# HEALDSBURG MUNICIPAL AIRPORT

# MASTER PLAN 2025

## A CITY OF HEALDSBURG AVIATION FACILITY


**MAY 2006**

**WADELL ENGINEERING CORPORATION**

AIRPORT PLANNING ENGINEERING MANAGEMENT CONSULTANTS

# HEALDSBURG MUNICIPAL AIRPORT
# MASTER PLAN / 2025

## ADOPTED MAY 15, 2006

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# 1. SUMMARY

The City of Healdsburg, California contracted with Wadell Engineering Corporation to prepare a general aviation airport master plan study utilizing a 90 percent Federal Aviation Administration grant under the Airport Improvement Program for Healdsburg Municipal Airport in Healdsburg, California. The basic intent of the study is to evaluate existing airport facilities, to assess airport demand and to prepare an airport master plan to accommodate the demand through the year 2025. This summary presents the objectives of the study, the approach utilized in the master planning process, the results of the analyses performed, and the recommendations for prudent and proper protection and development of the Healdsburg Municipal Airport. This report is intended to be a useful technical document to allow the City Council, Airport Commission, City Manager, City Staff, FAA, California Department of Transportation and Sonoma County Airport Land Use Commission to properly develop and protect the airport while enhancing its usefulness to the traveling public.

## Study Objectives

Specific objectives of the study are to:

- Determine, in concert with federal and state planning criteria, a set of forecasts and facility requirements for the development of the airport.
- Describe the concepts and alternatives considered in the course of the study.
- Provide concise and descriptive planning information. The impact and logic of the recommendations can then be clearly understood by the community and public agencies charged with the approval and development of this plan.

## Study Approach

This Master Plan covers the planning period of 2005-2025 and includes the following major components:

- Inventory of area planning efforts and background data.
- Forecasts of aviation demand, including the number of operations, aircraft types, and aircraft mix.
- Evaluation of the impact of development on adjacent land uses and on the community.
- Determination of facilities and improvements required to satisfy the forecast demand.
- Preparation of an airport layout plan.
- Estimation of the cost of airport development and operations.
- Recommendation of a plan for the ultimate development of the airport in accordance with community goals and increases in aviation demand.

This study becomes effective only after it has been evaluated, adopted by the City, and implemented. The plan has been designed to accommodate changes in community goals and aviation trends as they develop, imparting flexibility into the planning process. Community participation was invited during all planning phases by the consultant and the city. Numerous discussions and presentations were held during Airport Commission meetings and contact was made with airport businesses, the Healdsburg Airport Association and the Healdsburg Pilots Association. Primary agencies contacted during the course of the study include representatives of the City of Healdsburg, California Department of Transportation, and the Federal Aviation Administration. Valuable points of view regarding the future of aviation in the area were generated through these contacts and are reflected in the study.

## Findings

The Healdsburg Municipal Airport is located approximately three miles northwest of Healdsburg, with access from U.S. Highway 101. It is comprised of 45 acres of land. It is owned and operated by the City of Healdsburg under the Airport Commission, established by Ordinance 744. The airport is administered by the Community Services Department. Although outside city limits, it is incorporated within the city as an island. The airport has one paved runway serving single and light twin-engine aircraft.

Fifty-seven percent of all of aircraft owners at the Healdsburg Municipal Airport are from Healdsburg and the immediate area in the county and about 33% are from other parts of Sonoma County. Ten percent of the current owners are from outside Sonoma County. Presently, 63 aircraft are based at the airport. The total is expected to increase to 82 by the year 2025. Growth will occur mostly in single engine piston aircraft. Annual runway operations will increase from 18,900 to 24,300 by the year 2025, all of which will be general aviation.

To meet FAA standards for safety and future aviation demand, construction of new facilities will be necessary throughout the planning period. The existing 2,692 foot by 60 foot runway does not meet current FAA standards. A 3,130 foot by 60 foot runway with 240 foot safety areas off each end is needed to meet current aviation demand and to improve safety. Site constraints preclude runway extensions, yet improved safety areas are needed. Increases in covered aircraft parking facilities will be required; the development of city owned hangars for the storage of based aircraft is recommended in the Master Plan.

Airport plans were prepared to depict the airfield area, terminal area, and approaches to the airport. A stage development plan presents the capital improvement program. These plans explain how the growing needs of the Healdsburg Municipal Airport can be met through the year 2025.

Recent projects under completion during finalization of the master plan include (1) access road modifications, (2) parallel taxiway and runway safety area grading, drainage and taxiway paving, (3) west terminal area grading and drainage, with hangar taxiway paving, (4) airfield lighting vault with runway and taxiway edge lighting modifications and airfield signing, (5) precision approach path indicators (PAPI) and runway end identifier lights (REIL), and (6) segmented circle reconstruction. Since these projects are considered "underway and funded", they are not included in the future capital improvement program.

## Stage I

The objectives of the first stage of development, 0-5 years, are (1) runway 31 blast pad and runup area construction and extended safety area grading, (2) construction of 10 city owned T-hangars, (3) construction of perimeter fencing and gates (Phase 2), (4) terminal building renovations, (5) east auto parking area seal coat and marking, (6) fire protection system, (7) concrete aircraft wash rack, (8) automatic weather observation system (AWOS), (9) east apron expansion & hangar site preparation with septic relocation, and (10) a GPS approach procedure.

## Stage II

The second stage of development, 6-10 years, focuses on (1) the east side parallel taxiway extension, and (2) eight additional city owned aircraft T-hangars.

## Stage III

The third stage of development, 11-20 years, includes pavement maintenance and marking projects to protect the investment in the airport and enhance safety, such as (1) runway & taxiway pavement overlay and marking, (2) apron pavement overlay and marking, (3) hangar taxiway pavement overlay and marking, and (4) five additional city owned aircraft hangars.

The capital improvement program cost summary associated with the three stages of development is shown in the following table.

**Capital Improvement Program Cost Summary**
**Healdsburg Municipal Airport**
**(In 2005 $)**

| | |
|---|---|
| Stage 1 (2006-2010) | $1,533,000 |
| Stage 2 (2011-2015) | $415,000 |
| Stage 3 (2016-2025) | $1,109,500 |
| Total | $3,057,500 |
| | |
| FAA Funds | $2,852,375 |
| State Funds | $142,619 |
| Local Funds | $62,506 |
| Total | $3,057,500 |

Source: Wadell Engineering Corporation

The FAA grant program provides 95% grant funding for eligible projects. The California Aeronautics Program offers a 5% state match of the federal amount. The local share is 0.25%. The projects that were typically in-eligible in the past can be funded, including hangar construction, fueling systems and support utilities. Projects that are not eligible are private facilities, such as fixed base operator (full service aviation businesses) FBO hangars and other business facilities.

A 20-year cash flow analysis was prepared to model the income and expense. The resulting operating profit was combined with the local share of funds to match FAA and State grants for the development of eligible projects and construction of non-eligible facilities. The twenty year program results in reconstruction and improvement of aviation facilities, numerous new city owned hangars, updated rates and charges and significant positive cash flow from airport operations.

## Recommendations

It is recommended that the City of Healdsburg adopt the Healdsburg Municipal Airport Master Plan, 2005-2025, and undertake the following steps:

- Use the Master Plan as City policy for development on and adjacent to the Healdsburg Municipal Airport.
- Incorporate by reference this Airport Master Plan into the Healdsburg General Plan and amend the policy and implementation section of the general plan to reference this airport plan as the guiding plan for airport improvements and land use regulations. The airport related portions of the Transportation Element (Goal F) should be updated to reflect this Airport Master Plan.
- Submit the adopted updated Healdsburg Municipal Airport Master Plan to the County of Sonoma to incorporate, as appropriate, into the County of Sonoma Regional Aviation Plan and Airport Land Use Plan.
- Use the 2025 Noise Contours as the basis for assessing the compatibility of proposed noise sensitive development in the airport environs.
- Retain the existing "airport environs" definition in the County of Sonoma Airport Land Use Plan.
- Apply to the Federal Aviation Administration and the State of California for construction grants for facility development at the Healdsburg Municipal Airport.
- Implement the development program at the Healdsburg Municipal Airport.
- Install a fire water protection system.
- Apply for FAA funded hangars, or if not available seek State of California aviation fund loans for hangars at the airport.
- Staff the airport with a qualified part time airport manager leading to a full time position as funding allows.
- Utilize the talents and interests of the Airport Commission for advice to the City of Healdsburg for matters involving aviation, airport maintenance and development issues while avoiding conflicts of interest when members are users or tenants; assign City staff all responsibility for contracting and financial operations including reviewing and establishing rates and charges, lease negotiation and lease enforcement for the airport.
- An airport overlay zone should be applied to the airport property owned by the city to limit the land uses to airport and airport related as required by the FAA grant assurances.

# 2. INVENTORY

The inventory is prepared to provide a description of the airport location and setting, the climatic and geographic features of the area, and the history of the airport. The on-airport and off-airport land use and facility development is described, including the airfield area, terminal area, and airspace. Pertinent information is presented to identify the type and nature of aviation use.

## Location and Setting

Healdsburg is located in northern Sonoma County within the nine-county San Francisco Bay Region. Situated 12 miles north of Santa Rosa, Healdsburg lies just beyond the northern edge of the intense urban development that has occurred along the Highway 101 corridor in Sonoma County. The larger community of Windsor lies eight miles to the south. The small community of Geyserville is located three miles to the north, and Cloverdale is located farther on, approximately 18 miles to the north. Refer to Exhibit 1, Location Map.

Geographically, Healdsburg is defined principally by Highway 101, the Russian River, surrounding agricultural lands, and mountains to the east and west. Highway 101 is the principal coastal route between San Francisco and the Oregon border. The Russian River, rising in Mendocino County, flows through Healdsburg on its way to the Pacific Ocean. The City lies at the intersection of three rich agricultural valleys: Russian River Valley, Dry Creek Valley, and Alexander Valley. East and west beyond the agricultural lands rise subsystems of the Coastal Mountain Range.

Historically, Healdsburg served as an agricultural service center and a milling and distribution center for north coast lumber. More recently, however, development of small-scale manufacturing, geothermal support, electronics firms and tourism has diversified the local economy.

The airport is located approximately three miles northwest of the center of Healdsburg on Lytton Springs Road connecting with U.S. Highway 101 to the east. It is comprised of 45 acres of land. It is owned and operated by the City of Healdsburg, and although outside city limits, it is incorporated within the city as an island.

## Geology

Healdsburg is located within the Coast Range Geomorphic Province of California. This regional subdivision of California's diverse geologic environment is characterized by northwest-southeast trending ranges of low mountains and intervening valleys. This regional geomorphology is controlled by active tectonics and related geologic structures, including large-scale folds and faults.

Healdsburg is located in the vicinity of the San Andreas fault zone, a complex of active faults forming the boundary between the North American and Pacific lithospheric plates. Movement of the plates relative to one another results in the accumulation of strain along the faults, which is released during earthquakes. Numerous moderate to strong historic earthquakes have been generated in northern California by the San Andreas Fault Zone. The level of active seismicity results in classification of the area of seismic risk Zone 4 (the highest risk category) in the California Building Code.

**Exhibit 1**
**Location Map**
**Healdsburg Municipal Airport**


Source: Microsoft Map

The Working Group on California Earthquake Probabilities has estimated that there is a 67 percent probability that one or more large earthquakes (magnitude 7 or greater) will occur along one of the major fault zones (San Andreas, Hayward, Calaveras, or Rodgers Creek) in the San Francisco Bay Area during the 30-year period 1990 to 2020. However, this probability should be regarded as minimum as large earthquakes are also possible on other fault zones (e.g., Calaveras, Maacama) that were not included in this regional investigation.

The Maacama fault is the nearest identified active fault, located northeast of the airport. In January 2000, three earthquakes (magnitude 4.3, 4.3, and 4.2) occurred near the Maacama fault, which were the first earthquakes over magnitude 4.0 during the 30 years of detailed recordings by the U.S. Geological Survey. These earthquakes occurred near the Maacama fault, not on the main trace of the fault. The USGS has concluded that these earthquakes occurred on a minor fault associated with the Maacama, indicating that the Maacama is a complex fault system.

The airport site could also experience significant ground shaking during expected earthquakes on the other regional faults. The San Andreas fault zone is located approximately 22 miles west of the airport. This fault could generate a magnitude $M_w$7.9 earthquake. Moderate to strong ground

shaking would be expected at the airport during such an event. Light to moderate shaking would occur during moderate to large earthquakes on other regional active faults.

There is a potential for soil liquefaction. Liquefaction is the temporary transformation of loose, saturated granular sediments from a solid state to a liquefied state as a result of seismic ground shaking. In the process, the soil undergoes transient loss of strength, which commonly causes ground displacement or ground failure to occur.

## Climate

A mild climate prevails in the Healdsburg area throughout the year with cool wet winters and warm dry summers. In the Healdsburg area, the average maximum and minimum temperatures are 88.7 degrees Fahrenheit in July and 37.9 degrees Fahrenheit in January, based on monthly climate summaries from years 1931 to 2003.

Mean annual rainfall in the area is 42 inches, with the rainy season concentrated between October and April. The average maximum and minimum total precipitation in Healdsburg has been reported to be 0.04 inch in July and 9.01 inches in January, based on data collected by the Western Regional Climate Center between 1931 and 2003.

Dominant winds are season dependent. During the summer, north to northwesterly winds are common. During the winter, storms from the South Pacific result in southerly winds.

## History

Thousands of years ago, the beautiful, lush area called Healdsburg was home to the Pomo Indians. These early residents built their villages in the open, fertile valleys along the Russian River. They hunted the elk, bears, and mountain lions that roamed the dense oak and madrone forests along the meandering River. Occasional visits of European sailing vessels on the California Coast from the 1500's to early 1800's had little impact on the area.

The mid-1800's, however, brought new settlers. The Russians built Fort Ross on the coast, and the Mexican government established the vast 48,800-acre Rancho Sotoyome. This enormous land grant was awarded to sea captain Henry Delano Fitch in 1841. Fitch promptly hired trapper Cyrus Alexander to manage his bountiful rancho; the magnificent Alexander Valley is named for this early tenant. The California Gold Rush of 1849 brought itinerants, squatters, and failed miners to the more generous farming land here. Over the year, these squatters settled on the verdant land owned by the Fitch family. In 1857 a fight named the "Westside Road Wars" commenced among the squatters. One of the winners of this colorful "conflict" was Harmon Heald, an Ohio entrepreneur.

Harmon constructed a store and post office in what is now downtown Healdsburg. He then carefully laid out a town grid and sold lots for the heady price of $15 each. Harmon saw a grand plan for the village that would be his namesake, and plotted a town complete with a central Spanish-style Plaza. The Plaza remains one of the few examples of early California town planning in existence today.

Officially incorporated in 1867, young Healdsburg prospered. Residents quickly constructed all the necessities of city life, a City Hall, landscaped Plaza, water mains, bridges, offices - even a Public

Library. The long-awaited arrival of the Northwestern Pacific Railway in 1871 brought increased commerce and success.

The community has grown over the years to become a popular tourist destination featuring a central plaza square with excellent shopping, restaurants and nearby wineries. Conversion of the privately owned airport to city ownership has allowed for improved aviation facilities to meet the growing tourist and business needs.

## Ground Access

Healdsburg Municipal Airport is three miles northwest of the center of Healdsburg. Access to the airport is from Highway 101 to Lytton Springs Road to the northerly portions of the airport site where the terminal areas are located.

The tracks of the Northwestern Pacific Railroad are located east of the airport. Freight service on the line has been discontinued but is expected to resume in the near future. If funds become available, passenger rail service between Healdsburg and San Rafael could be initiated, as well as a possible tourist train.

## Aviation Facilities

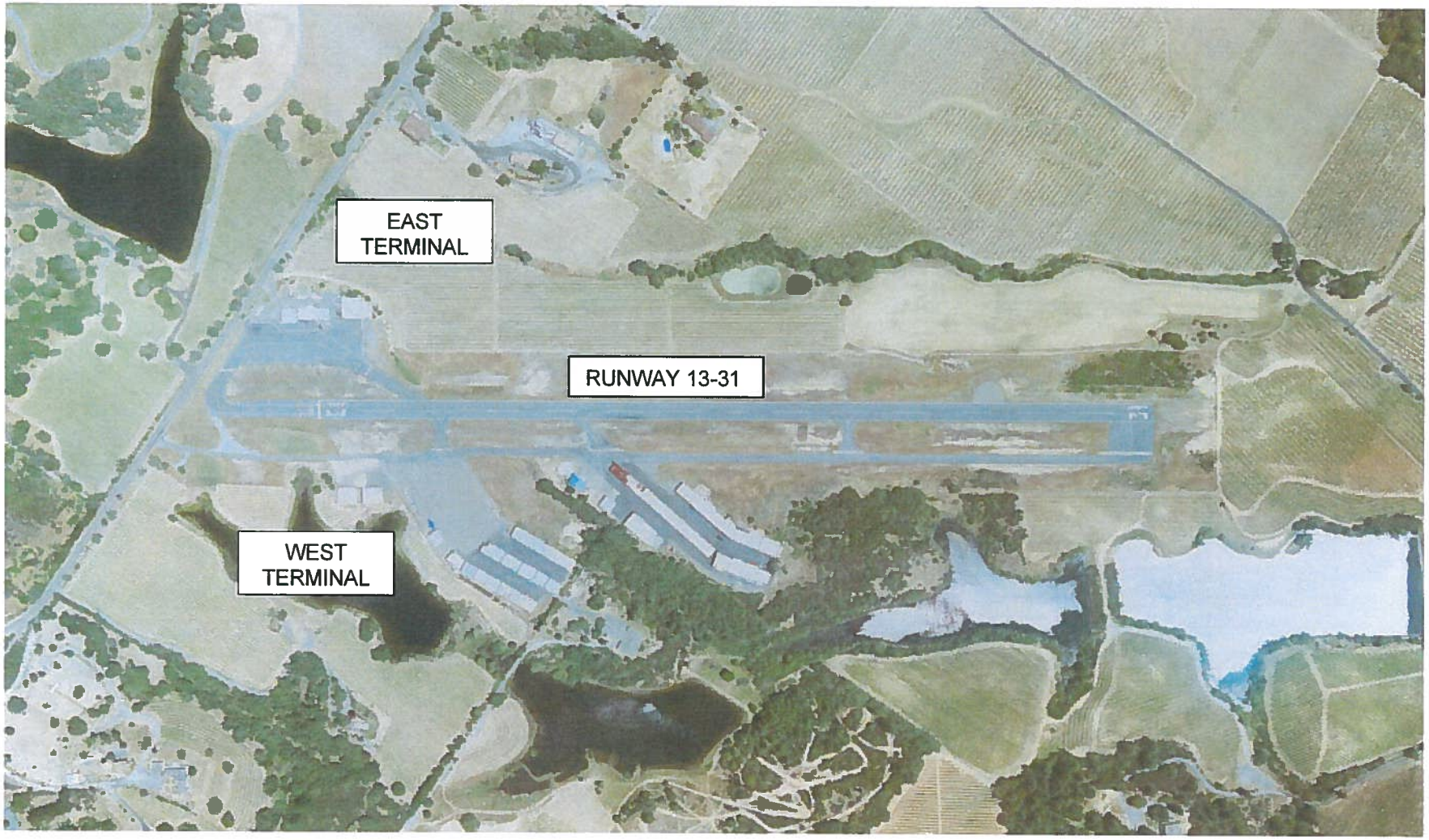
Aviation facilities inventoried include the airfield area, the terminal area, and the airspace / navigational facilities.

### Airfield Area

Healdsburg Municipal Airport has a single asphaltic concrete paved runway (Runway 13-31) 2,692 feet long and 60 feet wide oriented in a northwest to southeast direction. There is a runway safety area at the northwest with 60 foot wide paving. The southeast end has a graded runway safety slightly shorter than the 240 foot standard. There is a partial parallel taxiway on the west side of the runway and an exit to terminal ramp on the east side.

The runway and the runway approaches are described below. See Exhibit 2: Airport Aerial Photograph.

**Exhibit 2**
**Airport Aerial Photograph**
**Healdsburg Municipal Airport**




Source: Wadell Engineering Corporation

## Runways

The runway at the existing airport is described as follows:

**Table 1**
**Runway Characteristics**
**Healdsburg Municipal Airport**

| Runway | Orientation | Dimensions | Effective Gradient | Composition |
|---|---|---|---|---|
| 13-31 | NW-SE | 2,692' x 60' | 0.9287% | Asphalt |

Source: Wadell Engineering Corporation

Runway 13-31 has medium intensity edge lights and no signs, rotating beacon or landing aids. The runway, taxiway, and apron pavements are rated "good". The estimated runway pavement gross weight strength for aircraft with various landing gear configurations is as follows:

**Table 2**
**Pavement Strength**
**Healdsburg Municipal Airport**

| Runway | Single Wheel | Dual Wheel | Dual Tandem Wheel |
|---|---|---|---|
| 13-31 | 12,500 lbs. | N/A | N/A |

Source: FAA Airport Master Record for the Healdsburg Municipal Airport, December 2003.

### Runway Approaches and Obstructions

The existing approach slope ratios (horizontal:vertical) for each runway end are as follows:

**Table 3**
**Runway Approach Slopes**
**Healdsburg Municipal Airport**

| Runway End | Approach Slope |
|---|---|
| 13 | 9:1 |
| 31 | 33:1 |

Source: FAA Airport Master Record for the Healdsburg Municipal Airport, December 2003.

## Terminal Area

The west terminal area provides for hangar storage of aircraft and based aircraft tiedowns. The east terminal area is comprised of an aircraft self fueling facility, public terminal building and three maintenance hangars. Only one of those hangars is used for active aviation business, a popular FBO facility. The other two serve primarily non-aviation activities. The east area accommodates 16 tiedown positions on an asphalt apron for transient aircraft and those parked for maintenance. The west area has 20 based aircraft tiedown positions and 50 hangar spaces. See Exhibit 3: Terminal Area Photographs.

**Exhibit 3**
**Terminal Area Photographs**
**Healdsburg Municipal Airport**

**East Terminal Area Fueling, Terminal Building and Maintenance Hangar**

**East Area FBO Maintenance Hangar**

**West Area Apron and Storage Hangars**

Source: Wadell Engineering Corporation

### Airspace/Navigational Facilities

For visual approaches, the airport utilizes a right-hand approach pattern to Runway 13 and a left hand pattern to Runway 31. The published traffic pattern is 1,278 feet above mean sea level or 1,002 feet above the airport elevation. Neither runway is equipped with precision approach slope indicators (PAPI) which provide visual descent information to pilots. There are no published instrument approaches to the airport.

## Off-Airport Land Use

Healdsburg Municipal Airport is about three miles northwest of downtown Healdsburg, outside corporate city limits but incorporated as an "island" within the city. The land uses surrounding Healdsburg Municipal Airport are within the County of Sonoma and are considered to be compatible. The county zoning in the airport vicinity is "agriculture/resource development". Vineyards are located to the north, west, south, and east of the airport. There are grassy hills to the north. Lytton Springs Road crosses the runway approach along the north boundary. About ¼ mile southeast of the airport a portion of land is zoned "rural residential".

The Land Use Element of the county plan calls for maintaining open space between cities and for preserving rural agricultural areas. Policies support preserving large lot sizes and avoiding incompatible uses and the loss of prime farming. The Air Transportation Element of the county plan has goals and policies to promote compatible land uses near all airports in the county so as to not reduce the airport's future capabilities. This is accomplished by making County land use decisions consistent with the airport compatibility policies of the Airport Land Use Commission's (ALUC) Comprehensive Airport Land Use Plan. A plan has been prepared for each airport.

# 3. 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 2025.

## Airport Service Area

The area served by Healdsburg Municipal 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. The existing Healdsburg Municipal Airport is strategically located to serve general aviation demand in Healdsburg and the surrounding areas. Almost all based aircraft owners are from the vicinity. See Table 4.

**Table 4**
**Location of Based Aircraft Owners**
**Healdsburg Municipal Airport**

| Owner Location | Percent |
|---|---|
| Healdsburg Area | 56.9 |
| Santa Rosa | 13.8 |
| Windsor | 5.2 |
| Cloverdale | 3.4 |
| Geyserville | 3.4 |
| Rohnert Park | 3.4 |
| Petaluma | 3.4 |
| Fort Bragg | 3.4 |
| Other | 6.9 |
| Total | 100 |

Source: City of Healdsburg.

Eleven aircraft owners on the hangar waiting list are from the following areas: Healdsburg – 36.4%, Santa Rosa – 27.3%, Cloverdale – 18.2% and Other – 18.2%.

## Socioeconomic Data

Total employment in Healdsburg was estimated at 4,820 in 1990, 6,060 in year 2000, and 5,930 in 2003. Agricultural production is a primary business in Sonoma County. Wine grapes are the most valuable crop, followed by milk and livestock/poultry. The Healdsburg Municipal Airport is surrounded by vineyards and wineries. Many aircraft operations are related to tourists and businesses visiting Healdsburg due to the wine related activities. Unemployment in Healdsburg was 180 in 1990, 150 in 2000, and 280 in 2003.

## Population

Healdsburg was incorporated in 1867. In 1870 the population was 959, by 1900 it was 1869, by 1950 it was 3258 growing to 10,722 by year 2000. By 1998 the city population growth rate exceeded the county rate. The City of Healdsburg population forecast prepared by ABAG in 2003 indicates the population will be as follows: 2005 – 12,700, 2010 – 13,500, 2015 – 14,000, 2020 – 14,600, and 2025 – 14,700.

The State of California Department of Finance indicates the population of Sonoma County was 458,613 in year 2000. The county is projected to grow to 544,513 in year 2010, 613,173 in year 2020 and 684,311 by year 2030.

## 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.

General aviation includes a multitude of diverse and growing uses of aircraft, ranging from flying for sheer enjoyment to transportation of personnel by business firms in privately owned aircraft to highly specialized uses such as crop dusting, patrol, and aerial photography.

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. FAA statistics of current nationwide activity as well as forecasts through 2016 identify an increasing trend in general aviation growth. In 2005 there were 219,780 forecast general aviation aircraft in the United States. Of these, 73.6% are piston powered fixed wing aircraft, 3.2% rotorcraft, 3.4% turboprops, 4.0% turbojets, 13.1% experimental and sport, and 2.8% other. Of all fixed wing piston aircraft, 10.9% are twin engine. By 2015 piston will decrease to 68.8%, turbojet will increase to 6.6% and sport will grow from 3.5% to 6.4%. See Table 5.

**Table 5**
**National Active General Aviation Aircraft**
**By Type of Aircraft**
**FY 2005 - FY 2016**

| | 2005 | 2016 |
|---|---|---|
| Fixed Wing | | |
| Piston | | |
| Single Engine | 144,150 | 148,000 |
| Multi-Engine | 17,645 | 17,235 |
| Subtotal | 161,795 | 165,235 |
| Turbine | | |
| Turboprop | 7,400 | 8,400 |
| Turbojet | 8,750 | 15,900 |
| Subtotal | 15,550 | 24,300 |
| Rotary Wing | 6,985 | 7,915 |
| Experimental & Sport | 28,700 | 36,790 |
| Other | 6,150 | 5,830 |
| Total | 219,780 | 240,070 |

Source: FAA Forecasts, Fiscal Years 2005-2016, March 2005.
Rounding by Wadell Engineering Corporation.

## Aircraft Activity

General observation of the activity at Healdsburg Municipal Airport indicates that it is not busy, except on some weekends. However, as with most non-towered airports, aircraft operations have not been counted, except for brief two week acoustical counts in November 1993 and April 1994. Those counts are useful in determining percent of traffic in peak hour and distribution throughout the average day, but they are not reliable for annual forecasting.

It is estimated that 35% of current operations are local and 65% itinerant. The vast majority of operations are by single-engine aircraft at Healdsburg Municipal Airport, although some are by multi-engine piston aircraft.

## Based Aircraft

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. To receive federal aid, airports must be in the NPIAS. The 2003 NPIAS shows that there will be 63 aircraft based at Healdsburg from 2005 to 2020. The FAA operational forecast is constant from 2005 to 2020 at 31,400 total operations, of which 25,000 per year are local movements. The Metropolitan Transportation Commission 1996 forecasts indicate 43,000 operations and 78 based aircraft in year 2010. The Sonoma County General Plan year 2005 forecast is for 100 based aircraft and 16,000 annual operations. Yet that plan was prepared in the 1980's.

By factoring the current 63 aircraft to the year 2025, the following results: ABAG population growth for the City – 82 aircraft, California Department of Finance population forecasts for Sonoma County – 82, FAA national growth factor for general aviation aircraft - 77 aircraft. The FAA Terminal Area Forecasts is 63 aircraft every year through 2024. This master plan forecast is for 82 aircraft by year 2025.

## Aviation Forecasts

For purposes of this study, forecasts were prepared for based aircraft and annual operations from the base year of 2004 (labeled as 2005) through the year 2025. The forecast, as presented in Table 6 and Exhibit 4, provides detailed information concerning the determination of mix for runway capacity analyses, the types of based aircraft for future apron and hangar parking requirements, the number of instrument operations for determination of instrument approach capabilities and needs, and the aircraft operations by type for use in airport noise analyses.

Most of the based aircraft will be single engine, although there are two multi-engine piston and two turboprops (TCM-700 and E-90) based at the airport. Some twin engine piston aircraft make transient flights to Healdsburg for business and tourism reasons. Toward the end of the planning period there would be a based business jet, likely an Eclipse or Citationjet.

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 Healdsburg Airport has fewer local touch and go operations than other county airports since those flights are discouraged and limited to four per aircraft per day, as published in the FAA airport data records. Reasonable fuel prices encourage itinerant flights for refueling.

The instrument operations noted in Table 6 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.

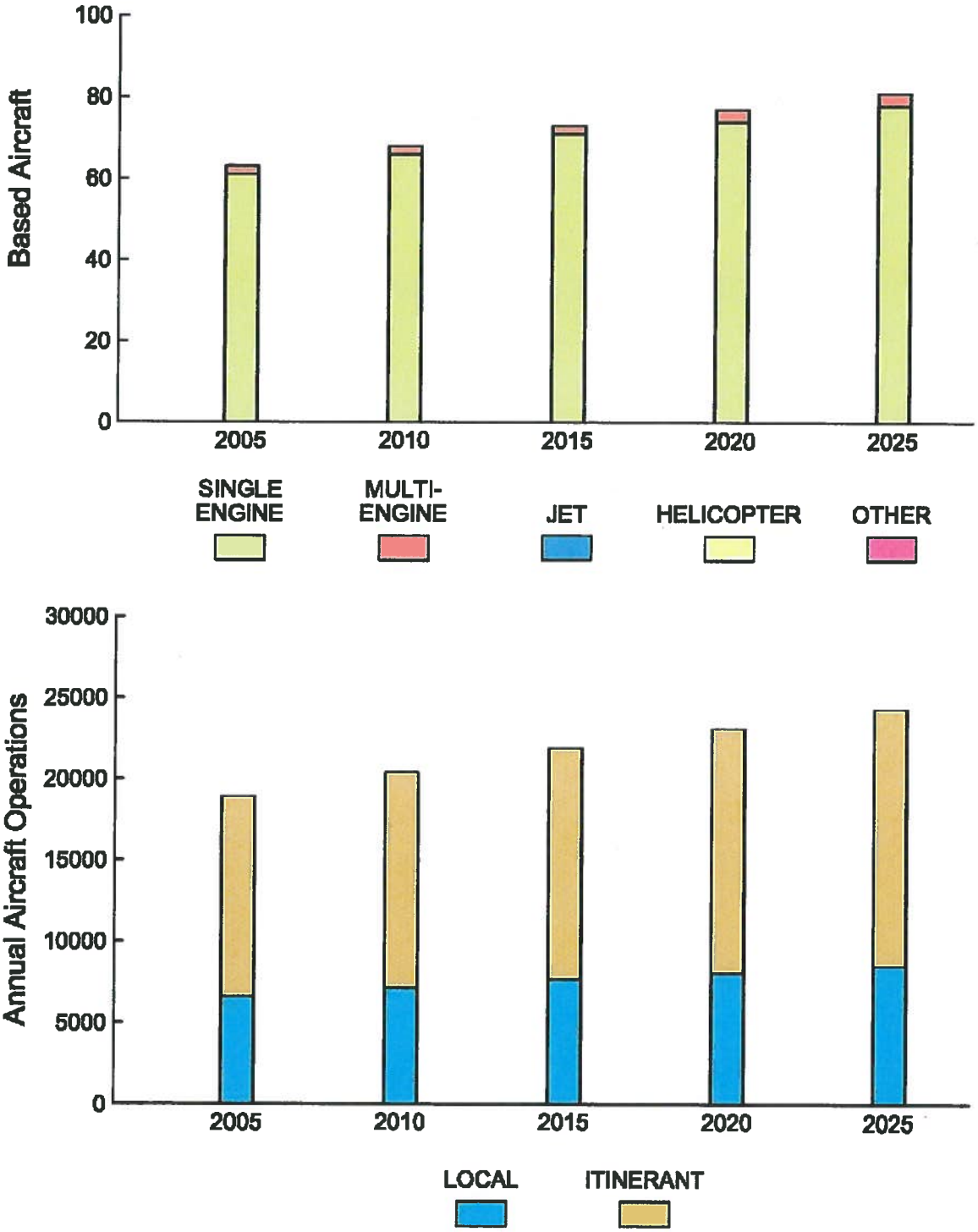
Typically there are more instrument departures than instrument approaches at general aviation airports since the instrument approach is a more precise operation and usually occurs when arriving at a destination where it is necessary to let down to the airfield through cloud conditions or fog. Instrument 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 is no published instrument approach procedure for the Healdsburg Municipal Airport, and therefore actual instrument operations are zero. A future GPS approach would be beneficial to the airport and can be implemented with no new equipment or cost to the city.

## Table 6
## Aircraft and Operations Forecast
## Healdsburg Municipal Airport
## 2005-2025

| | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|
| **Based Aircraft:** | | | | | |
| Single Engine | 59 | 64 | 69 | 71 | 75 |
| Multi Engine | 2 | 2 | 2 | 3 | 3 |
| Helicopter | 0 | 0 | 0 | 0 | 0 |
| Turboprop | 2 | 2 | 2 | 3 | 3 |
| Turbine | 0 | 0 | 0 | 0 | 1 |
| Total | 63 | 68 | 73 | 77 | 82 |
| **Annual Aircraft Operations:** | | | | | |
| **By Type of Operation** | | | | | |
| Local | 6,615 | 7,140 | 7,665 | 8,085 | 8,505 |
| Itinerant | 12,285 | 13,260 | 14,235 | 15,015 | 15,795 |
| Total | 18,900 | 20,400 | 21,900 | 23,100 | 24,300 |
| **By Type of Aircraft** | | | | | |
| Single-engine prop. | 17,330 | 18,790 | 20,220 | 20,690 | 21,510 |
| Multi-engine prop. | 710 | 720 | 740 | 1,030 | 1,050 |
| Helicopter | 100 | 110 | 130 | 140 | 150 |
| Turboprop | 760 | 780 | 810 | 1,140 | 1,170 |
| Turbine | 0 | 0 | 0 | 100 | 420 |
| Total | 18,900 | 20,400 | 21,900 | 23,100 | 24,300 |
| **By Type of User** | | | | | |
| Military | 0 | 0 | 0 | 0 | 0 |
| Air Taxi | 0 | 0 | 0 | 0 | 0 |
| General Aviation | 18,900 | 20,400 | 21,900 | 23,100 | 24,300 |
| Total | 18,900 | 20,400 | 21,900 | 23,100 | 24,300 |
| **Aircraft Operations Distribution** | | | | | |
| Peak Month | 2,840 | 3,060 | 3,290 | 3,470 | 3,650 |
| Peak Week | 710 | 770 | 820 | 870 | 910 |
| Average Day of Peak Month | 95 | 102 | 110 | 116 | 122 |
| Peak Hour of Average Day of Peak Month | 14 | 15 | 17 | 17 | 18 |
| Instrument Operations | 610 | 660 | 710 | 750 | 790 |
| Approaches | 150 | 200 | 240 | 250 | 260 |

Source: Wadell Engineering Corporation

**Exhibit 4**
**Aircraft and Operations Forecast**
**Healdsburg Municipal Airport**
**2005-2025**




Source: Wadell Engineering Corporation

# 4. AVIATION REQUIREMENTS

Demand/capacity analysis and facility requirements are based on guidelines established in 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. It should be recognized that on the basis of demand, this chapter merely identifies items and quantities for input to the Airport Plans section of the report (Chapter 5). Actual recommended development is identified in the Implementation Plans section (Chapter 6), where all of the physical and financial aspects of the proposed development are brought together.

## Aircraft/Airport Classifications

Airports are planned and developed to serve certain categories of existing and future user aircraft. In order to select appropriate dimensional standards, it is necessary to identify the various categories and design groups of 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 7.

**Table 7**
**Aircraft Approach Category**

| Category | Approach Speed |
|---|---|
| A | Less than 91 knots |
| B | 91 knots or more but less than 121 knots |
| C | 121 knots or more but less than 131 knots |
| D | 131 knots or more but less than 166 knots |
| E | 166 knots or more |

Source: FAA Advisory Circular 150/5300-13.

### Airplane Design Groups

The airplane design groups table categorizes airplanes by wingspan and is presented below.

**Table 8**
**Airplane Design Groups**

| Group | Wingspan |
|---|---|
| I | Up to but not including 49 feet (15 m) |
| II | 49 feet (15 m) up to but not including 79 feet (24 m) |
| III | 79 feet (24 m) up to but not including 118 feet (36 m) |
| IV | 118 feet (36 m) up to but not including 171 feet (52 m) |
| V | 171 feet (52 m) up to but not including 213 feet (65 m) |
| VI | 213 feet (65 m) up to but not including 262 feet (80 m) |

Source: FAA Advisory Circular 150/5300-13.

## Airport Types

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.

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. The airport types are presented in Table 9.

Healdsburg Municipal Airport meets A-I criteria and is a basic utility facility. Even though it occasionally serves B-I aircraft, it will remain primarily an A-I facility serving "small aircraft only".

**Table 9**
**Airport Types**

| Type | Description |
|---|---|
| Basic Utility--Stage I | This type of airport serves about 75 percent of the single-engine and small twin-engine airplanes used for personal and business purposes. Precision approach operations are not usually anticipated. This airport is designed for small airplanes in airport reference code B-I. |
| Basic Utility--Stage II | This type of airport serves all the airplanes of Stage I, plus some small business and air taxi-type twin-engine airplanes. Precision approach operations are not usually anticipated. This airport is also designed for small airplanes in airport reference code B-I. |
| General Utility--Stage I | This type of airport serves all small airplanes. Precision approach operations are not usually anticipated. This airport is also designed for airplanes in airport reference code B-II. |
| General Utility--Stage II | This type of airport serves large airplanes in aircraft approach category A and B and usually has the capability for precision approach operations. This airport is normally designed for airplanes in airport reference code B-III. |
| Transport | This type of airport serves all large airplanes in aircraft approach categories C and D. |

Source: FAA Advisory Circular 150/5300-13.

## Airport Service Role

Healdsburg Municipal Airport is classified in the NPIAS as a basic utility airport, which serves aircraft with approach speeds up to but not including 91 knots (Category A). There are twin engine operations by based piston and turboprops, plus transient twin-engine aircraft. The airport should be developed as a basic utility stage II airport handling primarily A-I aircraft (small aircraft only).

## Airfield Capacity

Airfield facilities were evaluated for their ability to satisfy forecast aviation demand at the airport. Hourly runway capacities and annual service volume were estimated. Hourly runway capacity is defined as the maximum number of aircraft operations that can take place in one hour for given conditions. Annual service volume is a measure of annual aircraft operations that can be used as a reference in preliminary airfield planning.

The aviation forecasts along with the operations levels were evaluated. The airfield layout and operational use was determined from the existing Airport Layout Plan and observations of airfield operations.

### Runway Use

Runway use encompasses the number, location, and orientation of active runways, as well as the directions and types of operations using each runway. Runway use depends primarily on wind direction and wind speed, but also depends on other factors such as air traffic control rules and noise abatement procedures, runway instrumentation, taxiing distance, and runway length. The annual use percentages were calculated based upon conversations with airport users, available wind analysis, observations of airfield use and review of the Sonoma County airport land use plan report. It is estimated that Runway 31 is used 40% of the time, and Runway 13 is used 60% of the time. Larger aircraft tend to land on runway 31 and depart on runway 13.

### Airspace and Air Traffic Control

Healdsburg Municipal Airport has no on-airport navaids. Oakland Center has been delegated responsibility for control of instrument flight rules (IFR) aircraft within this area. The overall airspace of Healdsburg Municipal Airport is generally unrestricted.

It is assumed that current air traffic control procedures will continue throughout the planning period to 2025. Ongoing FAA research may lead to new standards in the future. The benefits from this research will be realized primarily under IFR conditions, which is an important factor at Healdsburg Municipal Airport. It is possible to have a GPS approach in future years as the FAA undertakes the preparation of new published instrument approaches. An FAA funded air traffic control tower is not expected to be commissioned during the planning period, since entry-level traffic demand criteria typically must be over 200,000 annual operations.

### Ceiling and Visibility Conditions

Ceiling and visibility have an important impact on airfield operations and runway capacity because spacing between aircraft is often less with high ceilings and good visibility than when conditions are less favorable.

The two types of flight rules for specific weather conditions are visual flight rules (VFR) and instrument flight rules (IFR). The definitions of these conditions are:

VFR: Ceiling is at least 1,000 feet and visibility is at least 3 miles
IFR: Ceiling is below 1,000 feet and/or visibility is below 3 miles

There is no weather data to establish the percentage of VFR versus IFR conditions. It is assumed that a VFR condition occurs approximately 95% of the time and IFR conditions occur approximately 5% of the time. It is seldom that IFR conditions continue throughout a full day.

## Aircraft Mix

Aircraft mix is composed of four aircraft classifications: A, B, C, and D. Class A includes small single-engine aircraft (weighing 12,500 pounds or less); Class B includes small twin-engine aircraft (weighing 12,500 pounds or less); Class C includes large aircraft weighing more than 12,500 pounds and up to 300,000 pounds; and Class D includes heavy aircraft weighing more than 300,000 pounds. No class C or class D aircraft utilize Healdsburg Municipal Airport.

The following aircraft mix at the airport was derived from the aviation demand forecasts presented in Table 6. It was assumed that helicopters are negligible. All turboprop and turbine aircraft and multi-engine piston aircraft are assumed to be Class B. For this study, it is assumed that 50% of the Class A aircraft do not operate in IFR weather conditions and that all Class B aircraft will operate during IFR conditions.

**Table 10**
**Aircraft Mix (In Percent)**
**Healdsburg Municipal Airport**

| | 2005 | 2015 | 2025 |
|---|---|---|---|
| Aircraft Class (VFR Conditions) | | | |
| A | 92 | 93 | 91 |
| B | 8 | 7 | 9 |
| Aircraft Class (IFR Conditions) | | | |
| A | 86 | 87 | 80 |
| B | 14 | 13 | 20 |

Source: Wadell Engineering Corporation

## Hourly Runway Capacity

Hourly runway capacity is the maximum number of aircraft operations that can take place in one hour for given conditions. Factors that affect hourly runway capacity include:

- Runway use
- Airspace and air traffic control
- Ceiling and visibility conditions
- Aircraft mix

VFR peak hourly capacity at Healdsburg Municipal Airport is dependent on the runway-use configuration actually utilized. IFR operations at Healdsburg Municipal Airport only occur under a single runway-use configuration.

Under both VFR and IFR conditions, the hourly runway capacities are above peak hour demand through the 20-year planning period. It is assumed that IFR conditions occur approximately 5% of the year and do not continue over a long period of time.

Estimated hourly runway capacities, together with peak hour demand for the planning period, are as follows:

**Table 11**
**Hourly Runway Capacity**
**Healdsburg Municipal Airport**

| | 2005 | 2015 | 2025 |
|---|---|---|---|
| VFR peak hourly demand | 14 | 17 | 18 |
| VFR peak hourly capacity | 100 | 100 | 100 |
| IFR peak hourly demand | 1 | 2 | 2 |
| IFR peak hourly capacity | 0 | 10 | 10 |

Source: Wadell Engineering Corporation

## Annual Service Volume

Annual service volume is based on hourly capacities for the airfield operating conditions that occur throughout the year and on monthly, daily, and hourly variations in aircraft operations. The estimated annual service volume and the forecast annual demand levels are as follows:

**Table 12**
**Annual Service Volume**
**Healdsburg Municipal Airport**

| Year | Annual Service Volume | Annual Demand |
|---|---|---|
| 2005 | 230,000 | 18,900 |
| 2015 | 230,000 | 21,900 |
| 2025 | 230,000 | 24,300 |

Source: Wadell Engineering Corporation

On the basis of the analyses of the existing airfield, it is concluded that Healdsburg Municipal Airport capacity exceeds aviation demand throughout the planning period.

## 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 / Public Utilities
- AIRSPACE/NAVAIDS
- LAND AREA REQUIREMENTS

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 aids/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 Width & Length

Runway width is based on FAA standards, ranging from 60' to 75' for small aircraft. The existing width is 60 feet, which meets FAA standards. Runway length is determined analytically by evaluating the elevation of the airport above mean sea level and the design temperature, which is the mean of the maximum temperature during the hottest month of the year. A design elevation of 280 feet MSL and a critical July temperature of 88.7 degrees F were used to prepare the runway length requirements table.

The Transport or business jet runway length requirements are based on aircraft size and useful load carried. The 75 percent level of business jet fleet includes all business jets weighing up to 30,000 pounds, typically the smaller business jets. The 100 percent fleet includes the largest planes up to 90,000 pounds, such as the Gulfstream V. Most recently, multi-engine business jets are often grouped according to maximum takeoff weight as light (up to 20,000 pounds), medium (20,000 to 35,000 pounds), heavy (35,000 to 50,000 pounds) and global (50,000 pounds and up).

**Table 13**
**Runway Length and Strength Requirements**
**Healdsburg Municipal Airport**

| Airport Classification | Runway Length | Runway Strength* |
|---|---|---|
| Existing Runway 13-31 | 2,692 ft. | 12,000 # S |
| | | |
| Basic Utility Stage I | 2,580 ft. | 8,000 # S |
| Basic Utility Stage II | 3,130 ft. | 8,000 # S |
| General Utility Stage I | 3,730 ft. | 12,500 # S |
| General Utility Stage II | 4,290 ft. | 30,000 # S |
| | | |
| Transport** | | |
| 75%/60% | 4,890 ft. | 30,000 # S |
| 75%/90% | 6,830 ft. | 30,000 # S |
| 100%/60% | 5,640 ft. | 60,000 # D |
| 100%/90% | 8,490 ft. | 60,000 # D |

* "S" is pounds of single wheel gear configuration load; "D" is pounds of dual wheel load.
** First percent is aircraft size within business jet fleet; second percent is amount of useful load carried.

Source: Wadell Engineering Corporation

Discussions with the city staff and tenants indicate that the majority of activity involves single-engine aircraft and light twin-engine aircraft. Single engine and twin engine based turboprops use the airport. Small business jets utilize the airport facilities rarely.

The existing 2,692-foot runway can handle only small general aviation aircraft and light turboprops and the lightest of business jets. There is not space available on the site to extend the runway to 3,130 feet to meet FAA standards for a runway suitable to meet the objectives of a basic utility stage II standard.

Runway Strength

The runway strength requirement is determined by the airport runway category and type of aircraft anticipated to operate at the airport. The runway pavement strength of runway 13-31 is 12,500 pounds single wheel gear configuration, which exceeds the standards required for most operations expected at the airport as shown in Table 13. A design strength of 12,500 pounds is suitable.

Runway Orientation

The number and orientation of the 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).

There is no site-specific FAA approved wind data for Healdsburg Municipal Airport. Users indicate that cross winds have not been a constraint at the existing Healdsburg Municipal Airport. A single runway will be adequate for wind and capacity purposes.

Runway/Taxiway Markings

For paved runways, white runway numbers and centerline stripes are recommended. Non-precision and precision runways have additional threshold and edge markings. Yellow taxiway markings along the centerline and yellow transverse holding lines a specified distance from the runway centerline are recommended. The proper distances are found in the Airport Plans chapter and depicted on the Airport Layout Plan.

**Taxiways**

The addition of taxiways increases the airport operational efficiency and the runway capacity potential. 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. The Range in Acceptable Exit Locations (Table 14) shows the range of acceptable exit locations by type of aircraft for various types of exits. Parallel taxiways are recommended to enhance airport operational flexibility efficiency. Based on the taxiway analysis, adequate exit taxiways are available on Runway 13-31.

**Table 14**
**Range in Acceptable Exit Locations**
**Distance from Threshold**
**Healdsburg Municipal Airport**

| | Existing Exit Locations | | Useable By |
|---|---|---|---|
| Exit Type | Runway 13 | Runway 31 | Small Aircraft |
| Right Angle (90°) | 400', 1700', 2675' | 975', 1850', 2300' | 1250' - 4400' |
| Angle (45°) | 825' | 2350', 3000' | 1050' - 3900' |
| High Speed (30°) | --- | --- | 850' - 2400' |

Source: Wadell Engineering Corporation

**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 cone
Rotating beacon
Medium Intensity Runway Lights (MIRL)
Precision Approach Path Indicator System (PAPI)

In addition to the above visual aids and lighting, airports with precision or non-precision approaches and larger aircraft have some of the following:

Runway End Identifier Lights (REIL)
High Intensity Runway Lights (HIRL)
Runway distance marker signs
Approach light systems with sequence flashing lights
Non-precision or precision runway markings

The Healdsburg Municipal Airport has a visual runway with medium intensity edge lighting. Improvements needed include illuminated runway exit and hold signs, and PAPI for runway 13-31. The lighting systems will be incorporated in the capital improvement program.

## Terminal Area

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

### Airplane Parking and Tiedown Aprons

The currently available quantity of apron tiedown positions is adequate to meet demand through the forecast period. Some apron could be converted to hangar buildings since the trend is toward inside protected parking for aircraft. The apron pavements are in good condition.

The facility requirements for airplane parking and tiedown aprons were determined by relating existing and planned apron tiedown positions with projected demand by aircraft type. The General Aviation Facilities Requirements Summary table (Table 17) identifies the demand for aircraft parking by type.

Transient parking space requirements are based on projections of existing demand, recognizing an increase in business and visitor activity. Airplane parking and tiedown requirements have been estimated based on characteristics of local based tiedown demand. Some aircraft are currently parked on aprons, since hangars are not available for all users. Hence, future based aircraft tiedown space requirements reflect the assumption of hangar demand and the ability to satisfy hangar demands. If adequate hangar facilities are not available, the requirements for based tiedown positions will increase.

### Buildings and Hangars

The number of hangars depends upon local demand and climate. Presently, the number of hangar storage spaces at the airport totals 50. See Table 15. Airport users indicate more hangar facilities are needed. Hangar demand is estimated at 74 in 2025.

Airport buildings should be constructed to fulfill specific needs. These needs include fixed based operator buildings providing repair and maintenance, air charter, shops, salesroom and administrative buildings accommodating the public including pilots, passengers, and visitors. All buildings shall be equipped with fire sprinklers to meet fire code requirements. The number of pilots and passengers in the terminal area is presented in Table 16. The activity can be accommodated in the existing city owned terminal building. Also local business lobbies function as a terminal building for based and transient users. The addition of a new larger fixed base operator

aircraft maintenance hangar would provide new opportunities to attract business and increase airport revenues, since there are currently no hangars on the airport suitable for the busy and expanding aircraft maintenance operation. The smaller east side hangars can be leased to businesses involved in direct full time maintenance and repair of aircraft.

**Table 15**
**Available Aircraft Parking Facilities**
**Healdsburg Municipal Airport**

| Facility | Existing Available Spaces |
|---|---|
| Tiedowns | |
| East | 16 |
| West | 20 |
| Subtotal | 36 |
| Hangars | |
| East Business | 3 |
| West Business | 1 |
| Storage | 50 |
| Subtotal | 54 |
| Total Spaces | 90 |

Source: City of Healdsburg

**Table 16**
**General Aviation Terminal Area Operational Factors**
**Healdsburg Municipal Airport**

| | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|
| **Busy Hour Operations** | | | | | |
| **Local** | 5 | 5 | 6 | 6 | 6 |
| **Itinerant** | 9 | 10 | 11 | 11 | 12 |
| **Total** | 14 | 15 | 17 | 17 | 18 |
| **Busy Hour Pilots and Passengers** | | | | | |
| **Local** | 6 | 7 | 7 | 7 | 8 |
| **Itinerant** | 18 | 20 | 22 | 22 | 23 |
| **Total** | 24 | 26 | 30 | 30 | 31 |
| **Pilots and Passengers in Terminal Area** | 20 | 21 | 24 | 24 | 25 |

Source: Wadell Engineering Corporation.

Fixed based operator lease areas, tiedowns, and hangars are revenue producing facilities. Their timely development is essential for growth of the airport and production of revenues to be used for matching funds. The positive revenue-generating benefits of these facilities will be derived if the facilities are built when sufficient demand exists, thereby assuring the success of the building development program.

## Roads and Auto Parking

Access to the airport is important to meet demand levels. Automobile access and parking facilities required to serve projected demand have been based on busy hour pilot and passenger forecasts within the terminal area.

There are two airport access points from Lytton Springs Road. The west entrance serves the west apron and hangar storage area and paint shop. Long term auto parking is designated in the west area. The east entrance serves the transient area, terminal and three business hangars. There are 9 marked auto parking spaces. Additional parking is near the business hangars. The airport has excellent airport access. The roadways have sufficient capacity to accommodate airport generated vehicular traffic demands throughout the forecast period. Based on the forecasts, auto parking for the year 2025 is estimated to be 25 spaces (see Table 17).

## Support Facilities / Public Utilities

Support facilities for the airport include communications, fuel storage and distribution, electric power, water supplies, wastewater disposal, and storm water collection and disposal. A self serve above ground city owned 10,000 gallon avgas fuel farm is located north of the easterly terminal building. No jet fuel is available. The electric power service is adequate, yet the airport has no lighting vault for high voltage distribution. The water supply is by a well system, since there are no city water mains in the airport area. The water supply is adequate for domestic use, but not for fire protection. Sewer is by septic tank east of the east side businesses. The septic system is adequate for the relatively low activity terminal area.

Fire protection is by pumping water from an adjacent vineyard pond west of the airport. The City of Healdsburg fire chief states that the pond should not be used in factoring fire flow because it is unreliable during the summer and fall months. The chief states that to meet California Fire Code (CFC) requirements (appendix III-A), the fire water storage tank needs to be a minimum of 144,000 gallons (1200 GPM x 2 Hours). In addition, a Fire Pump & Controller meeting NFPA 20 Standards capable of 2000 GPM @ 70 PSI would provide adequate fire flow. Water mains serving hydrants should be stubbed out at existing structures and future building pads to supply fire sprinkler systems.

Availability of these facilities is essential to the operation of the airport. The development of these facilities / public facilities is described in Chapter Six.

## Land Area Requirements

The initial step in any airport development is the determination of sufficient land to ensure that (1) the airport can accommodate the long-term air traffic requirements, and (2) the land area contains airport operational areas under appropriate control to ensure compatibility of land use around the airport. The airport land is adequate through the 20 year planning period. The avigation easements at each end of the runway fulfill FAA requirements for control of approaches. The amount of land needed can vary considerably in size depending on landing area (e.g., length, number, and layout of runways and taxiways), approach areas (e.g., runway protection zones), and building area (e.g., T-hangars, aircraft tiedowns, buildings, auto parking). Specific land area requirements are subject to siting and layout and, therefore, are discussed in Chapter Six, Airport Plans.

## Table 17
## General Aviation Facility Requirements Summary
## Healdsburg Municipal Airport

| | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|
| **Demand** | | | | | |
| Based Aircraft | 63 | 68 | 73 | 77 | 82 |
| Aircraft Operations | 18,900 | 20,400 | 21,900 | 23,100 | 24,300 |
| **Airfield Facilities** | | | | | |
| Runways - Number | 1 | 1 | 1 | 1 | 1 |
| Longest Length (Feet) | 2,692 | 2,692 | 2,692 | 2,692 | 2,692 |
| Width (Feet) | 60 | 60 | 60 | 60 | 60 |
| Strength (Pounds - Single) | 12,500 | 12,500 | 12,500 | 12,500 | 12,500 |
| **Terminal Facilities** | | | | | |
| Airport Business Tenants | 1 | 1 | 1 | 2 | 2 |
| Acres | 1.0 | 1.0 | 1.0 | 2.0 | 2.0 |
| Auto Parking - Spaces | 19 | 20 | 22 | 23 | 25 |
| Acres | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 |
| Hangars - Spaces | 57 | 61 | 66 | 69 | 74 |
| Acres | 7.1 | 7.6 | 8.3 | 8.6 | 9.3 |
| Open Tiedown Spaces | | | | | |
| Based | 6 | 7 | 7 | 8 | 8 |
| Transient | 9 | 10 | 11 | 12 | 12 |
| Open Tiedown Acres | | | | | |
| Based | 0.5 | 0.6 | 0.6 | 0.7 | 0.7 |
| Transient | 1.1 | 1.3 | 1.4 | 1.5 | 1.5 |
| Total Terminal Area Acres | 9.8 | 10.7 | 11.5 | 13.0 | 13.7 |
| **Access** | | | | | |
| Access Road Lanes | 2 | 2 | 2 | 2 | 2 |
| Daily Vehicle Trips | 315 | 340 | 365 | 385 | 410 |
| Peak Hour Trips | 35 | 37 | 40 | 42 | 45 |

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

Source: Wadell Engineering Corporation

The foregoing comments about facilities required during the planning period are direct input to the Airport Plans chapter and are used in developing physical layouts. Once the layouts are prepared, quantities and cost estimates for development are determined and presented in Chapter Six, Implementation Plans.

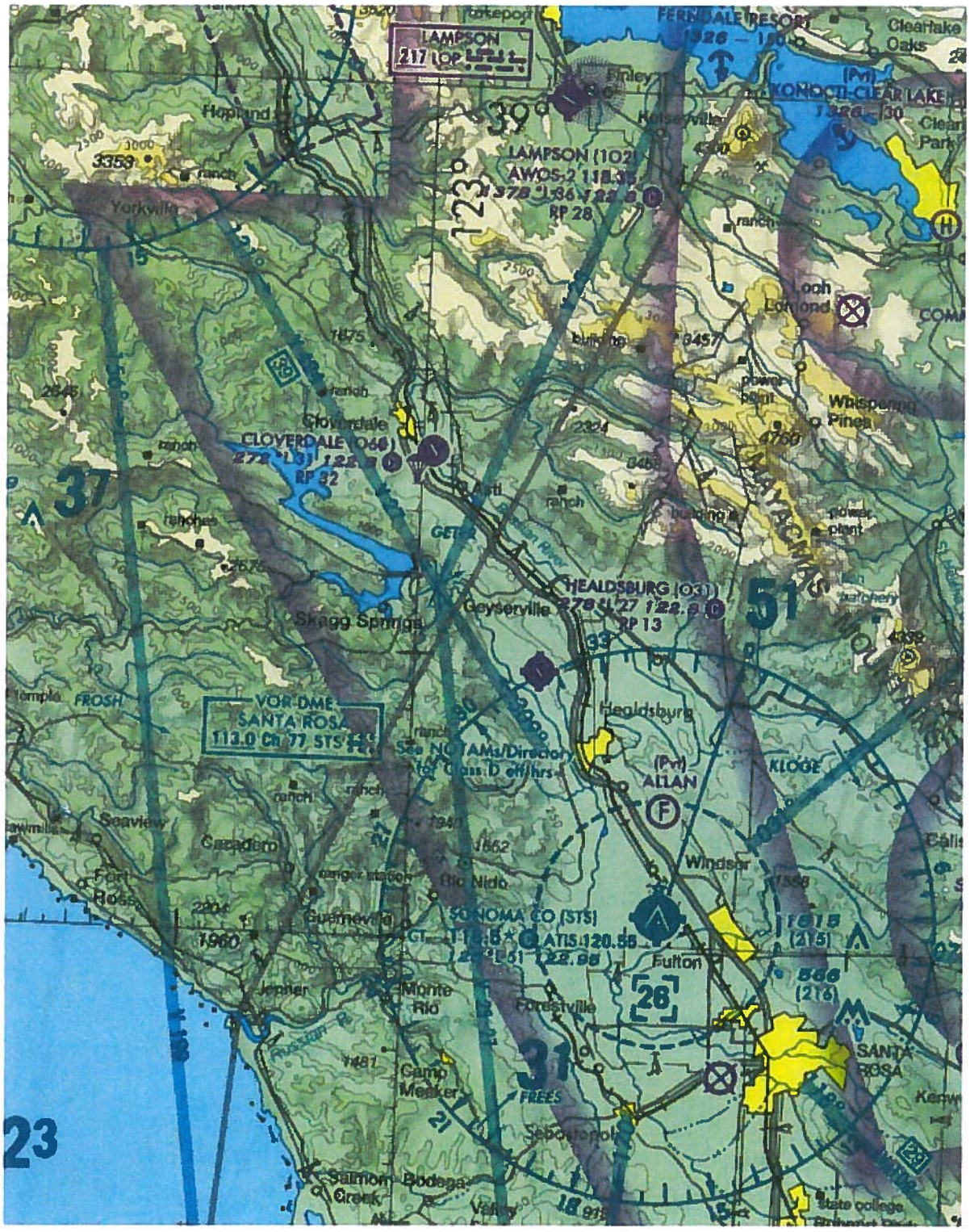
## Airspace/Navaids

Healdsburg Municipal Airport is not served directly by Victor airways that are used by lower altitude enroute traffic. However, the airport is less than 2 nautical miles abeam to the Victor 27 airway, using radials from the Santa Rosa VOR/DME. The Sonoma County Airport provides nearby weather and altimeter information that is helpful to pilots using Healdsburg Municipal Airport. See Exhibit 5.

There are no areas of restricted airspace that impact operations at the Healdsburg Municipal Airport. The Oakland Center has responsibility for control of instrument flight rules (IFR) aircraft in the area. As discussed previously, Healdsburg has no published non-precision GPS instrument approach.

An analysis of existing navaids serving Healdsburg Municipal Airport was undertaken to assess the capability of these facilities to adequately serve future air traffic operations. Currently, the Airport has no navigational facilities. An automated weather observation system (AWOS) is desirable for automatic weather reports since the airport does not have a tower or flight service station. Future lighting additions for the runway would include precision approach path indicators (PAPI) for Runway 13-31.

**Exhibit 5**
**Area Airspace**
**Healdsburg Municipal Airport**




Source: FAA San Francisco Sectional Aeronautical Chart.

# 5. AIRPORT PLANS

The Airport Plans represent the end-result of considering alternative configurations of facilities, particularly the establishment of navaids, the location and alignment of T-hangars, the aircraft parking aprons, and the construction of the runway and taxiway system. Incorporated in the Airport Plans are the recommended development items for the three major airport components: the airfield, the airport terminal area, and the access and parking system. Chapter 6, Implementation Plans, discusses the stage development program for these airport improvements, as well as their cost and the economic/financial impacts of undertaking their development.

The specific objectives of the Airport Plans are to provide:

- A safe airfield system with adequate runway length, strength, and clearances for A-I aircraft use.

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

- A flexible development plan with space and use relationships that will enhance service and provide user and community benefits.

- An economical plan that will provide suitable facilities and generate revenues necessary for proper operation, management and development of the airport.

The Airport Plans for the Healdsburg Municipal Airport have been prepared as follows:

- Airport Layout Plan
- Approach and Runway Protection Zone Drawing
- Terminal Area Drawing
- Stage Development Drawing (In Chapter 6)

The technical format has been prepared to meet FAA requirements for processing and approving final master plan drawings.

## Airport Layout Plan

The Airport Layout Plan depicts the airfield system. It includes the runways, taxiways, lighting, on-airport navaids, and the runway protection zones. See Exhibit 6.

The existing runway 13-31 is 2,692 feet long and 60 feet wide. The runway is adequate for small aircraft use, but does not have sufficient length to meet current FAA standards. A runway length of 3,130 feet is required, as discussed in the previous chapter of this master plan.

The deficiency of 438 feet in runway length can not be remedied on the existing site due to Lytton Springs Road at the northwest and vineyards to the southeast. A runway extension to the south would require the taking of agricultural land within the County which could be politically and environmentally unfeasible. The previous runway pavement to the northwest functions as a paved safety area. Plowed ground exists at the southeast end, which does not meet runway safety area standards. Safety will be enhanced by construction of an 80' wide by 60' long asphalt blast pad at

the southeast end. The remaining safety area width and length should be graded and compacted to 95% relative density, except for approximately 40 feet of length which is outside the airport.

The existing parallel taxiway serving Runway 13-31 is 25 feet wide and is located at a center to center distance from the runway of 150 feet, which is adequate for airports serving only "small" aircraft. Portions of the taxiway are narrow and closer to the runway. Some terminal facilities and hangars penetrate the object free areas; however the recent FAA grant will correct the situation. A new east side partial parallel taxiway will enhance safety by providing an additional east side exit and an additional crossing point to the west side terminal area.

Usually holding aprons are constructed at both ends of the runway to provide an area clear of taxiway traffic for aircraft to park while the "before-takeoff-check" is performed and IFR departure clearance is obtained. Holding aprons minimize delays to departing aircraft by providing bypass capability. The existing holding apron for runway 31 should be expanded for aircraft to remain clear of the hold line. There is no holding apron serving runway 13 due to limited space. A paved shoulder should be constructed north of the runway 13 east entrance taxiway to reduce foreign object debris caused by aircraft run-ups in the area along Lytton Springs Road.

The airfield lighting at Healdsburg consists of medium intensity runway edge lighting, some taxiway edge lights and a lighted windcone. There are no lighted runway exit signs or hold signs or a rotating beacon. Lighted signs and solar powered taxiway edge lights are needed to complete the lighting and signing program.

A precision approach path indicator (PAPI) should be installed at both ends of Runway 13-31 to provide improved visual descent guidance to pilots. Runway end identifier lights (REIL) should be installed on both ends of the runway to enhance a pilot's ability to identify the runway thresholds during darkness and low visibility. A rotating beacon should be installed adjacent to the new airport lighting vault.

The airport lighting constant current regulator is protected within a relatively new outdoor cabinet, yet all other lighting systems and controls are merely attached to the backside of a hangar in the east complex. A lighting vault cabinet should be constructed for the replacement and upgraded controls and system.

Table 18 indicates the runway separation standards for aircraft in approach categories A and B. Table 19 indicates design standards for runways serving aircraft in approach categories A and B for non-precision and visual runways. As discussed previously, existing runway 13-31 is a visual category A-I runway serving small aircraft only.

Table 20 identifies the runway setback requirements selected for use at the Healdsburg Municipal Airport. These requirements have been adjusted to properly accommodate the layout and development of the runway and taxiway system and adjacent aircraft parking and building areas. The criteria identified in Table 20 meet or exceed the FAA standards presented in the previous tables. Runway safety area requirements are indicated on the Airport Layout Plan. For Healdsburg Municipal Airport, the runway safety area (RSA) is centered on the runway and has a width of 120 feet. In this area, no object may penetrate the volume of space above this zone except for necessary lighting and frangible-mounted navaids.

The building setback line (BSL) defines the closest point to the runway that any building may be constructed. The minimum BSL is 225 feet each side of runway 13-31 and includes the runway protection zones. In practice, a building's height must also be considered before siting its location,

and the requirements of Federal Aviation Regulations Part 77 satisfied regarding obstructions to navigable airspace. The BSL is designed to not only meet BSL requirements, but also prevent buildings or permanent objects from being placed inside the ROFA (Runway Object Free Area) and RVZ (Runway Visibility Zone). Furthermore, the BSL is set back far enough to prevent aircraft operational aprons from being blocked by unintentional placement of structures.

**Table 18**
**Runway Separation Standards for Aircraft Approach Categories A & B**

| ITEM | AIRPLANE DESIGN GROUP | | | | |
|---|---|---|---|---|---|
| | I* | I | II | III | IV |
| Nonprecision Instrument and Visual Runway Centerline to: | | | | | |
| Parallel Runway Centerline | | Varies from 700' VFR up to 4300'+ IFR | | | |
| Hold Line** | **125'** | 200' | 200' | 200' | 250' |
| Taxiway/Taxilane Centerline** | **150'** | 225' | 240' | 300' | 400' |
| Aircraft Parking Area | **125'** | 200' | 250' | 400' | 500' |
| Precision Instrument Runway Centerline to: | | | | | |
| Parallel Runway Centerline | | Varies from 1000' up to 4300'+ | | | |
| Hold Line** | **175'** | 250' | 250' | 250' | 250' |
| Taxiway/Taxilane Centerline** | **200'** | 250' | 300' | 350' | 400' |
| Aircraft Parking Area | **400'** | 400' | 400' | 400' | 500' |

* Facilities for only small airplanes.

** No part of an aircraft (tail tip, 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 to these separation distances may be needed at higher elevations.

Note: Runway 13-31 serves Group I aircraft.

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

**Table 19**
**Nonprecision Instrument and Visual Runway Design Standards**
**For Aircraft Approach Categories A & B**

| ITEM | AIRPLANE DESIGN GROUP | | | | |
|---|---|---|---|---|---|
| | **I*** | I | II | III | IV |
| Runway Length | (Varies--See Aircraft Flight Manuals) | | | | |
| Runway Width | **60'** | 60' | 75' | 100' | 150' |
| Runway Shoulder Width | **10'** | 10' | 10' | 20' | 25' |
| Runway Blast Pad Width | **80'** | 80' | 95' | 130' | 200' |
| Runway Blast Pad Length | **60'** | 100' | 150' | 200' | 200' |
| Runway Safety Area Width | **120'** | 120' | 150' | 300' | 500' |
| Runway Safety Area Length Beyond RW End** | **240'** | 240' | 300' | 600' | 1,000' |
| Runway Object Free Area Width | **250'** | 400' | 500' | 800' | 800' |
| Runway Object Free Area Length Beyond RW End** | **300'** | 500' | 600' | 1,000' | 1,000' |
| Runway Obstacle Free Zone Width and Length | (length = runway length + 400'; width varies from 120' to 400') | | | | |

*Facilities for only small airplanes.

** The runway safety area and runway object free area lengths begin at each runway end. With the declared distance concept, these lengths begin at the stop end of each ASDA and both ends of each LDA, whichever is greater.

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

The runway obstacle free area (ROFA) is shown. The following table summarizes the setback requirements for the runways.

**Table 20**
**Runway Setback Requirements**
**Healdsburg Municipal Airport**

| Runway | Lateral Distance from Runway CL BSL | RSA | ROFA |
|---|---|---|---|
| 13-31 | 225' | 60' | 125' |

Source: Wadell Engineering Corporation

The Airport Layout Drawing shows the future fencing program necessary for proper operations of the airport. The purpose of a properly prepared fencing program is to minimize hazards to pedestrians and ground vehicles by separating them from aircraft as a safety measure. Furthermore, fencing allows for better definition of airport property and areas under lease to airport tenants. The fencing as shown on the layout drawings generally reflects perimeter fencing of the airport property, but also identifies fencing necessary in the terminal areas to separate aeronautical from ground base activities. In addition, fencing should be provided to keep out non-airport activities unless a suitable lease agreement and ingress/egress permit is established. A recent fencing project provided for new access control gates and terminal area fencing. Additional fencing to complete the security plan for the airport is shown on the plan.

## Approach and Runway Protection Zone Drawing

An Approach and Runway Protection Zone Drawing was prepared for the Healdsburg Municipal Airport (see Exhibit 7). This supplements the Airport Layout Plan 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 the runways and adjacent airspace. The drawing was prepared using criteria contained in Federal Aviation Regulations, Part 77, "Objects Affecting Navigable Airspace."

Tables 21 and 22 present FAA standards for approach surface dimensions and runway protection zone dimensions.

At Healdsburg, the FAR Part 77 dimensional standards applied for runway 13-31 are those relating to "visual" runways serving small aircraft.

The Airspace Protection Plan shows imaginary primary, approach, transitional, horizontal, and conical surfaces. The primary surfaces surround the runways and extend 200 feet beyond the thresholds. The width of the primary surface is 250 feet for Runway 13-31. The elevation of the primary surface is the same as the runway centerline.

The approach surfaces rise from the ends of the primary surfaces. The slope of the surface for runway 13-31 is 20:1 with a length of 5,000 feet. The approach surface flares from an inner width equal to the primary surface to an outer width equal to 1,250 feet.

## Table 21
## Approach Surface Dimensions

| ITEM | RUNWAY END | | APPROACH SURFACE DIMENSIONS | | | |
|---|---|---|---|---|---|---|
| Airports Serving: | Approach End | Opposite End | Surface Length | Inner Width | Outer Width | Slope (H/V) |
| **Small Airplanes Only** | **Visual** | **V** | **5,000'** | **250'** | **1,250'** | **20:1** |
| | | NP | 5,000' | 500' | 1,250' | 20:1 |
| | | NP 3/4 or P | 5,000' | 1,000' | 1,250' | 20:1 |
| | Non-Precision | V or NP | 5,000' | 500' | 2,000' | 20:1 |
| | | NP 3/4 or P | 5,000' | 1,000' | 2,000' | 20:1 |
| Large Airplanes | Visual | V or NP | 5,000' | 500' | 1,500' | 20:1 |
| | | NP 3/4 or P | 5,000' | 1,000' | 1,500' | 20:1 |
| | Non-Precision | V or NP | 10,000' | 500' | 3,500' | 34:1 |
| | | NP 3/4 or P | 10,000' | 1,000' | 3,500' | 34:1 |
| Large or Only Small Airplanes | Non-Precision 3/4 | V or NP | 10,000' | 1,000' | 4,000' | 34:1 |
| | | NP 3/4 or P | 10,000' | 1,000' | 4,000' | 34:1 |
| | Precision | V or NP | 10,000' | 1,000' | 4,000' | 50:1 |
| | | NP 3/4 or P | 50,000' | 1,000' | 16,000' | 50:1/40:1 |

Legend:

V = Visual Approach
NP = Nonprecision instrument approach with visibility minimums more than 3/4 statute mile
NP 3/4 = Nonprecision instrument approach with visibility minimums as low as 3/4 statute mile
P = Precision instrument approach

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

## Table 22
## Runway Protection Zone (RPZ) Dimensions

| ITEM | RUNWAY END | | DIMENSIONS FOR APPROACH END | | | |
|---|---|---|---|---|---|---|
| Airports Serving: | Approach End | Opposite End | Zone Length | Inner Width | Outer Width | RPZ (acres) |
| **Small Airplanes Only** | **Visual** | **V** | **1,000'** | **250'** | **450'** | **8.035** |
| | | NP | 1,000' | 500' | 650' | 13.200 |
| | | NP 3/4 or P | 1,000' | 1,000' | 1,050' | 23.542 |
| | Non-Precision | V or NP | 1,000' | 500' | 800' | 13.922 |
| | | NP 3/4 or P | 1,000' | 1,000' | 1,200' | 25.252 |
| Large Airplanes | Visual | V or NP | 1,000' | 500' | 700' | 13.770 |
| | | NP 3/4 or P | 1,000' | 1,000' | 1,100' | 24.105 |
| | Non-Precision | V or NP | 1,700' | 500' | 1,010' | 29.465 |
| | | NP 3/4 or P | 1,700' | 1,000' | 1,425' | 47.310 |
| Large or Only Small Airplanes | Non-Precision 3/4 | V or NP | 1,700' | 1,000' | 1,510' | 48.978 |
| | | NP 3/4 or P | 1,700' | 1,000' | 1,510' | 48.978 |
| | Precision | V or NP | 2,500' | 1,000' | 1,750' | 78.913 |
| | | NP 3/4 or P | 2,500' | 1,000' | 1,750' | 78.913 |

Legend:

V = Visual Approach
NP = Nonprecision instrument approach with visibility minimums more than 3/4 statute mile
NP 3/4 = Nonprecision instrument approach with visibility minimums as low as 3/4 statute mile
P = Precision instrument approach

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

The transitional surfaces are sloped at 7:1 from the primary surfaces and approaches 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 runway 13-31. 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 this airport.

The Approach and Runway Protection Zone Drawing indicates that most of the terrain surrounding the airport is sufficiently low so that it does not penetrate the imaginary surfaces, except north of the airport where there are penetrations to the horizontal and conical surfaces due to rising terrain.

## Terminal Area Drawing

The Terminal Area Plan, see Exhibit 8, was prepared after completion of the Forecast, Demand/Capacity Analysis, and Facility Requirements section of this report. The plan was developed simultaneously with the Airport Layout Plan to assure workability within the total plan, as well as appropriate integration in the staging process. An effort was made to achieve balance between operating convenience and efficiency with facility cost.

The terminal area includes the aircraft parking aprons, T-hangar areas, FBO areas, terminal building, fueling facilities, and other aviation-related facilities and services. Some considerations in development of the terminal plan are:

- Proper use of existing facilities
- Proximity of utilities
- Auto access and circulation
- Impacts on surrounding land uses
- Operating efficiencies and safety
- Development costs
- Business viability
- Passenger convenience and comfort
- Aircraft operational requirements
- Flexibility for future change

The terminal area facilities are on both the west and east sides of the runway toward the north end of the airport. Entrances to both areas are via Lytton Springs Road. There is no internal access for autos.

The existing west side terminal area offers too much apron parking and not enough hangars. The existing west side terminal area apron provides 20 tiedown spaces. The east side parking is available to transient aircraft and those aircraft visiting the maintenance shops. The existing 16 east side aircraft tiedown spaces are adequate to serve the existing and future terminal and maintenance activities.

There are 50 hangars for aircraft storage; however 4 old city-owned hangars will be removed to provide taxiway clearance standards along the west parallel taxiway. Two new hangars will be constructed where the four were removed. The master plan shows spaces for more hangars with taxiway extensions. Hangar parking is the most suitable type for Healdsburg due to the very hot summer and cold winter temperatures.

An aircraft wash rack is planned adjacent to the new lighting vault and east of the existing paint shop. The concrete wash rack will be used for based aircraft owners to wash their aircraft.

In the east terminal area there is a city owned terminal building with lobby, restrooms and offices. The terminal is adequate for current and forecast use, but is in need of renovation. Additional east

side buildings include three maintenance hangars. Two of these hangars are used mostly for non-aviation purposes, although the businesses offer aircraft upholstery and aircraft welding among other services. These two hangars offer an attractive location that can foster new aviation businesses and activity. The city should phase out non-aviation uses and seek tenants such as avionics shops, aircraft interiors and engine overhauls / repairs. The FAA requires that the airport facilities be used for aviation purposes.

The primary FBO building toward the south end functions as a maintenance hangar and office. It is not adequate since more maintenance hangar space is needed due to the popularity of the business with customers. A new 60' by 80' hangar is illustrated to satisfy this expansion need. This will provide for a secure location without the need for additional auto access and roads. The site is occupied with a septic tank leach line, which would need to be relocated.

The new Terminal Area Drawing provides a concept to improve the terminal area layout and utilization. This will be achieved by additional hangar development to the east and west and re-allocation of outside apron parking to hangar uses.

The Healdsburg Municipal Airport has off-site fire protection by the city fire department. A single 10,000 gallon tank located adjacent to the terminal is the sole source of water on the west side of the airport. Because the tank has no fill system and lacks any fill gauge, it is considered unreliable. In addition, the capacity is currently far below the required fire flow for the terminal area and not adequate throughout the planning period. A fire protection water storage tank, fire mains, laterals and hydrants should be installed and extended along the west and east terminal area and flight line. There are no current plans to extend city water mains to the airport.

Since no air carrier activities are expected, it is not required that the City provide an aircraft rescue and fire fighting facility (ARFF).

## Access Plan

Excellent access to the Healdsburg Municipal Airport is available directly from the freeway and the along Lytton Springs Road. See Exhibit 9. The west and east entrances to the airport are off Lytton Springs Road. However internal airport access is not possible since the runway pavements terminate near the northerly fence line. Vehicles are not allowed to cross the runway.

A recent project provided secure card activated electric access gates serving both west and east terminals. Only authorized parties will have access. Additionally, an access card is required to exit the airport, thereby discouraging tail-gating and runway crossings.

Auto parking space is limited due to land constraints. The forecast need for future auto parking totals 25 spaces. Near the terminal building there are nine marked spaces for autos. The terminal plan provides for remarking to increase available spaces. Since the parking is short term only, the reduced setback to existing avgas unloading should not be a problem. In the west terminal area aircraft owners should be allowed to park their vehicles inside their hangars to provide convenient access, allow security for their parked vehicles while out of town, and to reduce the need to construct internal parking areas. This parking must not block taxilanes or object free areas.

**Exhibit 9**
**Access Plan**
**Healdsburg Municipal Airport**


Source: MapQuest.

## Land Use Plan

Land use planning, both on and off the airport, is essential for establishing appropriate development areas on the airport and determining suitable and compatible uses for off-airport land development. A land use plan provides goals and objectives relating to protection and utilization of the land resources, development consistent with the needs and service levels of the community, and constraints to development based upon the local conditions. General adherence to land use plans, their goals, and their objectives will permit the orderly development of the airport and the surrounding area.

## On-Airport

Identifying existing and recommended land uses within the ultimate airport boundary is necessary to provide the adequate control and management of the airport facility. The future land uses depicted in an on-airport land use plan are developed through analysis of the specific aviation needs of the airport. The development of land use plans for an airport can ensure the compatibility among the airport users and the efficient development of airport property. An on-airport land use plan is intended to serve as a broad guideline to assist in fulfilling the primary aviation needs of the airport. As future needs arise, an airport can apply the provisions of the master plan and its land use plan to each phase of development. If necessary, consideration should be given to determine the need to revise the master plan and land use plan as more information regarding actual airport use becomes available.

For the purposes of the Healdsburg Municipal Airport Master Plan, several on-airport land use designations have been defined. These land use categories include the following:

- Airfield: Runways, taxiways, runway protection zones, approach areas, and land within the building restriction lines.

- General Aviation Commercial: Fixed based operator (FBO) facilities involving the sale of general aviation products and services to the general public and limited service commercial facilities, such as avionics sales and repair shops, aircraft paint shops and aircraft maintenance facilities.

- General Aviation Non-Commercial: Facilities for the basing and servicing of aircraft owned by individuals or organizations. To be used solely for the benefit of the private aircraft owner.

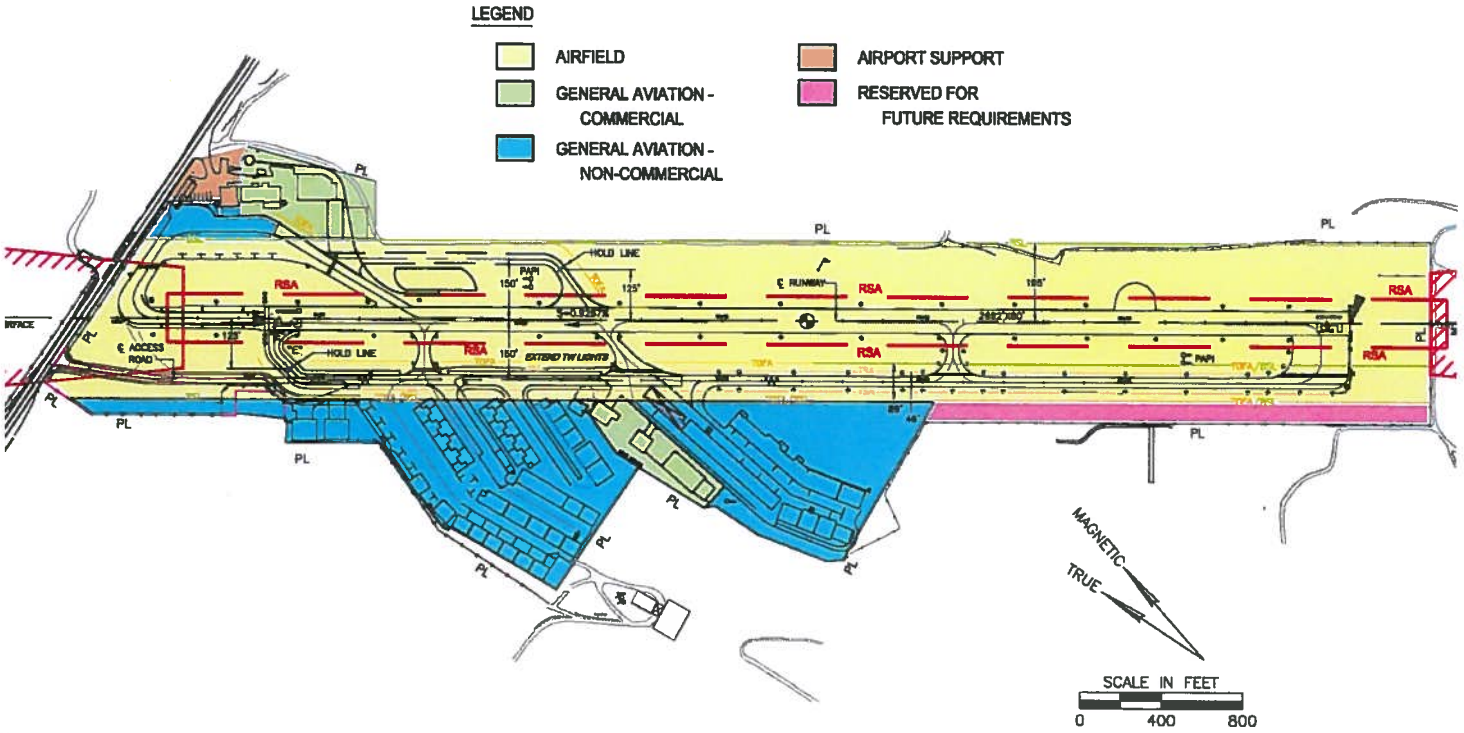
- Airport Support: Facilities that provide airport-related services, such as airport administration, airport maintenance, aviation fuel facilities, pilot lounge and general services facilities, and aircraft rescue and fire-fighting facilities (ARFF).

- Reserved for Future Requirements: Land that may possibly not be required within the master planning time frame, but should be reserved for potential long-range development of airfield, general aviation, or airport support facilities.

- Future Acquisition: Land that should be acquired to protect the ultimate capacity of the airport site, including existing out parcels and large areas for future airport expansion and approach protection.

The on-airport land uses depicted on Exhibit 10 are based upon the descriptions as presented above. The property shown is owned by the City of Healdsburg. The designated land uses and their locations are intended to be a broad guideline for future airport development based upon the forecast needs as developed in this Master Plan. Because airport needs can change dramatically over time, this land use plan should be used as a guideline and, if warranted by changes in the aviation demand and character, should be modified to reflect the ongoing needs of the airport.

**Exhibit 10**
**On-Airport Land Use Plan**
**Healdsburg Municipal Airport**




Source: Wadell Engineering Corporation.

The City of Healdsburg zoning for the airport property is "P", Public District. While various uses are allowed, the FAA grant obligations and assurances require that only aviation uses and aviation businesses be allowed. The airport has adequate land to meet needs through the 20 year planning horizon. The city has avigation easements in both runway approaches which meet the minimum requirements of the FAA for controlling land in the runway protection zones. No additional acquisitions are required.

## Off-Airport

The basic responsibility for off-airport land use planning is with the City of Healdsburg and Sonoma County. The county zoning near the airport is agricultural / resource. Rural residential zoning is ¼ mile southeast. Both are considered compatible with airport activities. The county Airport Land Use Commission has jurisdiction over review of aviation compatibility for proposed developments in the airport environs.

The objective of off-airport land use planning is to guide safe, compatible land uses around airports.

Aviation-related factors to be considered and evaluated when planning land uses or redeveloping lands adjacent to airports include:

- Aviation noise and its effects on people.
- Safety of persons on the ground.
- Safety of pilots.

Many forms of urban development can cause conflict with aircraft operations. Airspace obstructions such as buildings and transmission lines can significantly decrease airport safety and capacity. Electrical interference can restrict the use of communications and navigation equipment. Offsite lighting can make it difficult for pilots to distinguish between airport lights and others. Developments such as garbage dumps, sewage lagoons, and certain vegetation, which attract birds, can create bird-strike hazards. In addition, smoke, odors, and intensive noise each have separate and negative impacts on airport operations. The accumulation of these and other factors can reduce and sometimes eliminate the usefulness of an airport.

Since an airport can attract a variety of land uses, planning for the airport environment attempts to encourage activities best able to take advantage of a location near an airport. This involves two approaches: (1) the prohibition of uses negatively related to the airport, and (2) the encouragement of uses benefited by an airport location. Those uses most attracted to the airport are generally those least bothered by noise and other annoyances. The presence of these attracted uses acts as a buffer to uses, which are negatively affected. Compatible land uses near airports typically have one or more of the following characteristics: they are (1) land uses involving few people, such as natural or open areas, (2) uses which are noisy, such as industries, (3) indoor uses, especially commercial and industrial use, which can be protected from noise by sound reduction construction, and (4) airport-related uses.

The area affected by airport operations is normally termed the airport's "environs." Generally, aircraft noise is the principal consideration in determining an airport's area of influence, but other factors such as safety of pilots and persons on the ground, local circulation systems, area development plans, and terrain are often included in the formulation of the influence area. Within the airport environs, planning and zoning authority provide the ability to preserve opportunities for

airport development and minimize off-airport land use incompatibility. With a clear policy established regarding land use in proximity to an airport and with the regulatory mechanisms to assure implementation of that policy, off-airport development decisions can be made easily and rapidly. Unfortunately, the importance of this approach is often misunderstood or disregarded.

The key element of the Healdsburg Municipal Airport Master Plan affecting land use decisions in the airport environs is the relatively minor increase in aviation activity. Since there will be no significant changes in the runway length or operational capability, protective airspace surfaces and safety areas remain relatively unchanged. The City should continue efforts to acquire avigation easements at the runway ends.

## Land Use Control Strategies

Local land use plans, ordinances and policies are the principal means for ensuring land use compatibility in the vicinity of an airport. Various land use control strategies that can be used in the Healdsburg Municipal Airport environs are described below.

The City can act to discourage adverse noise and safety conditions from occurring in the airport environs, and to protect the airport from encroachment by incompatible land uses through the adoption of this master plan, incorporation in the Healdsburg General Plan, and submittal to Sonoma County for airport land use and zoning protection. The Sonoma County Airport Land Use Commission (ALUC) is the primary agency for ensuring compatible land use around airports within the county. Developments in the airport environs must be submitted to the ALUC for review. Decisions of the ALUC are subject to an override vote by the City Council. It is unlikely that the city would support new development that is adverse to the city owned airport.

In addition to considering potential aircraft noise impacts, the City can also adopt specific airport safety, height, and obstruction clearance criteria. These standards are set forth in Federal Aviation Regulations, Part 77. The City has adopted airport approach zoning ordinances, which regulate and restrict the height of structures and objects, and regulate the use of airspace in the vicinity of the airport. No additional ordinances will be needed for the new airport master plan.

The Policy and Implementation section of the Healdsburg General Plan needs to be amended to reference the Airport Master Plan as this document is the guiding plan for airport improvements and land use regulations and transportations policies.

## Aircraft Noise

A major potential conflict between continued airport use and off-airport development centers on noise impact. The FAA's Integrated Noise Model (INM), Version 6.1 was used to perform calculations and produce contours of equal noise exposure for this study. Noise exposure maps for 2005 operational conditions and 2025 forecast conditions are set forth below.

Key variables in the noise modeling effort included existing and forecast aircraft activity levels, aircraft types, time of day of operations, flight tracks, and flight procedures in use, among others. Data describing these variables was arranged and input to the computer model to produce contours of equal cumulative noise levels expressed in CNEL metric. CNEL is a methodology specified in the FAA Airport Noise Standards and used in California. CNEL adds an additional 10dB penalty during nighttime hours to account for increased annoyance.

Operational information on current 2005 activity was estimated during 2004, since actual counts do not exist. Forecast activity levels for the year 2025 were derived from this master planning process. Table 23 sets forth average day aircraft operations by aircraft classes used in noise modeling assumptions for 2005 and 2025. As can be seen from Table 23, average day aircraft operations are forecast to increase by almost 30 percent between 2005 and 2025. Forecast noise contours for the year 2025 represent these increased operations as well as anticipated minor changes in the aircraft fleet mix using the airport.

CNEL noise contours for current conditions (2005) and future conditions (2025) were calculated. Exhibit 11 shows the current 2005 CNEL situation while Exhibit 12 shows the future. There are no incompatible land uses within even the 60 contour, since critical noise is within the airport property. Therefore, aircraft noise adjacent to the Healdsburg Municipal Airport is not expected to exceed typical noise and land use planning criteria, as demonstrated by the INM noise contours. However, it is reported that neighbors in the vicinity are disturbed by noise from various aviation activities, including Healdsburg Municipal Airport traffic and enroute traffic from other airports.

Compatibility enhancement measures can be taken to reduce noise from aircraft operating from the Healdsburg Municipal Airport. These measures include adding noise abatement instructions to the planned AWOS transmitter, and directing the new airport manager to monitor activity at the airport and to work with local pilots and neighbors to establish noise reduction procedures.

**Table 23**
**Average Day Operations By Aircraft Class**
**Healdsburg Municipal Airport**

| | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|
| Daily Aircraft Operations: | | | | | |
| (Days per year) | 365 | 365 | 365 | 365 | 365 |
| By Type of Operation | | | | | |
| Local | 18.1 | 19.6 | 21.0 | 22.2 | 23.3 |
| Itinerant | 33.7 | 36.3 | 39.0 | 41.1 | 43.3 |
| Total | 51.8 | 55.9 | 60.0 | 63.3 | 66.6 |
| By Type of Aircraft | | | | | |
| Single-engine prop. | 47.5 | 51.5 | 55.4 | 56.7 | 58.9 |
| Multi-engine prop. | 1.9 | 2.0 | 2.0 | 2.8 | 2.9 |
| Helicopter | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 |
| Turboprop | 2.1 | 2.1 | 2.2 | 3.1 | 3.2 |
| Turbine | 0.0 | 0.0 | 0.0 | 0.3 | 1.2 |
| Total | 51.8 | 55.9 | 60.0 | 63.3 | 66.6 |
| By Type of User | | | | | |
| Air Taxi/Commuter | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Military | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| General Aviation | 51.8 | 55.9 | 60.0 | 63.3 | 66.6 |
| Total | 51.8 | 55.9 | 60.0 | 63.3 | 66.6 |

Source: Wadell Engineering Corporation

Table 24 shows general land use designations along with guidelines on compatibility with specific aircraft noise levels. The designations contained in this table do not constitute a determination that any use of land covered by the table is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. Land uses determined to be appropriate by local authorities in response to locally determined needs and values may be inconsistent with the guidelines in this table.

Federal Aviation Regulations (Part 150) establish a CNEL of 65 dBA as the maximum acceptable noise exposure for residential land uses. This criterion is set primarily with regard to air carrier airports in urban locations. For typical general aviation airports and less noisy suburban or rural settings, a 60 CNEL standard is sometimes used by local authorities. At the Healdsburg Municipal Airport the existing and future 65 CNEL contours are within the airport property.

**Table 24**
**Land Use Compatibility Guidelines**

| Land Use | Below CNEL 65 | CNEL 65-70 | CNEL 70-75 | CNEL 75-80 | CNEL 80-85 | Over CNEL 85 |
|---|---|---|---|---|---|---|
| **Residential** | | | | | | |
| Residential, other than mobile homes and transient lodgings | Y | N(1) | N(1) | N | N | N |
| Mobile home parks | Y | N | N | N | N | N |
| Transient lodgings | Y | N(1) | N(1) | N(1) | N | N |
| **Public Use** | | | | | | |
| Schools | Y | N(1) | N(1) | N | N | N |
| Hospitals and nursing homes | Y | 25 | 30 | N | N | N |
| Churches, auditoriums, and concert halls | Y | 25 | 30 | N | N | N |
| Government services | Y | Y | 25 | 30 | N | N |
| Transportation | Y | Y | Y(2) | Y(3) | Y(4) | Y(4) |
| Parking | Y | Y | Y(2) | Y(3) | Y(4) | N |
| **Commercial Use** | | | | | | |
| Offices, business and professional | Y | Y | 25 | 30 | N | N |
| Wholesale and retail--building materials, hardware and farm equipment | Y | Y | Y(2) | Y(3) | Y(4) | N |
| Retail trade--general | Y | Y | 25 | 30 | N | N |
| Utilities | Y | Y | Y(2) | Y(3) | Y(4) | N |
| Communication | Y | Y | 25 | 30 | N | N |
| **Manufacturing and Production** | | | | | | |
| Manufacturing, general | Y | Y | Y(2) | Y(3) | Y(4) | N |
| Photographic and optical | Y | Y | 25 | 30 | N | N |
| Agriculture (except livestock) and forestry | Y | Y(6) | Y(7) | Y(8) | Y(8) | Y(8) |
| Livestock farming and breeding | Y | Y(6) | Y(7) | N | N | N |
| Mining and fishing, resource production and extraction | Y | Y | Y | Y | Y | Y |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Recreational** | | | | | | |
| Outdoor sports arenas and spectator sports | Y | Y(5) | Y(5) | N | N | N |
| Outdoor music shells, amphitheaters | Y | N | N | N | N | N |
| Nature exhibits and zoos | Y | Y | N | N | N | N |
| Amusements, parks, resorts and camps | Y | Y | Y | N | N | N |
| Golf courses, riding stables and water recreation | Y | Y | 25 | 30 | N | N |

LEGEND

CNEL = Community Noise Equivalent Level (Used in California)

Y (Yes) = Land Use and related structures compatible without restrictions

N (No) = Land Use and related structures are not compatible and should be prohibited

NLR = Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

25, 30, or 35 = Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.

Notes for Land Use Compatibility Guidelines Table 24:

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR or 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2)Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3)Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4)Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(5)Land use compatible provided special sound reinforcement systems are installed.

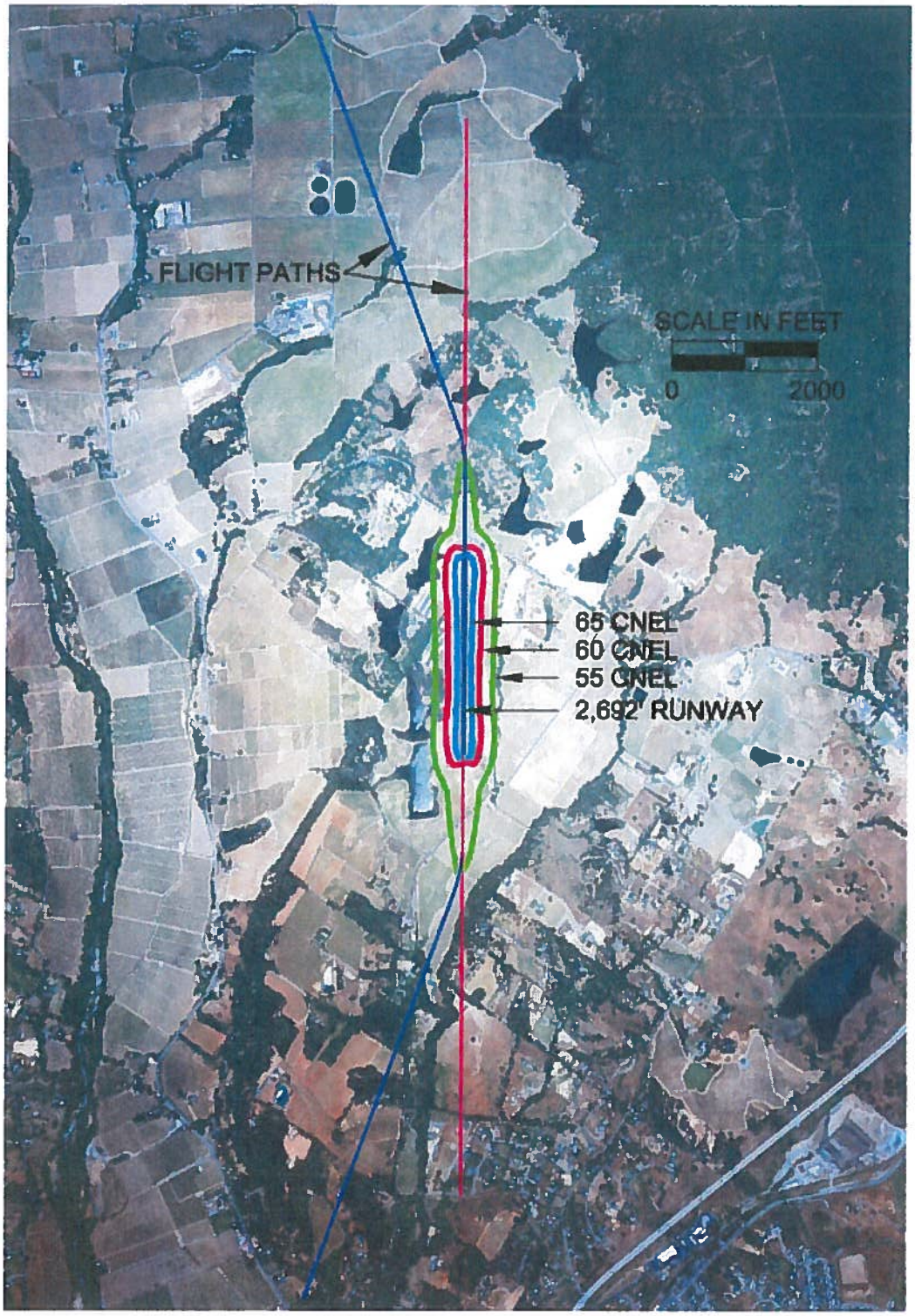
(6)Residential buildings require an NLR of 25.

(7)Residential buildings require an NLR of 30.

(8)Residential buildings not permitted.

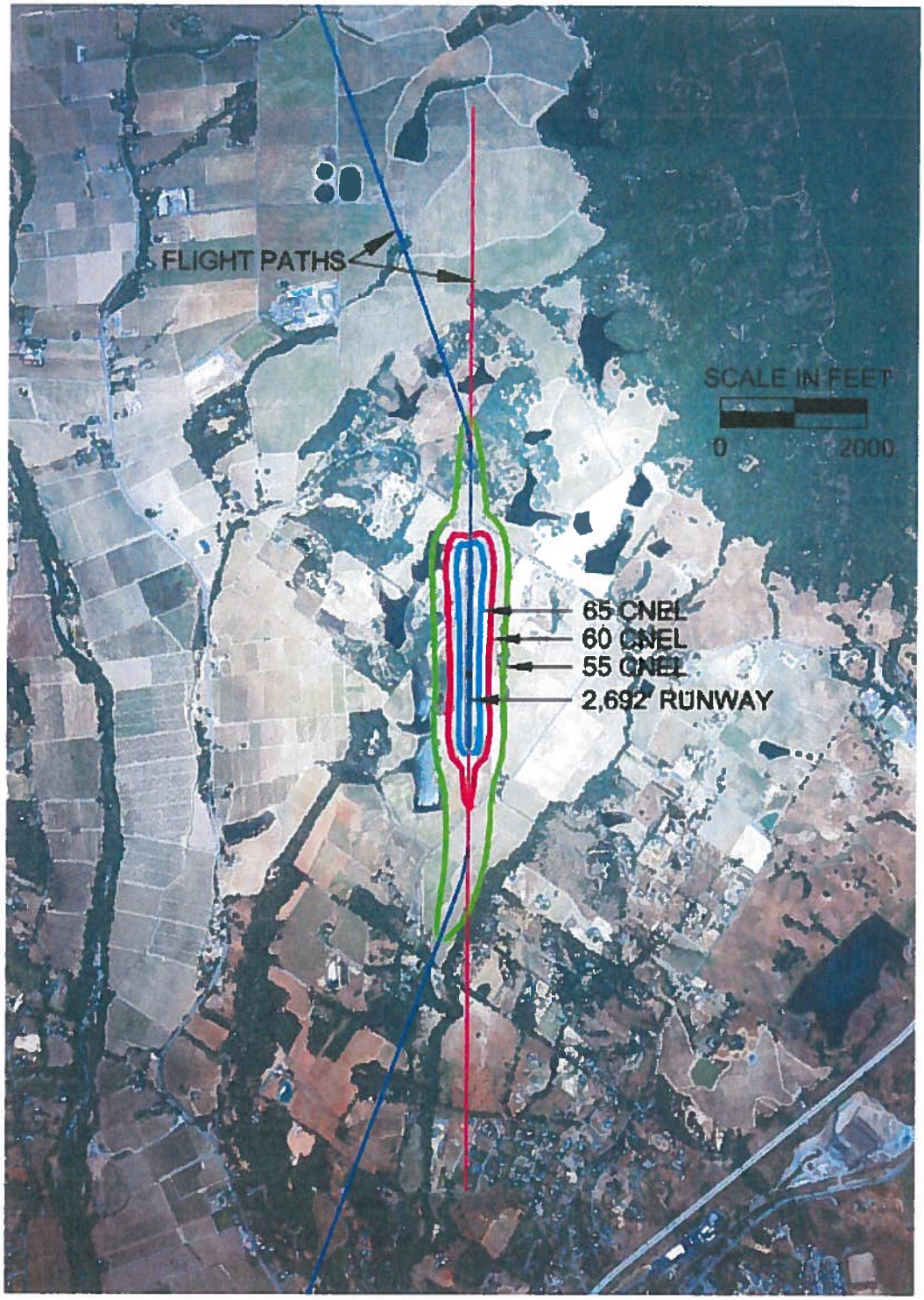
Source: Wadell Engineering Corporation, based on FAA Regulations Part 150, "Airport Noise Compatibility Planning," Revised January 18, 1985.

**Exhibit 11**
**Current Noise Contours**
**Healdsburg Municipal Airport**




Source: Wadell Engineering Corporation

**Exhibit 12**
**Future Noise Contours**
**Healdsburg Municipal Airport**




Source: Wadell Engineering Corporation

## Safety

In addition to the airport noise as a consideration in planning compatible land uses, it is important to consider safety from two different perspectives: people who may live or work in the area around the airport and pilot/aircraft safety.

The proposed Airport Master Plan does not propose any major capital development measure that could negatively affect safety and off-airport land use, since there are no major changes to the runway or airspace. The provision of an additional parallel taxiway, a new runway 31 blast pad and PAPI serving both runway ends will enhance safety for pilots.

## Land Use and Recommended Changes

Land in the airport environs is controlled by Sonoma County. There are no increased land use incompatibilities expected by implementing this master plan.

It should also be noted that City of Healdsburg does not have an Airport Land Use Commission (ALUC), which is the usual vehicle for reconciling the overlapping interests of government agencies regarding land use. Sonoma County has the ALUC and has prepared the Healdsburg Municipal Airport Land Use Plan (ALUP). The City and County should coordinate any land use changes in the airport vicinity.

In the accomplishment of the above, this Master Plan recommends that no land in the very immediate airport vicinity be designated or zoned for incompatible uses such as residences, schools, hospitals, and the like.

It is recommended that the City of Healdsburg:

- Incorporate this Airport Master Plan, by reference, into the Healdsburg General Plan and amend the policy and implementation section of the general plan to reference this airport plan as the guiding plan for airport improvements and land use regulations. The airport related portions of the Transportation Element (Goal F) should be updated to reflect this Airport Master Plan.

- Use the 2025 Noise Contours as the basis for assessing the compatibility of proposed noise sensitive development in the airport environs.

- Retain the existing "airport environs" definition in the County of Sonoma Airport Land Use Plan.

# 6. IMPLEMENTATION PLANS

The Implementation Plans chapter contains information concerning the capital improvement program, the financial program, and the implementation schedule. The Implementation Plans are prepared based upon (1) the facilities required to accommodate forecast demand, and (2) the development of those facilities as discussed in Chapter 5, Airport Plans.

## Capital Improvement Program

The Capital Improvement Program is comprised of (1) stages of development, and (2) cost estimates of improvements proposed in this Master Plan study. The 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

Recent projects under completion during finalization of the master plan include (1) access road modifications, (2) parallel taxiway and runway safety area grading, drainage and taxiway paving, (3) west terminal area grading and drainage, with hangar taxiway paving, (4) airfield lighting vault with runway and taxiway edge lighting modifications and airfield signing, (5) precision approach path indicators (PAPI) and runway end identifier lights (REIL), and (6) segmented circle reconstruction. Since these projects are considered "underway and funded", they are not included in the future capital improvement program.

### Stage I

The objectives of the first stage of development, 0-5 years, are (1) runway 31 blast pad and runup area construction and extended safety area grading, (2) construction of 10 city owned T-hangars, (3) construction of perimeter fencing and gates (Phase 2), (4) terminal building renovations, (5) east auto parking area seal coat and marking, (6) fire protection system, (7) concrete aircraft wash rack, (8) automatic weather observation system (AWOS), (9) east apron expansion & hangar site preparation with septic relocation, and (10) a GPS approach procedure.

### Stage II

The second stage of development, 6-10 years, focuses on (1) the east side parallel taxiway extension, and (2) eight additional city owned aircraft T-hangars.

### Stage III

The third stage of development, 11-20 years, includes pavement maintenance and marking projects to protect the investment in the airport and enhance safety, such as (1) runway & taxiway pavement overlay and marking, (2) apron pavement overlay and marking, (3) hangar taxiway pavement overlay and marking, and (4) five additional city owned aircraft hangars.

The capital improvement program is depicted on Exhibit 13, Stage Development Drawing.

## Cost Estimates

The following Capital Improvement Program Cost Summary, Table 25, indicates the total costs and expected funding sources for each stage of development for the airport. Table 26 identifies specific projects within each time frame. Order of magnitude costs are indicated for planning purposes only. The project costs are separated as to FAA share and local share. The FAA portion is based on 95 percent funding. Recent legislation provides that FAA funds may be expended for hangars, fueling systems, and utilities serving eligible facilities. Non-eligible facilities include private business facilities such as FBO hangars and terminal renovation. All eligibility is subject to FAA review and the outcome of future legislation.

Definitions of capacity in planning manuals incorporate a reasonable amount of maximum delay. The timing of development indicated provides airfield development benefits commensurate with costs. Each improvement is timed with respect to safety to users and with the goal of commencing facility development, preferably two to three years before demand exceeds capacity or before delayed maintenance or reconstruction results in undue deterioration of paving and lighting systems. Construction prior to the operational dates may occur depending upon the availability of funds, changes in demand, and other opportunities.

All construction costs are based on 2005-dollar values. Quantities are for minimum acquisition and improvements necessary to provide acceptable facilities to meet forecast demands. For planning purposes, the multipliers presented below may be applied to estimate future construction costs, although the future economy cannot be exactly projected. These escalations are based on an extrapolated average annual increase at 5 percent compound interest.

Range in Multiplier of 2005 Costs

| | |
|---|---|
| 2005-2010 | 1.00 to 1.28 |
| 2011-2015 | 1.34 to 1.63 |
| 2016-2020 | 1.71 to 2.08 |
| 2021-2025 | 2.18 to 2.65 |

There are many uncertainties with respect to forecasting costs, especially in long-range plans. The airport owner should incorporate adequate contingencies to cover changes in costs, sophistication of equipment, environmental protection requirements, and special studies or programs. Cost estimates are order of magnitude costs for planning and programming purposes only. Detailed topographic mapping, soil investigations, and field investigation during the design process will result in more accurate estimates of future development costs.

Grant applications should be made for development of portions of the improvement program to complete specific sub-areas of the airport. Improvement programs must be realistic and comply with FAA and local funding limitations; therefore, some projects may have to shift to subsequent time periods, if funding is not available.

## Table 25
## Capital Improvement Program Cost Summary
## Healdsburg Municipal Airport
## (In 2005 $)

| | |
|---|---|
| Stage 1 (2006-2010) | $1,533,000 |
| Stage 2 (2011-2015) | $415,000 |
| Stage 3 (2016-2025) | $1,109,500 |
| Total | $3,057,500 |
| | |
| FAA Funds | $2,852,375 |
| State Funds | $142,619 |
| Local Funds | $62,506 |
| Total | $3,057,500 |

Source: Wadell Engineering Corporation

## Table 26
## Capital Improvement Program Cost Estimates
## Healdsburg Municipal Airport Development
## (In 2005 $)

| PROJECT | YEAR | STAGE / PROJECT DESCRIPTION | TOTAL COSTS | FAA SHARE | STATE SHARE | LOCAL SHARE |
|---|---|---|---|---|---|---|
| | | **STAGE 1:** | | | | |
| 1 | 2006 | PAVED BLAST PAD WITH RSA GRADING & RUNUP AREA | $35,500 | $33,725 | $1,686 | $89 |
| 2 | 2006 | T-HANGARS (10 UNITS) | $350,000 | $332,500 | $16,625 | $875 |
| 3 | 2006 | PERIMETER FENCING & GATES | $237,500 | $225,625 | $11,281 | $594 |
| 4 | 2006 | TERMINAL RENOVATION | $50,000 | $0 | $0 | $50,000 |
| 5 | 2006 | EAST AUTO PARKING SEAL COAT & MARKING | $5,000 | $0 | $0 | $5,000 |
| 6 | 2007 | FIRE WATER PROTECTION SYSTEM | $600,000 | $570,000 | $28,500 | $1,500 |
| 7 | 2008 | AIRCRAFT WASH RACK (2500 SF PCC) | $50,000 | $47,500 | $2,375 | $125 |
| 8 | 2009 | AUTOMATED WEATHER OBSERVATION SYSTEM (AWOS) | $125,000 | $118,750 | $5,938 | $313 |
| 9 | 2010 | EAST APRON EXPANSION & HANGAR SITE PREPARATION | $80,000 | $76,000 | $3,800 | $200 |
| 10 | 2010 | GPS APPROACH PROCEDURE | $0 | $0 | $0 | $0 |
| | | **TOTAL STAGE 1** | $1,533,000 | $1,404,100 | $70,205 | $58,695 |
| | | **STAGE 2:** | | | | |
| 11 | 2011 | EAST SIDE PARALLEL TAXIWAY EXTENSION - 25' X 700' | $115,000 | $109,250 | $5,463 | $288 |
| 12 | 2012 | T-HANGARS (8 UNITS) | $300,000 | $285,000 | $14,250 | $750 |
| | | **TOTAL STAGE 2** | $415,000 | $394,250 | $19,713 | $1,038 |
| | | **STAGE 3:** | | | | |
| 13 | 2016 | RUNWAY& TAXIWAYS PAVEMENT OVERLAY & MARKING | $555,500 | $527,725 | $26,386 | $1,389 |
| 14 | 2017 | APRON PAVEMENT OVERLAY & MARKING | $154,000 | $146,300 | $7,315 | $385 |
| 15 | 2018 | HANGAR TAXIWAYS PAVEMENT OVERLAY & MARKING | $212,500 | $201,875 | $10,094 | $531 |
| 16 | 2020 | T-HANGARS (5 UNITS) | $187,500 | $178,125 | $8,906 | $469 |
| | | **TOTAL STAGE 3** | $1,109,500 | $1,054,025 | $52,701 | $2,774 |
| | | **GRAND TOTALS** | $3,057,500 | $2,852,375 | $142,619 | $62,506 |

Source: Wadell Engineering Corporation

# Financial Program

## Local Benefits Assessment

General aviation airports contribute significantly to the prosperity of a community and are crucial elements in the economic well being and safety of a city, county, and region. Today, general aviation is the largest, most far reaching, and a most significant segment of America's air transportation system.

The role and function of a general aviation airport differs from one location to another. Leisure travel is only one use of a general aviation airport. Aircraft are used for firefighting and monitoring weather conditions and air quality levels. General aviation airports play an important role in medical evacuations, law enforcement, and mail delivery.

The advantages and benefits of air carrier service to a community are readily apparent. But direct and indirect benefits of general aviation and other airport-related services may be more difficult to assess. General aviation airports such as the Healdsburg Municipal Airport generate employment, sales taxes, personal property taxes (which are divided among the school district, city and county), and increased consumer spending within the area. A recurring consequence of an airport's growth or facility expansion is an increase in the number of local jobs and stimulated economic activity.

Indirect employment results from services and businesses supporting the airport and its employees if business potential is developed. Growth of the airport means more dollars spent locally.

General aviation aircraft operating expenses are indicative of money being spent at an airport that eventually finds its way into the community. For each based aircraft there are dollars spent annually for fuel, oil, insurance, hangars/tie-downs, and routine maintenance. Table 27 shows the potential for aviation businesses in the area if the airport has adequate services and facilities available.

**Table 27**
**Potential General Aviation Aircraft Expenditures**
**Healdsburg Municipal Airport**

| | Cost Per Hour | Average Hours Flown | $/Based Aircraft | Total Expenditures 2005 | 2010 | 2015 | 2025 |
|---|---|---|---|---|---|---|---|
| Single Engine | $40 | 135 | $5,400 | $318,600 | $345,600 | $372,600 | $405,000 |
| Multi-Engine | $135 | 200 | $27,000 | $54,000 | $54,000 | $54,000 | $81,000 |
| Helicopter | $275 | 425 | $116,875 | $0 | $0 | $0 | $0 |
| Turboprop | $400 | 450 | $180,000 | $360,000 | $360,000 | $360,000 | $540,000 |
| Turbine | $800 | 500 | $400,000 | $0 | $0 | $0 | $400,000 |
| | | | | $732,600 | $759,600 | $786,600 | $1,426,000 |

Source: Wadell Engineering Corporation

An airport interacts with and enhances the economic life of the community. Traditionally, a community's well being has been tied to either transportation or communications. In the growth of the United States, those towns and cities located along railways grew and prospered while others without access to good transportation routes faltered and died. The same case can be made for aviation.

Everyone is aware of the timesaving value of aircraft travel. Not everyone realizes the indirect economic values produced by air travel. In the fast-moving business world, travel by corporate aircraft to close business deals can take only a few hours, with departure back to the home office on the same day without ever drawing the attention of anyone in particular. Yet, the consummation of that business deal, which might not have occurred without the local airport, will have a vital effect on the area's economy.

## Financing Considerations

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 desirability of future airport development depends on the ability of an airport to achieve a self-supporting status and, within a reasonable time, to cover local development costs. Estimated revenues must be sufficient to help offset annual costs of capital investment and operations.

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. Sources available during recent years for financing airport facilities include the FAA's Airport Improvement Program (AIP), the State of California, private donations, leasebacks, direct revenue loans, certificates of participation, and revenue and general obligation bonds. Also, capital improvements can be financed from general funds that are provided by annual operating and tax revenues. The most likely sources are discussed below.

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. Recently hangars, fuel farms and necessary utilities are now FAA eligible. 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). The Healdsburg Municipal Airport is in the NPIAS. Presently, the Federal share of these projects in California is 95 percent of eligible costs. A recent addition to the FAA program is the $150,000 maximum per airport annual entitlement funds. Larger projects use "carry forward" of annual entitlement funds plus "discretionary" funds.

State of California Aeronautic Program funds for airport development are available as 90% grants for specific 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 95% plus 5% of 95% which equals 99.75%. Therefore, the local matching share is 0.25% of total project cost when both FAA and State funds are utilized. The state also provides a $10,000 annual grant to each qualified airport. Additionally, the state has a favorable loan program which many communities use for financing feasible facilities such as T-hangars, terminal buildings and fuel farms.

Municipal Lease Purchase Financing (tax-exempt leasing) is an alternative method for financing public use and acquisition of equipment or facilities otherwise too expensive to be included in annual budgets. Leasing permits political subdivisions to enter into installment sale or lease purchase contracts with principal and tax-free interest increments payable over time. Tax-exempt

lease contracts have two requirements: (1) the governmental body must pay the purchase price plus interest over a period of years, and (2) it must have the right to purchase the property for a nominal price at the end of the contract term. The funds to pay the contract installments can come from any source available to the public body. The appropriation is put in the annual budget. Should the appropriation not take place, the balance due on the contract is accelerated and the investor either receives back the asset for which the funds were spent or otherwise seeks relief.

Financing airport improvements directly from the airport enterprise fund is the most economical method of all, since there are no interest payments. Airport improvements financed by this approach could place constraints on money available from the airport fund to meet normal operating and other expenses.

An airport authority is commonly developed when one public agency is burdened with total airport costs, while other communities have the benefits and even taxation, but not the costs. A new district or authority could not create new taxes, but could sell lease-revenue bonds.

For Healdsburg 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. If FAA funding of hangars is not available, an internal general fund loan to the airport is the best source of funding for airport hangars, with repayment from the airport fund. This method avoids financing issuance costs. In lieu of the general fund, a state aeronautics loan can be readily obtained.

The current airport ownership by the city is most practical, since the airport is too small for formation of an authority and it primarily serves city residents and businesses within the area.

## Cash Flow Analysis

Pricing of airport services and facilities is a sensitive issue and subject to controversy. Each party may have a different perspective and motivation. While a public entity may seek a yearly return equal to yearly expenditures, private businesses may seek to maximize profits, and some airport users feel that a facility supported by public funds should be willing to charge less and even sometimes operate at a deficit. Local governments have to cover costs, or must accept a deficit with the view that other community revenues are increased adequately to warrant a deficit.

Many airports seek to attain a high degree of self-sufficiency and have rates and charges commensurate with the operating costs and capital improvement expenses. At other airports, local conditions and circumstances preclude charging full actual costs and a public entity may choose to absorb some of the financial burden and not pass it on to the user. FAA grant agreements require the airport to seek self sufficiency.

The preceding section on financing considerations indicates some of the mechanisms typically used for financing the local share for airport projects. An early determination should be made as to the most desirable and feasible approach to initiate implementation. The only long-term satisfactory way to resolve concerns regarding financing are through a strong statement of airport financial policy and aggressive implementation of that policy. For this reason, it is essential that a financial policy and program be established and monitored regularly. It should be recognized that the fees and charges levied would be less than possible with private facilities because public agencies can receive Federal and state funding for facility development while private can not.

The estimated Healdsburg Municipal Airport Financial Analysis, presented on the Cash Flow Analysis Table 28, is a key element of this study. Through this analysis, the capital improvement

program and the projection of annual operating income and expenses are brought together to establish an estimate of the future financial condition over the twenty-year planning period for the airport.

The Cash Flow Analysis is stated in terms of constant 2005 dollars with no escalation. Increases are based on correcting past deficiencies and achieving market value rates. The cash flow analysis is based on several components:

- Operating income
- Operating expense
- Operating profit/loss
- Capital requirements
- Annual cash flow
- Accumulative cash flow

A philosophy and fee schedule must be established in order to assure that adequate operating income is collected. It is necessary to generate significant revenue at the airports to provide for matching of FAA and state grants in order to implement the capital improvement program. The underlying assumption for the income schedule is that the local pilots and other users sincerely desire development of new airfield and terminal facilities and qualified airport management, and are willing to pay appropriate fees.

The Healdsburg Municipal Airport competes with other airports in the region for receiving Federal and State aid. Only airports with available grant matching funds and in compliance with previous grant obligations and assurances can receive grants. Revenue must be generated on the airport with the intent that it will be returned to users in the form of grants for airport improvements and improved operations, maintenance and management services.

The Healdsburg Municipal Airport is an asset to the City and community. In order to achieve full potential, the airport needs to generate revenues and have qualified staffing. Sound lease policies and rate structures must be established with the goal of providing sufficient revenues so that the airport can meet its operational and housekeeping responsibilities and develop a reserve for future expansion.

The operating income is comprised of apron tiedowns, transient aircraft parking fees, new hangars, old hangars, hangar land leases, business leases, fuel flowage fees, commercial landing fees (such as small parcel delivery flights) and agricultural land leases.

For airport businesses, new prevailing rates and charges are assumed to be established by the city when current leases expire. Each business lease is unique and must be evaluated and negotiated when due based on city and business needs and requirements. This plan holds the current rates throughout the planning period, even though some increases will be achieved by specific negotiations when leases are expiring.

Some of the businesses in the prime terminal area have little connection or work volume related to aircraft. Often such businesses locate on airports since the area is spacious and less costly than sites downtown. However, FAA grant obligations and assurances require that airport property be leased to aviation businesses. Leasing to aviation businesses establishes an image of a vibrant airport open to customers that are serious about quality aviation services. This helps airport businesses and based aircraft owners and increases revenues to the city. The city must establish

a program for releasing in the near future to establish the necessary aviation environment and perform in compliance with FAA grants.

New hangar construction is planned for the airport during the planning period. New hangar revenue will be a major source of income for the City through the collection of hangar rental fees. Lease rates on these hangars should be set so that the revenue produced will offset the cost of construction and provide a capital recovery fund and help support the airport operations and maintenance.

Old city owned hangars include 4 small units and 10 larger units. The small units are in poor condition and two of them obstruct the parallel taxiway and are to be removed. All four poor hangars should be removed and replaced with two new small hangars clear of the taxiway obstacle free area. Remaining old city hangars should be removed and replaced when necessary.

Existing ground leases for privately constructed hangars expire at various times throughout the planning period. Upon expiration of the leases, the new rates will be based on the square footage of the hangar footprint and set at a rate that provides the city a fair return on the land used by and associated with the hangar.

In order to give the City more flexibility in setting rental terms, at the end of the current leases or contractually agreed extensions thereof, the leases will revert to month-to-month land leases. Rates will not be adjusted more than once per year. It is the intention of the City that the month-to-month leases will be renewed so long as the tenant remains in compliance with the lease, the hangar is properly maintained, and the airport remains in operation. New private hangers will not be permitted. New leases shall require that the tenant give the City sixty (60) days advanced notice of intent to sell and the City shall have the first right of refusal to exercise a purchase of a private hanger at appraised market value within this time period.

Aircraft tiedowns provide limited income compared to hangars, but do offer space for aircraft while waiting for an available hangar. Reasonably priced tiedowns can attract aircraft to the airport, resulting in additional fuel sales and maintenance revenue to local businesses.

Transient tiedowns are collected and retained by the FBO. Most of the parking is near the terminal and FBO complex. When a part time airport manger is hired, the transient tiedown revenue should be collected and retained by the city.

Commercial landing fees should be collected from aircraft that use the airport for the purpose of transferring cargo and passengers. Occasionally package delivery flights use the airport, especially when Santa Rosa airport is fogged in. It is customary and reasonable to charge those flights a landing fee. Collecting the fees from transient passenger flights is less practical and likely not worth the effort for the limited income.

Fuel revenue is an important source of revenue. The city owns the self fueling facilities and compensates the FBO for operational monitoring and supply vendor coordination for a flowage fee of 15 cents per gallon for the first 40,000 gallons and a reduced rate thereafter. Upon hiring of a part time airport manager, the fueling operation will be operated by the new city staff and all revenue from the city owned fueling facilities would be retained by the city. This will help fund the part time manager position.

# Table 28
# Cash Flow Analysis
# Healdsburg Municipal Airport
# (In 000's of 2005 $)

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **INCOME** | | | | | | | | | | | | | | | | | | | | | |
| Leases - Airport Businesses | 40.0 | 40.0 | 43.1 | 43.1 | 43.1 | 43.1 | 55.1 | 55.1 | 55.1 | 55.1 | 55.1 | 55.1 | 55.1 | 55.1 | 55.1 | 55.1 | 55.1 | 55.1 | 55.1 | 55.1 | 55.1 |
| New Hangars (City Owned) | 0.0 | 42.0 | 42.0 | 42.0 | 42.0 | 42.0 | 42.0 | 75.6 | 75.6 | 75.6 | 75.6 | 75.6 | 75.6 | 75.6 | 75.6 | 96.6 | 96.6 | 96.6 | 96.6 | 96.6 | 96.6 |
| Old Hangars (City Owned) | 23.1 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| Hangar Land Leases | 29.5 | 32.6 | 34.1 | 37.7 | 41.0 | 42.5 | 42.5 | 71.2 | 71.2 | 74.0 | 74.0 | 74.0 | 74.0 | 74.7 | 74.7 | 74.7 | 74.7 | 74.7 | 74.7 | 74.7 | 74.7 |
| Tie-Downs | 3.4 | 1.2 | 1.8 | 2.4 | 3.0 | 3.6 | 4.2 | 0.0 | 0.6 | 1.2 | 1.8 | 2.4 | 3.0 | 3.6 | 4.2 | 1.2 | 1.8 | 2.4 | 3.0 | 3.6 | 4.2 |
| Commercial Landing Fees | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 |
| Fuel Net Revenue | 22.5 | 22.9 | 23.2 | 23.6 | 23.9 | 24.3 | 24.6 | 25.0 | 25.4 | 25.7 | 26.1 | 26.3 | 26.6 | 26.9 | 27.2 | 27.5 | 27.8 | 28.1 | 28.4 | 28.6 | 28.9 |
| Transient Tiedown Fees | 0.0 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 |
| Agricultural Land Lease | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| **TOTAL INCOME** | 119.5 | 164.4 | 170.0 | 174.5 | 178.8 | 181.3 | 194.2 | 252.7 | 253.7 | 257.5 | 258.5 | 259.3 | 260.2 | 261.8 | 262.7 | 281.0 | 281.9 | 282.8 | 283.7 | 284.6 | 285.5 |
| **EXPENSES** | | | | | | | | | | | | | | | | | | | | | |
| Salaries | 18.2 | 50.0 | 50.8 | 51.6 | 52.3 | 53.1 | 53.9 | 54.7 | 55.5 | 56.3 | 57.0 | 57.8 | 58.6 | 59.4 | 60.1 | 60.1 | 60.9 | 61.7 | 62.5 | 63.3 | 64.1 |
| Maintenance | 19.0 | 10.0 | 10.2 | 10.3 | 10.5 | 10.6 | 10.8 | 10.9 | 11.1 | 11.3 | 11.4 | 11.5 | 11.7 | 11.8 | 11.9 | 12.0 | 12.2 | 12.3 | 12.4 | 12.5 | 12.7 |
| Supplies/Other | 2.1 | 2.5 | 2.5 | 2.6 | 2.6 | 2.7 | 2.7 | 2.7 | 2.8 | 2.8 | 2.9 | 2.9 | 2.9 | 2.9 | 3.0 | 3.0 | 3.0 | 3.1 | 3.1 | 3.1 | 3.2 |
| Insurance | 8.9 | 9.3 | 9.4 | 9.6 | 9.7 | 9.9 | 10.0 | 10.2 | 10.3 | 10.5 | 10.6 | 10.7 | 10.8 | 11.0 | 11.1 | 11.2 | 11.3 | 11.4 | 11.5 | 11.7 | 11.8 |
| Utilities | 1.9 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 |
| Miscellaneous | 7.6 | 8.0 | 8.1 | 8.3 | 8.4 | 8.5 | 8.6 | 8.7 | 8.9 | 9.0 | 9.1 | 9.2 | 9.3 | 9.4 | 9.5 | 9.6 | 9.7 | 9.8 | 9.9 | 10.0 | 10.1 |
| **TOTAL EXPENSES** | 57.7 | 81.8 | 83.1 | 84.4 | 85.6 | 86.9 | 88.2 | 89.4 | 90.7 | 92.0 | 93.3 | 94.5 | 95.6 | 96.8 | 98.0 | 98.4 | 99.6 | 100.8 | 101.9 | 103.1 | 104.3 |
| **ANNUAL STATE AERONAUTICS ALLOCATION** | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| **OPERATING PROFIT (LOSS)** | 71.8 | 92.6 | 96.9 | 100.2 | 103.3 | 104.4 | 116.1 | 173.3 | 173.0 | 175.5 | 175.1 | 174.9 | 174.6 | 175.0 | 174.7 | 192.6 | 192.3 | 192.1 | 191.8 | 191.5 | 191.2 |
| **CAPITAL REQUIREMENTS** | | | | | | | | | | | | | | | | | | | | | |
| FAA Grants | 0.0 | 591.9 | 570.0 | 47.5 | 118.8 | 76.0 | 109.3 | 285.0 | 0.0 | 0.0 | 0.0 | 527.7 | 146.3 | 201.9 | 0.0 | 178.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| State Grants | 0.0 | 29.6 | 28.5 | 2.4 | 5.9 | 3.8 | 5.5 | 14.3 | 0.0 | 0.0 | 0.0 | 26.4 | 7.3 | 10.1 | 0.0 | 8.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Local Capital | 0.0 | 56.6 | 1.5 | 0.1 | 0.3 | 0.2 | 0.3 | 0.8 | 0.0 | 0.0 | 0.0 | 1.4 | 0.4 | 0.5 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **TOTAL CAPITAL** | 0.0 | 678.0 | 600.0 | 50.0 | 125.0 | 80.0 | 115.0 | 300.0 | 0.0 | 0.0 | 0.0 | 555.5 | 154.0 | 212.5 | 0.0 | 187.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **ANNUAL CASH FLOW WITHOUT FINANCING** | 71.8 | 36.1 | 95.4 | 100.0 | 102.9 | 104.2 | 115.8 | 172.5 | 173.0 | 175.5 | 175.1 | 173.5 | 174.2 | 174.5 | 174.7 | 192.2 | 192.3 | 192.1 | 191.8 | 191.5 | 191.2 |
| **ACCUMULATED CASH FLOW** | 71.8 | 107.9 | 203.3 | 303.3 | 406.3 | 510.5 | 626.2 | 798.8 | 971.7 | 1,147.2 | 1,322.4 | 1,495.8 | 1,670.1 | 1,844.6 | 2,019.3 | 2,211.5 | 2,403.8 | 2,595.9 | 2,787.6 | 2,979.1 | 3,170.3 |

Source: Wadell Engineering Corporation

**Table 29**
**Major Revenue Assumptions**
**Healdsburg Municipal Airport**
**(In 2005 $)**

Tiedowns: Based $40/month, increasing to $50 by 2006
Tiedowns: Transient $3/night, increasing to $5/night by 2006
New City Owned T-Hangars: $350/month
Old City Owned T-Hangars: $165 per month, increasing to $200 by 2006.
Hangar Land Leases: No new leases. Escalate old per contract then $0.10 psf-mo. Remove aging hangars at end of lease period, as appropriate.
FBO Facilities Lease: Fair market value upon expiration. Aviation businesses only.
Commercial Landing Fees: $10/per landing

Source: Wadell Engineering Corporation

The operating expenses for airports are comprised primarily of salaries, maintenance labor and supplies, insurance, utilities and miscellaneous costs. It is assumed that there will be an increase in salary expenditures in 2006 with the addition of a half-time airport manger. The manger would assist with enforcement of revenue collection for the finance department, enforce city regulations and requirements, oversee major maintenance and perform minor maintenance. The manger would be staff liaison to the airport commission.

Airport maintenance related labor is expended as necessary. It is assumed that there would be a reduction in both maintenance labor and materials because the airport is being well maintained and reconstructed with FAA paving and lighting projects and the terminal renovation project with result in a modernized facility. While it might be expected that maintenance costs would increase rapidly due to aging facilities, the capital improvement program provides for reconstruction of eligible airport paving and lighting systems thereby precluding the expense of major maintenance programs. However, supplies will increase as more light bulbs are replaced and additional visitors use the terminal building. Insurance costs will increase as aircraft operational activity increases.

Utilities will increase slightly. Electricity related to lighting at the airport for the runway and taxiway system will increase as signs and lights are added. Yet reconstructed systems that demand less energy will offset some of the increased costs. Miscellaneous costs include attendance by staff at conferences, special programs initiated by the airport, and other professional and community related activities. This expense will increase slightly as airport staff goes to training sessions to keep up with governmental and industry requirements. The major expense assumptions and their increases are listed in the following table.

**Table 30**
**Major Expense Assumptions**
**Healdsburg Municipal Airport**
**(In 2005 $)**

| | |
|---|---|
| Salaries: | $18,200/year in 2005 increasing to $50,000 by 2006. |
| Airport Maintenance: | $19,000/year in 2005 decreasing to $10,000 by 2006. |
| Supplies: | $2,100/year in 2005 increasing to $2,500 by 2006. |
| Insurance: | $8,900/year in 2005 increasing to $11,700 by 2025. |
| Utilities: | $1,900/year in 2005 increasing to $2,500 by 2025. |
| Miscellaneous Expenses: | $7,600/year in 2005 increasing to $10,000 by 2025. |

Source: Wadell Engineering Corporation

For the purpose of the Financial Analysis, the specific assumptions discussed above were made for income and expenditures. However, there are also a series of generalized assumptions underlying the entire analysis.

- The forecast activity levels will occur as projected in this report.
- No capital improvement expenditures in addition to those presented in the report will be required.
- Improvements will be funded to the extent possible with Federal and State funds (assumed to be 95 percent federal and 5 percent of federal as state match for eligible items).
- All 2005 dollars are used for income, expenses, and capital improvements during the 20-year period and the City will undertake and complete the revenue enhancement projects.
- Specific analysis will be made prior to major commitments, and the airport cost accounting system and development plan will be monitored and updated as necessary.

Based on the revenue and expense assumptions, the annual income and expenses were combined to determine the operating profit (loss). The cash flow results when the operating profit is coupled with the local share of new capital requirements. The new revenues and the collection of current revenues generate an operating profit for each year through the year 2025. When combined with the City share of new capital to match grants for capital improvements, there is a positive annual cash flow every year even though large capital projects are developed and the airport pays the local match for federal projects. By year 2025 the airport fund has over $3 million in the bank.

The cash flow analysis utilizes current dollars and airport operations on a "cash basis." Sources of financing have not been applied, since it is assumed that sequential FAA and State grants will provide sufficient funds. During the 20-year planning period the airport has been reconstructed, expanded, and new revenue-producing City hangars are developed. After the planning period, there would not be any significant FAA/State and local capital requirements other than maintenance and repair of facilities as they age. The years beyond the planning period, under the Master Plan assumptions, would yield increasing annual operating profits.

Two vital assumptions used in the Cash Flow Analysis tables are (1) the willingness and cooperation of current or new based aircraft owners and tenants to pay new fees to the airport fund and (2) the FAA and state funding will occur and will range from 95 percent federal and 5% of federal as state match for all eligible items. A major assumption is that the FAA will fund new hangars in order to assist the airport to become self sufficient. However it is recognized that as a practical matter, even though hangars are FAA eligible, the FAA funds them after funding of all necessary non-revenue airfield and terminal facilities. If the hangars are not funded in a timely manner by the FAA, the construction would be either delayed or the city should seek state aeronautics loans to develop the needed hangars. The state aviation loan program has a significant amount of funds available.

The financial program for the continued development of the Healdsburg Municipal Airport should allow operation and management of the airport in order to obtain reasonable revenue from airport users and to recover operating expenses, financial expenses, and depreciation; to maintain adequate reserves for protection against unpredictable contingencies; and to provide for future improvements and capital equipment.

Based on review of the Cash Flow Analysis tables, it is necessary to obtain maximum FAA and State funding and to meet cash flow requirements on a yearly basis, otherwise projects will be

delayed. The estimated amount of annual funds would be that amount shown as "annual cash flow without financing". General fund, state aeronautics loans or internal city loans for hangar development can provide sufficient funds at a relatively low interest rate without the cost of issuance or fees.

In order for the airport to be operated as an enterprise fund in a transparent manner, it is recommended that the City Council utilize the talents and interests of the Airport Commission for advice to the City of Healdsburg for matters involving aviation, airport maintenance and development issues while avoiding conflicts of interest when members are users or tenants. The City should assign City staff all responsibility for contracting and financial operations including reviewing and establishing rates and charges, lease negotiation and lease enforcement for the airport.

## Implementation Schedule

The efforts in the planning process are brought to fruition through completion of the master plan and processing under the California Environmental Quality Act (CEQA), acceptance of the Master Plan, followed by implementation steps that include incorporation in the general plan, updating of zoning, and seeking grant funds. The FAA reviews both the Master Plan and the Airport Layout Plan (ALP). The Airport Layout Plan approval is the most important and occurs after completion of the FAA review and coordination among the various divisions of the FAA.

The implementation schedule for the Stage I capital improvements is shown in the following table. The Stage I capital improvements recommended in the Stage Development Program are to be implemented (1) as requirements for facilities arise, and (2) in a manner consistent with the financial capabilities of the City.

**Table 31**
**Implementation Schedule**
**Healdsburg Municipal Airport**

| STAGE I ACTIVITIES | INITIATION DATE | RESPONSIBILITY |
|---|---|---|
| FAA Grant Applications | Winter 2005 | City |
| Surveying & Design | Winter 2005 | Consultant |
| Bidding | Spring 2006 | City |
| FAA Stage 1 Funding | Spring 2006 | FAA / State / City |
| Construction | Summer 2006 | Contractor |

Source: Wadell Engineering Corporation

END OF REPORT

# APPENDIX
# HEALDSBURG MUNICIPAL AIRPORT MASTER PLAN

# APPENDIX A
# GLOSSARY
# HEALDSBURG MUNICIPAL AIRPORT

**Aircraft Approach Category.** A grouping of aircraft based on 1.3 times stall speed in a landing configuration at maximum certificated landing weight. The categories are A, B, C, D, and E.

**Airplane Design Group (ADG).** A grouping of airplanes based on wingspan. The groups are I, II, III, IV, V, and VI.

**Airport Elevation.** The highest point on an airport's usable runway expressed in feet above mean sea level (MSL).

**Airport Layout Plan (ALP).** The plan of an airport showing the layout of existing and proposed airport facilities. All development must be in accordance with the FAA approved ALP.

**Airport Reference Code (ARC).** A coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport. The code has two components relating to the airport design aircraft. The first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed. The second component, depicted by a Roman numeral, is the airplane design group and relates to airplane wingspan.

**Airport Reference Point (ARP).** The latitude and longitude of the approximate center of the airport.

**Blast Fence.** A barrier used to divert or dissipate jet blast or propeller wash.

**Building Restriction Line (BRL).** A line which identifies suitable building area locations on airports.

**Clearway (CWY).** A defined rectangular area beyond the end of a runway cleared or suitable for use in lieu of runway to satisfy takeoff distance requirements.

**Compass Calibration Pad.** An airport facility used for calibrating an aircraft compass.

**Declared Distances.** The distances are:

**Takeoff run available (TORA) -** the runway length available for takeoff.

**Takeoff distance available (TODA) -** the runway length available for takeoff plus the length of available clearway (CWY).

**Accelerate-stop distance available (ASDA) -** the runway length available for takeoff plus the length of available stopway (SWY).

**Landing distance available (LDA) -** the runway length available for landing.

**Hazard to Air Navigation.** An object that the FAA determines will have a substantial adverse effect upon the safe and efficient use of navigable airspace by aircraft, operation of air navigation facilities, or existing or potential airport capacity.

**Large Airplane.** An airplane weighing more than 12,500 pounds (5,700 kg) maximum certificated takeoff weight.

**Object.** Includes, but is not limited to above ground structures, NAVAIDs, people, equipment, vehicles, natural growth, terrain, and parked aircraft.

**Object Free Area (OFA).** A two-dimensional ground area surrounding runways, taxiways, and taxilanes which is clear of objects except for objects whose location is fixed by function.

**Obstacle Free Zone (OFZ).** The airspace defined by the runway OFZ and, as appropriate, the inner-approach OFZ and the inner-transitional OFZ, which is clear of object penetrations other than frangible NAVAIDs.

**Runway OFZ** - The airspace above a surface centered on the runway centerline.

**Inner-approach OFZ** - The airspace above a surface centered on the extended runway centerline. It applies to runways with an approach lighting system.

**Inner-transitional OFZ** - The airspace above the surfaces located on the outer edges of the runway OFZ and the inner-approach OFZ. It applies to precision instrument runways.

**Obstruction to Air Navigation.** An object of greater height than any of the heights or surfaces presented in Subpart C of FAR Part 77. Obstructions to air navigation are presumed to be hazards to air navigation until an FAA study has determined otherwise.

**Runway (RW).** A defined rectangular surface on an airport prepared or suitable for the landing or takeoff of airplanes.

**Runway Blast Pad.** A surface adjacent to the ends of runways provided to reduce the erosive effect of jet blast and propeller wash.

**Runway Protection Zone (RPZ).** An area, formerly the clear zone, used to enhance the safety of aircraft operations. It is at ground level beyond the runway end.

**Runway Safety Area (RSA).** A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

**Runway Type.** A runway use classification related to its associated aircraft approach procedure. The runway types are:

> **Visual runway** - A runway without an existing or planned straight-in instrument approach procedure.

**Nonprecision instrument runway** - A runway with an approved or planned straight-in instrument approach procedure which has no existing or planned precision instrument approach procedure.

**Precision instrument runway** - A runway with an existing or planned precision instrument approach procedure.

**Shoulder.** An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface, support for aircraft running off the pavement, enhanced drainage, and blast protection.

**Small Airplane.** An airplane weighing 12,500 pounds (5,700 kg) or less maximum certificated takeoff weight.

**Stopway (SWY).** A defined rectangular surface beyond the end of a runway prepared or suitable for use in lieu of runway to support an airplane, without causing structural damage to the airplane, during an aborted takeoff.

**Taxilane (TL).** The portion of the aircraft parking area used to access taxiways and aircraft parking positions.

**Taxiway (TW).** A defined path established for the taxiing of aircraft from one part of an airport to another.

**Taxiway Safety Area (TSA).** A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

**Threshold (TH).** The beginning of that portion of the runway available for landing. When the threshold is located at a point other than at the beginning of the pavement, it is referred to as either a displaced or a relocated threshold depending on how the pavement behind the threshold is used.

**Displaced threshold** - the portion of pavement behind a displaced threshold is available for takeoffs in either direction and landings from the opposite direction.

**Relocated threshold** - the portion of pavement behind a relocated threshold is not available for takeoff or landing. It may be available for taxiing of aircraft.

**Transport Airport.** An airport designed, constructed, and maintained to serve airplanes in Aircraft Approach Category C and D.

**Utility Airport.** An airport designed, constructed, and maintained to serve airplanes in Aircraft Approach Category A and B.

**APPENDIX B**
**AIRPORT DESIGN AIRPLANE AND AIRPORT DATA**
**AI AIRCRAFT WITH NON-PRECISION APPROACHES**
**HEALDSBURG MUNICIPAL AIRPORT**

AIRPORT DESIGN AIRPLANE AND AIRPORT DATA

| | |
|---|---|
| Aircraft Approach Category | A |
| Airplane Design Group | I (Small Airplanes Exclusively) |
| Airplane wingspan . . . . . | 48.99 feet |
| Primary runway end approach visibility minimums are | not lower than 1 mile |
| Other runway end approach visibility minimums are | visual exclusively |
| Airplane undercarriage width (1.15 x main gear track) . . . | 12.00 feet |

RUNWAY AND TAXIWAY WIDTH AND CLEARANCE STANDARD DIMENSIONS

| | Airplane | Group/ARC |
|---|---|---|
| Runway centerline to parallel runway centerline simultaneous operations when wake turbulence is not treated as a factor: | | |
| VFR operations with no intervening taxiway . . . . . | | 700 feet |
| VFR operations with one intervening taxiway . . . . . | | 700 feet |
| VFR operations with two intervening taxiways . . . . . | | 700 feet |
| IFR approach and departure with approach to near threshold 100 ft for each 500 ft of threshold stagger to a minimum of 1000 feet. | | 2500 feet less |
| Runway centerline to parallel runway centerline simultaneous operations when wake turbulence is treated as a factor: | | |
| VFR operations . . . . . | | 2500 feet |
| IFR departures . . . . . | | 2500 feet |
| IFR approach and departure with approach to near threshold . . | | 2500 feet |
| IFR approach and departure with approach to far threshold 100 feet for each 500 feet of threshold stagger. | | 2500 feet plus |
| IFR approaches . . . . . | | 3400 feet |
| Runway centerline to parallel taxiway/taxilane centerline . | 139.5 | 150 feet |
| Runway centerline to edge of aircraft parking . . . . . | 125.0 | 125 feet |
| Runway width . . . . . | | 60 feet |
| Runway shoulder width . . . . . | | 10 feet |
| Runway blast pad width . . . . . | | 80 feet |
| Runway blast pad length . . . . . | | 60 feet |
| Runway safety area width . . . . . | | 120 feet |
| Runway safety area length beyond each runway end or stopway end, whichever is greater . . . . . | | 240 feet |
| Runway object free area width . . . . . | | 250 feet |
| Runway object free area length beyond each runway end or stopway end, whichever is greater . . . . . | | 240 feet |
| Clearway width . . . . . | | 500 feet |
| Stopway width . . . . . | | 60 feet |
| Obstacle free zone (OFZ): | | |
| Runway OFZ width . . . . . | | 250 feet |
| Runway OFZ length beyond each runway end . . . . . | | 200 feet |
| Inner-approach OFZ width . . . . . | | 250 feet |
| Inner-approach OFZ length beyond approach light system . . . . | | 200 feet |
| Inner-approach OFZ slope from 200 feet beyond threshold . . . | | 50:1 |
| Inner-transitional OFZ slope . . . . . | | 0:1 |

| | | |
|---|---|---|
| Runway protection zone at the primary runway end: | | |
| Width 200 feet from runway end | | 250 feet |
| Width 1200 feet from runway end | | 450 feet |
| Length | | 1000 feet |
| Runway protection zone at other runway end: | | |
| Width 200 feet from runway end | | 250 feet |
| Width 1200 feet from runway end | | 450 feet |
| Length | | 1000 feet |
| Departure runway protection zone: | | |
| Width 200 feet from the far end of TORA | | 250 feet |
| Width 1200 feet from the far end of TORA | | 450 feet |
| Length | | 1000 feet |
| Threshold surface at primary runway end: | | |
| Distance out from threshold to start of surface | | 0 feet |
| Width of surface at start of trapezoidal section | | 250 feet |
| Width of surface at end of trapezoidal section | | 700 feet |
| Length of trapezoidal section | | 2250 feet |
| Length of rectangular section | | 2750 feet |
| Slope of surface | | 20:1 |
| Threshold surface at other runway end: | | |
| Distance out from threshold to start of surface | | 0 feet |
| Width of surface at start of trapezoidal section | | 250 feet |
| Width of surface at end of trapezoidal section | | 700 feet |
| Length of trapezoidal section | | 2250 feet |
| Length of rectangular section | | 2750 feet |
| Slope of surface | | 20:1 |
| Taxiway centerline to parallel taxiway/taxilane centerline | 68.8 | 69 feet |
| Taxiway centerline to fixed or movable object | 44.3 | 44.5 feet |
| Taxilane centerline to parallel taxilane centerline | 63.9 | 64 feet |
| Taxilane centerline to fixed or movable object | 39.4 | 39.5 feet |
| Taxiway width | 22.0 | 25 feet |
| Taxiway shoulder width | | 10 feet |
| Taxiway safety area width | 49.0 | 49 feet |
| Taxiway object free area width | 88.6 | 89 feet |
| Taxilane object free area width | 78.8 | 79 feet |
| Taxiway edge safety margin | | 5 feet |
| Taxiway wingtip clearance | 19.8 | 20 feet |
| Taxilane wingtip clearance | 13.9 | 15 feet |

REFERENCE: AC 150/5300-13, Airport Design, including Changes 1 through 4.

Prepared By: Wadell Engineering Corporation