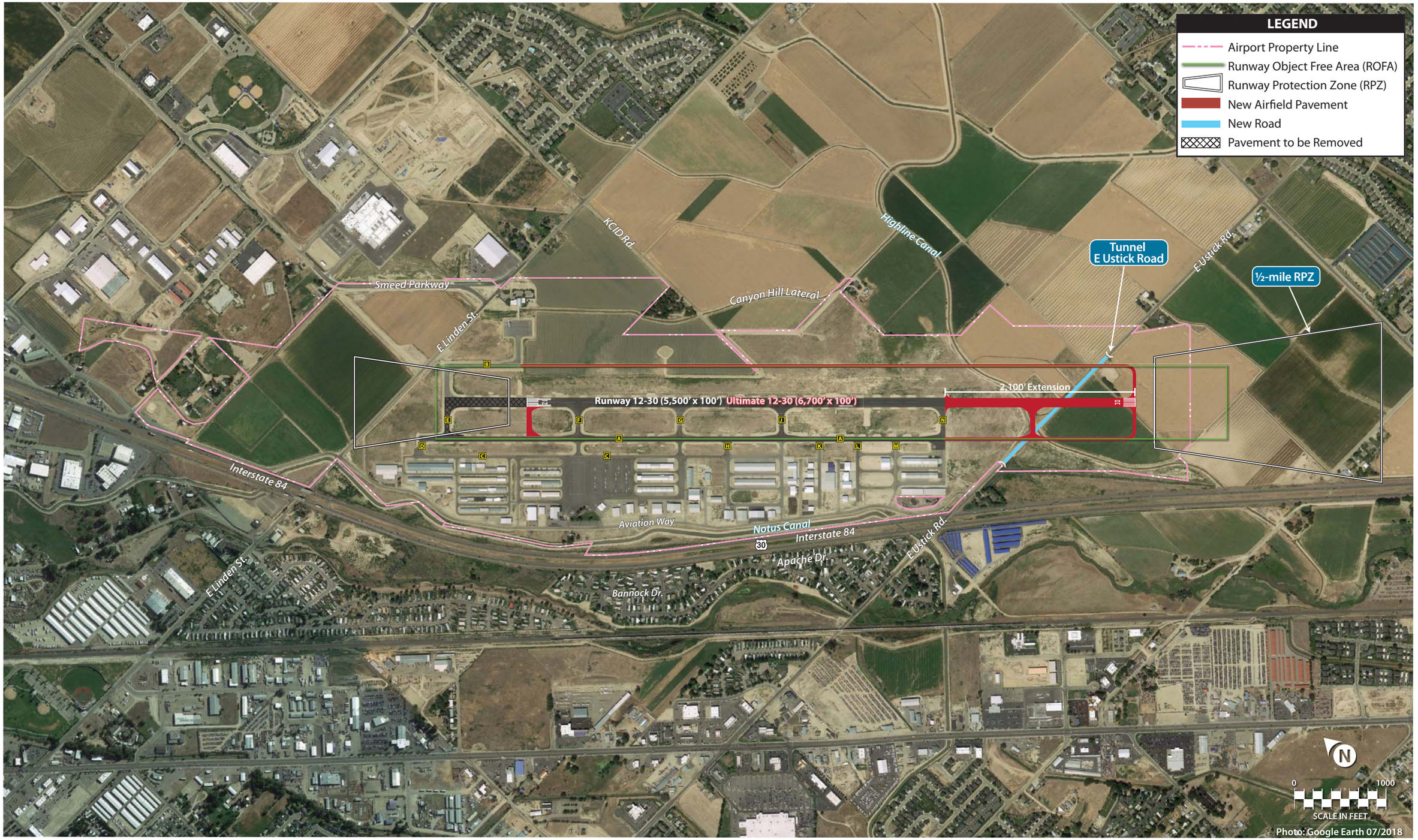
Exhibit 4H shows the planned runway extension and taxiway system. An extension of 1,400 feet is shown on the Runway 12 end. Linden Street is closed, consistent with previous airport and city planning. The ARC C-II design standards for RSA and ROFA are applied. The additional 1,400 feet of runway length will bring the total pavement length up to 6,900 feet, 200 feet more than the recommendation. The reason for the extra 200 feet is the need to keep the RSA and ROFA beyond the Runway 30 end from extending across Ustick Road. This is accomplished with the use of declared distances.

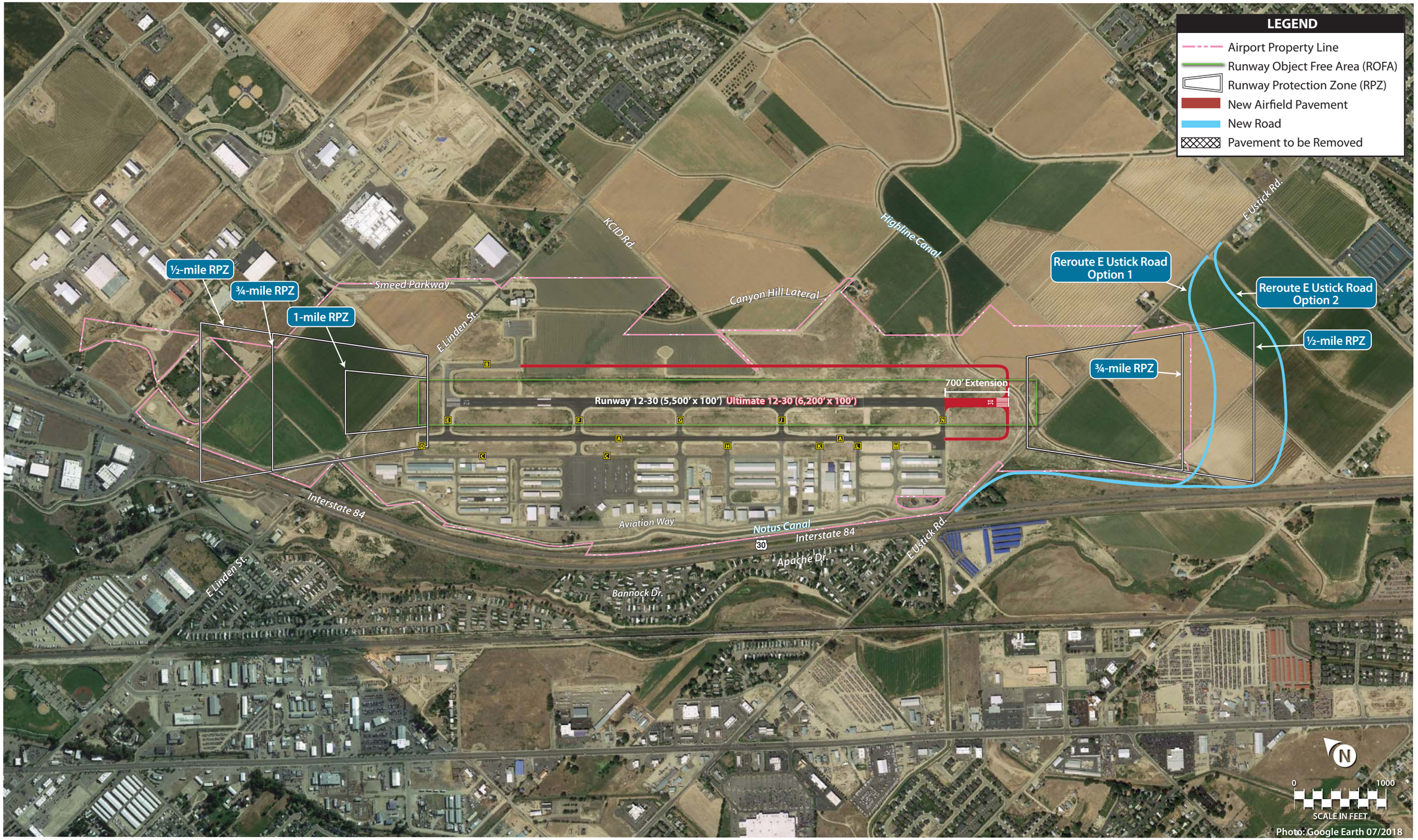
Implementing declared distances is described in FAA AC 150/5300-13A, *Airport Design*. With FAA approval, the runway length can be declared (published) shorter for certain operations to provide the necessary safety areas and/or RPZ land use compatibility. The AC describes declared distances as follows: "Declared distances represent the maximum length available and suitable for meeting takeoff, rejected takeoff, and landing distance performance requirements for turbine-powered aircraft." The declared distances are defined by the FAA as:

- *Takeoff run available (TORA)* - The distance to accelerate from brake release to lift-off, plus safety factors.
- *Takeoff distance available (TODA)* - The distance from brake release past lift-off to start of takeoff climb, plus safety factors.
- *Accelerate-stop distance available (ASDA)* - The distance to accelerate from brake release to takeoff decision speed (V_1), and then decelerate to a stop, plus safety factors.
- *Landing distance available (LDA)* - The distance from the threshold to complete the approach, touchdown, and decelerate to a stop, plus safety factors.

Implementation of declared distances, in this case, is designed to provide full RSA and ROFA beyond the Runway 30 end. The need to implement declared distances is triggered when the Airport transitions from its current B-II classification to C-II. When this occurs, the RSA and ROFA change from extending 300 feet beyond the runway ends to extending 1,000 feet.

In relation to declared distances, the ASDA and LDA account for the availability of the RSA and ROFA. Therefore, by declaring the ASDA and LDA for Runway 12 shorter by 200 feet, the full 1,000-foot RSA and ROFA are made available. The declared distances will not impact the ASDA and LDA for Runway 30. The full 1,000 feet of RSA and ROFA beyond the Runway 12 end would be available (assuming the property in the RSA and ROFA is acquired). The landing threshold to Runway 30 would remain in its current location because landing operations only require 600 feet of RSA and ROFA leading to the runway.


LEGEND
Airport Property Line
Runway Object Free Area (ROFA)
Runway Protection Zone (RPZ)
New Airfield Pavement
New Road
Pavement to be Removed
Tunnel E Ustick Road
½-mile RPZ
2,100' Extension
Runway 12-30 (5,500' x 100') Ultimate 12-30 (6,700' x 100')
Smeed Parkway
KCID Rd.
Highline Canal
Canyon Hill Lateral
E Linden St.
E Ustick Rd.
Interstate 84
Aviation Way
Notus Canal
Apache Dr.
Bannock Dr.
30
N
0
1000
SCALE IN FEET
Photo: Google Earth 07/2018


LEGEND
Airport Property Line
Runway Object Free Area (ROFA)
Runway Protection Zone (RPZ)
New Airfield Pavement
New Road
Pavement to be Removed
½-mile RPZ
¾-mile RPZ
1-mile RPZ
Smeed Parkway
E Linden St.
KCID Rd.
Canyon Hill Lateral
Highline Canal
E Ustick Rd.
Reroute E Ustick Road Option 1
Reroute E Ustick Road Option 2
½-mile RPZ
¾-mile RPZ
700' Extension
Runway 12-30 (5,500' x 100') Ultimate 12-30 (6,200' x 100')
Interstate 84
Aviation Way
Notus Canal
Interstate 84
30
Apache Dr.
E Ustick Rd.
E Linden St.
Bannock Dr.
N
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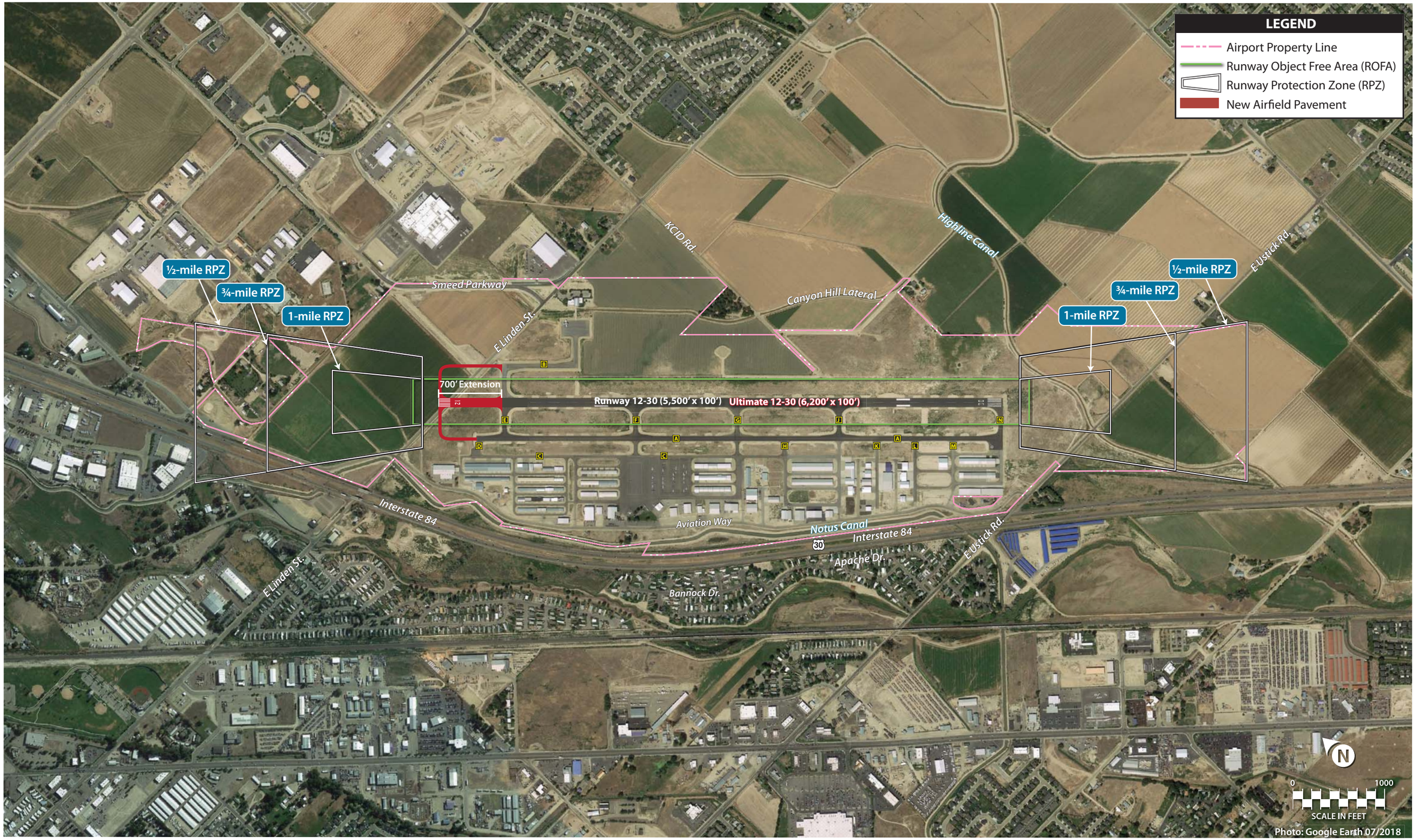
SCALE IN FEET
Photo: Google Earth 07/2018


LEGEND
Airport Property Line
Runway Object Free Area (ROFA)
Runway Protection Zone (RPZ)
New Airfield Pavement
½-mile RPZ
¾-mile RPZ
1-mile RPZ
½-mile RPZ
¾-mile RPZ
1-mile RPZ
Smeed Parkway
KCID Rd.
Highline Canal
E Linden St.
Canyon Hill Lateral
E Ustick Rd.
700' Extension
Runway 12-30 (5,500' x 100')
Ultimate 12-30 (6,200' x 100')
Interstate 84
Aviation Way
Notus Canal
Interstate 84
30
Apache Dr.
E Ustick Rd.
E Linden St.
Bannock Dr.
N
0
1000
SCALE IN FEET
Photo: Google Earth 07/2018

RUNWAY 12

TORA/TODA 6,900'

ASDA/LDA 6,700'

RUNWAY 30

TORA/TODA/ASDA/LDA 6,900'

Smeed Parkway

KCID Rd.

E Linden St.

Highline Canal

¾-mile RPZ

½-mile RPZ

E Ustick Rd.

AWOS

Relocated Segmented Circle/ Wind Sock

Cover Canal

1,400' Extension

Runway 12-30 (5,500' x 100')

Ultimate 12-30 (6,900' x 100')

MALSR

Interstate 84

Aviation Way

Notus Canal

30

Apache Dr.

Bannock Dr.

DECLARED DISTANCES

Parameters	Runway 12	Runway 30
Takeoff Run Available (TORA)	6,900'	6,900'
Takeoff Distance Available (TODA)	6,900'	6,900'
Accelerate Stop Distance Available (ASDA)[1]	6,700'	6,900'
Landing Distance Available (LDA)[1]	6,700'	6,900'

[1] Available runway length when factoring 1,000' RSA and ROFA beyond departure runway end.

LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Protection Zone (RPZ)
- New Airfield Pavement
- Pavement to be Removed
- Property to be Acquired

N

0 800

SCALE IN FEET

Photo: Google Earth 07/2018

The only physical change to the runway system would be that the red runway end light fixtures that are currently located at the Runway 30 pavement end, would have to be relocated 200 feet to the west. Typically, these lights are not embedded in the pavement but are instead positioned to both sides of the runway. **Table 4D** presents the declared distance to be applied to the future runway at EUL.

TABLE 4D | Declared Distances for Recommended Concept
Treasure Valley Executive Airport

Parameters	Runway 12	Runway 30
Takeoff Run Available (TORA)[1]	6,900'	6,900'
Takeoff Distance Available (TODA)[2]	6,900'	6,900'
Accelerate Stop Distance Available (ASDA)[3]	6,700'	6,900'
Landing Distance Available (LDA)[3]	6,700'	6,900'

[1] Departure RPZ begins 200 feet from the end of the TORA.

[2] TORA cannot be longer than TODA. Departure surface is set on TODA. TODA can be shortened to mitigate departure surface penetrations; if so, TORA is shortened, too.

[3] Available runway length plus RSA. Approach RPZ begins 200 feet from the landing threshold.

Source: FAA AC 150/5300-13A, Airport Design

The airside plan also includes completion of the north side parallel taxiway and several connecting taxiways to the runway. Aircraft hold/runup aprons are planned on both ends of the planned parallel taxiway. A new hold/runup apron is planned on the extension of Taxiway A; however, this hold/runup apron is situated approximately 500 feet from the end of Taxiway A. This location is necessary because of the desire to preserve the intersection of Linden Street and Aviation Way. The existing hold/runup apron at the west end of Taxiway C would be removed from service since it does not provide the required clearance radius.

As noted in the Facility Requirements chapter, Taxiway F leads directly from the main south side aircraft apron to the runway. This geometry is to be avoided and corrected when feasible. The recommended solution is to shift that portion of Taxiway F between Taxiway A and the aircraft apron to the east approximately 100 feet.

The planned connecting taxiways from Taxiway B to the runway are staggered in order to comply with the design requirement that crossing taxiways not be located within the middle third of the runway.

Improvements to the instrument approach visibility minimums are planned as well. The approach to Runway 12 is planned to have visibility minimums of ¾-mile. There are incompatible land uses that would have to be addressed. The most significant are the homes which are planned for acquisition. The interstate would also cross the southwest corner of the RPZ which may require additional analysis. Approximately 1.4 acres of undeveloped land on the south side of the interstate fall under the RPZ and are recommended for acquisition.

Additional analysis of the Runway 12 RPZ may be required once the runway extension becomes a higher priority. It is not likely that Interstate 84 could be re-routed so that the RPZ does not cross it because of an estimated cost of $40 million. At the time of that analysis, a benefit-cost analysis that accounts for the likelihood of an airplane crashing onto the interstate within the RPZ, should be conducted. In addition, a full RPZ analysis as outlined in FAA Memo, *Interim Guidance on Land Uses Within a Runway Protection Zone,* should be undertaken at that time.

On the Runway 30 end, visibility minimums not lower than ½-mile are considered. This instrument approach is planned as a GPS-based approach (when available) and will not require additional ground-based equipment like a glideslope antenna and a localizer antenna. Visibility minimums lower than ¾-mile require a medium intensity approach lighting system with runway alignment indicator lights (MALSR). This RPZ provides compatible land uses except for Ustick Road, which may require additional analysis.

LANDSIDE ALTERNATIVES

Landside planning issues, summarized on **Exhibit 4A**, will focus on facility-locating strategies following a philosophy of separating activity levels. To maximize airport efficiency, it is important to locate facilities intended to serve similar functions close together. For example, larger hangars supporting airport businesses should be centrally located, while smaller box 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 (those 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 housing fixed base operators (FBOs), 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 still 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 to the ends of the flight line. This use category will require electricity but may not need water or sewer utilities.

In addition to the activity center development philosophy, the Airport should consider acquiring any land that is parallel to the runway/taxiway system for future aeronautical development. There is approximately 42 acres of land east of the terminal building that is planned for future acquisition.

At EUL, the north side of the runway is currently completely undeveloped except for the terminal building. This side of the runway presents an opportunity for Airport management to guide development, which follows the separation of activity levels principal. **Exhibit 4J** presents a graphic depicting this development philosophy. The existing terminal building would serve as the focal point for the high activity area. A large apron should be planned that serves transient users and some portion of local tie-down aircraft. Larger conventional hangars from which various airport services are offered (i.e., FBO) should be in this area facing the apron. To the sides, then, are the medium and low activity centers.

On the south side of the runway, there are very few places available to develop additional hangars. All undeveloped land is either under a ground lease or is actively being considered for hangar construction by private developers. Therefore, the graphic simply indicates that any available land be utilized for infill hangars.

In addition to the functional compatibility of the terminal area, the proposed development concept should provide a first-class appearance for the Airport. Consideration to aesthetics should be given high priority in all public areas, as many times the Airport can serve as the first impression a visitor may have of the community.

The three landside alternatives to follow examine aeronautical development scenarios on the north side. These alternatives do not take into consideration the future closure of Linden Street because the need to close the road (due to a transition from ARC B-II to C-II, and a runway extension) is projected in the intermediate to long term (years 10-20). The landside alternatives depict a variety of hangar types (T-hangars, box/executive hangars, and larger conventional hangars) that are typically desired for an airport. An effort has been made to provide a large main apron on the north side, fronted by conventional hangars, with T-hangars and box hangars to the sides.

LANDSIDE ALTERNATIVE 1

Landside Alternative 1, as shown on **Exhibit 4K**, depicts a future hangar layout for the north side of the Airport. The area surrounding the terminal building is reserved for high activity larger conventional hangars. These hangars typically are used for airport businesses and bulk aircraft storage. These hangars face a large main apron area that can accommodate local and transient tie-down positions.

An aboveground static fuel farm is shown on the main apron area, to the west of the terminal building. If desired, this fuel farm could have a self-serve capability. A short access road to the fuel farm is planned, which will allow delivery tankers to unload fuel to the static tanks without traversing the aircraft movement surfaces.

To the east is situated a development complex of T-hangars and box hangars. Access to this development area is provided from two taxilanes that extend from the planned parallel taxiway. This complex could be developed independent of the main complex surrounding the terminal building.

An access road is planned on the north side of Airport property, parallel to and immediately south of the Canyon Hill Lateral. Situating the access road on the north side of the property allows for the greatest depth of aeronautical development.

LANDSIDE ALTERNATIVE 2

Landside Alternative 2 is presented on **Exhibit 4L**. This alternative presents a development scenario that includes T-hangars, box hangars, and conventional hangars in the main terminal area. The benefit to this layout plan is that construction of any hangar type could be accomplished without waiting for the main apron to be built out first. For example, a series of taxilanes could be built-out to access a hangar with the main apron filled in at a later time.

A static fuel farm is shown situated on the expanded main apron. This fuel farm could support a self-serve function. A disadvantage of this option is that fuel delivery trucks would have to traverse the main apron to make their delivery.

To the west of the terminal building is a 12-unit T-hangar and a four-unit box hangar. One conventional hangar is situated in this area as well. To the east is a complex of four conventional hangars facing an expanded main apron. Farther to the west are two taxilanes providing access to connected box hangars.

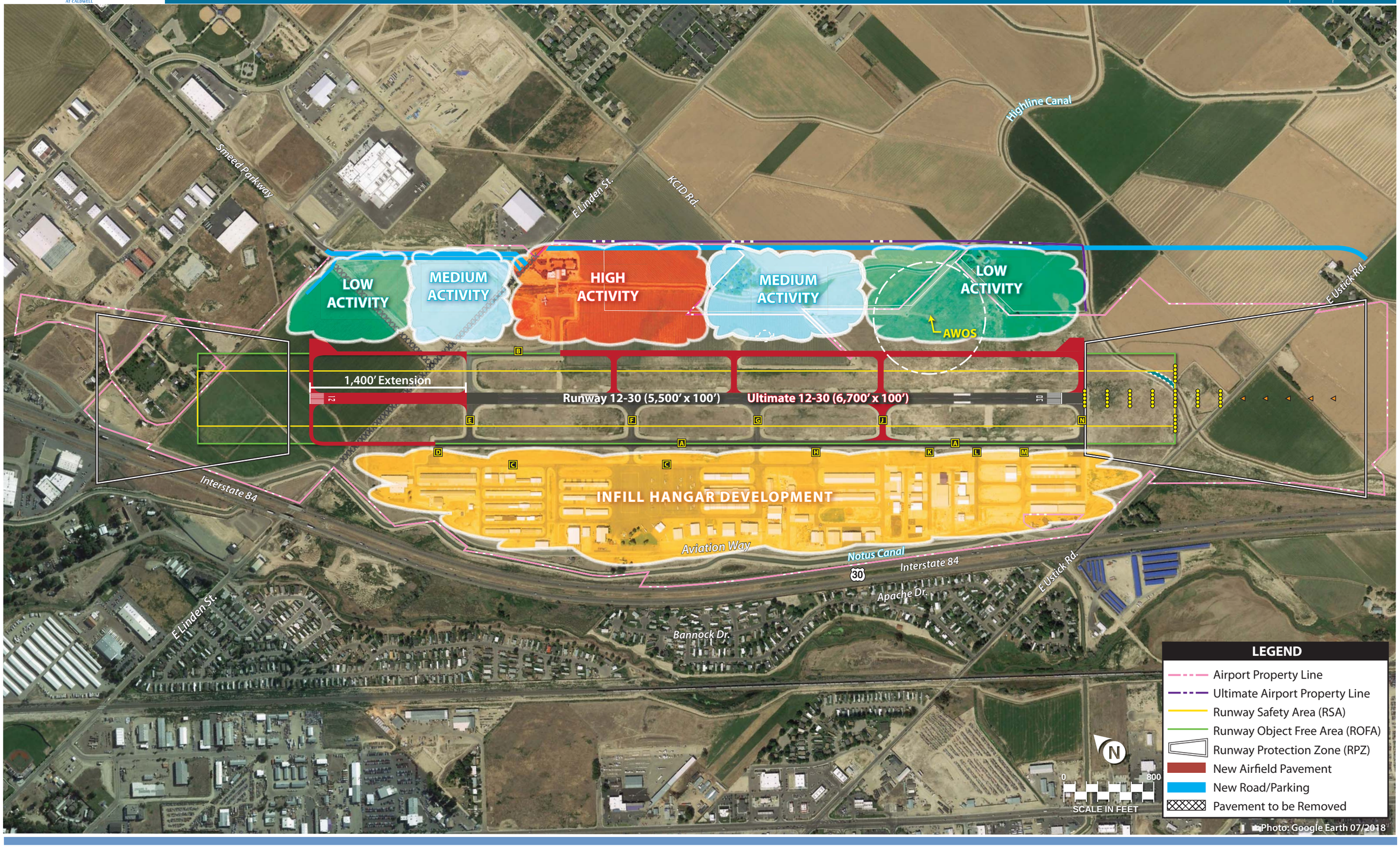
LANDSIDE ALTERNATIVE 3

The third landside alternative is presented on **Exhibit 4M**. As with the first two land side alternatives, this alternative presents a development plan with the terminal building serving as the focal point. The area between the existing apron and Linden Street is shown with three conventional hangars. A fuel farm is situated on the west side of the main apron with tanker delivery truck access from Linden Street. To the east of the existing apron are several T-hangar buildings and a row of box hangars.

To the east of this initial development complex is a second complex with several conventional hangars. On the far north side of the second development complex is a T-hangar building and a row of connected box hangars.

CONTROL TOWER LOCATION

As discussed in Chapter Three – Facility Requirements, activity levels at the Airport likely qualify for an airport traffic control tower. The FAA would have to run the formal benefit-cost analysis if the Airport were to move forward with the process.


Smeed Parkway
E Linden St.
KCID Rd.
Highline Canal
E Ustick Rd.
LOW ACTIVITY
MEDIUM ACTIVITY
HIGH ACTIVITY
MEDIUM ACTIVITY
LOW ACTIVITY
AWOS
1,400' Extension
Runway 12-30 (5,500' x 100')
Ultimate 12-30 (6,700' x 100')
INFILL HANGAR DEVELOPMENT
Interstate 84
Aviation Way
Notus Canal
Interstate 84
30
Apache Dr.
E Ustick Rd.
E Linden St.
Bannock Dr.
LEGEND
Airport Property Line
Ultimate Airport Property Line
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Protection Zone (RPZ)
New Airfield Pavement
New Road/Parking
Pavement to be Removed
N
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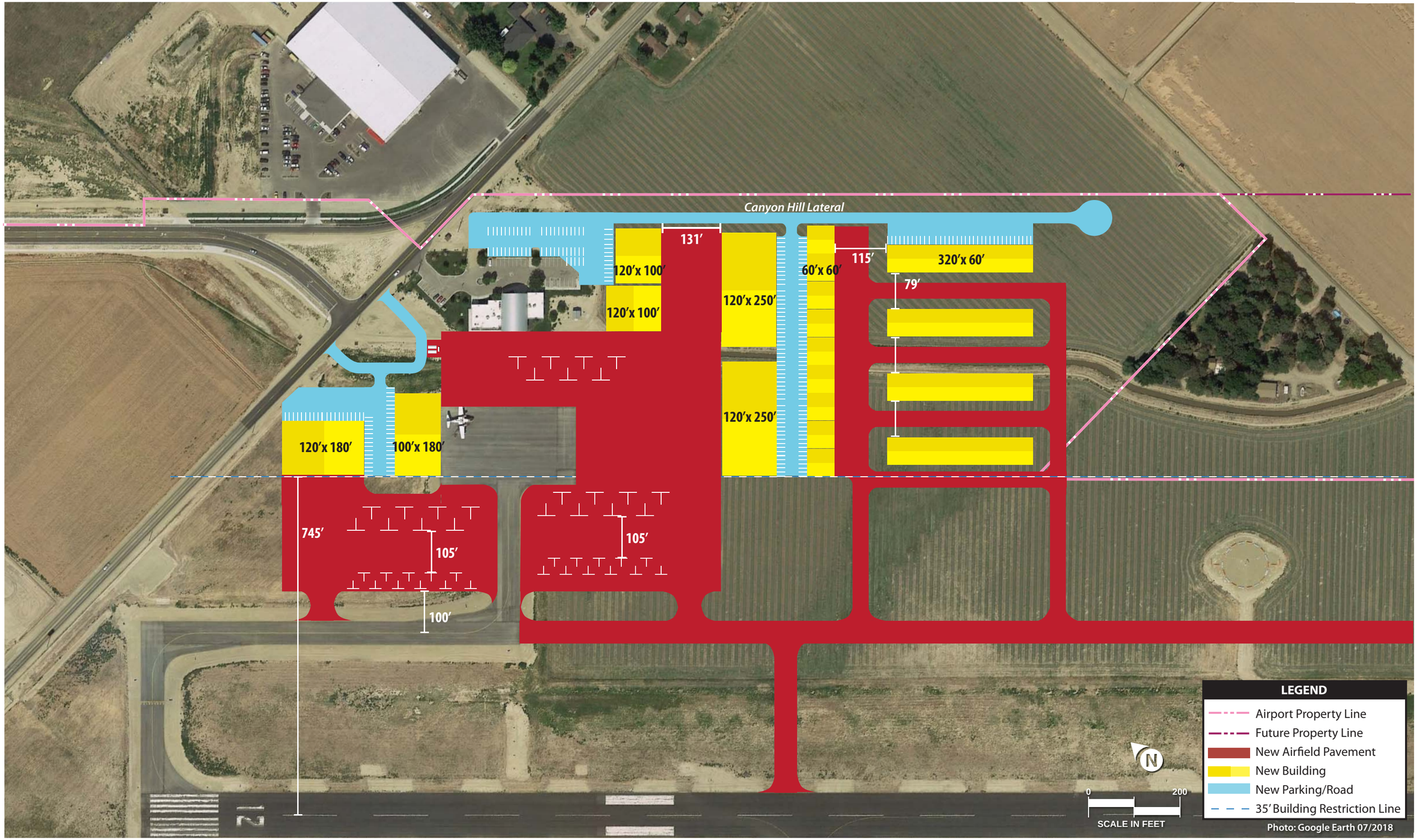
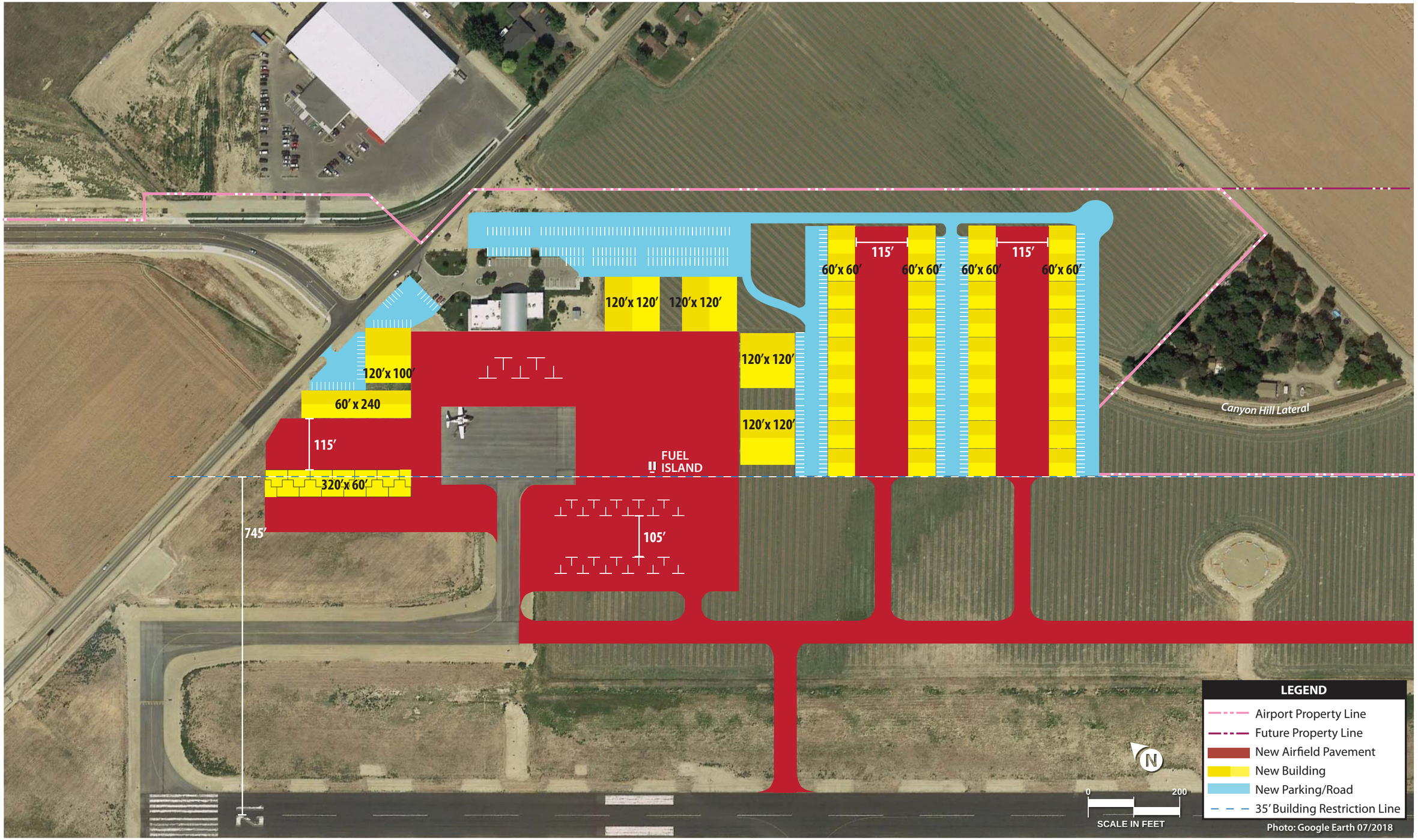
SCALE IN FEET
Photo: Google Earth 07/2018


Canyon Hill Lateral
131′
120′x 100′
120′x 100′
120′x 250′
120′x 250′
60′x 60′
115′
320′x 60′
79′
120′x 180′
100′x 180′
745′
105′
105′
100′
N
0
200
SCALE IN FEET
LEGEND
Airport Property Line
Future Property Line
New Airfield Pavement
New Building
New Parking/Road
35′ Building Restriction Line
Photo: Google Earth 07/2018


120'x 120'
120'x 120'
120'x 100'
60' x 240
115'
320'x 60'
745'
FUEL ISLAND
120'x 120'
120'x 120'
105'
115'
115'
60'x 60'
60'x 60'
60'x 60'
60'x 60'
Canyon Hill Lateral
LEGEND
Airport Property Line
Future Property Line
New Airfield Pavement
New Building
New Parking/Road
35' Building Restriction Line
N
0
200
SCALE IN FEET
Photo: Google Earth 07/2018

60'x 60'
79'
115'
320'x 60'
115'
79'
320'x 60'
79'
320'x 60'
79'
115'
320'x 60'
60'x 60'
79'
79'
100'x 200'
120'x 140'
100'x 250'
160'x 100'
120'x 160'
120'x 160'
120'x 250'
ATCT
Canyon Hill Lateral
745'
FUEL ISLAND
Runway 12-30 (5,500' x 100')

LEGEND
- Airport Property Line
- Future Property Line
- New Airfield Pavement
- New Building
- New Parking/Road
- 35' Building Restriction Line

N

0 200
SCALE IN FEET

Photo: Google Earth 07/2018

FAA Order 6480.4A, *Airport Traffic Control Tower Siting Process*, provides guidance on locating control towers. When siting a control tower, the end goal is to allow for the shortest possible structure that meets all siting criteria. A Visibility Siting Requirements Analysis must be conducted to address the Unobstructed View, Object Discrimination, and Line-of-Sight (LOS) Angle of Incidence requirements.

Unobstructed View: Visibility from the tower cab must provide an unobstructed view of all controlled movement areas. At EUL, this includes the runway, both parallel taxiways, and air traffic in the vicinity of the Airport. FAA is responsible for conducting this analysis utilizing the Airport Traffic Control Tower Visibility Analysis Tool (ATCTVAT), which is a simulation computer program.

Object Discrimination: FAA will perform an Object Discrimination Analysis to assess observers' probability of detection and recognition of an object on the Airport surfaces.

Line-of-Sight (LOS) Angle of Incidence: FAA will perform this analysis to assess the angle at which the observers' view of a distant object intersects with the airport surface in accordance with established criteria.

Any control tower must be clear of specific airport surfaces, including the runway safety area, runway object free area, runway obstacle free zone, runway protection zone, and the building restriction line. Consideration shall be given to direct sun glare, indirect sun glare off natural and manmade surfaces, nighttime lighting glare, external light sources, and thermal distortion. The tower shall be oriented where the primary operational view faces north or alternately east, or west, or finally south in that order of preference.

The optimal location for a tower is central to the runway system with unobstructed views of the primary movement areas as well as the aprons, taxilanes, and hangar areas. While it would be preferable for the tower to face north (thus being located on the south side of the runway), there is no available undeveloped land on the south side of the runway. Therefore, a space on the north side will be identified on the ALP and reserved for a future control tower.

HELICOPTER HELIPORT

The Airport is home to a significant helicopter flight training business that is located on the south side of the airfield. It is estimated that helicopter operations represent 33 percent of total operations or approximately 50,000 annual operations.

Because of the high level of helicopter operations, the Airport may wish to consider the establishment of a formal helicopter heliport. A formal heliport will provide additional flight safety procedures and a designated landing and takeoff location to enhance safety. FAA AC 150/5390-2C, *Heliport Design*, provides guidance on the development of a heliport.

The basic layout of a heliport consists of a Touchdown and Liftoff Area (TOFL) contained within a Final Approach and Takeoff Area (FATO) surrounded by a safety area. A heliport also has a Heliport Protection Zone (HPZ), which has 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 and TOFL, and the safety area are square imaginary surfaces surrounding the landing area, the dimensions of which are based on the rotor diameter of the most demanding helicopter utilizing the heliport. In addition, a heliport has an Approach/Departure and Transitional Surface, which are a continuation of the HPZ to a total distance of 4,000 feet.

Exhibit 4N shows the general specifications of a general aviation heliport. The optimal location for a heliport is near the desired origination and/or destination of the potential users. There is no requirement or operational threshold to establish a heliport.

ALTERNATIVES SUMMARY

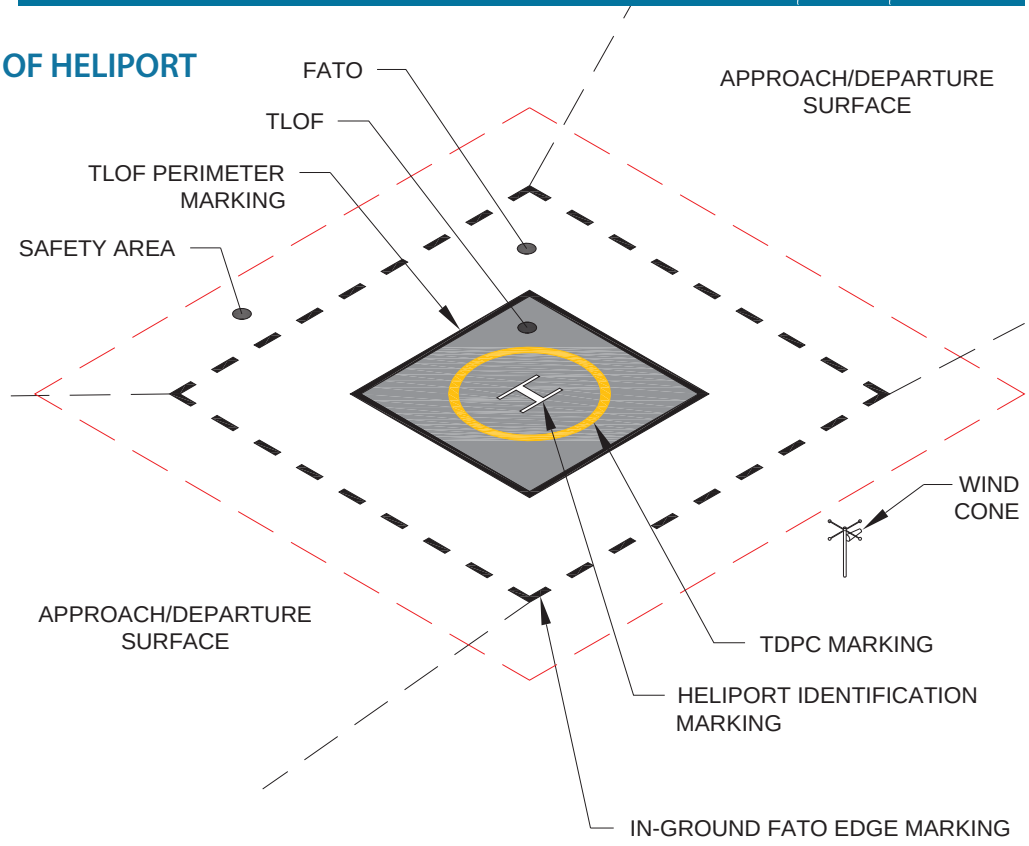
The alternatives chapter presents development alternatives for both the airside and landside. Each of the alternatives addresses specific issues identified in the Facility Requirements chapter, future demand as presented in the Forecasts chapter, or an overall long-term vision for the Airport. The need for alternatives is typically spurred by projections of aviation demand growth and/or by the need to resolve non-standard airport elements. FAA design standards are frequently updated with the intent of improving the safety and efficiency of aircraft movements on and around airports, which can lead to certain pavement geometries now being classified as non-standard when previously they did meet standard.

On the airside, the primary focus is to address the growing trend in activity by larger turboprops and business jets that require a longer runway to meet their operational needs. The runway is planned to be extended to the west to accommodate these users.

On the landside, the south side of the airfield is nearly built-out so any remaining parcels are reserved for new hangars. On the north side of the airfield, there is approximately 30 acres of undeveloped land available for aviation development. The landside alternatives presented consider strategies to develop the land before Linden Street is closed. It will be critical to methodologically develop this land to maximize its capability because the runway extension and associated closure of Linden Street may not be justified for many years.

The next step in the master plan process is to arrive at a recommended development concept. Participation of the PAC and the public will be important considerations. 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 will be necessary to implement the plan.

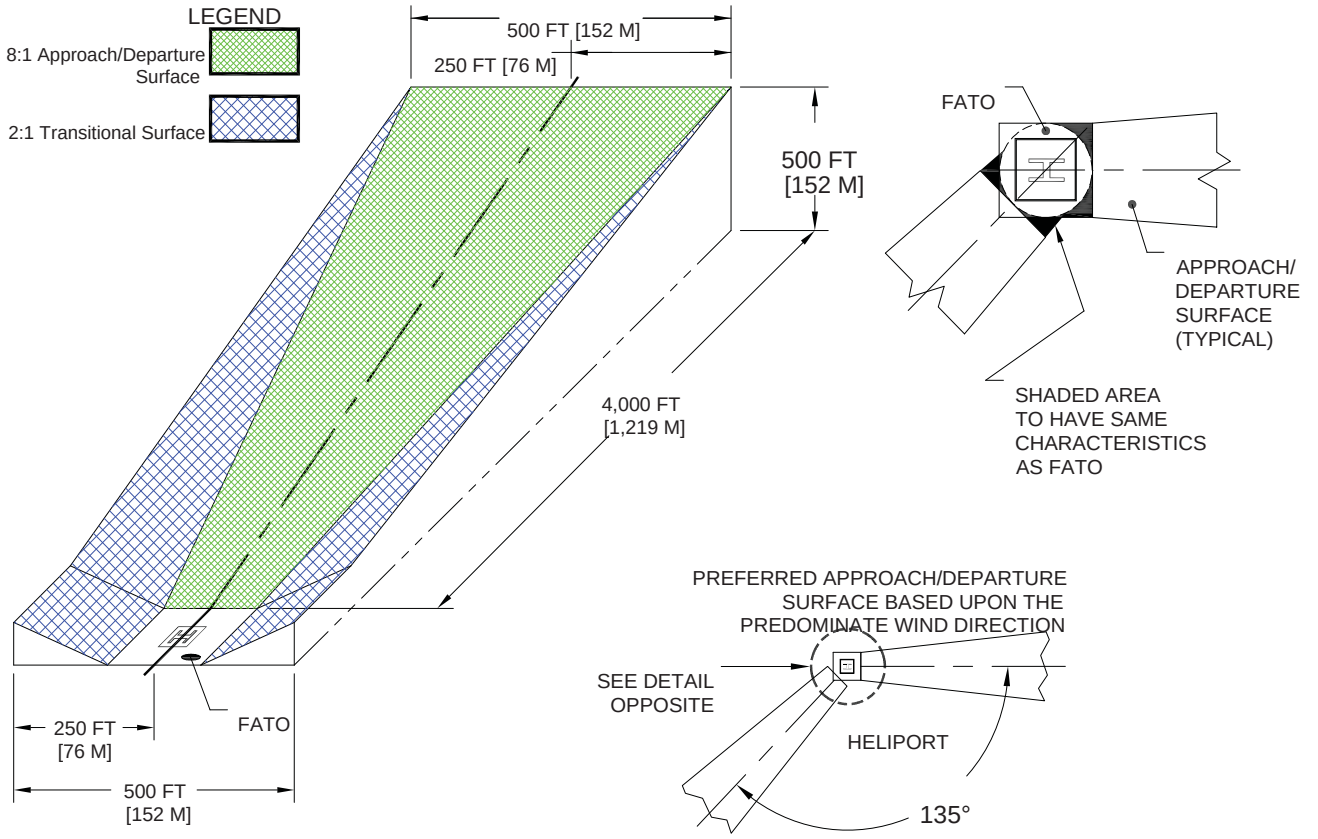
ESSENTIAL FEATURES OF HELIPORT



NOTES:

1. Locate the wind cone so that it will not interfere with the Approach/Departure Path or Transitional Surface.
2. TLOF size and weight limitation box omitted for clarity.

VFR HELIPORT APPROACH/DEPARTURE AND TRANSITIONAL SURFACES: GENERAL AVIATION



HELIPORT PROTECTION ZONE: GENERAL AVIATION