NEW LOS BANOS AIRPORT
SITE SELECTION & CONCEPT STUDY
NARRATIVE REPORT
A CITY OF LOS BANOS AVIATION FACILITY

WADELL ENGINEERING CORPORATION

AIRPORT PLANNING □ ENGINEERING □ MANAGEMENT CONSULTANTS

NEW LOS BANOS AIRPORT
SITE SELECTION & CONCEPT STUDY
NARRATIVE REPORT

MAY 2019

WADELL ENGINEERING CORPORATION
Airport Planning □ Engineering □ Management Consultants
San Francisco Bay Area Corporate Headquarters
Burlingame, California

Table of Contents

List of Figures

List of Tables

Appendix

EXECUTIVE SUMMARY

The New Los Banos Airport Site Selection & Concept Study was funded by the City of Los Banos. The study was prepared by Wadell Engineering Corporation with active participation by City of Los Banos professional staff. The purpose of the study was (1) to evaluate the existing airport in terms of current condition and ability to meet the City needs in the long run, (2) to identify better airport sites to meet future aviation needs, (3) to prepare conceptual drawings depicting the new airport site development, and (4) to provide a narrative describing the study, development opportunities and benefits to aviation.

The original site of the Los Banos Municipal Airport consisted of 100 pasture acres on land purchased by the City. Additional city funded land acquisition resulted in the city owned property increasing to 125.6 acres. Approximately 81.8 acres of the land is for airport use, while the remaining portion meets other city needs, such as recreation, municipal services, and open space. All land is city owned and there were no state or federal funds for any land acquisition. While the airport was at the west edge of the city in the 1940's, the city has grown and the airport is essentially downtown.

There is one paved runway 3,800 feet long by 75 feet wide with a northwest-southeast orientation. The existing runway wind coverage is approximately 91%, less than the FAA required 95% wind coverage for a single runway. The site is known for some strong crosswinds, and foggy conditions during periods of the year. There is not sufficient land for a cross wind runway that would meet FAA standards.

The existing airport does not have sufficient land for ownership of runway protection zones at each end of the runway or to provide clear runway safety areas and runway object free areas, due to road and canal penetrations.

The runway, taxiway and apron pavements have aged, and full depth rehabilitation with a 3" overlay is needed to restore the pavements. The airport lighting vault was installed in the early 1990's and is obsolete. In 2005 the FAA funded a new AWOS weather system and airfield lighting rehabilitation. All airfield facilities are or have already reached their 20 year life, and all buildings except for the 20 year old T-hangar building have deteriorated over time.

In the past the airport was more active and provided for general aviation recreation and business flights and limited weight air freight service. The freight operation discontinued years ago. Current activity is very low, about 2,330 annual operations, determined by city staff review of 24-hour airfield camera recordings. Based aircraft have reduced to 24. Two helicopters are owned by an agricultural helicopter service that uses the airport as a home base supporting their remote agricultural flight operations. The 20-year forecast projects growth to 33 based aircraft and 3,710 annual operations.

The previous critical aircraft (more than 500 operations per year) for design purposes was the daily air freight twin turboprops which required a 3,800' long runway. Currently the design aircraft is a single engine Cessna 182, with a runway length requirement of less than 3,200 feet and 60 feet wide. The low level of hourly activity does not require construction of a parallel taxiway.

Although there is less activity and demand than in previous years, the site selection study sought sites that were oriented with the wind and had space available to construct not only the required 3,200 foot runway, but also the same 3,800 foot runway length as exists at the current airport.

This study reviewed the sites identified in the previous site selection & master plan study. None of the previous sites were found viable at this time. Four new sites were identified for analysis, one west and three south of the city. In February 2016 the City purchased and installed wind recording equipment on the I-5 South site. That location was selected since it is just east of the freeway where the westerly terrain transitions from hilly to sloping agricultural land, and in general proximity to the three south sites. After several years of wind analysis, the I-5 South site was found to have 97% wind coverage. Similar coverage might be possible at the two other south sites.

All four sites were evaluated qualitatively several criteria including suitability of orientation, terrain, utilities, ground access, expected construction costs, farmland removal and surrounding land use compatibility. Airport concept layouts and airspace drawings were prepared to present the utilization and characteristics of each site. The Fox Hills site west of the city was rejected due to terrain and proximity to the landfill. The two central sites were less favorable due to extensive removal of prime agricultural land and the proximity of the Charleston Elementary School to the east site.

An in-progress briefing was made to the city council and public on November 4, 2015. The I-5 South site was identified by the consultant and city staff to be the preferred site for further analysis. The site is long enough for even a 6,000' runway, wide enough for extensive terminal development and required lateral clearances, and has ideal orientation based on analysis of site specific wind. The relatively flat site will allow for more favorable construction costs. The existing road and utilities network is not as developed as the central sites, but extensions would not be costly.

Airport Concept, Airport Airspace, Land Acquisition and Stage Development drawings were prepared for the I-5 South site, which are presented in the Appendix.

Based on the current aviation demand and Cessna 182 critical aircraft for design, the stage development program is presented in three stages. Only the first stage is required to satisfy demand during the next 20 years and meet current FAA standards.

The first stage of development (0-5 years) provides a new runway that is 60' wide by 3,200' long. The new runway has end exits with turn arounds, rather than a full length parallel taxiway. The current critical aircraft is smaller than past design aircraft, therefore a shorter and narrower runway would meet current standards. A parallel taxiway is not required, since there are only two forecast hourly operations.

A complete airfield lighting system would be installed, including medium intensity runway lights, precision approach path indicators (PAPI) and runway end identifier lights (REIL) at both ends, and an AWOS weather reporting station. This initial stage includes land acquisition, road access, utilities, relocated fueling system, hangars and aircraft parking apron.

The second stage of development, 6-10 years, includes a parallel taxiway and central runway exit with lighting and signing in the event these facilities are desired locally and the FAA concurs with the advantages and provides funding. These developments should be based on demand.

The third stage of development, 11-20 years, includes seal coating and paint marking of all first stage pavements. The sealing and marking would be needed for pavement maintenance reasons, regardless of traffic. This stage includes a 600' runway and parallel taxiway extension with lighting and signing, and relocated PAPI and REIL. The runway extension is based on demand. That demand must be over 500 operations by the larger critical aircraft to be considered for funding. It is unlikely that demand will develop during the 20 year planning period.

The first stage of development is estimated to cost almost $10 million, of which $4 million is land acquisition and $6 million construction of the new facilities. The second stage of development, if required, is the parallel taxiway system at a cost of almost $750,000. The last stage is the runway extension of 600 feet resulting in a 3,800 foot runway with parallel taxiway and lighting. That cost is estimated to be just over $600,000.

Typical steps to implement development of the new airport are as follows:

- Undertake a FAA funded site selection study and Airport Layout Plan
- Prepare a NEPA Environmental Assessment & CEQA DEIR
- Receive FAA Site Endorsement
- Receive FAA Grants for Land Acquisition and Design of Stage 1 Facilities
- Complete Land Acquisition and Design
- Bid and Construct the New Los Banos Airport

Considering the steps moving forward, the earliest land acquisition would be completed in two years. An optimistic new airport opening would be two years later. All of this is based on completion of planning and environmental processes and FAA agreement on new airport development and funding.

The benefits of the new airport are much greater than the new infrastructure alone. These include acreage, wind coverage, runway length and clearances, traffic patterns and approaches, instrument operations, and surrounding land uses. The new site at 269 acres is over three times larger than the existing airport land use. The larger size allows for ownership and control of all protective surfaces such as runway protections zone and object free areas.

Based on years of on-site wind collection and analysis, the new site has a 97% wind coverage, whereas the existing site wind has 91%, less than the required 95%. Further, fog is expected to be less of an issue at the new site.

While the initial development based on the critical aircraft is a 3,200' runway and exits, the new site has sufficient land for a 6,000' runway with full parallel taxiway, protection zones and 34:1 approach slopes. Instrument approach minimums might be as low as 200' and ¾ mile, allowing for improved use in actual instrument weather.

The new terminal land area is over five times larger and will allow for significant growth in the event of new aviation uses such as hangar storage and maintenance of large corporate aircraft that lack facilities at the large Bay Area airports.

The new site is adjacent to the I-5 freeway and at the edge of the valley where the westerly terrain commence a rise to the mountains. The new site will be convenient to California Highway Patrol helicopters and fixed wing aircraft, as well as fire-fighting helicopters and fire observation aircraft. Often fires occur during strong winds. The improved wind coverage of the new airport will be more favorable to fire-fighting pilots flying during those wind conditions.

Safety is enhanced at the new site, since there are no objects in the runway protection zones or obstacle free zones. The existing airport has Highway 152, canals and buildings in these areas.

Safety also is enhanced at the new site, since the surrounding land uses are more compatible at the new site, being out of town and within an agricultural area. There are no schools near the new site. The existing site has 15 schools (community college, high school and elementary schools) within just 2 miles of this downtown airport.

Development of a new site may benefit both education and aviation. The new site provides new educational opportunities for pilot ground schools, pilot flight training, aircraft manufacturing and maintenance, including training of airframe and powerplant mechanics. Nationwide, and in fact worldwide, there is a dire shortage of pilots and mechanics. The new site could provide the location and facilities needs for new aviation training, careers and jobs!

The relocation of the existing Los Banos Municipal Airport activities to the new I-5 South Site provides significant direct benefits to aviation relative to infrastructure improvements, opportunities for larger and safer facilities, improved parking and hangars, enhanced safety through proper wind coverage, and clear obstacle free zones.

Both aviation users and the community benefit from improvements to airport land use compatibility and the creation of new pilot and mechanic educational opportunities that are needed locally and worldwide. The future of aviation in Los Banos is bright!

1. INVENTORY

The inventory is prepared to provide a description of the general airport location and setting, the climatic and geographic features of the area, and other related information.

Airport Setting

The City of Los Banos is located in the San Joaquin Valley in Merced County in Central California. It is approximately 70 miles southeast of San Jose and 35 miles southwest of Merced, the County seat. The existing Los Banos Municipal Airport is located at the westerly edge of the City of Los Banos, near the intersection of State Highway 152 (Pacheco Boulevard) and West "I" Street. Los Banos is located at the foot of the coastal range in the fertile San Joaquin Valley. The geography of the area varies from marshes and verdant farmlands to hills. Most of the terrain in the Los Banos area is relatively flat and ranges from 100 to 135 feet above mean sea level (MSL); steeper slopes are found in the hills to the south and west which range from 1,000 feet to 1,200 feet above MSL.

The setting of the Los Banos area is characterized by residential, commercial and industrial uses, with supporting public and semi-public facilities including schools, churches, hospital, government offices and public utilities. There are 15 schools located within just two miles of the existing airport. In 2016 Los Banos had a population of approximately 37,000 people. The city limits encompass an area of over 10 square miles. The city is surrounded by agricultural land devoted mostly to field crops and pasture.

The climate of Los Banos is semi-arid Mediterranean which is typical of the San Joaquin Valley. Summers are dry, warm and often windy, with daytime temperatures typically in the mid-90s. Because of prevailing westerly winds which average 16 mph, and occasional air flow through Pacheco Pass, summer temperatures tend to be a few degrees cooler than more interior sections of the San Joaquin Valley. Wind is usually from the northwest, and there is often a gusty afternoon cross wind coming from a westerly direction.

Monthly average temperatures are as follows: maximum 96.5°F, minimum 36.3°F. Yearly average temperatures are: maximum 76.4°F, minimum 48.0°F, and mean 62.2°F. The average rainfall is 9.19 inches. Temperature inversions are frequent in summer and generally occur at an elevation of 3,000 to 4,000 feet. Winter temperature inversions are common, but they result from a different set of conditions from those occurring in summer. In summer, moisture laden winds are pulled inland by the hot valley and create fog to the crest of the Coast Range. As the fog creeps over the leeward (valley) side, the air expands to absorb moisture and warms rapidly, creating a temperature inversion. In winter, high relative humidity and windless nights combine with cooling of the air close to the ground surface to create inversions. As the night air temperature reaches the dew point, fog is formed. Los Banos, however, experiences significantly fewer days of heavy fog than most inland parts of the San Joaquin Valley.

Existing Airport

The original site of the Los Banos Municipal Airport consisted of 100 pasture acres on land purchased by the City. Additional land acquisition resulted in the city owned property increasing to 125.6 acres. Over 60% of the land is designated for airport use, and the remaining portion meets other city needs, such as recreation uses, municipal services, and open space. All land is city owned and there were no state or federal funds for any land acquisition.

There is one paved runway 3,800 feet long by 75 feet wide with a northwest-southeast orientation. The existing runway wind coverage is approximately 91%, less than the FAA required 95% wind coverage. The site is known for some strong crosswinds, and foggy conditions during some periods of the year. There is not sufficient land for a cross wind runway to meet FAA standards. The City of Los Banos provided water and sewer connections to the airport to accommodate expansion, and the runway was extended. Additional T-hangars were built and in 1963 the runway was extended to 3,000 feet. Additional property to the north was purchased by the city in 1974. In 1999 a new 12,000-gallon avgas and 12,000-gallon jet fuel facility and 8-unit nested T-hangar building were constructed with city funds. In 2004 the runway with parallel taxiway was extended northwest to a length of 3,800 feet.

Figure 1 Existing Airport Aerial Photograph

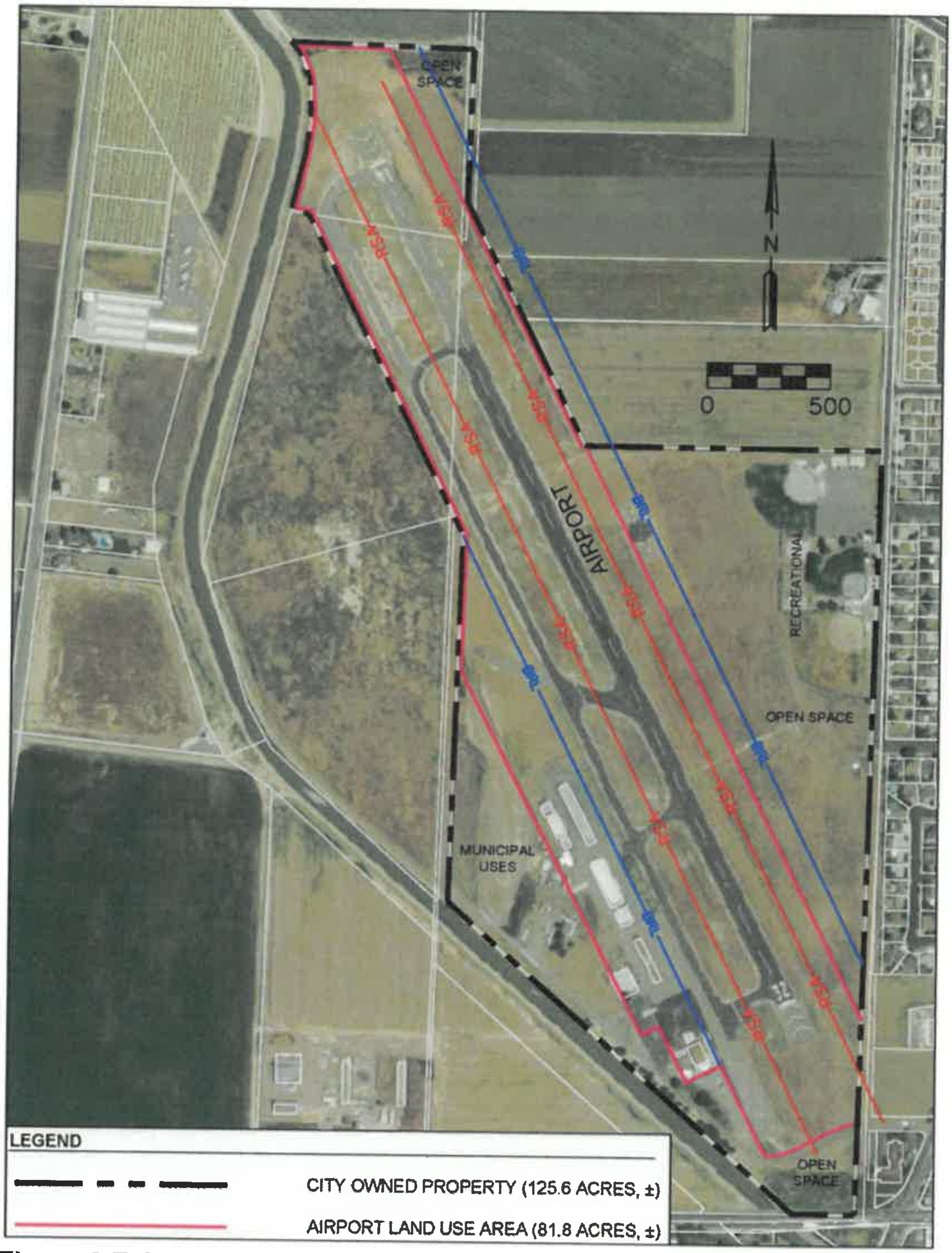


Figure 2 Existing City Owned Property

2. AVIATION FORECASTS

The aviation forecasts are prepared by first selecting and identifying the airport service area and its associated socioeconomic data, followed by analyzing aviation trends including aircraft activity and based aircraft. The activities commonly forecast for airport planning include passengers, aircraft operations and based aircraft. In this plan, forecasts are projected through the year 2038.

Airport Service Area

The area to be served by the Los Banos Airport is designated in this report as the airport service area. Geographical boundaries for airport service areas consist of a city, county, or other governmental subdivision because relevant population and economic data are readily available. Trends in aviation demand correspond with local growth trends in the governmental entity containing the main concentration of population served by an airport. About two-thirds of the current aircraft owners at the existing airport are from Los Banos.

Population growth is a primary factor in forecasting of aviation demand. The 2010 population of Los Banos was approximately 36,000 people. The current State of California Department of Finance Merced County population forecast and City general plan forecasts are as follows:

Year	County Population	City Population
2010	273,935	40,300
2020	348,690	60,700
2030	439,905	90,400

Aviation Trends

General aviation flying can be divided into four major categories:

- Business: The use of an aircraft for executive or business transportation. This category includes (1) aircraft used by a corporation or other organization and operated by professional pilots to transport its employees/property (not for compensation or hire), and (2) aircraft used by an individual for transportation required by a business in which he is engaged.
- Commercial: The use of an aircraft for commercial purposes (other than the certificated air carriers) in three types of activity: (1) air taxi, involving any use of an aircraft by the holder of an air taxi operating certificate; (2) aerial application, such as the distribution of chemicals (crop dusting); and (3) industrial special, such as pipeline patrol survey, advertising, and photography.
- Instructional: The use of an aircraft for flight training under an instructor's supervision.

- Personal: The use of an aircraft for personal reasons similar to the utilization of an automobile.

At the outset of the forecasting process, it is important to recognize the overall impact of general aviation on the nation's economy, as well as anticipated growth in general aviation through future years. The FAA Aerospace Forecast Fiscal Years 2017-2037 projects a small decrease in general aviation growth, and a shift or reallocation in the types of aircraft in the fleet. The largest forecasted percentage growth will be in turbine powered fleet, including rotorcraft, with turbine leading the way.

In 2016 there were 209,905 active general aviation aircraft in the United States. Of these, 66.7% were piston powered fixed wing aircraft, 5.1% rotorcraft, 4.5% turboprops, 6.6% turbojets, 13.6% experimental, 1.2% light sport, and 2.4% other. Of all fixed wing piston aircraft, 9.4% were twin engine.

In 2027 there the forecast indicates there will be 209,805 active general aviation aircraft in the United States. Of these, 61.0% are piston powered fixed wing aircraft, 6.1% rotorcraft, 4.6% turboprops, 8.5% turbojets, 15.4% experimental, 2.0% light sport, and 2.4% other. Of all fixed wing piston aircraft, 9.9% are twin engine.

From 2016 to 2027 the FAA forecast indicates a reduction in piston fixed wing of 5.7%, and an increase in turboprop of 0.1%, turbojet of 1.9%, rotary of 1.0%, experimental of 1.9%, and sport of 0.8%.

Aviation Forecasts

Aviation forecasts include estimates of aircraft activity (takeoff & landings), based aircraft and determination of the critical aircraft. The critical aircraft is the basis for determining development criteria, such a runway and taxiway widths, safety and obstacle clearance areas, etc. Operations and number of based aircraft are useful for determining the extent of taxiway and apron development and the need for aircraft hangars. Over recent years, the representative critical aircraft is a single engine Cessna 182 or similar equivalent aircraft. Some of the larger transient aircraft include King Air and Cessna Citations, however, the total visits by larger transient aircraft is less than 500 operations per year.

There have been both increases and decreases in based aircraft and operations over the decades. Some of the common reasons for decreases were due to aging pilots and airplanes, and the cost of flight training for some younger pilots. Sometimes increases and decreases are due to more accurate field counts.

Decreases have occurred since 2007 when there were reportedly 34 based aircraft. Currently there are 24 aircraft, all in hangars, and 5 empty hangar spaces are available for lease.

Aircraft activity defined here are aircraft operations being either local or itinerant operations. According to 14 CFR 170.3, "local operations mean operations performed by aircraft which: (i) Operate in the local traffic pattern or within site of the airport; (ii) are known to be departing for or arriving from flight in local practice areas located within a 20-mile radius of the airport; or (iii) execute simulated instrument approaches or low passes at the airport. Itinerant operations mean all aircraft operations other than local operations."

Los Banos Airport is considered a low activity airport, in terms of runway operations. The FAA Terminal Area Forecast (TAF) issued February 2019 indicates about 16,000 operations (takeoffs and landings) per year as a constant from 2006 through 2045.

Several years ago the City of Los Banos installed cameras observing both ends of the runway. Video records between 2017 and 2018 indicate there were approximately 2155 aircraft operations. Inquiries of the based helicopter operator indicate and additional 160 annual helicopter operations. Total operations are approximately 2,330 per year, which are forecast to increase to over 3,710 operations through year 2038 as presented in Table 1.

General observation of the activity at the Los Banos Municipal Airport indicates that it has a consistent level of activity throughout the week. Monthly operations during the recent counts indicates the monthly traffic ranges from a low of 160 to a high of 280 operations.

It is estimated that 60% of current operations are local and 40% itinerant. The vast majority of operations are by single-engine aircraft at Los Banos Municipal Airport, although some are by transient multi-engine piston and occasional business jets and turboprops.

An airport plan is primarily developed from aviation demand forecasts. The California Aeronautics Program and the FAA, through the National Plan of Integrated Airports System (NPIAS) provide information about ownership, role, category, aircraft and development. To receive federal aid, airports must be in the NPIAS. The 2019 NPIAS shows that there are 21 aircraft based at the Airport. The FAA Terminal Area Forecast (TAF) shows a constant number of 21 based aircraft through 2045.

Airport management reports that there are 24 based aircraft, all single engine in hangars. There are 5 empty hangars and no persons on the hangar waiting list. The forecast indicates minimal growth to 33 based aircraft, of which two are multi-engine piston, two helicopters, and three turbine powered. Most will be single engine piston, yet it is recognized that by 2038 some of those would actually be battery powered instead.

Table 1 Aircraft and Operations Forecast

	2018	2023	2028	2033	2038
Based Aircraft:					
Single Engine/Ultralight	22	23	24	25	26
Multi Engine	0	1	1	1	2
Helicopter	2	2	2	2	2
Turboprop	0	0	1	1	2
Turbine	0	0	0	1	1
Total	24	26	28	30	33
Annual Aircraft Operations:					
By Type of Operation					
Local	1,400	1,570	1,740	1,910	2,230
Itinerant	930	1,040	1,160	1,270	1,480
Total	2,330	2,610	2,900	3,180	3,710
By Type of Aircraft					
Single-engine prop./Ultralight	1,980	2,060	2,150	2,230	2,360
Multi-engine prop.	100	300	300	300	500
Helicopter	200	200	200	200	200
Turboprop	30	30	230	230	430
Turbine	20	20	20	220	220
Total	2,330	2,610	2,900	3,180	3,710
By Type of User					
Military	0	0	0	0	0
Air Taxi	0	0	0	0	0
General Aviation	2,330	2,610	2,900	3,180	3,710
Total	2,330	2,610	2,900	3,180	3,710
Aircraft Operations Distribution					
Peak Month	230	260	290	320	370
Peak Week	60	70	70	80	90
Average Day of Peak Month	8	9	10	11	12
Peak Hour of Average Day of Peak Month	1	1	2	2	2
Instrument Operations	10	10	10	10	10
Approaches	0	0	0	0	0
Pilots and Passengers in Busy Hour	2	2	3	3	3

Source: Wadell Engineering Corporation

For purposes of this study, forecasts were prepared for based aircraft and annual operations from 2018 through the year 2038. The forecast, as presented in Table 1, provides detailed information concerning the determination of types of based aircraft for future apron and hangar parking requirements, the number of instrument operations for determination of instrument approach capabilities and needs. Most of the current and future based aircraft will be single engine piston powered.

The forecast of aircraft operations is by type of operation, type of aircraft, and type of user. The local aircraft movements include touch-and-go training activity as well as flights in the immediate airport environs. The remaining aircraft movements are classified as itinerant, which includes flights that have origins and/or destinations away from the airport.

The instrument operations in Table 1 include instrument approaches (when aircraft arrive at the airport under instrument conditions using navigational aids) and instrument departures, which are the primary portion of the instrument operations. Typically, there are more instrument departures than instrument approaches at general aviation airports since the instrument approach is a more precise operation and usually occurs when arriving at a destination where it is necessary to let down to the airfield through cloud conditions or fog. Instrument departures most often involve a climb-out from the airport during instrument conditions when visual flight rule conditions exist on top of the clouds. There are published non-precision instrument approach procedures for the Los Banos Municipal Airport.

3. AVIATION FACILITY REQUIREMENTS

Demand/capacity analysis and facility requirements are based on guidelines established in the FAA Advisory Circulars, FAA Regulations and good planning and engineering judgment. Facility requirements are matched with the forecast of aviation demand to provide for the safe, efficient, and convenient utilization of the airport without unreasonable delays.

FAA standards have changed over the years since the existing Los Banos Municipal Airport was designed and constructed. In recent years a thrust of the FAA has been to "right size" airport facilities. Therefore, if older facilities were longer, wider and stronger than is needed to meet demand, the FAA Airport District Offices direct that rehabilitation projects design to current standards and current demands. For example, taxiways that may have been 40' wide under old standards, are rehabilitated to just 25' wide if that adequately satisfies demand and meets the now current standards. This would be the case for a replacement airport in Los Banos. This will be discussed further in the Capital Improvement section of this report.

Aircraft/Airport Classifications

FAA Advisory Circular 150/5300-13A, *Airport Design*, prescribes the standards and recommendations set forth by the FAA to ensure the utmost safety and security in airport planning and designs.

Runway Design Code

The critical Aircraft Approach Category, Airplane Design Group and Visibility Minimum form the Runway Design Code. The Runway Design Code is for the entire runway length and determines various design standards. The Cessna 182 is an A-1 small aircraft.

Aircraft Approach Category

An aircraft approach category is a grouping of aircraft based on an approach speed of 1.3 V_{so}. V_{so} is the aircraft stall speed at the maximum certificated landing weight. V_{so} and the maximum certificated landing weight are established for the aircraft by the certificating authority of the country of registry. The aircraft approach categories are presented in Table 2.

Table 2 Aircraft Approach Category (AAC)

AAC	VREF/Approach Speed
A	**Approach speed less than 91 knots**
B	Approach speed 91 knots or more but less than 121 knots
C	Approach speed 121 knots or more but less than 141 knots
D	Approach speed 141 knots or more but less than 166 knots
E	Approach speed 166 knots or more

Source: FAA Advisory Circular 150/5300-13A

Airplane Design Groups

The airplane design groups table categorizes airplanes by tail height and wingspan. If their tail height and wingspan fall into different groups, the higher group is used.

Table 3 Airplane Design Group (ADG)

Group #	Tail Height (ft)	Wingspan
I	**< 20'**	**< 49'**
II	20' < 30'	49' < 79'
III	30' < 45'	79' < 118'
IV	45' < 60'	118' < 171'
V	60' < 66'	171' < 214'
VI	66' < 80'	214' < 262'

Source: FAA Advisory Circular 150/5300-13A

Visibility Minimums

The visibility minimums are characterized by runway visual range ratings and flight visibility in stature miles.

Table 4 Visibility Minimums

RVR (ft)	Instrument Flight Visibility Category (statute mile)
5000	**Not lower than 1 mile**
4000	Lower than 1 mile but not lower that ¾ mile
2400	Lower than ¾ mile but not lower than ½ mile
1600	Lower than ½ mile but not lower than ¼ mile
1200	Lower than ¼ mile
VIS	Designated with visual approach only

Source: FAA Advisory Circular 150/5300-13A

Runway Reference Code

The FAA has recently separated the runway reference code (RRC) into the approach reference code and departure reference code. These codes are derived from the runway to taxiway separation, as well as the visibility minimum as established in the Runway Design Code (RDC). This distinction allows the airport planners and designers to know a runway's current operational capability and meet FAA standards on future expansions.

Approach Reference Code (APRC)

The aircraft approach category, the airplane design group and the visibility minimums determine the approach reference code. While the approach reference code usually corresponds to the runway design code, that is not always the case. In certain situations, a runway can have multiple approach reference codes.

Table 5 Approach Reference Code

Visibility Minimum	Runway to Taxiway Separation (ft)						
	≥150	≥200	≥225	≥240	≥250	≥300	≥350
Visual	**B/I(S)/VIS** *	B/I(S)/VIS	B/I/VIS	B/II/VIS	B/II/VIS	B/III/VIS D/II/VIS	B/III/VIS

Source: FAA Advisory Circular 150/5300-13A

Departure Reference Code (DPRC)

The departure reference code is only comprised of the aircraft approach category and the airplane design group. This designation determines what aircraft can depart from a specific runway while other aircraft are on an adjacent taxiway. This code is determined only from the taxiway separation and that separation must be achieved before an aircraft can take-off.

Table 6 Departure Reference Code

Runway to Taxiway Separation (ft)					
≥150	≥225	≥240	≥300	≥400	≥500
B/I(S) *	B/I	B/II	B/III D/II	D/IV D/V	D/VI

Source: FAA Advisory Circular 150/5300-13A

Airport Categories

The FAA defines the airport categories as Commercial Service, Cargo Service, Reliever and General Aviation. Los Banos Municipal Airport is a general aviation airport which is defined by the FAA as "public-use airports that do not have scheduled service or have less than 2,500 annual passenger boardings."

Airport types describe the operational and physical characteristics of the airplanes intended to operate at an airport. The airport reference code (ARC) is a system developed by the FAA which utilizes aircraft approach category and airplane design group components to assist in the design of critical airport elements meeting the requirements of the airplanes anticipated to use the aviation facilities. The Los Banos Municipal Airport has an ARC of A-I(S).

Transport airports are designed, constructed and maintained to serve airplanes in aircraft approach categories C and D, while utility airports serve the smaller airplanes in aircraft approach categories A and B. The latter airplanes are commonly used for personal and business flying and for commuter and air taxi operations.

Airport Service Role

The National Plan of Integrated Airport Systems (NPIAS) is a compilation of airports that are determined to be critical to transportation by aircraft and are eligible to receive federal funding and grants. The Los Banos Municipal Airport is a "Local" general aviation airport according to the NPIAS, as defined below.

The FAA further distinguishes general aviation into 5 separate categories:

- National – Supports the national and state systems by providing communities with access to national and international markets in multiple states and throughout the United States.
- Regional – Supports regional economies by connecting communities to statewide and interstate markets.
- Local – Supplements communities by providing access to primarily intrastate and some interstate markets.
- Basic – Links the community with the national airport system and supports general aviation activities
- Unclassified – Provides access to the aviation system

This airport is also categorized as a Community Airport according to the California Aviation System Plan (CASP). The State Division of Aeronautics defines a Community Airport as "airports that provide access to other regions and states; located near small communities or in remote locations; serve, but are not limited to, recreational flying, training, and local emergencies, accommodate predominantly single engine aircraft under 12,500 pounds gross vehicle weight, provide basic or limited services for pilots or aircraft."

Facility Requirements

An airport is composed of major elements, which contribute to its overall size and shape. The principal components include:

- AIRFIELD
  - Runways
  - Taxiways
  - Visual Aids/Lighting
- TERMINAL AREA
  - Airplane Parking and Tiedown
  - Buildings and Hangars
  - Roads and Auto Parking
  - Support Facilities

This section discusses the facilities required to accommodate the forecast aviation demand. Each of the major facility requirement categories noted above is described separately. The facility requirements are summarized in tabular form at the end of this chapter.

Airfield

The airfield requirements analysis is prepared to determine future needs for the runway, taxiway, and visual/lighting systems. These requirements relate the extent and type of development necessary to accommodate the forecast demand and the capacity required of the airfield system.

Runways

Analysis of the runway system involves a determination as to necessary runway length, width, strength, orientation and markings.

Runway length is determined evaluating the critical aircraft to determine the approach speed, maximum takeoff weight and passenger seats. Once these 3 key components are identified, the percent of fleet can be identified by type of community the airport serves. A 75 Percent of Fleet serves a smaller size population community sometimes in remote or rural areas, a 95 Percent of Fleet serves a medium size population community with a greater potential for increased aviation activities, while a 100 Percent of Fleet serves communities on the fringe of metropolitan areas or large remote populations. Los Banos Municipal Airport's typical group of critical aircraft is a Cessna 182 aircraft, that has a maximum takeoff weight of 2,550 pounds, an approach speed of greater than 50 knots and has 4 seats, an aircraft within the 75% fleet.

FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design* prescribes the analytical way of evaluating the elevation of the airport above mean sea level, the mean of the maximum temperature during the hottest month of the year and the percent of fleet.

A design elevation of 121 feet mean sea level (based on the existing airport site), a critical July temperature of 96.2 degrees Fahrenheit were used to prepare the following runway length requirements for the Los Banos area.

Table 7 Runway Length and Strength Requirements

Airport Type	Length (ft)	Width (ft)	Strength
75% of Small Fleet	2,600'	60'	8,000' Single Wheel
95% of Small Fleet	3,180'	60'	8,000' Single Wheel
100% of Small Fleet	3,770'	60'	12,500' Single Wheel
75% of Jet / 60% Load	4,770'	75'	30,000' Single Wheel
75% of Jet / 90% Load	7,230'	75'	30,000' Single Wheel
100% of Jet / 60% Load	5,750'	100'	60,000' Dual Wheel
100% of Jet / 90% Load	9,270'	100'	60,000' Dual Wheel

Source: Wadell Engineering Corporation

The existing municipal airport has a runway length of 3,800 feet. That length was appropriate, considering the daily transient flights by Ameriflight turbine powered twin turboprop cargo flights and frequent transient King Air aircraft. However, with the lesser demand in current times, and the improved performance of general aviation aircraft, a 3,200-foot long runway at the new site would accommodate 95% of the fleet.

The new site should be planned to provide as short as a 3,200' runway, or as long as a 3,800' direct size replacement runway. However, if possible, a new airport site should be capable of as much as 6,000' runway for very long-range planning.

The number and orientation of runways determine the configuration of the airport. The primary factors related to the number of runways required are airfield capacity and demand.

One of the primary factors influencing runway orientation is wind. FAA criteria for a utility airport specify that a crosswind runway is required if the primary runway is oriented so that the crosswind on it exceeds 12 miles per hour (10.5 knots) more than 5 percent of the time (thus providing less than 95 percent wind coverage). Where a single runway orientation does not provide this usability factor of at least 95 percent, the airport system should include a crosswind runway. For a business jet or transport type runway, the criterion is 15 miles per hour (13 knots).

Airport Management report that winds at the existing airport are usually from about 300 degrees magnetic. Strong cross winds from about 270 to 300 degrees occur during windy afternoons. During this study, Wadell Engineering Corporation analyzed the wind data for the existing airport. The wind coverage of the existing runway is 91%, less than the 95%

required for a single runway airport. The existing airport site is constrained and not capable of providing a cross wind runway. Any new site must have 95% wind coverage.

Taxiways

Taxiways increase the airport operational efficiency and the runway capacity. Exit taxiways should be located at frequent intervals along a runway to serve each type of aircraft operating under variable landing conditions. They should provide for a free flow of aircraft to a point where the aircraft is clear of the runway, thereby ensuring continuous flow and maximum capacity.

A 25-foot wide full-length parallel taxiway with 35-foot wide runway exit taxiways would adequately serve a new runway. Runway exits should not cross the parallel taxiway and connect directly to the apron area. Such a practice is discouraged by current FAA standards since they encourage inadvertent runway incursions. Therefore, apron access would be offset from the parallel taxiway.

Visual Aids/Lighting

The following visual aids and lighting are considered to be the minimum necessary at a well-planned, public, general aviation airport:

- Basic runway markings
- Segmented circle
- Lighted wind cones (primary and supplemental)
- Rotating beacon
- Medium Intensity Runway Lights (MIRL)
- Precision Approach Path Indicator System (PAPI)

Additional items include the following:

- Non-precision runway markings
- Runway end identifier lights (REIL)

All of these items are installed at the existing airport, and all should be provided at a new replacement airport.

Navigational Aids

There are no on-airport navigational aids at the existing airport. The instrument approaches are GPS based and do not require any on-airport facilities. The approaches are non-precision straight in and circle to land procedures. The new airport would not need on-site navaids. The clear airspace around potential new sites to the south of Los Banos provides opportunities for enhanced approaches with significantly lower approach minimums and no restrictions on departure procedures.

Terminal Area

Terminal area requirements include airplane parking aprons, buildings and hangars, roads and auto parking. The General Aviation Facility Requirements table at the end of this chapter presents a summary of necessary facilities.

Airplane Parking and Tiedown Aprons

The facility requirements for airplane aprons was determined by relating initial and planned apron tiedown positions with projected demand by aircraft type. Tiedown positions and taxi lane spacing are based on Airplane Design Group (ADG) I, which has a wingspan less than 49 foot and requires a taxi lane width of not less than 79 feet. The General Aviation Facilities Requirements Summary table identifies the demand for aircraft parking by type. At the current airport, tiedowns are used only by transient aircraft. Any new airport should provide adequate hangars for based aircraft and maintenance operations. Transient tiedowns will be needed for all transient and short-term based aircraft.

Buildings and Hangars

Three types of hangars should be available to meet the range of individual user needs. T-hangars that are nested with bi-fold doors are the most suitable for storage of single engine and small multi-engine piston aircraft. Larger twin engine and turboprop aircraft and business jets should be stored in larger rectangular buildings.

If demand warrants, a new large Terminal/Hangar Building with public lobby, offices, and even classrooms should be developed at the new site. A conceptual building of this type would be an 80' by 100' hangar with a two story 20' by 80' finished space on the end for people activities.

Roads and Auto Parking

The existing airport has a two-lane paved access road. The new site would require the same. Paved auto parking is needed adjacent to the central terminal area buildings and the tiedown apron. Hangar owners should be allowed to park their vehicles in their hangars while traveling, but not at other times.

Support Facilities

Support facilities for the airport include communications, fuel storage and distribution, electric power, water supplies, wastewater disposal, and storm water collection and disposal. Availability of these facilities is essential to the operation of the airport. A new site must have either sanitary sewer connections or septic tank facilities. Water may be by water main or well. Overhead power will be needed, with underground power within the airport property. AVGAS and jet fuel will be needed; however, the existing fuel tanks can be relocated to a new site.

Table 8 General Aviation Facility Requirements Summary

	2018	2023	2028	2033	2038
Demand					
Based Aircraft	24	26	28	30	33
Aircraft Operations	2,330	2,610	2,900	3,180	3,710
Airfield Facilities					
Runways - Number	1	1	1	1	1
Longest Length (Feet)	3,200	3,200	3,200	3,800	3,800
Width (Feet)	60	60	60	75	75
Strength (Pounds - Single)	8,000	8,000	8,000	12,500	12,500
Terminal Facilities					
Airport Business Tenants	1	1	1	1	1
Acres	1.0	1.0	1.3	1.5	1.8
Auto Parking - Spaces	24	26	28	30	33
Acres	0.2	0.2	0.2	0.2	0.3
Hangar Spaces	24	26	28	30	33
Acres	3.0	3.3	3.5	3.8	4.1
Open Tiedown Spaces					
Based Aircraft	0	0	0	0	0
Transient Aircraft	5	5	6	6	7
Transient Helicopters	1	1	2	2	2
Open Tiedown Acres					
Based Aircraft	0.0	0.0	0.0	0.0	0.0
Transient Aircraft	0.6	0.6	0.7	0.7	0.8
Transient Helicopters	0.3	0.3	0.5	0.5	0.5
Total Terminal Area Acres	5.1	5.4	6.2	6.7	7.5
Access					
Access Road Lanes	2	2	2	2	2
Daily Vehicle Trips	36	39	42	45	50
Peak Hour Trips	5	6	6	7	8

NOTE: Acreage requirements will vary depending on specific layout and geometrics.

Source: Wadell Engineering Corporation

4. SITE SELECTION STUDY

The previous sections of this report identified the aviation forecast and facility requirements for an airport serving the Los Banos area. This chapter will identify potential sites that meet aeronautical and physical requirements and may be beneficial for users, cost effective and capable of development with minimal environmental detriments.
The principal criteria in the long-term development of any site are to ensure that sufficient land is available to meet long-term aviation requirements, and to ensure that compatible land uses will be developed around the site with appropriate controls. Criteria used in the evaluation of the alternative sites to be discussed subsequently include consideration of four major factors: (1) operations, (2) environmental, (3) engineering, and (4) cost.

Previous Studies

In 2004 the City of Los Banos completed a site selection study for a replacement airport. Six possible alternative sites for a new airport location were studied. Three were to the west of the city and three located to the south of Los Banos.

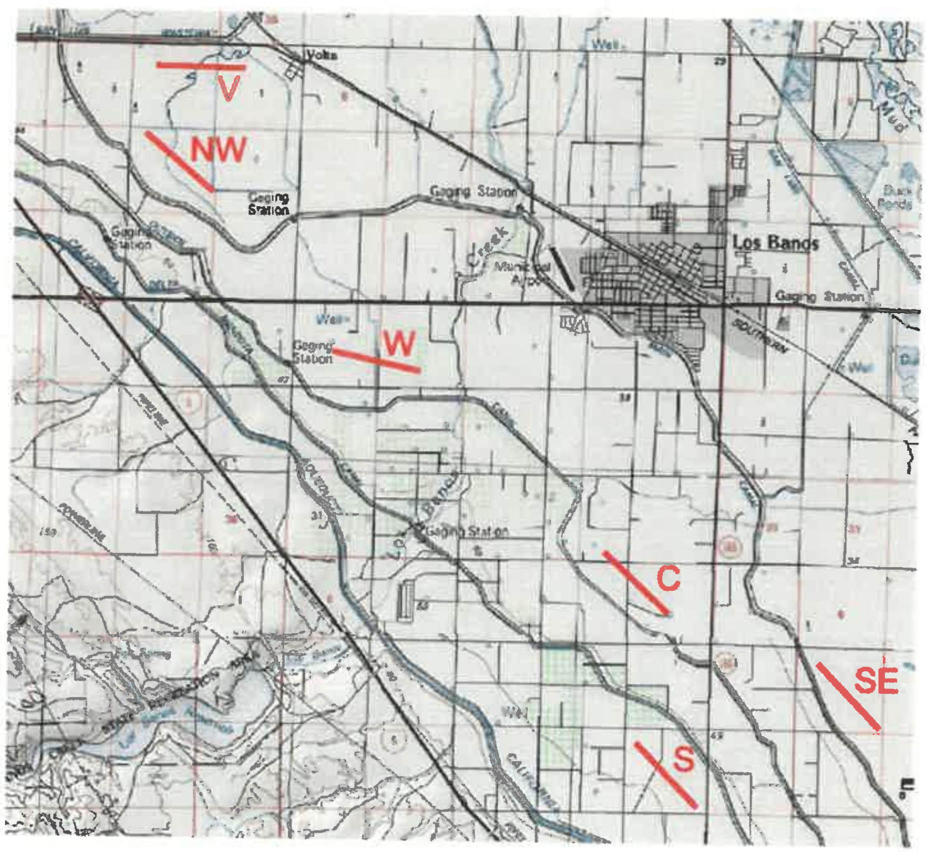


Figure 3 Six Potential Sites From The Previous Study

Source: Wadell Engineering Corporation

The six potential sites were:

1. Volta (V) located south and west of the community of Volta and having an east-west runway orientation.
2. Northwest (NW) located two miles southwest of Volta on grazing land and having a northwest-southeast runway orientation.
3. West (W) located four miles west of Los Banos, south of State Highway 152 on farmland designated of statewide importance and having a northwest-southeast runway orientation.
4. Central (C) located three miles south of Los Banos on farmland designated as prime farmland and having a northwest-southeast runway orientation.
5. South (S) located over five miles south of Los Banos on prime farmland and having a northwest-southeast runway orientation.
6. Southeast (SE) located five miles southeast of Los Banos on grazing land and having a northwest-southeast runway orientation.

The West site near Pioneer Road was identified as the best choice, and a master plan and environmental reports were prepared. Land and development costs precluded development at that time, and the site is no longer a viable option.

For this study an evaluation leading to identification and selection of potential new airport sites was undertaken. The steps undertaken in this study were:

- Identification of previous sites analyzed in other studies
- Identification of other geographic areas capable of accommodating a new airport
- Preliminary screening of available areas
- Selection of specific airport sites

The initial step in identifying geographic areas as potential airport sites was to analyze the terrain conditions in the area. Because FAA criteria require that a general aviation airport runway be constructed with an overall gradient not to exceed 2 percent, reasonably level terrain is desirable, or at least terrain that can be graded without excessive costs. It is desirable, therefore, to consider new airport sites on which longitudinal and transverse slopes are 2 percent or less to minimize earthwork and site grading requirements during airport construction. This factor considers not only the runway longitudinal slope but also considers the requirement to minimize cross-slopes for the taxiways and apron areas.

For this updated airport site selection study, a new study area south and west of the City of Los Banos was identified. The study area limit is presented on Figure 4 Study Area Limits Plan.

Preliminary Screening of Available Areas

A search and identification of sites that would be capable of development as a general aviation airport was undertaken. As a result, 4 sites were identified, each of which has different characteristics and different capabilities for development. The consultant compared of each of these sites. The sites were screened on the basis of five key planning criteria. The factors considered in this screening process were: (1) overall size, (2) accessibility, (3) site area development, (4) site topography, and (5) obstructions.

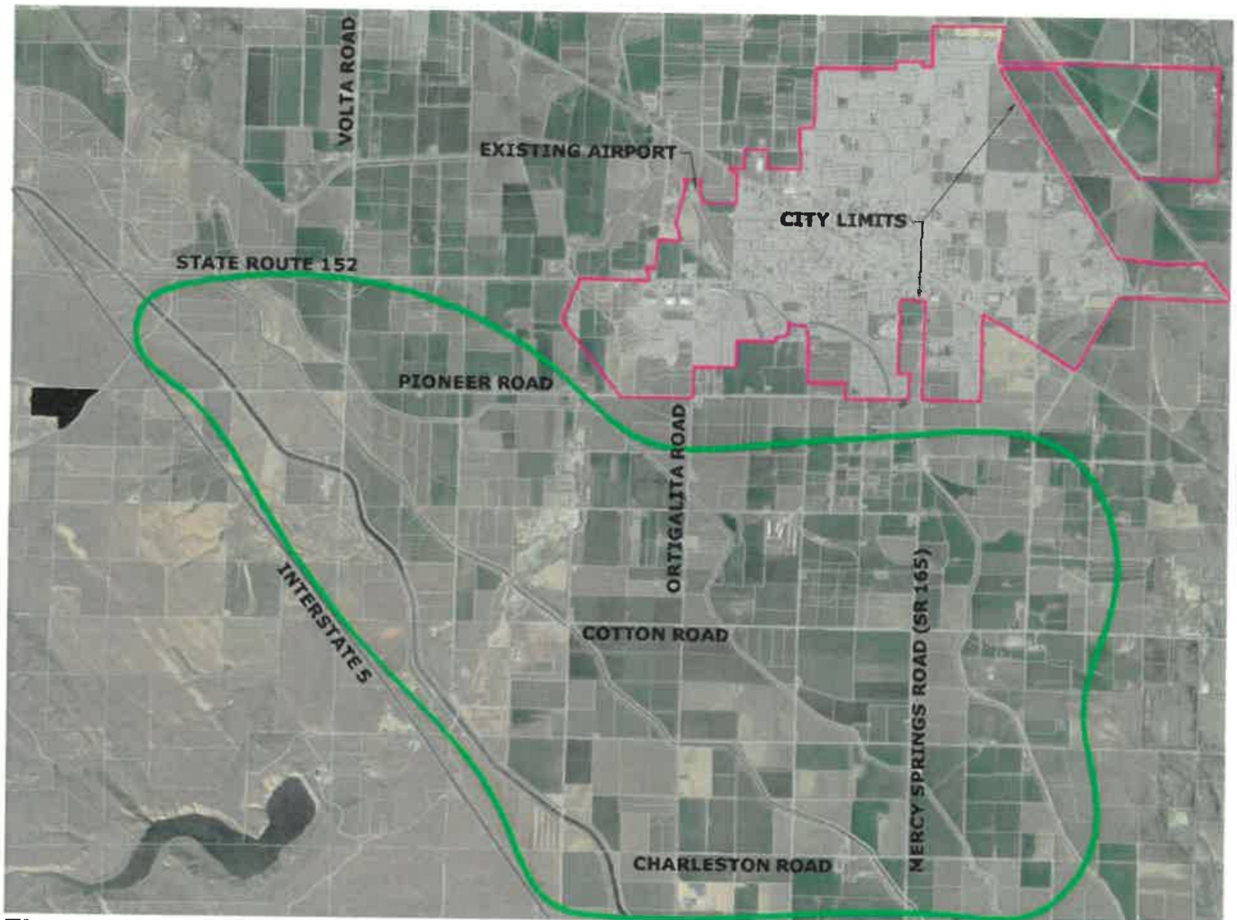


Figure 4 Study Area Limits Plan

Source: Wadell Engineering Corporation

(1) Overall Size. The preliminary land area requirements indicated the need for an area of 250 or more acres for a new airport in the Los Banos area. All site areas meet this requirement.

(2) Accessibility. In terms of access, a prime consideration was that the site be accessible to the community as well as sufficiently accessible and attractive to regional users. For accessibility a paved public road with highway access is highly desirable. Long, circuitous, or substandard roadways would not be workable for the long-range development of aviation facilities serving Los Banos. All sites have adequate access.

(3) Site Area Development. In determining airport location, community growth trends must be considered to assure that incompatible land uses around the airport will be avoided. Ideally, an airport should be located in a relatively undeveloped area where land use controls and zoning can be easily implemented. All site areas are located in presently undeveloped or agricultural areas.

(4) Site Topography. It is desirable to consider new airport sites on which the longitudinal and transverse slopes are 2 percent or less to minimize earthwork and site grading requirements during airport construction. All four sites meet or can be graded to meet the slope requirements.

(5) Obstructions. Specific considerations of site slope and runways become an important consideration in the overall orientations of the facilities. The capability of the site to satisfy terrain obstruction criteria based on Federal Aviation Regulations Part 77, "Objects Affecting Navigable Airspace," can have a significant effect in reducing costly earthwork and relocation of utilities or roadways. An analysis of approach surface clearances for visual approaches was performed for each site. All but one of the sites are clear of terrain penetration of the Part 77 surfaces. One site has terrain penetration in the horizontal surface but the extent of penetration is considered to be minimal and acceptable.

The overall runway orientation at each site was based on a consideration of wind, terrain obstructions, parcel configuration and potential impacts on surrounding development. While other potential airfield alignments are possible, the selected configurations are reasonable for comparative analytic purposes. All sites are aligned in a northwest/southeast orientation.

Selection of a Specific Airport Site

Each site was analyzed for its site capabilities, types of surrounding land use, expected obstructions, and traffic patterns.

All four sites are capable of meeting demand throughout future years, although some at significantly higher costs. Each has different features when compared to one another. The consultant established the best location and alignment of a representative 3,800-foot runway for each site as well as the planning layout for parallel taxiway and access. The length criteria was based on replacing the existing airport runway with the same length at a new site. If the FAA were funding a new runway to serve the Los Banos area, the likely funded length would be 3,200' and the width 60' based on demand and current design criteria.

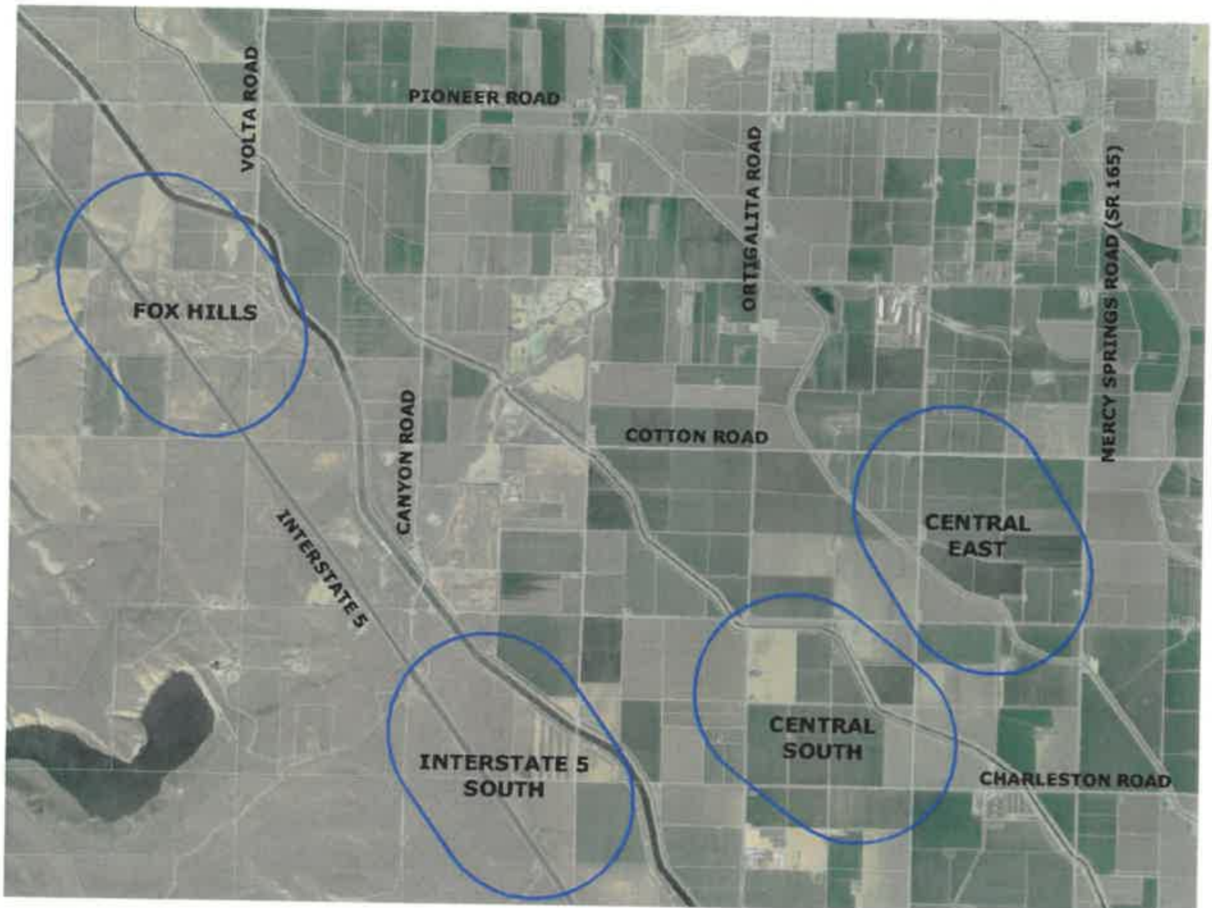


Figure 5 Site Locations Plan

Source: Wadell Engineering Corporation

The overall runway orientation at each site was based on the consideration of the three major factors: (1) wind, (2) terrain obstructions, and (3) potential impact on surrounding development.

The result of this analysis produced a runway system layout for each site. Based on the above criteria, the selected configurations appear reasonable for comparative purposes.

(1) Wind. Because aircraft cannot tolerate excessive crosswinds, runway alignment is dependent on wind direction and velocity. Site specific wind data was recorded for several years at the I-5 South Site, in cooperation with the landowner. The wind data collected at that site is considered to be generally representative of the wind within the southern study area limits.

(2) Terrain Obstructions. Specific considerations of site slope, power lines, and roadways become particularly important in the overall orientations of the runway. Significant earthwork and relocation of transmission lines or roadways can be very costly. Hence,

altering alignments to minimize site development costs and obstructions was considered. The analysis was based on criteria contained in Federal Aviation Regulation Part 77.

(3) Surrounding Development. Land use plans from Los Banos and Merced County were reviewed. In determining the proper location of an airport, the community growth trends must be considered to avoid incompatible land uses around the airport. It is ideal to locate an airport in a relatively undeveloped area where land use control zoning can be easily implemented. Although the search areas contained sparsely populated regions, consideration of surrounding area development and land uses affecting runway alignment was necessary to minimize incompatible uses.

Layout concept plans and airspace plans for each of the sites are presented on following pages. The order of presentation counterclockwise starting with the Fox Hills site.

The concept plans are presented on photo base maps showing land use, roads and canals. Each plan illustrates for each site a typical airport layout, runway protection zones at each runway end, the general wind direction, necessary fee title and avigation easement acreage (recognizing assessor parcel sizes and shapes) and roads providing access.

The airspace plans also presented on photo base maps show the airport layout, the FAR Part 77 airspace surfaces, key elevations and land uses or objects of interest.

SITES OVERVIEW

Fox Hills

The Fox Hills site is located on uncultivated land between Interstate 5 and the California Aqueduct. The property was initially planned for a residential community, so adequate drainage and ease of access from Volta Road are inherent. The topography for the site is rugged and uplifted. This would require significant construction to produce a flat, consistent sloping area that is required for airports. While the airspace around the site is predominately clear, the site is approximately two (2) miles from a landfill. Landfills can propose a hazard to aircraft due to bird attractions. The FAA Advisory Circular 150/5200-34A, "requires a minimum separation distance of six statute miles." If a new landfill should not be constructed within 6 miles of an airport, it is logical that the FAA would not be supportive of a new airport being constructed in close proximity to an existing landfill.

I-5 South

The I-5 South site is the farthest from the existing municipal airport and like the Fox Hills site is situated between Interstate 5 and the California Aqueduct. The land at this site is gently rolling with sufficient drainage. It is grassland and is used for cultivating crops. Access to the site is from South Creek Road. A short road extension to the airport would be needed, as well as some maintenance and repair for increased public use. Existing utility poles parallel to South Creek Road may need to be relocated to not interfere with runway protection zones. The airspace surrounding the site location is penetrated by high tension transmission towers and the tops of several hills to the west of Interstate 5, however, these objects would not preclude use of the site for instrument operations.

Central/South

The Central/South site is located between Center Road and Ortigalita Road, just north of Charleston Road. The land on this site is categorized as prime farmland, which is extremely flat. The flatness of the site reduces grading costs and avoids airspace issues caused by terrain. This site is the largest of the four, with an area of almost 300 acres. While the airspace is clear of penetrations, the southeasterly approach would require aircraft to fly over a portion of a local dairy.

Central/East

Much like the Central/South site, the Central/East site is located on prime farmland with flat topography. Access to the airport site would be from Center Road, which is one mile west of State Route 165 (Mercy Springs Road). Of the four sites, this location is closest to the city center, while still being in a rural area. The site is bordered on public streets with utility poles on the south and west which may need to be relocated to protect the airspace. As with the Central/South site, the Central/East site would have flights directly over the same dairy and the Charleston Elementary School.

Figure 6 Layout Concept Plan - Fox Hills Site

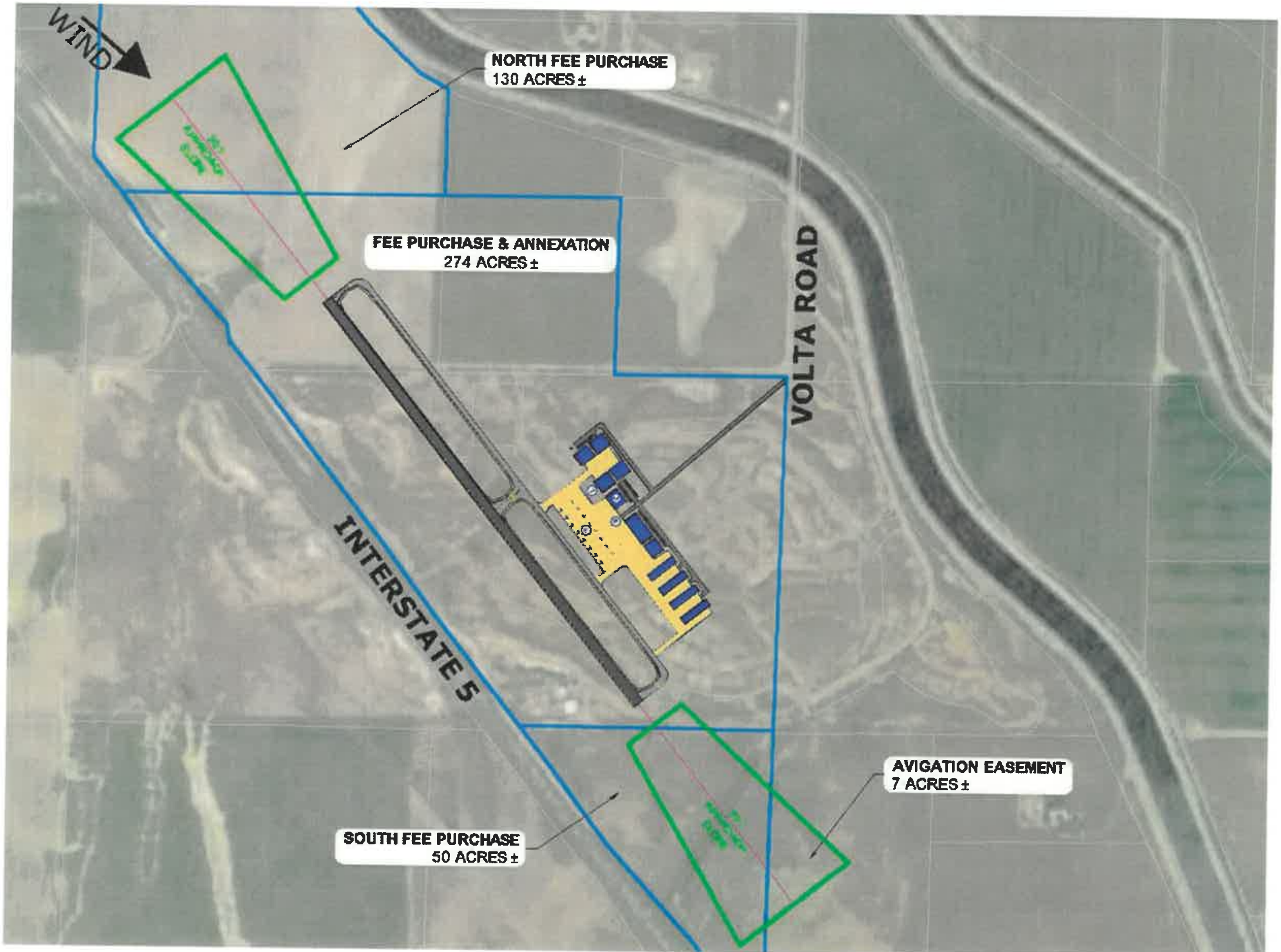


Figure 7 Airspace Plan - Fox Hills Site

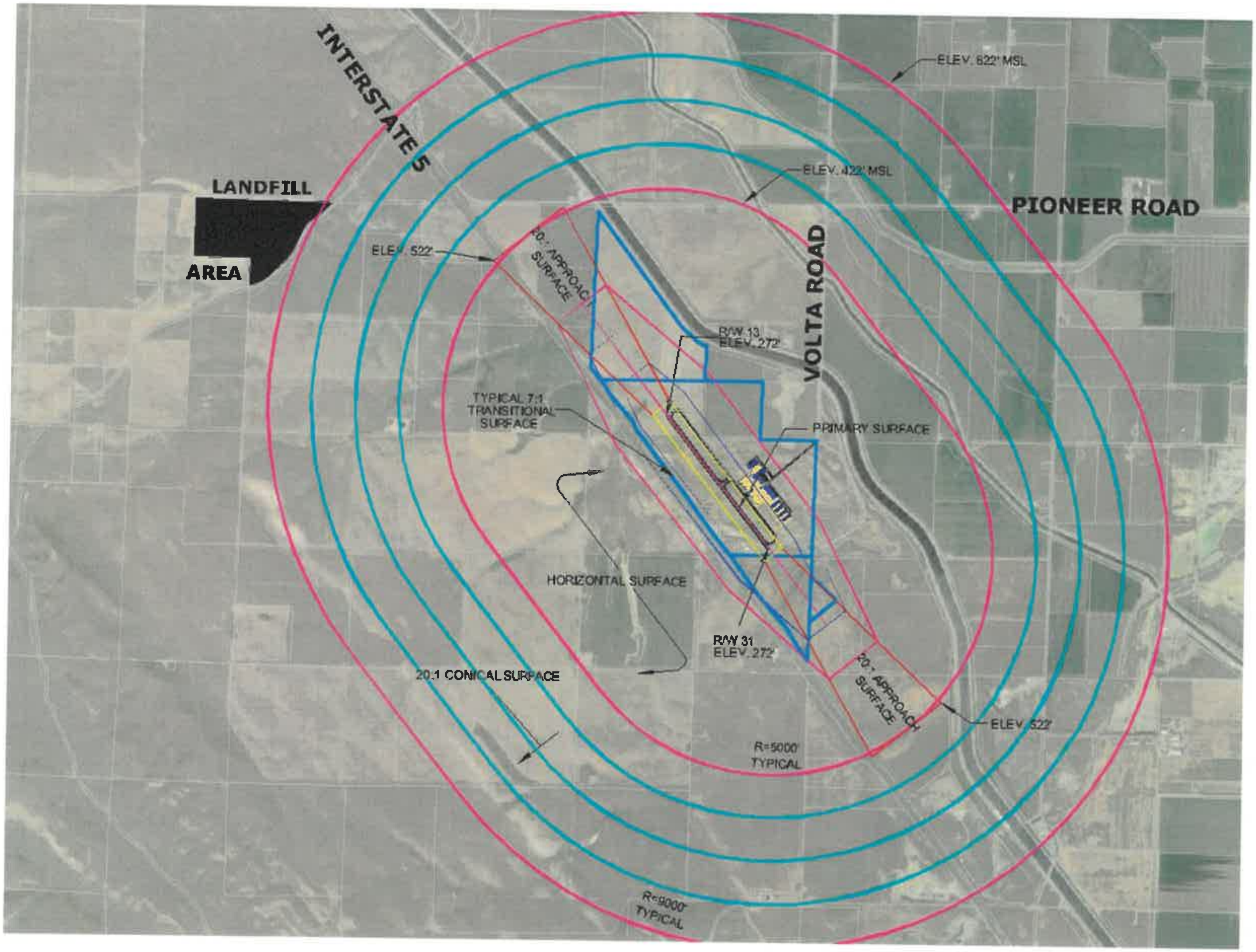


Figure 8 Layout Concept Plan - I-5 South Site

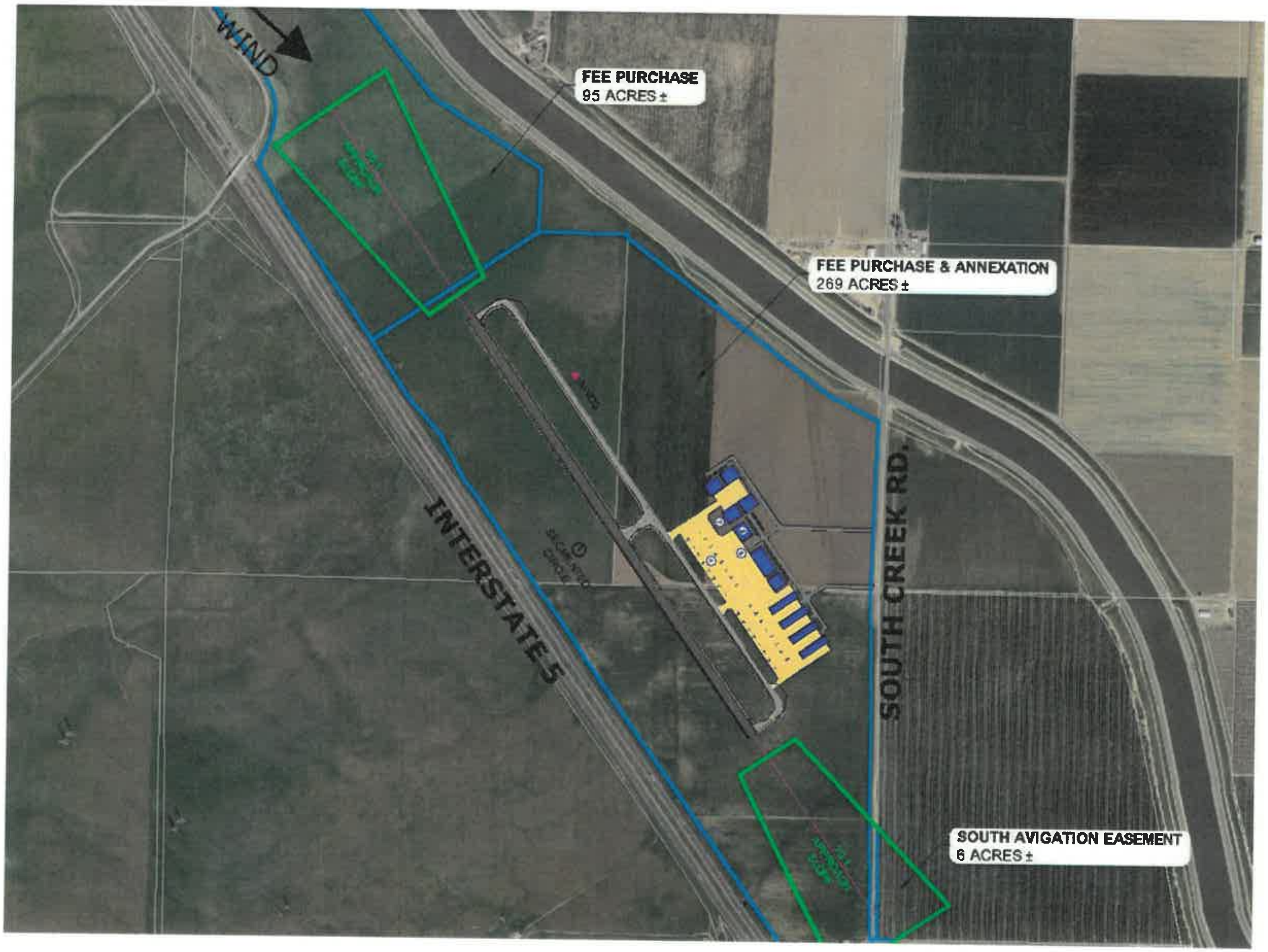


Figure 9 Airspace Plan - I-5 South Site

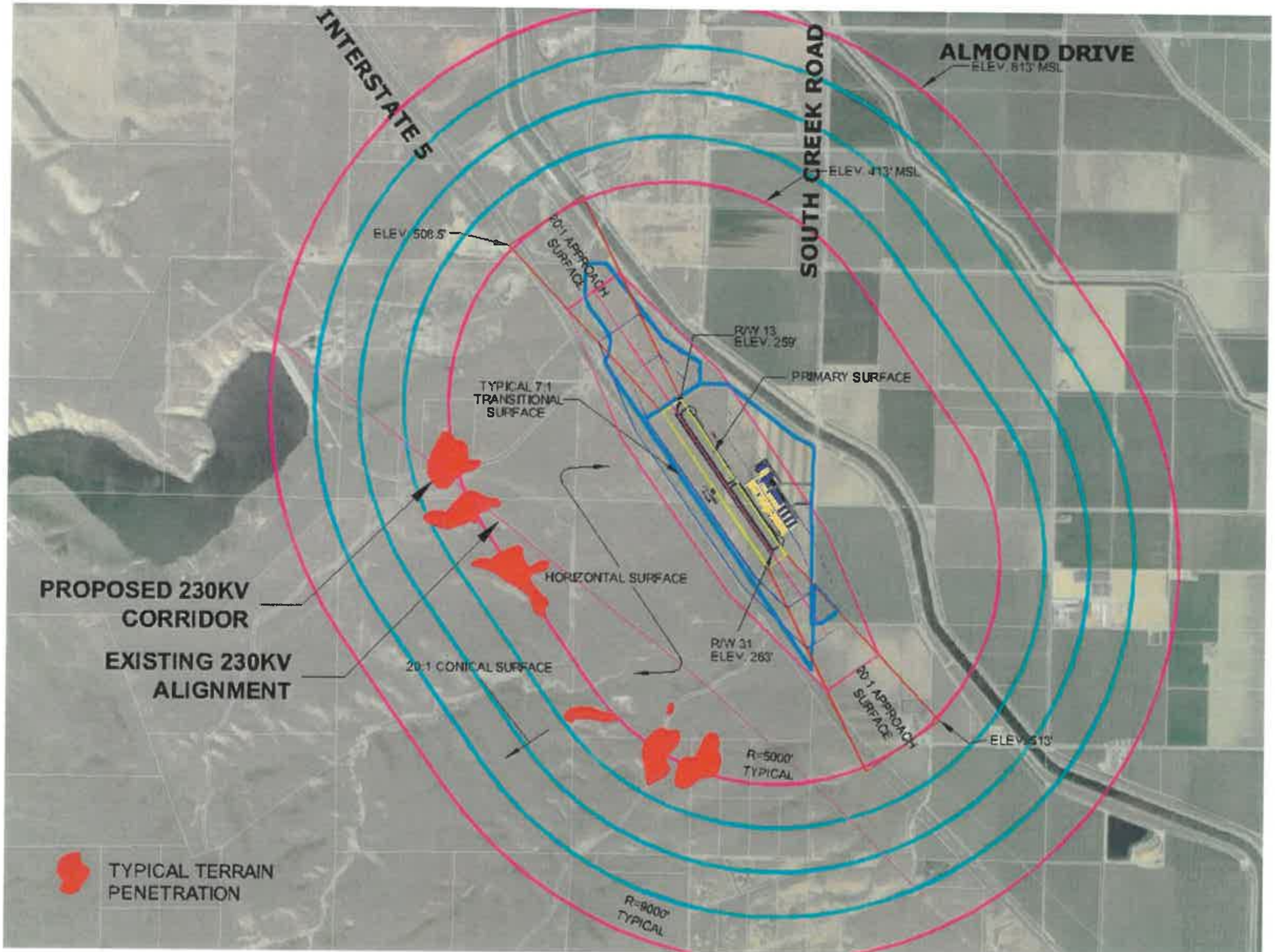


Figure 10 Layout Concept Plan - Central/South Site

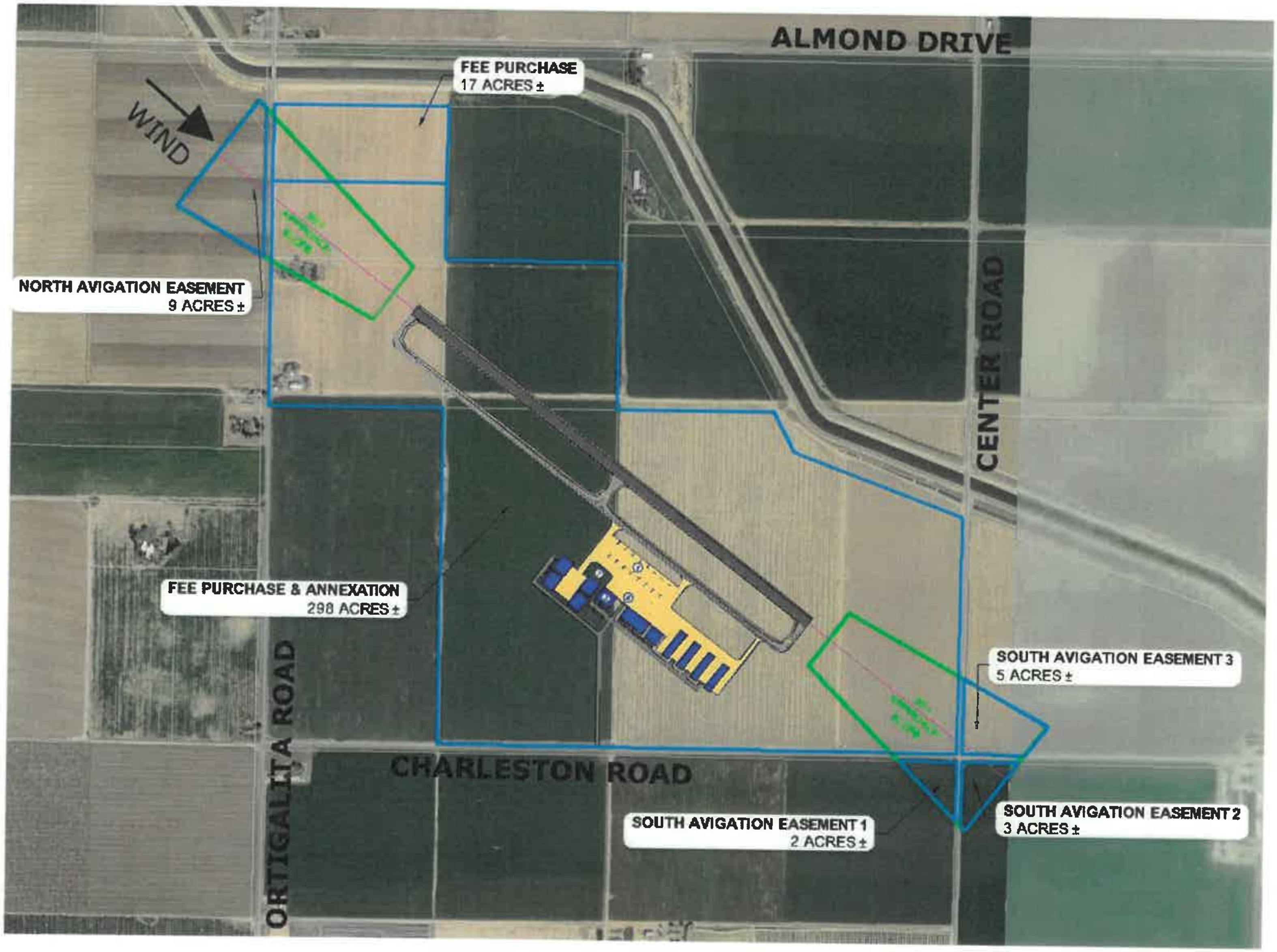


Figure 11 Airspace Plan - Central/South Site

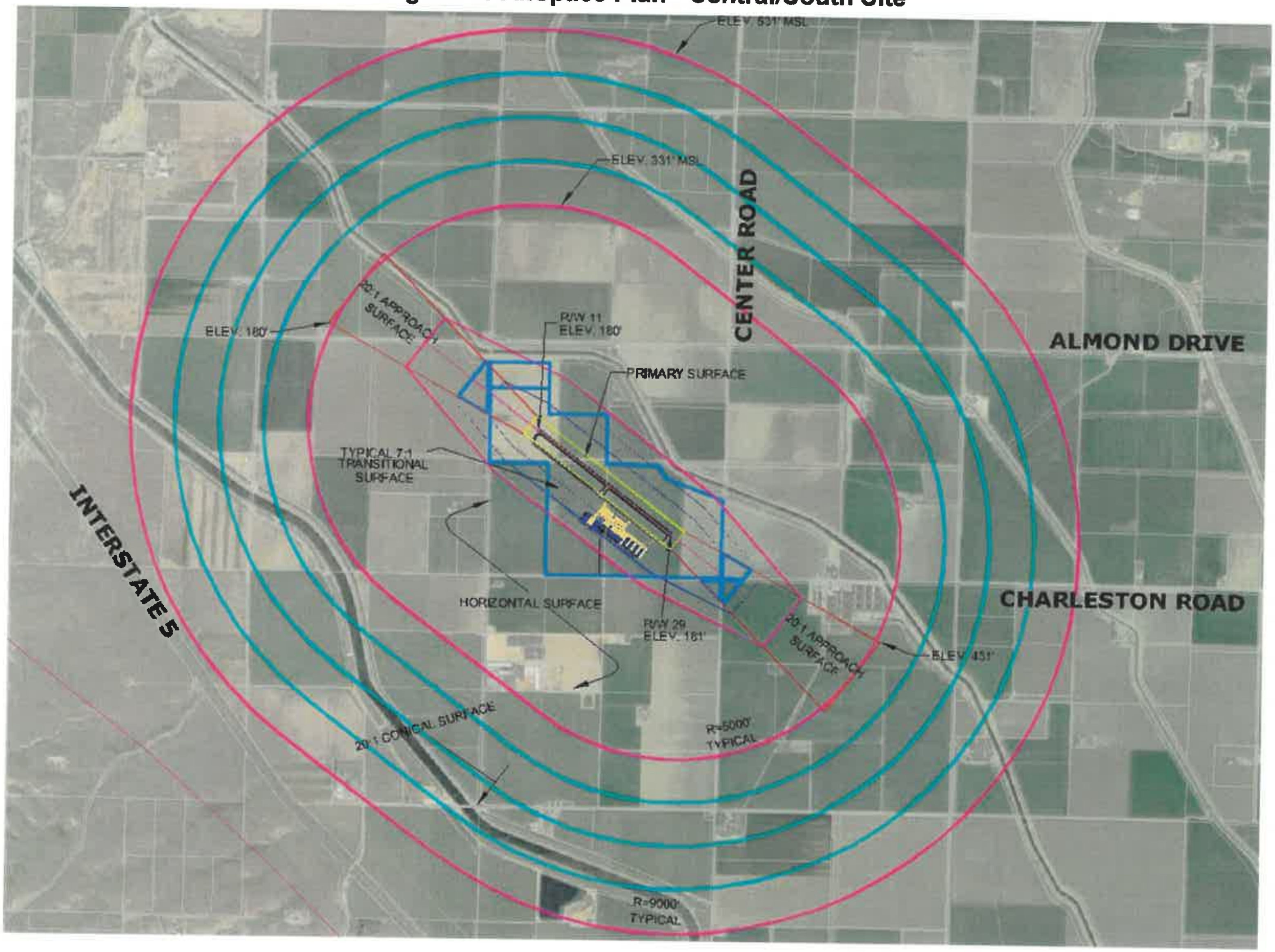
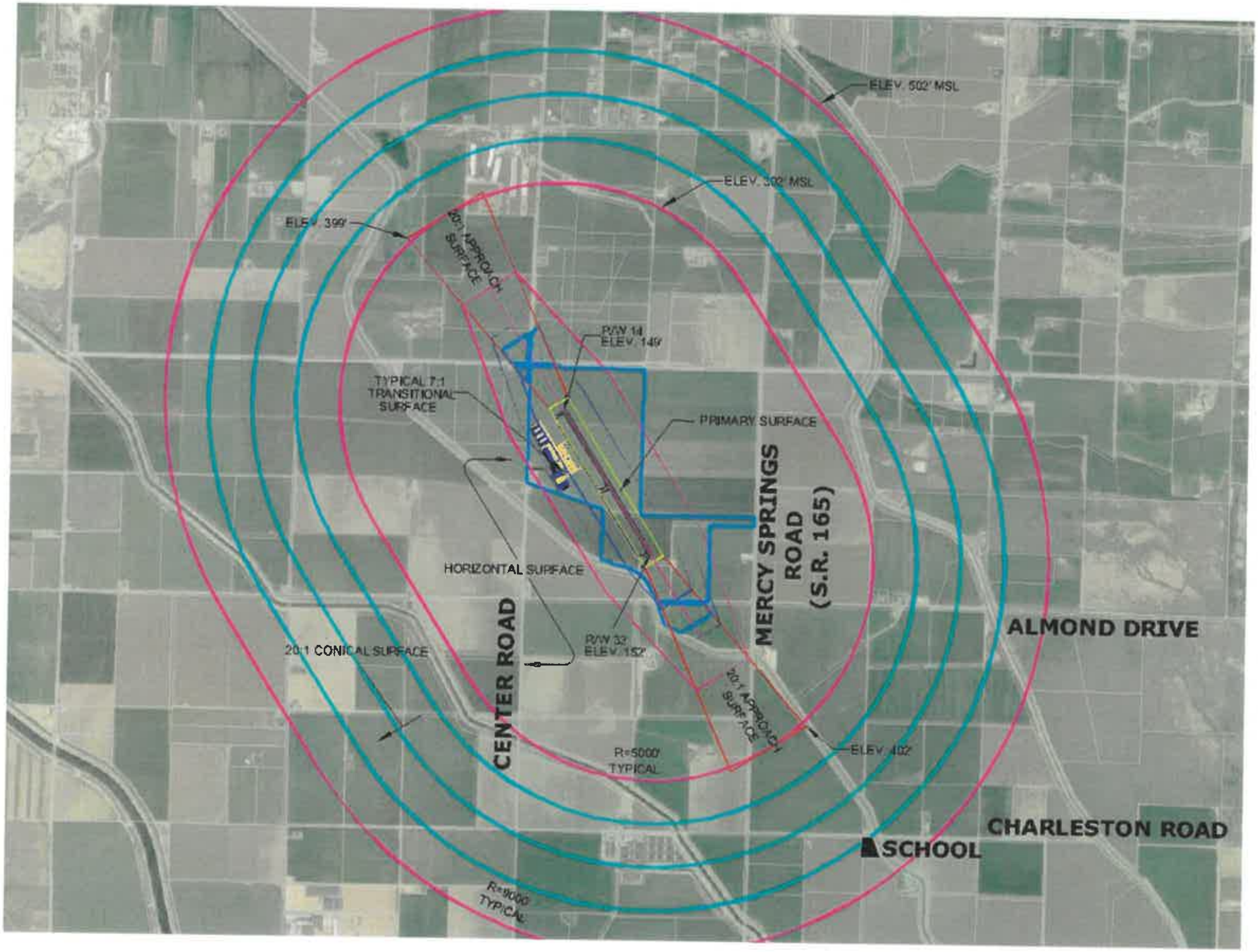


Figure 12 Concept Layout Plan - Central/East Site

Figure 13 Airspace Plan - Central/East Site



Site Evaluations

During this site selection process, a critical review of the alternative sites was made to determine their adequacies for development. A comparison of site alternatives with regard to the major factors influencing the selection of the general aviation airport site is described below and is illustrated in qualitative comparison matrix tabulation at the end of this chapter.

The factors influencing the selection of the general aviation airport site have been categorized into four areas:

Operational Factors
- Airspace
- Obstructions
- Wind
- Visibility
- Accessibility

Environmental Factors
- Natural Environment
- Social Environment

Engineering Factors
- Topography and Drainage
- Soil
- Utilities
- Relocation

Cost Factors
- Land Acquisition
- Construction
- Relocation
- Utilities

Operational Factors

Conditions that affect the airport operations have an important influence on the capability of the airport to reach its full potential. These operational factors include airspace and obstructions, wind, visibility, and accessibility.

(1) Airspace and Obstructions. A preliminary evaluation of each airport site from an airspace standpoint governed by Federal Aviation Regulations has been performed. An airspace review is essential to ensure that the alternative sites would provide safe and efficient use of the airspace in the area.

A new airport site should be located so that interference with air traffic patterns and ATC procedures is minimized. Generally, sufficient distance between airports should be maintained to avoid air traffic conflicts and to prevent unnecessary congestion.

From the standpoint of air traffic control, sites for new runways should be selected so that the runway can accommodate instrument approaches. It is emphasized that in an advance planning stage it is more desirable to be conservative and allow for compromises at a later date than to constrain subsequent detailed planning efforts.

Specific terrain and man-made obstructions, such as site slope, power transmission lines, and other fixed objects were considered because they may affect the safe and efficient operations of the airport.

Site Evaluation: All four of the potential sites are outside of the Los Banos city limits and away from military training/flight corridors. No other airports are in close proximity; therefore, there are no airspace conflicts with other airports under VFR conditions.

The Fox Hills site would require extensive earthwork to meet terrain slope and assure the runway placement is not impacted by even on-site grading. The I-5 South site has minor terrain penetrations to the westerly edge of the horizontal surface (150' above the runway) and the edges of the 20:1 sloping conical surface. These are not considered significant and would not hamper visual or instrument flight operations.

(2) Wind. Because general aviation aircraft cannot tolerate excessive crosswinds, runway alignment is dependent upon wind direction and velocity.

Site Evaluation: Site specific wind data has been and continues to be collected on the I-5 South site since February 20, 2016. The wind coverage is approximately 97%, more than the required 95%. By comparison, the existing airport wind coverage is approximately 91%. A new runway with northwest orientation at the existing airport would be needed to accommodate the stronger occasional westerly winds. All four of the alternative sites are in the same general wind direction.

(3) Visibility. Visibility problems created by smoke, glare, or fog conditions can have a profound effect on the operations of an airport. The spacing between aircraft must be greater when visibility is poor.

Site Evaluation: Although fog is an issue throughout the valley, no unusual visibility problems appear to exist at any of the sites. Sites away from bodies of water tend to have less fog. There is little manmade development that would conflict with visibility. Hence, visibility does not appear to pose a particular problem at any of the sites. On a comparative basis, the Fox Hills and I-5 South sites may have less fog, since they are along the west edge of the study are and farther from moist agricultural land uses.

(4) Accessibility. Accessibility is the ability of potential users to conveniently reach the airport from their place of origin. Convenience can be measured in terms of time and/or

cost. If the airport is remotely located from the demand centers, it will not be able to serve the needs of the community and thus will not be able to reach its full development potential.

Site Evaluation: All sites are accessible from the urban area. The Fox Hills site is to the west, while the other three sites are directly south of the city. All have paved roads in the vicinity. The Central/East Site has the shortest travel time, since it is just west of Mercy Springs Road (SR 165).

Environmental Factors

A preliminary evaluation of environmental factors at each of the sites was performed for the purpose of comparative analysis. Sites which offer the least environmental impact and the most compatibility with airport activities will be given preference. In this analysis two general areas of impact, natural and social environment, will be described.

(1) Natural Environment. Natural environment factors which may be affected by airport development in the area include specific environmental hazards, environmentally sensitive areas, and natural resource areas. These include those physical areas that (1) are susceptible to an adverse impact by some natural occurrence (e.g. floods, landslides, earthquakes), (2) maintain a unique ecological balance (e.g. wildlife habitat), and (3) are a natural source of supply of benefit to man (e.g. minerals, water, and air).

Site Evaluation: All sites, to some degree, will impact the natural ecology of the area. The Fox Hills site will require extensive earthwork and drainage systems due to the existing terrain. The Central/South and Central/East sites are within developed agricultural crop areas, while the I-5 South site is in less developed crop land and grasses.

None of the site alternatives are in designated floodplains. No significant flood hazard is anticipated.

There are no known fault zones in the area, but Central California is a seismically active region. There appears to be no significant landslide areas within the vicinity of the alternative airport sites. Normal care must be taken in engineering cut and fill operations and project construction must conform to UBC Seismic Zone 3 regulations.

Wildfire hazard does not appear to be significant in the area. The potential airport sites are located in areas which are not susceptible to significant wildfire hazard because of the comparative lack of natural vegetation.

The contribution of air pollution from aircraft and ground vehicle operations is not anticipated to differ significantly among the sites. Air pollution levels are high in the San Joaquin Valley Air Basin.

Water quality problems are relatively minor at all sites. The water of best quality generally has a minimum contact with rocks and soil. Wells are used adjacent to the site areas.

During construction, careful preventative measures can be expected to ensure that no degradation of water quality occurs as the result of construction activity.

(2) Social Environment. Social environment considerations include historical sites, parks and recreational areas, agricultural lands, existing and proposed development, and airport noise.

Site Evaluation: No historical or archaeological sites are known to exist at any of the potential airport sites. Generally, potential archaeological areas are expected to be near springs, around playas or along riverbanks.

There are several wetlands and duck pond areas located within the Los Banos area. None of the airport sites are near any of these.

Agricultural land in the area is common. All of the alternative sites would impact existing agricultural land uses. Yet the impacts vary from farmland to grass land. The Central sites have the most impact on current agricultural land uses.

Noise is one of the most controversial effects of airport operations. For purposes of this study, runway utilization and flight patterns were assumed to be the same at all sites. As a result, the CNEL noise contours would be the same for each site; however, the number of people impacted will depend on the surrounding land use. The extent of the noise impact would be primarily within the airport property and along the extended approaches. This is mostly over open space and agricultural land at all sites. Hence, noise does not appear to be a significant problem at any of the sites except for Central/South and Central/East. There can be potential concern about aircraft overflights. A dairy is in the vicinity of both Central/South and Central/East. Charleston Elementary School is about 8,000 feet from the runway end for a straight in approach to the Central/East site.

Engineering Factors

Engineering factors relate to the physical aspects in the development of the airport. These include topography, drainage, soil, utilities, and relocations. These elements indicate site development problems expected to be associated with each site and the special construction measures that need to be implemented.

(1) Topography and Drainage. Earthmoving requirements for runway construction are directly related to the degree of slope of terrain at the site. As the slope increases, so do the excavation and embankment requirements. As described previously, the first step in the identification and selection of airport sites was an analysis of terrain conditions that could physically accommodate the airfield requirements.

As the degree of slope at the site affects earthmoving requirements, it also affects drainage. Adequate drainage is important because it affects the stability and usability of areas. Topographic maps, soil reports, vegetation cover, climate, and temperature reports aid in determining the drainage capabilities of the site.

Site Evaluation: The topography of the Fox Hills Site would require somewhat extensive earthwork. The other sites are relatively flat and would not have any significant earthwork.

Drainage is comparable at all of the sites except for Fox Hills where the land is relatively steep and would require more elaborate drainage systems to protect against erosion.

(2) Soil. Soil characteristics affect the construction costs of airfields, roadways, and buildings.

Site Evaluation: The soil conditions present at all sites are expected to be somewhat similar, however the two central sites have agricultural soils that are not as good for pavement construction.

(3) Utilities. Availability of utilities is an important factor in evaluating an airport site. The site's accessibility to a developed infrastructure ensures the availability of utilities for the airport. Utilities necessary for airport development include electricity, communications systems, water, and sewerage.

Site Evaluation: Future electric utilities and communication lines to the sites would come from the urban area and highway corridor. Water would be provided by wells and sewage treatment would be by septic or a package treatment plant. New utility systems would be needed at all of the sites.

(4) Relocation. Because of the amount of land required, airport development often necessitates some relocation or removal of structures and roads.

Site Evaluation: There are no residences at the Fox Hills or I-5 South sites. Some residences are near the Central/South and East sites that could be impacted. Relocations would be optional and subject to the actual land acquisition program. Road closures and removals will be necessary at the two central sites.

Cost Factors

Relevant major cost elements associated with the programs under consideration are described below.

(1) Land Acquisition. These costs can vary from site to site. Generally, they are a function of remoteness from a community, degree of development, and access to infrastructure (transportation, utilities, etc.).

Site Evaluation: The Fox Hills and I-5 South Sites are more remote and not as developed for agricultural uses. The two central sites are on more developed and productive farmland than others and should be more expensive to acquire.

(2) Construction. These costs include site preparation, airfield construction, navigational aids, aircraft parking areas and access roads. Site preparation costs include clearing, excavation, filling, grading, and drainage.

Site Evaluation: The cost of providing runway, taxiway, and lighting systems as well as terminal area facilities is essentially identical at each site because the same quantity and types of facilities will be developed at each site. There are, however, differences in total development cost for each site due to the necessary preparation of each site and the handling of special features inherent at some sites but not others. Special aspects of topography and drainage have been discussed previously, as well as the additional costs for existing road closures and relocations.

Site preparation costs for the Fox Hills Site would be higher than for the other sites. This is due to the fact that the terrain would require more earthwork and drainage systems. The two central sites may have higher pavement construction costs due to the agricultural crop soils.

(3) Relocation. These costs include the social costs of relocating people, businesses, and structures. Also considered is the cost of relocating utility lines and access roads which would be displaced at the potential airport sites.

Site Evaluation: All sites would have property acquisition and minor relocation costs. The I-5 South site would have no road closures, while the Fox Hills site would have some, and the Central/South and Central/East would have significant road closures and utility relocations.

(4) Utilities. These costs vary in accordance with the distance from services or from the nearest existing utility source. Included in utility costs are telephone service, electric power, water supplies and sewers.

Site Evaluation: Utility costs are expected similar at all sites, since electrical service would be extended, and each site would have new water wells and septic systems.

Qualitative Review

It is apparent that while there are numerous similarities in site development aspects, there are also differences. The Qualitative Comparison of Site Alternatives table identifies relative advantages, disadvantages, and neutral aspects of some of the key site comparison criteria.

Table 9 Qualitative Comparison of Site Alternatives

	Fox Hills	I-5 South	Central/South	Central/East
OPERATIONAL FACTORS				
Airspace	0	0	0	0
Obstructions	0	0	0	0
Wind	0	+	+	+
Visibility	+	+	0	0
Accessibility	+	0	0	+
ENVIRONMENTAL FACTORS				
Natural Environment	0	0	0	0
Social Environment	+	+	-	-
ENGINEERING FACTORS				
Topography	-	+	0	0
Drainage	-	+	0	0
Soils	0	+	-	-
Utilities	0	0	0	0
COST FACTORS				
Land Costs	+	+	-	-
Construction Costs	-	+	0	0
Relocation Costs	-	+	-	-
Utility Costs	0	0	0	0

Legend: + Advantage 0 Neutral/No Effect - Disadvantage

Note: All factors are not equally important.

Source: Wadell Engineering Corporation

Site Recommendation

As a result of the comparison of possible airport sites, the overall preferred alternative is development of the New Los Banos Airport at the I-5 South Site. While the rating factors are not of equal importance, the site has more positive aspects and no negative ones. The site is preferable in terms of expected land and construction costs, relocations, and distance from sensitive land uses such as residences and schools, and removal of quality farmland. Based on wind studies since early 2016, the site has a 97% wind coverage.

The slope and orientation of the terrain lends well to grading and drainage, and the shape of the site allows for as much as a 6,000' runway, should the need for expansion ever occur. The other sites are generally limited to 3,800' of runway length.

The landfill near the Fox Hills site may cause it to be not-eligible for FAA funding. The dairy near the Central/South and Central/East sites is of concern. The Charleston Elementary School being within 2 miles of the Central/South site would likely cause it to be unacceptable locally.

5. AIRPORT PLANS

The Airport Plans (presented in the Appendix) include the Airport Concept Drawing and the Airport Airspace Drawing.

The conceptual layout illustrates the concept for development of the I-5 South Site It is the result of considering alternative configurations of facilities, particularly the establishment of navaids, the location and alignment of the runway and taxiway system, T-hangars, the aircraft parking aprons and the ground access and parking system.

The specific objectives of the Airport Plans are to provide:

- A safe airfield system with a non-precision approach and adequate runway length, strength, and clearances for A-1 Small aircraft use initially, with the ability to expand the initial 3,200' runway to 3,800', and ultimately up to 6,000' if required in the distant future.

- Terminal facilities for general aviation aircraft, pilots, and passengers with adequate and convenient aircraft basing area, buildings, auto parking, and access.

- A flexible development plan with space and use relationships that will enhance service and provide user and community benefits, including the opportunity for classrooms for pilot and mechanic training.

- An economical plan that can be expanded easily to accomplish aviation needs and to provide suitable facilities and generate revenues necessary for proper operation, management and development of the airport.

The Airport Plans for the New Los Banos Municipal Airport have been prepared as follows:

- Airport Concept Drawing
- Airport Airspace Drawing

The Capital Improvement Program and Development Costs section of this report discusses the Stage Development and Land Acquisition Drawings and the associated capital improvement cost estimates.

Airport Concept Plan

The Airport Concept Drawing (presented in the Appendix) depicts the entire airport and focuses on the airfield system. It includes the runways, taxiways, lighting, on-airport navaids, and the runway protection zones.

Table 10 indicates the runway separation standards for aircraft in approach categories A and B. A runway to taxiway separation of 300' is used to allow the runway system to be developed to a full precision instrument runway in the future if desired. It is not possible at the existing airport, but the land area is sufficient at the new site, and a goal is for the new site to provide increased benefits to aviation users. The Los Banos area does experience significant ground fog during certain periods of the year.

Table 10 Runway Separation Standards for Aircraft Approach Categories A & B

ITEM	Airplane Design Group					
	I*	I	II*	II	III	IV
Non-precision Instrument and Visual Runway Centerline to:						
Parallel Runway Centerline	Not Applicable to this Airport					
Hold Line**	125'	200'	125'	200'	200'	250'
Taxiway/Taxilane Centerline**	150'	225'	240'	240'	300'	400'
Aircraft Parking Area	125'	200'	250'	250'	400'	500'
Precision Instrument Runway Centerline to:						
Parallel Runway Centerline	Not Applicable to this Airport					
Hold Line**	175'	250'	175'	250'	250'	250'
Taxiway/Taxilane Centerline**	200'	250'	**300'**	300'	350'	400'
Aircraft Parking Area	400'	400'	400'	400'	400'	500'

* Facilities for small planes only.

**No part of an aircraft (tail, wing tip) at a holding location or on a taxiway centerline can be within the runway safety area or penetrate the obstacle free zone (OFZ). An increase of these separation distances may be needed at higher elevations.

Table 11 identifies the runway setback requirements for use at the New Los Banos Airport. These requirements are established to properly accommodate the layout and development of the runway and taxiway system and adjacent aircraft parking and building areas.

The runway safety area (RSA) is centered on the runway and has a width of 150 feet for runway 13-31. In this area, no object may penetrate the volume of space above this zone except for necessary lighting and frangible-mounted navaids. No object can be higher than 3 inches above the ground surface and the area should be clear of ditches and terrain penetrations.

The building restriction line (BRL) defines the closest point to the runway that any building may be constructed. In practice, a building's height must be considered before siting its location, and the requirements of Federal Aviation Regulations Part 77 satisfied regarding obstructions to navigable airspace. The BRL is designed not only to meet customary setback requirements, but also to prevent buildings or permanent objects from being placed inside the runway object free area (ROFA) and taxiway object free area (TOFA). A 650-foot building restriction line setback from Runway 13-31 will provide adequate clearance for any future FAR Part 77 primary surface and will ensure adequate taxiway to fixed or movable object clearance.

The following table summarizes the setback requirements from the Runway 13-31 centerline.

Table 11 Runway Setback Requirements

	Lateral Distance from Runway Centerline		
Runway	Building Setback Line	Runway Safety Area	Runway Object Free Area
13-31	650'	75'	175'

Source: Wadell Engineering Corporation

Airport Airspace Drawing

The Airport Airspace Drawing (presented in the Appendix) supplements the Airport Concept Drawing and provides plan view and approach profile information for the runway approach areas.

A key function of this drawing is (1) to provide a basis for height zoning in the airport environs, and (2) to identify obstructions in the vicinity of the airport, which may have an impact on the use of runways and adjacent airspace. The drawing was prepared using criteria contained in Federal Aviation Regulations, Part 77, "Objects Affecting Navigable Airspace."

Tables 12 and 13 present FAA standards for approach surface dimensions and runway protection zone dimensions. The FAR Part 77 dimensional standards applied for the initial Runway 13-31 are those relating to "visual" instrument runways. The plan shows imaginary primary, approach, transitional, horizontal, and conical surfaces. Primary surfaces surround the runway and extends 200 feet beyond the thresholds. The width of the primary surface is 250 feet. The elevation of the primary surface is the same as the runway centerline. The Airport's elevation is based on the highest point of elevation of the runway, in this case the south end of the runway.

The approach surfaces rise from the ends of the primary surfaces. The slope of the surfaces for the runway are 20:1 with a length of 5,000 feet since the runway has visual approaches. The approach surface flares from an inner width equal to the primary surface to an outer width equal to 1,250 feet.

The transitional surfaces are sloped at 7:1 from the primary and approach surfaces until intersecting the horizontal surface. The horizontal surface is 150 feet above the airport elevation and extends 5,000 feet from the primary surface of the runway. At the limit of the horizontal surface, a conical surface of 20:1 slope and a 4,000-foot width completes the required protection surfaces for the airport.

The Airport Airspace Drawing indicates that some terrain penetrations are west of the new I-5 South site in the horizontal and conical surfaces. The penetration is minor and not considered to be unacceptable for use of the runway.

Table 12 FAR Part 77 Approach Surface Dimensions

ITEM	RUNWAY TYPE	RUNWAY END		APPROACH SURFACE DIMENSIONS			
Airports Serving		Approach End	Opposite End	Surface Length	Inner Width	Outer Width	Slope (H/V)
Small Airplanes Only	**Utility Runway**	**V**		**5000**	**250**	**1,250**	**20:1**
			V	**5000**	**250**	**1,250**	**20:1**
		V		5,000	500	1,250	20:1
			NP	5,000	500	2,000	20:1
		NP		5,000	500	1,500	20:1
			NP	5,000	500	1,500	20:1
Large or Small Airplanes	Other than Utility Runway	V		5,000	500	1,500	20:1
			V	5,000	500	1,500	20:1
		V		5,000	500	1,500	20:1
			NP 3/4+	10,000	500	3,500	34:1
		V		5,000	1,000	1,500	20:1
			NP 3/4	10,000	1,000	4,000	34:1
		V		5,000	1,000	1,500	20:1
			PIR	50,000	1,000	16,000	50:1/40:1
		NP 3/4+		10,000	500	3,500	34:1
			NP 3/4+	10,000	500	3,500	34:1
		NP 3/4+		10,000	1,000	3,500	34:1
			NP 3/4	10,000	1,000	4,000	34:1
		NP 3/4+		10,000	1,000	3,500	34:1
			PIR	50,000	1,000	16,000	50:1/40:1
		NP 3/4		10,000	1,000	4,000	34:1
			NP 3/4	10,000	1,000	4,000	34:1
		NP 3/4		10,000	1,000	4,000	34:1
			PIR	50,000	1,000	16,000	50:1/40:1
		PIR		50,000	1,000	16,000	50:1/40:1
			PIR	50,000	1,000	16,000	50:1/40:1

Legend:
Utility Runway= Runway for propeller driven aircraft with a maximum gross weight of 12,500 pounds.
V = Visual Approach
NP = Non-precision instrument approach on Utility Runway
NP 3/4+= Non-precision instrument approach with visibility minimums more than 3/4 statute mile
NP 3/4 = Non-precision instrument approach with visibility minimums as low as 3/4 statute mile
PIR = Precision instrument approach
Source: Wadell Engineering Corporation, based on FAA Advisory Circular 150/5300-13A

Table 13 Runway Protection Zone Dimensions for Aircraft Approach Category A & B

ITEM	Airplane Design Group					
Runway Protection Zone	I*	I	II*	II	III	IV
Non-precision Instrument and Visual Runway:						
Length	**1,000'**	1,000'	1,000'	1,000'	1,000'	1,000'
Inner Width	**250'**	500'	250'	500'	500'	500'
Outer Width	**450'**	700'	450'	700'	700'	700'
Acres	**8.035**	13.770	8.035	13.770	13.770	13.770
Precision Instrument Runway:						
Length	2,500'	2,500'	2,500'	2,500'	2,500'	2,500'
Inner Width	1,000'	1,000'	1,000'	1,000'	1,000'	1,000'
Outer Width	1,750'	1,750'	1,750'	1,750'	1,750'	1,750'
Acres	78.914	78.914	78.914	78.914	78.914	78.914

Source: Wadell Engineering Corporation, based on FAA Advisory Circular 150/5300-13A

6. CAPITAL IMPROVEMENT PROGRAM AND DEVELOPMENT COSTS

This chapter provides information concerning the capital improvement program and costs of airport development during the first twenty years of development.

Capital Improvement Program

The Capital Improvement Program is comprised of (1) stages of development, and (2) cost estimates of improvements proposed in this plan. The 20 year development program is presented in three stages so that all projects can be undertaken when demand justifies development. The cost estimates are prepared in current dollars and are to be used for planning purposes only.

Stage Development

The Stage Development Drawing (presented in the Appendix) illustrates future project development. The objectives of the first stage of development, 0-5 years, are (1) environmental study and design costs, (2) land acquisition and fencing, (3) earthwork and drainage, (4) paved runway (60' wide by 3,200' long) with lighting, signing, PAPI, REIL's and AWOS, (4) two runway end exits with runup aprons, and aircraft parking apron for 14 aircraft, (5) hangar storage for 24 aircraft (8 hangars relocated and 16 new hangars), (6) relocated aircraft fueling, and (7) access road and site utilities.

This first stage of development provides a new runway that is 60' wide by 3,200' long, less than the 75' by 3,800' runway at the existing airport. The new runway has exits with turn around areas at each end, rather than a full length parallel taxiway. As mentioned in the facility requirements discussion, the current critical aircraft is smaller than past design aircraft, therefore a shorter and narrower runway would meet current standards.

A typical runway serving small A and B light aircraft with no parallel taxiway has an hourly operational capacity in VFR conditions of over 40 operations per hour. A parallel taxiway is not required, since there are only two forecast hourly operations.

The second stage of development, 6-10 years, includes a parallel taxiway and central runway exit with lighting and signing in the event these facilities are desired locally and the FAA concurs with the advantages and provides funding. These developments should be based on demand.

The third stage of development, 11-20 years, includes (1) seal coating and paint marking of all first stage pavements (none of the more recent second stage pavements would be sealing and marked), (2) a 600' runway and parallel taxiway extension with lighting and signing, and relocated PAPI and REIL.

The sealing and marking would be needed for pavement maintenance reasons, regardless of traffic. The runway extension is based on demand. That demand must be over 500 operations by the larger critical aircraft to be considered for funding. It is unlikely that demand will develop during the planning period.

Ultimate development beyond the 20 year planning period include additions to the access roads, auto and aircraft parking and hangars. These are based on based and transient aircraft demand. No cost estimates are shown for development beyond the 20 year planning period.

Cost Estimates

The following Capital Improvement Program Cost Summary indicates the total costs and expected funding sources for each stage of development for the airport.

Table 14 Capital Improvement Program Cost Summary

Stage 1 (2019-2024)	$9,839,000
Stage 2 (2025-2029)	$730,000
Stage 3 (2030-2035)	$630,000
Total	$11,199,000
FAA/State Funds	$10,583,500
Local Funds	$615,500
Total	$11,199,000

Source: Wadell Engineering Corporation

The next table lists specific projects within each time frame. Order of magnitude costs are indicated for planning purposes only.

Do to the relatively low levels of demand, it is unlikely that stage two and three projects are warranted except for the pavement sealing and marking maintenance.

The project costs are separated as to FAA/State share and local (city) share. The FAA portion is based on 90 percent funding. The State of California aeronautics program often provides a 5% match of FAA funding, which is 4.5 percent of total funding. Therefore, the local share is 5.5% of total project costs, and all of costs that are not-eligible for grants, such as hangars and sewer systems.

The development presented meets current FAA criteria for eligibility considering the relatively low forecast demand and small critical aircraft used for design. As such, there are no reductions in capital development scope that would reduce development and therefore cost. The only cost reduction would be a reduction of land acquisition acreage. The land at the proposed site is less costly than other sites and the amount of land proposed helps ensure compatible land uses and airspace protection.

Table 15 Capital Improvement Program Cost Estimates

YEAR	STAGE / PROJECT DESCRIPTION	TOTAL COSTS	FAA/STATE COSTS	LOCAL SHARE
	STAGE 1:			
2020	REIMBUSE ENVIRONMENTAL & PRELIM. EXPENSES	$300,000	$283,500	$16,500
2020	LAND ACQUISTION - AIRPORT ANNEXATION (269 ACRES)	$2,859,000	$2,701,800	$157,200
2020	LAND ACQUISTION - AIRPORT PROTECTION (95 ACRES)	$1,010,000	$954,500	$55,500
2021	PERIMETER FENCING	$190,000	$179,600	$10,400
2021	EARTHWORK / DRAINAGE	$188,000	$177,700	$10,300
2021	RUNWAY PAVING (3200' X 60')	$1,338,000	$1,264,400	$73,600
2021	TAXIWAY & EXITS PAVING	$289,000	$273,100	$15,900
2021	RUNWAY & TAXIWAYS MARKING	$23,000	$21,700	$1,300
2021	RUNWAY LIGHTING	$208,000	$196,600	$11,400
2021	TAXIWAY REFLECTORS	$4,000	$3,800	$200
2021	LIGHTED AIRFIELD SIGNS	$18,000	$17,000	$1,000
2021	DISTANCE REMAINING SIGNS	$8,000	$7,600	$400
2021	PRECISION APPROACH PATH INDICATORS (2)	$109,000	$103,000	$6,000
2021	RUNWAY END IDENTIFIER LIGHTS (2)	$69,000	$65,200	$3,800
2021	SEGMENTED CIRCLE AND LIGHTED WIND CONE	$25,000	$23,600	$1,400
2021	AIRPORT ROTATING BEACON	$15,000	$14,200	$800
2021	AUTOMATED WEATHER OBSERVATION SYSTEM	$150,000	$141,800	$8,200
2021	AIRPORT LIGHTING VAULT	$169,000	$159,700	$9,300
2022	APRON SECURITY LIGHTING	$13,000	$12,300	$700
2022	APRON & HANGAR TAXILANES	$1,357,000	$1,282,400	$74,600
2022	T-HANGAR RELOCATION (8 UNITS)	$60,000	$56,700	$3,300
2022	T-HANGARS (16 UNITS)	$800,000	$756,000	$44,000
2022	WATER / FIRE PROTECTION SYSTEM	$94,000	$88,800	$5,200
2022	SITE ELECTRICAL	$25,000	$23,600	$1,400
2022	SANITARY SYSTEM (SEPTIC)	$38,000	$35,900	$2,100
2022	SOUTH CREEK ROAD EXTENSION	$163,000	$154,000	$9,000
2022	AIRPORT ACCESS ROAD	$170,000	$160,700	$9,300
2022	AUTOPARKING	$52,000	$49,100	$2,900
2022	CARD CONTROLLED SECURITY GATES (1)	$13,000	$12,300	$700
2022	FUEL FARM RELOCATION (24,000 GAL. SELF-SERVE)	$32,000	$30,200	$1,800
2022	TERMINAL	$50,000	$47,300	$2,700
	TOTAL STAGE 1	**$9,839,000**	**$9,298,100**	**$540,900**
	STAGE 2:			
2025	PARALLEL TAXIWAY & EXIT PAVING	$711,000	$671,900	$39,100
2025	TAXIWAY REFLECTORS	$4,000	$3,800	$200
2025	LIGHTED AIRFIELD SIGNS	$15,000	$14,200	$800
2025	TAXIWAYS MARKING	$5,000	$4,700	$300
	TOTAL STAGE 2	**$730,000**	**$689,900**	**$40,100**
	STAGE 3:			
2030	STAGE 1 PAVEMENTS SEALING	$104,000	$98,300	$5,700
2030	STAGE 1 PAVEMENTS MARKING	$53,000	$50,100	$2,900
2035	PERIMETER FENCING	$32,000	$30,200	$1,800
2035	EARTHWORK / DRAINAGE	$75,000	$70,900	$4,100
2035	RUNWAY EXTENSION PAVING (600' X 60')	$251,000	$237,200	$13,800
2035	PARALLEL TAXIWAY EXTENSION & EXITS PAVING	$241,000	$227,700	$13,300
2035	RUNWAY & TAXIWAYS EXTENSION MARKING	$6,000	$5,700	$300
2035	RUNWAY EXTENSION LIGHTING	$26,000	$24,600	$1,400
2035	TAXIWAY REFLECTORS	$4,000	$3,800	$200
2035	LIGHTED AIRFIELD SIGNS	$9,000	$8,500	$500
2035	DISTANCE REMAINING SIGNS	$4,000	$3,800	$200
2035	PRECISION APPROACH PATH INDICATOR RELOCATION	$10,000	$9,500	$500
2035	RUNWAY END IDENTIFIER LIGHTS RELOCATION	$4,000	$3,800	$200
	TOTAL STAGE 3	**$630,000**	**$595,500**	**$34,500**
	GRAND TOTALS (STAGES 1, 2 & 3)	**$11,199,000**	**$10,583,500**	**$615,500**

Source: Wadell Engineering Corporation

7. IMPLEMENTATION PLAN

The implementation plan considers (1) the implementation process to develop a new airport, (2) the financing sources, and (3) the benefits to aviation by relocating to a new airport site.

Implementation Process

The City of Los Banos commissioned this Site Selection and Concept Study to determine possible new site alternative, compare those alternatives, and identify the preferred location for relocation of the existing municipal airport. A critical step was collection of several years of on-site wind data to confirm the candidate site would have suitable wind coverage. While the results of the wind analysis confirms only the specific I-5 South Site, it does recognize that the nearby central sites could be feasible from a wind coverage aspect, in the event the I-5 South Site is not possible.

The next step would be a FAA funded site selection study with resultant Airport Layout Plan depicting development at the preferred site. This concept study is a useful basis for the new FAA funded study, thereby reducing cost and duration. The new study would take 6 months, considering the work completed to date.

Following the planning effort, an environmental assessment would be prepared under NEPA and a Draft Environmental Impact Report under CEQA. Upon completion, the FAA would be prepared to undertake the Federal action of site endorsement and acceptance of the Airport Layout Plan depicting the development program. The report, public hearings and federal and state processing would take 6 to 8 months to complete.

With site endorsement, the City of Los Banos may undertake land acquisition, which would be based on two qualified appraisals and a fair market value offer to purchase. This process would take about 2 months.

Having secured the site, airport design would be undertaken for the first stage of development, followed by construction. The topographic surveys, geotechnical investigations and design would typically take 8 months. The bidding advertising and grant process would be about 2 months. Construction would typically start in April and be completed in December.

Considering the steps moving forward, the earliest land acquisition would be completed is about two years. An optimistic new airport opening would be two years later.

All of this is based on completion of planning and environmental processes and FAA agreement on new airport development and funding.

Financing Sources

A sound financial program is instrumental to the successful development of the airport. Proper planning, design, and feasibility studies are efforts spent in vain unless an adequate financing program can be developed to accomplish the improvements indicated. The goals of airport financial planning are to (1) achieve a sound economic operation, (2) provide an adequate level of public facilities, and (3) avoid taxpayer burdens by developing a reasonable financial return from the airport facility.

The relatively low based aircraft ownership and usage in Los Banos coupled with minimal transient activity and lack of aviation business results in less than desired revenue at the existing airport, and the same would hold true at the new airport. Aging infrastructure at the existing airport caused increased expense and added to the difficulty of the airport to achieve a self-supporting status.

While the primary responsibility for financing proposed facility development rests with the sponsor, there are many ways that airport development funds can be supplemented. Money for capital improvements may come from a number of sources and may be used singly or in combination to accomplish airport development. The primary sources available during recent years for financing airport facilities include the FAA's Airport Improvement Program (AIP) and the State of California Caltrans Division of Aeronautics. Other sources include loans from the general fund of the city and certificates of participation.

Federal Aviation Administration funds for airport development are derived from user taxes and are available for land acquisition, construction, alteration, fire fighting, and rescue vehicles and facilities, as well as for establishing and improving air navigation facilities. Both publicly-owned and privately-owned public use airports are eligible for such aid provided the proposed project is included in the National Plan of Integrated Airport Systems (NPIAS). Presently, the Federal share of these projects in California is 90 percent of eligible costs. Los Banos Airport receives $150,000 maximum of annual entitlement funds. Larger projects use "carry forward" of annual entitlement funds (up to 4 years or $600,000 total) plus "state apportionment or discretionary" funds. The latter funds are quite competitive and scarce, especially for smaller airports.

State of California Aeronautics Program funds for airport development are available as 90% grants for specific non-FAA projects as well as 5% of federal matching grants when the airport owner chooses to utilize FAA funding. When combined, the state and federal share is 94.50%. Therefore, the local matching share is 5.50% of total project cost. The state also provides a $10,000 annual grant to each qualified airport. The state has a favorable loan program which many communities use for financing feasible revenue producing facilities such as T-hangars, terminal buildings and fuel farms.

Financing airport improvements directly from the airport enterprise fund is the most economical method of all, since there are no interest payments. However, due to low revenues and high costs, the enterprise fund does not have adequate resources. Airport improvements financed by this approach could place constraints on money available from the airport fund to meet normal operating and other expenses.

For the New Los Banos Municipal Airport funding from the FAA and State combined with revenues from the airport fund is the most cost effective and practical method of airport development. State Aeronautics loans are the best source of funding for airport hangars, with repayment from the airport fund.

Recent discussions with staff in the FAA's San Francisco Airports District Office indicate there is not strong support to date in relocation of the existing airport. Some discussions relate to the necessity to relocate and the ownership of the existing airport land. If in the future the FAA agrees with airport relocation, the focus will be on the FAA requirement that the proceeds from the sale or transfer of the current airport land, at current fair market value, be expended at the new site prior to any additional federal funds for the new site.

Records indicate that the land occupied by the existing airport and other municipal uses was purchased by the City of Los Banos and there have never been any state or federal funds in the acquisition. Since the original land purchase there have been no additional land purchases for airport use nor any subsequent FAA grants for land resulting in acquisition. Of the 125.6 acres of city owned land, approximately 81.8 acres are used for airport purposes.

It is logical that since the City of Los Banos provided city owned land for the existing airport's utilization, that if the city were to relocate the airport activity to a new site, that the city would once again provide land for the new airport's utilization. As such, the city would retain the existing site land and would fund the necessary new land for airport development.

An additional issue is repayment of the remaining value of past FAA grants to the existing Los Banos Municipal Airport. The grant obligation runs for 20 years. The most recent FAA grants for construction are as follows: 2003 perimeter fencing for $150,000, 2005 runway lighting for $250,000, and 2007 runway pavement for $150,000. If the new airport were to open in 4 years, or 2024, the repayment value will be essentially nil.

The airport capital improvement program submitted to the FAA in January 2019 for the existing airport plans on an expenditure of approximately $2 million for pavement rehabilitation. That planned expenditure might be more wisely spent at the new site, which would have all new infrastructure and provide increased benefits to aviation and the community.

Benefits to Aviation

The existing airport requires a substantial investment. Due to the cracked condition and settlement all of the runway, taxiway and apron pavements need full depth reclamation ("FDR") under the new FAA specification P-207 and a 3" P-403 asphalt overlay. The northwest 800' of runway and parallel taxiway constructed about 20 years ago needs crack repair and overlay.

The airport lighting vault and equipment was installed in the early 1990s and has reached the end of useful life. The airport lighting fixtures and cables were rehabilitated in 2005 and an AWOS was installed. Both have a few years to the end of their 20 year grant obligation life. The AWOS may not last the 20 years and AWOS spare parts are becoming increasingly unavailable for these older models.

All airport buildings are quite old, ranging from the original 1940's wood frame hangar to aging T-hangars. One 8 unit T-hangar building and the city fuel farm, both funded and constructed by the City 20 years ago are functional but aging. The fueling credit card system is out of date and requires upgrading. However, this 8 unit hangar and fuel system could be relocated to the new site. From an infrastructure perspective, aviation users will benefit from a replacement airport at a new site.

The benefits of the new airport are much greater than the new infrastructure alone. Several of the benefits are presented in the comparisons table. These include acreage, wind coverage, runway length and clearances, traffic patterns and approaches, instrument operations, and surrounding land uses.

Table 16 Los Banos Airport Comparisons

ITEM	EXISTING AIRPORT	NEW AIRPORT SITE
ACREAGE	81.8 ACRES	269 ACRES
TERMINAL AREA ACRES MAXIMUM	19 ACRES	108 ACRES
WIND COVERAGE	91%	97%
RUNWAY LENGTH MAXIMUM	3800 FEET	6000 FEET
RUNWAY WIDTH MAXIMUM	75 FEET	150 FEET
STANDARD TRAFFIC PATTERN	NO	YES
APPROACH SLOPE	20:1	34:1
RUNWAY PROTECTION ZONES OWNED	NO	YES
OBJECTS IN RUNWAY PROTECTION ZONES	HIGHWAY, CANALS, BLDGS	NONE
INSTRUMENT APPROACH MINIMUMS	400-1	200-3/4
SURROUNDING LAND USES	SCHOOLS/RESIDENTIAL	AGRICULTURAL
DISTANCE TO SCHOOLS - COLLEGE	1.4 MILES	5.3 MILES
DISTANCE TO SCHOOLS - HIGH SCHOOL	1.7 MILES	5.5 MILES
DISTANCE TO SCHOOLS - ELEMENTARY	0.6 MILES	3.7 MILES
NUMBER OF SCHOOLS WITHIN 2 MILES	15	0
DISTANCE TO CITY CENTER	1.1 MILES	5.9 MILES

Source: Wadell Engineering Corporation

The new site at 269 acres is over three times larger than the existing airport land use. The larger size allows for ownership and control of all protective surfaces such as runway protection zones and object free areas.

Based on years of on-site wind collection and analysis, the new site has a 97% wind coverage, whereas the existing site wind has 91%, which is less than the required 95%. Further, fog is expected to be less of an issue at the new site.

While the initial development based on the critical aircraft is a 3,200' runway and exits, the new site has sufficient land for a 6,000' runway with full parallel taxiway, protection zones and 34:1 approach surfaces. Instrument approach minimums might be as low as 200' and ¾ mile, allowing for improved use in actual instrument weather.

The new terminal land area is over five times larger and will allow for significant growth in the event of new aviation uses such as hangar storage and maintenance of large corporate aircraft that lack facilities at the large Bay Area airports.

The new site is adjacent to the I-5 freeway and at the edge of the valley where the westerly terrain commence a rise to the mountains. The new site will be convenient to California Highway Patrol helicopters and fixed wing aircraft, as well as fire fighting helicopters and fire observation aircraft. Often fires occur during strong winds. The improved wind coverage of the new airport will be more favorable to fire-fighting pilots flying during those wind conditions.

Ground access to the new site is almost 6 miles to the city center, rather than 1.1 mile for the existing site. This is to be expected, since the existing airport is downtown. However, all based pilots currently drive to the airport, and they would continue to do so at the new site. Transient pilots get a ride to their destination. The city operated local bus would serve the new site, providing a quality low cost ride into town.

Safety is enhanced at the new site, since there are no objects in the runway protection zones or obstacle free zones. The existing airport has Highway 152, canals and buildings in these areas.

Safety also is enhanced at the new site, since the surrounding land uses are more compatible at the new site, being out of town and within an agricultural area. There are no schools near the new site. The existing site has 15 schools (community college, high school and elementary schools) within just 2 miles of this downtown airport.

California Education Code Section 17215 requires that property proposed to be acquired or leased for school purposes within two (2) nautical miles (12,152 feet) of an existing or proposed runway be evaluated by the California Department of Transportation Aeronautics Office (Caltrans) prior to the acquisition or lease of the property. Schools and school development and expansion within two miles of a runway are of concern.

Development of a new site may benefit both education and aviation. It is logical that community colleges and high schools would not want to encourage or expand aviation use and activities within two miles of their schools. The new site provides new educational opportunities for pilot ground schools, pilot flight training, aircraft manufacturing and maintenance, including training of airframe and powerplant mechanics. Nationwide, and in fact worldwide, there is a dire shortage of pilots and mechanics. The new site could provide the location and facilities needs for new aviation training, careers and jobs!

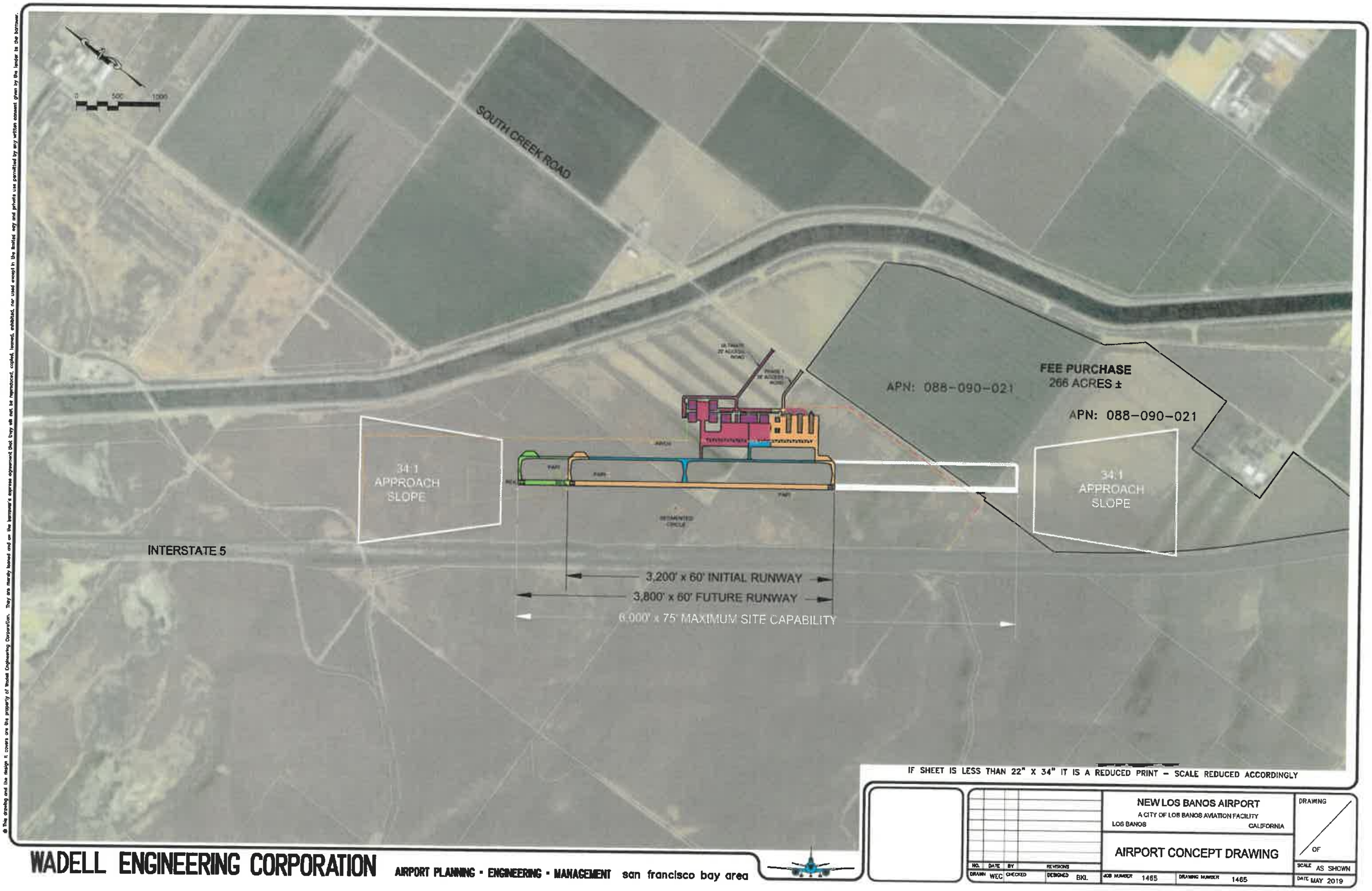
The relocation of the existing Los Banos Municipal Airport activities to the new I-5 South Site provides significant direct benefits to aviation relative to infrastructure improvements, opportunities for larger and safer facilities, improved parking and hangars, enhanced safety through proper wind coverage, and clear obstacle free zones.

Both aviation users and the community benefit from improvement to airport land use compatibility and the creation of new pilot and mechanic educational opportunities that are needed locally and worldwide. The future of aviation in Los Banos is bright!

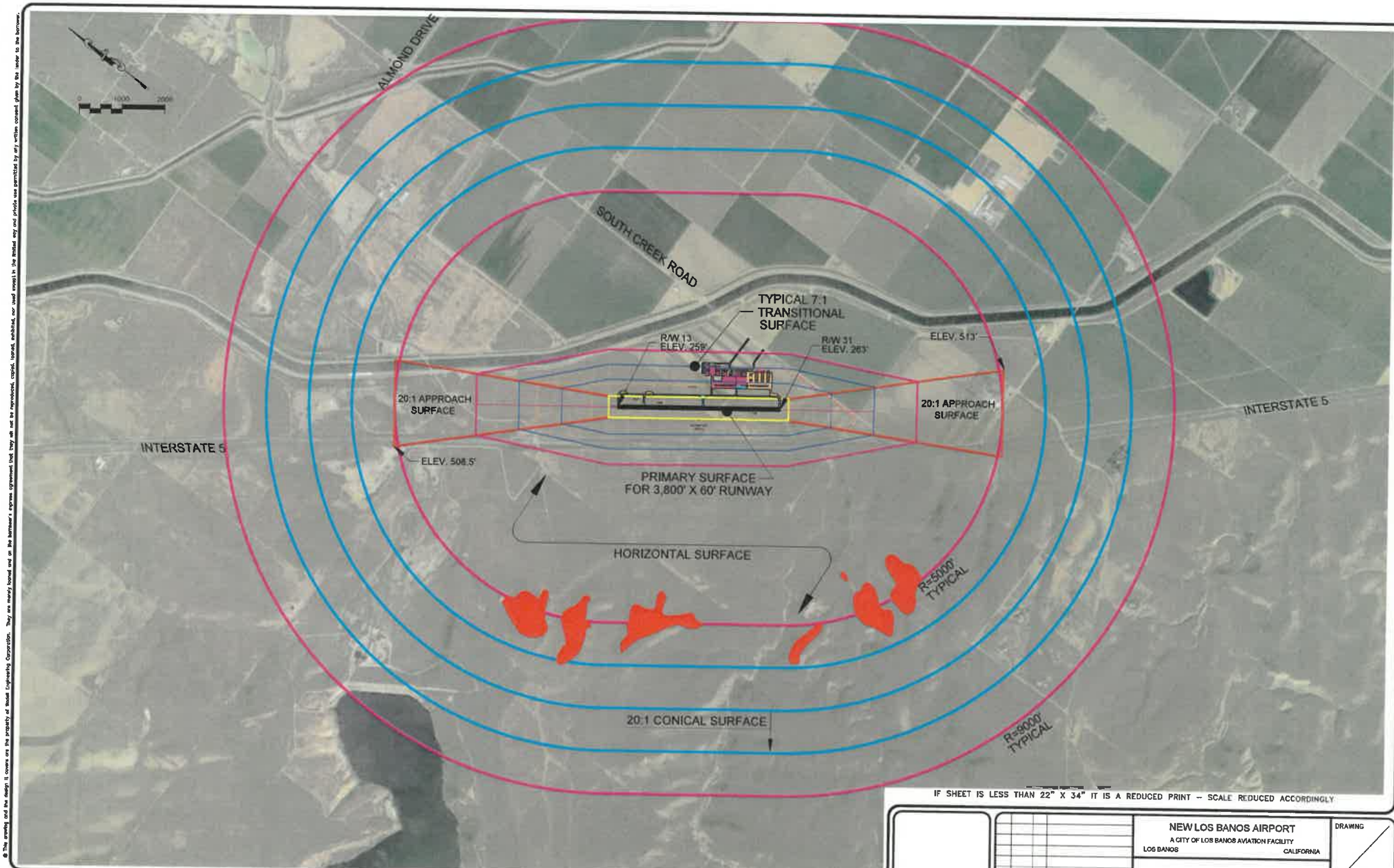
END OF REPORT

Appendix

Airport Concept Drawing
Airport Airspace Drawing
Stage Development Drawing
Land Acquisition Drawing



WADELL ENGINEERING CORPORATION AIRPORT PLANNING • ENGINEERING • MANAGEMENT san francisco bay area



IF SHEET IS LESS THAN 22" X 34" IT IS A REDUCED PRINT – SCALE REDUCED ACCORDINGLY

NEW LOS BANOS AIRPORT
A CITY OF LOS BANOS AVIATION FACILITY
LOS BANOS CALIFORNIA

AIRPORT AIRSPACE DRAWING

NO.	DATE	BY	REVISIONS
DRAWN WEC	CHECKED		DESIGNED BKL

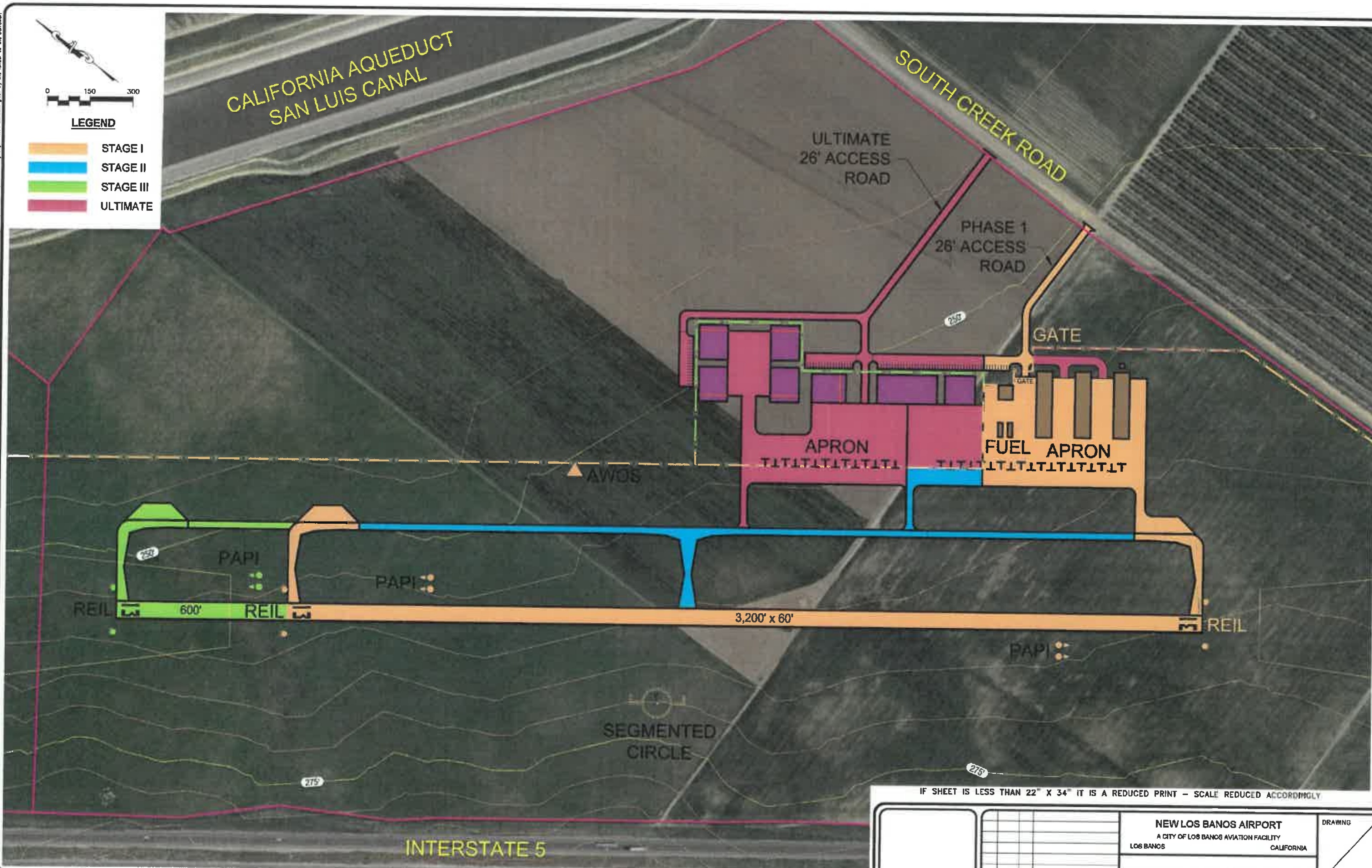
JOB NUMBER 1465 DRAWING NUMBER 1465

DRAWING / OF

SCALE AS SHOWN

DATE MAY 2019

WADELL ENGINEERING CORPORATION AIRPORT PLANNING • ENGINEERING • MANAGEMENT san francisco bay area



IF SHEET IS LESS THAN 22" X 34" IT IS A REDUCED PRINT – SCALE REDUCED ACCORDINGLY

NO.	DATE	BY	REVISIONS
DRAWN WEC	CHECKED		DESIGNED BKL

NEW LOS BANOS AIRPORT
A CITY OF LOS BANOS AVIATION FACILITY
LOS BANOS CALIFORNIA

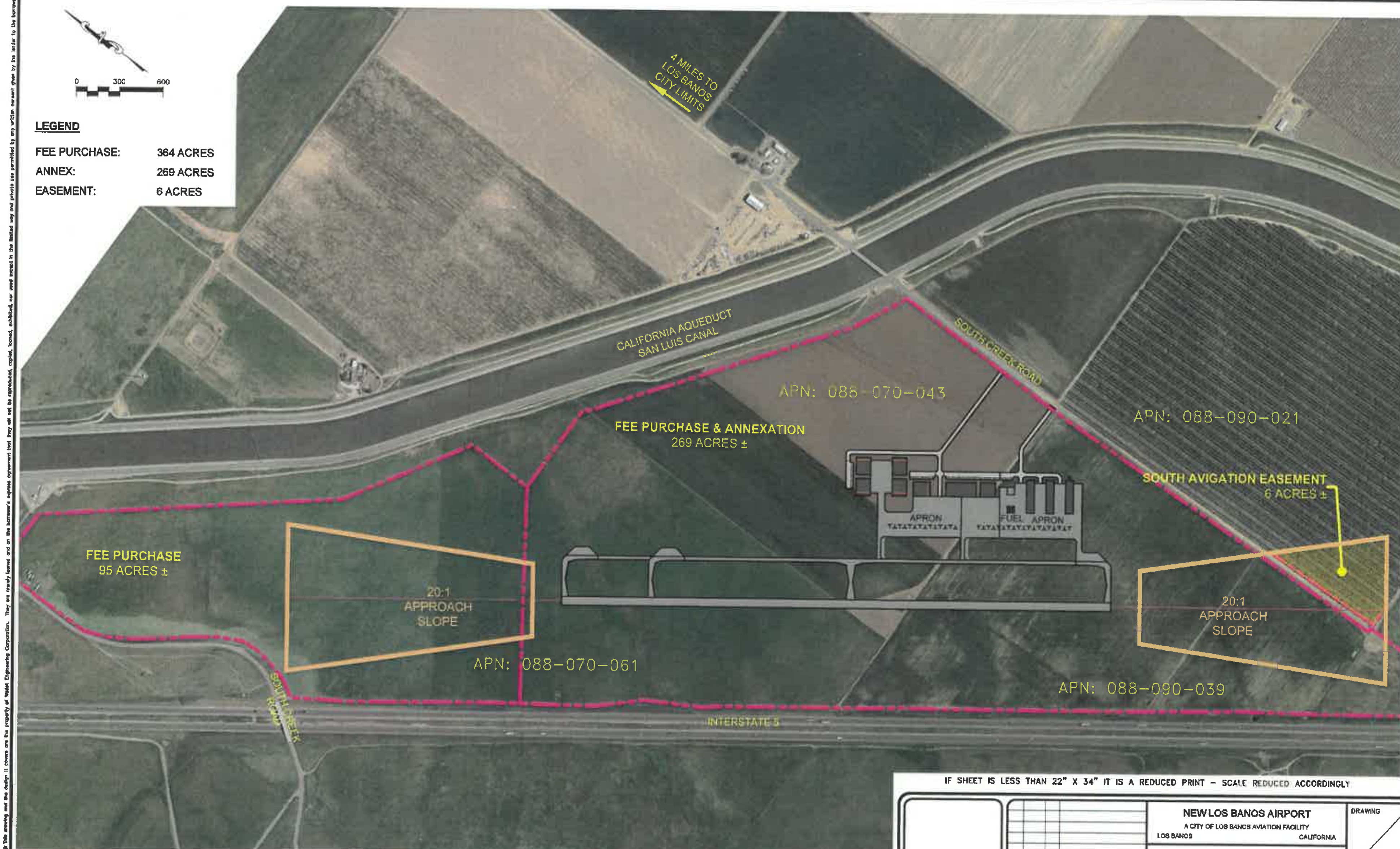
STAGE DEVELOPMENT DRAWING

JOB NUMBER 1465 DRAWING NUMBER 1465

DRAWING / OF

SCALE AS SHOWN
DATE MAY 2019

WADELL ENGINEERING CORPORATION AIRPORT PLANNING • ENGINEERING • MANAGEMENT san francisco bay area



LEGEND

FEE PURCHASE:	364 ACRES
ANNEX:	269 ACRES
EASEMENT:	6 ACRES

IF SHEET IS LESS THAN 22" X 34" IT IS A REDUCED PRINT – SCALE REDUCED ACCORDINGLY

WADELL ENGINEERING CORPORATION AIRPORT PLANNING · ENGINEERING · MANAGEMENT san francisco bay area

NEW LOS BANOS AIRPORT
A CITY OF LOS BANOS AVIATION FACILITY
LOS BANOS CALIFORNIA

LAND ACQUISITION DRAWING

NO.	DATE	BY	REVISIONS
DRAWN WEC	CHECKED		DESIGNED BKL

JOB NUMBER 1465 DRAWING NUMBER 1465

DRAWING OF

SCALE AS SHOWN
DATE MAY 2019

RESOLUTION NO. 6117

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LOS BANOS ACCEPTING AND APPROVING THE NEW LOS BANOS AIRPORT SITE SELECTION & CONCEPT STUDY, NARRATIVE REPORT, A CITY OF LOS BANOS AVIATION FACILITY, DATED MAY 2019, AND AUTHORIZING THE CITY MANAGER TO SUBMIT SAID STUDY TO THE FEDERAL AVIATION ADMINISTRATION (FAA) FOR THEIR REVIEW

WHEREAS, the City of Los Banos entered into an agreement with Wadell Engineering Corporation to do a new Los Banos Airport Site Selection & Concept Study Narrative Report; and

WHEREAS, the current Los Banos Airport Site, due to urban growth, lies within areas of residential, commercial and industrial uses; and

WHEREAS, the said study has studied five potential new airport facility locations; and

WHEREAS, the said study has identified the I-5 South Site as the most beneficial for a new airport facility; and

WHEREAS, the said study has developed a construction staging plan and a financial funding scenario for the I-5 South Site.

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Los Banos does hereby accept and approve the New Los Banos Airport Site Selection & Concept Study, Narrative Report, A City of Los Banos Aviation Facility, dated May 2019, and authorizes the City Manager to submit said report to the FAA for their review.

The foregoing Resolution was introduced at a regular meeting of the City Council of the City of Los Banos held on the 7th day of August 2019, by Council Member Johnson-Santos who moved its adoption, which motion was duly seconded by Council Member Jones and the Resolution adopted by the following vote:

AYES: Council Member Johnson-Santos, Jones, Lewis, Mayor Villalta
NOES: None
ABSENT: Council Member Faria

APPROVED:

Michael Villalta, Mayor

ATTEST:

Lucille L. Mallonee, City Clerk