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Inventory of Existing Conditions

Introduction

Minden-Tahoe Airport is located in the Carson Valley of Western Nevada. Nestled at the bottom of the eastern slope of the Sierra Nevada Mountains, the Airport serves an important niche in the general aviation and glider/soaring market for Douglas County and its surrounding region. Minden-Tahoe Airport is open to the general public and to visiting aircraft and the area is blessed with year round world-class soaring conditions. The Airport does not have commercial passenger activity and has been in continuous operation at the current site since 1942.

Minden-Tahoe Airport is located in Douglas County approximately three nautical miles north of the City of Minden, three and one-half nautical miles north of the City of Gardnerville and 32 nautical miles south of Reno. The Airport is located within the heart of the Carson Valley area, just east of Lake Tahoe. The Airport provides a safe operating environment for a variety of general aviation aircraft types, ranging from gliders and small single and multi-engine powered aircraft to corporate jets. The Airport's relative location within the region is illustrated in Figure A1, *AIRPORT LOCATION MAP*.

Douglas County lies in western Nevada, adjacent to the California border. The county has a population of approximately 47,000 residents. Combining small town charm with productive farmland, low crime rate, world class skiing and continued growth, Douglas County offers an extraordinary quality of life. Additionally, the county has one of the best school districts in the state, with scores well above the national standard. The County consists of three main population centers, the Genoa area, the Minden/Gardnerville area, and the Stateline/Kingsbury area. Genoa was the original County seat and is the oldest permanent settlement in the Nevada. Minden and Gardnerville are located southeast of Genoa and serve the agricultural population of Carson Valley. While Minden is located north of Gardnerville, the two towns have fused

Figure A1
Airport Location Map

together to form one larger community. After the turn of the century, the county seat was moved from Genoa to Minden. The Stateline/Kingsbury area makes up a large portion of the Douglas County population and provides a majority of the county's room tax revenue. The casinos and ski resorts of Lake Tahoe's south shore are famous for their breathtaking views of Lake Tahoe and the Sierra Nevada.

While airport planning documents related to the layout of airport facilities have been kept up-to-date, an overall master planning study of airport facilities has not been completed since 1993. During this time, aviation issues on a local, regional, and national level have changed, and the FAA recommends that an Airport Master Plan be updated every 5-10 years.

This Airport Master Plan is intended to provide a comprehensive evaluation of the Airport resulting in a well-conceived long-term facilities and operational plan for the Airport. This effort is also intended to further the mission of the Airport to promote the Minden-Tahoe Airport as a safe, friendly, planned growth, premiere general aviation community airport through public information, awareness and economic development. This initial *INVENTORY OF EXISTING CONDITIONS* chapter examines three basic elements. These elements are:

- Airport facilities (runways, taxiways, aircraft parking aprons, hangars, ground access, etc.);
- Relationship of the Airport to the Airspace System; and,
- The Airport environs.

In addition, the last section in this chapter identifies issues that will, to some degree, influence future activity and facilities at the Airport.

Airport History

The following airport history is provided on the Airport's official website¹. The Minden-Tahoe Airport (MEV) was originally constructed in 1942 as a military training base and was one of 345 federally funded military bases and landing fields constructed in the country between 1939 and 1943.

The airport land was deeded to the County by the Dangberg family and Congress had appropriated \$417,000 for the project. Construction began in July 1942 and runway surfacing began in August 1942, with the field becoming operational by late October.

¹ Source: Williams, Pete, Minden-Tahoe Airport History: <http://www.mindentahoeairport.com/About/history.asp>

The physical location of the field was chosen in order to stay relatively clear of the local marshlands in the area. To ensure adequate drainage of the field, several deep and wide ditches were placed adjacent to the runways. The initial six runway directional layouts were based on wind rose observations recorded by the U.S. Weather Bureau Station at the Airport.

The Airport was actually never developed as military air base like Stead Airport was at Reno, however, it was used to train U.S. Army Air Force pilots using flight training school groups under contract to the government. The training consisted of up to 150 students at a time in what was called secondary flight training. The students stayed at the Minden Inn during the training. Between September 1943 and January 1944, the Army Air Forces War Service Training Detachment operated a flight school at the Airport.

Glider pilots began flying out of MEV in 1964 and by 1969 the airfield was being used regularly as a glider “Wave Camp” with as many as 70 aero tows a day during the 2-3 week spring and fall wave sessions. Douglas County Airport was rapidly gaining a reputation of being one of the best locations in the country for glider high altitude wave flights, long distance and speed record flight attempts. By 1977, two soaring fixed based operators created businesses onsite offering glider training, rental, aero-tows and support of soaring badge and record flight attempts. Today, the Airport is still heavily used for glider operations. From April to October many soaring pilot visitors base their gliders at MEV. It is possible during a summer day to have as many as 100 glider related movements at the Airport.

Douglas County's initial obligation for the operation and maintenance of the Airport was under the AP-4 Resolution of the Development of Landing Areas National Defense Program. The AP-4 Resolution was adopted by the Douglas County Commissioners in April of 1943 and expired September 11, 1969. However, since the expiration of this resolution, the County has continued to operate and maintain the Airport as the recipient of federal grant funds under the Airport Improvement Program (AIP). Under AIP, the County is obligated by federal grant fund assurances, to operate the Airport for the use and benefit of the public and to make the Airport available to all types, kinds and classes of aeronautical activity as well as to the general public.

Government agencies in the area, such as the Nevada Division of Forestry, Bureau of Land Management, Bureau of Indian Affairs and the U.S. Forest Service have also called the Airport home. Most of these agencies are located within the Sierra Front Interagency Dispatch Center (SFIDC), which is dedicated to providing interagency dispatch support to the greater Sierra Front area. The Center functions under the Incident Command System (ICS), in cooperation with local emergency management agencies and municipalities, as well as State and federal agencies in the mitigation of natural and human-caused incidents.

Airport Role and Facilities

As previously described, Minden-Tahoe Airport began operating in 1942 and currently serves the general aviation needs of the community by providing many aviation-related services, including: soaring/glider flying, business-related flying, law enforcement/fire/rescue flying services, recreational flying, flight training, air charters for medical services, search and rescue, along with other aviation-related activities. The facility, which was originally constructed as a military training base, has developed into one of the internationally recognized premier soaring facilities within the western United States.

According to a 2005 study completed by the Bureau of Business and Economic Research at the University of Nevada, Reno (*NEVADA GENERAL AVIATION AIRPORT ECONOMIC IMPACT STUDY*), airport activity at Minden-Tahoe Airport directly generated \$33,880,193 in economic activity and another \$12 Million is generated when all cascading economic effects are taken into account. The report also stated that several hundred jobs are attributable both directly and indirectly to airport operations, while the labor income from directly employed personnel generates \$11,355,347. The report concludes that these are significant numbers and that the economic impact of all airport activities should be taken into account when making any future development decisions.

The Airport is owned and operated by Douglas County. The Airport is classified as a general aviation airport by the FAA's National Plan of Integrated Airport Systems (NPIAS). The 2004 Nevada Airport System Plan classifies the Airport as a General Aviation (GA) Airport and further classifies the Airport within the GA category as a Community Airport (CA). Community Airports are public-use airports within the State of Nevada with a paved runway serving a community or number of communities in the immediate vicinity of aid airport with a total population of more than 1,500 people. As shown in the previous illustration, entitled *AIRPORT LOCATION MAP*, Minden-Tahoe Airport is located north of the City of Minden, approximately 11.5 nautical miles east of the California/Nevada border, and approximately one mile east of U.S. Highway 395. The Airport's more immediate surroundings are shown in Figure A2, titled *AIRPORT VICINITY MAP*.

Airside Facilities

Minden-Tahoe Airport is operated with one primary runway (Runway 16/34), oriented in a north/south direction along with a paved crosswind runway (Runway 12/30) oriented in a northwest/southeast direction. There is also a dirt runway (Runway 12G/30G) oriented parallel to the crosswind runway used primarily for glider/sailplane

operations located east of the crosswind runway. Figure A3, entitled *EXISTING AIRPORT LAYOUT*, provides a graphic presentation of the existing airport facilities.

The Airport Reference Point (ARP) for Minden-Tahoe Airport is located at Latitude 39° 00' 01.100" N and Longitude 119° 45' 04.300" W. The Airport has an elevation of 4,726 feet above mean sea level (AMSL). The Airport encompasses approximately 990 acres.

Runway 16/34. The primary runway at the Airport has a designation of 16/34. It is 7,400 feet in length and 100 feet in width. The runway is constructed of asphalt and has a published gross weight bearing capacity of 30,000 pounds single wheel and 50,000 pounds dual wheel main landing gear configuration. The runway was recently rehabilitated in 2005 and is currently rated in good condition according to the FAA 5010 form, Airport Master Record. Douglas County passed an initiative ordinance in 1984 limiting the weight of aircraft operating at the Airport to 30,000 pounds. This ordinance was revised in 1990 to allow aircraft up to 50,000 pounds with multiple wheel landing gear configurations. However, a 2002 airport pavement evaluation accepted by the Nevada Department of Aeronautics (NDOT) and the FAA concluded that “operations of aircraft in the 60,000 pound and 75,000 pound classes, if restricted from a few areas should not have a significant impact on pavement performance.” Also, a structural assessment of pavement capacity was completed for Runway 16/34 following completion of the August 2005 resurfacing of the runway. This assessment utilized empirical design procedures listed in FAA AC 150/5380-6 and concluded that Runway 16/34 has adequate structural capacity to serve the traffic mix currently utilizing the Airport with up to 400 annual operations by aircraft weighing more than 50,000 pounds.

Runway 16/34 has a MIRL (Medium Intensity Runway Lights) edge lighting system and 4-box visual approach slope indicators (VASI) on each end. The runway is marked with basic visual runway markings which are listed in fair condition.

Runway 12/30. The crosswind runway at the Airport has a designation of 12/30. It is 5,300 feet in length and 75 feet in width. The runway is constructed of asphalt and has a published gross weight bearing capacity of 30,000 pounds single wheel and 50,000 pounds dual wheel main landing gear configuration.

Runway 12/30 does not have any edge lighting or visual approach aids. The runway is marked with basic visual runway markings which are listed in good condition.

Runway 12G/30G. In addition to the primary and crosswind runways, there is a landing strip for glider operations (referred to as Runway 12G/30G) located parallel to the crosswind runway. The dirt landing strip is located approximately 550 feet north of the Runway 12/30 centerline, and is 2,200 feet in length and 60 feet in width.

Taxiways. In addition to the runways and landing strip, the airside facilities at Minden-Tahoe Airport consist of a taxiway system that provides access between the runway surfaces and the landside aviation use areas.

A 50-foot wide full parallel taxiway (i.e., Taxiway “A”) serves Runway 16/34. The taxiway is constructed of asphalt and has five connector taxiways that connect to the runway and several additional connector taxiways that join various aircraft parking areas to the parallel taxiway. The parallel taxiway is located on the west side of the runway and is separated from the runway by 500 feet (centerline to centerline).

Runway 12/30 is served by two partial parallel taxiways (i.e., Taxiways “B” and “S”). Taxiway “B” is a 35-foot wide taxiway extending from the primary aircraft parking area to the southeast to the Runway 30 end. This partial parallel taxiway is located southwest of Runway 30 and is separated from the runway by 500 feet. Taxiway “S” is a 50-foot wide taxiway extending from Taxiway “A” to the northwest to Runway 12 end. This partial parallel taxiway is located northeast of Runway 12 and is separated from the runway by 275 feet.

One additional taxiway (Taxiway “C”) serves the aircraft parking areas at the Airport located along the southwestern half of the closed Runway 03/21. Taxiway “C” is a 35-foot wide taxiway extending from the intersection of Runways 16/34 and 12/30 to the southwest perpendicular to Runway 12/30. The Airport also has numerous taxilanes that serve various aircraft parking apron areas and hangar areas.

Figure A2
Airport Vicinity Map

Figure A3
Existing Airport Layout

Landside Facilities

The primary landside development area at the Airport consists of two aircraft parking apron areas located west of the Runways 16/34 and 12/30 intersection. These facilities include a terminal area, aircraft parking aprons, Fixed Base Operator (FBO) facilities, general aviation aircraft storage hangars, fuel storage facilities, and access roadways.

Aprons. The primary aircraft parking apron at Minden-Tahoe Airport is located southwest of Runway 12/30. This apron consists of approximately 33,300 square yards of aircraft parking and movement space. This apron contains areas for large aircraft parking, small aircraft and glider tiedowns and a fuel island. A pavement maintenance project was recently completed for the large aircraft parking area. This area provides a total of 24 aircraft tiedowns.

Connected to this apron is a small aircraft/glider tiedown area with eight rows of tiedowns aligned parallel to Runway 12/30. This apron consists of approximately 50,000 square yards of aircraft parking and movement space and provides a total of 113 aircraft tiedowns.

There is a third aircraft parking apron located immediately between Runway 12/30 and Runway 12G/30G. This apron is connected to the Runway 12/30 and partially paved connector taxiways provide access from the apron to Runway 12G/30G. There are no tiedowns located on this apron and only about half of the apron's 33,300 square yards are currently marked as available for aircraft parking due to its proximity to Runway 12/30.

In addition to the aircraft parking aprons, the northeast end of the closed Runway 03/21 is currently used as a parking area for gliders and glider trailers.

Fixed Base Operators (FBOs) and Aviation Service Providers. The Airport has two full service FBOs, however, there are a number of other aviation service providers located at the Airport. The FBOs and service provider facilities are primarily located adjacent to the aircraft parking aprons on the west side of the Airport. Services provided by the FBOs and aviation service providers include aircraft maintenance, flight instruction, aircraft sales, tiedowns, and aircraft fueling. The FBOs also operate the Airport's Unicom on frequency 122.8 during the hours of 6:30 a.m. to dusk in the summer and 7:30 a.m. to dusk in the winter. The layout and location of the various facilities and hangar types are illustrated in Figure A3, entitled *EXISTING AIRPORT LAYOUT*.

Hangars and Aircraft Storage. The Airport currently operates 78 T-hangar spaces, which have historically been maintained at an occupancy rate of 100 percent. The

current wait list for hangar space consists of approximately 25 aircraft owners. Additionally, there are approximately 30 maintenance/storage hangers located on airport property associated with various lease holders and aviation service providers.

Glider Facilities. Currently, one of the FBOs at the Airport conducts commercial glider operations and a number of the services provided at the Airport are associated with soaring. There is also a glider club that is based out of Minden-Tahoe Airport. The glider operators use both paved runways for launching gliders and for glider recovery/landing operations, but only utilize one end (Runway 30G) of the unpaved runway for glider landing/recovery. The glider operators also have a tiedown area along the northeast end of the closed Runway 03/21 and an apron/staging area located between the Runway 12/30 and Runway 12G/30G. There is also vehicle parking in this area. Landside facilities for glider operations currently exist at the main apron/terminal area and include tiedowns and clubhouse facilities for the glider operations.

Fuel Storage Facility. Prior to 1991, fuel was stored in underground tanks located under the aircraft parking apron. In 1991, a fuel farm was constructed on Barling Street and the underground tanks were removed. Both 100 low-lead AvGas and Jet-A fuel are available and fuel is dispensed by the FBO's from trucks. Currently, aviation fuels are stored in a total of six storage tanks each with a storage capacity of 12,000 gallons giving the Airport a total storage capacity of 72,000 gallons. Three tanks contain 100LL AvGas and three tanks contain Jet-A fuel.

Automated Weather Observing System. The Airport is served by an Automated Weather Observing System III (AWOS III) which is located approximately 1,850 feet north of the Runway 34 threshold and 550 feet east of the runway centerline. This facility measures the following weather parameters: wind speed, wind gusts, wind direction, wind variable direction, temperature, dew point, altimeter setting, density altitude, visibility, sky condition, and cloud height and type. The AWOS III provides a minute-by-minute update to airborne pilots via VHF radio frequency. The radio frequency for the Minden-Tahoe Airport AWOS III is 119.325 MHz, with a telephone access number of (775) 782-6264.

Aircraft Rescue and Fire Fighting (ARFF) Facility. Minden-Tahoe Airport currently does not have on-airport fire fighting facilities, with the exception of typical safety devices such as fire extinguishers. Airport fire protection services are provided by the East Fork Fire & Paramedic District located in Minden. The nearest fire station is located approximately five road miles south of the Airport. On-airport ARFF facilities are not required by the FAA at general aviation airports.

Sierra Front Range Interagency Dispatch Center. The Sierra Front Interagency Dispatch Center (SFIDC) is dedicated to providing interagency dispatch support to the

greater Sierra Front area. The Center functions under the Incident Command System (ICS), in cooperation with local emergency management agencies and municipalities, as well as State and federal agencies in the mitigation of natural and human-caused incidents. Facilities associated with this center include a number of buildings, an aircraft parking area and two aircraft slurry loading pads located west of the Runway 16 end.

Private Leasehold Aircraft Storage. There are a number of private leasehold areas on the Airport with taxilane access and aircraft parking and hangar facilities. One such area is located south of the Sierra Front Range Interagency Dispatch Center along P-51 Court and consists of five large aircraft storage hangars, taxilanes and vehicle access. There are also plans to expand the private leasehold areas in the southwest quadrant of the Airport.

Existing Ground Access and Parking Facilities

Ground Access. From a regional perspective, ground access to Minden-Tahoe Airport is provided by Airport Road (located west of the Airport), by way of U.S. Highway 395, which is also located west of the Airport and runs north/south through the Douglas County from Reno and Carson City to California. Access to some of the Airport's hangar facilities is provided off of Heybourne Road while access to the Sierra Front Range Interagency Dispatch Center and P-51 Court is provided via Heybourne Road and Firebrand Road. There is also a road providing access to the east side of the Airport off of Firebrand Road designated as Bliss Road.

Parking Facilities. There are several vehicular parking areas associated with the airport facilities located adjacent to the terminal building/FBO facilities, as well as next to some of the additional service providers located at the Airport. Parking facilities are also located on the north side of the Airport, adjacent to the Sierra Front Range Interagency Dispatch Center and P-51 Court.

Airspace System/Navigation and Communication Aids

As with all airports, Minden-Tahoe Airport functions within the local, regional, and national system of airports and airspace. The following narrative provides a brief description of Minden-Tahoe Airport's role as an element within these systems.

Air Traffic Service Areas and Aviation Communications. Within the continental United States, there are some 22 geographic areas that are under Air Traffic Control (ATC) jurisdiction. Air traffic services within each area are provided by air traffic controllers in Air Route Traffic Control Centers (ARTCC). The airspace overlying Minden-Tahoe Airport is contained within the Oakland ARTCC jurisdiction. The Oakland ARTCC includes the airspace in portions of California and Nevada.

Minden-Tahoe Airport can be found on the San Francisco sectional chart. Aviation communication facilities associated with the Airport include an Aeronautical Advisory Station (UNICOM) on frequency 122.8 (Aviation Services), air traffic control service (Reno Approach) on frequency 119.2, Minden Automated Weather Observing System (AWOS) on frequency 119.325. Minden-Tahoe Airport does not normally have an air traffic control tower; however, during periods of heavy fire air tanker activity, a temporary tower is placed at the Airport and authorized by official local Notice to Airmen (NOTAM).

Surrounding Terrain Description. The airfield property is located in the Carson Valley of western Nevada approximately 9.5 nautical miles east of Lake Tahoe. Rapidly rising terrain to the east and west of the Airport is the result of the valley being nestled between the Sierra Nevada range to the west and the Pinenut Mountains to the east.

Airspace. The following illustration, *AIRSPACE/NAVAIDS SUMMARY*, depicts the surrounding airports, local airspace, and navigational facilities in the vicinity of Minden-Tahoe Airport. Local airspace surrounding Minden-Tahoe Airport is represented by a combination of Class G and Class E airspace. The Class G airspace that overlays the Airport extends from the surface up to 700 feet above ground level (AGL). The floor of the Class E airspace over the Airport is established at 700 feet AGL and extends upward to 18,000 feet above mean sea level (AMSL). Radio communications and transponders are not required to operate within these airspace areas under Visual Flight Rule (VFR) conditions; however, Instrument Flight Rule (IFR) flights must be capable of communicating with Reno Approach Control, and be Mode C Transponder equipped (capable of reporting altitude).

During fire fighting operations requiring a temporary control tower at the Minden-Tahoe Airport, the airspace surrounding the Airport becomes Class D due to the presence of the tower. During these operations, the Class D airspace extends from the ground to 2,500 feet AGL. Radio communications are required for both VFR and IFR operations. The primary controlled airspace influence in the vicinity of Minden-Tahoe Airport is the Class D Airspace surrounding the Lake Tahoe Airport to the southwest. The primary controlled airspace to the north is the Class C airspace which extends in concentric circles around the Reno-Tahoe International Airport. The Reno Class C Airspace consists of controlled airspace extending upward from various floor elevations to a ceiling of 8,400 feet AMSL within which all aircraft are subject to specific operating rules (an ATC clearance must be obtained to enter the airspace); student pilots are allowed in this airspace classification if they have approval from their certified flight instructor and have had specialized instruction on flying in Class C Airspace; and, aircraft equipment (a transponder with automatic altitude reporting and a two-way radio).

Military airports, military operations areas, and restricted areas can also impact airspace use in the vicinity of a civil airport. There is only one military airport within a 60 nautical mile radius of Minden-Tahoe Airport, which is Fallon Naval Air Station (NFL) also known as Van Voorhis Field. Fallon Naval Air Station is located approximately 55 nautical miles northeast of Minden-Tahoe Airport. The Military Operations Areas (MOAs) in the vicinity of the Airport are located approximately 35 nautical miles east in association with Fallon Naval Air Station and include the Churchill Low MOA, the Ranch High and Ranch MOAs, and the Gabbs Central MOA. Several designated wilderness areas exist south of the Minden-Tahoe Airport including the Carson-Iceberg Wilderness Area and the Hoover Wilderness Area. These areas have Class E airspace floor higher than the usual 700 feet AGL in an effort to keep en-route aircraft at higher altitudes over these areas.

Navigational Aids. A variety of navigational facilities is currently available to pilots around Minden-Tahoe Airport, whether located at the field or at other locations in the region. Many of these navigational aids are available to en-route air traffic as well. The navigational aids (NAVAIDS) available for use by pilots in the vicinity of the Airport include Very High Frequency Omnidirectional Range Stations (VORs) including VOR-DME stations and VORTAC stations. VOR-DME stations are VORs collocated with distance measuring equipment while VORTAC stations are VORs collocated with military tactical air navigation (TACAN) facilities.

A VOR station transmits a very high frequency signal, 360 degrees in azimuth oriented from magnetic north. The Squaw Valley VOR-DME (113.2) is located approximately 26 nautical miles northwest of the Airport and the Mustang VORTAC (117.9) is located approximately 32 nautical miles north of the Airport.

In addition, several existing visual navigational aids located on the Airport are available to pilots. These include a rotating beacon and a lighted wind cone with segmented circle, which is located west of the runway intersection. Four additional wind socks are located on the Airport near the Runway 16/34 ends and the Runway 12/30 ends. In addition, Runway 16/34 is equipped with Visual Approach Slope Indicator Lights (VASIs), which provide visual descent guidance, and are configured for a three degree glide path angle.

There is also a network of low-altitude published federal airways (i.e., Victor airways) in the vicinity of Minden-Tahoe Airport, which traverse the area and span between the regional ground-based VOR/DME and VORTAC equipment. Victor airways include the airspace within parallel lines located four nautical miles on either side of the airway and extend 1,200 feet above the terrain up to, but not including, 18,000 feet AMSL. The Victor airway designated V 165 is a north/south oriented airway that connects the Clovis VOR in California with the Mustang VOR near Reno and is located approximately six

Figure A4
Airspace/NAVAIDS Summary

nautical miles east of the Airport. The Victor airway designated V 28-113 connects the Linden VOR in California to the Mustang VOR and is located approximately 12 nautical miles west of the Airport.

Minden-Tahoe Airport currently has two published non-precision instrument approach procedures. Non-precision approaches provide lateral guidance but not vertical guidance. Both approaches are Global Positioning System (GPS) instrument approaches and are circling (circle to land) approaches meaning that they are not published for a specific runway end. Instead of a typical straight-in approach to a specific runway end, aircraft fly the approach until the runway is in sight and then circle to land on the appropriate runway.

The GPS-A approach procedure allows for a Minimum Decent Altitude (MDA) or ceiling minimum of 1,502 feet and a visibility minimum of either 1 ¼, 1 ½, or 3 miles depending on the approach speed of the aircraft. The GPS-B approach procedure allows for a Minimum Decent Altitude (MDA) or ceiling minimum of 1,882 feet and a visibility minimum of either 1 ¼, 1 ½, or 3 miles depending on the approach speed of the aircraft. If the aircraft reaches the MDA for either approach and the pilot does not have the runway in sight, a missed approach procedure must be initiated. The FAA is currently in the process certifying and implementing new Global Positioning System (GPS) instrument approach augmentation technology [i.e., both Wide Area Augmentation Systems (WAAS) and Local Area Augmentation Systems (LAAS)], to help Airports like the Minden-Tahoe Airport implement new or improved instrument approaches. These new systems allow for increased accuracy and reliability of the procedures and can also provide vertical guidance.

Table A1
INSTRUMENT APPROACH PROCEDURES
Minden-Tahoe Airport Master Plan

Approach	Designated Runway(s)	Ceiling Minimum (AGL)	Visibility Minimums
GPS-A	Circling	1,502'	1 ¼ Mile ⁽¹⁾ / 1 ½ Mile ⁽²⁾ / 3 Miles ⁽³⁾
GPS-B	Circling	1,882'	1 ¼ Mile ⁽¹⁾ / 1 ½ Mile ⁽²⁾ / 3 Miles ⁽³⁾

Source: *U.S. Terminal Procedures, Southwest (SW), 23 November 2006.*

(1) Category A aircraft.

(2) Category B aircraft.

(3) Category C and D aircraft.

Navigation and communication aids will be evaluated in detail in the following chapters, and future recommendations will be identified.

Noise Abatement Procedures

There are several voluntary Noise Abatement Procedures that have been established at the Minden-Tahoe Airport. The procedures are designed to help the Airport be a good neighbor to the surrounding residential communities and pilots are encouraged to operate their aircraft in the quietest manner possible, consistent with safety. Generally, aircraft operators are requested to avoid flying above the more densely populated residential areas. These areas are indicated in Figure A5, *AIRPORT TRAFFIC PATTERNS*. Generally, they include areas to the northeast and south of the Airport. Powered aircraft are encouraged to fly traffic patterns on the west side of the Airport, or non-standard right-hand patterns to Runways 16 and 12. Gliders are encouraged to fly patterns on the east side of the Airport or a non-standard right-hand pattern to Runway 30. The general traffic pattern altitude for light aircraft is 5,700 feet above mean sea level (AMSL) and 6,200 feet AMSL for heavy aircraft (1,000 feet and 1,500 feet above ground level respectively). Additionally, the Airport has designated Runway 34 as the calm wind runway.

Aircraft are requested to comply with the following procedures as posted on the Airport website, unless weather conditions or aircraft limitations are present:

- Southbound departures from Runway 16 should fly straight-out on the runway heading.
- Northbound departures from Runway 16 should fly a right downwind over US Highway 36.
- Southbound departures from Runway 34 should fly a left downwind over US Highway 36 and avoid residential areas south of the Airport.
- Northbound departures from Runway 34 should turn left heading 320 before crossing Johnson Lane and avoid residential areas.
- Straight-in approaches to all runways should be avoided.
- Approaches to Runways 16 and 12 should fly right hand patterns.
- Approaches to Runways 34 and 30 should fly left hand patterns.
- Sailplane/glider traffic patterns should be flown east of the runways.

Minden Glider Area Operations

Areas and procedures for glider operations within positive controlled airspace under the jurisdiction of Oakland Air Route Traffic Control Center (Oakland Center) have been established in a Letter of Agreement between the Oakland Center and the Pacific Soaring Council. This agreement authorized the Pacific Soaring Council to deviate from the requirements of FAR 91.135 when operating in these areas and under the responsibilities and procedures specified in the agreement. The procedures primarily apply to times when high altitude soaring conditions prevail and require the Wave Camp Operation Manager to request from the Oakland Center, a block of altitudes above Flight Level 180 (18,000 feet above mean sea level) in a specific Minden Glider Area(s). The three established Minden Glider Areas are shown on Figure A6, *MINDEN GLIDER AREAS*.

Figure A5
Airport Traffic Patterns

Figure A6
Minden Glider Areas

Airport Environs

Minden-Tahoe Airport is located immediately north of the unincorporated boundaries of the cities of Minden and Gardnerville, Nevada, south of Johnson Lane and east of Highway 395. The Airport is located within the general planning area of Carson Valley and within the Douglas County limits. Because the operation of an airport influences surrounding land use and surrounding land use has an influence on the operation of an airport, it is critical in any airport planning study to gain an understanding of existing and proposed land use types in the area near the Airport. The following text and illustrations describe existing land use, existing zoning, and future land use in the airport environs.

Existing Land Use

The “Airport Community,” as defined in the Douglas County Master Plan, consists of 4,677 acres of land. Of this area 3,766 acres are privately owned and 911 acres are publicly owned. The majority of the publicly owned land is owned by Douglas County, with only one acre owned by the U.S. Forest Service. Over 50 percent of the area surrounding the Airport consists of agricultural or vacant lands. This rural land lies mostly along the U.S. 395 highway corridor and south of the Airport. To the east lies forest and range land, with some residences located northwest of the Airport. The land immediately north and west of the Airport is industrial while the area south of the Airport is mainly agricultural. Southeast of the Airport, but within airport property, is a wetland/floodplain area, set aside for aviation safety.

Specifically, the western portion of Airport property is used primarily for aviation business and private aircraft hangars. There is also a maintenance yard area that includes the County Road Department, a County vehicle maintenance facility, a County/School district warehouse, a County record storage facility, a School District bus yard and maintenance facility, and a U.S. Forest service storage yard.

Existing Zoning

The following illustration, entitled *GENERALIZED EXISTING ZONING MAP*, provides a general idea of the land use zoning pattern in the area surrounding the Airport. The area illustrated encompasses portions the Carson Valley planning area and the surrounding area of Douglas County.

Zoning is the public regulation of land use. It involves the adoption of ordinances that divide a community into various districts or zones. Each district will allow a certain use of land within that zone, such as residential, commercial, and industrial (and many others). Typical zoning regulations address such things as the height of buildings,

number of people that can occupy a building, lot area, setbacks, parking, signage, and density. Zoning information for the Airport was obtained from Douglas County.

The Douglas County Master Plan designates the Airport environs as an Urban Service area because of its urban and industrialized areas. The Airport is zoned as “AP,” airport, defined as an area designated to maintain, preserve and enhance the viability of the county’s airport operations while being responsibly sensitive to surrounding land uses. To the north and west of the Airport are areas zoned as Service Industrial. The County Master Plan describes these areas as having light industrial uses with a mix of supporting commercial and retail uses. Northeast of the Airport are several areas designated as SFR-1, single family residential zones with a maximum density of one home per acre. The land to the east of the Airport is mostly zoned as FR-19, forest range with a minimum parcel size of 19 acres. According to the County Master Plan, the purpose of the FR-19 zone is to preserve rural areas for the purpose of efficiently using land to conserve forest and range resources, protect the natural environment, preserve open spaces, and preserve open areas for grazing and other agricultural uses for land under private ownership. This is a low density land use district with a maximum permitted density of one home per 19 acres.

The land to the south and northwest of the Airport is zoned as A-19, agricultural land with a minimum parcel size of 19 acres, set aside to conserve agricultural resources, preserve open space and the rural character of the county, and to direct urbanization into manageable and identified development areas. Similar to FR-19, this is a low density land use district with a maximum permitted density of one home per 19 acres. There is also one small segment of land, north of Johnson Lane that is zoned as NC (neighborhood commercial), an area of restricted retail and business uses which have minimal impact on surrounding properties. The uses are oriented to provide services to the immediate neighborhood area.

Figure A7
Generalized Existing Zoning Map

Future Land Use Planning

The future land use for the area surrounding Minden-Tahoe Airport is depicted in the following figure entitled *GENERALIZED FUTURE LAND USE MAP*. This information was taken from the 2005 Douglas County Master Plan Update: Airport section of the Carson Valley Planning Area Land Use and Transportation Plan.

The Douglas County Master Plan was updated in 2005 in order to provide a guide for future growth and development within the County. The Plan outlines the goals and corresponding policies that will help the County grow under a specific strategy. As part of this Plan, the County will update its zoning to be consistent with the changes in the County Master Plan. In order to keep this consistency, the County plans to include the retention of more restrictive zoning, such as residential and commercial, and the rezoning of vacant parcels of land. This process does not include a plan to rezone any existing residential properties to nonresidential, unless requested by the owner.

Under the Douglas County Master Plan: Airport sub-section, the Airport's first goal (Goal AP.01) is to "promote the growth of the Airport community as an employment center and new residential community that is compatible with the built and natural environments in the vicinity and consistent with the Airport Master Plan." This sub-section also states that the County will use zoning, project review process, and design guidelines that will enhance property values and the aesthetics of the Airport Community.

In the Airport community, there are about 1,000 acres of industrial land planned for future development in the community. Additionally, the County Land Use Plan for the Airport encourages the industrial use of the land along Johnson Lane in order to provide a buffer to the residential area to the north. The Airport Community has also designated a substantial tract of land, called a "receiving area," to increase flood protection and airport buffering. This area is located on the eastern side of the Airport. The County Master Plan requests that the property owner of the receiving area create a specific plan for this land, to be reviewed by Douglas County, which focuses on flooding controls, infrastructure, water and sewer systems, traffic and roadways, land compatibility, community design and other pertinent issues. The plan will also prevent the development of high occupancy structures and noise sensitive land uses in the flight path area. However, approximately 1,400 acres of this land is anticipated to be developed into residences with single-family estate densities.

Due to expanding industrial development and industrial use, the plan also calls for the addition of a recreational park in the area and the possible addition of a fire station to service the area. The Douglas County Open Space Plan also addresses the Airport, with a goal of maintaining a large buffer of open space land between the Airport and Minden.

Figure A8
Generalized Future Land Use Map

The Douglas County Master Plan main section also addresses future land use possibilities for the Airport. Goals for future Airport land uses under this plan include the expansion of additional facilities and services. These facilities could include the construction of a sailplane facility on the east side of the Airport, a new runway, an additional taxiway, hangars and the expansion of the FBOs, construction of a central air traffic control tower and the addition of electronic navigational aids.

Environmental Inventory

The primary goal of this task is to gather available materials that summarize the baseline environmental conditions at the Minden-Tahoe Airport. This environmental inventory is intended to assist in the thorough evaluation of development alternatives and provide information that will help expedite subsequent environmental processing. Any potentially sensitive environmental resources in and around the Airport will be identified so that adequate consideration of environmental factors can be given in the evaluation of development alternatives.

Meteorological Conditions

Douglas County lies between two mountain ranges that have a marked influence on the climate. The two ranges are the Carson Range to the west, which affects the climate mainly in the winter, and the Pinenut Mountains to the east, which affects the climate mainly in the summer. The Carson Range is part of the Sierra Nevada. It rises from the valley floor to an elevation of about 10,000 feet within a distance of 10 miles. The Pinenut Mountains generally rise to elevations of 7,000 to 9,500 feet. On the valley floor, the highest elevation is approximately 5,400 feet (near Woodfords, California) and the lowest is approximately 4,625 feet (northern part of Douglas County). The relatively high elevation, location of the mountains and the dry climate of western Nevada all help make Douglas County one of the world class flier destinations.

Local Climate. According to the Douglas County Master Plan the local climate can be described as continental. The summers are short and often hot, and the winters are moderately cold. The percentage of possible sunshine averages 78% for the year; 90% for the summer, 66% for the winter, but the abundant sunshine is somewhat offset by the shortness of the growing season. The average daily maximum temperature in July is 90° F, and average daily minimum temperature in January is 18° F.

The Sierra Nevada effectively reduces the moisture content of storms that sweep in from the Pacific Ocean. Winter is by far the wettest part of the year; more than half the annual precipitation is received during the period November through February. Total

precipitation averages 9.37 inches a year at Minden, but variations of about 25 percent are common from year to year.

In winter, because the Sierra Nevada is a barrier to the flow of air toward the east, there is considerable difference between the amount of precipitation received at the higher elevations and the amount received at the lower elevations.

The summer showers are a product of the moist air from the Gulf of Mexico. The blocking effect of the Pinenut Mountains to the flow of air toward the northwest is strong, but not nearly as pronounced as that of the Carson Range blocking to the flow of air toward the east in winter. Weather data indicates that the area gets an average of only 12 thunderstorms a year.

The Sierra Nevada also produces the sources of powerful lift, such as waves and thermals, which make Minden-Tahoe an important location for glider pilots. When stable air flows over a barrier (such as the Sierra Nevada Mountains), the barrier causes the air to powerfully rise and fall, creating waves. These waves can be ridden by glider pilots to extremely high elevations. The waves associated with the Sierra Nevada are world famous and they allow for the possibility of record setting altitude and distance flights from the Minden-Tahoe Airport.

Ceiling and Visibility Conditions. Ceiling and visibility conditions are important considerations because the occurrence of low ceiling and/or poor visibility limit the use of the Airport to instrument approach and departure operations until conditions change. Under poor visibility conditions or Instrument Meteorological Conditions (IMC), the pilot must operate under Instrument Flight Rules (IFR) rather than Visual Flight Rules (VFR). Under IFR, the pilot maneuvers the aircraft through sole reference to instruments in the aircraft and navigational aids on the ground. The Airport must be closed when conditions are worse than the published IFR minimums. When flight conditions are visual or Visual Meteorological Conditions (VMC), the pilot can maneuver the aircraft by reference to the horizon and objects on the ground.

AWOS observation transmitted to the FAA's Weather Message Switching Center can be acquired and compiled by the National Oceanic and Atmospheric Administration's National Climatic Data Center and organized into the FAA standard 36-point wind rose format. By customizing this data based on the specific ceiling and visibility minimums published for an airport, a determination of the percentage of time the flying conditions at the Airport are VMC, IMC and below minimums can be made. However, because a data link to the FAA's Weather Message Switching Center has not been established for the AWOS at the Minden-Tahoe Airport, this determination cannot be made.

Runway Wind Coverage. Surface wind conditions (i.e. direction and speed) generally determine the desired alignment and configuration of the runway system. Aircraft land and takeoff into the wind and therefore can tolerate only limited crosswind components

(the percentage of wind perpendicular to the runway centerline). Runways that are not oriented to take advantage of prevailing winds will restrict the capacity of the Airport. Wind conditions affect all airplanes in varying degrees; however, the ability to land and takeoff in crosswind conditions varies according to pilot proficiency and aircraft type. Generally, the smaller the aircraft, the more it is affected by the crosswind component. This especially applies to the glider activity at the Minden-Tahoe Airport.

As stated previously, wind data from the AWOS at the Minden-Tahoe Airport is not available. Appendix 1 to FAA AC 150/5300-13, *Airport Design* states that when data is not available for the site, it is permissible to develop composite wind data using wind information obtained from two or more nearby recording stations. However, composite data is usually only acceptable if the terrain between the stations and the Airport is level or only slightly rolling. Because of the mountainous terrain surrounding the Airport, wind data to construct an all-weather wind rose was obtained from the closest available weather station. The Western Regional Climatic Center (WRCC) maintains a weather station called a Remote Automated Weather Station (RAWS) located in Fish Springs, Nevada, approximately six miles southeast of the Airport. However, the applicability of this station to the Airport is marginal because the RAWS is located at an elevation approximately 450 feet higher than the Airport and the terrain between the Airport and the station is hilly. Other concerns about the applicability of the RAWS data are the trees, vegetation and terrain surrounding the station, likely resulting in a higher percentage of calm wind observations. There were approximately 86,265 observations available from the Fish Springs RAWS for a period from 1996 to 2006. The allowable crosswind component is dependent upon the Airport Reference Code (ARC) for the type of aircraft which utilize the Airport on a regular basis. According to the existing Airport Layout Plan the ARC for Runway 16/34 is C-III, the ARC for Runway 12/30 is B-II and the ARC for Runway 12G/30G is A-I.

In consideration of the ARC C-III classification, airport design standards specify that the 16-knot crosswind component be utilized for analysis on Runway 16/34. In consideration of the ARC B-II classification, airport design standards specify that the 13-knot crosswind component be utilized for analysis on Runway 12/30. Runway 12G/30G is parallel to Runway 12/30 and will consequently not be used in this wind analysis. In addition, because the Airport is used frequently by aircraft for which the 10.5-knot crosswind component is considered maximum, this crosswind component will be considered for both runways. The following illustration entitled *FISH SPRINGS ALL WEATHER WIND ROSE: 16-, 13-, & 10.5-KNOT CROSSWIND COMPONENTS*, illustrates the all weather wind coverage provided at the Airport based on the Fish Springs RAWS station data.

The desirable wind coverage for an airport's runway system is 95 percent. This means that the runway orientation and configuration should be developed so that the maximum crosswind component is not exceeded more than 5 percent of the time annually. The

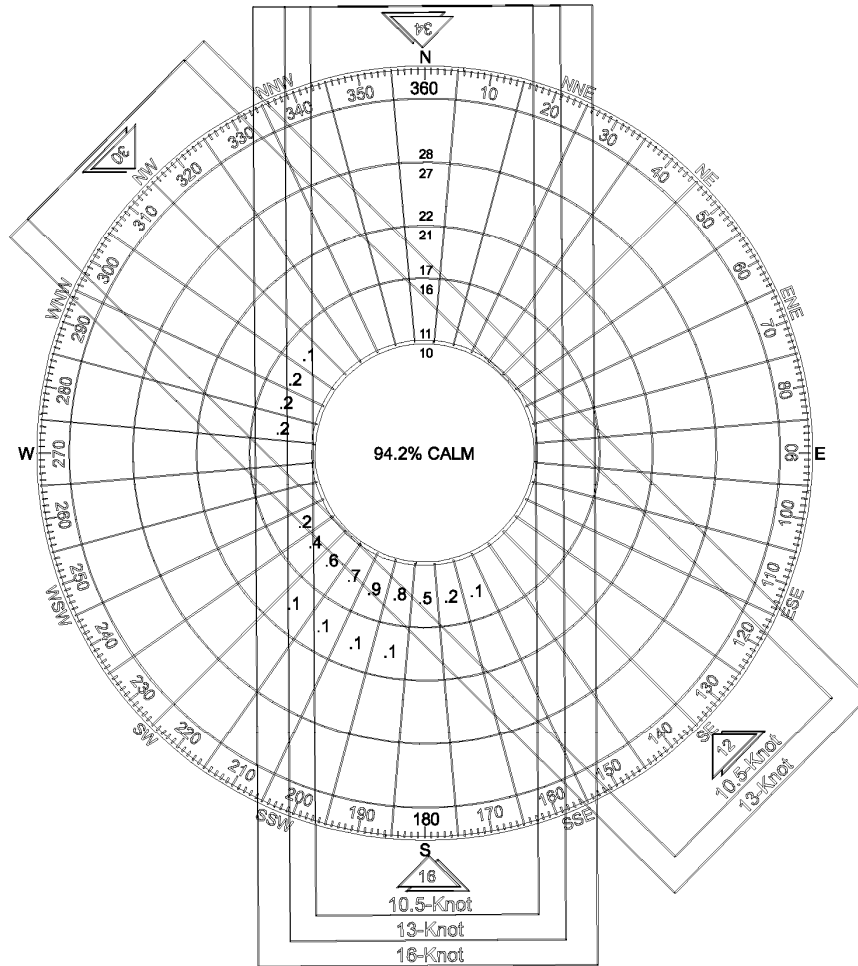
following table, entitled *FISH SPRINGS ALL WEATHER WIND COVERAGE SUMMARY*, quantifies the wind coverage offered by the Airport's existing runway system, including the coverage for each runway end. Based on the all weather wind analysis, the existing runway configuration would provide 99.7 percent wind coverage for the 16-knot crosswind component, 99.6 percent wind coverage for the 13-knot crosswind component, and 99.1 percent coverage for the 10.5-knot crosswind component. Overall, the runways combine to provide almost 100 percent wind coverage according to the Fish Springs RAWs data. However, as stated previously, there are numerous factors that affect the applicability of this station to the Airport, most notably the vegetation and trees surrounding the station that likely prevent accurate wind velocity and direction observations. The percentage of calm observations (less than 10.5 knots) is 94.2 percent which is very high in comparison to the wind data published in the previous airport master plan which consisted of observations during a period from 1949 to 1955 and indicated approximately 86.4 percent calm observations. It is highly recommended that a data link be immediately established for the AWOS in order to conduct a more applicable wind analysis and at least 1 year of wind data be collected in accordance with recommendation in Appendix 1 to FAA AC 150/5300-13, *Airport Design*.

Table A2
FISH SPRINGS ALL WEATHER WIND COVERAGE SUMMARY
Minden-Tahoe Airport Master Plan

Runway Designation	10.5-Knot Crosswind Component	13-Knot Crosswind Component	16-Knot Crosswind Component
Runway 16/34	98.5%	99.2%	99.7%
Runway 12/30	96.9%	98.7%	--
Combined	99.1%	99.6%	99.7%

Source: *Wind analysis tabulation provided Western Regional Climatic Center.*

Figure A9
FISH SPRINGS ALL WEATHER WIND ROSE: 16-, 13-, & 10.5-KNOT CROSSWIND COMPONENTS
Minden-Tahoe Airport Master Plan



Source: Wind rose developed by Barnard Dunkelberg and Co. using data provided by the Western Regional Climatic Center Station: Fish Springs, Nevada. Period of Record – November 1996-October 2006. Total Observations: 86,265.

Noise

The 1993 Airport Master Plan prepared for Minden-Tahoe Airport included an existing and future noise analysis to assist in the future planning of the Airport and its surrounding environs. These noise contours will be reviewed and updated based on the forecasts of aviation activity developed in the following chapter. In 1991 there were sufficient operations at the Airport to generate the 55 LDN, 60 LDN and 65 LDN noise contours. The 1991 65 LDN noise contour existed entirely on airport property. The future 2011 65 LDN noise contour extended slightly off airport property off the ends of Runway 16/34, however, this property has since been acquired by the Airport.

Air Quality

There are only two counties in Nevada, Clark County and Washoe County, currently classified by the US Environmental Protection Agency (EPA) as nonattainment areas for National Ambient Air Quality Standards (NAAQS). Parts of Clark County are classified as nonattainment for Ozone (8-Hour), Carbon Monoxide and Particulate (size < 10 micrometers). Parts of Washoe County are classified as nonattainment for Carbon Monoxide and Particulate (size < 10 micrometers). Clark County is located approximately 225 nautical miles southeast of Douglas County while Washoe County is located approximately 11 nautical miles north of the Airport. There are currently no classified nonattainment areas for air quality pollutants within Douglas County.

Soils

Farmland and soils maps obtained from the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) indicate that the majority of airport property consists of Gardnerville clay loam, slightly saline-alkali soil which would only be classified as prime farmland if irrigated and reclaimed of excess salts and sodium. Additional areas of airport property and the immediate surrounding areas consist of Gardnerville clay loam, drained, Godecke fine sandy loam, and Ormsby loamy sand. The only potential prime farmland in this group is the Gardnerville clay loam, drained and again this soil must be irrigated and reclaimed of excess salts and sodium to be classified as prime.

Vegetation and Wildlife

The vegetation on airport property and in the vicinity of the Airport is typical of the high desert climate of western Nevada. According to the Douglas County Master Plan, the County is home to several sensitive plant and animal species. It is also part of the mule deer's critical habitat. Other wildlife species, while not endangered, contribute to the County's recreational opportunities and quality of life. The US Fish and Wildlife Service

and Nevada Fish and Wildlife Office do not list any endangered species known to exist in Douglas County. The following is a list of Threatened and Candidate Species for Douglas County

Bird. Bald Eagle (*Haliaeetus leucocephalus*), Threatened

Amphibian. Mountain yellow-legged frog (*Rana muscosa*), Candidate

Fish. Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), Threatened

Plants. Webber ivesia (*Ivesia webberi*) and Tahoe yellowcress (*Rorippa subumbellata*), both Candidate

Historical, Archaeological and Cultural Resources

There are no known historical, archaeological or cultural resources on or in the vicinity of the Minden-Tahoe Airport. However, the Nevada State Historic Preservation Office will be contacted concerning historical and cultural resources following the completion of the conceptual development plan in following chapters. According the National Register of Historic Sites, one of the closest historic sites to the Airport is the Genoa Historic District. This district, also known as Mormon Station, encompasses an area of about 1,295 acres, including 29 buildings. Located about five miles west of the Airport, the historic area marks the location of Nevada's first permanent nonnative settlement, which is the reason Carson Valley is also known as the birthplace of Nevada. Another historic site in the area is Boyd Toll Road, about 14 miles south of Carson City on Highway 395. This road, created in 1861, was built to be a connecting road between Genoa and Cradlebaugh Toll Road (the connection to the mining district of Esmeralda). Additionally, the land is part of an area which might have been used by the native Washoe Tribe before settlement by Mormons in the 1800s. Although there are no known archeological, cultural or historic resources associated with this tribe in this area, there is a possibility that something of tribal value might be found if previously undisturbed land is developed.

Floodplains

Douglas County is located in the Great Basin and has a wide variety of different land types and associated waterways. The dominant waterway within Carson Valley is the Carson River, which creates the largest drainage basin in Douglas County. This river flows south to north, with two main forks, the East and the West, which join in the middle of Carson Valley. The land which composes most of Carson Valley has been filled with well-bedded fine-grained Tertiary lake sediments to a depth of over 1,000 feet.

Because of this large accumulation of sediment, much of the valley is poorly drained and has a high water table, which can add to the potential for flooding.

Several large floods occurred within the Carson Valley Drainage system, usually as a result of spring run-off and wet mantle storms (excessive rain on already saturated soils). The three main reasons for flooding in the Carson Valley are obstruction to the waterways, insufficient capacity and the natural slope of the channel. Because of the history of frequent floods in the Carson River Valley, Douglas County entered the Federal National Flood Insurance Program in January 1974. A flood insurance study was completed on the East and West Forks of the Carson River, the Genoa area, and Topaz Ranch Estates areas of Douglas County. Additionally a study was completed on several stream basins along the west side of the Carson Valley and along the east side of the Carson Valley between 1986 and 1990. The updated Federal Emergency Management Agency (FEMA) maps were adopted by Douglas County in 1992. The revisions to the floodplain mapping are on-going and the limits to further areas of flood studies are dependent on limited FEMA funding.

According to the Douglas County Master Plan, the County participates in the National Flood Insurance Program, which provides a basis for flood planning in areas mapped and designated flood prone. The Federal Insurance Program regulations dictate that a community can adopt floodway ordinances which prohibit encroachment (including fill, new construction, and other development) that would result in any increase in flood levels. The floodway is based on the principle that the regulated area must be designed to carry the water of the base flood without increasing the water surface elevation of the flood more than one foot at any point.

According to FEMA floodplain maps, for the most part, the existing 100-year floodplain lies approximately 9,000 feet west of the Airport, on the opposite side of Highway 395. Segments of the 500-year floodplain are within approximately 1,000 feet of Runway 30 end, on the eastern side of the Airport. These are areas that still flood during a 100-year storm, but in general retain water of less than one foot. Areas designated as 100-year floodplain are also located southwest of the Airport approximately 2,500 from the Runway 30 end.

Wetlands

According to the National Wetlands Inventory, there are several designated wetlands near the Airport. One potential wetland lies to the southwest of the Airport while the other, larger segment of potential wetland lies approximately 1,000 feet southeast of the Runway 30G end.

This wetland is connected to the Dangberg Reservoir Number Three by an intermittent stream. The Douglas County Master Plan indicates that the wetlands near the Airport could potentially be used to help relieve some of the flooding by adding additional flow capacity for Carson River flood flows. Since the Carson River typically floods while the irrigation system is not being used, the system could help relieve flooding by adding flow capacity for Carson River flood flows. This solution would require the County and the ditch owners to come to an agreement on how this system would be operated and maintained. Flows could be conveyed to wetlands near the Douglas County Airport by using portions of the Allerman Canal and its associated reservoirs. This possibility would also require agreements with ditch and land owners for use and joint maintenance of the ditches.

Water Quality

The groundwater in Carson Valley is generally suitable for drinking water according to County standards. However, the agricultural, septic tanks, urban runoff and geothermal activities in the County impact the groundwater at certain locations. According to a 1989 study by Garcia and Thodal several areas in the County exceeded certain drinking water standards for a few chemicals associated with these activities. In the Airport region, manganese levels exceeded standards.

Douglas County Utilities provides water and sewer service in the area. The County's North Valley Plant provides sewer service to the Airport area and developments in the Johnson Lane area and the corresponding effluent disposal is on a small agricultural field adjacent to the lagoons at the plant.

Financial Inventory

The primary goal of this task is to gather materials that summarize the financial management of the Airport. In addition, it is important to develop an understanding of the financial structure, constraints, requirements, and opportunities for airport activities as related to the development of a Capital Improvement Program (CIP). The documents that have been gathered and reviewed for this financial inventory will be used to formulate a reasonable and financially sound CIP, with which to fund projects identified in the master planning process.

An airport is both a public service and a business, and must be operated as both. Financial assistance to public airports is often provided by the city, county, state, federal, and private sources, where available. In return, the Airport provides jobs, supplies economic benefits to the area that it serves, and provides a major element of the public

transportation system. This is the public service component. From a business standpoint, the Airport has the ability to generate certain revenues and, therefore, has the obligation to do so. The most successful and satisfactory method of accomplishing this is through a combination of fair and equitable fees and charges associated with the use of airport facilities. It is a federal requirement that airport generated revenues be used at the Airport. Airport revenues can be derived from leases, rental rates, airfield fees and charges, airlines, cargo operators, and other sources of operating revenue.

In consideration of these issues, the Airport's financial statements have been gathered for fiscal years 2001 through 2005. A review of the financial documentation for the Minden-Tahoe Airport indicates that the Airport is operationally self-supporting. Major sources of revenue for the Airport include: leases, rents and royalties, miscellaneous charges for service, and interest from pooled investments, including federal and state grants.

Table A3
REVENUE AND EXPENSE SUMMARY, 2001-2005
Minden-Tahoe Airport Master Plan

Year	Grants⁽¹⁾	Other Revenues	Capital Expenditures	Other Expenditures
2001	\$1,367,655	\$884,616	\$1,548,330	\$423,930
2002	\$428,738	\$821,341	\$525,336	\$539,433
2003	\$3,114,439	\$823,797	\$2,761,975	\$1,147,930
2004	\$1,103,339	\$871,040	\$1,329,140	\$654,686
2005	\$2,480,985	\$910,428	\$2,831,232	\$1,046,547

Source: 2004/2005 Douglas County Annual Report

(1) Includes FAA grants. Amount shown does not correspond to capital expenditures for each year because some projects may have taken more than one year to complete.

In addition, the Airport's 2008-2012 Capital Improvement Program has also been received and reviewed. The following improvements are listed on the CIP for Minden-Tahoe Airport:

2008

- Partial Taxiway A2 & Taxiway D Between Taxiway's A & B Reconstruction
- Ramp Area Row A and Taxilane Reconstruction
- Ramp Crack Repair and Seal
- Runway's 34 & 16 Run-up Aprons Taxiway Intersection Seal
- Super AWOS

- Telephone Access System – Security Gates
- Phase 3 of AIP 15 under grounding of Power Lines
- Rehabilitate Taxiway *FUTURE FAA/STATE PROJECT*
- Construct Equipment Building *FUTURE FAA/STATE PROJECT*

2009

- Parking Lot Reconstruction
- Constructing Barling Road (Taxiway F)
- Construct Run up Area for Runway 30 (80' x 100')
- Crack Repair & Seal Runway 12/30 & Taxiway B
- T-Hangar Crack Seal and Slurry Seal
- East-Side Tiedown Ramp Engineering

2010

- Construct Northwest Section of Taxiway B
- Acquire Land for Runway 34 RPZ (79.1 Acres)
- Acquire Land for Runway 30 RPZ (18.9 Acres)

2011

- Purchase Snowplow
- Construction of East-Side Tiedown/Ramp

2012

- Convert old runway 21 into new Taxiway C (2,400' x 50')
- Construct Runway 21

The current CIP covers five years and programs a total estimated expenditure of \$7,511,048, with the local share expected to be approximately \$393,800 and the FAA's federal share will be approximately \$7,904,848. It should also be noted that the current CIP will be updated in conjunction with the revised project list that is prepared for this Airport Master Plan.

Issues Inventory

Identification of the current and future planning issues, which may impact the use of a public facility, is an important step in the planning process. This is particularly true of an airport where infrastructure investment is great, where the issues are complex, and where

the entire airport facility, along with its environs, should be planned in unison to minimize incompatibility between the Airport and its surroundings.

The following list identifies the most significant issues facing Minden-Tahoe Airport. Some of these issues have been gleaned from the community visioning workshop conducted in Minden early in the planning effort, some from specific information gathered during the inventory process, while others relate to general airport planning principles. A goal of this plan is to evaluate these issues and incorporate them into the formulation of the future plans for Minden-Tahoe Airport:

- Soaring/Glider Activity
- Existing Airport Ordinance
- Growth Management
- Corporate Aircraft Use
- Economic Development
- Land Use Compatibility
- Runway Configuration
- Safe & Efficient Airport Utilization
- Stakeholder/Management Communication

Forecasts of Aviation Activity

Introduction

Forecasting is a key element in the master planning process. The forecasts are essential for analyzing existing airport facilities and identifying future needs and requirements for these facilities. Forecasting, by its very nature, is not exact, but it does establish some general parameters for development and, when soundly established, provides a defined rationale for various development activities as demands increase. The amount and kind of aviation activities occurring at an airport are dependent upon many factors, but are usually reflective of the services available to aircraft operators, the meteorological conditions under which the airport operates (daily and seasonally), the businesses located on the airport or within the community the airport serves, and the general economic conditions prevalent within the surrounding area.

Forecasting generally commences by obtaining accurate historical and existing data. Using the present time as an initial point, certain quantifiable facts and trends can be identified, along with many intangible factors, which will impact the aviation activity forecasts. This data has evolved from a comprehensive examination of historical airport records and recent planning documents relative to the Airport (i.e., the 2006 *FAA Terminal Area Forecast*, *FAA Aerospace Forecast Fiscal Years 2006-2017*, the 2004 *Nevada Airport System Plan (NASP) Update* and the 1993 *Minden-Tahoe Airport Master Plan Report*). These documents were assembled in different years, making the data quite variable and emphasizing the need for establishing a well-defined and well-documented set of base information from which to develop forecasts of aviation activity.

Prior to an examination of current and future activity levels at the Airport, there are several conditions and assumptions that should be noted to form the foundation for the development of the forecasts contained here. These variables represent a variety of physical, operational and socioeconomic considerations, and to varying degrees relate to and affect aviation activity at the Minden-Tahoe Airport.

Weather Conditions

The most current and complete set of weather data available for the Minden-Tahoe Airport was obtained and analyzed. With the exception of a few days annually, the Airport is not adversely affected by poor weather conditions. Airport personnel estimate that Visual Flight Rules (VFR) meteorological conditions are experienced a high percentage of the time. Therefore, aircraft can operate at the Airport on a regular basis throughout the year, with limited interruption due to weather *(the potential negative impact of poor weather conditions on the operational capability of the Airport will be analyzed in the following chapter of this document)*.

Socioeconomic Conditions

Historically, the socioeconomic conditions of a particular region impact aviation activity within that region. The most often analyzed indicators are population, employment, and income.

Population. According to estimates by the Nevada State Demographer, the Cities of Minden and Gardnerville have demonstrated population growth since 1996, with the exception of a slight dip for Minden in 2002. The population of Douglas County has increased 78% from 1990 to 2005. The population of Minden was approximately 2,275 in 1996. By 2005, the population had increased to an estimated 2,983 people. This equates to an average annual growth rate (AAGR) of about 3.4%. The 1996 population of Gardnerville was 2,630 and it increased to 5,165 by 2005 with an AAGR of approximately 10.7%. The population of Douglas County was 38,369 in 1996 and had grown to approximately 50,108 by 2006. The State Demographer projects the population of Douglas County will increase by 15,956 people to a total of 66,064 by the year 2026. This would be an increase of 31.8% from 2005 or an AAGR of 1.5%. By comparison, the State of Nevada is projected to increase from 2,518,869 (2005 population estimate) to 4,370,521 in 2026. This represents an increase of 73.5% and an AAGR of 6.6%. In fact, the US Census Bureau projects the 2030 population of the State of Nevada will show an increase of 114.3% from the 2000 census, the highest percentage increase of any state. The US Census Bureau estimates that the national population will increase from 296,410,404 in 2005 to some 363,584,000 by the year 2030. This represents an approximate increase of 22.6% and an AAGR of 0.9%.

Employment and Property Values. According to the Douglas County Master Plan, employment in the County has increased from 19,000 in 1996 to 23,495 in 2005, while the unemployment rate in the County has decreased from 6.8% in 1996 to 4.4% in 2005. The assessed property value in Douglas County has increased at an AAGR of 6.44% from 1996 to 2004, but has increased 22.05% from 2004 to 2005 and is estimated to have increased 24.51% from 2005 to 2006.

Income. According to the 2006 Douglas County Master Plan annual review, the median household income for the County has increased at an AAGR of 3.03% since 1997 to a 2005 total of \$66,950. This compares to the State of Nevada median household income of \$48,496 and the national median household income of \$46,071 according to the US Census Bureau.

Community Support

The Minden-Tahoe Airport benefits from the support of the Douglas County government, local industry and citizens of the County. The Airport is recognized as a vital community asset that contributes to the stability and future of the area's economy. Since its beginnings as a military training base, the Airport has been central to local economic development. Today, the Minden-Tahoe Airport is a hub of recreational flying, soaring and business activity. The Airport is host to many regional and national gliding competitions and events. However, there is a division in the community about the future of the Airport. The divided opinion relates primarily to the Weight Ordinance adopted by the County in 1984 and revised in 1990 which allows operations by aircraft weighing up to the 50,000 pounds with multiple wheel landing gear configurations to use the Airport. Under the ordinance, aircraft weighing more than 50,000 pounds are restricted from operating at the Airport.¹

Community/Airport Location and Potential

Both Douglas County and the surrounding area, with its numerous educational and recreational opportunities, tourist activities, and expanding population base, provide a strong and definable market area for continued general aviation and recreational flying growth and development. Located in the special niche of recreational and sport flying, the Minden-Tahoe Airport is properly postured to increase its importance and market share in this specific avenue of general aviation. Catering to this general aviation activity rather than attempting to attract commercial service operations represents the implicit potential of the Airport. This strategy also takes advantage of the potential of the Airport to enhance economic growth opportunities for Douglas County.

¹ Large fire bomber aircraft operations are allowed at the Airport under a waiver to the weight ordinance.

Negative or Neutral Factors

The Airport has very few negative factors and is in an enviable position due to the previously described positive features and conditions. However, there are some factors that can and do have a negative impact on the Airport that must be considered in the planning process. One issue is the overall condition of the general aviation industry in the United States that, since 1978, has been in a significant recession. The FAA identified several factors that have contributed to this prolonged downturn. These factors include three economic recessions, two fuel crises, the enactment of the Airline Deregulation Act of 1978, the repeal of the GI Bill, and the repeal of the investment tax credit.

Other causes of this downturn include the expense of owning and operating aircraft (i.e., the cost of insurance, fuel, and maintenance), competition from commuter airlines in the more open aviation market since airline deregulation, changes in disposable discretionary income, increases in airspace restrictions affecting fair-weather flying, reductions in personal leisure time, and shifts in personal preference as to how leisure time is spent. In particular, these factors have severely restricted the single-engine light aircraft segment of the industry. In response to this downturn, the general aviation industry has been focusing more on the business aircraft operator and less on the recreational operator.

However, there are several factors having a positive impact on segments of the general aviation industry. One factor includes the passage of the long-awaited General Aviation Revitalization Act of 1994, providing an eighteen year limit on product liability lawsuits against general aviation aircraft and component manufacturers. As a result of this legislation, there is renewed interest and optimism among U.S. aircraft manufacturers, who are either reentering the single engine aircraft market after several years' absence, or are increasing future production schedules to meet expected renewed demand. The growth in the amateur-built aircraft market and the strength of the used aircraft market indicate that demand for inexpensive personal aircraft is still strong. Increased general aviation instrument operations at FAA towered airports, and general aviation aircraft handled at FAA en route centers point to continued growth of the more sophisticated general aviation users. Additionally, operations at non-towered U.S. airports have increased, supporting the belief held by many that much of general aviation has been forced out of towered airports because of increased commercial air carrier or business jet activity.

Historical and Existing Activity Summary

A tabulation of historical aviation activity since 1995 at the Minden-Tahoe Airport is presented in Table B1, titled *HISTORICAL AVIATION ACTIVITY, 1995-2005*. This table presents five categories of aircraft operations (an operation is defined as either a take-off or a landing), including air taxi, military, general aviation, total operations as reported in the FAA Terminal Area Forecasts (TAF), and total operations as estimated by airport personnel.

Table B1
HISTORICAL AVIATION ACTIVITY, 1995-2005
Minden-Tahoe Airport Master Plan

Year	Air Taxi Operations⁽¹⁾	Military Operations⁽¹⁾	General Aviation Operations⁽¹⁾	Total Aircraft Operations⁽¹⁾	Total Aircraft Operations Estimate by Airport⁽²⁾
1995	2,200	200	69,000	71,400	---
1996	2,500	300	77,000	79,800	75,419
1997	2,500	300	77,000	79,800	75,864
1998	2,500	300	77,000	79,800	76,313
1999	2,500	300	77,000	79,800	76,764
2000	2,500	300	77,000	79,800	77,218
2001	2,500	300	77,000	79,800	77,675
2002	2,500	300	77,000	79,800	78,134
2003	2,500	300	77,000	79,800	78,597
2004	2,500	300	77,000	79,800	79,062
2005	2,500	300	77,000	79,800	79,529

Source: ⁽¹⁾FAA TAF, February 2006
⁽²⁾Minden-Tahoe Airport personnel
 --- no data available

Aircraft Operations

At non-towered airports, the actual number of aircraft operations is very difficult to ascertain with any degree of certainty. Often, the FAA TAF, or past FAA Form 5010 *Airport Master Records*, are the only sources of data. It is important to note that this information is estimated. Often times, the historic numbers are suspect as to their accuracy.

The historical records for the Minden-Tahoe Airport were limited to the TAF and the FAA 5010 Form (very common for non-towered airports). Airport staff and the local FBOs were asked to more specifically estimate their operational counts at the Airport. From this activity examination, it was determined that the currently reported number of TAF operations (approximately 79,800 annual operations) was fairly accurate. Consequently, the 2005 operations estimate by airport personnel of 79,529 annual operations will be used as the baseline for aircraft operations projections.

Air Taxi Operations. Generally, a company or individual performing air passenger and/or cargo transportation service on a non-scheduled basis over unspecified routes is classified as air taxi operations. For purposes of this study, air taxi operations will be included in the general aviation operations category. According to the TAF, air taxi and commuter operations, including charter operations, have remained constant since 1996.

General Aviation Operations. General aviation operations are more typically tied to economic conditions than commercial service operations. In the future, as economic conditions in the area change, fluctuations in the number of general aviation operations at the Minden-Tahoe Airport can be expected.

Military Operations. Military operations at the Airport do occur, but are not common. The TAF has historically reported 200 to 300 annual military operations at the Minden Tahoe Airport.

Local and Itinerant Operations

Aircraft operations are placed into two categories, local and itinerant. Local operations generally reflect training operations. The *Air Traffic Control Handbook* defines a local operation as any operation performed by an aircraft operating in the local traffic pattern, within sight of the tower, known to be departing or arriving from flight in local practice areas, or executing practice instrument approaches at the airport. For the most part, local operations are either touch-and-go operations or flights to and from local practice areas and local glider areas.

Itinerant operations include all other aircraft operations and are often associated with business aircraft activity. The historic data presented in the TAF indicate that local operations currently account for approximately 80% of the total operations. This is higher than what is typically true for most general aviation airports, where local operations may account for roughly 60% of all operations.

Existing Operations By Aircraft Type

The current level of aviation activity by aircraft type is summarized in the following table, titled *EXISTING OPERATIONS BY AIRCRAFT TYPE, 2005*. This summary indicates that of the TAF reported total of 79,800 aircraft operations at the Airport in 2005, approximately 3.13% of the operations were attributed to air taxi operations. Military operations are estimated to account for less than 1% of total operations. The Airport currently does not accommodate any operations by commuter or air carrier aircraft; general aviation activity accounts for over 96% of all aircraft operations.

As can be seen, the Minden-Tahoe Airport currently experiences a large number of single-engine general aviation operations and a large number of glider operations when compared with operations by other types of aircraft. Of the total aircraft operations at the Airport in 2005, it is estimated that single engine aircraft represented approximately 46.32% while glider operations represented approximately 38.60%. Aircraft operations classified as Multi-Engine or Jet accounted for approximately 11% of total operations, while helicopter and military operations represented less than 1% of total operations. Of the 5,267 jet operations, it is estimated that approximately 40 of these operations are conducted annually by aircraft exceeding the weight ordinance restriction of 50,000 pounds.

Table B2
EXISTING OPERATIONS BY AIRCRAFT TYPE, 2005
Minden-Tahoe Airport Master Plan

Aircraft Type	Operations	Traffic Percentage
<i>Air Taxi</i> ⁽¹⁾	2,500	(3.13%)
<i>General Aviation</i> ⁽²⁾	77,000	---
Single Engine Piston and Turboprop	36,960	(46.32%)
Multi-Engine Piston and Turboprop	3,511	(4.40%)
Glider	30,800	(38.60%)
Jet	5,267	(6.60%)
Helicopter	462	(0.58%)
<i>Military</i> ⁽¹⁾	300	(0.37%)
TOTAL	79,800	(100.0%)

Sources:⁽¹⁾ FAA Form 5010 Minden-Tahoe Airport Master Record, 2005.

⁽²⁾ Minden-Tahoe Airport personnel.

Based Aircraft

The number of aircraft based at any airport is dependent upon many factors, such as aircraft maintenance facilities, airport communication practices, services provided at the airport, airport proximity and access, and similar factors. According to a recent airport count, in November of 2006, there were 288 based aircraft at Minden-Tahoe Airport. It is also estimated by the Airport that at least an additional 16 gliders are based at the Airport seasonally during the summer months which would bring the total to 304 aircraft which is more consistent with the numbers from the 2005 FAA TAF (303 aircraft) and the 5010 Form (312 aircraft). Of the 304 based aircraft, 200 are single engine aircraft, 24 are multi-engine aircraft, nine are jet aircraft, eight are helicopters, and 63 are gliders.

The following table titled *SUMMARY OF BASED AIRCRAFT, 1995-2005* shows the historic information available on based aircraft compiled from the FAA TAF and 10 years of 5010 forms collected by airport personnel.

Table B3
SUMMARY OF BASED AIRCRAFT, 1995-2005
Minden-Tahoe Airport Master Plan

Year	TAF Based Aircraft	5010 Based Aircraft
1995	180	223
1996	223	223
1997	223	223
1998	223	223
1999	243	243
2000	243	243
2001	261	261
2002	299	299
2003	300	299
2004	299	299
2005	303	312

Sources: ¹FAA TAF, February 2006
²FAA 5010 Form, Airport Master Record

Aviation Activity Forecasts

Using the historical data and incorporating the previously stated assumptions, aviation forecasts can be developed. Several forecasting elements are pertinent to this planning effort: general aviation operations, local and itinerant operations, operations by aircraft type, based aircraft, based aircraft by type, and peak period operations.

General Aviation Activity Forecast

As discussed earlier, recessions and growth periods in the country's economic cycle have historically affected aviation operations overall. However, with more of the general aviation aircraft fleet being utilized for business purposes than it was in the past, the economy should have somewhat less of an affect upon overall general aviation activity. Because of the economic conditions that prevail in Douglas County and the surrounding area, it is anticipated that both recreational activity and itinerant traffic will increase at the Airport. These factors, combined with the previously mentioned legislative action limiting general aviation aircraft and parts manufacturers liability, should generate a positive impact on general aviation activity.

In developing the general aviation activity forecasts, several aviation forecasts and national trends were reviewed. Included in this assessment, and presented in the following table titled *GENERAL AVIATION OPERATIONS FORECAST SCENARIOS, 2005-2026*, are several general aviation operational forecasts, including the 2006 FAA TAF, the 2004 Nevada Airport System Plan (NASP) Update, a straight-line trend projection (TP) based on historical data, and three additional scenarios developed for this Airport Master Plan.

In **Scenarios One and Two**, itinerant air taxi operations are held constant at 2,500 per year (as reported in the FAA TAF), while itinerant general aviation and local operations are forecast to increase at the corresponding AAGR. According to forecasts contained in the *FAA Aerospace Forecasts Fiscal Years 2006-2017*, general aviation activity is projected to grow at approximately 2% annually. Much of the reason for this aggressive annual growth in general aviation activity forecast by the FAA is the result of strong sector growth for the business use of high-end turboprop and business jet aircraft. This operations forecast reflected in Scenario One, illustrates this annual growth rate of approximately 2%. The Scenario Two forecast uses an annual growth rate of 3.96%, which corresponds to the historical population growth rate for Douglas County since 1986. In many cases where the FAA nationwide general aviation forecasts may not fully be representative of the overall national growth forecast, a local growth factor may be included, if there is a strong correlation between the local indicator used and the sector growth anticipated for the Airport.

Scenario Three assumes the 25 aircraft owners currently on the hangar waiting list with paid deposits are accommodated in 2007 and 2008. This scenario then uses the existing Operations Per Based Aircraft (OPBA) figure of 263 and forecasts operations based on this OPBA. From 2009 to 2026 based aircraft are forecast to increase at an AAGR of 1% (which corresponds to the FAA TAF growth rate for based aircraft at MEV) and the 263 OBPA is held constant throughout the planning period. For comparison purposes, some FAA publications list acceptable OPBA ranges for general aviation airport planning and operations forecasting purposes. FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPLAS)* suggests using 250 OBPA and FAA AC 150/5300-13, *Airport Design* suggests using 679 OPBA for NPIAS public use airports. However, based on the historical growth of aircraft operations at the Airport, it is likely that each of the previously described scenarios do not accurately predict aircraft operations growth for the Minden-Tahoe Airport.

A **trend projection** is a computer model that plots the activity for each of the historical years represented and develops forecasts for future activity representative of past occurrences. Therefore, the highs and lows of past years are very important in the trending forecasts. As such, skewed numbers may be seen in the first years of many trend projections. The importance of this trend projection is in the overall growth that it forecasts for the Airport. This particular trend projection's value rests in the 0.58% annual growth rate it forecasts for each year of the 20 year term of this Airport Master Plan. The trend projection is shown the following table as Scenario Four.

For many reasons, Scenarios One, Two and Three rely heavily upon business sector growth as the stimulus for the general aviation fleet expansion (in the case of Scenario One) and increase in population (in the case of Scenario Two). For this reason, the 0.58% annual growth rate of the previously described trend projection has been selected as the Most Reasonable growth rate for this study. Furthermore, the 0.58% growth rate adopted for this study roughly corresponds to both the *FAA Aerospace Forecasts Fiscal Years 2006-2017* annual growth of single and multi-engine aircraft fleet utilization of 1.00% and the TAF forecast for nationwide general aviation growth of 0.98% annually. It is anticipated that airport growth over the period of this study will primarily correspond to the anticipated annual increases in recreational flying activity at the Minden-Tahoe Airport. This growth assumption is supported by the excellent flying conditions and airport facilities provided at the Minden-Tahoe Airport that support recreational flying for glider and soaring operations.

Table B4

GENERAL AVIATION OPERATIONS FORECAST SCENARIOS, 2005-2026*Minden-Tahoe Airport Master Plan*

Year	Scenario One FAA Aerospace Rate 2.00%	Scenario Two County Population Rate 3.96%	Scenario Three OPBA 1.44%	Scenario Four TP 0.58%⁽¹⁾	NASP 2.77%	FAA TAF 0.00%
2005	79,529	79,529	79,529	79,529	98,400	79,800
2006	82,028	83,556	79,952	80,000	---	79,800
2007	83,619	86,766	83,240	80,437	---	79,800
2008	85,242	90,103	86,659	80,896	---	79,800
2009	86,897	93,572	87,525	81,354	---	79,800
2010	88,585	97,179	88,400	81,812	110,700	79,800
2011	90,307	100,928	89,284	82,270	---	79,800
2012	92,063	104,826	90,177	82,728	---	79,800
2013	93,855	108,878	91,079	83,186	---	79,800
2014	95,682	113,090	91,990	83,644	---	79,800
2015	97,546	117,469	92,910	84,102	124,900	79,800
2016	99,447	122,022	93,839	84,560	---	79,800
2017	101,386	126,755	94,777	85,018	---	79,800
2018	103,364	131,676	95,725	85,476	---	79,800
2019	105,381	136,792	96,682	85,935	---	79,800
2020	107,439	142,110	97,649	86,393	139,400	79,800
2021	109,537	147,639	98,625	86,851	---	79,800
2022	111,678	153,386	99,612	87,309	---	79,800
2023	113,862	159,361	100,608	87,767	---	79,800
2024	116,089	165,572	101,614	88,225	---	79,800
2025	118,361	172,030	102,630	88,683	---	79,800
2026	120,679	178,744	103,656	89,141	---	79,800

Sources: *Barnard Dunkelberg & Company*OPBA – *Operations Per Based Aircraft.*TP – *Trend Projection, based on 1986-2005 historical data from Table B1.*NASP – *Nevada Airport System Plan, September 2004.*TAF – *FAA Terminal Area Forecast, Issued February 2006, downloaded December 13, 2006.*⁽¹⁾*Selected Forecast Scenario.*

Operations Forecast By Aircraft Type

A further assessment of the forecasts involves the individual and collective use of the Minden-Tahoe Airport by various types of aircraft. The types of aircraft expected to use the Airport assists in determining the amount and type of facilities needed to meet the aviation demand.

The following table, titled *SUMMARY OF OPERATIONS FORECAST BY AIRCRAFT TYPE, 2006-2026*, depicts the approximate level of use by aircraft types projected to use the Minden-Tahoe Airport. This summary is based on percentage estimates made by airport personnel and includes actual 2006 counts of large jet aircraft in excess of 50,000 pounds. The Fire Bomber aircraft category also includes large aircraft in excess of 50,000 pounds; however, this category does not include Single Engine Air Tankers (SEATs) which are smaller single engine turboprop aircraft also used for fire fighting purposes. The SEATs are included in the turboprop category.

As can be seen in the following table, the Minden-Tahoe Airport currently experiences a large number of single-engine general aviation operations and glider operations. The existing percentage breakdown of aviation activity by aircraft type is forecast to remain constant throughout the planning period.

Table B5

GENERAL AVIATION OPERATIONS FORECAST BY AIRCRAFT TYPE, 2006-2026

Minden-Tahoe Airport Master Plan

	Percentage of Operations⁽¹⁾	2006	2011	2016	2021	2026
Single Engine Piston	48.00%	38,400	39,490	40,589	41,688	42,788
Multi-Engine Piston	2.00%	1,600	1,645	1,691	1,737	1,783
Turboprop	2.00%	1,600	1,645	1,691	1,737	1,783
Jet over 50k	0.05%	40	41	42	43	45
Jet under 50k	6.75%	5,400	5,553	5,708	5,862	6,017
Glider	40.00%	32,000	32,908	33,824	34,740	35,656
Helicopter	0.60%	480	494	507	521	535
Military	0.38%	304	313	321	330	339
Fire Bomber	0.22%	176	181	186	191	196
Totals	100%	80,000	82,270	84,560	86,851	89,141

Sources: Barnard Dunkelberg & Company.

⁽¹⁾Airport Personnel.

Local and Itinerant Operations Forecast

Forecasts of operations have also been categorized into local and itinerant operations. As stated above, the *Air Traffic Control Handbook* defines a local operation as any operation performed by an aircraft operating in the local traffic pattern, within sight of the tower, known to be departing or arriving from flight in local practice areas, or executing practice instrument approaches at the airport. The number of local operations will likely continue to be the dominant aircraft activity at the Minden-Tahoe Airport. Local operations currently account for 80% of all airport operations and this rate is projected remain constant throughout the planning period. Based on this consideration, forecasts of local and itinerant operations are shown on the following table, titled *SUMMARY OF LOCAL AND ITINERANT OPERATIONS, 2005-2026*.

Table B6
SUMMARY OF LOCAL AND ITINERANT OPERATIONS, 2005-2026
Minden-Tahoe Airport Master Plan

Year	Local	Itinerant	Total
2005 ⁽¹⁾	63,623	15,906	79,529
2001	66,296	16,574	82,870
2016	67,648	16,912	84,560
2021	69,481	17,370	86,851
2026	71,313	17,828	89,141

Source: *Barnard Dunkelberg & Company.*
⁽¹⁾ *Actual.*

Peak Period Forecast

An additional element used to assess airport use and determine various capacity and demand considerations is the peak period activities. Airport personnel estimate approximately 300 operations on an average day during the peak month. In lieu of air traffic records or other reliable sources of information, FAA statistics and assumptions from airports with similar activity and operational characteristics have been applied to the Minden-Tahoe Airport. These include: a 31-day peak month and the peak hour operations that occur on the average day of the peak month occur approximately 10% of the time.

Table B7

PEAK PERIOD AIRCRAFT OPERATIONS, 2005-2026*Minden-Tahoe Airport Master Plan*

Year	Annual	Peak Month	Average Day of Peak Month	Peak Hour/ Average Day Ratio	Peak Hour
2005 ⁽¹⁾	79,529	9,300	300	10.0%	30
2011	82,270	9,617	311	10.0%	31
2016	84,560	9,885	319	10.0%	32
2021	86,851	10,153	328	10.0%	33
2026	89,141	10,420	337	10.0%	34

Source: *Barnard Dunkelberg & Company from methodology contained in FAA AC 150/5070-6A Airport Master Plans and FAA AC 150/5060-5 Airport Capacity and Delay.*

⁽¹⁾ *Actual.*

Based Aircraft Forecast

The number and type of aircraft anticipated to be based at an airport is a vital component in developing the plan for the airport. The number of aircraft that can be expected to base at any airport is dependent upon many factors, such as aircraft maintenance facilities, airport communication practices, services provided at the airport, airport proximity and access, and similar factors. The FAA TAF forecasts based aircraft to increase at the Minden-Tahoe Airport at an AAGR of approximately 1%. The TAF based aircraft forecast is shown in the following table along with the based aircraft forecast for the Airport included in the NASP Update. The third scenario shown in the table assumes the hangar wait list is accommodated in 2007 and 2008 and then forecasts based aircraft to increase at the TAF rate of 1%. For facility planning purposes, the TAF based aircraft forecast (Scenario One) has been selected as the most reasonable scenario.

Table B8
BASED AIRCRAFT FORECAST SCENARIOS, 2005-2026
Minden-Tahoe Airport Master Plan

	Scenario One TAF	Scenario Two NASP	Scenario Three ⁽¹⁾
2005	303	261	304
2006	304	---	304
2007	308	---	317
2008	311	---	330
2009	315	---	333
2010	318	336	336
2011	321	---	339
2012	324	---	343
2013	329	---	346
2014	332	---	350
2015	335	326	353
2016	339	---	357
2017	344	---	360
2018	347	---	364
2019	351	---	368
2020	355	352	371
2021	359	---	375
2022	362	---	379
2023	367	---	383
2024	372	---	386
2025	376	---	390
2026	378	---	394

Sources:⁽¹⁾ *Barnard Dunkelberg & Company.*
TAF – FAA Terminal Area Forecast, Issued February 2006, downloaded December 13, 2006.
NASP – Nevada Airport System Plan, September 2004.

The mix of based aircraft for incremental periods is shown in the following table, titled *BASED AIRCRAFT FORECAST BY TYPE, 2006-2026*. The percentage of based aircraft by type is forecast to remain constant throughout the planning period. In other words, the projected increase in based aircraft is forecast to be spread evenly among the listed aircraft types.

Table B9
BASED AIRCRAFT FORECAST BY TYPE, 2006-2026
Minden-Tahoe Airport Master Plan

Aircraft Type	2006⁽¹⁾		2011		2016		2021		2025	
Single Engine Piston and TP	200	(65.8%)	211	(65.8%)	223	(65.8%)	236	(65.8%)	249	(65.8%)
Multi-Engine Piston and TP	24	(7.9%)	25	(7.9%)	27	(7.9%)	28	(7.9%)	30	(7.9%)
Jet	9	(3.0%)	10	(3.0%)	10	(3.0%)	11	(3.0%)	11	(3.0%)
Glider	63	(20.7%)	67	(20.7%)	70	(20.7%)	74	(20.7%)	78	(20.7%)
Helicopter	8	(2.6%)	8	(2.6%)	9	(2.6%)	10	(2.6%)	10	(2.6%)
Total Fixed Wing (Excluding Gliders)	241		254		269		285		300	
TOTAL	304		321		339		359		378	

Source: *Barnard Dunkelberg & Company.*
⁽¹⁾ *Minden-Tahoe Airport personnel.*

Summary

A summary of the aviation forecasts prepared for this study are presented in the following table, titled *SUMMARY OF AVIATION ACTIVITY FORECASTS, 2006-2026*. This information will be used in the following chapters to analyze the capacity of the Airport, develop facility requirements, and to determine future noise impacts and exposure. In other words, the aviation activity forecasts are the foundation from which future plans will be developed and implementation decisions will be made.

Table B10

SUMMARY OF AVIATION ACTIVITY FORECASTS, 2006-2026*Minden-Tahoe Airport Master Plan*

Operations	2006	2011	2016	2021	2026
<i>General Aviation</i>	<i>79,696</i>	<i>81,957</i>	<i>84,239</i>	<i>86,521</i>	<i>88,802</i>
Single Engine Piston	38,400	39,490	40,589	41,688	42,788
Multi-Engine Piston	1,600	1,645	1,691	1,737	1,783
Turboprop	1,600	1,645	1,691	1,737	1,783
Jet over 50K	40	41	42	43	45
Jet under 50K	5,400	5,553	5,708	5,862	6,017
Glider	32,000	32,908	33,824	34,740	35,656
Helicopter	480	494	507	521	535
Fire Bomber	176	181	186	191	196
<i>Military</i>	<i>304</i>	<i>313</i>	<i>321</i>	<i>330</i>	<i>339</i>
TOTAL OPERATIONS	80,000	82,270	84,560	86,854	89,141
Local Operations	64,000	65,816	67,648	69,481	71,313
Itinerant Operations	16,000	16,454	16,912	17,370	17,828
Based Aircraft By Type					
Single Engine Piston/TP	200	211	223	236	249
Multi-Engine Piston/TP	24	25	27	28	30
Jet	9	10	10	11	11
Glider	63	67	70	74	78
Helicopter	8	8	9	10	10
TOTAL	304	321	339	359	378

Source: *Barnard Dunkelberg & Company.*